

# Unpacking Collaboration: the Interactional Organisation of Trading in a City Dealing Room

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**Abstract:** It is increasingly recognised that whilst CSCW has led to a number of impressive technological developments, examples of successful applications remain few. In part, this may be due to our relative ignorance of the organisation of real world, cooperative activity. Focusing on share trading in a securities house in the City of London, we explore the interactional organisation of particular tasks and the ways in which dealers interweave individual and collaborative activity. These observations suggest ways in which we might reconsider a number of central concepts in CSCW and begin to draw design implications from naturalistic studies of work and interaction.

## 1. Introduction

Despite impressive technological developments in CSCW, it is widely recognised that there are relatively few examples of successful applications in real world settings. In part, this is due to the innovative character of many of the systems and their relative fragility. More seriously however, it is suggested that the lack of success of CSCW systems derives not so much from their technological limitations, but more from their insensitivity to the organisation of work and communication in real world environments (e.g. Grudin 1988, Orlikowski 1992). Galegher and Kraut (1990) suggest, for example that the design and application of CSCW systems could learn a great deal from 'what we know about social interaction in groups and organisations'. In this light, we have recently witnessed a growing interest in delineating some basic distinctions concerning the organisation of 'cooperative work' and exploring their implications for the design of particular tools and technologies. Whilst many of these distinctions are indeed fundamental to

the organisation of cooperative work and the design of relevant technologies, including co-present versus physically distributed, synchronous versus asynchronous, symmetrical versus asymmetrical, the idea of 'cooperation' or perhaps more specifically 'collaboration' remains ambiguous and largely unexplicated (cf. Schmidt and Bannon 1992). If this apparent ambiguity were merely a matter of sociological relevance, then it would be of little importance to CSCW, however, our relative ignorance of the organisation of cooperative and collaborative activities in work settings may have profound implications for the success of the technologies we are attempting to develop.

In this brief essay, we wish to explore a few aspects of the organisation of collaborative work in a real world setting, namely the dealing room of an international securities house in the City of London. By examining the ways in which dealers coordinate their actions with colleagues and participate in each other's conduct, we wish to provide a sense of the delicacy and complexity of collaborative work, and show how apparently individual tasks are systematically, yet unobtrusively, coordinated with the actions of colleagues. In the light of these observations, we will consider not only the relevance of proposed technological support for market trading, but also discuss their more general implications for the design of systems to support cooperative work.

## 2. The Setting

There are many different types of trading that take place on dealing room floors, for example, there are markets in foreign exchange, bonds and derivatives ('forwards', 'futures' and options), and combinations of these vary from one dealing floor to another. However, much of this trading tends to focus around the notion of making 'deals' that is, the buying and selling of shares and bonds in order to make a profit.

Our study focuses on market makers on the equities desk of one dealing floor of a securities house, who deal in stocks on both the US and UK markets. These dealers have a continuous responsibility to buy shares at their published bid price or to sell shares at their offered price, whether or not they actually hold the shares. In this way market makers make a profit on the difference between the prices at which they buy and those at which they sell.

Our study is gathering materials from the 'number one' position on the equities desk which deals in the top ten stocks (for example, Hanson, ICI and Wellcome). Dealers currently work the stock collaboratively, and at present, this position is managed by two dealers; one (John) being mainly responsible for dealing in registered stocks, those which are listed on the UK Stock Exchange, and the other (Robert) for American Depository Receipts (ADR's), which are certificates traded in the US backed by registered holdings of shares in UK companies. As these dealers can effectively trade and hold stock in both sterling and dollars, they have to

keep track of changes in the exchange rate and the current state of both markets. They also must ensure that the bank has enough of the appropriate currency to cover any deals done in ADR's (figure 1 is a rough plan of the local area of the dealing room where John and Robert are located).

