

# Beyond Electronic Patient's File: Assisting Conversations in a Healthcare Network

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**Abstract.** Healthcare networks have been created to meet new health requirements. This new mode of organization gives healthcare professionals with different competences overall patient coverage. The aim of this study was to define tools supporting cooperation between these professionals. An ethnographic study on a healthcare network carried out during a period of one year has helped to understand how these networks function and what their requirements are. In this paper, we present the network studied, and describe a theoretical framework which can be used to analyze its activities; we focus in particular on the transactions taking place during face-to-face meetings, and we conclude that in order to cooperate efficiently, professionals need a coordination tool which is more than just an electronic patient file. We end this paper by suggesting guidelines for computer-supported cooperative activities in the field of healthcare networks.

**Keywords:** Healthcare network, CSCW, ethnographic study, conversation

## Introduction

The growing specialization of health professionals has given rise to an increasing need for cooperation between the various healthcare professionals dealing with the same patient [1]. To meet these needs for integrated, coordinated teamwork, a new mode of organization is emerging: the healthcare network. However, integrated patient coverage involves more than simply coordinating the contributions of medical, psychological and social specialists working side by side. Coherence is required in order to give patients really relevant overall coverage. The electronic patient's file, which is often the first step in computer-supported medical work, makes it possible to share data about patients and their treatment. It promotes coordination between several health professionals by allowing each of them, for instance, to know what the others have done for a patient. But pooling patient files does not make it possible for professionals to communicate with each other and therefore does not promote cooperation between all the disciplines dealing with a patient at the same time. The aim of our present research is to define tools for computer-supported cooperation in healthcare networks. We are particularly interested in collective coverage, which goes beyond data and information sharing. This joint approach to healthcare is one of the goals of the RPM network (Réseau Pôle Mémoire in French, which means Memory Pole Network),

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which we studied for one year. In this paper, after briefly presenting the RPM network, we describe the Theory of Symbolic Communicational Transactions, which is the theoretical framework adopted to analyze its activities. We then present our analysis of the network and our initial results, before suggesting some design principles for computer-supported RPM activities. Lastly, we describe how our work links up with other research on computer-supported medical activities.

## **1. Case Description: the RPM network**

The term “Healthcare network” involves being “centered on populations, on the scale of a district or of a city. These networks developed at the same time a medico-psycho-social coverage of people, and a public health or community health activity. They associate the local public utilities, health professionals and associations in projects of diagnosis, prevention, and training. They are generally not-for-profit associations”<sup>2</sup>. The ageing of the population in industrial countries the failure to detect cognitive disorders in the early stages, and the wish to treat these pathologies in a cooperative way involving different professions were the main reasons for creating this network. The main objective of RPM is to improve the medico-psycho-social coverage of people suffering from memory disorders. Its members are now negotiating with URCAM (Union Régionale des Caisses d’Assurance Maladie in French, which means Regional Union of Health Insurance Funds) to obtain funds for the network. Other initiatives have also been launched to find money to help the network.

RPM is a non-for-profit association composed of 190 members who are all health professionals interested in setting up the network. According to the statutes of this association, “including mainly private health professionals, as well as hospital workers and other actors in the medical and social fields the objective of the association is to promote and carry out all activities such as prevention, care, services, training and research for the benefit of elderly people suffering from cognitive disorders inhabiting Troyes and the surrounding area” (translated from the French statutes). The specialties of these 190 health professionals were as follows: 4 Neurologists, 3 Psychiatrists, 12 Gerontologists, 98 General practitioners, 20 Speech therapists, 13 Psychologists, 2 Nurses, 1 Auxiliary, 10 Institutional representatives, 4 Users representatives, 23 Others (social centers, mutual insurance company, local information and coordination center representatives). One of the main roles in the network is that of the coordinator: the present coordinator is a neuropsychologist who plays her own professional role as well as role of coordinator, which consists in supervising the patients’ follow-up.

The objective of improving the medico-psycho-social coverage of people suffering from memory disorders can be defined more specifically as follows:

- First, the network members want to reduce the time taken to reach a diagnosis in order to be able to act fast and thus to slow down the progression of the disease as early as possible; this point is particularly critical in the case of Alzheimer's disease.

