KNOWING IN PRACTICE. THE CASE OF TELEMEDICINE

Davide Nicolini

Warwick Business School
University of Warwick
Coventry, CV4 7AL
UK

Tel: +44 247652 4282

Email: Davide.nicolini@wbs.ac.uk

Abstract

The paper adopts a practice-based perspective and addresses organizational knowing as a form of social and material expertise, which is, as knowledge in action, situated in a historical, social, and cultural context, and embodied in a variety of forms and materials.
The paper argued in particular that although practice provides for those who pursue this approach an epistemic object and an empirical anchor, it is feasible to maintain an analytical (although not ontological) distinction between practicing and knowing. This is possible if we consider practice as the site of knowing and focus on how knowing is sustained and manifested in practice and through practice. While emphasizing that when we examine a practicing we inherently examine a knowing, the notion of site helps us in keeping a distinction between the two. In doing so, it directs our attention to the specific junctures of the practicing when knowing manifests itself, as well as to the associations that link different knowings together and the resulting power effects.
Building on the result of a longitudinal research project conducted in a telemedicine centre in northern Italy, the paper will illustrate this particular approach by investigating the reconfiguration of knowing brought to bear by the introduction of telemedicine and remote medical care practices.

1 ON THE RELATONSHIP BETWEEN KNOWING AND PRACTICE

The idea that knowing is 'something we do' is a common trait of all anti-foundationalist knowledge theories. With this term I refer to the different traditions that in the last two centuries have disputed the traditional epistemic model (and ideology) of the mirror of nature (Rorty, 1981). Authors such as Heidegger, Wittgenstein, James, Vygotsky, Garfinkel, Taylor have all shown, moreover, that conceiving knowledge performatively implies granting an ontological primacy to practical activities. For all these authors, in fact, practice constitutes the unsung texture against which epistemic objects emerge, theories become intelligible, and the very existence of a relationship between knower and known becomes possible. Anti foundationalist projects are thus inherently practice-oriented and often explicitly practice-based efforts (Dreyfus, 2005).

Lately this practice-based approach has gained increasing acceptance in organisation and business studies, and a growing number of authors have started to explore the implications stemming from the idea that knowledge and learning must be viewed as forms of social and material expertise, that is, knowledgeability in action situated in the historical, social, and cultural context in which it arises and embodied in a variety of mediators and materials (Nicolini et al., 2003). For these authors, practice has become both a figure of discourse that allows them to re-connect knowing with doing and an epistemic object, that is, a still to-be-defined object of inquiry that is fuelling the current interest surrounding the topic.

With the growth of interest in the practice-based approach to knowing and learning, three main different ways of conceptualizing the relationship between practice and knowledge have emerged in the literature.

One line of research has posited a relationship of containment between knowledge and practice. According to this view, knowledge is not a property of the individual and it resides instead in communities of practice (Wenger, 1998), networks of practice (Brown and Duguid, 2002), or knowledge communities (Lindkvist, 2005); that is, it is located within the social gatherings sustained by specific practices.

A second line of inquiry explored the relationship between knowledge and practice in terms of mutual constitution. Their attention has been focused on the interaction and co-emergence of practice and knowledge and on the ways in which ongoing knowledge is constituted and reconstituted as actors engage with the organisational world in practice (Orlikowski, 2002).

Finally, a last group of scholars take a more radical stance, and argue that the relationship between knowledge and practice is better understood as a specific form of equivalence (Lynch, 2001; Engeström, 2000; Gherardi and Nicolini, 2002). From this perspective, one needs to eschew the idea that knowledge describes an entity or a substance that pre-exists its utilization and that is "used" in action. Knowing is inherently tied to the pursuit of an activity and to the heterogeneous elements and processes that are involved in it. Put another way, knowing is tied to the social processes through which it is assimilated by newcomers, the mediatory artefacts and resources used, the way in which the practice is accounted for, and the process by which the practice is legitimate vis-à-vis other practices and prevailing discourses. It is in this sense that we can affirm that knowing inherently transpires in and through socio-material practices: knowing and practicing are ontologically equivalent, in that we cannot distinguish them in our daily commerce with the world. To study knowing in practice means, from this perspective, investigating the local and trans-local conditions which sustain the accomplishment of the practicing.

Upholding the notion of an ontological equivalence between practicing and knowing (which is like saying that they cannot be treated at two separate "things" but only as different aspects, or dimensions, or facets of the same phenomenon), does not, however, prevent us from establishing an analytical difference between the two[1]. My argument is that by collapsing practicing and knowing, and by establishing a complete relationship of

[1] This is for example the path followed by some extreme relationalist scholars such as ethnomethodologists and Actor-Network theorists. Both movements assume a complete relationship of synonymity between knowing and practicing and consequently refuse, or better abstain, from to considering knowledge as a separate topic of investigation. It is not that they do not address or deal with the ontological issue of knowing: ethnomethodology is after all about explaining how knowledgeable actors recurrently assemble ordered scenes of action. However, these scholars refrain from thematising knowledge as a separate topic of investigation; you will look in vain for a reference to knowledge in the most recent and comprehensive introduction to Actor-Network Theory (Latour, 2005), even though there are 15 entries under the heading 'object'..

synonymity between the two, we end up with a flatter view of organisational phenomena, one in which we loose one way of understanding the organising process, and, as in the above, one in which we privy ourselves of a fruitful springboard for intervention. The challenge is therefore that of sustaining an analytical distinction between knowing and practicing while at the same time avoiding turning this analytical distinction into an ontological one. This can be achieved if we conceptualise practice as the site of knowing.

2 PRACTICE AS THE SITE OF KNOWING

In order to generate an analytical but not an ontological distinction between knowing and practicing we need to turn towards what Schatzki (2002, 2005) has recently defined site ontologies. Site ontologies derive mainly from the work of Heidegger and Wittgenstein (although Cultural Historical Activity Theory could easily be counted in) and develop in one way or other the Heideggerian concept of *Lichtung* (clearing, as in "the clearing in a forest").

According to Heidegger (1929), before we can discern a subject and an object, we need a context in which entities can show up and make sense, that is to say, we need certain conditions so that anything can appear or come to light at all. This context is provided by social practices: before we can discern a 'player' and a 'football', we need the game of football and we need to have experienced in some way what constitutes a game. The practices into which we are socialized provide a background understanding of what counts as objects, what counts as subjects and, in the event, what counts as real. It is only on the basis of this understanding of "what it means to be" (which is embodied in the ways of doing, the tools, and the institutions of a society) that we can direct our minds towards things and people (Dreyfus, 1991). It follows that "the clearing is neither on the side of the subject nor the object -- it is not a belief system or a set of facts -- rather it contains both and makes their relation possible" (Dreyfus, 1995, p. 12).

We can compare the clearing performed by the practices to the illumination in a room which makes directedness towards objects possible but is not itself an object towards which

the eye can be directed[2]. In this sense, we can scrutinise the knowing and its phenomenology as a distinct moment of the practicing without assuming them as separate. Knowing not only makes itself present in practice, it also transpires through it. As a site, practice is thus a specific type of context in which the contextualised knowing and its contextual conditions constitute each other while remaining, however, analytically different. The notion of site allows us to treat them as ontologically equivalent and analytically separate.

The identification of practice as the site of knowing has three relevant consequences for the study of knowing in practice.

First, there is the intuition that the knower-known complex is primordial and that it is rooted in practice. Against the notion that we make sense of the world by way of a system of beliefs or other types of cognitive paraphernalia, the idea of practice as the site of knowing view states that knowing comes down to "only skills and practices" (Dreyfuss, 1991, p. 22). When we observe a practicing we observe a knowing, without the necessity of assuming the existence of a knowing "subject" and examining what makes it possible to have any knowledge or experience of a world. Here I am extending to knowing what Schatzki says of practice: "Recording a student's grade, for example, intrinsically occurs as part of educational grading practices. Along with acts of pondering grades and calculating them, acts of recording grades are moments of these practices…A particular episode of grading is tied to particular grading practices, just as the character of the grading practices is tied to this and the other grading episodes that compose it. In scrutinizing the episode, accordingly, one scrutinizes the practice, and vice versa. A site is inseparable from that of which it is the site" (Schatzki, 2005, p. 468). Practice is therefore the site of knowing and by scrutinising an episode one scrutinizes both the practice and the knowing that goes into its accomplishment.

This intuition is at the basis of all contemporary practice theories which, in different ways, suggest that for understanding knowing in practice we need to follow Wittgenstein 's advice and take seriously Goethe's dictum 'Im Anfang war die Tat' [in the beginning was

[2] The example, which was originally put forward by Merleau-Ponty, is discussed in Dreyfus (1995).

the deed] (Wittgenstein, 1980, p.31). This dictum nicely summarises the common thread weaving the work of authors such as Wittgenstein, Garfinkel, Dewey, Cultural and Historical Activity Theorists, Sociologists of Translation, and other non functional and practice-sensitive social theorists. It also invites us to start our inquiry in 'medias res' (from the middle), in such a way that real time practicing constitutes both the starting point and the end of any [good] piece of organisational research. As Latour (2005) aptly puts it, the main task of social scientists is not explaining practicing with something else, so much as observing and reporting the methodical ways in which practically achieved associations between humans and non humans are forged and our dis/orderly world performed.