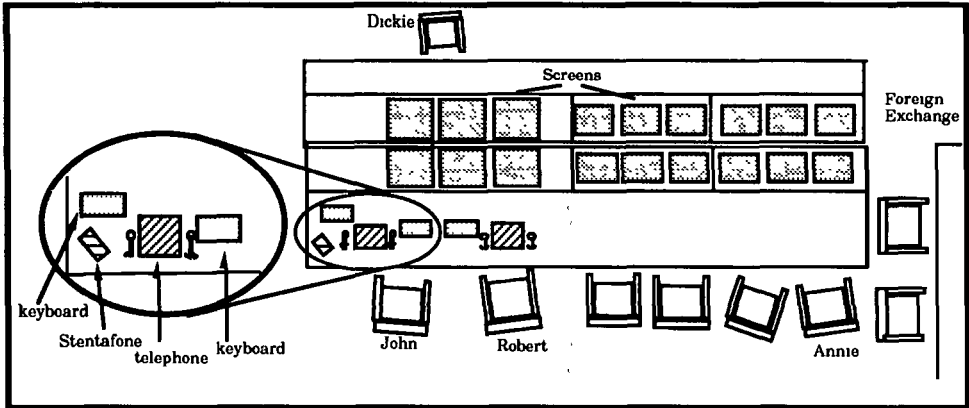


Figure 1. The 'number one' desk in the dealing room

Primarily, dealing in shares takes place over the telephone between different market makers' dealing rooms. But other deals occur within the dealing room either through the stentafone (an intercom system), face-to-face or shouted across the dealing floor and usually occur between market makers and salespeople with or without consulting foreign currency dealers. Dealers have a range of technology to assist them in understanding the current state of the market. Figure 2 is a diagram of the displays for various systems that John and Robert have available to them.

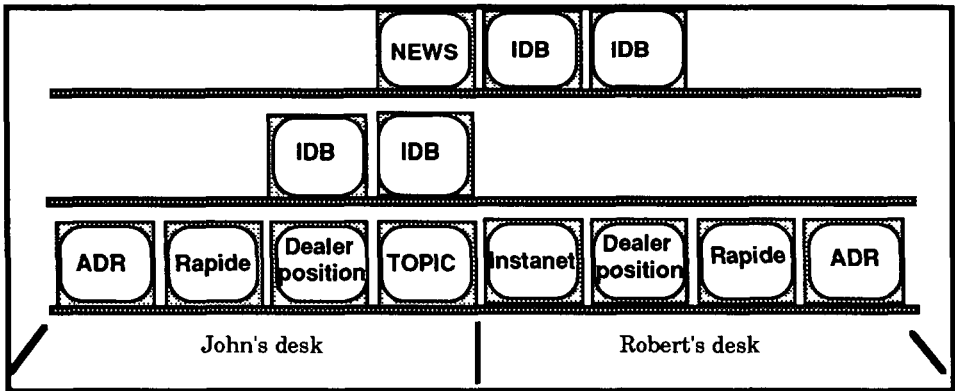


Figure 2. The displays available to the 'number one' desk

These systems include: TOPIC, for screen based price and market news; Instanet for American wide information on stocks and prices; IDB systems which provide a facility for displaying anonymous prices from Inter-dealer brokers (i.e. Cedar Street Ltd, Tullet and Tokyo, Garban Equities and First Equity); and Rapide, the security house's own system which, by presenting a restricted amount of information, allows dealers to see 'at a glance' which competing market makers are

'on the strip', that is, offering the best prices on a particular stock. This is also the only system, on which dealers can input information, enabling them to change their bid and offer prices on stock according to the current state of the market. ADR screens show the equivalent information on ADR's along with conversions from registered stocks to ADR's. Finally, each dealer has a screen which displays their current position, that is, the dealer's current holdings in stocks in which they are dealing. Thus, from all these resources, dealers must be able to discriminate what is relevant for them in order to make a deal.

After a deal is made, whether through the telephone to another market-maker or within the dealing room itself, it is required to be recorded and transferred to the Stock Exchange centralised database. As at peak times a dealer may make deals anywhere from every five to thirty seconds, great effort is spent in ensuring that these records are accurate. At present, this activity, called 'deal capture' is done on 'tickets'. Each dealer has a book which holds the tickets on which he or she writes a record of the deal. The ticket itself is then removed from the book and picked up by 'deal input' staff.

### 3. Coordinating collaboration with activity completion

Each dealer is responsible for a number of stocks or ADR's and is accountable for the profits and losses made through their sale or purchase. So, whilst dealers need to remain aware of the work of their colleagues, they frequently make deals themselves without direct reference to others within the local milieu. Within the dealing room, we do find instances of the forms of sequential, collaborative activity one finds in other settings, such as Control Rooms, medical consultations or more conventional office environments. In these cases, the activity of one individual, is coordinated with the completion of the activity of another, so that we can find sequences or trajectories of conduct which allow separate individuals within a relatively circumscribed division of labour, accomplishing collaboratively, step by step, a particular task or activity. In general, the form of collaborative activity supported by many CSCW applications, is designed to support this cumulative, sequential collaboration, characteristic of many organisational settings.

