Introduction
Some of the finest work within the sociology of organizations began to emerge from Chicago following the second world war. Due in part to the efforts of E. C. Hughes, social science witnessed the emergence of a substantial body of naturalistic studies of work and occupations that began to dominate the discipline in a way that is hard to overstate. The research that formed the basis of this work was characterized by its employment of a rich and robust empirical method that combined a deep understanding of the social context of work and occupations with an attention to the fine-grained details of social interaction and organization. These studies, and the conceptual framework developed by Hughes, have had a profound influence on the study of work and organizations in the post-war period. The work of Hughes and his colleagues, and the work that followed, remains a central part of the sociology of work and organizations.

Convergent activities
Clotthorpe through the contributions of successive generations, continue to permeate social science. It is interesting to note that there is a corpus of research currently emerging within cognitive science that has many of the hallmarks of the postwar naturalistic studies of work and organizations. In the light of powerful critiques of goal-oriented, plan-based models of human conduct (e.g., Suchman, 1987; Wosnig and Flores, 1980), a growing interest in activity theory, and the emergence of distributed computing, we are witnessing the development of an exciting body of naturalistic research concerned with work practices and new technology in organizational settings, sometimes conceptualized in terms of "distributive cognition" (see, for example, Huschle, 1985, 1999, 1995; Lave, 1988; Olson, 1980; Olson & Olson, 1991; Norman, 1988).

Although the Chicago School made a significant contribution to our understanding of work and occupational life, the ways in which they explain tasks and activities in institutional environments is not without its problems. For example, at a very general level, it is unclear how useful it is for sociological explanation to transpose metaphors used in one domain to characterize work and occupational life in another. More importantly, perhaps, while recognizing the importance of the mundane and routine in work, such studies, often by virtue of the conceptual framework they employ, ignore the ways in which tasks and work-based activities are accomplished in actual circumstances within organizational settings. In particular, despite Hughes's recognition of the importance of social interaction to the accomplishment of work and occupational life, the ways in which specialized tasks such as medical diagnosis or psychiatric treatment are produced and through interaction remains unexplored, glossed in terms of "organizational culture," "operational philosophy," "negotiation," or "taking the role of the other," etc. Perhaps as a consequence of subscribing to a model of human conduct that presupposes that social order rests upon shared meanings and understandings that remain stable for brief periods of time, the sociologist's interest in the representation of tasks and activities within organizational settings is largely lost to the analytic domain. This chapter, like others in the volume, is concerned with continuing the rich ethnographic tradition in the sociology of work and organizations, but tries to re-orient the focus toward the sociocorporatist foundations of task-based activities. Drawing on video recordings and field observation of work and interaction in the Linen Control Rooms of the London Underground, it explores the ways in which professional and non-professional work tasks are accomplished and contested in the institutional context of organizations. We wish to show how seemingly individual and specialized work tasks are produced with respect to the actions of colleagues and rely upon individuals' ability to participate, simultaneously, in multiple activities. In this chapter, we are particularly interested in showing how line control and the provision of public information on the London Underground rests upon a body of practices and reasoning through which personnel produce...
recognize, and coordinate their specialized actions and activities with the contributions of their colleagues. Although such analysis falls within a longstanding sociological tradition, it is also of potential relevance to recent developments in computer science and human-computer interaction (HCI; see Baerle & Buxton, 1987; Carroll, 1995; Norman & Draper, 1986). Alongside the growing interest in developing systems to support collaborative work, we have witnessed the emergence of a research domain, CSCW (Computer Supported Cooperative Work; see Baerlecke, 1993; Gallegher et al., 1990; Greif, 1988), in which it has been recognized that...in...ing...ive...ing...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...ive...i...
controller, DRA, Signalmen, and Duty Crew Managers, to coordinate train flow and passenger movement. In the Line Control Room, Controller, DRA, and other staff use the timetable as a reference with their understanding of the current operation of the service to determine the adequacy of the service and, if necessary, initiate remedial action. Indeed, a significant part of the responsibilities of the Controller is to serve as a "policies of the timetable." Even if he is unable to shape the service according to the timetable’s specific details, the Controller should, as far as possible, attempt to achieve its underlying principle: a regular service of trains with relatively brief intervening gaps.

The timetable is not only a resource for identifying difficulties within the operation of the service but also for their management. For example, the Controller will make small adjustments to the running times of various trains to cure gaps that are emerging between a number of trains during the operation of the service. More serious problems such as absences, vehicle breakdowns or the discovery of "suspect parcels" on trains or platforms, which can lead to severe disruption of the service, are often managed by “reforming” the service, that is, by rearranging trains so that they are crewed by and follow the schedule of a different train. These adjustments and “reformations” are undertaken by the Controller. He marks on the relevant pages of his timetable the changes on the relevant pages of his timetable. The paper pages are covered with cigarette or laminate sheets to enable the Controller (and others) to mark changes in the timetable and then to remove them with a cloth when the trouble is over. The changes made by the Controller to the timetable have to be known by the DRA and Signallers Assistants and communicated to Operators (Duty Crew Managers, Duty Train Managers, and others outside the Line Control Room). It is critical that the DRA, relief Controller, signal assistants, and others receive information concerning changes to the timetable, otherwise they will misunderstand the current operation of the service and undertake inappropriate courses of action.

Despite important differences in the formal specification of the responsibilities of the Controller and DRA, the various tasks they undertake rely upon close collaboration. Indeed, Control Room personnel have developed a safe and complex body of practices for monitoring each other's conduct and coordinating a varied collection of tasks and activities (see Heath & Luff, 1992). These practices appear to stand independently of particular personnel, and it is not unusual to witness individuals who have no previous experience working together, informally, implicitly, yet systematically coordinating their conduct with each other. One element of this extraordinary interweaving of sequential and simultaneous responsibilities and tasks is an emergent and flexible division of labor that allows the personnel to lend support to the accomplishment of each other's tasks and activities and thereby manage difficulties and crises.

