The critical role of workplace studies in CSCW

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While there is no question that workplace studies play a prominent role in computer-supported cooperative work or CSCW, the exact nature of this role has been a subject of much reflection and debate over the years. So far, the deliberation has been inconclusive, and, moreover, in the last few years a certain sense of disillusionment and even skepticism has arisen concerning the ways in which and the extent to which such studies in fact contribute to CSCW systems design.

Plowman, Rogers, and Ramage (1995), for example, have raised the question 'what are workplace studies for?' To investigate this issue they undertook a survey of a large part of the workplace studies published in the area of CSCW — altogether 75 papers — and found what they called a 'paucity of papers detailing specific design guidelines' (p. 313). While they hesitated to conclude that 'workplace studies do not produce specific design guidelines', they did feel confident that the observed paucity 'can be attributed to the lack of reported research which has developed to the stage of a system prototype' (ibid.). Discussing these observations, Plowman et al. surmised that the reason for the apparent failure to bridge the gap is 'a big discrepancy between accounts of sociality generated by field studies and the way information can be of practical use to system developers' (p. 321).

While agreeing with the characterization of the state of affairs advanced by Plowman et al., Bob Anderson has challenged their tentative explanation, arguing that the issue of how ethnographic findings are formatted is a distraction; ethnography can be highly formal when *that* is appropriate for the research program at hand (Anderson, 1997). Instead, Anderson argued that the problem has deeper roots. Observing that not all kinds of qualitative studies of social life in the 'real world' are ethnographies and that the idea of ethnography 'as a method for the specification of end-user requirements for systems' is 'predicated in a misunderstanding of ethnography's role in social science', he stated flatly that 'designers do not need ethnography to do what they wish to do' (Anderson, 1994, p. 153):

> 'designers may well work closely with users, engage in fieldwork among the end-user organizations for whom they are designing; and focus on the intersection of the technological,

Version 3.0, 17 June 1998
To appear in Christian Heath, Jon Hindmarsh, and Paul Luff (eds.):
Workplace Studies: Recovering Work Practice and Informing Design,
Cambridge University Press, Cambridge [In press].

> the organizational, and the social dimensions of the working environments within which their designed systems will find a place, all without ever engaging in the kind of analytic ethnography […] found in the social sciences. In fact, doing ethnography may prove a barrier to achieving the goals that designers want to set themselves.' (Anderson, 1994, p. 155). [1]

While Anderson's observations that not all kinds of qualitative studies of social life in the 'real world' are ethnographies and that ethnography cannot serve as a requirements analysis methodology are topical and appropriate, he did not get to what I consider the root of much of the confusion, namely the mix-up of two distinct questions: (a) the role of workplace studies of particular settings with a view to the design of specific CSCW systems for the same or similar settings, that is, the role of workplace studies as a requirements analysis method; and (b) the role of workplace studies of particular settings as contributions to the development of the conceptual foundation for CSCW and, thereby, to the development of CSCW technologies. While workplace studies in both roles might be said to contribute to 'systems design', albeit in very different senses and through quite different mechanisms, the latter role is critical whereas the former is highly problematical.

Firstly, let me address the role of workplace studies in the development of the conceptual and technological foundation of CSCW.

Cooperative work is a tricky phenomenon. We are all engaged in cooperative activities of various sorts in our everyday lives and routinely observe others working together around us. We are all experts from our everyday experience. And yet this quotidian insight can be utterly misleading when applied to the design of systems to support cooperative work.

