Chapter 9
Analysing and Supporting Cooperative Practices: An Interdisciplinary Approach

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In this chapter we present an approach that aims at the development of a research program that entails a theoretical-empirical and a technological dimension simultaneously. The objective is both to contribute to the understanding of the socio-cognitive phenomena that underpin cooperation and collaboration in context and to contribute to the sustainable development of society by designing services that fulfil societal needs in a selected set of domains (e.g. risk and crisis management, social support for the disabled and the elderly, ecological sustainability and energy savings). One of the distinctive points of our approach is that it involves a set of researchers coming from different disciplines and working in a single team on the same empirical-theoretical and technological objects: mediated communication, cooperative practices and cooperative technologies. This approach has different but complementary faces: the naturalistic analysis of cooperative practices in different contexts, the design of services to support cooperative practices and the design of technological models, architectures and platforms that provide an infrastructure to support the cooperative services.

9.1 Introduction

Like others, we have been involved for many years now in interdisciplinary projects that put at the forefront of their agenda the development of design solutions which are both practical and socially relevant by taking into account the user as a socio-cognitive agent, embedded in a cultural and historical context and in a field of situated practices (professional, educative, domestic). One of the distinctive points

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in our own approach (which is the reason why we use the term 'interdisciplinary') is that it involves a set of researchers coming from different disciplines and working in a single team (named Tech-CICO[1]) on the same empirical-theoretical and technological objects: mediated cooperative practices and the technologies to support them.

The most exciting but sometimes difficult aspect of this endeavour is to manage how to handle the articulation of different disciplinary fields which have different traditions of research, various methodological orientations and sometimes conflicting, even contradictory, theoretical statements. On the other hand, it offers a unique opportunity to confront ideas, insights and design options and to mutually discuss and enrich both the different theoretical frames of reference and the design process of new situations of interaction and cooperation.

Ultimately, we are more concerned with designing services that support critical societal challenges (social support, autonomy of the elderly, crisis and risk management, sustainable development) than with designing the interface of the next generation of mobile phones or massively distributed games.[2] This focus is partially determined by contingent factors[3] but also by personal or collective ethical engagement in a field of activity of societal value.

In this chapter, we will start by situating our position in the context of the EUSSET manifesto (see introduction) and by giving a general overview of our approach. We will then present our interdisciplinary research program in detail and will illustrate it by one project example before concluding on issues coming from reflection on the implementation of our research framework.

9.2 Positioning

9.2.1 A Syncretic View of the Adopted Interdisciplinary Approach

When we – the Tech-CICO team – are conducting interdisciplinary design-oriented projects, our collective positioning can be characterised as follows:

It is *transformative* in essence since it aims at (re)designing situations. Obviously this aspect is claimed by disciplinary fields represented in the team that encompass a

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[1]*Technologies pour la Coopération, l'Interaction et les Connaissances dans les collectifs* (Technologies for Cooperation, Interaction and Knowledge in Collective).

[2]We have no problem with such research, but it is not the topic of this chapter. Some of our recent projects are actually related to the design of participative serious games and social software for smartphones.

[3]It is fair here to face the reality: in a context where public funding gets lower and lower, it has become critical to be able to find external resources, and this can lead to the opening of new studies in fields of application of societal concerns related to current trends in funding policies (see, e.g. Wulf et al. 2011) for a similar reflection).

technological commitment, namely, informatics and ergonomics. But the very idea of mutual shaping as constituent of the relationship between humans and technology is at the core of the general project of our team and is shared by all its members. We are strongly committed to the view that thinking that introducing a new artefact will solely have an augmentative/linear effect on users and their field of practices is an unrealistic and naïve view.

It is *prescriptive* by necessity as it aims at process improvement by (re)designing situations where the importance of procedures, rules and good practices – be it made explicit as scripts that guide action or embodied in the constraints imposed on activities by the logics of a technological artefact or process – is significant. For us, it is therefore clear that designing is prescribing. This prescriptive approach seems, on the face of it, to sit uncomfortably with the informal, situated, emergent dimension of work activities (e.g. francophone tradition of ergonomics and work psychology and unorthodox trends in management sciences) (de Montmollin 1984). We disagree. Prescribing is inherent to any engineering of situations of human activities; the critical point here is not prescription per se, but the way it is informed by empirical evidences and integrated in a participative approach that takes into account the current practices as well as the capabilities of actors appropriate of these implemented prescriptions in the field of work.

Finally, it has a *direct concern with contemporary societal challenges*. That is why our scope of interest and action is now mainly focused on a restricted set of application domains of significant social value: risk and crisis management (Matta et al. 2012), social support and autonomy (Tixier and Lewkowicz 2011), collaborative sustainability (Cahier 2009), arrangement of informational and knowledge layers in urban spaces (Cahier et al. 2011; Soulier et al. 2011, 2012).

