

Communities of Action: a Cognitive and Social Approach to the Design of CSCW Systems

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ABSTRACT

Most current theories about collective cognitive activities in limited groups apply to structurally closed co-operative situations. Here we propose to work in the framework of intellectual transactions and communities of action theory with a view to describing and designing CSCW systems which can be used in more structurally open situations. First we compare this approach with other theories of collective cognition (such as those focusing on situated cognition and communities of practice, distributed cognition and coordination mechanisms). We then present the core concepts involved in defining communities of action, the duality of goals and forms of knowledge and the operational, strategic, integrative and relational categories of collective activity on which the OSIR model is based. We conclude by presenting as an example the application of the model to a research project designed to assist the setting up of a health network.

Categories and Subject Descriptors

K.4.3 Organizational Impacts - *Computer-supported collaborative work*, H.4.1 Office Automation – *Groupware*, I.2.6 Learning – *Knowledge acquisition*

General Terms: Management, Design, Human Factors

Keywords: Co-operation, collective cognition, design, co-operation technologies, health network

1. DESIGN BASED ON COLLECTIVE COGNITION THEORIES

Research in CSCW has often made use of theoretical ideas about the nature of collective activities to specify the functionalities of the support systems. Some of the most frequently quoted theories of this kind are the theories of situated action (Suchman, [20]), communities of practice (Wenger [22]), distributed cognition (Hutchins [9]), and studies on co-ordination mechanisms and “articulation work” (Schmidt and Simone [18]). However, it is worth noting that each theory of collective activity deals with situations of a specific kind and that none of them are easily applicable to other situations.

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For instance, the models and theories of collective cognition developed in the fields of ergonomic psychology and cognitive science have been based on work settings which are fairly complex but usually quite restricted, such as those involved in the piloting of planes and boats [9] or air traffic control situations [16]. In these situations, the actor can usually transform neither the organisational framework, the structure of the group, the roles of its members, nor the functional characteristics of the tools available, such as the software programs used in the piloting operations.

Rather than these situations that we have qualified as “structurally closed”, we are interested here in more structurally open situations in which the actors have the possibility of bringing about changes not only in the social structure of the relationships inside the group and in its internal organization, but also at the technical level, by changing the parameters of the program (changing the indexation of documents, the access rights, the directory, etc.). These more open situations correspond to most collective design situations in professional environments, on which many studies have been carried out [4], as well as to most intellectual professions involving collective activities.

In this paper, after defining cooperative activities, we will compare several current theories of collective cognition before presenting the theory of intellectual transactions and communities of action intended to guide the design of cooperation technologies in structurally open cooperative situations. The applications of this theory will be briefly illustrated by describing an ongoing research project in the field of health networks.

2. COOPERATION AND STRUCTURALLY OPEN SITUATIONS

2.1 A definition of cooperative activities

One of the specificities of our present research is that it is based on an original definition of cooperative activities, which differs somewhat from the definition given, for instance, by K. Schmidt and C. Simone in the field of CSCW. According to these authors, “Cooperative work is constituted by the interdependence of multiple actors who, in their individual activities, in changing the state of their individual field of work, also change the state of the field of work of others and who thus interact through changing the state of a common field of work” ([18], p. 158). The problem with this definition is that it also applies to strictly standardized activities in which the members of the group are aware neither of the common goals nor of the activity of their partners, as occurs, for example, in the case of an assembly line or among the users of

an airplane reservation system cooperating via the system, as in the example given by K. Schmidt and Simone in their 1996 article.

Here we will use the term cooperative activity, which is taken to mean a special kind of collective activity in which the actors are aware of both the goals pursued and the means deployed to achieve them, and in which the characteristics of the organization and those of the environment do not lend themselves to being strictly standardized. According to our definition, *cooperative activities are collective activities oriented towards goals in which the means of designing and attaining the goals are neither completely formalized nor standardized. The actors therefore have a significant amount of autonomy and are free to define their modalities of coordination and to adapt themselves to emergent situations.*

2.2 Intellectual transactions and coordination levels

To describe cooperative activities, we have developed the “intellectual transactions theory” focusing mainly on the role of linguistic communications in the analysis of collective activities (Zacklad [24]). In this paper, we will present an extension of this theory, the conceptual framework of the communities of action, which is a tool designed for the analysis of small groups working to achieve goals and to assist the design of distributed computer environments developed for this purpose.