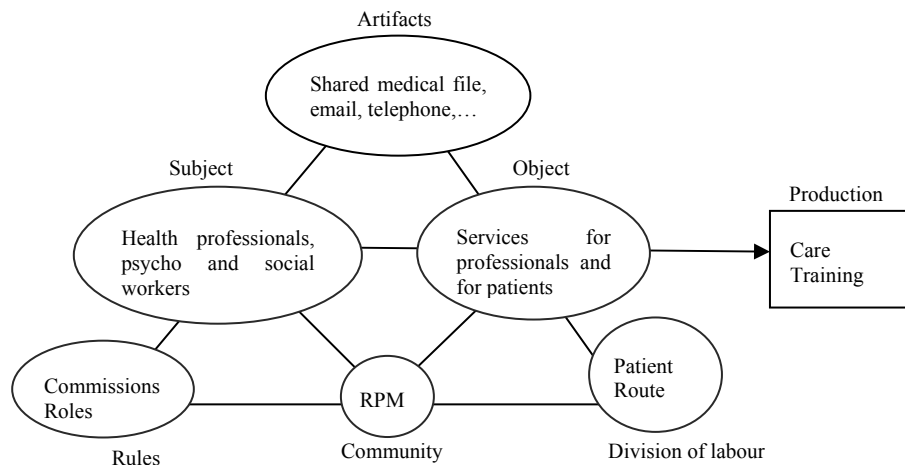
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<sup>2</sup> CNR (Commission Nationale des Réseaux in French, which means National Networks Commission) - <http://www.cnr.asso.fr/presentationCnr/presentation.htm>

- The network plans to provide complete coverage of patients, so that they can benefit from full medico-psycho-social assistance.
- Finally, the assistance of those close to the patient is very important in mental diseases of this kind, and the network also wishes to help families having to cope with the problems involved when these pathologies occur in their midst.
- Training is another network commitment because health professionals must be able to update their knowledge and improve their practices.

One of the more implicit but necessary objectives for the successful functioning of the network is to abolish all hierarchical barriers between the various members. Efficient communication and cooperation between members will only be possible if everyone is listened to in the same way, whatever their skills and their role in dealing with patients.

In activity theory terms ([2], [3]), RPM can be depicted as in figure 1.



**Figure 1.** The activity system for RPM

Activity Theory framework clearly defines the various concepts mobilized by the RPM network. However, although this theory provides a general analytical framework, none of the underlying models can be used to perform a close analysis focusing on the interactions between members, which are “sense -creative” within a collective. We therefore now propose a more fine-grained theoretical framework.

## 2. Issues and theoretical framework

### 2.1. Issues

Upon observing RPM meetings, we noted that in many cases the conversations were not task-centred. Designers defining Information Systems often ignore exchanges of this kind and focus on information management functions relating directly to the

ongoing task. What is produced during these conversations is therefore generally neglected. In fact, if we are interested in the provision of services, since all conversations are value-creative, they must be taken into account when analyzing collectives [4]. In order to identify and qualify these conversations, we used the Theory of Symbolic Communicational Transactions, according to which transactions are by definition sense-creative. This analytical framework includes a model distinguishing between the four different modes of regulation involved in transactions, which are presented below.

## *2.2. Theoretical framework: Theory of Symbolic Communicational Transactions*

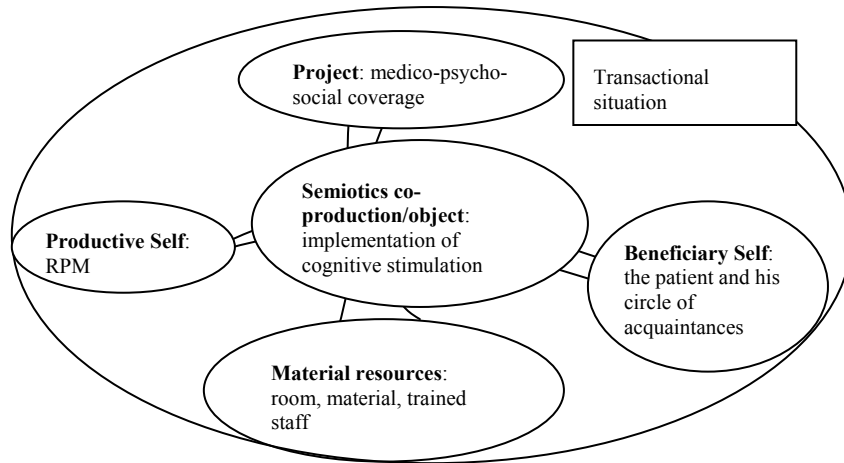
Symbolic Communicational Transactions have been defined by Zacklad [5] as “interactions between actors cognitively interdependent allowing them to create new meanings to reduce their mutual uncertainty in their activity management. Creating meaning consists in sharing knowledge to develop representations, attitudes or affects which the value is cemented by a mutual grip of commitment” (translated from [6]). Creating new meanings is a major step in RPM. The exchanges between its members allow each of them to become aware of various aspects of the pathologies in question. They can then develop common or shared representations. In addition, the actors have to define cooperative practices, which are not yet existent because the network is still in the early stages. We have classified interactions between RPM members as Symbolic Communicational Transactions.