As participants of a cooperative effort we routinely take its orderly accomplishment for granted. We have to do that, in order to get the job done. In depending on the activities of others, we are 'not interested' in the enormous contingencies and infinitely faceted practices of colleagues, unless these may impact on the our own work (cf. Schutz, 1943; Schutz, 1953; Schutz, 1967). An actor will thus routinely expect not to be exposed to the myriad detailed activities by means of which his or her colleagues deal with the contingencies they are facing in their effort to ensure that their individual contributions are seamlessly articulated with the other contributions. Conversely, an actor will routinely avoid to publicize those contingent practices which colleagues do not 'need to know', not only in order to appear competent in the eyes of colleagues and managers, but also and more importantly in order to not to add to the complexity of the work of his or her colleagues. The individual activities of cooperating actors are *made to appear as if* they are seamlessly integrated and meshed. Disclosing only those aspects of the work required to articulate the distributed and yet interdependent activities which are relevant to the concerns of colleagues — that is, knowing what to make publicly visible and what *not* to make publicly visible in a given situation — is a crucial aspect of competent conduct in any cooperative work

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1 Emphasis deleted.

setting. Just like illusionists and acrobats strive to make their acts appear as if performed effortlessly, cooperating actors strive to 'dampen the noise' from the contingencies of their own work and from the concomitant efforts of articulating their own activities with the other contributions to the joint endeavor by skillfully modulating which aspects of their work are made visible, and how, and which aspects are performed such that they are inconspicuous to colleagues.

The notion of orderliness which cooperating actors take for granted and have to take for granted and which they, in turn, convey to colleagues through the way they make publicly relevant aspects of their own local affairs publicly accessible and visible, is not an illusion or some kind of 'false consciousness'. The mutual projection of order is rarely deceptive to competent members. It reflects the fact that myriads of cooperative activities usually are accomplished, integrated, meshed, articulated successfully, day in and day out, and it reflects this fact perfectly adequately by 'escamotating'[2] the detailed practices by means of which this orderliness is achieved. It is rather a necessary simplification, indispensable for us to be able to cope with the routine complexities of our daily work.

The problem arises when the categories in which these notions are generalized as common-sense constructs (e.g., 'task,' 'goal,' 'shared,' 'context,' 'role,' 'procedure,' 'team,' 'organization') are used uncritically beyond the realm of everyday work. It may for example make a lot of sense to refer to a 'shared goal' in a particular setting, for instance if one actor has asked the other participants in a meeting 'Do we all agree this is what we want to do?' and they have nodded their consent. While the category of a 'shared goal' can be seen to escamotate the ways in which the members arrange the multiple, partially dissonant, motives and interests into a workable compromise and handle the unavoidable indications of continual discord and diverging interpretations of the compromise, competent members of the particular setting know the extent to which and the sense in which the 'goal' is 'shared'. But if a joint effort — for other purposes, e.g., for the purpose of sociological theory or for the design of organizational information systems — is conceived of as constituted by a 'shared goal,' the notion of a 'shared goal' becomes utterly misleading.[3] Thus, in his studies of the engineering design process as it unfolds within design projects, Louis Bucciarelli found that

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2 From the French 'escamoter', to remove something diligently and surreptitiously, normally used to denote the skilled practices of illusionists and conjurers.

3 For a brilliant example, cf. Sabbagh: 'Each person working on Worldwide Plaza had a different goal: for a bricklayer, during 1987, to see the gleaming, soft-beige-and-rose expanse of crisply laid brick reach up to six hundred feet; for a steel fabricator in Houston, to see nineteen thousand tons of steel erected into a soaring framework of complex ellipses and sturdy rectangles; and for the developers, to see an investment that would transform the West Side of New York, and bring profits for decades to come.' 'Linked to any major construction project are men and women with every type of personality, intellect, and qualification. Scientists and engineers, welders and electricians, artists and writers, salesmen and real-estate brokers, accountants and bankers, canteen managers and dynamite experts, seismologists and calligraphers — all feeling entitled to think of a building as "their" building is the same way as the architect or the principal developer. This possessiveness can be a driving force behind each craftsman and his task. It can lead to the excitement of competition, as the mason, the waterproofer, and the window installer will the steel erector to complete *his* stage in the building to make *their* work possible.' (Sabbagh, 1989, pp. 1-3).