The intellectual transaction theory originated at the meeting point between three disciplines: cognitive science, as described, for example, in the seminal work by A. Newell and H.A. Simon [13], research in organisational and management science, as represented by the work of H. Mintzberg [12] and A. Hatchuel [7] and research in social psychology of interactions, which goes back to G.H. Mead [11]. In our analytical framework, interactions occur between “*cognitively interdependent*” actors and can be described as “*transactions*” corresponding to “*a sharing of personal knowledge and to a reciprocal commitment*” [24].

These interactions are therefore primarily viewed here as an exchange, a sharing or a mutual gift not mainly involving objects but knowledge and confidence. Intellectual transactions are said to be epistemic when “*prevails the attempt to clarify personal knowledge allowing the third party to construct a common representation of the field of operation*” and relational when “*prevails the attempt to clarify the mutual commitment allowing the third party to reach a common representation of the roles and competencies*” (ibid, p. 208), although these two aspects are always indissociable. Before it is endowed with a monetary value, an intellectual transaction will first have a cognitive and relational cost. Intellectual transactions become material when standardization abolishes the “*personal knowledge and commitment of the actor*” and is reduced to a “*behavioural established sequence infinitely reproducible*” (ibid, p. 216).

Intellectual transactions can be defined in terms of the level of abstraction of the knowledge involved. Using the logic of inquiry theory developed by J. Dewey [5], we will compare interactions depending on whether they involve the use of “existential” or “universal” propositions. In the first case, the actors refer either directly to the constituents of the situation in question or to generalizations formed by induction on the basis of previously observed recurrent associations or routine actions. In the second case, the propositions are based on a more general cognitive

scheme, which serves as an interpretative framework to guide actions and to formulate hypotheses which are both more abstract and more hypothetical [24]. The use of these various kinds of knowledge in intellectual transactions provides another means of making the distinction between different levels of coordination in organized action. These coordination levels are as follows:

- Mutual perception: where the coordination is carried out by directly collecting and mutually exchanging information about the activities of the partners and their fields of operation. Intellectual transactions are mostly indexical (their meaning is anchored in the epistemic and relational characteristics of the situation under investigation).
- The standardization of the knowledge or the relationship: where the intellectual transactions on which the coordination is based are integrated into a routine program that assigns predefined roles to the actors and breaks down the field of operation and the procedure into normalized objects. At this level of coordination, most intellectual transactions standardize to some extent the objects and the roles and reproduce generic schemas which can be used to handle most of the daily situations arising. When extreme standardization of the interactions occurs, it leads to a “*resorption of the intellectual transactions*” into purely material transactions in which the actors are no longer personally committed (p. 216).
- The abstraction of the knowledge or the relationships: where the intellectual transactions refer to the principles and reasons justifying the transactions, which can be based on either technological and scientific knowledge about the field of operation or organizational (legal, managerial, psychological or social) knowledge relating to the actors and the group as a whole.

As we will see later on, these two different kinds of knowledge used by the actors involve different modalities of collective action, where either the tacit, situated aspects of action prevail or the more highly structured, rhetorical aspects that lead to building projects for the future and more systematically redefining the current modalities of organization or intervention in the field of work.