This global approach takes different but complementary faces:

– *The naturalistic analysis of cooperative practices in different contexts.* These are mainly real situations, but occasionally experimental studies in ecologically sound situations too, especially when there is a need to perform limited evaluation of technology-mediated cooperation.
– *The design of services to support cooperative practices.* This idea is to 'translate' the results of the analysis and interpretation of outcomes from empirical studies.
– *The design of technological models, architectures and platforms* that provide an infrastructure to support the design of cooperative services.

The building of this collective project has different implications. First, it requires adhesion to a set of shared principles and values (see above) as a prerequisite for team working. Second, it has a direct effect on the composition which, we argue, must be intentionally heterogeneous. Comprehensive studies of practices in complex settings at different levels of analysis require the intervention of different competencies from human and social sciences (sociology, psychology, linguistics, management science). Conversely, the instrumental dimension of the project requires competencies in computer science and engineering (knowledge engineering, web design, software engineering, etc.). Finally, taking critical societal challenges seriously leads to the building of long-term relations with the different

actors involved in the field of practice (associations, hospitals, etc.). This relation of mutual trust is of course necessary to develop relevant technological support, services and organisational solutions. It is also necessary when one wishes to be able to perform an empirically informed follow-up and appraisal of the effects of the introduction of an innovation in the field of activities. This is especially critical when the analyst has to enter, for instance, the intimacy of a family (Budweg et al. 2012; Tixier et al. 2009), a community (Gaglio and Foli 2011) or a group of co-workers in a tricky context (Palaci et al. 2012) over a long period of time.

9.2.2 General Context: The EUSSET Manifesto and the ECSCW Community

The EUSSET Situated Computing manifesto (EUSSET 2012) provides a set of analytic policies intended for promoting a new field of research that will be distinctively identified and institutionally recognised in the years to come. Needless to say, we embrace most of the statements expressed in this manifesto with a special emphasis on the following points which resonate with our own practices:

– First, the manifesto stresses the need 'to close the gap between purely technical development on the one hand and "social impact" studies on the other'. From the beginning we have attempted to overcome this limitation by associating human and social scientists, computer scientists and engineers within joint projects where each disciplinary community can develop its own research activity as long as its members keep in mind that they are committed to the more global objective of providing thinking, concepts, frameworks, methods, empirical data and technical realisations (mock-ups, prototypes, simulation tools) to feed the design process and the implementation of artefacts (technical and organisational) with the aim of supporting human practices in the real world.
– Subsequently, we have attempted, since the birth of Tech-CICO, to simultaneously conduct a theoretical/empirical research program and a technological research program (design-oriented effort). This implies, consistent with other contributions to this book, interwoven breakthroughs in the design of new computational environments and a scientific attempt to understanding the instrumentality of artefacts, informed by 'in-depth analysis of complex practices'.
– The radical extension of the domain of activities under the scrutiny of CSCW researchers has become more and more obvious for some years now (see, e.g. the panel on the future of CSCW organised during the 2010 edition of the COOP conference). As a matter of fact, historically devoted to the study of cooperation in professional settings and to the design of systems (groupware, workflow, etc.) that support those activities, CSCW has moved more and more outside of its original domain of work so as to encompass such fields as the coordination of activities at home, group education, collective cultural and leisure activities, non-professional social interactions and communities of interest. Our involvement

in fields like social support (Tixier et al. 2010), mobile social interaction (Zouinar et al. 2010), creative and artistic thinking (Salembier and Legout 2012), mediated interaction in diaspora communities (Atifi and Marcoccia 2003) and sustainability (Cahier et al. 2008; Salembier et al. 2009) makes this enlargement of CSCW's initial scope a natural move for us.

– Finally, one of the major contributions of the EUSSET manifesto is its emphasis on informal, highly distributed mechanisms that support the capture of context and meaning as opposed to formal and mechanical models of semantic search. This idea of keeping tracks of contextual features that embed manifest cooperation and interaction finds an illustration in the works we have been doing for many years now in the domains of semiotic ontologies (Zacklad 2005), multi-viewpoint models (Cahier and Zacklad 2001), participative annotation of shared resources (Merle et al. 2012), narrative account of project memories (Soulier and Caussanel 2002) and collaborative translation (Lacour et al. 2013).

We believe these commitments to be emblematic of a joint set of interests evidenced in what we will call the situated computing/ECSCW community (although we do not mean to imply they are not found elsewhere). They all share a common twofold objective: (1) *understanding* (what we call theoretical-empirical dimension of a research program), labelled as 'intellectual project' (Vienna University of Technology, Multidisciplinary Design Group), 'theoretical and epistemological concerns' (IT University of Copenhagen, GIRI) or 'research challenge' (University of Siegen), and (2) *designing* technological and organisational artefacts for the support of cooperative activities (what we refer as the technological dimension of a research program).