According to Dewey et al [7], transactions, which differ from interactions, characterize creative meetings at the end of which a new production is achieved and each actor has been transformed (in other words, interactions do not lead to original production or the transformation of the actors). In the present study, we will not use “interactions” with this particular connotation because this does not fit the meaning of symbolic interactionism, for example<sup>3</sup>. We will use the term “interactions” to denote behaviour associated with the exchanges which take place at meetings without the creative suggestions.

Moving away from this terminology, we now oppose routine transactions and creative transactions. Unlike the production of routine transactions, which is largely standardized, creative transactions involve the production of both an original (semiotic or material) “work” and “selves” (Figure 1 in [4]). Selves can be either individual or collective, and the producers of transactions can be either different people or the same person engaged in an internal dialogue<sup>4</sup>. Symbolic Communicational Transactions become effective in the context of transactional situations, which are made up of different constituents, as described in the RPM context by the example shown in figure 2.

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<sup>3</sup> Dialogue is here largely considered. Indeed, preparing oneself a good meal is a transaction too.



**Figure 2.** An example of an RPM transactional situation: the implementation of cognitive stimulation

The modes of regulation involved in transactions are defined by crossing the transaction focus (on work or on self) with the degree of reflexiveness of the transactions (introspective or extrospective) (table1). The extrospective degree of reflexiveness is that occurring in quite concrete actions, such as the way people get organized to work together. For instance, the patient route (figure 3) is an extrospective function which tells RPM members who does what and in what order; here we could speak about coordination. The introspective degree of reflexiveness is much more abstract. It relates for example to ethics and people’s interest in working together. Focusing on the work or on the self means focusing on care or on the members of the group.

**Table 1.** Four modes of regulation- SEPI matrix (new version of OSIR matrix [5])

	<b>INTROSPECTIVE</b>	<b>EXTROSPECTIVE</b>
<b>SELF</b>	<p style="text-align: center;"><b>Socio - Relational</b></p> <p>Regulation centered on explicitation of the conditions of relations’ development between productive self(s) and beneficiary(ies) in the structural and personal dimensions</p>	<p style="text-align: center;"><b>Politico - Organizational</b></p> <p>Regulation centered on explicitation of the relations between selfs (productive and beneficiary) towards the collective functioning allowing the semiotic production</p>
<b>WORK</b>	<p style="text-align: center;"><b>Epistemic</b></p> <p>Regulation centered on the conditions of realization of the semiotic production from the points of view of the explicitation of the common necessary representational basis, required instruments, and functioning rules</p>	<p style="text-align: center;"><b>Instrumental</b></p> <p>Regulation centered on the explicitation of measure criteria for the evaluation of the semiotic production</p>

In other words, the socio-relational mode of regulation deals with understanding others and their needs; the politico-organizational mode concerns the way people share out work; the epistemic mode of regulation relates to definition and coverage in healthcare network settings, and the instrumental mode of regulation concerns pooling patients' data.

Table 1 suggests that we could define the information management functions corresponding to each mode of regulation. Analyzing the interactions between RPM members in the framework of these modes of regulation will therefore make it possible to identify more quickly the functions of a tool supporting RPM activities. In designing an Information System for a healthcare network, it is necessary to fulfill at the same time needs related to each of the modes of regulation, and needs in terms of flexibility, so that the members of the network quickly and easily reconfigure their workspace according to the current mode of regulation. Taking all possible types of transactions types into account in Information System design makes it possible not to neglect conversations which are not directly connected to the task in hand.

