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Organizational Consequences of E-mail Introduction, adoption and Diffusion

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1. Introduction

Electronic communication technologies are dramatica lly changing social and economic life, producing a number of pervasive and cumulative organizational consequences. Workplace changes and their effects on labor market segmentation and employment, and organizational changes and their effects on the structure and evolution of competition are among the most important themes in European Union agenda. Learning economy, virtual organizations, teleworking, small business networks are some of the many issues invested by the patterns of adoption and diffusion of electronic communication technologies. While many policy recommendations and research projects have implicitly dealt with information technologies, and many other researches have explicitly explored their technical potentialities and characteristics, up to now no one have directly investigated organizational consequences of their actual adoption and diffusion in the real world of managerial and working practices and experiences. This research project intends to fill the gap, studying how different kinds of organizations in some European (and American) countries adopted communication technologies, and what organizational consequences came from concerning human-human and human-technology interactions.

Electronic communication, especially under the forms of email (EM), are part of computer-mediated communication (CMC), and represent the most diffused form of advanced information supports, aiding for group decision making and for social communication in organizations. While it is widely accepted that advanced communication technologies are changing the size and forms of organizational structures as well as social patterns of communication, power distribution and the structure and competencies of internal and external labor markets, it is still debated and unclear why, how, where and when such changes take place (Markus 1994a). Even though it is commonly accepted that there is a sort of reinforcing mechanism between networking processes within (and between) organizations and the adoption of CMC devices, and between ne twork firms and firm networks (Biggiero 1999a), it is not clear how it occur, whether it concerns more complex tasks, whether it increases organizational participation, whether they can fully replace face-to-face (FtF) interactions, how local (organizational or group specific) social context constraints and orient CMC adoption, what is the role played by technological mediators in the use and appropriation of CMC technologies, what is the influence of time flow in recurrent-repeated interactions, and, finally, what is the pattern of the complex interactions

between all these aspects. Among the many kinds of CMC, EM has been chosen because it is widely diffused in large or hi-tech organizations, but at the same time it belongs to the set of advanced information technologies. Moreover most empirical researches in this field investigate just the impact of EM communication systems, and so it allows us to directly compare our findings with those. Finally, where mailing lists have been created it is possible also to employ also new analytical tools, like mailing list analysis. Basically EM communication is contrasted principally to FtF and other forms of communication.

In a growing complex environment the knowledge of these issues is essential to understand a number of problems and to orient policy interventions, at European, national, regional and organizational levels. Among the main problems coped with, there are:

- the management techniques for organization design of large companies and of boundaryless organizations. To the former, it helps (1) to better design coordination mechanisms between and within functions and departments, and (2) to lead organizational change towards less bureaucratic/more process-oriented structures. To the latter, teamwork steering and the construction of inter-organizational relationships can receive substantial support, because when teams and firm networks are located in different places they become virtual ones, and consequently the formation and evolution of trust and identity depend on electronic communication technologies;
- the ways to create and sustain any form of virtual organizations are also better understood through this research, because they depend on trust formation and communication patterns, which both depend on the characteristics of communication technologies and on the peculiarities of their adoption and diffusion;
- the future of teleworking, which is also strictly related to the types of appropriation of many electronic communication technologies, and to their potential to fill in the gap of ambiguity and uncertainty in the coordination between entrepreneurs/managers and workers;
- the introduction and diffusion of technological innovations, because email is just a type of technological innovation in the field of communication devices; and finally,
- the knowledge stemming from the studying of organizational consequences of email adoption and diffusion helps to understand more general questions concerning the segmentation of future labor markets, the possible creation of new professional roles within the organizations, and the birth of new organizational forms.

2. Research Goals and General Framework

The research goals consist in understanding:

1. the way in which some explaining variables constraint the introduction/adoption/diffusion of email communication within and between organizations, and the degree to which that technology can replace face-to-face communication;
2. how email adoption/diffusion influences the formation of trust within and between organizations, and the creation of an organizational identity in the virtual and real space;
3. how email adoption/diffusion influences the structure and evolution of power, decision making and participation within organizations;
4. which types of adoptions and practical use are generated by any single organization;
5. what kind of patterns of adoption and diffusion emerge when considering email communication as a type of technological innovation in the field of communication technology.