2.3 Comparisons with other theories of collective activity

Table 1 makes it possible to compare the theory of intellectual transactions with some current theories of collective cognition put forward in CSCW research. The first theoretical framework is composed of a combination between the situated cognition and community of practice frameworks. In line with some previous authors [10], we have associated the situated cognition paradigm [20] with that of communities of practice ([22], [2]). In these two approaches, the problem solving abilities of the individuals emerge from concrete, situated practices, while the material and social environment constitute the essential resources for the orientation of action and the knowledge mainly remains tacit and contextualized. The second theory is the theory of distributed cognition chiefly represented by the work of Hutchins [9]. The third is the conceptual framework of coordination mechanisms and articulation work put forward by K. Schmidt and C. Simone in the field of CSCW [18].

Table 1. A typology of the main theories of collective cognition

Theoretical framework	Situated action and communities of practice	Distributed cognition	Coordination mechanisms and articulation work	Intellectual transactions and communities of action
Favorite coordination process	The shared environment which is the context of the action, the social network formed through storytelling and mutual learning	Instruments which have crystallized previous domain know-how and contribute to propagating representational states within the cognitive distributed system	Via “ <i>coordination mechanisms</i> ” consisting of protocols and artifacts that correspond to reification of the articulation work	Via intellectual transactions (performed during communicative interactions) of various types (epistemic or relational), involving various levels of abstraction
Knowledge types used for coordination	Tacit, rooted in the environment of action, based on stories	Representational states which circulate between the members of teams via artifacts	No emphasis on the knowledge except during the designing of the coordination mechanisms, when some virtual categories may be implemented, depending on the field involved	Concrete knowledge (existential) or abstract (universal) about the field of intervention or the relationships involved
Collective types and favourite situations	Communities of practice committed in the sharing of tacit knowledge through socialization and narratives	A cognitive system distributed between artifacts and actors in contexts of co-presence cooperating in situations involving actions with short reaction times	Actors mutually dependent in the completion of tasks in fairly stable distributed production environments	Communities of action in cooperative situations which are structurally open in the long term

The theories of distributed cognition and coordination mechanism seem to be fairly complementary, although some of their epistemological postulates differ, especially as regards the possibility of accessing the cognitive activities of the actors. The first of these theories focuses mainly on the role of the instruments used in the coordination of collective action, and the second, on the role of specific artifacts, the “coordination mechanisms”, which reify the results of “articulation work”. In these two cases, the theoretical framework does not attribute a leading role to the linguistic interactions occurring between the actors or to the profound impact these interactions can have on the on-going design of work situations at the organisational and cognitive levels.

The theories of situated action and communities of practice are more open to learning situations, and they give the linguistic interactions between actors an important role, although little attention is paid to the details of the mechanisms underlying these interactions. However, the knowledge is mainly tacit in this framework. Storytelling is a mode of transmission based on case histories where the actors adapt their behaviour in the light of the lessons learned from experience, via a mainly analogical reasoning process. The learning occurs here on the basis of contextualized actions which it is difficult to generalize. Although these socio-cognitive mechanisms are also at work in any group under investigation, this analytical framework does not allow the actors to design original cooperative situations, especially in response to an explicit, purposeful collective project.

3. STRUCTURING PRINCIPLES OF COMMUNITIES OF ACTION

3.1 A definition

It is traditional in sociology to oppose the terms “community” and “associative” social relationships. According to Weber [21], “*communalization relies on the subjective feeling of the two parties to mutually belong to each other and to be fully committed in the existence of the other*” as in the case of “*the family, the parish and the neighbourhood, the military fraternity, the trade union, the religious brotherhood, the love relationship, school, university*” ([14] p. 107). By contrast, associative relationships “*result from a will or rational and interested motives rather than an affective identification*” (ibid p. 107).

In the conceptual framework of communities of practice, primacy is given rather to the community relationship. But although the minimum social system that we are attempting to define does possess some of the characteristics of communities, such as long-term collective activities, the development of a common language, and mutual learning in the course of action, it also possesses some characteristics typical of the associative social relationship, such as the “voluntary” nature of the association between the members and the importance of defining “common goals” to direct the collective activity, which make this activity more “rational”.