Second, the idea of site and its roots in the idea of the *Lichtung* suggests that practices (and knowing in practice) are 'prior' to representation: the totality of one's practices or coping strategies is a background totality that in some way escapes representation. Because the knowing is in the doing and what goes into it, practice cannot be encompassed by a theory. It follows that theorising knowing in practice is always going to be an indirect, provisional, and partial endeavour. Studying knowing will necessarily take the form of studying some of its manifestations, and focusing on some specific junctions or moments of the practicing.

Third, the idea of site suggests that when we scrutinise an episode of knowing in practice we highlight a locus which is part of a broader field or texture of connectedness. The existence of an opening implies a multiplicity of paths that leads to it and irradiates from it. In other words, all instances of practicing are immersed in a texture of relationships which extend in time and space.

In order to clarify the idea that what happen in a specific instance of practicing is part of a broader contexture, we can summon the help of a number of metaphors. First, we can think of an iceberg, a metaphor which captures the idea that what the practicing implies a variety of resources and knowings that enter into its accomplishment although they are necessarily deferred by our act of observation (just like the tip of an iceberg implies a large mass of ice under the water); second, we can summon the metaphor of the rhizome, which suggests that practicing depends on, and performs an irregular pattern of material and social relationships of mutual imbrication that irradiates from it; third, there is the metaphor of the "moment of

truth", which suggests that all practicing is in fact an event of which its destiny is dependent on the effectiveness of prior work and which opens up new opportunities for future events, while closing others. Lastly, and very importantly, we can summon the metaphor of the field of forces and of the entrenchment of practices. The image of the field of forces conjures the image of a landscape in which the local and situated practicing is the result of the coming together and the collision of a variety of forces, expectations, and interests which make the practicing feasible (or not feasible), without, however, causally determining it. Power, in this sense, is an effect of practice, not one of its ingredients. The idea of entrenchment, as in the example above, suggests that practices exist in a regime of mutual dependency and that their stability depends on how well they are built, maintained, and defended vis a vis other, alternative ways of doing and saying.

Taken together, these metaphors conjure the idea that knowing in practice is the moving target of a vast array of other knowings and identities that swarm toward it[3]. Understanding knowing in practice requires thus by definition understanding how the relationships between different and/or distant knowings are brought to bear and sustained in a specific and situated practicing. Because knowing unendingly circulates and, like electric power, it can only be detected through the effects it produces in the world, the task will be that of illuminating how the pattern of connectedness comes about, how associations between knowings are forged and kept in place, and what power effects emerge from this.

In sum, the notion of practice as the site of knowing, and the related insight that knowing manifests itself in and through the practicing suggest that for re-presenting knowing in practice we need to turn our attention to the real time accomplishment of a practice and the texture of relationships between practicings which, in effect, can be said to be the final 'house' of knowing.

In the following paragraphs I will utilise these sensitising concepts for exploring the knowing in practice implicated in the practicing of a new way of conducting medical work, that is the emerging practice of telemedicine. The case study will thus constitute both an

[3] The formulation is taken from Latour, 2005, p. 47.

exemplification of the idea of practice as the site of knowing and the test bench for it effectiveness.

3 BACKGROUND

3.1 Research methods and settings

The data are derived from a four year longitudinal research conducted by the author in northern Italy. The research included several periods of participant observation in two specialised medical centres during which I observed the practice in the context of the daily ward's routine. During the participant observation I conducted a number of ethnographical and semi-structured interviews with doctors, nurses, managers, and health officials. I attended a number of meetings, promotional workshops, and training sessions. Finally, I examined a variety of technical and policy documents, reports, and scientific materials.

In the research I also used a type of qualitative interview called "the instruction to the double" (Oddone et al., 1977; Gherardi, 1995). This is a projective technique which requires interviewees to imagine that they have a double which will have to show up at their job the next day. The informant is then asked to provide the necessary detailed instructions which will insure that the plot is not unveiled and the double is not unmasked. The interview mimics the position of a novice entering a new workplace (in this case, the novices are the researcher and the readers) and it is usually triggered by a short example which helps the interviewee to focus on conduct and interaction. The researcher usually remains silent during the process, so that organizational members can freely use the local language, codes and expressions. Twelve of these interviews were conducted during the project[4]. They were all tape, transcribed and carefully analysed.

The research was part of a larger project on the social and organisational implications of telemedicine. The larger research programme is described in detail[5] in Gherardi and Strati (2004) and Nicolini (2006).

[4] Part of the interviews were conducted by Francesco Botto, PhD, whose contribution is gracefully acknowledged.
[5] Readers are referred to these sources for further details on the research project.

3.2 Tele-monitoring chronic heart failure patients

Serious chronic heart failure (CHF) is a highly debilitating chronic condition affecting a growing number of patients, most of them aged 60 and over. In very simple terms, heart failure means that the heart doesn't work properly. People cannot carry out their daily activities, feel out of breath and get deep chest and other pains doing even the most light action such as combing their hair. Acute crises are not uncommon, especially in more seriously ill patients. When such crises occur, patients need to be rushed to the hospital, put under intensive care, and "stabilized" with an appropriate cocktail of medicines. Until a few years ago this condition was typically treated through a recurrent pattern of hospitalization, intensive therapy, discharge, deterioration of condition and subsequent new hospitalization. When evidence started to point at the necessity of preventing the events of instabilisation by intensifying the "continuity of care", some cardiology departments started to set up "day hospitals", that is, a half way solution between being at the hospital and being at home. "Day hospitals", however, still required these very sick patients to travel significant distances. They are also very expensive to run. In this context, health practitioners in different parts of the world started to consider the possibility of using information and communication technologies, i.e., telemedicine, for addressing the issue in a novel way. In Italy, this idea took root first in Lombardy. One site was particularly instrumental in the early translation of these ideas in (northern) Italy: the cardiology centre of G.

3.3 The hospital of G.

The centre of G., where the telemonitoring activity to be discussed takes place, is one of nine medical centres owned and operated by a large Italian non-profit ("Charitable") medical foundation. The centre of G. is one of four establishments operated by the Foundation in the northern region of Lombardy. It is a relatively small, highly specialised hospital with three wards and about 60 beds. Each ward has an annex outpatient clinic. The telemedicine service depends functionally on the Cardiology department, the largest at G. The department occupies about 40 health care professionals who look after 35 beds. The department is nationally renowned for its work on Chronic Heart Failure and other

chronic cardiopathies. For this reason, it attracts patients not only from the town of G. and immediate surroundings, but also from other parts of Lombardy, (the centre of G. has an established partnership with two of the best know cardiac surgeries in the country), and other regions of Italy, some quite far away.

4 KNOWING AS ACCOMPLISHING

In G. hospital, the practice of telemonitoring remote patients is well organized. It unfolds as a sequence of regular telephone contacts and check-ups from a well established point in time. The activities are also easily identified. To benefit from the service a patient must be 'enrolled'. Most of the following exchange is through telephone contacts by telemedicine service staff (telemonitoring) or by the patients themselves (tele-assistance). All activities are carefully recorded on a personal medical file. The assistance is carried out by nurses who monitor patient status, make dietary and lifestyle recommendations, correct and adjust the therapeutic regime and provide other information and instructions to patients and their families. Nurses also coordinate their activities both with hospital cardiologists who send most of the patients (with the telemedicine service acting as an extension of hospital services), and with family doctors, who assist the patients staying at home. In most cases, however, the nurses are free to manage the assistance as they see fit.

4.1 Every nurse knows that[6]…

Every nurse at G. knows that you report to work at 8am precisely, go to the cardiology ward and put on your uniform. You wear a white coat and clogs. In your coat pocket you put a ruler to measure the width of the ECG curves, a pen, a pencil, a highlighter, a small notebook or an agenda (or check that they are there). A coat pocket full of instruments and rulers is the hallmark of cardiology practitioners. You move on to the telemedicine room, but first you stop by the nurses' room. You check to see if there are any messages for you (some of your patients may have called during the night) or any other news. You collect the list of patients to be discharged over the next few days who have been placed on the

[6] This section is based on the results of the interviews to the double briefly described above.

telemedicine list. You chat briefly with the other ward colleagues, ask who the doctors on duty are, who is doing what that day (exercise tests, echocardiographs) and who did the night shift. In this way you find out who to ask in case of need and which doctors to avoid because they are in a bad mood…

The first thing to do is reply to urgent requests. If the patients have called during the night you must call them immediately. For routine contacts it is pointless to call too soon because many of the patients still have to get up from bed, or measure their blood pressure, weight, etc. Many others will be out shopping or at their doctor's. Since it is summer, you will be aware that the patients prefer to go out when it is cooler…

Only when you have no other commitments you can start to make your phone calls. You leave the longer calls, those which constitute full check-ups, for the late morning or for the afternoon. You make the quickest calls first: calls where you ask how things are going, calls to collect data which had not been sent the day or days before, or to ask when the next check-up will be. You will remember that one of the fundamental aspects of your work is "showing that you are there". So it is better to make one call more than one less. And if the patient is not in, you put it down in your agenda and when you do get into contact with them you tell them that you have already called. So you must always use the agenda, also because it can be used to back you up if someone complains that you did not call...