The Theory of Symbolic Communicational Transactions is an analytical framework which can be used to define and identify the various interactions occurring in the RPM Network. This analysis includes the conversations which constitute the main observable cooperative activity of the network. It is now proposed to present the RPM analysis.

### **3. RPM Analysis**

We conducted an ethnographic study, which “describes a social setting as it is perceived by those involved in the setting” [8]. In addition, we contributed considerably to setting up the network by being present at the actors' side when they needed support, especially computer support. Furthermore, we actively participated in the IT commission by proposing a method enabling the participants to specify their needs exactly. In this way, although we joined the network simply as observers, we were also involved in designing the Information System in order to support their cooperative work. However, this was rather a difficult position, because we are not the usual actors: only health professionals or social professionals normally take part in the network.

The aims of the network, as well as the way it works, are defined by its members at meetings of various kinds:

- “Staff” meetings, which are attended by fifteen people or so on average, give participants an opportunity of presenting complex cases. Depending on their specialties, the other participants ask questions and suggest solutions or give advice about care and patient coverage. The composition of the staff can change at each meeting.
- Commission meetings:
  - The practical commission, which includes fourteen people, meets once a month. This commission is attempting to define good practices so that professionals can refer to specific documents and act accordingly. These practices can evolve with time and experience.
  - The assessment commission consists of four people responsible for defining quantitative and qualitative assessment criteria, as well as procedures for

collecting the information needed for assessments. This commission has not yet met.

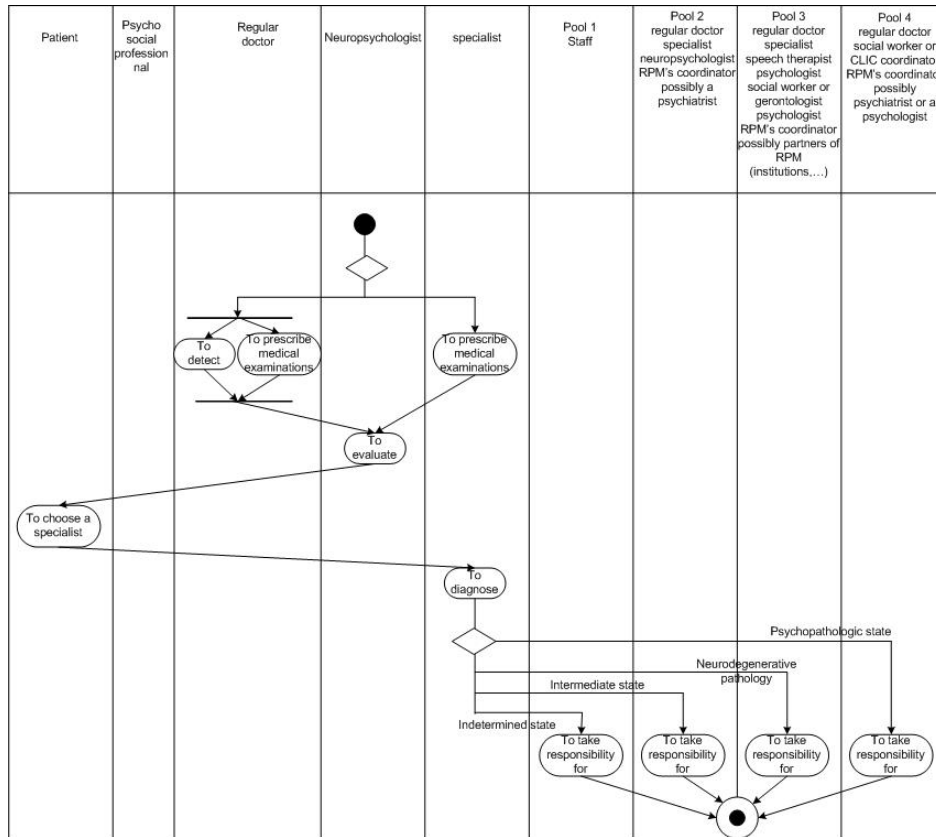
- The IT commission, which meets once a month, consists of six people. It is responsible for drafting the functional specifications of the Information System. The requirements are determined via the patient route.

Whatever the agenda of these meetings may be, the aims of the network, its role and its limitations are also often discussed.