As mentioned above, it is proposed here to give the social system we are attempting to characterize the generic name “community of action”, so as to avoid the traditional opposition between community and associative relationship when dealing with small groups which actively and thus to some extent rationally pursue explicit goals while relying on a tightly woven fabric of

Table 2. The categories of collective activity in a community of action as defined in the OSIR model

	Existential (local, situated) knowledge: indexical IT	Universalizing (global, abstract) knowledge: abstract IT
Services goals (epistemic IT)	Operational Activities <i>Performing the tasks corresponding to services goals and short term regulation loops</i> [epistemic coordination via mutual perception and standardization]	Strategic Activities <i>Constructing the external goals, the environment and the clientèle, middle and long term planning</i> [epistemic coordination via abstraction]
Integration goals (relational IT)	Relational Activities <i>Constructing the social network and the identities of the partners (e.g. « storytelling »)</i> [relational coordination via mutual perception and standardization]	Integrative Activities <i>Constructing the organization, the legitimate actors, the decision procedures</i> [relational coordination via abstraction]

relationships to promote mutual sympathy and the mimetic learning that is assumed to characterize primary groups and communities of practice. Although the continuous activity of communities of action certainly allows their members to benefit from partly tacit shared knowledge, these communities are also intended to develop an explicit, systematic body of knowledge which can be used to extract the know-how and the informal relations required to be able to recurrently redefine both the nature of the services they are supposed to provide and the internal organization on which they rely in the context of structurally open cooperative situations. We will now outline some of the essential characteristics of communities of action.

3.2 The duality of goals

The principle of the duality of goals is based on the sociology of action as described by T. Parsons [15]. Although this theory has been criticized because it is excessively conceptual and systematic, some of its formal aspects seem to be relevant (see [25] for a discussion with special reference to the work of Parsons). A community of action has to work towards two kinds of goals simultaneously: (i) transforming an external situation obeying economic or activist principles, for instance, and (ii) constructing an internal social milieu allowing its members to develop mutual knowledge and identities while enjoying mutual sympathy; this does not rule out the occurrence of confrontations which can be animated but are carefully regulated. The goals of the first kind, that we call “services goals”, tend to be reached as the result of epistemic intellectual transactions between the members, whereas those of the second kind, that we call “integration goals”, rely on relational transactions.

One essential point worth mentioning is that neither of these types of goals is given priority over the other. Unlike the reasoning inherent to economics and some branches of management science, according to which the organization is a means of reaching external goals defined in terms of their efficiency and suitability for the objectives of the general management, we do not assume here that the internal goals systematically serve external goals. Although this configuration can occur, the opposite configuration involving the use of external goals to serve internal goals is just as likely, as is the occurrence of a coherent equilibrium between these two kinds of needs and goals. The main incentive of a community of action could therefore be to reach “integration

goals” with a view to developing an internal network of relationships and knowledge. In this case services goals seem after all to be a kind of pretext or a means of finding the resources required for internal action.

3.3 The duality of the forms of knowledge

The duality of knowledge forms directly reflects the coordination levels involved in intellectual transactions and fits the distinction borrowed from J. Dewey (1938) between (1) existential propositions, which describe singular events and their organization into genres, and (2) universal propositions, which can be defined in terms of the mode of action of the existential material involved (and are hypothetical because they are abstract. This duality can also be compared with recent ideas in ergonomic psychology about the levels of regulation of activity ([8], [15]). According to Hoc, there are three levels of regulation (1) based on conceptual knowledge (2) based on rules and (3) based on automatisms. The first kind corresponds to universal knowledge, and the others to existential knowledge. The activity of dynamic process supervision described by this author is controlled by a “recurring representation” of the situation which includes three facets “(i) a representation of the process and of its goals (...), (ii) a representation of the possible actions (...), and (iii) a representation of the available resources (...)” (p. 126).

