Communication Work: information society and work in 'postmodern organisations'

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Abstract

Within sociology and economy, the 'Information society' has become an important category characterising current trends in modern society. Although a huge amount of quantitative data has been gathered in Order to assess the ongoing changes, one of the key features of information society, 'information work' (by which „information workers" are defmed) still needs clarification. Especially the question of how the quality of information work can be determined is still considered to be open.
On the background of this discussion, it is argued that a clarification of the notion of 'information work' can be gained by looking 'Workplace Studies'. Focusing on the 'centres of co-ordination', they study work activities in what may be said the paradigmatic form of Organisation in the 'information society'. However, instead of work being guided and determined by information technologies, it turns out to be rather situational, being characterised by contextual contingencies and the logic of interaction. For this reason, the concept of 'communicative work' is suggested which accounts for the situatedness of work processes, their contextual rationality and essential social interactivity.

Contents

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1. Overview

Modem society is continuously changing, and one may even say that change is one of its few stable features. One task of the science of society is, therefore, to identify what it is that is changing. In recent years a host of sociologists hinted at changes in the field of work which deeply affect the structure of modern - or, for that matter, late modern society. The impact of changing work situations on society have been characterised by quite a ränge of very different notions. By the notion of 'post-industrial society', Bell hinted at the Substitution of manufacturing by Services; the notion of 'knowledge society' (Drucker 1969) suggested that knowledge rather man manual work becomes the driving force of a society's productivity. Yet, the most widely used concept of societal change with respect to work and work Organisation is being covered by the notion of the 'information society'. Whereas the other characterisations are mainly restricted to discussions in certain sections of the social scientific discourse, 'information society' is not only broadly discussed in several branches of sociology, information science, economy and other disciplines. It also forms part of a broad public debate, to be found in newspapers, Journals and magazines. Moreover, it is used äs a leading concept for regional, national and international policy making: 'Information society' has been a topic for a G-7 Conference in 1995, it informs European politics (EU investing more man 40% of its research budget for information and communication technologies) and national budgeting, thereby - almost by way of a self-fulfilling prophecy - inducing the very changes it assumes to come about independently of these policies (Ferguson 1986). Finally, the implications of this concept can be feit in the everyday life of almost any person. The impact of the 'information explosion' (De Sola Pool) results in the explosive increase of Computers, the establishment of digital networks for telephone communication, in the involvement of more and more people in Computer networks, in automatised production, in the restructuring of office communication, in the availability of data banks, Computer processing and Software for more and more diverse purposes, virtual reality, virtual organisations etc.

However, being impressed by the sheer pace of of this development one should not hinder us to ask: What exactly is meant by 'information society'? Does it only refer to the social distribution of these technologies? Or does it affect culture and social structure of in more profound ways?

One of the most important approaches to answer these questions Stresses particularly the relation between information and communication technologies and work. In this view, new technologies give rise to a new type of worker, the 'information worker' who is preoccupied with information work. Information work, then, forms the foundation of the rising information society. Yet, despite the impressive empirical data produced to support this view, the question still remains open: What is meant by 'information work' which is at the core of the 'information society', and how is this work being organised?

In Order to address these questions, I shall first outline the relation between information society and information work. Since particularly the qualitative content of the latter notion turns out to be utterly insufficient, I shall suggest that a series of new qualitative research of the use of technology in work situations may give us some insight into what is called information work. Thereby I shall try to link „macro-level discussions of the impact of technological development on the skills and Organisation of work and micro-sociological analysis of locally constructed and negotiated work activities" (Engeström and Middleton 1996, 1). For this reason I shall particularly focus on studies of work in one kind of Organisation which seems to be paradigmatic for the information society: the 'control centre' or the 'centre of co-ordination'. As evidence shows, work in these contexts can hardly be labelled 'information work'. By way of conclusion I shall therefore suggest a notion of communicative work which allows (1) to substitute the notion of information work by overcoming its shortcomings and (2) to develop an integrated view of the relation between work, interaction and technology.