Second, these approaches generally follow an *action-research* perspective which highlights the interest of translating academic research into community problem-solving strategies (Stokols 2006).[4] The idea behind action research here is to promote sustained collaboration between different stakeholders (researchers, community members, policy makers) focused on a similar object of concern that entails a scientific interest and societal issues and where actors integrate expertise drawn from different disciplines and field experiences.

Third, they tend to restrict their scope of intervention to a limited more or less select set of application domains of societal relevance: health care, community support, social and ecological sustainability, ageing society, cross-cultural communication and gender studies to name a few.

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[4]But in our opinion, this cannot be reduced to a mere 'applied science' perspective where outcomes from academic research could be transferred and applied so as to manage problems of societal concern in an uncritical way. Quite the opposite: it is the prerogative of the field to question findings from scientific disciplines, giving new, sometimes unexpected, impetus to the study of phenomena of theoretical and practical interest.

9.3   An Interdisciplinary Research Program

9.3.1   A General Position: Cooperation as Participation and Contribution

CSCW at large has been involved over many years with (1) the design and evaluation of computing systems that can be seen as a technological reification of prescriptive organisational artefacts (norms, procedures, scripts, good practices, etc.) such as ERP and workflows or (2) the design and evaluation of systems that support coordination by providing mutual awareness, shared context and alignment of representations between actors and workers, and most of our research effort can be labelled as an attempt to investigate the notion of cooperation from the 'participation' or 'contribution' point of view. That is, it provides a coherent and principled conceptual approach to the problem of effective transformation.

The late modern world contains growing sets of situations in which different actors, identified or unidentified, ratified or not, distributed in space and time, contribute to a sometimes ill-defined collective goal, using most of the time low-overhead web-based technologies. A prototypical example of this kind of situation is the multiple Internet forums in which people exchange information, advice and comment on various (and sometimes critical) concerns such as social support, personal experience of disease, cultural interest, practical know-how in domestic daily practices, professional wisdom and tricks, etc. Doing so, people participate to a collective design that aims (more or less intentionally and in a more or less controlled manner) at generating a bunch of perpetually dynamic collective knowledge (and decisions) submitted to discussion, negotiation and sometimes dismissal.

This endeavour finds a field of application in a variety of different professional settings, for example, programming language communities. This relatively new phenomena gave rise to a convergence between professional networks with restricted access (intranets) and widely open social networks. In the context of the CSCW community, this convergence has been studied recently in different domains, for example, crisis management (Reuter et al. 2012) and software engineering communities (Bourguin et al. 2013).

This propensity to consider cooperation as a collective effort to contribute to design led us to adopt structural or conjectural standpoints at the ontological, epistemological and instrumental (design) levels.

9.3.2   Underlying Statements

9.3.2.1   Ethical and Ontological Levels

This orientation to a collaborative/contributive approach is partly determined by contingent factors (commitment to particular fields of activities) and partly by ethical considerations that orient to relevant theoretical objects (social support,

presence, responsibility). Of course, a history of attention to the collaboration per se can partly explain this orientation. For example, the delivery of patient-centred care at home is made possible by the ability of caregivers (including professionals from different disciplines and family members) to collaborate (Tixier et al. 2010). Similarly, in the domain of sustainable development, the participation of citizens in the debate related to ecological degradations is a critical point for escalating demand for natural resources, energy consumption and so on (Cahier 2009). At the same time, personal concerns and collective engagements in favour of the development of collaborative policies and participative attitudes in the management of societal issues have led many of us to choose to address these issues in their professional activities as researchers and designers.[5]

Ontological should be understood in a modest or 'weak' sense. The purpose is not to address the question of the very nature of cooperation[6] but to make explicit that we put the emphasis on a particular dimension of cooperative activities. One might say that the focus is more on the collaborative than on the coordinative facet of cooperative practices, even though we do not dismiss the critical role played by coordinative mechanisms. We are especially interested in the informal dimension of coordination mechanisms, based on the building and continuous updating of a mutual awareness, for example, and by the regulation mechanisms of mediated conversations. For instance, in a forum, the intervention of an actor may have a direct impact on the thread of a discussion seen as a jointly managed process, and it may consequently require the intervention of other actors so as to regulate interventions that threaten the more or less explicitly and mutually ratified desirable state of affair.

9.3.2.2   Epistemological Level

At a general level, our perspective is concerned with how communication, joint actions and knowledge are collaboratively constructed, understood, negotiated and maintained in a particular context of practice. Thus, following the traditional doxa of normative epistemology, this general perspective must be refined and made more explicit: it is necessary to define a set of relevant methods and analytic approaches for empirically accounting for the theoretical objects and statements formulated at the ontological level.