**Assessing the service**

The London Underground, like other rapid urban transport systems, does not provide the public with a timetable with which to schedule their journeys. Rather, passengers organize their travel arrangements on the assumption that trains will travel between particular locations at frequent and predictable intervals. On the Bakerloo Line for example, trains run approximately every two and a half minutes during the "peak" period and between five and seven minutes at other times in the day. The DRA orients to the ways in which passengers organize their travel with London Underground and provides information when particular problems arise in the "normal" operation of the service. Such problems may vary from a slight delay as a result of absent staff, through to a major evacuation caused by the discovery of a "suspicious parcel." The nature of such information varies with respect to the circumstances at hand; however, these public announcements do reveal recurrent characteristics.1

*Fragment 1 (10.7.89 19.45)*

**DRA:** Good Morning sir: in Bakerloo Line Information (07.30)

**DRA:** The next train (and left from Regents Park (1) (07.30) (or) will be with you at Baker Street (0) (one minute 03.22) Marylebone (06.30) three minutes. (1) Paddington approximately six minutes. (1.2)

**DRA:** (Our next train just left from (1) Regents Park (1) (1.2) destination Harrow at Willesden.)*

The actual advice is routinely foreshadowed by a series, or package, of actions that successively align the potential recipients to the upcoming information. These actions include a greeting and an official identification of the speaker. The
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the Signal Assistants, explicitly to provide information in each other when encountering the problems they have noticed or the instructions they may have made. Indeed, given the demands on these personnel, especially when dealing with emergencies or difficulties, it would be impossible to abandon the tasks in which they were engaged in order to provide explicit information concerning what they were doing and why. However, it is essential that both Conductor and OMA (and others) remain sensitive to each other's conduct, not only to allow them to coordinate specific tasks and activities, but also to enable them to gather appropriate information concerning the details of the current operation of the service.

To produce timely and relevant information for passengers, the DIA systematically monitors the service and the activity of his colleagues, and transforms these bits and pieces into carefully tailored announcements for passengers who are using the service at some moments in time. Consider the following instance, where the DIA delivers an announcement to those passengers at a particular station that their next train will be delayed.

Fragment 2.1

DIA: Hello and good afternoon. Ladies and Gentleman. (1) Bakerloo Line Information (0.37) "We have a slight gap in our South Bound Bakerloo Line Service (2) towards Elephant and Castle. (1.8) Your next South Bound train (1.5) should depart from this station in about another five minutes. (2.2) The next South Bound train (2.8) should depart from this station in about another five minutes."

The announcement emerges in the light of the DIA overhearing the Controller's conversation with the driver, or operator (Op), and assessing its implications for the expectations and experience of the passengers using the service.

Fragment 2.2

C: Control the train at: Clapham. South Bound. Do you receive? (6.3) (2) Switch CCTV monitor to platform.

C: Control the train at: Clapham. South Bound. Do you receive? (6.3)

Op: Yes, this is . . . do you want to put the CCTV monitor on platform? (5.2)

Op: Yes, that's it.

C: Thank you very much, . . . [End Op: (5.2)]

DIA: Hello and good afternoon. Ladies and Gentleman. (1) Bakerloo Line Information (0.37) "We have a slight gap in our South Bound Bakerloo Line Service (2) towards Elephant and Castle. (1.8) Your next South Bound train (1.5) should depart from this station in about another five minutes. (2.2) The next South Bound train (2.8) should depart from this station in about another five minutes."

The DIA transforms the Controller's announcement into a relevant announcement by determining who the decision will affect and what its consequence will be. In

"Monitoring" and discriminating action

Although the DIA does have independent access to various forms of information concerning the operation of the service, such as the fixed-line diagram and the CCTV screens, the announcements he makes and the various actions he undertakes are often dependent upon the actions of his colleagues, and in particular the Line Controller. It is relatively unusual, however, for the Line Controller, the DIA or

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coordinate announcements with train movement

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announcing the start of the service.
this case, this particularly concerns the passengers at Charing Cross whose train is being delayed as a consequence of a problem emerging on the Southbound service. A little later, the DIA produces a second announcement (not included in the transcript above) to inform passengers who have recently arrived on the platform of the delay.

The DIA does not wait until the completion of the Controller's call before preparing to take action. As the Controller begins his first attempt to contact the driver, the DIA glances at the fixed-line diagram, as if to seek an account for the Controller's intervention (Fig. 4, frame 2.1). As the Controller begins his second attempt to contact the driver, the DIA moves to a seat nearer the console and in reach of the PA system (Fig. 4, frame 2.2). On the phrase "couple of minutes," where the specific implications of the intervention become apparent, he begins to set the PA system to make an announcement to the passengers at Charing Cross (Fig. 4, frame 2.3). The DIA monitors the Controller's actions as they emerge in interaction with the driver, and using the various technological sources of information, particularly the fixed-line diagram, is able to account for the Controller's intervention and to assess its implications for passengers at a certain location.

The DIA overhears the Controller's emerging intervention and transforms his request for the Driver to "take a couple of minutes" in the platform, into a public announcement informing passengers that there will be a slight delay before the train continues its journey. The announcement "reproduces" certain features of the request to the driver, providing an explanation—"a slight gap in our speech bound Bakerloo Line Service T," which fore shadows the specific advice—"your next South Bound train: T (0.6) should depart from this station in about another three minutes." The Controller's intervention, therefore, appears to engender a specific activity by the DIA; an activity that systematically reformulates features of a conversation between two colleagues and presents the information to a particular category of passengers.

Despite the necessity to monitor closely the conduct of the Controller, the DIA maintains a certain "social distance," providing his colleague with what would be apparent were they to speak directly to each other.
DA: Two Three Three. He's at Biker Street now.

Before the Controller has finished speaking to the Driver, the DIA calls the Station Manager at Pickett Rd and warns him that the 233 is to be "detained." On completing the call, the Driver produces a series of public announcements on each southbound platform between Biker Street and Pickett Rd, warning passengers that the train is "for Pickett only." The photographs in Fig. 5 will provide a sense of the ways in which the DIA produces a series of actions on overhearing the Controller's request to the driver.