2. Information society and Information work

The idea of information society may be defined in different ways. ' The *technological definition of information society* has been coined among others by the work of Nora and Mine (who had a strong impact on French public politics) who invented the notion of the 'informatisation' of society. By this they referred to the convergence of hitherto relatively disparate technical complexes: information technology and communication (or 'compunications'). The technological definition of the information society relates to hardware

[1] Webster (1995, 6ff) distinguishes five different approaches to define information societies: technologically, economically, occupationally, spatially and culturally. Steinfeld and Salvaggio (1989, 3), on the other hand,

as well äs Software developments of digital information, Computer processing, Computer networks, the growth of digital communication (e.g. BTX, Compact Discs, ISDN), the increased automatisation of former mechanical processes, the construction of information networks etc. At the very heart of the technological definition of the information society lies the assumption that society, private and public life äs well äs the market spheres are continuously penetrated and determined by information and communication technology which induce corresponding social, economical and cultural changes (Kuhlen 1995, XXIII).

The penetration of society by information technology has been subject to an *economic approach* which also came to be known äs the industry approach to information economy. This approach has American äs well äs Japanese origins.[2] On the one hand, the study of the information economy goes back to Umesao who in 1963 coined the notion 'Joho Sangyo Ron' (information industries). Umesao distinguished 'endoderm' industries (agriculture, fishing) frorn 'mesoderm' industries (industrial production) and 'ectoderm' industries or information industries, assuming that societies can be characterised according to the importance of these industries. In Order to make this assumption accessible to empirical research, the Research Institute of Telecommunication and Economics in Tokyo (RITE) developed two indicators: the information ratio and the information index. The information ratio mirrors the relation between the general household expenditures to the expenditures for information. The information index is constructed on the basis of calculations of information consumption. The Information index is constructed by such indicators äs the number of phone calls per person and year, the number of newspaper per 100 persons, the number of books published per 1000 persons, number of television sets, phones, radios and Computers per household, extension of the Service sector, the percentage of students in the population etc. This way, a 'post-industrial information society' has been defined by criteria such äs that the Service sector has to account for more than 50% of the GDP, that there must be more man 50% students in an age-group etc.

The approach, however, has been subject to serious criticisms. Thus it is argued that some widespread information technologies had not been taken into account (such äs teletext, BTX, email etc.). Moreover, the assumption of the 50% boundary seems utterly arbitrary. Finally, the concept is based on some insufficient indicators and suffer from impoverished, contradicting or even misleading operationalisations (Webster 1994). Thus not only depend

distinguish an economic, a technological approach, critical approaches and multidimensional approaches. However, their stressing the "consumption of information" tums out to be part of an economic perspective.

[2] This approach should be distinguished from the „economy of information".

the often impressive numbers on societal Information flows on vague criteria by which „these measures are used and how the findings are interpreted" (Dordick/ Wang 1993, 56). They are also, äs Webster notes, often misleading. Thus, äs an indicator for interpersonal communication, researchers used just the population density (Hensel -1990, 61). Or they equate, to give an other example, 'Information' offered by one minute of music, one minute of colour television and one minute of classroom lecture to 120 words (Dordick/ Wang 1993, 56). Finally, the very notion of 'information' which lies at the heart of an approach to the 'information society' remains to be clarified.[3]

In order to avoid these problems, the 'occupation' or *socio-structural approach* to information economy tried to analyse the information society with respect to its occupational structure. This approach goes back to the work of Fritz Machlup (1980/1962) who was one of the first to attempt to integrale knowledge and information in the GDP. Since this approach had been later taken up by Daniel Bell in his famous analysis of the 'post-industrial society', both notions came to be used almost synonymous, referring particularly to changes in the social structure (Webster 1995, 32). Machlup assumed that in addition to the three economic sectors of fishing, agriculture, industrial production and Services, another sector is developing which he called the information sector. This sector is constituted by several areas, such äs education, research and development, media, information machinery, and information Services. Building on Machlup, Porat (1977) further differentiated the information sector into a primary information sector (including all information products, Services offered on the market[4]) and the secondary information (i.e. information not offered on the market or not paid for).[5]

The constitutive feature of the information sector are professions and occupations which are defined by 'information work', that is to Machlup, the production, cultivation or distribution of information.

Analytically, Machlup distinguished information workers from non-information workers. Information workers are subdivided into information producers and information

[3] Even the information scientist Fox (1983, 37) admits that "information science is in the rather embarrassing Position of lacking any clear understanding of its central notion".
[4] In the primary information sector he distinguishes eight economic areas: 1) research and development; 2. information distribution and communication in education, media etc.; 3. risk management by insurance companies, and banks; 4. advertisement, tax and money consultancy; 5. information consumption by the media; 6. the production of information goods (printing machines, newspapers); 7. govemmental information activities (i.e. post, mail) and 8. "support facilities", i.e. costs for the construction of libraries.
[5] This distinction has been taken ip by the OECD in ist establishment of a department on Information, Computer, Communications Policy (ICCP).

users.[6] This classification has been taken up and differentiated again by Porat who classifies Information professions into four groups:[7] Information workers are a) information producers (scientists, engineers, architects, medical doctors, programmers), b) information users (judges, administrators, managers); c) Information distributors (joumalists, teachers), or d) information structure professions (printer, cameramen, electricians etc.).