This multilevel frame can be divided in several layers of theoretical-empirical analysis:

– At the micro level, fine-grained analysis of sequences of interaction is performed according to the tradition of conversational analysis and interactionism. It enables

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[5]Let us remind a trivial point: the relation between ethics and theory is always present in the definition of a research program. It is not just a question of selecting or rejecting more or less amenable fields of application: ethics orients (or should orient) the choice of theoretical objects offered to the scrutiny of the researcher.

[6]See, for example Schmidt (2011).

us, for example, to identify sequential structures and organisation of speech acts that permit the achievement of a successful exchange in the context of a cooperative episode. It makes it possible to identify informal, sometimes non-explicit, rules of communication observed by actors (e.g. ad hoc communicative contact). Similarly and when the constraints of the setting make it possible, an emphasis is put on the phenomenological experience of the actor's own activity. This level of analysis gives us an opportunity to have an access to the fine-grained detail of the pre-reflective thinking which might reveal dimensions of activity such as emotion and the nature of experience (trust, well-being, stress) (Cahour and Salembier 2012; Février et al. 2011; Lewkowicz et al. 2008).

– At an intermediate (meso) level, the activity of individuals is observed, recorded and analysed in order to recompose the organisation of collective practices ('individual-collective' approach). The basic idea here, in the tradition of fran-cophone ergonomics (Salembier 2013; Schmidt et al. 2011) and partially in micro-sociology of activity, is to give account to what is actually done by the human agents, sometimes in reference/opposition/tension to what should be done according to the organisational artefacts (rules, procedures), sometimes for its own content (thus more and more activities are independent of any organisational prescription). The emphasis put on these dimensions of activity and the importance given to the meaning ascribed by the actor to his/her own activity have a direct influence on the range of methods used by the analyst. Besides the traditional approach, francophone work psychology and ergonomics have developed a method that aims at articulating the manifest expression of activity and retrospective verbal reports. This method, sometimes quoted as 'self-confrontation interviews' (Cahour et al. 2005), aims at showing a subject a recording of his/her own activity in order to put him/her in the context of or to re-enact a past experience. The goal is to collect verbal reports that may be factual descriptions of the actions performed by the actor or general comments that allow the analyst to give meaning to what has been done.

– At a more macro level, different relevant concepts (standards, rules, procedures, processes, organisational routines, cultural communities, end-to-end manage-ment, institutional and public policies, etc.) may be evoked in order to provide a better understanding of higher-level organisational, social and cultural factors that may shape the organisation and dynamics of collective practices in a particular field of activities. This approach may be used at the level of a group, a community or a network of actors.

9.3.2.3 Design Level

The technological side of our research program aims at making concrete reali-sations of theoretical thinking and empirical data built together at the different epistemological levels. The different perspectives/levels of analysis of the different disciplines involved allow us to design from a rich and eclectic characterisation of the activity to be instrumented. Combining methods coming from conversational

analysis, psychology and sociology permits us to merge interviews with potential end users and observations of both face-to-face and online practices (through email or social media), helping us to get a deep analysis of existing cooperative situations from which we can start designing and implementing pertinent services.

This implementation can serve different purposes:

– First, as expected in any user-centred approach, the results of the empirical studies and theoretical/speculative thinking are expected to feed the design process and to influence the designer's decisions (depending on the level of granularity of the empirical material; see above). Ultimately, the traditional minimal objective is to design a service, an artefact or a device that hopefully will be of some practical utility to a group or community of potential users in the context of a societally relevant field of activity. But what we strive towards here is to adopt a more integrative approach that aims at proposing an articulated solution that includes technological media, a content and a set of organisational principles compatible with the field of activities. The general idea is one of what we call 'engineering of situations[7] of activities'. These situations can be of different nature: from co-located dyadic interaction to large-scale sociotechnical systems.
– Second, the objective is also to inform the organisation of the design process (Dubois et al. 2006; Alaoui and Lewkowicz 2013), by providing intermediary objects that are used as resources for promoting exchanges between the actors (designers, users, stakeholders) involved in the project.
– Third, mock-ups and prototypes can be used as 'heuristic probes'. The artefacts provide opportunity for the academics to test theoretical hypothesis of interest in the context of their own field of research in a semi-realistic way. For example, an experimental forum can be used to study the effect of different factors on the organisation of communication and the emergence of patterns of interaction.
– Fourth, the work done at the ontological and empirical levels is used to help developing, enhancing or modifying a software infrastructure dedicated to the collaborative representation and manipulation of data, contents and knowledge (Cahier et al. 2013). Taking a biologically inspired metaphor, the idea here is that design concerns should reflect ontological and epistemological statements not only at the 'phenotypic' (services and interfaces) level but also at the 'genotypic' (infrastructure and architecture) level. This idea, according to which the adoption of a specified underlying computing paradigm should lead to the implementation and use of a dedicated infrastructure, is illustrated, for example, by the GIRI initiative (Bardram et al. 2011) and by the ITSME project (DeMichelis and Loregian 2009).