Whilst such sequential collaboration is perhaps less prominent within the dealing room than within the other environments, at least between dealers themselves, we do find that individuals frequently orient to the potential completion of a colleague's activity, prior to initiating collaboration. Their reluctance to 'interrupt' an activity of a colleague is hardly surprising, not simply because it might infringe conventional etiquette, but by virtue of the fact that to some extent a colleague's current activity is only partially 'visible' or available to others, even within the local vicinity. The relative inaccessibility of many of the activities of one's colleagues within the local

milieu, especially those undertaken on the telephone, coupled with one's inability to access the relative importance of particular actions, however seemingly trivial, encourage personnel to be sensitive to when and where they should attempt to initiate collaboration. Notwithstanding the etiquette in question, it is likely that an individual will stand a far greater chance of establishing mutually focused collaboration with a colleague, if he coordinates his initiating action with the completion of an activity in which the other has been involved.

So for example, in each of the following instances, a dealer produces an utterance which demands a reply from a colleague, just as the other completes an activity.

**Fragment 1. 14:40:47**

- R: Thanks very mu:ch. (on the 'phone)  
(2.3) {R replaces receiver on console}
- J: Do you want to take the B.P. in New York?
- (R): Yes:::
- J: An then run em up (.) a bit.

**Fragment 2 14:27:26**

- R: DICKIE: {outloud, having taken an incoming call}  
(1.2)
- R: Cedar Street  
(2.2) {R replaces receiver on console}
- H: I've put some Shell (an) sell at fifty six and three quarters...

**Fragment 3 14:24:02**

- R: {Lifts hand from keyboard and flicks calculator to one side}
- J: Wh-what are Hansons, they're twenty: o five offered?  
(0.4)
- R: Yeah.  
(0.2)
- J: Ninety two o five I'd say. {picks up 'phone}

In fragment 1, John initiates a query concerning whether they should buy B.P. shares which immediately develops into buying stock on the New York Market. In the second instance, Robert tells Dickie that Cedar Street (an Inter-Dealer Broker) is on the phone and then replaces his receiver. Harold then turns and informs Robert that he has put out some Shell for sale. Harold then proceeds to detail the various shares and their prices that he has put out on the New York Market. In fragment 3, John asks a question concerning the price of Hanson, precisely at the point at which Robert marks the completion of typing with an exaggerated press of the key and the movement of his calculator to one side.

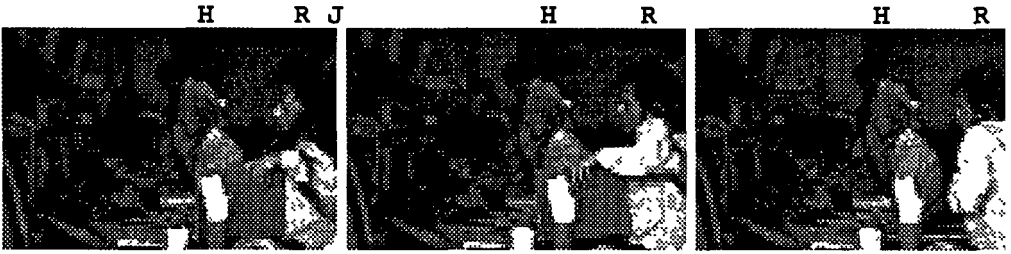
In each instance a dealer successfully initiates collaboration with a colleague by producing an utterance, such as a query or an informing, as his colleague completes an activity in which he has been engaged. By positioning the utterance in this way, dealers not only preserve the integrity of the activities in which their colleagues may be engaged, avoiding interrupting a potentially important business which is being

undertaken, but also initiate collaboration at a juncture at which they are more likely secure the cooperation of colleagues.

#### 4. Monitoring potential boundaries within a colleague's activities

In the instances mentioned above, the initiation of collaboration by a colleague is coordinated with relatively gross, visible features of a co-participant's conduct, such as closing a telephone conversation, or removing one's hands from a keyboard. Even so, it is interesting to note that in these and other cases, a dealer does not necessarily have to wait for actual completion of the activity before successfully initiating mutual engagement with a colleague. In the cases at hand, a colleague can be aware of the upcoming completion of a particular activity, even before the last few moves are actually accomplished. On a telephone call for example, well before the actual receiver is placed on the console, a colleague can monitor the talk and know, unambiguously, that it is drawing to completion. More interesting perhaps, individuals can assess a physical action or activity undertaken by another, within the course of its production, and prospectively envisage its completion. So for example, it is not unusual in the dealing room for individuals to time, with precision, an utterance which engenders collaboration, so that it coincides with a colleague finishing writing out a ticket or swallowing a mouthful of lunch. By monitoring the course of action in this way and by prospectively identifying its upcoming boundaries, individuals can successfully initiate collaboration so that it does not interrupt an activity in which a colleague is engaged.