On the basis of these indicators, it seemed possible to 'measure' the information society and to compare the 'informatisation' of different societies by looking at their Professional structure.[8] Thus, it was found, that since 1980, the United States is an information society since 45% of its workforce could be classified in the information sector. And the information workforce in the United Kingdom, e.g., was shown to have increased from 28.8% in 1950 to 38.0 in 1980.

As mentioned, these observations have been supported by Daniel Bell's analysis of the post-industrial society, who preferred the notion of 'knowledge' to that of 'information'. Bell showed that technicians, scientists and Service personal are of increasing importance, overtaking the percentage of the industrial work-force, giving rise to new social groups, such äs Professionals, and the changing Status of other groups, such äs the increasing importance of the women in work settings. As the proponents of the information society, he stressed that it is not only the distribution of occupations but the kind of work they are performing.

Being also based on a poorly conceptualised notion of information, it is exactly the category basic to this approach, information (or knowledge) work which is left unspecified, leading to such absurd classifications äs referring to people who are repairing copy machines äs information workers, but to people working in a railway signalling centre äs industrial workers. On the one hand, work activities may encompass a broad ränge of activities so that it is still unclear how the "information portion of work may be grasped" (Mensel 1990, 87). On the other hand, it is still not clarified what the notion of information work refers to, i.e. by what 'qualities' it may be defined.[9] Although there are äs different attempts to conceptionalise information work äs Output oriented organisations and professions approach and action-oriented approaches, they only focus, äs Nass (1988) stresses, on particular aspects of this work (äs on the Outputs of work activities, the actions that turn inputs into Outputs, work äs

[6] ..."transporters, transformers, processors, Interpreters, analysers, and original Creators of Communications of all sorts" (Machlup 1980/1962, 382).
[7] On the basis of the 400 professions mentioned by the American Bureau of Census, he distinguished eleven Professional groups and classified them into three sectors.
[8] In 1970 it had been 30%; USA: 45% (1980); Japan: 38% (1980). Cf. R. Katz, An International Perspective on the Information Society. Cambridge/ Mass. 1985.

inherently integrated with other tasks, work äs fundamentally isolated activity). In accordance with Nass (1988, 314) one can therefore conclude that *a füll understanding of Information work is still required which particularly focuses on how Information work can be characterised and defined, i.e. on the qualitative features of Information work.*

The question äs to how we can grasp information work becomes even more pertinent with respect to critical views on the information society. In fact, several analysts have been criticising the prophetic elements of this notion which to them appears to be rather a normative notion to guide practical policies man a descriptive category to analyse society (Schement 1989). This critical stance is supported by the finding that even in applying the proponents' indicators, the development towards the information society may take a slower path than they expect (Meehan 1984). Thus Etzioni (1984) hints at counter-trends to informatisation and suggests a 'two track society' with a strong industrial on the one side and a strong high technological sector on the other. This view is supported by the recent development in the most advanced society, suggesting that whole societies may follow one of these two tracks, the US and the UK tending more to the information society side, Japan and Germany more to the industrial track. Yet, still in the 1990s manufacturing accounts for a considerable part of the work-force in all of these societies, and in societies with a significant increase in their Service sector, the increase of advanced information-based Services is paralleled by a similar increase in basic personal Services. On the basis of these insights, Castells concludes that we are not facing to see the development of a clear cut informational sector characterised by exclusive information work. Rather than substituting manufacturing and presumably more traditional kinds of work, the new technologies „profoundly transform the nature of work and the Organisation of production" (1996, 265).

For this reason, we are not only faced with the question, What is information work? We are moreover faced by the more encompassing question äs to how more traditional forms of work and organisations are being transformed by the use of modern technologies. Admittedly this question is too big and encompassing an issue äs to be addressed here. For this reason, I want to restrict myself to considering this question with respect to work processes in a certain kind of Organisation which seems to be crucial for whatever may be called an 'information society'.

[9] Thus also Deutsch und Sonntag (1981, 1) remark: "an evaluation of the quality of communication is also necessary", framing communication in terms of a cybematical notion of information.