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[7]Theureau characterised this orientation as 'methodological situationism' in order to contrast it with 'methodological collectivism' and 'methodological individualism' as research strategies for studying cognition in real-world settings (Theureau 2006).

9.3.3 Usage, Services and Architecture

During the past 15 years, we have conducted empirical studies in a wide range of professional and non-professional situations. These studies were opportunities to apply, in a more or less integrated way, the elements of the frame described above. Each project includes an empirical dimension where the analysis of a group of actors' current practices is performed using different methods: ethnographic observations, activity analysis, free interviews and retrospective verbal reporting based on different traces (writings, sketches, notes, automatic acquisition of actions on a computer system and audio and video recordings). Similarly, these methods are applied to the assessment of 'situations of activity' engineered in the project. This empirical phase is an occasion for collective reflexive thinking on the nature of the theoretical objects, concepts, descriptive and analytical categories and behavioural markers tackled in the context of the study.

The outcomes of the data analysis are then used to inform the design of services that are supposed to offer a solution to an aspect of a broader societal challenge. As a recent evolution in our work, the design of these services is not 'simply'[8] seen as a purely applied enterprise of reifying empirically inspired elements into technological and organisational artefacts. The notion of service here is considered as an object of conceptual thinking that goes beyond its instrumental status (i.e. as an integrated bunch of artefacts that fulfils a particular need and supports a specific activity). From this point of view, service is an instrument of task and social shaping but may also be considered as an interdisciplinary effort aiming at gathering and organising a set of practical and theoretical knowledge, empirical methods and case studies in order to enhance the performance of the service business and to extend the capabilities of innovation.

Even though we manage to avoid the design of services as a repeated one-shot process by considering service as an object worthy of conceptual thinking, the capitalisation of experience gained on each design project remains a critical problem. One solution to soften this possible limitation, and in the same time a way to embed the general principles listed in the research program in a material substrate, is to propose a software architecture or platform that can be used as an infrastructure in every new project which aims at designing collaborative supports. Different studies conducted at Tech-CICO since 2000 in the domain of collaborative knowledge engineering gave birth to the notion of 'socio-semantic web' (Caussanel et al. 2002) and to the hypertopic model (Zhou et al. 2006), seen as a semiformal alternative to the formal approach of semantics promoted by the semantic web. It aims at fostering participation among knowledge workers (Zhou et al. 2006). Hypertopic was notably designed to overcome the limits of topic maps by enabling the expression of different viewpoints on shared items. It was first implemented in agorae, a 'marketplace' where different professions can describe a given catalogue

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[8] As everyone involved in this sort of translation knows, this is far from being simple.

depending on their viewpoints. At the same time, a similar model was implemented in Porphyry, a digital library system in which scholars could annotate documents and confront their interpretations. Comparing both systems helped in defining a protocol that could be used by these tools, by a core service (Argos), and by other add-on utilities (Cassandre, LaSuli, Steatite). Hypertopic was successfully used to manage multi-viewpoint catalogues built by citizens (sustainable development projects, open-source software), educators and students (open courseware), managers (telecom and aeronautics), mechanical engineers and researchers (social scientists, open archive, UNESCO diaspora knowledge network).

9.4 An Illustration: Developing Online Social Support Services

9.4.1 Context: The MISS Project

Social support involves giving advice, information and emotional, psychological or material support to people experiencing difficult situations (disease, stress, loss of work, etc.). It is often provided by relatives, friends, the family or trained professionals (such as psychologists or social workers). However, a new trend has been developing on the Internet during the last few years: social support is now being provided by peers, who are neither relatives nor professionals, mostly on Internet forums. In view of this emerging trend, it was proposed to define and apply new principles for developing innovative online services to meet the current social demand which has arisen.

   The challenge here was to succeed in understanding and implementing an activity (social support) which is difficult to describe. We started off by analysing the specific needs of a group of people, the family caregivers of patients with memory disorders (Alzheimer's disease in most of the cases) in the Aube region (N–E of France), where a dedicated health-care network named 'Réseau Pôle Mémoire' (RPM) was launched in 2001. It was therefore proposed to design a tool for family caregivers that would be as intuitive as possible. It was assumed that the more we keep in mind actual social support practices in designing our platform, the more intuitive and user-friendly it will be for caregivers.