> 'different participants in the design process have different perceptions of the design, the intended artifact, in process. […] The task of design is then as much a matter of getting different people to share a common perspective, to agree on the most significant issues, and to shape consensus on what must be done next, as it is a matter of concept formation, evaluation of alternatives, costing and sizing — all the things we teach' (Bucciarelli, 1984, p. 187)

That is, the 'shared goal' is not there in advance; it is constructed by the members in the course of the project, and it is in the process of agreeing to a 'shared goal' that the designers arrive at an agreed-to design. When the designers have a 'shared goal', they have — for all practical purposes — finished the design task. In fact, they may not even agree on anything but the design when they finish; agreeing on a 'shared goal' may require additional effort and participants may simply decide, tacitly, that it is not worthwhile: 'Design decision in this instance is best seen as an overlay of interests rather than their synthesis within some flat, cognitive domain' (Bucciarelli, 1988).

Similarly, the notion of 'shared knowledge,' which spontaneously crops up in CSCW contexts, ignores the work required to make knowledge 'shared': determining the adequate level of abstraction for a given purpose, eliminating aspects of less relevance to the intended audience and formatting according to the expected use situation, providing indexation, etc. (cf., e.g., Bowker and Star, 1991). Even such ubiquitous and seemingly innocuous categories as 'task' and 'collaboration' are problematic, in that they introduce a conceptual separation of 'individual' and 'collective' which, at closer inspection, turns out to be misleading since 'seemingly individual and specialized work tasks are produced with respect to the actions of colleagues' (Heath and Luff, 1996, p. 97).

In order to develop computer-based technologies which can enhance the ability of actors to accomplish their cooperative endeavors we cannot take the orderliness of cooperative work for granted. On the contrary, we need to go beyond the common-sense notions of everyday working life. We need to understand *how* orderliness is accomplished in cooperative endeavors; we need to uncover the practices through which the myriad distributed and yet interdependent activities are meshed, aligned, integrated, because *it is the very practices through which such orderliness is accomplished that must be supported*. The primary role of workplace studies in CSCW is thus to dismantle the common-sense conceptions of cooperative work, take them apart, unpack and disclose the hidden practices of articulation work, and thus give us access — analytically and conceptually — to the intricate ways and means of the production of social order in cooperative activities. This role is critical in the sense that it is crucial, but it is also critical in the Marxian sense of uncovering the social practices through which categories that are otherwise taken for granted are produced as necessary 'thought forms' and thereby determining the boundaries of the validity of these categories.[4]

And indeed, those workplace studies that have had the strongest influence on CSCW research have been studies which did not aim at arriving at specific design recommendations for specific systems but instead tried to uncover, in minute

4 Cf. the subtitle of Marx' *Capital: Critique of political economy*.

detail, the ways in which social order is produced in cooperative work settings, whatever the design implications of the findings might be.

In this respect the studies of office work conducted by Suchman and Wynn almost two decades ago are exemplary. They undertook to demonstrate empirically that the conceptions of 'office work' then prevailing among managerial ideologists, designers of 'office automation' systems, office equipment vendors, etc. were misleading. In particular, they subjected the common-sense presuppositions about the status of office procedures vis-a-vis the actual course of action to a critical analysis and demonstrated that office procedures do not determine action causally; they could thereby show that the design visions of the office automation movement were misguided (Wynn, 1979; Suchman, 1982; Suchman, 1983; Suchman and Wynn, 1984). In doing so, they were highly influential in shaping the agenda of the research program which a few years later became CSCW.

Since then, workplace studies have had and continue to have profound impact on the development of CSCW technologies. Not in the form of a direct relationship of 'requirements specification' with respect to the design of specific systems, but by contributing to the conceptual foundation of CSCW. Most significantly, a series of studies such as the Lancaster study of air traffic control (e.g., Hughes et al., 1988; Harper et al., 1989; Harper et al., 1991; Harper and Hughes, 1993) and the study of the London Underground control room (Heath and Luff, 1992a; Heath and Luff, 1996) have made the CSCW community understand the delicate interplay of individual and cooperative activities and appreciate the crucial role of 'awareness' in ensuring that individual activities are seamlessly integrated. This have incited and inspired computer scientists to explore ways in which the production of awareness in cooperative ensembles can be supported in CSCW systems through 'shared object servers' (e.g., Rodden and Blair, 1991; Rodden et al., 1992; Trevor et al., 1995), awareness models (e.g., Rodden, 1996; Benford and Greenhalgh, 1997; Sandor et al., 1997; Simone and Bandini, 1997), and so forth. Other areas of CSCW research can tell similar stories of how workplace studies have informed the development of CSCW technologies. For instance, ethnographic and other in-depth workplace studies have played a crucial role in the development of the concept of 'computational coordination mechanisms' and of the corresponding software environment (Simone et al., 1995; Schmidt and Simone, 1996; Simone and Schmidt, 1998).

