When Work becomes Opaque. Nurses at the Junctions of Medical Infrastructures

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Introduction

The introduction of Electronic Patient Records (EPR) in medical practice relies on the conviction that a seamless web of communications improves the quality of care, reduces errors and wastage, and generates greater overall efficiency. Nevertheless, the reality of infrastructuring processes often presents scenarios in which paper-based and electronic systems coexist but the latter are poorly interconnected, resist customization, and are unable to deliver information efficiently (Hyssalo 2010).

Many suggest that the adoption of standards and protocols and the use of participatory design techniques could avoid the need for specific work by healthcare personnel in connecting all the systems in use together. This paper, instead, reflects on the difficulty of eliminating such work. Moreover, it argues that the adoption of forms of participatory design may paradoxically increase the amount of such interconnection work (here 'junction work') and push into the background parts of the work that they are supposed to support. The case analysed here concerns nursing work in a hospital oncology department. It enables reflection on the increasing opacity of certain work tasks and the technical-organizational implications of the concentration of these duties at the junctions among healthcare infrastructures that are not fully interoperable.

Invisible work, background work, junction work.

In CSCW, the need to devise forms of support for activities undertaken in workplaces has clashed with the difficulties of observing, analysing, and representing them in all their complexity. Such difficulties concern those non-formalized activities – or ones deemed of minor importance – that are denoted with various labels: 'invisible work' (Star and Strauss 1999, Suchman 1995), 'articulation work' (Strauss 1985), 'coordination work' (Ellingsen 2003). In this paper we propose the concept of junction work to indicate the work of facilitating the exchange of data among different information systems (both electronic and paper-based) and which especially characterizes technologically dense environments. By 'junction work' we mean activities involving direct and explicit action to overcome barriers impeding data exchange among two information systems. These activities are the transcription or digitization of data, their transfer from one system to another with memory devices (e.g. USB keys, hard drives) or manual uploads, change of format, and so on. Junction work, in other words, is performed when communication does not occur in a seamless web. It is not in itself visible or invisible, and it can be both formalized and performed through workarounds and tricks of the trade that avoid standard procedures. Although the need for explicit (and non-automatic) intervention to have the systems communicate is not negative in itself, it often results from the delegation to human actors of what has not been possible, or has been deemed not necessary, to realize through infrastructuring (Piras and Zanutto, under review).

Setting and methodology

The research was conducted in an oncology department of a hospital in North Italy which for more than ten years has used an EPR constructed with the collaboration of a medical informatics research group. Working in the department was a team of ten doctors and eleven nurses who treated (mainly with chemotherapy) 35-40 patients daily. Semi-structured interviews, personal conversations, and participant observation were carried out. Interviews (five in total) and conversations were used to reconstruct the birth and evolution of the EPR through the narratives of the members of the development team, the doctors, and the nurses. The observation consisted of a series of weekly shadowing sessions conducted on doctors and nurses for a period of 8 weeks across six months. In light of analysis of the data collected in the first two weeks, the subsequent observations were focused on nursing work, and in particular on how the various information systems used in the department were linked together.

The EPR (and how is it fed with data)

Analysis of practices in department started from the observation that the oncologists did most of their work using the EPR, while the nurses and secretaries more frequently used other computerized and paper-based systems. The reason for this difference was identified by reconstructing the history of the system.

The project which originally gave rise to the system had proposed the electronic networking – via a synchronous teleconsultancy tool – of 27 departments of 9 hospitals in a small Italian region. From the outset, however, the realization that it was necessary to have a system of shared data management induced a shift of the project towards the creation of an EPR. In that period, a new chief had been appointed to run the oncology department of the largest hospital. S/he saw an EPR as the tool with which to steer the doctors' work practices towards greater collaboration and sharing, in particular by changing from a care system in which each doctor had his or her "own" patient to one in which the patient could be managed by any doctor in the department. The design of the system interwove with redesign of care delivery by the doctors. Collaboration between the medical personnel and the design team was close and prolonged (it still continues), and it led to frequent meetings during which the system's requirements were identified and a prototype was produced and trialled. This prototype initially enabled only the management of strictly clinical data, but the weekly briefings between doctors and designers gave rise to requests for new functionalities able to manage the workflow (e.g. appointment books), accounting (e.g. consumption of medicines), communication with other departments (e.g. to book examinations), or analysis of the department's performances (e.g. waiting times). These were studied and implemented during the two years of the project.

The analysis of the interviews showed that, during that period of time, mutual shaping took place between the system and work practices, so that the EPR became the pivot of doctors' work, who wanted it to be used for management of all their activities. The observations verified that this desire was substantially fulfilled, and that large part of the doctors' activities were supported by the EPR. Nevertheless, the same observations showed that this was because a portion of the work was transferred to the nurses. The doctors, in fact, needed data contained in other information systems not fully interoperable with the EPR (those of other departments, outlying hospitals, analysis laboratories) and which arrived in the oncology department via different media (e.g. fax, paper documents). The data necessary for the completeness of the oncological EPR were acquired through the compilation of templates by the nurses (e.g. the results of a blood test made in a private lab). The nurses also undertook the reverse work of transferring information to other systems. For instance, if a doctor requested a TAC and put it on the calendar in the EPR's appointment book, it was the nurses who managed the information flow with the laboratory via phone calls, faxes and paper

documents so that the appointment became effective. This also applied to a series of other actions (e.g. booking of blood tests, providing car park permits to patients) whose accomplishment depended on the nurses' work in creating junctions between systems. Moreover, this work frequently interrupted the nursing workflow, as faxes, telephone calls and paper documents arrived without warning and without the EPR transfer of the data required for an examination.

Discussion. Building the junctions

The shadowing of the nurses made it possible to observe the mundane and material practices of the junction work performed by nurses and how it affected their workflow. As seen, (i) the nurses' junction work was what made the EPR files complete and usable by the physicians; (ii) this work required the use of various artifacts (e.g. fax, telephone, paper); (iii) the junction work interrupted the nursing workflow. A further finding is that the junction work observed consisted of a chain of micro-actions (e.g. receiving a fax, making a brief telephone call) that sometimes concretized the transfer of information from one system to another over a time-span of some weeks. This made both these actions and the overall process difficult to represent in formal terms, with the consequence that they were undervalued by the doctors. The history of the development of the system and the analysis of a specific functionality introduced during the observation period suggest that the scant visibility of this work was one of the factors which, over time, turned the system into a tool for the redefinition of work tasks and their substantial delegation to the nurses. Paradoxically, this happened because the close collaboration between clinicians and designers came about through mechanisms of participatory design. In contexts such as this, in fact, the difficulty of representing and appraising the amount of work required to connect systems together leads to the devising of functionalities useful for the doctors without full awareness of their effects on nursing work.

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