   For this purpose, we carried out an 'action-research' approach in which several analyses (conducted by researchers in sociology, conversational analysis and psychology) were combined in order to design services and to define the appropriate infrastructure to run these services.

9.4.2 The Interdisciplinary Design of Situations of Activity

We started by studying online social support practices to understand the factors making online social support exchanges work. It led us to identify the efficient patterns of interaction and therefore to define the main episodes of which online

social support exchanges should consist, along with the corresponding functionalities, which will form the core of the platform. For instance, the initial results of the conversational analysis suggested that 'asking a question' and 'sharing experience' are important components. These results also showed that reciprocity is a key to successful online social support exchanges and that information seeking and the assessment of this information are an important feature.

In addition, to obtain detailed information about the actual social support practices and the expectations of the group for whom we were designing the platform, we observed face-to-face social practices while attending RPM support groups for family caregivers.

To supplement these findings and ideas, we conducted semi-directive interviews with the family caregivers participating in the support group meetings, facilitating understanding of their day-to-day practices outside the monthly support group meetings. Their description of the way they cope with their ailing relatives and the burden they often feel is key to understanding their needs, which can be either clearly expressed or more latent.

Observation and interviews confirmed some of the findings we had made on analysing online social support exchanges and brought to light some new findings: first, experience sharing is also identified as a key point by the caregivers themselves. What links the members of the support group together is their experience of Alzheimer's disease from the caregiver's point of view, especially as they feel no one else can understand what this experience is like unless they have been in a similar situation; 'If you have not been through it yourself, you cannot understand what it involves' was an expression which cropped up frequently in the interviews. Second, the need for information was expressed very strongly. In fact, most of the needs clearly expressed by the caregivers we met were related to information seeking and information management. For instance, they were interested in tips and advice, they would like to learn about the side effects of the patients' medicine and how to improve the patients' well-being, and they would like to be given some help with the paperwork they have to deal with. This gave rise to the idea that the social support platform should include a section for exchanging documents and information, structured in line with the categories of information listed above (medicine, well-being and paperwork). Finally, reciprocity was again identified as a key factor in social support; the caregivers clearly stated that they came to the support group to talk about themselves as well as with other people.

These findings were used to inspire the design of the social support platform. This does not mean that the results were translated directly one by one into functionalities, as functionalities are complex combinations, and the models and data on which they are based are often complex too. However, the results of our analyses (e.g. the need for reciprocity) determined several design options, from which we take four examples to illustrate our approach:

1. *Reciprocity as a key to successful social support*: This led the informatics researchers to think about how to encourage reciprocity among the users of the platform. This cannot be achieved by simply using a single 'reciprocity function-

ality' nor is it possible to compel users to act in a reciprocal way. The idea was to make people aware of each other's contributions (messages) in order to multiply the opportunities for reciprocity. By highlighting the number of requests that have received few or no messages of support on the homepage and at the top of each section, we can hope to encourage reciprocity. Providing users with 'mail alert' features that signal any messages they receive is another functionality which may serve this purpose (it also helps people to stay in touch with the platform). In addition, the platform provides a weekly and monthly digest, a kind of newsletter helping members to be aware of the activity of the group.

2. *The central role of informational support*: What we learned by observing real-life support groups, such as the fact that caregivers go there to learn more about diseases and how to deal with patients' day-to-day care and the fact that requests for information are prominent on social support websites that led the informatics researchers to include sections dedicated to exchanging information. The first section is dedicated to document sharing and to online discussion facilities. Users can read and upload interesting file documents or website links and have the ability to organise documents around topics through keywords. The section is bootstrapped with some of the domain literature like, for instance, patients' associations and respite care services websites, socio-demographic studies about family caregivers and document about memory disorders. The 'discussions' sidebar, which has its proper instance for each document, enables users to comment, share their opinion and discuss the contents. The second section, which is dedicated to questions and responses (Q&A), is based on a metaphorical situation where users can ask other people questions via a one-line question text field followed by a larger text field for giving details. The rules and norms found to apply in situations involving the exchange of social support show how relevant this choice of metaphor and these technical features are, since our users are familiar with real-life situations of this kind, as compared with more abstract metaphors such as those on which forums and chat rooms are often based.

3. *The central role of experience sharing*: The importance of accounts on personal experience and stories in social support exchange has been emphasised both in the online social support analysis (i.e. description or narration of the problem, presentation of its negative consequences) and in the field analysis (i.e. caregivers come to the support group to talk with other people but also to talk about themselves). This led the informatics researchers to create a 'story and experience sharing' section where a user can post a new topic and share his/her story. Other users are enabled to post their personal stories under the same topic. The 'story sharing' form has also been designed keeping in mind the reciprocity factor, since it enables users to invite other people to share their experience on one topic through email alerts. Inside a topic, stories are sorted by authors, and each of them has a dedicated page to underline the personal dimension of such content. Discussions on the topic can be performed through the discussions sidebar.