That is, the observed 'paucity of papers detailing specific design guidelines' (Plowman et al., 1995, p. 313) does not reflect on the *relevance* to CSCW of ethnographic or other in-depth workplace studies informed by sociological programs such as ethnomethodology or symbolic interactionism. Nor does it, in fact, reflect on the actual impact of workplace studies on the development of CSCW technologies.[5] That is, 'designers' of novel CSCW technologies — as

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5 Notice that the trails of this impact — the histories of how workplace studies inform the development of CSCW technologies — is not always readily visible in papers reporting on findings from workplace

opposed to application of existing technologies to the requirements of specific settings — indeed do need ethnography and other sociologically informed kinds of workplace studies 'to do what they wish to do'.

Instead, I will suggest that the paucity of specific design guidelines reflects (1) on the state of CSCW technology and (2) on a lack of appreciation of how radical the CSCW program really is.

(1) Conducting a requirements analysis presumes a mature and reasonably understood technology. The analyst investigates a particular work setting or a set of settings in a particular work domain in order to determine if a given family of technologies might be usefully deployed, to determine which aspects of the work activities in the domain would benefit most from computerization, and to sketch a design. Without knowing the general characteristics of the potential technologies, the analyst would be faced with an infinite space of possibilities and would in fact, in order to give specific guidelines or recommendation, be expected to develop the new technologies more or less from scratch.

In terms of technology, CSCW has a long way to go. Discussing the state of CSCW technologies in any kind of detail is, of course, completely beyond the scope of a brief set of comments on the role of workplace studies. Allow me to mention one point, however, just to illustrate the situation: As pointed out by foundational CSCW workplace studies such as the ATC study and the London Underground study, cooperative and individual activities are inextricably interwoven in daily work practice, and a CSCW system should thus support a fluent and seamless meshing of individual work and cooperative work. However, current operating systems are basically designed to support work conceived of as individual work. They do not provide facilities for supporting the articulation of cooperative activities with respect to the shared data structures and functionalities as represented by applications. Thus, although CSCW facilities supporting mutual awareness and adaptation (monitoring the activities of colleagues, making one's work appropriately visible to colleagues, directing attention to anomalies, etc.) are orthogonal to applications such as word processors, spreadsheets, and drawing tools, CSCW designers attempting to build shared work spaces are forced to incorporate such facilities in the domain-specific data-structures and functionalities, i.e., in applications. As a result, users are suddenly faced with 'individual' as well as 'cooperative' word processors, spreadsheets, drawing tools, etc. and an impedance is consequently created between individual and cooperative activities. CSCW facilities providing 'shared work spaces' should not be conceived of as applications or be implemented as part and parcel of applications but as extended operating system functions that can be accessed from and combined with, in principle, any application. Otherwise the delicate and dynamic relationship between cooperative and individual work breaks down. (For an attempt to outline the implications of workplace studies for the architecture of a CSCW software environment, cf. Schmidt and Rodden, 1996).

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studies. The transfer of findings and insights typically happens in the course of discussions within cross-disciplinary research teams and are often only documented in design-oriented papers.

In the absence of appropriate computing environments — and I have indicated only one example of many equally fatal deficiencies — it is no wonder if workplace studies do not result in *specific* design recommendations or CSCW prototypes for specific settings. We are still in the murky prehistory of CSCW, and there is a long way to travel until environments that support articulation work fairly adequately become available. Until then, there will remain a big discrepancy between accounts of sociality generated by field studies and the way information can be of immediately practical use to system developers.