4.2 Practical concerns

The nurse's work at G. includes a variety of activities which are all part of the practice of telemonitoring. These activities unfold depending on the daily circumstances but are mostly organised around a few practical concerns that are part and parcel of telemonitoring and that make it notably different from other practices carried out in the hospital. These practical concerns include keeping the patient compensated, setting the scene so that patients can be controlled at a distance, and maintaining intact a sustainable regime of accountability.

A major practical concern for the tele-nurses is keeping the patients compensated, that is, preventing the emergence of crises by identifying early signs of decompensation and by

intervening at a distance by manipulating the dosage of medicines of dietary regimes. In the words of one of the nurses “it is sort like making the patients walk on a tightrope looking from the ground. We tell them when something doesn’t look right and adjust things before they get out of control”. This, in turn requires producing a trajectory of the patient’s state in time and controlling the patients at a distance.

The possibility of identifying early signals of instabilisation requires in fact the production of regular snapshots of the patient’s state. Unlike in the ward, where the course of the illness is constructed collectively through the socio-material practice of “handing over cases”, here the nurse is alone and has to deal with a remote patient. For producing a view of the patient state over time, she has thus to rely on the mobilisation and alignment of a variety of signs and texts, on the basis of the logic that it is cheaper to move representations of the patient than to move the patient herself. This, in turn, puts the activity of making calls to the patients at the core of the practice of telemedicine at G. While making calls is only one of the things nurses do during their daily shifts, the activity of making calls is central in that it sustains all others.

4.3 Making a call

Imagine the following. The nurse is sitting at her desk. In front of her, she has placed her agenda and two large ring binders with clear plastic envelopes. She looks at the agenda and tells me that she is about to call one female patient. She opens one of the two binders, looks through the

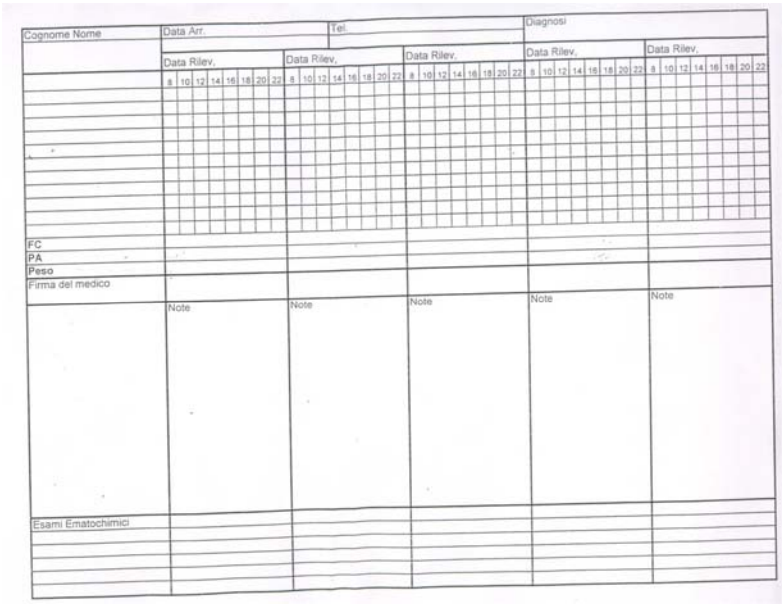

Figure 1: Therapy sheet used in the telemonitoring service

envelopes in alphabetical order and retrieves the one belonging to the patient she wants to call. She turns and takes two fax sheets from a pile on her desk: an ECG trace received earlier and a fax with the results of the laboratory tests the patient has undergone. She takes her ruler from her coat pocket, measures the pulsating curve of the electrocardiogram and shakes her head. She put the sheet back on the table. She takes a look at the plastic envelope containing a variety of sheets and pulls out a big A3 sized sheet that he/she places on the table under the computer. The big "therapy" sheet (see Fig. 1) contains a number of columns as well as a heading, and some of them are already filled. The date of the call is indicated at the top of each column on the sheet. In the first column (with a heading) each line carries the name of a drug. Lower down there are three lines for heart function, pressure and weight. At the bottom of the sheet there is a line for the doctor's signature and a large notepad. The different columns next to each call indicate the dosage of each drug, weight and pressure data, with occasional notes in their respective fields.

The nurse has in front of her an agenda, the two tests, the binder and the large open sheet. On the computer screen one can see a form with the new medical file into which data was being inserted not long before. However, the nurse appears to ignore it. She will tell me later that she prefers to work with pen and paper because the computer file is "clumsy". The nurse looks at the binder, reads the phone number, and then calls the patient:

Nurse: « Hello, how is it going?	The nurse takes a look at the sheet with the tests in front of her which she had already looked at before.
Patient: «Ok…»	
Nurse: «The trace has arrived…I read it…how are you feeling? »	While making this comment, the nurse pulls up the therapy sheet and takes a look at the data (the sheet also contains data from previous calls).
Patient: «Last night I collapsed…my nerves…I didn't have much to eat…I fell out of bed but I didn't faint…then I vomited…my pressure dropped…	
Nurse «Trouble with your digestion? Did you catch cold? »	The nurse keeps looking at the sheet. She notes down the new piece of information while commenting on it.
Patient: «…I didn't eat at all…»	
Nurse «Tell me something more about you…»	
Patient: «…I was worried because I was feeling too good…Saturday I overdid it because I went on a long trip but	

it wasn't pleasant …I didn't have dinner…»	
Nurse «…was the apple on your stomach? » *Patient: «I don't even eat apples…»* Nurse «Well, we'll have to discuss this next time you come for a check-up…but we talked about these problems when you came in the past… didn't we ??…How are your readings today? » *Patient: «84 and 95 over 130»*	The nurse keeps on looking at the sheet at the therapy sheet and writing down the information. Then she writes something in the notepad at the bottom of the sheet. The nurse takes note of the figures in the upper part of the sheet.
Nurse «Very good !…now let's check the therapy»	While making this comment the nurse moves the sheet with the tests and pulls up the therapy sheet. She puts her pencil on the box next to the name of the first drug.
Patient: «Same as ever…» Nurse «…let's have a look at it » *Patient: «Capotem… yes, I am still taking it as usual but… I stopped taking the Liponorm a couple of days ago…»* (…)(silence)	The nurse lifts the pencil up from the page…she steers in silence at the therapy sheet, slightly shaking her head …She the scribbles again on the bottom part of the sheet (the note section).
Nurse : «hmm…we'll have to check the tests…maybe we can change it»	
Patient: «I am trying an experiment…the doctors have taken too long to understand…the high triglyceride levels are caused by the medicines I was taking…»	While the patient says this the nurse scribbles something on a post it an puts it on the front of the plastic folder.
Nurse «But going without for a week is too long…look, do all the tests indicated in the form, so we can check how your cholesterol is without medication…but be sure to call if you are not feeling well…» *Patient: «Yes ...of course»*	The nurse records this on the sheet. She pulls up the binder, takes a look at the date of the next check-up and pulls up the agenda.
Nurse «Well, see what you can do… I'll call you next week…good by» *Patient: «Good Bye».*	She turns the pages of the agenda and writes down the patient's name. Then she starts to collect the various sheets and put them back into the envelope.

4.4 Other practical concerns

Making a call is clearly a critical moment of the practice of telemonitoring. However, the success of the call is dependent on other critical practices. One for example is that of enrolling patients in practice of telemonitoring.

The enrolment takes place inside the hospital in the telemedicine department or, less frequently, in the hospital ward at the patient's bed. The process generally only takes about 20 minutes. It should pointed that the people involved are frail and ailing. The nurses concentrate on the few aspects of fundamental importance of which they have learned that go towards the success of the service: carefully explaining how the service operates, helping the patients get used to the portable cardiograph (not just using it but also how to send the trace), setting the date for the first contact, enrolling the patient in the register of callers and opening a medical file. This represents an important opportunity for the nurses to establish personal contact with the patients, because after this they will only be speaking to them over the phone.

During enrolment the nurse explains to patients and their families that monitoring is not only based upon the centre's receiving an ECG trace, but also requires the patient to send via fax the results of urine tests, and less frequently, blood tests. The patients must ensure that their GP prescribe these tests. When calling the nurse the patients must learn to provide all the required data: weight, pressure, diuresis and overall health conditions. This means that they will have to measure these parameters either at home (many will have precision scales and a pressure reader) or outside (for example in a pharmacy). These data must also be sent to the nurses by fax on the day of the planned phone call or the day before.

Practicing with the portable ECG is a key aspect of enrolment. Telemonitoring involves the patient directly gathering and sending ECG data. To help patients follow these practical procedures correctly within the telemonitoring routine, nurses must simulate the whole procedure personally with the patients during the enrolment process. The nurses observe this phase attentively because other aspects can be modified 'remotely' after the patient is discharged, unlike not this one: the patients' ability to use the device properly must be

consolidated before their departure. Often the nurses will return to the ward to simulate a recording with the patients before their discharge.

The enrolment does not respond only to the practical concerns of making the calls. It is also important in view of another critical practical concern that orients the work of the nurses, that is, controlling patients at a distance.