4. *Tips and advice*: The interviews with caregivers and the observation of the support group meetings showed how important it is for family caregivers to be able to exchange tips and advice. The relevance of encouraging the exchange

of good daily caregiving practices is based not only on the participants' own practices but also on more formal information such as the training documents provided by the health-care network that led the informatics researchers to define a functionality enabling users to mark the contents of the platform (documents, Q&A threads and members' stories) as 'useful tips' in order to help them browse easily among these precious contributions and retrieve them via a simple link.

To summarise, the data and results coming from the analyses conducted by researchers in psychology, conversational analysis and sociology were discussed with informatics researchers and not mechanically and simplistically translated into functionalities. Moreover, thanks to the conversational analysis of online social support exchanges, the medium into which social practices are being 'translated' is taken into account. Finally, the data taken from the interviews go beyond the design of a platform. For instance, they question the role of health-related websites, which are providing information to patients and by then change their relationships with their practitioner. One can also mention the implementation of 'respite care' services which is a matter for the public health policy. This study is then included into a broader process of intervention research.

9.4.3   Reflections

Dialogue between the social sciences and design is recognised as complex, and the implementation of the proposed approach is no exception. At the end of the second year of the research project described here, a collective return on the benefits and limitations encountered in this interdisciplinary activity was synthesised by the team. It was judged that cooperating in this project opened up exciting scientific thinking as working around shared concepts (i.e. social support, reciprocity) seen in the light of different disciplines, which then become boundary objects for research. The state of the art on the mobilised theories and objects has therefore been enriched by these interdisciplinary perspectives. Moreover, having to present his/her research to researchers from other disciplines facilitated clarification and explicitation and allows self-reflection on the limits of his/her own discipline.

With regard to the value of designing services on the part of human and social scientists, we noticed that this type of project permits us to identify more specifically the value of the human and social science research. Designing involves moving analyses and results outside their natural territory, particularly during the transition between describing the phenomena and prescribing the instrumentation of the activity. This is, in and of itself, a valuable experience for social and human researchers. In addition, the design can be seen as an opportunity to test research hypotheses.

For the informatics researchers in charge of the design, working with human and social scientists has permitted a better understanding of the activity and practices. A rich corpus of elements for design was made available, and dialogue with the

colleagues mastering theoretical frameworks and analytical material to make sense of the activity has been a great help. Discussing how these elements have been translated into the services has improved the computer-based application and the understanding of the role of the tool for the designers.

However, the benefits of the interdisciplinary work itself was not seen as equal; informatics researchers found inspiration and valuable insights for the design, while the interest of human and social scientists for the computer-based application did not appear to be so obvious. A limit exists between the objectives for each of the researchers implied in the design project: designing a useful tool for practice – that satisfies users – is actually a quite distant and secondary research issue for sociology and conversational analysis. These disciplines are interested in describing and understanding social phenomena and practices but arguably less in the practical business of transformation. Building and deploying a tool, especially if it is supposed to be innovative and different from what may exist otherwise, disturb the 'natural' framework of actual practices in the field and make the study of this situation unattractive as it becomes local and specific. Unless being specifically interested in phenomena such as the appropriation of technology by a group, as it is the case for ergonomics or CSCW, the tool and its use are ultimately not much of interest to our colleagues.

A possible solution would be to see design as an opportunity for social and human researchers to theorise design choices in terms of potential effects in the field in relation to, for instance, social and cultural capital. This way of working seems promising but we were not able to work in this direction during this project. The expectations and assumptions of social and human researchers were not perceived or understood from the informatics side, while advancing the implementation of the application through mock-ups finally gave the impression to social scientists that the design was far away from them.

Each of the studies conducted during the MISS project is a research action in itself. This work led to publications in each discipline communities and led to questions that go beyond the issue of interdisciplinary design. Allowing the dissemination of work in each discipline without manipulation of one by the other appears to the participants as a prerequisite for cooperation between human and social sciences and informatics.