This evolving representation is fed both by the perception of the environment during on-going actions and by the general ability of the operator to interpret the incoming perceptual information (in the light of his own knowledge). Automatic knowledge is involved in short term regulation loops that do not challenge the recurring representation. Whenever any coherence problems arise, the recurring representation is adjusted mainly on the basis of rules which are used in the context of medium term regulation loops. Lastly, to deal with greater changes in the situation, the recurring representation will be transformed with the help of general knowledge in the context of a long term regulation loop requiring the creation of new goals and new criteria for interpreting the situation. Existential knowledge corresponding to automatism and rules is called up in the context of short and long term regulatory mechanisms. Universal knowledge is called up during activities contributing to designing the goals, the actions and the interpretative frameworks involved in long term regulation processes.

Table 3. Application of the OSIR model to the health network studied

	Existential (local, situated) knowledge : indexical IT	Universalizing (global, abstract) knowledge : abstract IT
Services goals (epistemic IT)	Operational Activities <i>Treating cases (first case studies to define the procedure).</i>	Strategic Activities <i>Defining the nature of the services, targeting the pathologies and the patients, their predictable numbers, etc.</i>
Integration goals (relational IT)	Relational Activities <i>Promoting mutual acquaintance between the health professionals, their network of acquaintances, and their professional identities</i>	Integrative Activities <i>Defining the internal organization of the network, setting up the commission, defining the roles (active involvement of the research workers, etc.)</i>

Using the duality of the knowledge forms to analyze the collective activity is an important specificity of the conceptual framework underlying our theory of communities of action. Collective knowledge is not viewed as being only of a tacit, local and situated nature. General knowledge and the construction and use of principles and laws based on hypothetical and deductive reasoning processes are also part of the activity of these communities. Although the invisible setting up of habits and routines is an essential component of collective learning, the instituting activities focusing on the definition of common goals and designing the organization also play a major regulatory role. In its activity, the group makes use alternately of existential knowledge to regulate ordinary situations and universal knowledge, that we will also call “universalizing knowledge”, to show that it is hypothetical and still developing, to deal with new situations and to design the infrastructure in which the cooperative activities will subsequently take place.

3.4 Categories of collective activity in the OSIR model

Upon linking up the types of goals and the types of knowledge, the four categories of collective activity featuring in the OSIR model (Operational, Strategic, Integrative, and Relational) can be defined. The operational activities correspond to the performance of the concrete tasks involved in achieving services goals. These goals have to do with the environment of the community of action in question, which they transform in producing the information, services or objects required, for instance. Strategic activities, which also focus on the external environment, are of a more abstract nature and are required to define the external goals, delimiting the relevant environment, defining “customers” and partners and appropriate principles on which to base operational activities and to plan their future development.

To fulfill the needs and reach the goals of integration which focus on the actors themselves and promote mutual discovery, relational activities are required to construct the social network and the individual identities within the community of action in a situated context. The storytelling activities which have aroused new interest in sociology are one of the means whereby the development of this mutual knowledge can be furthered [19]. At a higher level of abstraction, integrative activities are those involved in constructing the organization of the community of action, its

legitimate actors, the internal procedures of debate and decision-making, and the principles on which these are based.

The type of activity can be identified by analyzing the topics involved in the intellectual transactions occurring, for example, via linguistic interactions during meetings between the actors, whether these topics conform to an explicit agenda or whether they emerge spontaneously to meet an underlying need.

3.5 Problem solving in communities of action by a process of specialization

Communities of action can be differentiated depending on the degree of specialization of their members in the dimension of the “services goals” or of the “integration goals”. Without going as far as the extreme stage, where the cooperation dissolves, resulting in the transition of the community of action towards other forms of organization (cf. the notion of “secondary structures”, [1]), specialization, whether acquired via organizational or professional knowledge of the field or whether it corresponds to a specific innovation, is a prerequisite for solving problems and achieving goals.