The DIA, therefore, overrides the Controller's instructions and assumes its implications for both staff and passengers. The Controller's requests, and in particular the word "return," engender sequentially relevant actions from the DIA; first to warn the station manager of the upcoming events, and second, to inform passengers who may join the train at a number of stations prior to Pickett Rd in preparation for departure. The driver himself is sensitive to the implications of "turning early" for the passengers, and asks the Controller to have the DIA make the relevant announcement. The Controller relies upon the DIA undertaking a specific set of sequentially appropriate actions with respect to particular types of action that he, the Controller, may undertake. Indeed, in the case at hand, if the DIA failed to warn the station manager or provide the appropriate passenger information, the absence of such actions would be noticeable and accountable.

DA: Good morning Ladies and Gentlemen. (1) Biker Street Line Information ((0) This train is for (8) Pickett Road only. (5) Your train is for (1) Pickett Road only. (1) Please remain at the rear of the train. (1) Please remain at the rear of the train.

This train is for Pickett Road only.

Convergent activities

It is not simply that DIA's happen to remain attentive to the local environment of activity and are able to draw the relevant information from the actions of their colleagues. Rather, personnel within the Control Room organize their conduct to that while engaged in one activity, they simultaneously monitor and participate in the activities of others. This double-edged element of accommodating these specialized tasks within the Line Control Room is an essential feature of their "collaborative work," demarcating that participants design their activities on how while undertaking one task they remain sensitive to the "independent actions of their colleagues.

Producing an activity while simultaneously participating in the activities of another has implications for the ways in which personnel utilize the various tools and technologies within the Line Control Room. So for example, the DIA may switch his CCTV monitor to a particular platform to enable him to read a number from the front of a train for the Controller, even though the DIA is engaged in delivering a public announcement and only happened to overhear that problems concerning the identity of particular trains are emerging. Or for example, it is not unusual to find the Controller or DIA switching the telephone handset to the other ear, to enable his colleague to overhear a conversation with a member of the Underground staff based outside the Line Control Room. Almost all tasks within the Line Control Room are produced by the DIA or Controller as they simultaneously participate in the concurrent activities of their colleagues. The various tools and technologies that are provided to support these tasks, are shunted, corralled, and even abandoned, in order to enable Control Room personnel to participate simultaneously in multiple activities that move or locate involve each other. In both Fragments 2 and 3 we can see the ways in which phrases or even single words serve to enframe particular actions and activities for colleagues within the Control Room itself. These words or phrases, while featuring in the accomplishment of specific actions in interaction on the radio phone, simultaneously enframe particular activities for the DIA and allow him to produce sequentially appropriate conduct and provide a coordinated response to a problem or crisis. The DIA is not the "principal recipient" of the Controller's telephone talk, and yet is able to retrieve the necessary bits and pieces of information to enable him to produce "sequentially relevant actions and activities. The production of conduct by the DIA (and others such as the Signal Assistants) relies upon a body of procedures and conventions that provide for, and engender, the relevance of particular actions given specific types of activity undertaken by the Controller. The very intelligibility of the scene for the DIA, and his colleagues, derives from their use of and orientation to a body of practice that informs the production, recognition, and coordination of routine conduct within the Line Control Room. So, for example, it is not simply that the DIA remains peripherally aware and sensitive to the whole gamut of "going on" within the Control Room, but rather discriminates the local environment of conduct with respect to, for example, the multiple implications of specific types of events for his own conduct. Interest-
tions such as turning trains short, closing stations, delaying trains, taking trains out of service, and so on, in their different ways implicate specific trajectories of action for the DIA (and others). The procedures and conventions oriented to by the DIA and his colleagues in producing and coordinating actions, inform the ways in which they "monitor" and discriminate each other's conduct and remain sensitive to the local environment of "going on."

The production of convergent activities

Personnel within the Live Control Room are continually and unavoidably "monitoring" and "discriminating" the local environment of conduct, and by virtue of a body of indigenous practice and procedure, coordinate particular actions and activities with each other. Through these practices, personnel produce and preserve the mutual intelligibility of emergent events and activities and are able to recognize and make sense of each other's actions and the movement of traffic along the line. The natural history of specific events, such as the management of a "suspect parcel" or a "person under a train," even the natural history of the operation of the traffic "on this morning" and "on this day," provides for the intelligibility of actions and their relevance for particular conduct by individual personnel within the Live Control Room. In making sense of the actions of colleagues, the various information displays and the events at hand, the DIA and others orient to a body of practice that interweaves their particular actions and the ways in which those practices have configured and rendered intelligible the immediately prior events. Take, for example, a case in which a Controller might ask the DIA to perform a particular action. However "explicit" that request might be, it unavoidably relies upon the DIA's current understanding of the service, its sense of the action. Consider the following instance in which the Controller (Cic) requests the DIA to ask a driver of a train at Oxford Circus to continue his journey southbound.

Fragment 4 Transcriber 1

(Cic replaces one receiver and picks up another)

Cic: Tell him to go. (If you've got a clear signal)

DIA: Uh...yeah

(6.4) (DIA enters the PA system)

DIA: This is a train operator. (0.2) in the train operator (.) if you have a Green Signal: 1. you may depart. (4.4) if you have a Green Signal you may proceed. Southbound.

(1.2)

DIA: Staff announcement to the train driver. If you have a Green Signal you may proceed. (1.5) Southbound. (The train leaves Oxford Circus)

Until the delivery of the request, the Controller and the DIA have been engaged in distinct and apparently unrelated tasks. The Controller has been attempting to contact a driver who has unaccountably "sat down" at Oxford Circus for some minutes and caused a severe backing of traffic on the southbound service. Meanwhile the DIA is preparing to make a public announcement concerning an unrelated difficulty emerging elsewhere in the service. On the failure of the Controller's third attempt to contact the driver at Oxford Circus, he abandons the radio phone and grabs the telephone in order to ask the station manager to go down to the platform and tell the driver to go. As the Controller looks for the Station Manager's number on the touch screen telephone, he "suddenly" turns to the CCTV monitor and asks the DIA to tell the recalcitrant driver to go.