3. Post-modern organisations and centres of co-ordination

For a long period, the notion of work Organisation has been guided by the Fordist model of rational bureaucracy. According to this model, organisations are characterised by a functional division of labour and vertical distribution of power. Just recently, and particularly in the context of the 'informatisation' of society, this notion has been criticised by economic regulation theories which suggested a shift from Fordism to post-Fordism.[10] It is especially the use of new information and communication technologies, such äs Computer networks or satellite telecommunication, which have serious impacts on the structure of organisations (Sproull/ Kiesler 1991). It is argued that these technologies allow to co-ordinate spatially distributed activities, such äs in the case of 'just-in-time' production, outsourcing to highly specialised small companies, or tele-commuting. Therefore, the application of these technologies is linked to changes in the organisational structure in terms of decentralised networks, vertical disintegration and flexible specialisation. These organisational structure have also been labelled 'post-modern'. The development towards 'post-modem organisations' is expressed in joint ventures, Strategie co-operation, project co-operation, and network organisations. Post-modem organisations are characterised by a highly flexible workforce, an informal division of labour, labour relations based on trust, participative decision-making and the crucial role of highly developed information and communication technologies (Clegg 1990).

The development of this kind or work Organisation was first discemed in the sphere of industrial production. Within the 1980s these changes came to be labelled by the notion of 'new industrial spaces', i.e. the technological and organisational ability to separate the production process in different locations, while reintegrating this unity through telecommunication linkages' (Castells 1996, 386). Since the 1990s, these changes also started to seriously affect the Service industry, especially in production Services and communication. As Castells (1996, 378) argues, „the structure of Organisation most salient in the informational society may be characterised äs 'command and control centres', i.e. local centres which are able to co-ordinate and manage the Organisation's temporally, spatially and socially distributed activities. Since the co-ordination of the various mtertwined activities is rendered

[1] For a more elaborate analysis cf. Knoblauch (1996).

possible, facilitated and accomplished by advanced Information and cornmunication technologies, these command and control centres are not only examples of organised information work. Moreover they owe their very existence to the development of the technologies which are said to be constitutive of this kind of work.

If one asks for analyses of this type of Organisation, represantatives of the informational society and post-modern Organisation typically leave us with a but a few theoretical concepts which are often developed by way of a contrast to modern or Fordist organisations. Moreover, they currently exhibit a serious „lack of empirical evidence" (Reed 1992, 233) for what they call post-modem Organisation (most prominently Benetton).

It is for this lack of detailed information that it may be worth considering a series of qualitative studies sometimes called the Workplace Studies. As will become obvious, Workplace studies are not only focusing on the kind of organisations which exhibit the features of post-modern organisations. with respect to the questions posed above it may be even more important that they particularly focus on the minute details of work activities accomplished within these contexts, thus providing for the detailed study of what is used to be called information work.

In fact, within the field of Workplace Studies particular stress on 'control centres' in Service and cornmunication, such äs emergency call centres, Underground transport control rooms, medical centres, airports and airport control rooms, etc. These subject-matters have been characterised by Suchman (1993) äs centres of co-ordination. She characterises *centres of co-ordination* äs areas of work in which a set of actors is located performs activities with respect to another set of absent actors. Since both sets of actors are linked by some kind of technology, centres of co-ordination are typically furnished with a wide ränge of different information and communication technologies. For this reason, these centres may be considered also äs 'high technology settings'.[11] More importantly, however, centres of co-ordination are concemed with an activity which seems crucial for any modern Organisation: the co-ordination of activities across time and space. Because of the spatial distribution of personal and the co-ordination of activities within a certain time-schedule (respectively in accordance with unforeseen new developments in critical Situation) space and time constirute the specific problems to these activities. The set of actors localised in the centres are co-ordinating the activities of the set of spatially dispersed actors, „...work in the operations room can be seen äs the production of a coherent relation between a normal order of events,

[11] The notion of 'high technology settings' refers to organisations of work which are equipped with Information and communication technologies to a more than average degree (Hodson and Parker 1988).

described by particular representational technologies, and an order of events observable by operations room personnel in the work of the local site, both sites being mediated by technologies of scheduling" (Suchman 1993, 114f.).[12]

4. **Workplace studies and the context of** Information

he investigations in this kind of Organisation do not Start from an *a priori* notion of work, technology or organisations. They are, rather, trying to inductively generate a notion of work by observing the activities within these Organisation. This means that they are interested in the real time activities in work organisations, trying to focus particularly on how actors co-ordinate their activities with one another äs well äs with respect to the technologies involved.