Members of the RPM also meet each other at training sessions. For example, twenty-seven participants are taking part in a scheme to train speech therapists and psychologists to use methods of neuropsychological assessment. Three training meetings for general practitioners have also taken place, each of which was attended by ten general practitioners on average. At these training sessions, participants learn how to perform three simple tests. These tests make it possible to rule out possible pathologies, depending on the signs observed, and to confirm certain fears or intuitions. A general practitioner trained in this way will be able to decide whether his patient should undergo further investigations. In this case, the patient can consult the network and follow five steps (figure 3):

1. The first step, named “detection”, is an initial filter. It sorts out patients who require a detailed assessment and those who do not.
2. If the patient needs a more detailed assessment, the patient can choose which of the neuropsychologists will carry out this test.
3. Depending on the test results, the patient will then choose one of the specialists, who can be a neurologist, a gerontologist or a psychiatrist.
4. The specialist diagnoses the pathology exactly and prescribes an appropriate treatment. The patient’s regular doctor, who will follow the patient, will be free to adapt this treatment as required.
5. At the end of these steps, the patient is examined by a team of health professionals. If the diagnosis is psychopathology, the team will be composed of the regular doctor, a social worker or a coordinator of a CLIC (“Centre Local d’Information et de Coordination” in French, which means Local Information and Coordination Center), the RPM coordinator, and maybe a psychiatrist or a psychologist. If the diagnosis is neurodegenerative pathology, the team will be composed of the regular doctor, a specialist, a speech therapist, a psychologist, a social worker, a gerontological psychologist, the RPM coordinator, and possibly other network partners. If the diagnosis is intermediate, the team will consist of the regular doctor, a specialist, a neuropsychologist, the RPM coordinator, and maybe a psychiatrist. In the case of an undefined condition, the patient’s situation is discussed at a staff meeting.

This patient route implemented in the network reduced by four months the time elapsing between the first contact with the patient and the treatment of this patient. In order to act fast during the first few steps on the route, neuropsychologists and specialists reserve slots in their schedules. Patients can therefore obtain appointments much more quickly than is normally the case. Thanks to the five-step procedure described above, professionals in the network meet only people with real needs.



**Figure 3.** Patient route in RPM

On the above patient route (figure 3), it can be noted that a patient often changes health professionals. These professionals, especially those working together in pools, need more than just sharing access to patients' data; communication is essential, and conversations are necessary for RPM to function well. In fact, the first steps on the patient route could be assisted by a workflow, since the procedure has been well defined. Some information exchanges take place between professionals: for example, the assessment report is sent to the patient's regular doctor and to a specialist, when it is necessary to pursue investigations. But once they have been integrated into the healthcare network, patients are followed by the whole team of professionals (called the pool), which becomes responsible for them. The pooling of data does not suffice here. In fact, each case is quite different, and professionals have to cooperate to treat each patient without being able to follow a pre-defined procedure (such as that available in the early stages, before diagnosis). Actually, the only means at their disposal are the telephone and email, which do not satisfy the need for effective cooperation and properly processing the questions which arise while treating a patient.

### 3.1. Corpus collection and analysis

In order to understand exactly how the RPM functions, we decided to attend all the meetings listed above. During one year, we therefore watched and filmed most of these meetings. The assessment commission has not yet met and the IT commission does not deal with medical or organizational issues. It therefore did not seem to be relevant to film the meetings of the latter commission. Ten meetings, lasting around one hour and a half each, were filmed and now being retranscribed. In addition, retranscriptions of ten meetings which took place during previous years before the RPM association was officially set up were incorporated into the corpus.

We processed the corpus using the NVivo<sup>5</sup> software tool, which makes it possible to manage a set of independent documents in the context of the same project. It gives overall results on the whole project, aggregating the analysis carried out on all or some of the documents associated with the project. We coded the corpus according to the theoretical framework adopted: modes of regulation (cf. SEPI matrix in table 1) from the Symbolic Communicational Transactions Theory.

From the operational point of view, RPM activities can be classified as follows: cooperative activities correspond to socio-relational, epistemic and instrumental modes of regulation, and coordination activities correspond to the politico-organizational mode of regulation. It was then proposed to identify the various modes of regulation in the corpus, noting which modes occurred most frequently, and to note any changes from one mode to another. Here we present the initial results obtained, which focus on the identification of the modes of regulation. To handle this corpus, we needed to define how to identify the modes of regulation encountered. It was decided to associate each mode with types of face to face interactions, as illustrated in table 2.