Despite their involvement in distinct activities prior to the request, and the absence of any "communication" about the difficulty at Oxford Circus, the Controller assumes that the DIA knows who the "him" is and has some understanding both of the problem and why the DIA is being asked to help to solve it. The design of the unnearest presupposes a common orientation to a particular domain and problem, and assumes that the DIA is in a position to immediately and efficiently contact the driver. The Controller's presuppositions prove well founded. The DIA demands neither explanation nor any additional information, but rather accepts the request, resets the PA system, and a few moments later delivers the announcement to Oxford Circus asking the driver to go "if he has a Green Signal." As the DIA accepts the request, the Controller begins to deal with another unrelated problem. After making the announcement, the DIA witnesses the train leaving Oxford Circus and resets the Public Address system in preparation for a public announcement to tell passengers when their next train will arrive.

In part, the Controller's request achieves its intelligibility and performative impact by virtue of its position within the local configuration of the DIA's actions. Immediately prior to the delivery of the request, as the Controller searches the screen of the touch-screen telephone for the Station Manager's number, the DIA turns from the fixed-line diagram to the station CCTV monitor (with an intermediary glance at the PA monitor). As he turns from the fixed-line diagram to the station screen, a picture of the train at the southbound platform of Oxford Circus begins to emerge. Before the image has settled, the Controller looks up and produces the request.

Fragment 4 Transcriber 2

Cic: (1.3) Tell him to go. If you've got a clear signal

DIA: 1. looks at station screen

DIA: Looks at fixed screen

Cic: Yeah

[Image]
As the Controller delivers the request, both he and the DIA are looking at the train standing in the platform. The DIA makes sense of the utterance with respect to his own and the speaker's orientation towards the image on the monitor—the train standing in Oxford Circus southbound. Mutatis mutandis, the Controller reflexively inquires and constitutes a common reference by virtue of the design of the utterance and the coparticipants' orientation towards the CCTV monitor. The "common reference," namely "him," the driver of the train in the platform, is occasioned by the utterance, just as the accompanying visual orientation and the image on the screen serves to index the utterance. Each elaborates the other and feature in the production and the intelligibility of the utterance, in the way suggested by Garfield in his discussion of the "documentary method of interpretation" (1967, p. 77). In presupposing a common referent and designing the utterance accordingly, the Controller and the DIA reflexively establish a "scene in common."

Although the design of the utterance and the participants' visual orientation towards the screen provides a preliminary explanation for the success of the request, one or two questions remain unanswered. It is clear from the desk that the image of the train at Oxford Circus station only begins to emerge a moment before the onset of the Controller's utterance (less than one-fifth of a second) and it seems unlikely that the request is designed (at least from its outset) in the light of the Controller seeing and recognizing the train. Moreover, though it is possible that the DIA could make sense of the request by virtue of the speaker's orientation towards the monitor, it seems unlikely that he would be able to undertake the relevant course of action unless he had a sense of the difficulties at Oxford Circus (that the Controller was attempting to solve). The question remains therefore, why (and how) can the Controller presuppose that the DIA is not only aware of the problem at Oxford Circus, but also may be in a position to contact the driver and effectively solve the immediate difficulties at Oxford Circus?

To answer this question it is worth briefly considering some of the activity in the Control Room that occurred prior to the event.

The following fragment begins approximately 15 seconds before the Controller's request to the DIA. We enter as the Controller (C) is having a heated discussion with his colleague (Ci), who is a relief Controller and has just entered the room, concerning the failure of a signalman (located outside the Line Control Room) to undertake various changes to the running times of the trains. During this discussion the telephone rings. The Controller (C) picks up the handset, but delays taking the call until an opportune moment arises in the discussion. On his colleague uttering "Oh for effs sake" (Fig. 7, frame 4.4), the Controller (C) responds to the caller.

While the first call is being taken, a second phone rings (indicated by the arrow in Fig. 7, frame 4.2). The second call is answered by the relief Controller (Ci) after he finishes a brief discussion with the Signal Assistants concerning the identification of a train in Baker Street.

The first incoming call informs the Controller (Ci) of the difficulties at Oxford Circus. He grabs the radio phone and attempts to contact the driver. Ci makes three successive attempts to contact the driver on the radio and then turns to the conventional telephone in order to ask the station manager to ask the driver to go.

As the Controller begins his first attempt to contact the driver at Oxford Circus, the DIA and the Signal Assistant attempt to identify the train at Baker Street. He switches the CCTV monitor to Baker Street South and attempts to read the number from the front of the train as it enters the platform. The DIA utters "all the two," and as the Signal Assistant returns to his own desk he calls out "two two two," to his colleague (Fig. 8, frames 4.5 and 4.6). The DIA turns from the CCTV monitor (showing Baker Street) to the fixed-line diagram. The alignment
Controller to the train at Oxford Circus, on the Southwark bound, could you receive over?

Well...I just went to the window (I thought he said...) why didn't you do that? And he said he wouldn't.

It sometimes goes a lot.

On your future sick.

Controller.

Yes.

Figure 8.

of gaze from one to the other “representation” of the traffic not only serves to mark the completion of the previous activity but the onset of another, namely, an assessment of a particular aspect of the operation of the service. This alignment of gaze occurs with the Controller’s “Oxford Circus on the Southwark Bound” and with the Dia adopting a parallel orientation to the signal line diagram to the Controller, an orientation that is directed towards Oxford Circus (Fig. 8, frame 4.5). As the Dia aligns his gaze towards the diagram, the Controller momentarily adjusts his orientation towards the area of mutual regard. The
position of the DIA's alignment of gaze, at the point at which the Controller voices the potential location of the "problem," coupled with its orientation towards the domain in question, suggests that as the en activity is brought to completion, the DIA is already sensitive to the attempts to contact the driver and intervene in the operation of the service. Moreover, in the light of his colleague adopting a parallel line of regard, the Controller's reorientation may suggest that he is sensitive to the DIA's alignment towards his own attempts to contact the driver at Oxford Circus.

As the Controller begins his second attempt to contact the driver, he turns from the diagram to his data. The DIA simultaneously turns from the diagram towards the console (Fig. 8, frame 4.7). As the Controller produces the word "Oxford" in "Oxford Circus South," the DIA moves his hand forward toward the key controls of the PA system in readiness for a public announcement.