As it emerges in the telephone call, keeping patients compensated requires not only producing a diachronic image of the state of the patients, but also making them do or not do certain things (taking pills, following a certain dietary regime, etc.) This, in turn, requires putting in place the conditions for controlling patients' conduct at a distance. To obtain these effects, the practice of telemonitoring cannot rely on the physical presence of the hospital ward and the coercion it guarantees. There is no nurse in the patient's home who will stand threateningly in front of the patient's bed and see that the patient assumes the prescribed drug or eats only certain foods. The only resource, therefore, is enlisting disciplined bodies and minds (Law, 1987). Through the enrolment and other socialisation activities, the patients come to participate in a discourse which on the one hand makes patients and their families it responsible for competently managing themselves. At the same time, it makes it rational (and OK for them) to endure a strict regime of controls, taking medicines that make them vomit, dizzy, or that reduce sexual functions. It also connotes the relationship between medical staff and patients in explicitly collaborative terms. For example, the nurses' injunctions and prescriptive acts are construed as a way of reinforcing a partnership against the disease, rather than a disciplinary and coercitive action (see the call above). Finally, this discourse marks any form of non-compliance in a moral sense, generating a sense of guilt (see the call above) or attributing significance to possible reproach by health practitioners.

4.5 Where the knowing is

In the opening section I have argued that the idea of practice as a site implies that in scrutinising a practicing we are scrutinising a knowing. Describing knowing means,

therefore, re-presenting the ordered accomplishment of scenes of action and what goes into it. In the previous sections I have provided a short illustration of the practice of telemonitoring. So what sort of knowing transpires through the performing of the telemonitoring practice in the description provided above? In other terms: where is the knowing?

4.5.1 The knowing is in what is said and done

In the first place, both the above fragments suggest that the knowing is firstly in what is said and what is done, in the words uttered and in how they are uttered, e.g., in the careful joint turn taking, in the choice of expressions, in the material choreography (of which we see only one aspect) which takes place during the call. Both the call, which I cannot analyse here for lack of space, and the (fictitious) perspective provided by the interview to the double convey the idea that being involved in the practice of telemonitoring implies first and foremost the activation of what authors have called habit (Merleau-Ponty, 1962) and habitus (Bourdieu, 1980). This knowing is therefore "knowledge in the hand, which is forthcoming only when bodily effort is made, and cannot be formulated in detachment of that effort" (Merleau-Ponty, 1962, p. 144). Although this knowing can be learned by participants in the practice through hints, tips, and examples, when extracted from the context of the practicing, it can be only alluded to building on the existing practical experience of readers and listeners. We appreciate what it means to be the nurse and patients only to the extent that we tap into our own previous personal experience.

For the present discussion, it is important to note that the notions of habits and habitus do not point to some kind of object, a 'something' that is located either in heads or in the limbs, as much as a knowing that is expressed *in* the bodily conduct and through it. Consider for example the practice of filling the front pocket with the tools of the trades, or using of a specific jargon. This type of cultural knowing, although exhibited by the nurse, can hardly be considered personal. In other words, it cannot be reduced to something which is possessed by individual actors. The knowing provided by the habitus traverses the bodies but does not reside in them. The habitus of filling objects in the pocket, just as that of performing the doings and sayings that go into the telephone call, bring to fruition the

objective reality that generated it; it reflects the structure constitutive of that particular type of social environment and the material condition of existence characteristic of the occupational group. While producing practices, habitus reproduces the regularities immanent in the objective conditions of the production of its generative principle. The site of the knowing expressed by the habitus is in the ongoing practice, not its individual carriers.

One can add, without too much elaboration, that what applies to material doings is equally valid for discursive activities. As the example of the telephone call makes abundantly clear, "doing telemonitoring" is something that has both a material and a discursive dimension – the saying is a way of doing as much as the doing is in what is said or not said. When it comes to knowing in practice, distinguishing material and discursive practices has only an analytical, and not a substantial value import, and one should not give some kind of ontological priority to one over the other. In the call, for example, it is clear that the "doing telemonitoring" is accomplished through a skilled combination of material and discursive activities, all implied in the discursive and material choreography of making a call. This, in turn, reminds us that the same activity (in this case talking) acquires meaning only when contextualised within a specific practice or activity (Engeström, 2000; Schatzki, 2002). The fact that some practices are mainly of a discursive nature should not lead us to the conclusion that discourse is not a practice of that we can imagine an practices which are not material (as Foucault has pointed out long ago).

Finally, the knowing is clearly exhibited in the vocabulary. The use of terms such as creatinine, triglycerides, and Capotem – all words that I had to explain with the assumption audience did not know them – testifies that the practice performs and implies a specific semantic space that needs to be learned by newcomers and contributes to distinguish this practice from other ones .

4.5.2 The knowing is in the timing and the tempo of the practicing

The two examples also points out to another important aspect of knowing in practice. In both instances, the knowing transpires not only from what is said and done, but also from

when this happens: timing is a critical dimension of knowing. This aspect, which has been emphasised by all practice theorists, emerges clearly from both empirical excerpts.

The first one shows, for example, that being a competent nurse implies knowing when to do things and when not to do things: when to arrive at work, when to go and try to talk to doctors, and when to call or not to call patients. The second snippet illustrates the pervasiveness of the timing element and shows that tempo, sequencing, and timing are at the heart of our tacit knowing of how to accomplish orderly scenes of interaction, as posited by the research programme of conversation analysis (itself considered to be a practice theory of sort : see Lynch, 2001). As an example consider the central part of the call (lines 25 and 26). Here the patient is providing some information way before its time (if you read the whole call you'll see that the nurse devotes much time to collecting information). This is, of course, a pre-emptive manoeuvre, for the patient knows well that he has not followed some previous advice. This manoeuvre suggests that a) the temporal unfolding of the practice of telemonitoring has established some sequencing expectations and that b) such expectations can be used as a further resource in the interaction. Although we cannot examine this aspect in detail here, it is clear that knowing how to make telemonitoring happen is neither on the side of the patient non the nurse's as much as in the established practicing[7].

4.5.3 The knowing is in the process of material mediation

The two excerpts provided above are useful in highlighting that the knowing that manifests itself in the accomplishment of telemonitoring transpires not only from the actions and conducts of human characters, but also as from the alignment between a variety of human and non human elements. Both excerpts, in line with all practice theories, attract attention to the fact that the accomplishment of telemonitoring depends inherently on a variety of artefacts. Some of them (like the rooms, the phone, the chair) stand silently in the

[7] One could note that tempo is particularly important in this specific case given the particular nature of the practice at hand. Other sensory based forms of mastery, such as knowing how to touch, hear, or how to smell, would become more prominent if we took into consideration other practices such as that of a tailor, a musician, or a cook.

background, as all infrastructures tend to do. Others jump more obviously to the fore, as in the case of the therapy sheet in figure 1.

The therapy sheet is a central tool in telemonitoring because it allows two fundamental activities to occur: (a) it allows the chronology of the patient's history to be reconstructed. This is because it allows a comparative reading of the data recorded from a number of calls, allowing the evolution of the patient's condition to be followed; (b) it gives operators an overview of all the patient's critical parameters, that can be then compared extremely effectively. This process emerges in the call, where, as the nurse's movements show, the therapy sheet is the focal point representing a sort of geographic centre around which the other test results are arranged. The nurse always places the sheet directly in front of her and only looks at another document when more information needs to be added to the sheet itself.

The therapy sheet therefore acts as an active organizer of data and behaviour, a full-fledged trajectory making device. The effect of "creating a trajectory of the development of the patient's condition" is obtained by work sharing among human and also non-human staff. As one of the nurses explicitly declared: *"the therapy sheet was used as a guide for a long time …it guided our calls...especially when we were still inexperienced"*. Hence, the production of the "trajectory" effect and with it the accomplishment of telemonitoring was obtained from a hybrid assembly of human and non-human elements, which would align themselves to produce alignment.

This brief example is useful in pointing out that artefacts do not carry knowledge; they are not transmitters nor passive conduits of knowledge. On the contrary, artefacts constitute active mediators of knowing. As such, they 'try' to convey within the scene the scripts that their creators embedded into them, but, as mediators, theirs is only one of the 'voices' that compete for attention, one of the resources of the practicing. The knowing is therefore not so much in the artefacts as in their practical use: the practical meaning of artefacts only emerges in the actual real time practicing, and the knowing is neither on the side of the (human) users or the artefacts as much as in the pattern of use and in the alignment between them. As CHAT scholars have clearly indicated, the knowing is in the process of

mediation, which depends on the presence of mediating artefacts, but cannot be reduced to them. As the many failures in the ambit of knowledge management have clearly demonstrated, take their practical site away, and even the most sophisticated intermediaries of knowing will at best stutter or, worse fail to deliver.

4.5.4 The knowing is in the interactional order

Another dimension where inspecting the practice means inspecting a knowing is the patterns of interactional order between human (and non human elements). As it emerges from the two examples above, but also from our daily experience, knowing is always knowing with and among others. However, just as in the case of the sayings and doings, we can say that the knowing is not so much in the head of those who participate in the patterning of relationships, as much as in the order that is customarily expected by all the members. The notion of site, of course, suggests that such patterning is both the result and the context of the individual contributions. What is important here, however, is that the knowing is derived from "tuning in" to the expected order, not from the possession of some interactional capacity.

Consider for example the phone call above. The knowing here is necessarily distributed between the nurse and the patient; it transpires not from their individual conduct so much as from their mutual alignment. The organized nature of the interaction derives from the fact that both the nurse and patient concur in performing a particular form of interactional order that could be loosely described as a question-answer interview pattern. Their knowing in practice is achieved creatively by tuning in to the expectations and assumptions embodied in the practicing.