In these instances, an individual initiates one activity immediately following the potential completion of another. In some cases, the subsequent activity is relevant to the prior, and is directed towards the accomplishment of a task, such as collaboratively selling some stock. In other cases, the activity is juxtaposed with the prior, simply to avoid interrupting an action in which a colleague is engaged. Either way, we find that individual tasks are temporally coordinated, activity by activity. However, collaboration within the dealing room often involves the mutual overlapping of multiple activities, where a dealer will not await the completion of an activity prior to initiating collaboration, but interject an utterance at a 'natural juncture' within the course of the activity. Consider, for example, the following instance in which Robert positions an utterance at a potential boundary point within the developing course of one of Harold's current activities.



H: {Writing notes}

R: Things: like Han:son  
Trust {Har old we want

H: {Errrr

R: ou:t there:,  
(1.0)

R: I wan:t ter::  
(.) B.P. out  
there,

Harold is waiting for someone to answer a call. Whilst he waits he is making some notes on a piece of paper. He momentarily lifts his pen from paper, not so much completing the activity, but beginning a new line or section. As his hand breaks from the trajectory of writing, Robert produces an utterance which mentions the sorts of things that his colleague should be 'putting out' in New York. Harold briefly orients towards Robert while the initial part of the utterance is being delivered, and then turns away, producing a loud "Errrr" into the mouthpiece of the telephone, as if both to display to Robert that he is engaged on the telephone and simultaneously to respond to the caller. Despite his colleague's seeming difficulty in participating in the talk, Robert continues to list relevant stocks.

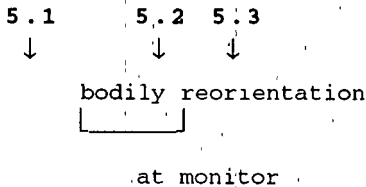
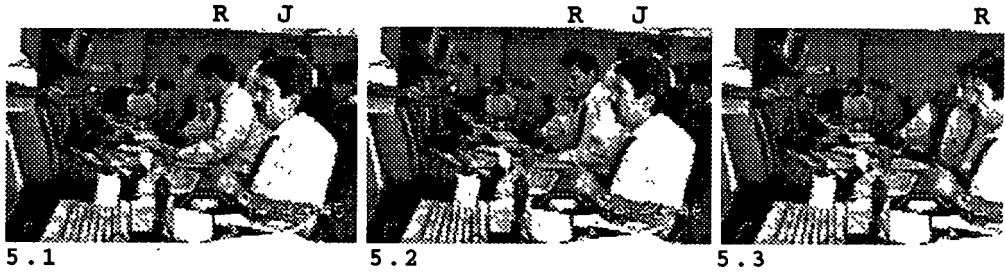
It is worth noting that in this case, Robert's interjection is not so much attempting to initiate a new activity between himself and Harold, but rather contributing to an activity in which he and his colleague are engaged and which has been the subject of an earlier discussion. The delicate design of Robert's utterance(s) does not demand mutually focused engagement and talk, but rather preserves Harold's primary commitment to the telephone conversation, whilst providing some potentially relevant information. The utterance(s) exploits Harold's ability to be participate in one activity, whilst 'peripherally monitoring' another.

## 5. Stepwise progression into collaborative activity

Whilst dealers may successfully initiate collaborative activity by coordinating an utterance with the completion of, or a boundary within, a colleague's activity, in many instances the actual initiation of mutual engagement is foreshadowed by non-verbal, or better, non-vocal behaviour through which the participants progressively

enter into collaboration. In the following instance, Robert's utterance, through which he initiates a discussion concerning stocks they are trying to purchase, is immediately preceded by his turning from the right hand side of his desk towards a monitor on the nearside of his colleague's desk. As he appears to complete the turn, John who is sitting on his left, turns and appears to look at the same monitor (picture 5.2). The moment John begins to realign his gaze, Robert moves posturally and facially so that his bodily orientation, as well as his gaze is in parallel with his colleague.