The juxtaposition of the DIA's actions with components within the Controller's utterances that identify the location of the problem, coupled with the ways in which his physical alignment and realignment parallels the actions of his co-participants, suggests and displays that the emergent activity of the DIA is convergent with the problem the Controller is attempting to address. Moreover, moving his hand to the PA controls serves to confirm, respectively, that the initial alignment by the DIA towards the fixed-line diagram is indeed a first action within an emergent trajectory of conduct. This trajectory being concerned with the delivery of an announcement to the passengers, who may be suffering because of the recalled intent behavior of the driver at Oxford Circus. Through the use of particular tools at successive stages within the Controller's attempts to deal with the problem, the DIA's actions become visible and intelligible as part of a narrative and recurrent activity that emerges in the light of interventions by the Controller in the operation of the service.

By the beginning of the Controller's third attempt to contact the driver, the DIA is setting the PA switches to enable him to deliver an announcement. As the Controller redials the radio and grabs the telephone to call the station manager, the DIA is retrieving the CCTV in preparation to witness the train finally leaving the station at Oxford Circus. This would enable him to provide precise information concerning the arrival of the train to the long-suffering passengers at Piccadilly Circus and beyond. While retrieving the CCTV, the DIA glances at the fixed-line diagram, as if to assess, once more, the severity of the problem generated by the driver at Oxford Circus (Fig. 9, frame 4.10).

We can begin to see therefore, how the production and intelligibility of the request is not only achieved by virtue of the participants' mutual alignment toward the object in question, namely the train standing at Oxford Circus, but with respect to the interweaving of two illustrated activities. On the one hand, we find the DIA producing a trajectory of conduct that foreshadows a public announcement. On the other, we can see the ways in which the components of this
activity are coordinated with the Controller's attempts to intervene in the service, an activity that routinely engenders a sequentially appropriate activity from the DIA—a public announcement. The request itself is occasioned by the Controller's sensitivity to the DIA's alignment towards the problem at Oxford Circus and appears coordinated with the moment at which the DIA is able to deliver the announcement. In Fragment 4, therefore, we find the Controller to be sensitive to the DIA's monitoring and alignment towards the activity in which he, the Controller, is engaged, and that he exploits the alignment precisely at the juncture at which his colleague is able to deliver the announcement.

There is evidence to suggest that the Controller is not only sensitive to the DIA's alignment towards the problem with which he is attempting to deal, but also to the conduct of other colleagues within the Control Room and in particular the other Controller. As the Controller is attempting to contact the driver, the relief Controller (C) answers a second incoming call. It is another call from elsewhere in Oxford Circus station, outlining the problem on the southbound platform. The relief Controller utters into the mouthpiece of the telephone “on the south” just as the Controller completes his second attempt to contact the driver (Fig. 9, Frame 48). The Controller (CII) overhearing “on the south” turns away from the mouthpiece of the telephone and utters, “Yes (I'm asking him.)” In overlap, the relief Controller informs the caller “Yeah (0.2) we're just letting him go now” (Fig. 9, Frame 49).

While engaged in one activity, therefore, the Controller is able to produce a timely contribution to an activity in which his colleague is engaged. It may even be the case that the utterance “on the south” is designed by the relief Controller not only to confirm the locale of the difficulty being reported by the caller, but also (through volume and intonation) to elicit, but not demand, confirmation from the Controller that he is indeed attempting to deal with the problem at Oxford Circus. Anyway, the Controller intercepts an utterance in juxtaposition with the relief Controller's utterance, which provides the resources through which both the caller and the relief Controller are assured that the problem is indeed being dealt with.

For the Controllers and the DIA, therefore, who, until recently have been engaged in distinct and unrelated activities, the problem at Oxford Circus, momentarily becomes the primary focus of their conduct, as they establish distinct, but interrelated, orientations towards the “the problem at hand” and its management. Their various activities converge as they systematically monitor and participate in each other's actions and produce a coordinated response to the difficulties at Oxford Circus. A few seconds later, the Controllers address a range of other issues and only the DIA remains concerned with the problems generated by the delay at Oxford Circus (see Fig. 10).

The Controller's request to the DIA to tell the train to go, therefore, is embedded in a complex configuration of activities and mutual monitoring that provides for the intelligibility and impact of the utterance, and allows the participants to solve one of the more immediate problems at hand. In designating the request, the Controller presupposes that the image appearing on the monitor is the train that he is attempting to contact at Oxford Circus and the DIA disambiguates the utterance with respect to the Controller's orientation to the emergent scene on the CCTV monitor. The request, and the Controller's accompanying orientation, both invoke and accomplish a (presupposed) common referent, and provide the resources through which the DIA can address the problem at hand and encourage...
the driver to continue his journey. It is positioned at a junction within the developing course of an activity undertaken by the DIA in order to provide passengers with timely and relevant information. The DIA scans the fixed-line diagram, sets the public address system to the relevant platforms, and alerts Oxford Circus or the CCTV monitor to witness the train leave the station and provide precise information to passengers. Watching the train leave the station is the last move in a package or trajectory of action, which foreshadows the delivery of an announcement to passengers. The Controller recognizes the trajectory of conduct and exploits the DIA’s apparent orientation to the “problems” at Oxford Circus, and his readiness to make an announcement, in order to contact the driver and encourage him to continue his journey.

As Fragments 2 and 3 suggest, many of the activities undertaken by the DIA are engendered by actions of the Controller and in particular his interventions in the routine operation of the service. So, for example, in Fragment 2, the Controller holds a train at Charing Cross and the DIA provides information to warn the passengers of the delay. In Fragment 3, as the Controller intervenes to “re-verse at Piccadilly,” the DIA informs the station manager and then delivers a series of public announcements. The participants appear to orient to the sequential relationship between particular activities, the DIA undertakes specific actions with respect to the interventions of the Controller. In the case at hand (Fragment 4), the DIA undertakes a series of actions that foreshadow a public announcement. These actions begin as the DIA completes one activity and while the Controller is attempting to contact the train at Oxford Circus. The DIA’s trajectory of conduct is not simply in immediate juxtaposition with the Controller’s attempts to call the driver; suggesting a sequential relationship between the two activities. Rather, various actions within the developing course of the trajectory that typically foreshadow a public announcement, are coordinated with the Controller’s conduct and his successive attempts to contact the driver. The routine organization of particular activities, the sequential relationships between the contributions of Control Room personnel, and the ability to mutually monitor each other’s orientation towards particular sources of information, provide the foundation of the design of the Controller’s request and the DIA’s ability to render it intelligible and deal with the emerging crisis at Oxford Circus.