The notion of Workplace Studies (WPS) covers a ränge of ethnographically and ethnomethodologically orientated research which developped in the last 15 years. The Substantive domains addressed in Workplace Studies cover a broad ränge of organisational settings. There is for example a growing corpus of research concerned with what Suchman (1993) has characterised äs 'centres of coordination', to which we shall turn later. These include for example studies of air traffic and ground control, of emergency dispatch centres, of the control rooms of rapid urban Transport Systems. There is also a growing body of studies concerned with the use and deployment of technologies in financial institutions. Projects on Software engineering have also been undertaken äs well äs studies of the use of electronic mail in the civil Service, the introduction of information technology for customer Services into high street banks, and the use of medical Systems in general medical practice for an overview cf. Knoblauch 1996).

Methodologically workplace studies are related to ethnography, conversation analysis, and context analysis, doing participant observation, expert interviewing äs well äs analysis of audio and, even more important, visual data collected in 'natural settings'. They direct attention towards to practices and practical reasoning in and through which participants accomplish their own actions and activities and make sense of the conduct of others. Some of the studies, especially those concerned with the interactional organisational of workplace activities, are primarily based on the analysis of videorecordings, and direct attention towards the moment by moment, collaborative accomplishment of visual, vocal and material conduct.

[12] For a more detailed analysis of centres of co-ordination and 'postmodem organisations' cf. Knoblauch (1997).

Amongst Workplace Studies there is also a growing body of video based research derived from quasi- naturalistic experiments. These can ränge from investigations of the deployment of prototype technologies into organisations, such äs research laboratories, through to short term exercises in which subjects are requested to undertake particular tasks. Experiments of this kind have proved invaluable for exploring the use of more advanced, experimental Systems, and have helped provide insights into communication and collaboration in more conventional circumstances.

One of the basic concepts of Workplace Studies consists in what Suchman (1987) calls *"situated actiori".* Although deemed deeply rational and rule-govemed, routine work in the different organisational settings (including the cetres of coordination) turns out to be typically guided by contingent requirements. Actors therefore have to adapt and be sensitive to the Situation of their actions. Thus, in a study of work in an airport control-centre, it had been assumed that Controllers could pursue clear-cut rules in working with the radar-data System (by which automatically delivered data from radars are gathered by the Controllers, treated and redistributed). In fact, a set of rules had been designed and collected in a 'Manual of Air Traffic Services'. However, it tumed out that the rules laid down did not suffice to accomplish the work. Rather, Controllers are faced with the continuous problem äs to which rules applied in which situations. Thence the rules had been applied in such varied way that they could no longer been considered äs rules. As a consequence, Harper and Hughes (1993, 128) came to the conclusion that work is guided by rules „fails to acknowledge that rules have to be applied within a setting such that what a rule or a procedure means, what action falls under it, is a matter that has to be decided, judged, determined on occasions of its application. Social actors, that is, have to make judgements äs to whether this rule applies here and now in respect to these circumstances. Action in accord with a rule is situationally accomplished by actors and done 'in light of the particularities of the setting". Situated action thus refers to the assumption (similar to structuration theory) that the accomplishment of an activity, its meaning and its consequences are embedded in the local context of the Situation which is itself constituted, maintained and changed by these very activities.

This concept of situated action, moreover, has serious consequences on the notion of rationality of activities and organisations. Since they are essentially based on situational contingencies, one could even talk of the *contextual rationality* (Reed 1992, 225) of these activities. is nicely illustrated by Suchman's (1993) comparison between European and Micronesian ways of navigation: At latest since the Renaissance, Europeans have been navigating their vessels by means of plans which represented the routes in a detailed way,

supported by observations of the sun, the Stars and, if possible, of the shore. Micronesian navigation, on the other hand, uses very different methods. The vessel's route depends on situative features, such äs the wind direction and water currents. Also Micronesians arrive at their goal with reliability, yet their routes differ significantly from those European navigators would have taken. In a similar vein, work in these contexts settings depends on situative contingencies and contextual influences, some of which are subject to the work process itself, other cropping only up in the course of work.[13]