**Fragment 5 14:42:48**



R: -----, --They will be ho:pefully (.) coming to us  
 J: -----  
       at monitor

John's response to the initial realignment of gaze, and in particular his turning towards the same focal point, appears to encourage Robert to align himself further with John (picture 5.3), and provide an environment for the delivery of the utterance. By placing himself alongside his colleague and adopting a parallel alignment towards the same focal point, Robert builds an environment of mutual orientation which may not simply provide a mutually established display of commitment to collaboration prior to the delivery of the initiating utterance, but actually inform both the design and interpretation of the utterance. It may be the case that the pronoun "they" invokes and refers to an object at which they are simultaneously looking; namely a bid which they have submitted for a particular stock that is being displayed on the monitor.

In eliciting a realignment of gaze from John towards the 'relevant' focal domain, Robert secures his cooperation to enter into mutually focused collaboration, prior to the delivery of the initiating utterance.



Unlike face to face interaction, where participants successively establish a bodily framework in which they are physically oriented towards each other in the dealing room, mutually focused activity is often foreshadowed by one individual bringing his visual and bodily alignment in parallel with a colleague and in particular orientating towards the focal area of the other's attention. Dealers, in initiating collaboration, rarely turn and directly look at the other as one might in face to face interaction, to do so would demand rather than encourage co-participation; (cf. Heath 1986). Rather by looking into the physical domain of a colleague, and aligning towards the objects and artefacts of their attention (the focal point(s) of their activity), dealers display their orientation to their colleague's activity, and preserve the integrity of the other's conduct. It allows a dealer to discern more accurately when it might be opportune to initiate collaboration and have the other see that their current activity is being attended to, but does demand the immediate involvement of the other. Such monitoring is potentially accountable, and the initiation itself, reflexively provides an explanation for the attention the other's activity is receiving. The ability to exploit a look, particularly aligning towards the focal object of another's activity to foreshadow mutual engagement, necessarily relies upon the participant's orientation within the dealing room to specific physical areas, monitors, and artefacts, belonging to particular individuals. The glance at the monitor, for example, is accountable by virtue of it not simply being the focal area of a current activity, but by being located within the immediate horizon of a colleague's work domain. The spatial distribution of personal work domains within the dealing room is momentarily exploited for the purpose of initiating collaboration.

## 6. Outlouds and recipient sensitivity

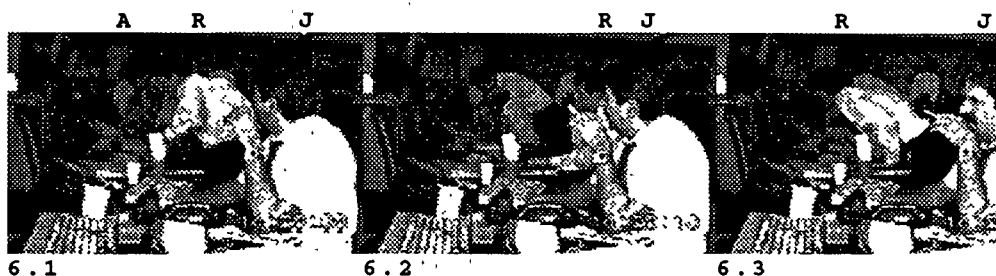
The data begin to suggest therefore, that though dealers may be engaged in a particular, individual, task they remain sensitive to the conduct of colleagues and the possibility of collaboration. As in other settings, such as London Underground Control Rooms (Heath and Luff 1992) and Air Traffic Control (Harper et al. 1991), individuals appear to remain sensitive to, and monitor, activities within the local milieu, whilst participating in relatively distinct activities and tasks. 'Peripheral' monitoring or participation, appears to be an essential feature of both individual and collaborative work within these environments.

The ability of dealers to remain sensitive to goings on within the local milieu whilst engaged in particular tasks also forms the foundation to the delivery and receipt of more general information within the dealing room; information which can serve to encourage focused collaboration between dealers.

Prior to the large-scale introduction of new technologies into stock exchange dealing rooms, dealing took place on an open floor. This 'open cry' aspect of floor trading and recent representations of trading rooms on film and television suggests

an image of dealers in a continual state of over excitement, shouting figures and stocks at each other in order to secure deals. Whilst this image reflects only short periods of activity, a visitor to a dealing room is immediately struck by the trader's practice, when necessary, of shouting names and calling numbers without either waiting for, or apparently expecting, a reply. In many cases, as in fragment 2, "DICKIE: (1.2) Cedar Street", names are shouted across the floor to have a trader answer a call which has been taken by a colleague at another desk. Whilst such information may be relevant for others who overhear the shouting, in large part, such public utterances are simply to have another take a telephone call. Other sorts of information which are shouted across the trading room floor are of more general relevance, and may be heard and acted upon by one or more dealers. These 'outlouds' are not necessarily, indeed rarely, designed for any particular dealer, but are available for and likely to be picked out by, any trader, who at that moment has, or can generate an interest in using the information. Such 'outlouds' can engender collaboration, and can lead, as in the following example, to traders deciding on whether they should buy or sell particular stocks.