4.5.5 The knowing is in the practical concerns which organise the doings and the sayings

A further fundamental dimension of the knowing in practice transpires as the practical concerns which guide the practicing of telemonitoring. This knowing, that has both a moral and a cognitive dimension, emerges from the results of the interviews to the double and

from the literary device of the “instructions to the double”. The “instructions to the double” convey the idea that the organized nature of the interaction derives in part from the fact that both the nurse and patient tune in to the “sense” performed by the set of practical concerns they are involved in. This aspect emerges in the call above, for example, when the patient provides without hesitation the weight and pressure readings “84 and 95 over 130” (line 20) and when the nurse understands their meaning without having to ask what they refer to. Both the nurse and the patient know that collecting weight and pressure are two critical practical concerns that need to be attended to, and this knowing both organises their conduct and give meaning to it. The same type of knowing also emerges from line 25 when the patient anticipates the nurse admitting an infraction («Capotem… yes, I am still taking it as usual but… I stopped taking the Liponorm a couple of days ago…». It is clear that through socialisation the patient has become part of a pattern of ordering called tele-monitoring and that such a pattern has a recognisable “sense” and moral implication -- which includes collaborating in the maintenance of certain parameters within the established limit. In other words, the patient, the nurse, and all other members participate in knowing which give sense to the practice, when sense is understood both as “meaning” and as “direction of unfolding of the practice”.

The knowing which transpires in and thought the practical concerns is learned by the novices when they are socialised into the new practice and is continuously re-negotiated and re-defined through the mutual positioning activities to be described below. This knowing, therefore, lives through the members but does not stem from their mind or their beliefs. All the way around, members come to be concerned in a certain way by virtue of joining a specific practice.

The idea of practical concerns as a form of knowing which organises the practicing from within captures from a different, and more experiential angle, the notion of the object of the activity put forward by CHAT scholars (See Engeström and Blackler, 2005, for a discussion). CHAT authors emphasise in fact that all human practices (that they call activity systems) are inherently object oriented. As Engeström puts it: “the object … give(s) actions their ultimate continuity, coherence and meaning” (Engeström, 2000, p. 964). The

notion of practical concerns captures the same idea describing however how the object is experienced by members in the practicing. In both cases, the underlying principle is that a specifiable system of activity, its object and practical concern, and members who know them, all emerge together in the context of a real time practicing.

One may add that practical concerns can be translated into words, as the instructions to the double clearly demonstrate. In the process, however, they loose their moral and committed nature – turning a 'know how' into a 'know that'. Even in their translated form, however, practical concerns are a critical form of knowing, in that, as we shall see in a moment, they allow carriers of different practical knowledgeability to operate in a coordinated manner without presupposing or requiring any form of sharing. As long as I know what practical concerns move you, I can work with you and around your practical concerns without necessarily having to become proficient in what you are doing.

4.5.6 The knowing is in the management of accountability

One of the central tenets of ethnomethodology is that the ordered production of all sayings and doings is always carried in view of the necessity for all members to make themselves accountable for all practical purposes. The appreciation and description of how they actually do it is the very object of ethnomethodological studies – and the way in which this approach would mainly respecify the issue of knowing in practice. As it appears from both the above examples, and especially from the instruction to the double, managing accountability is a critical aspect of knowing in practice. For instance, the instructions to the double do not refer to or try to convey the values or beliefs which supposedly guide the conduct of the nurse, for belief and value talking is alien to a practice-based approach. Even when they are used “in the field” (please recall that the “instructions to the double” mimic aspects of the novices’ socialisation process: see Gherardi and Nicolini, 2000 for a detailed discussion), instructions mainly convey the local lexicon of accountability which the hypothetical novice, in this case a nurse novice, has to learn in order to produce telemonitoring activities which are observable-reportable, or, that is, account-able (Garfinkel and Sacks, 1970). In the example the nurse is telling the novice (and us) that you need to use the agenda to accomplish your work and that by using it you make yourself

accountable, "for all practical purposes". We therefore learned that not only remembering appointments and sustaining the flow of the activity, but also writing these things down is a central practical concern. Through the instructions to the double we are therefore introduced to fact that all practices embody and are founded upon a local repertoire (the content) and lexicon (the right way of asserting it) of accountability; or the things you need to be concerned about when carrying out the activity and that you'll need to remember in order to make yourself accountable. Knowing how to use this repertoire and lexicon, that is, knowing when accountability is warranted or on the contrary, knowing when accountability becomes untenable and what to do about it, are critical dimensions of the practicing. Consider for example the telephone call. You may note that among other things, the nurse is modifying the therapeutic regime of the patient. This is of course a task that should be handled by a doctor. However, traditionally, expert nurses, at least at G., have always been granted certain discretionality on the dosage of medicine, for example in view of preventing excessive side effects or for handling crises[8]. Part of their knowing in practice, then, is appreciating when "enough is enough" and when it is time to call in the doctor[9]. Such knowing in practice, which I have described in details elsewhere (Nicolini, 2006), is highly situated, as the first example reminds us: if the doctor in charge has spent the night on duty, the nurse will be better off contacting her/him only if it is really necessary. What is important here is that the space of accountability within which a practice can oscillate, so to speak, is a feature of the local conditions of the practicing into which the participants tune in, not a skill of the actors involved. As such, knowing how to manage such space is a knowing that is rooted in practice and that transpires through it.

4.5.7 The knowing is in working with and around other knowledges

The above consideration that knowing is necessarily knowing with and among others implies that a critical dimension of knowing in practice is working different, and often

[8] If a patient is entering a grave crisis, one can expect the nurses to intervene with powerful drugs. In the words of one nurse: "If you are in the Coronary Unit, and a patient has angina pain…you don't stand there waiting for the doctor, you try anything: a defibrillator, drugs..."

[9] According to G. hospital data, about 90% of assistance given over the telephone was done totally independently by nurses, 7% involved coordinated work while in only 3% did the doctor replace the nurses and take pro-active control of the case.

dissonant knowledges together (Gherardi and Nicolini, 2002). Consider for example what one of the family doctors told me: “Specialist cardiologists are very aggressive about clinical parameters...in order to reduce your overall body pressure of the ventricular diameter to their standards; they often go beyond what is an improvement for the patient. I am thinking of a patient whose life was prolonged by two months, but who had her last year so completely disrupted and such a very low quality of life” (extract from interview). We have two very different knowledge abilities here. These knowings do not necessarily converge and yet they have to be worked together. Knowing how to be a good tele-nurse, but also a good cardiologist and family doctor, implies thus knowing how to interact with different knowing and the power positions that go with them. This requires, in turn, an appreciation of the different perspective based, for example, on the understanding of the practical concerns that guide other people’s conduct. It also requires the establishment of discursive and material practices of mutual positioning and alignment. The result is that the practice consistently looks much more like a dissonant pattern of voices in search of precarious point of alignment than a canon sung in unison by all those involved (Gherardi and Nicolini, 2002)

4.5.8 The knowing is in the expansion of the practicing

Last, but certainly not least, the knowing is in accommodating the continuous expansion of the activity. The notion of practicing as the site of knowing implies that practice is accomplished always in new and continuous conditions, and it is achieved therefore “each time for the first time”(Garfinkel, 1967). This , in turn, means that knowing in practice transpires through the capacity of solving the practical problems that emerge in the conduct of the activity, as well as in keeping up with the changes introduced into the practice by its the diverse elements. In this sense, knowing in practice is inherently a moving target, as indicated by CHAT authors, and knowing transpires from the capacity of coping with the new conditions (and the inevitable small and large break downs in the practicing).

A small, but telling example is the substitution of the therapy sheet in figure 1 with a computerised, state of the art electronic patient’s record. As I have shown, in the example of the phone call above, prior to the introduction of the electronic tool the nurses conducted

their call consulting a variety of documents that they used to lay 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. All this changed, however, with the introduction of the electronic patient's record. The electronic patient's record, 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, however, was very formal and interview-like and hence seldom followed by the nurses. This meant, however, that once they started to use the ERP 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 task. 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, the nurses 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" signalling the reason for the interruption and apologizing for it in the same sentence.

In sum, the excerpts and the previous discussion, which I consider far from exhaustive, help us gaining an appreciation that assuming practice as the site of knowing means that by scrutinising an episode of practicing one scrutinizes both the practice and the knowing that goes into its accomplishment. In the discussion I have pinpointed some initial dimensions of the practicing through which the knowing manifests itself: doings and saying, tempo, mediators, interactional orders, practical concerns, space of accountability, and expansion

of the practicing. The list is of course provisional and incomplete, and it waits to be accrued through further observation. At the same time, it is a useful starting point for illustrating the notion of practice as the site of knowing and the deriving principle that for observing knowing we need to observe a specific real time practicing and, vice versa, by observing a practicing we observe a situated, material, collective, open way of knowing.