This contextual rationality, moreover, affects the concept of Organisation, since organisations cannot be conceived of in terms of specific goals, a formal division of labour or the application of rational rules by individualised actors. In fact, it is not individual actors which are at the heart of activities. Rather, „the individuals are individuals-in-a-team, and much of their work consists in the ability to organise the distribution of individual tasks into an ongoing assemblage of activities *within* the 'working division of labour'" (Bentley et al. 1992, 126). In order to grasp this trans-subjective character of organisational work, the notion of activity äs developed within 'activity theory' plays an important role. *Activities* are what is accomplished by the co-operation of actors, thus being situated between subjective action and organisational structure. Therefore, one could conceive of activities äs „Systems of collaborative human practice" (Engeström 1988, 30) which are simultaneously constituted by interactions and constitute the context of these interactions by reason of their contextual reflexivity. That is to say that what the Organisation does is neither set by rules nor orientated towards äs fixed goal, but is being continuously accomplished, changed and reshaped. The stability of Organisation work, then, can be accounted for by activity Systems. Activity Systems are based on activities performed by a 'community of practitioners' sharing similar interactive practices, ways of handling equipment and categories of perception (Blackler 1995), or, one may be tempted to say, a 'habitus'.

Basic to the habitual work practices in these settings is a common mutual orientation of participants to one another, their attention at the same time being oriented towards their ongoing work activities and their handling technologies. Despite their dependence on technologies, work in *this type of Organisation depends seriously on face-to-face interactions.* Interactive processes are not restricted to the informal segments of work activities but are essential for the accomplishment of work in the settings under consideration. To give but a few examples, the investigation of a control-room of an Underground shows that the

[13] The description of Micronesian navigation goes back to Gladwin (1970). For a more detailed account which relates to the Workplace Studies cf. Hutchins (1994).

participants not only monitor each others activities; „rather their conduct is designed to simultaneously accomplish one activity whilst monitoring the conduct of his or her colleagues"... „the continual flow of information between Controller and DIA and their ability to monitor, and if necessary correct, each others' actions, are an essentiai feature of work in the control room" (Heath and Luff 1992). The interactive co-ordination of work is accomplished by means of verbal äs well äs non-verbal means of communication (in addition to the technological devices to which we shall turn later). Within routine work settings an exchange of gazes, a twist in body posture, acceleration of speed of talk may suffice to indicate a relevant activity to others. Despite the apparent indirectness of these means of communication, they can be shown to exhibit a certain reflexivity by which others understand that it is addressed to them. As Goodwin (1990) has shown in her research on the work in an airport ground control room, also certain communicative patterns may exhibit this reflexivity in terms of recipient design: In specific situations (e.g. loading of luggage) utterances exhibiting a specific rhythmic-formulaic structure are understood by the workers on the ramp äs Standing out of the remaining flow of talk to constitute what is understood äs 'announcements'. Thus WPS focus on the interactions of participants and their talk. Turns at talk are analysed in order to detect the orientation of the participants towards the technological Systems and to their co-workers.

It should be stressed that these interactions are shown to be crucial especially in such organisations which are designed for individual, solitary work, äs has been shown by Bentley et al. (1992) study of airport control Systems. Since the Controllers work in different sectors, their activities appear to be going on independent of each other. As, however, the ethnographical investigations showed, these activities can be accomplished only by virtue of an inconspicuous yet effective communication between the Controllers (who use manual notices on 'flight progress Strips' which are moved from one sector to another).

Moreover, even seemingly solitary activities turn out to be essentially interactive, orientated to others who are in co-presence. Interaction thus is shown to feature prominently in routine real-time work, and it is of even more importance when problems arise. Temporally and spatially distributed actions demand interactive co-ordination especially in times of crises when problems crop up, e.g. when trains on the Underground need to be rescheduled, or additional trains and new train teams need to be gathered. Moreover, in order to avoid accidents also the co-workers not directly involved in these activities need to be informed about such changes. The additional problem that work during crisis situations rarely leaves time to step aside and inform the others leads the actors to develop various ways by which

they make relevant 'private' action public to others. In the case of a total rescheduling of trains, they may engage in self-talk about what they are doing, thereby allowing their colleagues to gather the Information relevant to them. In addition they may talk through the several possibilities they are checking so äs to enable their colleagues to reconstruct the background of their decisions and act accordingly. This way Controllers co-ordinate their activities while engaging in their individualised tasks. „The production of the task, therefore, and its character, is inseparable from the concurrent conduct of others within the local milieu; the task, however 'individual', is interactionally accomplished" (Luff, Heath and Greatbatch 1993). The management of situated activities in these organisations, one may summarise, is managed by interactive routines constituted by and acquired in these settings.