Fragment 6 14:29:10



A: HAN:SON. TWENTY OF AN  
EIGHTH, FORTY BY  
FIFTEEN:, (SHEARSON)  
ON THE BI:D  
R: ((Sitting down))  
(0.2)

J: Are we going to hit  
em?  
(2.3)

R: ((Peers at screen))  
R: Erm:^ (.) YES::,

R: (0.9) WHO'S: THAT  
(1.0)  
R: Bernie? ((Picks u  
phone))  
(3.0)  
R: We want to sell  
(forty:) .....

In fragment 6, Annie who is sitting at one end of the ADR desk, shouts across the room that Shearson is on the bid (picture 6.1). Robert is in the process of sitting down and makes no indication that he has heard the utterance. As Robert lands in

his chair, John turns momentarily towards his domain and asks whether they should try to 'hit the bid' (i.e. sell Hanson shares - picture 6.2). John's question assumes that Robert has both heard the utterance and may be prepared to collaborate in selling the stock. The utterance appeals to, and invokes a mutual orientation towards, selling stock and initiates collaboration with John. A second or so later, Robert grabs the telephone and shouts to Annie, asking who is actually on the phone (picture 6.3). A little later a substantial amount of stock is sold.

Whilst Annie's utterance is shouted outloud, as if potentially relevant for anyone within the local vicinity, it is perhaps only two or three traders who might have an interest in the information. Shouting outloud, rather than specifically telling certain colleagues, is not only a relatively economic way of informing a number of recipients, but also delivers the information in a way that does not necessarily demand that anyone responds. So, whilst shouting across the room might be thought relatively incursive, potentially interrupting activities being undertaken by various traders in the room, it is perhaps less obtrusive than actually informing specific recipients. Annie's utterance does not demand that anyone respond; it allows them to overhear and receive the information without necessarily abandoning the activity in which they are currently engaged. It also provides a basis for collaboration, since one dealer, like John, can presuppose that others for whom the information might be potentially relevant will have heard the utterance.

Many 'outlouds' within the dealing room have this sort of character. They are designed to have a number of potential recipients hear the information, without demanding that all, or even any, of them actually respond. Even at the more local level, we find dealers delicately designing particular talk, including utterances which 'on the surface' are addressed to a particular recipient, to encourage another also to participate in the activity, if he or she so desires.

## 7. Individual and Collaborative Conduct

Within a working environment such as a dealing room therefore, as within other organisational settings, we can see the ways in which collaboration, as a delimited form of cooperative work, is simply a gloss to capture a complex configuration of momentary arrangements through which two or more individuals, sequentially or simultaneously participate in particular tasks or activities. Not only is collaboration initiated through a variety of interactional procedures and practices, but the form of cooperation which actually arises, is contingent and continually subject to rearrangement and reorganisation as it emerges step by step, within the activity(ies) in which the participants are engaged. Moreover, to characterise the cooperative arrangement of the number one position on the equities desk as a 'group', provides no firm anchor with which to secure a technologically relevant description. Even a brief glance at the domain reveals that the various tasks rely upon an socio-

interactional organisation allowing dealers to co-produce, and co-participate in, particular activities in highly variable and contingent ways.

The analysis above has not only revealed the complex set of arrangements which might reasonably constitute 'collaboration' within the environment, but also the difficulties of demarcating individual activities or tasks. For example, we find that whilst a dealer may be engaged in an apparently individual task such as making a deal, he will simultaneously monitor the local environment, including the activities of colleagues and the changes to his own computer screens and to those of others. Moreover, his production of the tasks or activities in which he is engaged is sensitive to the concurrent activities of colleagues, and may be altered, during the course of their production, in the light of some information he receives or overhears. Such 'peripheral monitoring' is an integral feature of the proper accomplishment of tasks within the dealing room, and dealers would be called to account if they failed to follow the array of concurrent 'goings on' within the local milieu. Indeed, a missed remark, an undetected screen change, or even an unnoticed sale or purchase by a colleague, can, during the course of deal, greatly effect a dealer's position in the market and have costly results for the bank. Individual work within the dealing room, relies upon a dealer's ability to monitor the action of his colleagues and changes within the local environment, even though he may be engaged in a potentially unrelated activity.