5 THE CONTEXTURE OF KNOWING IN PRACTICE: WORKING KNOWLEDGES TOGETHER

One of the main implications of the previous section is that knowing exists only as long as it is exercised, put to work, and kept in motion. As the case clearly shows, moreover, this knowing is also necessarily fragmented, distributed, and dispersed: knowing how to make telemonitoring happen comes into being at the same time in more than one place and transpires through more than one person's conduct or artefact's use. The knowing that keeps the nurse and the patients together ramifies rhizomatically involving distant people and increasingly distant practical knowing such as, e.g., the knowing of the cardiologist who is in charge of the patient, the knowing of the GP who prescribed the test, the knowing of the lab employer who analysed the sample, the knowing of those who built and tested the portable electrocardiographs, not to mention the knowing that goes into making the phone and the computer system work, etc. As I surmised in section 2, this state of affairs can be generalised, and we can state that the site of knowing is not a single, individual practice (a concept that is difficult to conceive, given that practices are not objects and hence they have no defined boundaries) so much as a contexture of interconnected instances of local knowings and practicings. As I stated above, each instance of practicing is both unique and related in different ways to a large number of other practicings. The challenge is thus in explaining how these knowings work together, how the associations between practicings are forged, stabilised, and how they make up a vast, metamorphosising and pulsating network.

To this end, we can fruitfully employ the notions of translation, mediators, and action-net put forward by Actor Network Theory (Latour, 2005; Czarniawska and Hernes, 2005).

In order to account for the process that makes two or more knowledges working together, Actor Network Theorists have introduced the notion of translation. In its broader sense, translation captures the establishment of "a relation that does not transport causality but induces two mediators to co-exist" (Latour, 2005, p.108). We have seen a typical example of translation in the process of enrolment above: the translations of the knowing between the nurse and the patient (and her family) establish a relationship and make them both part of the same practical knowing. In the process, the knowing also establishes roles and identities (e.g., the patient is made to be active and responsible for part of the deeds) and a power relationship (the two figures are empowered to do different things, as it emerges from the call above). Translation thus captures three main ideas. First, that for establishing associations and relations you need work. Any translation is the result of the active work of heterogeneous mediators which through this process find a place or are locked into place. Second, because knowings are different, they have to be translated. The movement from one context to another always implies a shift in meaning. Third, establishing associations has always has to do with interest and power. As actors from the outset have a diverse interests, the stabilisation of any form of association or relationship rests crucially on the ability to translate, that is, to re-interpret, to re-present or to appropriate others' interests to one's own through some process of (political) negotiation.

The process of translation is thus both a way of explaining how knowing in practice goes around the world (it proceeds rhizomatically by extending chains of action) as well as how the relationships between knowing are kept in place. The notion of translation suggests, in particular, that associations are precarious and that they need to be actively maintained. While this can be done by translating the same knowing over and over (the patients could be enrolled every morning), it is much more efficient to enlist the active intervention of material mediators, that is to say, entities which can establish and anchor relationships. When properly conceived, mediators can in fact translate agency over distance and contribute to locking parties together. Many things such as images, texts and inscriptions (contracts, rules, laws and regulations, scientific articles, and stories) software, disciplined bodies, contracts, and money can be mediators. The role of these mediators is stabilising the way in which knowings are made to work together. With the help of mediators,

different practices and different knowings form a living pattern of associations which quickly extends into a vast and pulsating contexture – what Czarniawska has called an action-net (Czarniawska and Hernes, 2005), another name for the site of knowing in practice. In the next session I would like to examine some of these mediators.

5.1 Mediators of telemedicine knowing

Three types of mediators, among many, are prominent in the case of telemonitoring knowing: disciplined bodies and mind, artefacts, and discursive productions.

First, as I have briefly described above, disciplined bodies and minds constitute critical mediators of the knowing in practice. As I have briefly indicated above, all the patients are socialised within the practice of telemonitoring through a variety of activities such as the enrolment, instruction (during their permanence in the hospital patients are taught about their disease and the medicines they will assume), and conversation (the nurse visits the patients in the ward before they are enrolled in the telemonitoring and make all effort to meet them whenever they come to G.) Through this well known process of socialisation and learning (Lave and Wenger, 1991) conducts are shaped and bodies are inscribed in such a way that they can carry knowing. The new patients, but also the new nurses who joined the service, and the personnel from other hospitals who came to G. for learning how to replicate telemonitoring in their institutions, extended the action net of the telemonitoring knowing in practice by becoming their human carriers. From now on, the knowing in practice will constitute one of their sources of sociality, one of the ways in which they are associated with other practitioners through knowing. Taken together, all the bodies and minds associated through the translation of knowing form a community of practitioners, which should hence be considered as an outcome of the translation, not as it cause.

A second critical type of mediator of the knowing in practice is constituted by artefacts. Artefacts are a particularly efficient category of mediators. They are reliable, often docile, cheap to produce and to transport (unlike, e.g., humans) and, above all, less unstable than

humans. Not only they are good at establishing associations, that is, at operating as boundary objects (Star and Griesemer, 1989; Carlile, 2004); they also tend to conceal the translation work. Because of their nature, objects dislocate the knowing, make associations happen, and once they are done with their mediatory work they silently retreat the background or are pushed on the side of the desk, as in the material choreography of the call above. A good example of mediator of telemonitoring knowing in the example above is the therapy sheet described in figure 1.

The sheet brings together an sheer variety of knowings such as: the knowing behind the decision on which data are the nurse needs to monitor the patient's state (this is scientific knowing which in turn required a lot of work to come into being); the knowing necessary for obtaining the required data (which, for the patient, implies going to the doctor, obtaining the necessary prescription, going to a lab, doing the test, receiving the results, sending them by fax: a very knowledgeable activity indeed!); the knowing necessary for making the portable electrocardiograph work (part of this knowing is inscribed in the technological artefact, part in the patient's conduct); the knowing necessary for contextualising and interpreting the data (we have seen the nurse in action above). The sheet is therefore an active aligner that arranges existing knowings into a new pattern which corresponds to the knowing in practice (of how to do telemonitoring at G).

It shouldn't come as a surprise that the sheet was the first thing anybody visiting the centre was shown and given as a gift. As the nurse quoted above clearly stated: *"the therapy guided our calls...especially when we were still inexperienced.…it was certainly the first thing we showed our colleagues"*. Because the sheet was able to guide their 'behaviour', it could do the same for other novices. By passing on the sheet, the nurses at G. extended the chain of association and the reach of the telemonitoring, not of telemonitoring 'in general', but of the knowing in practice developed and refined at G. and partially inscribed into the sheet.

Finally, a third type of mediator of the knowing in practice is the discursive production that the people at G. fostered and circulated. The term 'discursive production ' is used here to denote all types of written and oral texts (documents, accounts, stories) which anchor and

give a relatively stable form to objects and conducts, together with the structures and practices involved in their production and circulation. The discursive productions put in circulation by G. included presentations at conferences and seminars, appearances on local and national television, and publication of scientific papers and news articles. Taken together, they were aimed specifically at framing in a telemedical way the medical problem par excellence, that is 'What to do next?' with patients who suffer from CHF[10]. A notable textual production, very prominent in the translation of telemedicine albeit not present in the above description, was the 'protocol' developed at G. during the early phases of telemonitoring. The protocol, in effect was just a flow chart with some of the things "every nurse at G." already knew. It is notable in that it was conceived from the outset as a translation device. The protocol was intended in fact both as a way of extending the knowing action-net horizontally, that is to say, it was meant as a way of helping (and persuading) other centres and hospitals to take up telemonitoring and making it happen in their specific context. It was also intended as away of extending the action-net vertically, that is, as a way of associating behind telemonitoring a long list of powerful allies that would entrench the new emergent practice and make it defensible against other, rival ways treating chronic heart failure patients. In order to achieve these very ambitious goals, the protocol had first to empowered by going through scientifically testing. When a medical practice or therapy demonstrates its high efficacy and statistical significance in a randomized control trial (Sackett et al., 2000), and when the results are accepted by an important professional body, it becomes stronger and less reversible because it passes a "trial of strength" (Latour, 2005). From this moment on, to suggest that telemedicine is not a good way to care for CHF patients, would mean having to argue not only with the centre at G., but also with the methods, procedures, and overall logic used by the medical profession to construe their facts. The protocol thus established a direct relationship between the knowing in practice at G. and the wider knowing of the community of cardiologists. In effect, it translated the global network of cardiology knowing at G., putting it in many ways behind the new way of practicing telemedicine. At the same time, it contributed to the perpetuation of the overall cardiologic establishment through what

[10] The expression is taken from Berg (1997).

authors have called “back-translation” (Fujimura, 1995), that is, the empowering effect granted to institutions such as professional associations when they manage to control both the upward generalisation of local knowledge and the converse downward enforcement of what has been generalised at local level.

Once strengthened through these associations, the protocol could be used for translating the knowing in practice at different sites, starting with other centres of the organisation to which the centre of G. belonged. The new association made the protocol all the more authoritative and hence difficult to be ignored, or betrayed, or silenced, as often happens to human mediators. It is worth emphasising that the protocol promoted a very particular version of telemedicine. This becomes clear if we pause to observe that the rise of telemonitoring “G. style” corresponded to the exclusion of other, alternative ways of doing telemonitoring. For example, other centres (like the one of M., which belonged to the same foundation as G.), had experimented different ways of conducting telemonitoring which didn’t require the patient to use a portable electrocardiograph – they required the transmission of different type of data. Through the protocol it was thus the knowing in practice of G. that was taking over the (telemedical) world.