The main reason for the *pre-eminence of interactive processes* at work in co-ordination centres is connected to the very use of technological Systems. Whatever eise these technologies may accomplish, they constitute some form of representations which connect different locations, activities or actions. In this way they link actors who are in face-to-face co-presence to spatially dispersed actors who are involved in collaboratively performing activities. This constellation results in what may be called a „multiplicity of perspectives" (Schmidt 1991, 1): Whatever happens or is done may be relevant to actors be they co-present or spatially dispersed, yet because of their different locations and context they have a different perspective on what is happening or done. Since, moreover, actors have only restricted access to the perspective of other actors, there is a constant need for interaction with co-present actors. The necessity to interact is even enforced by the involvement of Information and communication technologies. This is caused by the fact that representations by these technologies are characterised by some form of decontexrualisation. Thus it turned out that audio-visual communication Systems designed to facilitate interaction of spatially distributed actors often fail to fulfill this function and change the interaction in such a way äs to endanger collaboration (Heath and Luff 1992, 315).

This has serious effects for the notion of *Information.* Information does not stand for itself but is constituted by the activities and meanings in a particular context. If it is transmitted technologically to other actors, locations or time, it is taken out of its context of use, a process I should like to call *decontextualised.* And on the other hand, whatever is transmitted by technology, i.e. 'Information', is being *recontextualised* in the activities of its application. Thus, it does not make sense at all to conceive of a non-contextual notion of information. This may be illustrated with respect to the investigation of work in a public safety communication centre by Whalen (in press). In this centre incoming phone calls by

citizens reporting safety problems (fire, violence, accidents etc.) are received by personal who enter them for further decisions by means of computer-aided dispatch tools on a CAD face sheet. Because of the fomulaic nature of the face sheets and their fields or informational slots, the call-takers conduct is, on the one hand, built around the textual record -. However, in their attempt to categorise and classify the incoming calls, call-takers have to gear them into the form of interactively produced narratives by which the caller report their events. For this reason, the technology is used äs a resource which enters into the interaction with the caller, thereby at the same time constituting and constraining the interactive retrieval of information. In another investigation of the construction of news items in an international new agencies financial department[14], Heath, Luff and Nicholls (1995, 212) came to a similar conclusion: „The text therefore, or at least the text displayed on the monitor (...) is 'ongoingly' constituted by and through the interaction. The characterisation which is developed, the animated versions of particular elements, the quotes and summaries, do not simply transmit or present the text, but rather constitute the text, the story, for the other(s)". Whatever may be called 'information' is being technologically decontextualised and has to be recontextualised in and for the co-ordination of the particular ongoing interactions. On these grounds, it becomes highly problematic to use the notion of information at all since the very notion seems to imply non-contextuality. (Typically, this notion also implies the transmitter metaphor of communication according to which information is, on the onse side, put into Containers, transmitted to a sender and 'unloaded'.) By way of conclusion one may therefore ask, how we can grasp the processes described.

5. Communication work and contextual reflexivity

On this basis, we can now retum to the question posed in the introduction: What are the features of 'information work' with respect to centres of co-ordination äs paradigmatic for organisations in the informational society? As I tried to show, real time work processes in these settings can be characterised in terms of siruated activities, activity Systems and interactive co-ordination. Therefore, the notion of 'information' seems to be utterly

[14] Several editors, journalists und subeditors work together on different terminals which are related to certain areas ('Money and Capital', 'Equities', 'Oil and Minerals' and 'Commodities'). Although they are primarily oriented towards their screens, they are simultaneously monitoring conduct on other terminals äs expressed in nonverbal behaviour, bodily posture and gaze direction. While working on the screen, information about the

misleading äs does the assumption that 'Information work' is determined by technologically processed knowledge. On the contrary, it seems, rather, that technology and Information processes have to be understood on terms of situated activities, interaction and contextual rationality.

In order to get a conceptual grasp of this kind of work, it may be useful to turn to one of the few prominent attempts to conceptualise the relation berween work and technology. Already in 1969 Jürgen Habermas stressed that modern technology fundamentally transforais the role of work. Basing his analysis on a fundamental distinction between work äs determined by the teleological rationality of technology and interaction äs being guided by life-worldly common sense rationality, he assumes that the instrumental rationality of work is being extended into other spheres of life which hitherto had been governed by the opposing principle, interaction. In his later work (e.g. 1981) he stressed the resulting penetration of society by technological (and other 'functional Systems') Systems even more: The socio-cultural life world is being colonialised by functional, 'systemic rationality.