Finally, it is interesting to consider briefly the activity of the DIA following his success in encouraging the driver at Oxford Circus to continue his journey southbound. Indeed, the DIA returns to a sequentially appropriate activity that he was ready to begin when the Controller asked him to contact the driver. After his witnessing the train leaving Oxford Circus, he resets the PA system and delivers the following announcement to the passengers waiting at Piccadilly Circus and Charing Cross. It is worth noting that the anticipated times of arrival of the next train are precisely the journey times between the locations, excluding the time it has taken to prepare to make the actual announcement.
organisational culture in essentially a sociointeractional organization; tasks are accomplished in and through interaction with others, and their competent and skilled performance is inseparable from the tacit practices and reasoning which inform their production, intelligibility, and coordination. The "situated" organization of Line Control is the sociointeractive and contingent accomplishment of a body of "routine" tasks.

One aspect of this sociointeractive organization is the ways in which personnel coordinate, sequence, particular tasks and activities. It was noted earlier that personnel appear to use, and orient to, conventional relations between particular activities; the conduct of one participant engendering sequentially appropriate activities from others. So, for example, a Controller's intervention that delays the running time of a particular train leads to a series of public announcements undertaken by the DIA. Or, for instance, the Controller turning a train short distance away from its scheduled line, requires relevant personnel including station managers. The DIA's activities are seen as related to and engendered by the Controller's interventions, just as the Controller's interventions project the reference of a specific action or activity to be undertaken by the DIA. These procedures inform the ways in which personnel recognize the relevance or appropriateness of particular actions, as well as forming the foundation to their intelligibility or sense. They also inform the manner in which individuals produce particular sequences or trajectories of action, and interrelate the "components" of an activity with the activities and contributions of colleagues.

Consequently, the relation within the Line Control Room, however, does not solely rest upon the intentional relations that pertain between particular activities. It is also dependent upon the ways in which personnel shape their participation in the activities of their colleagues, even while they may be engaged in distinct and unrelated tasks. For example, we can see the ways in which the DIA systematically monitors the activity of a Controller to enable him to retrieve the details of particular changes that are being made in the running of the service. In many cases, more active participation may be required. So, in Fragment 4, the Controller does not simply "monitor" the activity of his fellow "rider" Controllers, but makes an essential and timely contribution to the organization that his colleague is having on the telephone. The contribution is produced while the Controller remains "primarily engaged" in attempting to contact the driver at Baker Street. In other words, the production of a "task" is here seen as the emergence of activities of colleagues within the local milieu. The activities that personnel use and rely upon to participate simultaneously in more than one activity are not only additional to the formal procedures that "underlie" their various occupational tasks. Rather, they are an essential feature of work in the Line Control Room without which personnel would be unable to accomplish their individual tasks or coordinate their activities with each other. These individual practices and reasoning are the resources through which personnel competently and reliably maintain the operation of the service, for all practical purposes.

Although Control Room personnel are undoubtedly sensitive to prescribed ways of undertaking specific tasks, such as delivering a public announcement or altering the destination of a train, undertaking competent and reasonable work demands that "individual" activities are produced with respect to concurrent actions of colleagues within the local milieu. This may be no more than delaying a public announcement so as to avoid disrupting a delicate negotiation between the Controller and a driver. Alternatively, it may involve coordinating the production of an activity with the concurrent actions of a colleague who is "engaged" elsewhere, so that, for example, a timely contribution can be interjected into a telephone conversation. Or it may necessitate producing actions in such a way that potentially private and specialized tasks, such as rewriting the timetable from "within" a crisis, are rendered visible to colleagues within the local milieu, enabling them to coordinate their own actions accordingly (cf. Heath & Luff, 1992). The production of activities within the Line Control Room, including relatively complex and specialized tasks, is coordinated with, and sensitive to, the concurrent actions of colleagues.

One way of conceptualizing the sociointeractive organization of task-based activities is to draw on Goffman's (1981) discussion of a participation framework. Goffman suggests that any activity is dependent upon a particular production format that enables, or attempts to establish, the ways in which "those within the perceptual range of the event" will participate within the activity. In the materials at hand, we can begin to discern how the design of particular activities may be simultaneously sensitive to the potential demands of different "recipients," both within and beyond the local milieu. For example, while speaking to a customer on the telephone, he may be corrected on repeated use of the words "out of service". The Controller may not only articulate certain segments of his talk with respect to his conversion with the signalman, but shape particular words or phrases so that they are understood by and appropriate to the recipients. So, for example, even a single utterance may be designed to convey different actions by different colleagues who may be positioned at different locations within the organization. The production format of many activities within the Line Control Room is subject to multiple demands and implicates different forms of coparticipation from various personnel. The same activity can be systematically designed for different forms of coparticipation, and even momentarily merge different ecologies within the organizational milieu.

Technology in action

The quality and the fixed-line diagram, the computerized line displays, the CCTV monitors, and the various other tools designed to facilitate work within...
the Line Control Room rely upon practices and reasoning through which personnel produce their own actions and make sense of the conduct of their colleagues. In the light of these practices, Control Room personnel are continually and invisibly, implicitly and explicitly, gathering and distributing information to each other concerning the "current" operation of the service. Such information informs the very intelligibility of various diagrams and representations they use for steering and assessing the service, and induces the ways in which they recognize certain events and are able to develop a coordinated response. The use of the technology to identify and manage the various problems that routinely emerge in the operation of the service is dependent upon the routine ways in which personnel produce and coordinate their actions with each other.

For example, the "fixed-line" diagram displays the presence of trains on the Bakerloo Line between Queens Park and the Elephant and Castle. Each train appears as a strip of two and six lights, depending on how many sections of track the train is covering at a particular moment. At any time between 8:30 AM and 10:00 AM there are likely to be between 15 and 23 trains indicated on the board. The diagram provides staff within the Control Room and, of course, Visitors such as managers, with the ability to make, at a glance, an initial assessment of the current operation of the service. An even distribution of trains (lights) along the board with relatively few gaps.