In sum, these mediators constitute the warps and woof through which different knowing in practices are woven together. Mediators create, anchor, and sustain the associations between practices and the translation of knowing in space and time. The knowing, however, is not reducible either to the mediators (knowing is not in the protocol) nor to the associations that they sustain (knowing is not in the transfer of the ECG). The knowing transpires instead through the practices that these associations make possible. The knowing is thus in the call and not in the callers or the tools they use; it transpires in the making of a trajectory and it is not ‘contained’ in the therapy sheet; it manifests itself when a patient is convinced to keep up with her dietary regime, but it is not carried by the words uttered on the phone by the nurse. The knowing is in the instances of practicing and in the associations and connections between them.

5.2 Weaving knowledges together

A different way of expressing the idea that knowing transpires in the connections between practices is to affirm, as I did above, that the site of knowing is in fact the overall net of actions which, when properly associated together, make telemedicine happen.

Because of its nature, action-nets or knowing-nets, as we may call them, cannot be inspected panoramically. As noted by Bourdieu (1980), panoramic views extract timing from the practicing, therefore depriving action of one of its main components. A list of the nodes and ties of telemedicine, for example, cannot re-present the way in which these nodes are actively kept together: listing nurses and patients among other 'nodes' and stating that they are related tells us nothing about how this happen. The contexture of the many knowings which are made to work together in order to produce effects such as telemonitoring can be thus only inspected as events of knot working, that is, instances and places when knowings are brought together; or genealogically, through the reconstruction of how the relationship between knowings has been achieved in the first place; or, finally, in the presence of break downs, where the association of knowing is pried open and where an urgent repair work is necessary. In all cases, the only viable approach to observing the weaving of knowledges together is following the actors and their action. Having explored the genealogy of telemonitoring at G. and the repair work of accident elsewhere (Gherardi and Nicolini, 2002 ; Fasol and Nicolini, 2004), in the following I will briefly address two instances where (and when) one can inspect the weaving of the net of telemonitoring in action.

A first obvious connecting point is the making of a call exemplified above. One can see why calls are a central moment of the practice of telemedicine. As I suggested in section 2: calls constitute the cross roads of a number of knowings which need to be skilfully and successfully aligned. In this sense, the telephone calls are both the tip of the iceberg and the moment of truth in the knotting of a ramified variety of knowings. The call, however, is in itself a practicing, an instance through which a specific knowing shines through. The telephone call is not the place where knowledge ends, so much as a site where a knowing in

practice is performed, and through which knowing circulates. By the same token, we note that the knower emerges together with the practice and cannot be given priority. It is the practice that associates a knower with a knowing and not vice versa.

A second interesting place where one can inspect the weaving together of several knowings is the periodic review meetings between nurses, cardiologists, and centre managers. Meetings, together with projects, are very common "knotting sites", places where people met for the purpose of aligning future actions. Meetings do not need to be supported by the well known ceremonial, even though the ceremonial and its material dimension (agenda, notes, turn taking) plays an important role in making the anchoring of action all the more effective. Many, if not most, of the important meetings at G. happen in the corridors or in the cafeteria (there are not water dispensers at G.). The following excerpt, however, is derived from a short review meeting that took place in the telemedicine room

> *Nurse (reading from her therapy sheet)* "I spoke with Ms. ****...she talked about Lasix with her family doctor…now she takes it <u>all</u> together very early in the morning because her doctor told her that what matters is the dosage…"
>
> *Cardiologist:* What?!? Absolutely not, no way!
>
> *Nurse)* "That what she has been told (opening her arms, an Italian gesture of discouragement)…she also told me that she is not using the sticking plaster because it makes her dizzy…"
>
> *Cardiologist:* What dizziness and dizziness! Let her not change her own therapy…and insure that she's using the plaster"
>
> *Manager, talking to the nurse:* "I noticed that you are still using the old therapy sheet…we have the new software now…"
>
> *Nurse:* " Yes but…the software is cumbersome…I cannot pay attention to the patient on the phone and deal with the software...it takes me ages to find what I need…it was designed really poorly…"
>
> *Manager:* "I know, but the software is part of the project we are involved. We need it for making the data available for the study…"
>
> *Nurse:* "Well then, I will continue as I do now…I use pen and paper and then transcribe everything in the electronic patient record after the call"

This brief exchange, albeit not unusual, is very telling of what it means to work knowledges together.

In the first place, we can see here a number of different ways of knowing coming together; these ways of knowing in practice partially work together, and partially collide. Consider for example the first part of the exchange. The nurse here is reluctantly mediating the knowing of the patient, who has learned that Lasix (a powerful diuretic) is making her life hell (if you take Lasix you can never be too far from a toilet) and hence has enlisted the knowing of her doctor to try to get way with taking the dosage in one go, instead of two or three as prescribed. The nurse here is clearly a mediator who translates the knowing in practice of the patients into the meeting where this knowing collides with that of the cardiologist, who, in turn, knows well that in this way the medicine will have the desired effect. The exchange is interesting because it reminds us that conflict and collision are a form of associations, and that knowings do not need to be amicably aligned for working together. It also clearly shows how knowing is both the arena where conflict is played, and the object which needs to be sized.

Also the second part of the exchange is interesting, in that we see here two other knowings in practice which have a difficult time of living together. One is the subtle knowing of how to conduct a good and amicable telephone call. The nurse is telling her boss that the knowing 'represented' by software – the knowing that the designers inscribed into it and that the software translates back into the scene of action— interferes with her established way of interacting which, in turn, is a necessary ingredient for maintaining control over the patient's conduct, and a necessary premise for making the patient put their sticking plaster back. The boss, in return, upheld her own knowing that without providing data the telemonitoring cannot be justified and funds can run out. The exchange therefore presents us with at least five different types of knowing in practice (including the one of the nurse) which need to be worked together for telemonitoring to happen. The response of the nurse shows how the translation of all these knowings generate an expansion of the practice (see Nicolini, 2006 for a detailed description and discussion). Please note that the exchange also illustrates that the shape of the action net, and the knowing that it expresses, is far from

being the brainchild of a single voluntary action. Like Foucault's discourse, the overall contexture of knowing in practice is a collection of forms of strategic arranging which are intentional but do not necessarily have a subject (Law, 1994, p.21), and which emerge out of conflict and negotiation, as much as agreement.

Finally, the exchange emphasizes the importance of discursive practices in working knowledges together. The short exchange illustrated here shows that the working together of practical knowings implies a mirror game in which positions and identities are continuously re-enacted and negotiated (see Gherardi and Nicolini, 2002 for an in depth discussion). The work through which the different knowings are continuously re-enacted and challenged through discursive maneuvers is thus important in that the result is not only the destiny of the overall practice, but also the identity and power of all those involved. Discursive practices become especially important in this perspective, because discursivity (one of the dimensions of practice) is often both the locus of power struggles and the object of such struggles. The discursive representation of practices becomes in itself a contested terrain: to the extent that specific representations create assemblies of practices around specific projects and interests, representing practices always constitute a form of hegemonic activity.

In sum, working knowledges together depends both on the silent work of material mediators and on the active knotting of practices mostly achieved through discursive practices. Although you cannot encompass the whole gamut of connected knowing in action within one single representation, you can appreciate its sheer complexity and pulsating nature. Making serious CHF patients staying at home and feel well requires the continuous alignment and knotting together of all these different knowings, which, only what taken together, constitute the site of knowing how to make telemedicine happen.

6 SUMMARY AND CLOSURE

My aim in this paper was contributing to a practice-based understanding of knowing in organisational and work settings. I started by endorsing an ontological, but not analytical,

equivalence between practicing and knowing. This, I suggested, is possible if we processually conceive practice as the practicing of a specific activity, and if we take practicing to be the site in which and through which knowing makes itself manifest. The Heideggerian notion of site connotes knowledge as inherently situated in a system of ongoing activities; it describes knowledge as relational knowing, mediated by artefacts, and always rooted in a context of interaction.

From my premise it derives that knowing in practice cannot be theorised in the abstract but can only re-presented through text. For this reason, my discussion has been supported by the study of the emerging practice of telemonitoring serious chronic heart failure at a distance. The case study constitutes thus both an exemplification and an application of the idea of practice as the site of knowing.

Observing the practice of telemonitoring I identified a variety of features or moments of the practicing of telemonitoring through which knowing makes itself manifest. From the study it emerged that the knowing is in and transpires through:

- what is said and done
- the tempo of the practicing
- the process of material mediation
- the interactional order performed in the practicing
- the practical concerns which orient the practicing
- the management of accountability
- the working with and around a number of diverse ways of knowing
- the expansion of the practicing.

The observation of telemonitoring also made us appreciate that all the instances of knowing are inherently inter-connected. Knowing is thus always dislocated, dispersed, and decentred. The site of knowing is in effects the vast and heterogeneous contexture of interconnected instances of local practicings. The net of actions and knowings that emerges

around the practice of telemonitoring is a contexture because it is both the result and the context for the practice of telemonitoring[11]. It is a heterogeneous contexture in that it embraces both human and non human elements. The knowing that goes into making telemonitoring happen is thus dispersed within a metamorphosing labyrinth of associations between socio-material practicings that irradiates rhizomatically from different points and connects in complex ways different and at times distant knowings in practice. It the paper, I have shown that although we cannot grasp such labyrinth or web in its entirety, we can follow the way in which knowings are translated, associations are forged, and relationships between knowings are maintained and stabilised. The empirical work fore grounded in particular the fundamental importance of material mediators and discursive practices. Through their contribution, different knowings are made work together, in the sense that they collectively contribute to make telemonitoring happen – although collectively here does not mean in any way that they work in perfect harmony or consonance.