Dealers, however, are not simply expected to remain sensitive to the local environment of action and to discriminate what may, or may not, be relevant. Rather, work within the dealing room demands that whilst they are engaged in one activity they may have to participate simultaneously in the activities of colleagues. So, for example, we find dealers who are apparently engaged on the telephone, making recommendations to a colleague as to what he should buy or sell. Indeed, a dealer may design a single utterance in such a way that it not only secures a sale on the telephone, but simultaneously publicises the purchase within the dealing room itself, encouraging a colleague to make the necessary currency arrangements. More complex still, are the ways in which dealers simultaneously sustain and participate in multiple activities with their colleagues, so that a number of deals will be built alongside each other, and at the right moment, a substantial amount of stock will be sold as it is being purchased, maximising profit and keeping the books balanced. Within the dealing room therefore, we not only find a myriad of ways in which dealers collaborate with their colleagues, but it is difficult, if not impossible, to delineate the 'individual' from the 'collaborative', since personnel are continually participating in multiple activities which more or less involve their colleagues, and are produced with respect to the emergent conduct of others.

Through an examination of collaborative activity in the dealing room we have begun to reveal in more detail the nature of these forms of collaboration and the ways in which individuals move into and achieve collaborative activities. Even from this preliminary analysis it appears that the conventional distinction between

'individual' and 'collaborative' work requires further refinement, and it may be that such relatively restrictive conceptions of work have confined the nature of the technology that has been intended to support it. Furthermore, unpacking the notion of 'collaboration' may have implications for the design of technology that is not normally conceived of as being intended to support the work of several individuals. This respecification has consequences not only for technologies to support activities in the dealing room, but also for computer systems to support 'collaborative work' in general.

## 8. Collaboration and Technological Innovation

The technological failure of certain systems for dealing rooms has been one of the motivations for suggesting 'radical' alternatives for transforming the work of dealers. For example, it has been claimed that as the process of writing 'tickets' to record deals is time-consuming and prone to error, computational technology could be developed to automate the process known as 'deal capture'. Particular suggestions to support this process have included the addition of headphones to current systems, the use of touch screens to input the details of transactions and voice recognition technology to record the deal directly from the dealers' phone conversations (e.g. Howells and Crowley-Clough 1991). The analysis above may reveal why some of these solutions have encountered difficulties in their design and introduction into the workplace. For example, touch screens, not only reduce the visibility of particular items from the dealer who is using them, but also the dealer's 'interaction' with the screen may become too undifferentiated, making it difficult for others to identify boundaries and thereby coordinate their own activities. Similarly, headphones introduced to eliminate the 'negative effects' of noise, impede the dealer's ability to monitor for junctures in a colleague's activities and, more importantly, restrict the dealer's sensitivity to potentially relevant utterances, such as outlouds. At present, activities such as ripping a ticket from the book and placing it in a pot are often utilised as a display of 'completing a deal' and recognised as such by others for assessing a dealer's engagement in his or her work. Such activities have been viewed as archaic by some system designers and are obviated by automating the entire process of deal capture through the use of voice recognition technology. However, these innovations may also reduce the opportunities for dealers to monitor potential boundaries within a colleague's activities and thus hinder the stepwise transition into more focused collaborative work.

It is interesting to note that many of the justifications for the use of voice recognition systems in this domain arise from the constraints of the current state of the technology. It has been argued the limitations on the size of the vocabulary that such systems are able to recognise is matched by the limited amount of information that the system needs to record and the small number of words and jargon that

dealers use (e.g. thirty words plus numbers). In addition, the predominant use of the phone for dealing and the apparent limited movement of dealers around their local environment should make it possible to train these systems on individual dealer's voices using specific phones. However, even preliminary observations of the materials gathered from dealing rooms shows that these assumptions appear to be optimistic and to overlook the interactional and collaborative nature of dealing. In particular, dealers' vocabulary does not appear to be as restricted as originally envisaged, but more importantly dealers make sense of the details of transactions, without necessarily making them explicit, by utilising a range of resources which include: the information on the screens in front of them; news broadcasts and outlouds occurring in the local environment; and their co-participants' contributions to deals on the phone. Furthermore, deals are also made over the stentafone and across the floor; dealers 'cover' for each other often when just passing by an empty desk; and deals are collaboratively achieved not just between buyer and seller but also co-produced between dealers (see Jirotko et al. 1993).