However, while CSCW technology is still far from mature, important practical steps in the development of CSCW technologies are of course being taken in the form of experimental systems, sometimes developed as attempts to explore possibilities of supporting certain modes of interaction (Ishii, 1990; Ishii et al., 1992; Fuchs et al., 1995; Fitzpatrick et al., 1996; Roseman and Greenberg, 1996), sometimes to explore the feasibility and limitations of certain existing technologies for CSCW purposes (e.g., media spaces, workflow technology, hypermedia, etc.) in particular work settings (Shepherd et al., 1990; Grønbæk and Mogensen, 1997) or more generally (e.g., Heath and Luff, 1991; Heath and Luff, 1992b; Heath et al., 1995), and sometimes even to solve very practical problems in particular work settings (e.g., Pougès et al., 1994). In any case, these experimental systems inevitably support only certain modes of interaction and thus provide quite limited support for articulation work. These unavoidable limitations notwithstanding, the experiments provide indispensable insights, not only in the advantages and problems with applying those technologies for CSCW purposes, but also often — when the experience is carefully documented — in the (perhaps unforeseen) problems that can arise when such technologies are introduced in the social organization of work.

In the development of experimental CSCW systems, designers often — as pointed out by Anderson — work closely with users and engage in fieldwork in the settings for which they are designing; they may even invite sociologists and psychologists to assist in investigating the setting and evaluating the system and its impact. In these cases, however, the objectives of the experiment are clearly defined and the technological options identified and bounded in advance.

Thus, while requirements analysis — in line with other ways of developing requirements such as user participation in design — plays an important role in the development of experimental CSCW systems that investigate the applicability of specific technologies for specific aspects of articulation work, the impact of this kind of requirements engineering is limited by the fundamental inadequacies of existing software environments for CSCW purposes.

(2) Ironically, however, when the new technology eventually matures and the adequate software environments become available, to a large extent due to the long-term impact of sociologically inspired workplace studies, it may very well turn out that this technology does not leave much room for requirements analysis as a distinct kind of activity which requires specialized qualifications. In the 80’s much attention was paid to developing a methodology for requirements analysis

of ‘office work’. Most of that effort was made redundant with the development of modern graphical user interfaces and inexpensive ‘shrink wrapped’ software. As a result, contemporary users do not need to hire experts to conduct a requirements analysis and devise a requirements specification to configure, for instance, a Macintosh.

In fact, a radical conception of CSCW and CSCW systems argues that a CSCW system should provide an environment that supports users in designing and manipulating the coordination mechanisms that are appropriate for the particular setting (Schmidt, 1991; Kaplan et al., 1992; Malone et al., 1992; Ellis et al., 1995; Schmidt and Simone, 1996). In a similar vein, Bentley and Dourish (1995) have suggested that a CSCW system should be seen ‘as one whose behavior can be adapted through high-level customization to meet the needs of its users’ (p. 134). From this perspective, they argue, in-depth requirements analyses will no longer be necessary in order to design effective systems to support cooperative work.

That is, if the radical program in CSCW proves realistic, and I for one is convinced it will, the conventional notion of the product life cycle as constituted by distinct stages defined by the involvement of different professionals — ‘requirements analysis’, ‘design’, ‘use’, ‘evaluation’, ‘maintenance’, and ‘redesign’ etc. — will not be adequate for the design of CSCW systems.

In sum, then, the role of workplace studies in CSCW is crucial and critical: to dismantle prevalent common-sense notions of cooperative work by uncovering how orderly cooperative work is routinely and inconspicuously accomplished. On the other hand, there does not seem to be much room for workplace studies — e.g., ethnographies — in the design of specific CSCW systems, in part because the technology is not mature yet and requirements analysis therefore as yet is a problematic undertaking, and in part because CSCW represents a radical technology in which requirements analysis may eventually turn out to be gratuitous anyway.

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