The present study goes some way towards rectifying the increasing tendency of claiming the ontological equivalence between practices and knowing without exemplifying what this means. While it has become customary to proclaim that knowledge is acquired through participation, that it is continually reproduced and negotiated, and that it is hence always dynamic and provisional, there is a lack of empirical work supporting this contention.

By the same token, my study also clarifies that a coherent practice-based approach to the study of knowing implies the adoption of an appropriate methodological stance. Carrying out a practice-based or practice-oriented study requires turning towards those research approaches and narratives styles which respond to the material, factual, and temporal nature of practices – what Gubrium and Holstein (1997) calls "articulative" qualitative social research. Doing practice-based studies requires thus using methods of inquiry and styles of writing which endorse, explicitly or implicitly, the assumption that social phenomena are locally constituted and focuses on what people do and what sort of reality constitutes the outcome of such doing (Gubrium and Holstein, 1997).

[11] For a discussion of the notion of contexture see Schatzki (2002).

This study is also useful for demonstrating some of the benefits of a practice-based approach to the study of knowing in organisation.

First of all, the practice based approach used here eschews some of the usual quandaries in which other approaches to the understanding of organisational knowing end up. For example, by conceiving knowledge as knowing, and by equating it to the situated accomplishing of a practice, the approach avoids generating a duality between knowledge and knowing, and hence it does not require to invent some metaphor or process for reconciling the two. Because there is no substance, no entity called knowledge, the issue of how to put knowledge in practice simply does not emerge. The same applies to other dualities, such as that between knower and knowledge. From the perspective discussed here, without a practice, e.g., without telephone calls to be made, medicines to be taken at a certain time of the day, and soft wares to be aligned with calls, there is neither knowing or a knower. The two emerge together or don't emerge at all.

Second, the case study indicates that calling a knowing 'organisational' does not mean associating two entities (a thing called knowledge and a thing called organisation). The above discussion supports the idea that knowing is always knowing-in-working and knowing-in-organizing (Nicolini et al. 2003). The organised nature of the practice transpires through and as a result of the knowing. The distinctive characteristic of an organised phenomenon reflects thus the distinctiveness of the knowing that makes it possible and the way in which they have been weaved together.

Last, but certainly not least, the case study illustrates the capacity of the approach to take into consideration issues of power and domination. As clearly illustrated by all the examples provided here, the way in which knowings are connected and ordered perform identifiable power effects. The approach developed here helps us appreciating that the relationship between knowing in practice necessarily embodies and performs unequally empowered social positions and sustain the relation of power between them. The positioning and the power that goes with it is defined both materially (e.g., in terms of a specific range of material possibilities and constraints), discursively (e.g., in terms of the possibilities of discourse associated with the position), and subjectively (e.g., in terms of

the way the world is perceived and experienced) (Bourdieu,1980; Foucault 1970; 1979; Laclau and Mouffe, 2001).The result is a way of studying knowing which is shows how power, knowing , and organisation are not separate phenomena but different facet of the same social and material process.

7 REFERENCES

Berg, M. (1997), *Rationalizing Medical Work*. Cambridge: MIT Press.

Bourdieu, P. (1980), *The Logic of Practice*. Cambridge: Polity Press. (or. ed. 1980).

Brown, J. S. and Duguid, P. (2002), *The Social Life of Information*. Cambridge, MA: Harvard Business School Press.

Carlile, P. R. (2004), "Transferring, translating, and transforming: An integrative framework for managing knowledge across boundaries", *Organization Science*, vol.15, pp. 555-568.

Czarniawska, B., Hernes, T. Eds (2005), *Actor-Network Theory and Organizing*. Copenhagen: Liber and Copenhagen Business School Press.

Dreyfus, H. (1991), *Being- in- the- World: A Commentary on Heidegger's Being and Time Division I*. Cambridge, MA: MIT Press.

Dreyfus, H. (2001), "How Heidegger defends the possibility of a correspondence theory of truth with respect to the entities of natural science". In T. Schatzki, K. Knorr Cetina and E. Von Savigny (eds), *The practice turn in Contemporary. Theory*. London: Routledge.

Dreyfus, H. (2005), "Can There Be a Better Source of Meaning than Everyday Practices? Reinterpreting Division I of Being and Time in the Light of Division II," in Richard Polt, Ed., *Heidegger's Being and Time: Critical Essays*, Lanham: Rowman & Littlefield Publishers, Inc.

Engeström, Y. (2000), "Activity theory as a framework for analysing and redesigning work", *Ergonomics*, vol. 43, No.7, pp.960-974.

Engeström, Y. and Blackler, F. (2005), "*On the Life of the Object*", Organization, 12, pp. 307-330.

Foucault, M. (1979), *Discipline and Punish: the Birth of the Prison*. Harmondsworth: Penguin Books (or. ed. 1975).

Fujimura, J. H. (1995), “Ecologies of Action: Recombining Genes, Molecularizing Cancer, and Transforming Biology”. In S. L. Star (ed), *Ecologies of Knowledge: Work and Politics in Science and Technology.* Albany, NY: State University of New York Press, pp. 302-346.

Garfinkel, S. (1967), *Studies in Ethnomethodology*. Englewood Cliff: Prentice Hall.

Garfinkel, H., Sacks, H. (1970), “On formal structures of practical action”. In J. C. McKinney and E. A. Tiryakian (eds), *Theoretical sociology: perspectives and developments*. New York: Appleton-Century-Crofts, pp.338-66),

Gherardi, S. (1995), “When will he say ‘Today the Plates are Soft’- the Management of ambiguity and situated decision making”, in *Studies in Cultures, Organizations and Societies*, 1, no 1, pp 9-27.

Gherardi S. and Nicolini, D. (2000), “ Learning the trade: a culture of safety in practice”, *Organization*, 9, 2, pp. 191-223.

Gherardi S. and Nicolini, D. (2002), “Learning in a constellation of interconnected practices: canon or dissonance?” *Journal of Management Studies*, Vol. 39, No. 4, pp. 419-436.

Gherardi, S. and Strati, A., eds (2004) Telemedicina: tra tecnologia e organizzazione [Telemedicine: Between Technology and Organization]. Rome: Carocci

Heidegger, M. (1929/1996), *Being and Time*. Translated by Joan Stambaugh. Albany: SUNY Press.

Laclau, E., Mouffe, C. (2001), *Hegemony and socialist strategy: towards a radical democratic politics*, 2nd ed. London: Verso.

Lave, J., Wenger, E. (1991), *Situated Learning: Legitimate Peripheral Participation*. New York Cambridge: U. Press.

Latour, B. (2005), *Reassembling the social. An introduction to Actor-Network Theory*. Oxford: OUP.

Law, J. (1987), “Technology and Heterogeneous Engineering: The case of the Portuguese Expansion”. In W.E. Bijker, T. P. Hughes, T.J. Pinch (eds), *The Social Construction of Technical Systems: New Directions in the Sociology and History of Technology*, MIT Press: Cambridge MA.

Law, J. (1994), *Organizing Modernity. Oxford: Blackwell.*

Lindkvist, L. (2005), "Knowledge Communities and Knowledge Collectivities: A Typology of Knowledge Work in Groups", *Journal of Management Studies*, 42 (6), pp. 1189-1210.

Lynch, M. (2001), "Ethnomethodology and the logic of practice". In T. Schatzki, K. Knorr Cetina and E. Von Savigny (eds) *The practice turn in Contemporary Theory*. London: Routledge.

Merleau-Ponty, M. (1962), *The Phenomenology of Perception*. London: Routledge.

Nicolini, D. (2006), "The work for making Telemedicine work", *Social Science & Medicine*, in press.

Fasol, R., Nicolini, D. (2004) "Imprenditorialità nel campo della telemedicina". In Silvia Gherardi e Antonio Strati (eds) La telemedicina: tra tecnologia e organizzazione. Roma: Carocci, pp.120-132.

Nicolini, D., Gherardi, S., and Yanow, D. Eds (2003), *Knowing in Organizations: A Practice-Based Approach*. Armonk, NY: ME Sharpe.

Oddone, I., Re, A., Briante, G. (1977), *Esperienza Operaia, Coscienza di Classe e Psicologia del Lavoro*. Turin: Einaudi.

Orlikowski, W. (2002), "Knowing in Practice: Enacting a Collective Capability in Distributed Organizing", *Organization Science*, Vol. 13 , 3, pp. 249- 273.

Star, S. L. and Griesemer, J. (1989), "Institutional Ecology, 'Translations', and Coherence: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907- 1939", *Social Studies of Science*, 19: pp. 387-420.

Schatzki, T. (2002),T*he site of the social: A philosophical exploration of the constitution of social life and change*. University Park, PA: The Pennsylvania State University Press.

Schatzki, T. (2005), "The Sites of Organizations", *Organization Studies*, 26, pp. 465-484.

Wenger, E. (1998), *Communities of Practice. Learning, Meaning and Identity*. New York: Cambridge U. Press.

Wittgenstein, L. (1980), *Culture and Value*. Collected and edited by G. Von Wright, translated by P. Winch. Oxford: Blackwell.