Our hypothesis about specialization is that in planning the distribution of tasks and methods, communities of action attempt to increase their efficiency by expressing different opinions about the problem in hand and by subsequently organizing debates at which these are confronted and compared. The expression of different viewpoints generally reflects the divergent interests of the members, which are not of course abolished by the common goals that bring them together. But resorting to specialization can also be a deliberate strategy to generate specific competencies corresponding to the needs arising, competencies which are distinct and restricted as well as profound and precise. It is then necessary to organize a confrontation to integrate complementary and divergent viewpoints and to construct the solution to the problem. The model for judicial inquiry often put forward by Dewey, which was put into practice a thousand years ago, provides us with an outstanding example. To reach the truth more efficiently various actors, such as investigators, lawyers, and public prosecutors, adopt antagonistic viewpoints which are confronted and regulated by the judge in the courtroom. But the ultimate goal of these actors is the same: succeeding in drawing up a fair sentence.

Table 4. Application of the OSIR model to the specification of cooperation technologies

	Existential (local, situated) knowledge: indexical IT	Universalizing (global, abstract) knowledge: abstract IT
Services goals	Operational Activities <i>Operational database (e.g. patient file), operational workflow, standardized communications with the clients, etc.</i>	Strategic Activities <i>Piloting information system, domain oriented knowledge management system, communications with the stakeholders, etc.</i>
Integration goals	Relational Activities <i>Personal communication system (e-mail, chat, instant messaging), personal directory, etc.</i>	Integrative Activities <i>Internal communication system, organizational management system, organization chart, electronic voting, etc.</i>

When the level of formalization of the processes is weak, it has been pointed out in the field of small group studies that one can observe the emergence of regulators often called “leaders”, as in the study by (Bales [2]), who has described the emergence of two leaders, the “task centered” and the “group centered” (Parsons refers explicitly to the work of Bales in his distinction between internal and external goals). As mentioned in the intellectual transaction theory, having a preference for a mode of regulation (either epistemic or social), like the possibility of switching from one modality to another, is a useful variable for explaining organisational processes.

4. AN EXAMPLE OF THE ESTABLISHMENT OF A COMMUNITY OF ACTION IN THE FIELD OF HEALTH NETWORKS

The theoretical framework of communities of action has been described here particularly with a view to explaining how an actual community of action was established in the field of health networks in the context of an action research project managed by the Tech-CICO laboratory. The weakness of the interpretative framework provided by the theory of situated action and communities of practice led to adopting the intellectual transaction theory and extending it to include the “ideal-type” of communities of action. The health network studied here was a network in the process of establishment, which was created in order to deal more efficiently with the memory disorders of elderly people living in a restricted geographical area. It brought together various actors, such as health professionals (family doctors, neurologists, geriatricians, speech therapists, nurses, etc.) and social workers and it will be extended to include representatives of the patients, the “care-takers”, namely close parents of the elderly who are actively involved in supporting their relatives and who are in close contact with the other participants.

Some of the professionals already involved in collective medical practice wished to re-structure their activity and make the network more official, by applying for financial support from the national health services. This financial support would allow them to benefit from a durable system of coordination and to finance some training and coordination schemes involving logistic support consisting of call centre facilities and a web site with public and private spaces defining and promoting “good practice” and giving access to a system of light electronic medical files which would improve the circulation of information and the care of the patients.

To help to make their network more official in this way, the members took advantage of their collaboration with the Tech-CICO laboratory. A group of research scientists working in the field of management science headed by Corinne Grenier analyzed the management and coordination activities carried out within the network and another group specializing in the field of CSCW and cognitive science headed by ourselves undertook to define the cooperation technologies required to support the cognitive and social processes according to a socio-cognitive model for communities. The method used for this purpose was an action research method in which the research workers attended meetings and suggested some possible problem-solving modalities, depending on their specific competences and the wishes of their “clients” [6].

During these meetings, the various activities described in the OSIR model were discussed in turn. During the first few meetings, integration goals were pursued. The health professionals talked about their personal experience and told stories about their difficulties and needs. These first relational activities alternated with discussions about the services goals which constituted the explicit agenda of the first few meetings. These services goals were tackled first at the strategic level, which consisted in defining the purpose of the network, the patients for whom it was intended and the number of cases that it could reasonably deal with. This process of definition was necessary both to be able to give the association officializing the network a proper status and to be able to fill in the applications for financial support.