Between them, both on the South and North lines, tends to indicate that the service is running according to plan, i.e., the timetable. Yet, as any Controller knows, such an even distribution of trains along the line can conceal important problems that may only lead to difficulties. The fixed-line diagram does not tell whether the trains are in or out of tiers, or which particular tiers they are. Neither does it provide information concerning an upcoming shortage of drivers, trains that are causing difficulties, stations that are closed "due to a London Fire Brigade investigation," nor does it reveal any of the complex body of timetable formalizations that may have already been undertaken and which may lead to difficulties later. In short, the fixed-line diagram and the information it provides is a critical resource in control and crisis management, but only in the light of the natural history of the operation of the service on any particular day. Without knowledge of timetable formalizations, out-of-tours, vehicle problems, stations closures, that is, the incidents that have occurred and the ways in which they were managed, the technology is largely redundant. The socio-institutional organization of individual tasks and activities within the Line Control Room, and the ways in which personnel monitor and participate in each other's conduct, provides for the possibility of using the tools and technologies at hand. In the light of practices that provide for mutual monitoring and coordination function within the Line Control Room, the technology provides the Controller and DIA with the ability to assess the current operation of traffic and undertake, if necessary, remedial action or provide information to staff and passengers. The "public" availability of the technology within the Control Room, whether it is a fixed-line diagram, a CCTV screen, a screen-based line diagram or an information display, provides a critical resource in the collaboration between Controller, DIA, and Signal Assistant. For example, personnel are able to assume that they have equivalent access to the different technological sources of information and that, in principle, observations concerning the current operation of the service are a virtually uniformly and commonly available. More importantly, perhaps, personnel can use the common sources of information as a reliable means of accounting for a broad range of actions and tasks undertaken by others. So, for example, in Fragment 2 and 4 we noted how the DIA turned to the fixed-line diagram as a source of explanation for the Controller's intervention. Or, it was observed how the Controller could produce a request that is embedded within, and constitutes, a mutually available scene on a CCTV monitor. The mutual availability of the various information displays allows personnel to presuppose that information available to one is available to all, a presupposition that is dependent upon the systematic ways in which individuals monitor and participate in each other's actions and activities.

Although the mutual availability of peculiar sources of information is utilized in making sense of and coordinating actions with each other, it is the mutual availability of the use of technology within individual activities that provides an important resource in the production of collaborative action. For example, a
glance towards the fixed-line diagram, a gesture towards the radio phone, or a scroll through a display of the points at a particular junction, can all provide resources through which a colleague can recognize the action or activity of another. The use of a particular tool, even looking at a particular piece of text such as the timetable, can provide a relatively unambiguous sense of a colleague's conduct, the intelligibility of the use of a particular technology is embedded within the activity at hand. For example, switching on a CCTV monitor may gain its particular sense by virtue of the immediately preceding actions, such as glancing at the fixed-line diagram and grabbing the microphone and headset.

The intelligibility of the action (involving the use of some particular tool or technology), may not only be embedded within the developing course of the individual's conduct, but also may be located with respect to a colleague's activity. In other words, for example, in Fragment 1, the intelligibility of the DIA's setting of the PA system is not only accomplished by virtue of the action's position within a developing trajectory of conduct being undertaken by the DIA, but also the action's location with respect to the contemporaneous conduct of the colleague. For example, consider how in Fragment 4 the Controller presupposes that the DIA's orientation towards the CCTV concerns the driver at Oxford Circus. The location of the driver within the trajectory of the DIA's actions, coupled with the juxtaposition of the DIA's actions with the attempts to contact the driver, provide the resources through which the Controller can assemble the sense of the look and produce the means to contact the driver.

The visibility of a colleague's use of a particular tool or source of information, even if it consists of no more than a momentarily glint at a line diagram, is made sense of by virtue of the action's location, not only within the colleague's individual conduct, but also with respect to how that action, given its occurrence "here and now," may be sensitive to actions being undertaken by others within the local environs. For example, in one hand the action may "naturally" emerge within a trajectory of a particular individual's conduct, in which case it may also be simultaneously embedded in and coordinated with the activities of other individuals within the Control Room. For the "relevant" sense of the action to be assembled, personnel have to be sensitive to colleagues' concurrent participation in multiple activities within the local milieu. The use of the various tools and technologies embedded in the activities of simultaneously overlapping activities, which themselves are dependent upon an indigenous socioinstitutional organization that provides for their production, intelligibility, and coordination.

The use of a particular tool or technology may be monitored by a colleague and features in the production of multiple activities lends one to question the conventional wisdom in HCI that places the single user