**Table 2.** The SEPI matrix applied to RPM activities

Reflexiveness degree Focus	Introspection	Extrospection
Self	<b>Socio-relational</b> <i>(reaffirming the network objectives, creating a collective identity)</i> to join to describe an experience	<b>Politico-organizational</b> <i>(establishing how to work together)</i> to define good organizational practices
Work	<b>Epistemic</b> <i>(defining care within RPM)</i> To define good health care and ethical practices	<b>Instrumental</b> <i>(defining the global patient coverage)</i> to describe a situation (a patient case) to ask for additional description of the situation to suggest a solution

<sup>5</sup> NVivo (2002). QSR's software. <http://www.qsrinternational.com>, July © 2002 QSR International

In the socio-relational mode of regulation, “to join” refers to the interactions which lead to re-defining the objectives of the network, or creating a collective identity within the RPM. “To describe an experience” corresponds to a professional helping others by explaining a way of handling a problem. In the epistemic mode of regulation, “to define good health care and ethical practices” means attempting to define new practices making for better healthcare. In the instrumental mode of regulation, “to describe a situation” corresponds to professionals explaining patients’ cases to give an overall picture of the problem. “To ask for additional description of the situation” always occurs after a “to describe a situation” interaction and helps professionals who do not know the patient to understand the case. “To suggest a solution”, which is also an interaction which occurs after “to describe the situation”, generates the giving of advice. In the politico-organizational mode of regulation, “to define good organizational practices” means defining the distribution and organization of work. To illustrate these categories, we quote the following three corpus extracts.

**Table 3.** Corpus extracts and their qualitative definitions.

<b>Corpus extracts</b>	<b>Qualitative definition</b>
<i>He’s an 80-years-old patient, who suffers from Alzheimer’s disease. He’s diabetic and suffers from hypertension.</i>	<b>To describe a situation</b>
<i>Why did he arrive here?</i>	<b>To ask for additional description of the situation</b>
<i>It’s a familial reconciliation. He has his children here.</i>	<b>To describe a situation</b>
<i>Advising him to go to Arcades for example? Could we make him do any activities?</i>	<b>To suggest a solution</b>
<i>In a few words, take time to do tests and we’ll not need the network...</i>	<b>To join</b>
<i>So the network has to be here. It’s going to say « let’s do this or that, we have to hurry up, etc... »</i>	<b>To join</b>

### 3.2. Initial results

Thirteen meetings have been retranscribed so far, forming a written corpus. Table 4 gives a break-down of this corpus. It indicates the number of speech turns/written characters devoted by each professional to each activity. Table 5 gives the distribution of these transactions according to the modes of regulation.

**Table 4.** Number of speech turns / Number of characters according to the activity and the profession

Profession Activity	Regular doctor	Neuro- logist	Psycho- -logist	Speech therapist	Geria- trician	Social worker	IS or manage- ment consul- tant	total
to define good orga- nizational practices	41 / 2176	80 / 5567	63 / 5525	13 / 1115	5 / 286	0	184 / 24798	386 / 39467
to join	54 / 10320	40 / 8849	15 / 2472	1 / 22	4 / 742	11 / 1938	45 / 8156	170 / 32499
to describe the situation	84 / 16200	81 / 12998	49 / 8234	91 / 15429	0	0	0	305 / 52861
to ask for a complement of description of the situation	5 / 224	61 / 2702	14 / 603	7 / 239	0	0	7 / 304	94 / 4072
to suggest a solution	4 / 595	25 / 3718	14 / 1893	6 / 542	0	0	6 / 875	55 / 7623
to define good health care and ethical practices	29 / 3696	48 / 9981	33 / 6696	42 / 4963	3 / 505	0	17 / 2893	172 / 28734
to describe an experience	15 / 6083	14 / 7289	7 / 284	8 / 1534	0	0	1 / 69	45 / 15259
Total	232 / 39294	349 / 51104	195 / 25707	168 / 23844	12 / 1533	11 / 1938	260 / 37095	1227/ 180515

**Table 5.** Number of speech turns / Number of characters according to the modes of regulation (SEPI matrix)

Degree of reflexiveness Focus	Introspection	Extrospection
Self	Socio-relational mode of regulation 215 / 47758 (18% / 26%)	Politico-organizational mode of regulation 386 / 39467 (31% / 22%)
Work	Epistemic mode of regulation 172 / 28734 (14% / 16%)	Instrumental mode of regulation 454 / 64556 (37% / 36%)

Based on this analysis, it can be concluded that:

- 37 % of the speech turns were in the instrumental mode of regulation, that is to say, they were devoted to working out patients' global coverage. They amounted to 36 % of the whole corpus,

- 31 % of the speech turns corresponded to defining organizational practices, They amounted to 22 % of the corpus,
- 18 % of the speech turns or 26 % of the corpus corresponded to the socio-relational mode of regulation,
- 14 % of the observed speech turns, amounting to 16 % of the corpus, corresponded to the epistemic mode of regulation.