The importance of Habermas' analysis lies in the fact that it, in many respects, it contradicts the fmdings sketched above and, almost äs a negative picture, allows them to be highlighted *ex negativo:* instead of instrumental rationality taking over, work in these Organisation seems rather being govemed by a contextual rationality based on common sense. Instead of work being determined by technology and Information, technology and information rather turn out äs being constituted by interaction. And instead of being guided by formalised rules, organisational activities are accomplished by way of contextual rationality. That is to say, whereas traditional views on technology and work had been linked to a notion of instrumental rationality, the development of new information and communication technologies (at least within post-modem organisations) suggests a close relation between interaction and work in such a way that work cannot be considered to be determined by the instrumentalities of technology and by 'information'.

If we, then, no longer consider the notion of information work äs adequate, we should, rather, suggest a different notion in order to designate the kind of activities analysed by WPS. In fact, the need for a reconceptualisation of work has been expressed also by other researchers working in this area. Thus Grint (1991, 87) hints at the necessity to consider work nowadays äs something being „inherently and irreducably constructed, interpreted and organised through social actions and discourse". Also from the perspective of the French

texts are being exchanged which influence the work of correcting texts, äs well äs their selection and categorisation. Cf. also Heath, Jirotka, Luff and Hindmarsh (1995).

tradition of *Sociologie du travail,* Lacoste (1987, 234) discems "a central role to interaction and communication äs a means of acquiring and maintaining work competence". And in Austria sociologist Mikl-Horke (1994) suggests that work in 'post-modem' setting shows a tendency from a Separation between the 'intellectual' and the 'physical' to a stress on co-operation and communication. Since few attempts have been undertaken to elaborate these tendencies, by way of a conclusion I should like to propose the notion of communication work in order to account for the respective changes in the relation between technology, interaction and organisational change.

Whereas current approaches consider work and interaction äs contrasting categories, and technology äs something which is alien to human action (Grint and Woolgar 1997), the notion of *communication work,* allows to grasp how and why interaction and technology can be integrated in work organisations. By communication work I refer to a notion of communicative action äs meaningful, reciprocally orientated form of social action intentionally affecting the common environment of participants by way of some kind of signification or, if one prefers a less structuralistically biased notion: objectivation.

The notion of communication work, first, lays stress on the procedures and activities by which meanings are produced, maintained and changed. Communicative work also refers to the reciprocal orientation and recipient design of their actions towards co-participants äs well äs to the reflexive anticipation of and co-ordination to their respective, concurrent or consecutive actions. Communication work can be construed äs communicative actions which are co-ordinated with one another so äs to accomplish an activity (activity again being constitutive of activity Systems, i.e. organisations).

As opposed to the notion of 'interaction work' (suggested by Corbin and Strauss 1993) which relates to the 'meanings' of actions and focuses on the co-ordination of social actions by meanings, the notion of communication additionally includes some kind of process of objectivation and thus corresponds much more to a broad everyday concept of work. Objectivations play a particularly important role if information and communication technologies are involved. In fact, these technologies can be considered äs additional means and resources of what may be called technologically mediated communication. As has been shown, the objectivations used in mediated Communications (technical symbolisations, visualisations, representations) are decontextualised to such a degree that they need an recontextualisation in the face-to-face situations of their use.

Communication work is, moreover, characterised by *contextual rationality.* Contextual rationality corresponds to the „new type of rationality of human action within the

Organisation, a model pivoting around the attempt to match people, structures, and human creativity" referred to by Tixier (1989, 28). More exactly, it is characterised not only by situated action but by the logic of interaction and communication. It is, therefore, not primarily orientated towards a goal which has to be achieved by means of interaction. Rather, it is orientated towards understanding and ensuing co-operation äs its goal. (Instrumental rationality is, thus, to be considered äs a subordinated variety rather than äs opposed category to contextual rationality.)

From this point of view the notion of information society appears äs utterly misconstrued since it assumes that information and communication technologies determine the ways how work in society is organised. At least from the study of work in the kind of organisations deemed paradigmatic for the so-called information society, it seems äs if what we are facing is not so much determined by the abstract rules of imposed technologies. Instead it may be argued that these technologies are being embedded and integrated into the logic of social communication which prevails in common sense. Instead of surpressing human actors, the information society depends to a much larger degree on the co-operation, co-ordination and understanding of the actors involved and requires a kind of rationality which still needs to be investigated in much more detail.

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