Convergent activities and his or her cognitive capabilities at the center of the analytic domain. Even more innovative conceptions of the 'user' that aim to take into account the perceptions and attitudes of users who employ particular tools (e.g., Mumford, 1983), perhaps draw too sharp a distinction between a person handling a system and those others within the "local" environment whose actions may feature in the accomplishment of a particular task. For example, consider how the use of the CCTV monitor by the DIA occasioned a request by a colleague and provided the resources both for the design and impact of the utterance. Or how in Fragment 3 the DIA's use of the telephone to call the Station Manager during the request for the train to turn short allows the Controller to recognize his colleague tracking the activity, so that he can confidentially inform the Driver that the "DIA will make announcements for you." So, whereas the "direct" use of a particular system may indeed be undertaken by a particular individual within the Line Control Room, the action may well be monitored by colleagues, and frequent in their production of activity. Noticing another's noticing of one's own conduct, and sensing that another's actions are sensitive to one's own actions and activities, informs the accomplishment of tool-mediated tasks in which an individual is engaged. It is not simply that work within the Line Control Room is "collaborative"; it is rather that personnel, even within the accomplishment of apparently individual tasks, are sensitive to and participating in the activities of colleagues, and this participation is an intrinsic part of the organization of the task. The use of the various tools and technologies in the Line Control Room facilitates in the accomplishment of these various activities and their coordination and provides resources through which potentially "private" actions are rendered visible within the local milieu. The various and complex ways in which the accomplishment of specialized tasks within the Line Control Room and other working environments (cf. Greetham et al., 1993; Suchman, 1993) is embedded in and inseparable from interaction with the concurrent actions of colleagues may lead us to question the usefulness of traditional approaches to the development of requirements for new technologies, approaches that place that single individual user with a relatively circumscribed set of tasks at the forefront of the analytic domain (Luff et al., 1994), although the socioinstitutional organization of task-based activities within the Line Control Room, when the use of the various tools and technologies is embedded in the accomplishment of simultaneously overlapping activities, which themselves are dependent upon an indigenous socioinstitutional organization that provides for their production, intelligibility, and coordination, the ways in which an individual's use of a computer-supported cooperative work in real-world organizational environments suggest that it is both difficult and tenous to delineate the individual from the collaborative. In the
Line Control Rooms, although different personnel have distinct responsibilities that are not undertaken by members of the other occupational categories, the competent accomplishment of specialized tasks is dependent upon an in
digenous organization that systematizes and coordinates their activities with respect to the contributions of others. The Controller and the DIA produce particular activities, even relatively complex tasks, with respect to the responsi-
bilities and concurrent conduct of their colleague(s), tailoring their actions so that they preserve a mutually coordinated response to particular incidents and events. Moreover, while engaged in one activity, we find the Controller and DIA monitoring each other's conduct and able to discretely localize the total environment with regard to contingencies which may be relevant to either their own conduct or the actions of their colleague(s). Work within the Line Control Room does not simply necessitate that the participants distribute information and maintain a
compatible orientation to the current scene. Rather, it requires that even the most apparently individual tasks are "organically" accomplished, moment by moment, with regard to the conduct and responsibilities of the coparticipants. This may in-
volves mutually focused interaction between Control Room personnel, but in a large part it requires Controller and DIA to engage in distinct tasks and activities while simultaneously participating in the conduct of their colleague(s). The ac-
tivities of personnel within the Line Control Room continually flow between the private and the public, between the individual and the collaborative, so that any attempt to demarcate cooperative from individual work within the Line Control Room is unlikely to prove either reliable or conceptually fruitful.

Summary
Within an organizational environment such as the Line Control Rooms on the London Underground, we can begin to discern how the performance of highly specialized and complex work tasks are embedded in, and inseparable, from a tacit body of sociotechnical practice and reasoning. Personnel unknowingly rely upon these competencies in producing, making sense of, and coordinating their actions and activities, and thereby in managing the problems and crises that inevitably emerge in the day-to-day operation of the service. These tacit competen-
tcies do not simply allow personnel to "apply" a body of specialized organiza-
tional knowledge and skill, but rather underlie the very ways in which particular tasks are produced and made sense of. The intelligibility of the scene and the possibilities of collaborative conduct emerge within the participants' abilities to "intersectionality." Accomplish their various specialized activities and actions. Al-
though the organizational culture may well include "collective representations," "specialized vocabularies," and "codes and policies," routine work within the Line Control Rooms rests upon a complex foundation of sociotechnical prac-
tice and reasoning through which various specialized tasks are systematically and unproblematically accomplished.

Convergent activities

Although the "situated" character of system use is widely acknowledged, there still remains a tendency to conceptualize human-computer interaction with re-
spect to individual cognitive skills and competencies (see for example Young et al., 1990). The observations documented here, and related studies reported in this volume and elsewhere, suggest that even in circumstances in which the tech-
ology is primarily used to support the specialized tasks of particular individuals (such as medical practitioners; see Greeno et al., 1993), competent use of a system is embedded in conventional and routine ways of accomplishing particu-
lar activities, interactively, within the organizational setting. The accomplish-
ment of specialized tasks, and the conventional use of complex technologies to support those activities, are dependent upon a realm of tacit interpersonal compe-
tences that inform the very production and intelligibility of organizational con-
duct. Tasks are accomplished in and through interaction, and it is only by detail-
ly the socially sanctioned and "publicly" available competencies used by individuals within real-world situations that we will begin to uncover the system-
atics that undoubtedly underlie human-computer interaction and computer-sup-
ported cooperative work.

Although it is increasingly recognized that recent studies of work within com-
plex technological environments have important implications for our understand-
ing of concepts such as the "user," "task," and "collaboration," less attention has been directed towards their potential impact on more traditional research within the

sociology of work and organizations. From its early beginnings in the lec-
tures and writings of E. C. Hughes, naturalistic research concerned with work and organizations has recognized the significance of social interaction to work
and organizational behavior; indeed Hughes suggests that the aim of his ap-
proach is to discover patterns of interaction and mechanisms of control, the things over
which people in a line of work need to gain control, the sanctions which they
have or would like to have at their disposal, and the bargains which were
made—collectively or uncollectively—among a group of workers and between
them and other kinds of people in the drama of their work. (Hughes, 1971, p.
246).

Despite its commitment to placing interaction within the workplace at the
forefront of the analytic agenda, the sociology of work and, in particular, natural-
listic studies of organizational behavior, have, through successive generations, di-
rected attention away from how personnel within institutional settings accom-
plish their specialized occupational activities in and through interaction with
co-workers and clients. The sociotechnical foundations of work in real-world
situations have remained unexplained by virtue, one suspects, of the conceptual
framework that has dominated naturalistic studies of organizations for successive
generations. The observations discussed in this volume and elsewhere (Dew and
Heritage, 1993), begin to chart the ways in which a taxonomy with the sociotechnical
organization of work and occupation may lead to a respectification of the co-
organizational conduct and some of its central ideas including "data," "performance," and "collaboration."

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Notes

1 The fragments are transcribed using the methodology developed by Gail Ifflmann, which is widely used within ethnography and communication analysis. The technique of using data is transcribed by the same transcriber from a tape. The number of brackets refers to the same number of weeks; and not necessarily to the same number of weeks.

2 The figure is an abstract of a figure in the original text. The reference is to the original text. The figure is an abstract of a figure in the original text. The reference is to the original text.

3 In particular, an interesting point in these paragraphs is the use of plastic chimes.

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