At the subsequent small group meetings and plenary meetings, the integrative work resulted in finalizing the application for financial support, in which applicants were requested to sketch out the roles to be played by the various actors involved in the network. These activities provided an opportunity of defining the main roles of the coordinators of the internal commissions (those responsible for the definition of good practice, assessment procedures, information technologies, etc.) in keeping with the legal requirements as regards the activities of health networks. Another meeting designed to knit together the members of the network before registering the project was scheduled for an explicitly relational purpose. While awaiting the decision as to whether the financial support would be granted, meetings with an operational agenda were scheduled, and a commission of voluntary members was put in charge of examining the first medical cases on an experimental basis with the help of former patient’s files or by analyzing their current patient’s case histories. These meeting made it possible to define the internal organization more closely (by going back to the

integrative activities) and to define the scope of the network services more clearly (by going back to the strategic activities).

Numerous interactions between the various categories of activities have taken place. Since we cannot examine them all in the scope of this paper, let us mention for example the relationships occurring between the strategic, integrative, operational and relational activities in the case of a single actor, the psychologist. In the first strategic debate, the multidimensional nature of the cognitive pathology of ageing gave rise to much discussion. It was important that this pathology should be understood as being a matter of neurological, psychological and social concern. This discussion was necessary for the members of the network to ensure that they obtained a legitimate status. In particular, one group of participants proposed that the coordinator should be a psychologist so as to promote their own particular conception of these pathologies. From the outset, the strategic activities therefore influenced the integrative activities involved in defining the profile and attributions of the coordinator.

The background of the coordinator was brought up and defined at the end of the simulated treatment of the first patients which was run in order to clarify the operational procedure. It turned out in fact that in one of the phases in this procedure, the initial diagnostic consultation, it was necessary to decide whether the patient's disorder was organic or psychic. It is therefore necessary to call on a psychologist with knowledge of neuropsychology or to give a psychologist trained as a psychotherapist the appropriate additional training. The psychologist in the network therefore linked up with another participant, a speech therapist who was competent in this field, and developed closer working relationships with this colleague. This collaboration has led these two participants to design a simplified diagnostic test which can be directly used at the initial diagnostic consultation. The results of the integrative activities have therefore given rise to new relational activities, which have led in turn to strategic activities and the development of the test. This simplified test, which is supplied along with a small user's manual for family practitioners, constitutes quite an innovation, which should contribute to achieving the services goals in future operational activities.

5. BY WAY OF A CONCLUSION: FIRST IMPLICATIONS FOR THE SPECIFICATION OF COOPERATION TECHNOLOGIES

In table 5, a general functional scheme of classification is proposed for cooperative support systems, based on the categories of collective activities described in the OSIR model. Although this scheme may be useful at the first level of analysis, especially at collective design meetings, we are well aware that this kind of a priori method of matching between system functionalities and collective activities is always hazardous, since cooperation technologies, according to our definition, are bound to be a hybrid between the potential scope of the technology and the way in which the users appropriate them in their own singular practices. A "forum" could therefore be created to perform the four basic functions of the OSIR model, contributing to the actual treatment of a case, providing a means of exchanging medical knowledge, discussing the roles of the members of the group, and recounting personal experience. It so happens that in the network with which we are working here, many of the participants have very little

experience of using the internet, which is obliging us to make a very gradual start.

Nevertheless, it is also part of the attributions of the manager/designer to gradually align the parametering of the software programs with the activity of the group and conversely, to gradually align the activity of the group with the most suitable infrastructure, since this alignment has potentially structuring effects on the processes of integration and the supplying of services. In any case, this activity will benefit from being guided by relevant theoretical hypotheses about the development of cooperative activities providing an interpretative framework and a tool for coordination between the players involved in the design process. It is to advancing these hypotheses that we hope to contribute.

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