These results support the idea that even conversations which are not directly related to problem-solving play a relevant role in the life of the RPM; they should therefore not be neglected and must, on the contrary, be taken into account in designing a tool favoring cooperation within the network.

For instance, in the case of pool work, professionals have to follow up patients in the course of their everyday practice. They also have to decide together whether it is necessary to change the treatment and whether the patient needs psycho-social advice. This type of activity cannot be reduced to a formula, since each case is unique. Professionals therefore have to define new cooperative practices. During a staff meeting, a psychologist speaks about this problem in these terms: “at a more general level, I would like to speak about this... Well, about the treatment given by the neuropsychologist or speech therapist (those belonging to the pool)... What are we going to do?” Not only conversations, but also transactions are creative, since they have effects on the actors and on the situation, which are both changed as a result. We intend to support these same processes by providing a new medium other than the telephone and email. Supporting these activities by providing a computer tool seems absolutely necessary to enable health professionals, who are often remotely located and not always available, to follow up their patients in an asynchronous way. Besides, it would certainly be interesting to be able to trace previous exchanges in order to make full use of the information available and to be able to assess the efficiency of the work carried out by the network.

Furthermore, interactions between RPM members depend on various activities being organized and carried out. We therefore propose to develop a flexible Information System for the RPM, enabling its members to interact according to the four SEPI modes of regulation, and to shift from one mode to another. In table 6, we suggest some features characteristic of each of the four modes. For instance, global patient coverage requires collective decision-making and the pooling of patient data. Training requires learning activities to be organized, and defining good practices can require the cooperation of editorial staff and document sharing activities. Dialogue functions as well as document sharing and coordination functions both seem to be necessary for the network to function efficiently. The re-defining of the network identity, which was a recurrent theme in discussions between professionals, could be supported by tools facilitating dialogue. However, dialogue may not suffice to deal with the identity issue. This is a broader issue, in our opinion; it has been dealt with by Wenger [9], who introduced the idea of “communal identity” or “belonging and relationship” which make the stable functioning of networks possible. This point has also been discussed in the field of healthcare [10].

**Table 6.** Information management features related to the SEPI matrix

Reflexiveness degree	Introspection	Extrospection
Focus		
Self	<b>Socio-relational mode of regulation</b> Communication features	<b>Politico-organizational mode of regulation</b> Coordination features
Work	<b>Epistemic mode of regulation</b> Collaborative documents drafting Sharing of documents	<b>Instrumental mode of regulation</b> Patient data sharing Collective decision-making Learning

We now intend to collect all these features together to create a coherent set. However, it is important to keep in mind healthcare professionals' current attitudes, and to wonder whether they are willing to change their working habits. Would they be satisfied with completely computer-mediated relationships when they have chosen professions dealing with human beings? Some of them may be open-minded to technological change and be willing to adapt their practices to more efficient tools, but the risk has to be faced that others may feel less like becoming involved in these systems and even completely refusing to have anything to do with them. We must therefore find a balance, when it comes to introducing technologies which are essential to networking. Innovations such as the shared medical file or the workflow and the shared diary might be more acceptable, since they would obviously save a considerable amount of time without fundamentally changing professional practices, which already include filling in individual patient files. The issue of mediating meetings is still an open question: mediating them technologically would allow a larger number of professionals to participate, but this would mean making radically changing current practices. The question therefore arises as to how to support key meetings without risking a loss of motivation on the part of the professionals involved.

In this study, the specificity of the collective on which we focused led us to use the SEPI matrix originating from the Theory of Symbolic Communicational Transactions. It is now proposed to see how our research links up with other developments in the field of computer-supported medical activities.