An alternative focus for the design of deal capture systems may be to consider supporting the interactional nature of the activities. Thus, for example pen-based, 'mobile' systems with 'gestural interfaces' may allow deals to be recorded while preserving opportunities for others, non-intrusively, to monitor the activity for potential boundaries and make use of these to initiate more focused collaboration. One suggestion may be actually to design 'gestures' that make particular activities on the screen available or visible to others in the local environment, for example, it has been proposed that the gesture required for completing a transaction could be an exaggerated 'sweeping' gesture similar to 'ripping off' a ticket from the book. Whether such developments are considered as 'conservative', by attempting to maintain existing work practices, or as 'innovative' because they utilise novel technological devices, both adopt 'radical' ways of reconceiving the relationship between participants in the workplace and their interactions with and through technology.

Such an orientation to the design for systems to support collaborative work in the dealing room may also have implications for other, more conventional 'technologies' in the setting. For example, at present, the loudspeakers attached to the telephone and other audio devices are designed for individual use. Considering the ways in which others overhear and monitor deals undertaken using this technology, may inform ways of redesigning or reorienting the audio devices that allow for multiple forms of participation in such activities (cf. Gaver 1991). Similarly, the design and positioning of the various monitors are organised around the desks of individual dealers, and yet the instances above reveal how dealers make use of another's displays in order to move progressively towards more focused collaboration. The space surrounding the participants, and the configuration and design of technology used within it, could be reconsidered to take into account how dealers make use of particular 'domains of interest'.

Analysis of the ways in which dealers coordinate their actions with colleagues and participate in each other's conduct may also have implications for the design of systems to support collaborative work in general. For example, the development of systems to support shared editing, shared drawing and other focused activities has led to a range of possible solutions to the problem of 'floor control', including particular users being able to take pre-emptive control of devices, waiting for pauses in activities or in queues, and having and open and free floor (Greenberg 1991). In addition, there has been recent emphasis on supporting the 'seamless' movement from individual to collaborative activity (Ishii 1990). However, even these notions appear too restrictive when we consider the delicate ways in real world settings in which individuals move into focused activities, are sensitive to the activities of others and the range of ways co-participants engage in collaborative work. For example, we have revealed how a dealer can monitor a range of activities performed by a colleague, such as their use of a keyboard or a calculator, for boundaries in which to initiate more focused, collaborative work.

In this environment as in others, we find that the use of computer systems which were primarily designed to support 'single users' undertaking individual tasks, is embedded in the users' 'ongoing' interaction with colleagues within the local milieu. Indeed, the system, and the visibility of its use, provides an essential resource in the co-production and collaborative organisation of seemingly individual tasks. Although, some recent research has begun to investigate technological support for such aspects of collaborative work, even when the co-participants are physically distributed (e.g. Ishii et al. 1992, Gaver et al. 1993), it would be unfortunate if the emergence of CSCW detracted attention away from the collaborative organisation of many individual tasks. It may well be important for the development of suitable systems to design particular tools to support the more tacit, yet nonetheless essential, interactional practices which underpin the use of systems by single users in settings not conventionally seen as relevant to CSCW. However, when considering the methods, techniques and representations developed in HCI, it is perhaps not surprising that such aspects have also been overlooked for 'single-user' systems. For example, the concept of 'task' in task analyses is often restricted to work undertaken by an 'individual' and the particular representations utilised seem to impose a structuring which fails to account for the interactional and interleaved nature of activities in real world settings.

It may be the case, that we not only need to learn more about the social organisation of collaboration in order to develop requirements for systems to support cooperative work, but that it might be useful to reconsider some of the basic presuppositions which underlie empirical research and technological design in HCI. Indeed, we are beginning to respecify some of the key concepts, such as 'task', 'user', 'collaboration' and 'information' that inform many current methods and techniques for the analysis of requirements and system design.

## Acknowledgements

We are grateful to Joseph Goguen, Matthew Bickerton and others members of the Centre for Requirements and Foundations at the University of Oxford for discussions relating to the issues raised in this paper. We would also to thank Graham Button, David Greatbatch and Eric Livingston for helpful comments concerning the dealing room materials. The work reported in this paper is jointly supported by BT, EuroPARC and the EC RACE MITS Project. Finally, we are indebted to the individual dealers and management in the trading room for all their kindness and patience while we were undertaking this study.

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