Several lessons can be learned from this interdisciplinary design cooperation: (1) more upstream work to identify and clarify the expectations of each stakeholder in relation to the design project is important so that each can be more responsive to the other and to some extent control the different interpretations that can be made of large initial objectives such as 'designing services to assist the social support activity'. (2) Being able to open the design to social and human researchers and to facilitate their participation is important. As such, we noticed that it is actually more important than ever that a mock-up looks like a mock-up (Erickson 1995), i.e. that it does not have the appearance of a finished product. In fact, the interactive mock-ups that we built have not been a very effective medium for discussion. Thus, the explanation of which has been translated, and the intended use seems to be an important complement support to the mock-ups to foster dialogue and improve

translations. (3) In the context of interdisciplinary work, managing the time which is necessary for each of the disciplines to develop its analysis and its work is difficult to reconcile and could surely be better planned in advance. Following a development process with long iterations, as we did, devoting considerable time to studies during the first year of the project and to finally begin the design and implementation of a first prototype after two iterations may not be the best working solution. A more rapid prototyping option, with short iterations, as advocated by agile methods, would probably be more appropriate to facilitate the participation of all, giving a faster pace in the project and creating earlier links with the effective use of the system in the field.

Eventually, the MISS project we have reported here can be seen as the first step towards what Stokols (2006), in line with Kurt Lewin's analysis, conceptualised as a *transdisciplinary action research*, that is, an action research which entails transdisciplinary research and inter-sectoral partnership involving academics and representatives of community sectors. More precisely, Stokols mentions three types of collaboration in the context of a transdisciplinary action research: (1) collaboration among scholars from different disciplines; (2) collaboration among researchers and community practitioners; and (3) collaboration among agencies, organisations, institutions and communities. The MISS project is obviously an illustration of collaboration of the two first kinds, even though in our case we find more appropriate to speak about interdisciplinary than transdisciplinary research.

9.5   Conclusion

In this chapter, we briefly presented an approach that aims at conducting a research program that entails simultaneously a theoretical-empirical and a technological dimension. On one side the objective of this program is to contribute to the understanding of the socio-cognitive phenomena that underpins cooperation and collaboration in context. On the other side, it aims at contributing to a sustainable development of society by designing services that fulfil societal needs in a selected set of domains (risk and crisis management, social support for the disabled and the elderly, ecological sustainability and energy savings). As such, it can therefore be seen as a local contribution to a more general CSCW research program as depicted by Schmidt and Bannon (2013).

Applying such an approach is not always an easy nor a comfortable posture. As already pointed by other authors (Wulf et al. 2011), it is a continuous struggle to maintain a balance between contradictory stakes: short-term effective transformation of situations of activity and long-term immersion in real-world fields of cooperative practice, requirements from orthodox criteria of academic research and the distinctive features of the action-research approach and multidisciplinary investigation of transversal objects of shared interest and disciplinary-oriented valorisation of results.

Moreover, from an epistemological point of view, the real nature of the research program is highly problematic per se. First, if one considers the traditional definition of a research program (e.g. as defined in the tradition of Lakatos), it is obvious that our program starts from the traditional requirements: the definition of a strong core of hypotheses does not cope very well with the plurality of sometimes conflicting points of view applied to a single object. Similarly, the pragmatic use of theories seen as a toolbox to inform, inspire, anchor and design purposes/objectives may appear slightly suspect to the finicky.[9]

This can raise difficulties inside the team itself. The multiplication of ontological hypothesis inherited from different research traditions may eventually lead to tensions into the analytical scope. For example, psychologists may consider that each individual mentally constructs the world of experience through internal cognitive processes, while sociologists may favour a non-mentalist approach focused on social explanations of actions. Similarly, linguists may only consider interaction between agents rather than what occurs at individual level.

The fact is that until now, our approach is more a joint enterprise that aims at understanding a common object (cooperation) and (for some of us) designing situations of collective activity based on this plural rather than shared understanding. The multiplication of viewpoints obviously favours theoretical confrontation and is therefore an opportunity to enrich the design options. But it does not necessarily lead to substantial progress in the mutual elaboration of a body of knowledge in the context of a traditional research program, let alone the constitution of a transdisciplinary research which would ultimately aim at creating a new disciplinary field.

The risk here is to generate a sort of alliance of convenience that can be seen as a mutual instrumentalisation between human and social sciences on one side and informatics on the other side: informatics may use human and social sciences to inform the design in a more or less controlled way, and human and social sciences may utilise informatics to create artefacts that will allow them to explore phenomena of interest for their own purpose. A concerted commitment to design may not ultimately be realised. This issue is not new. Most research groups engaged in interdisciplinary work have to deal with it, and a huge amount of literature is devoted to this particular point. In the CSCW community, for example, since the seminal work conducted by the Lancaster team on studying air traffic controllers' practices and designing artefacts to support these practices, this tricky articulation between empirical data and design has been constantly questioned (see, e.g. Crabtree 2003; Hughes et al. 1993). The Situated Computing manifesto itself stresses the necessity to develop pluridisciplinary approaches to design but does not provide any method to proceed. The challenge remains still open to the EUSSET community.

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[9]This point opens a traditionally much debated question: does design require any theoretical foundations to fulfil its instrumental goals? (see, e.g. Halverson 2002) in the context of CSCW.

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