#### 4. Related work

Several analyses of activities in a healthcare network setting have been published, which help to understand occupational situations involving professionals with various competences. For instance, Bossen [11] has developed an analytical framework based on seven parameters forming a "common information space". Wolf et al [12] have defined a procedure which consists in answering eight questions, to guide the analysis and to show up possible interactions with other tasks. Four other questions can be used in which individual work is viewed as being integrated into a collective process. However, these analytical frameworks focus on existing situations. In the case of the RPM network, these cooperative situations do not exist for the moment, because the

network is in the preliminary phase, where the rules are still being defined by its members.

Concerning the involvement of the final users, we agree with Ruppel et al [13], who suggest that strong involving the end users makes for a better-quality final application, and better acceptance, particularly in the case of collaborative systems. In fact, the RPM members already participate actively in the definition of their Information System by explaining their needs and expectations. Our own contribution is restricted to giving advice and technical support. The RPM members will have to manage on their own the implementation of the system in collaboration with the firm developing the software program.

Another key point about cooperation and coordination between distributed professionals is knowledge sharing. Kindberg et al [14] suggest distinguishing between several types of knowledge: data, domain (specific vocabulary and particular competence), other people (their knowledge, their competences, their needs). The professionals in the RPM network want to share the data they have on their patients, and to exchange specialized knowledge, mainly by referring to specialists to improve their practice. They try to continue learning from others by inquiring about their profession and their tasks. They therefore know what to expect of their colleagues and who possesses the information they need to be able to deal with their patients. Kindberg et al [14] have also insisted on the value of knowledge, which can vary depending on the moment, or the professional involved. The effort required obtaining or transferring knowledge can be measured, and decisions can be made accordingly.

As far as the technologies used by health professionals are concerned, we have observed that many of them, whether they are private or hospital practitioners, use electronic files individually to record information about their patients. For the moment, apart from some hospitals where research activities are conducted, most of the files which are used collectively are paper based. This was pointed out in a paper [15] where the authors explain that hospital professionals use many collective paper documents. In order to improve this practice, these authors suggested introducing a documentary approach, and were particularly interested in developing means of annotating the electronic patient files. Several tools have been developed with a view to meeting the need for professionals to work on cooperative lines on each patient's case. Kindberg et al [14] have suggested implementing a "timeline view" giving good visibility as to who does what, and when. We intend to integrate this feature into the future RPM system. Bardram [1] proposed a tool called the "patient scheduler", consisting of four modules, each associated with one kind of cooperative activity: (1) an organizational module, (2) a module handling communications, (3) a module handling planning and scheduling, and (4) a sharing module. Calde et al [16] suggested producing a tool centered on roles, where each role corresponds to a personalized module based on a filter on the patient's data. This seems to be an interesting approach; we have already analyzed the various profiles occurring in the network, and we could possibly design interfaces dedicated to each profile.

Finally, the issue of supporting interactions has been discussed by Hardstone et al [10]. These authors mention that numerous informal discussions take place between health professionals and that they constitute necessary steps towards caring for patients and organizing the caring process. This was also found to be the case in the RPM, where a quarter of all the conversations recorded subscribed to the socio-relational mode of regulation.

## 5. Conclusion

We observed the RPM during a period of one year and analyzed its activities, using the Theory of Symbolic Communicational Transactions. This method was used to classify the transactions occurring in this healthcare network on the basis of four modes of regulation: the socio-relational, epistemic, politico-organizational and instrumental modes. We observed that a quarter of all the face-to-face exchanges occurring during RPM meetings belonged to the socio-relational mode. Their content did not relate directly to healthcare or organizational tasks, but these exchanges seem to be essential because they create a common sense of identity between all the members having different professions, and enable them to get to know each other better. We therefore feel it is necessary to support these transactions in order to promote cooperation and integrated care in the everyday activities of the network. Another point worth noting was the fact that switches between modes of regulation occur commonly at meetings. We can then conclude that an Information System for this healthcare network must also make provision for conversations, and that it must be sufficiently flexible to allow professionals to re-configure their interface, depending on the modes of regulation and the switches occurring between them.

We are also involved in another network, Addica, which is in a much more advanced stage because it exists officially since the year 2001. Addica deals with addictive practices (drug, alcohol and food abuse). Based on these parallel analyses on two networks, which differ in their age, their size, and the field of interest, it will be possible to check whether the findings made in our analysis of the RPM network are applicable to another network. We could then define generic principles for designing flexible Information Systems to support these particular communities, namely healthcare networks.

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