3. Theoretical Background

Previous studies on CMC rely on many general theories and different field research, such as: information richness theory (Daft & Lengel 1984), critical mass theory (Markus 1987, 1990; Oliver, Marwell & Teixeira 1985), social information processing theory (Walther 1992), structuration theory (Barley 1986; Orlikowski & Robey 1991; Poole & DeSanctis 1992; Yates & Orlikowski 1992; Orlikowski & Yates 1994), adaptive structuration theory (Contractor & Seibold, 1993; Contractor, Seibold & Heller, 1996; DeSanctis & Poole 1994; Gopal et al. 1993; Poole et al. 1991; Poole & DeSanctis 1990; Zack & McKenney 1995), self-organizing system theory (Contractor & Seibold, 1993; Contractor, 1994; Contractor, Whitbred, Fonti, Hyattt, O' Keefe &Jones, 2000), social constructionism and actor-network theory (Bijker, Hughes & Pinch 1987; Bijker & Law 1992; Callon 1997; Law 1991; Lea, O' Shea & Fung 1995), organizational identity theory (Albert & Whetten 1985; Ashforth & Mael 1989, 1996; Bergami 1996; Dutton & Dukerich 1991; Dutton, Dukerich & Harquail 1993), neo-institutionalism (Powell & DiMaggio 1991; Meyer & Scott 1983; Scott 1987, 1995; Zucker 1977, 1987, 1988), cues-filtered-out approaches (Culnan & Markus 1987; Dubrovsky et al. 1991; Siegel et al. 1986**;** Sproull & Kiesler 1986), the social identity model of deindividuation effects (Lea & Giordano, 1997; Postmes,Spears & Lea, 1998; Spears & Lea, 1994; Spears, Lea & Postmes,2000) traditional structural network approach (Contractor & Eisenberg, 1990; Monge & Contractor, in press, Rice & Aydin 1991; Rice et al. 1990), organizational ethnography (Cecez-Kecmanovic, Moodie, Busuttil & Plesman 1999; Denzin 1997; Schwartzman 1993), political interactionist theory (Markus 1994a, 1994b; Pliskin et al. 1993; Romm & Pliskin 1999; Romm et al. 1991), and second order cybernetics (Foerster 1982; Paetau 1999; Urlich & Probst 1984).

The proposed research project will focus mainly on social constructionism and actor-network theory (SCANT) and adaptive structuration theory (AST) as main theoretical frameworks, integrated by political interactionist theory (PIT), by organizational identity theory (OIT), , by second order cybernetics (SOC), by the social identity model of deindividuation effects (SIDE), and by social identity theory (SIT). This choice is due to the fact that AST, especially in the constructionist perspective (SCANT), avoids any sort of technological determinism, and is particularly careful about social-psychological aspects of organizational consequences of technological changes. PIT allows to catch micro-aspects of power conflicts, with a special attention to the recent characteristics of communication technology**,** and SOC, jointly with OIT, addresses the fundamental topics of trust and identity formation of social –and possibly virtual- organizations. Finally, SIDE applies a constructionist reading of social identity theory to the computer context to address issues of identity, conformity, accountability, and power relations within and between social groupings.

Structuration theory, social constructionism and neo-institutionalism can be grouped into the same class of social definition theories (Markus 1994), according to which

"members of social units (e.g., cultures, such as nations or organizations) are believed to develop shared beliefs about what a technology is good for in the process of using it (Barley 1986). Social definitions of appropriateness may or may not conform to objective definitions (Scott 1987), so that perceptions of EM's appropriateness in a particular organization may diverge significantly from its location on the information richness scale (whether it is judged as lean or rich).
In institutionalization theory, sponsorship of a behavior by key members of an organization legitimates the behavior and promotes its diffusion; withdrawal of sponsorship initiates the behavior's decline. Once established, the behavior is perpetuated through processes such as the socialization of new members and the social control of deviants (Goodman et al. 1980)" (Markus 1994: 508).

While in the very long run –in terms of decades- it is reasonable to expect, at least for interacting communities, a sort of uniformity of perceptions and uses of technology (Pinch & Bijker 1987; Yates & Orlikowski 1992), as happened in the case of telephone technology, in the short run any community

or organization develop its own form of adoption, use and diffusion of the same technology, depending on its specific purpose, culture, social context, structure and even single individuals. Structuration theory, based on Giddens' works (1979, 1984), allows for a more micro-level approach respect to neo-institutionalism, and for a more dynamic approach respect to social network analysis, even being compatible with both. The ways to perceive, appropriate and use technology depend on social context.

"Poole et al. (1985) developed Adaptive Structuration Theory (AST) for examining group decision making. AST has been applied to the study of computer-supported group decision making processes (Gopal et al. 1993; Poole & DeSanctis 1990; Poole et al. 1991), and Fulk & Boyd (1991) proposed that AST might similarly offer a useful foundation for CMC research. Use of the technology is conceptualized as a socially constructed process in which the technology is "appropriated" by a group to reinforce, adapt or reproduce a set of interaction rules and practices (Poole & DeSanctis 1990; Poole et al. 1991). In our case, appropriation would reflect the influence of social context on the patterns of EM and FtF interaction and how those constraints on interaction are socially rather than technologically imposed. Appropriation manifests at the individual and dyadic level in how EM users employ messaging system features such as distribution (one-to-one or one-to-many) and timing (synchronous or asynchronous exchange). Appropriation also applies to choosing from among several communication modes, for example, based on the extent to which richness or interactivity is required (Zack 1993). However, consistent with the social network perspective, the influence of social context on the appropriation of EM at the network level is best reflected in how group members employ the technology to support interaction among themselves, and that is the approach we adopted" (Zack & McKenney 1995: 396).

Social constructionism and actor-network theory (SCANT) derives from studies on the sociology of science and technology (Latour 1991) and studies on the epistemology of social sciences (Berger & Luckman 1966). While they are fully compatible with second order cybernetics (Biggiero 1998; Butts & Brown 1989; Glasersfeld 1995; Twomwy Fosnot 1996) and with some perspectives in post-positivist epistemology (Biggiero 1998), they developed independently. However current literature about organizational consequences of information technology neglects such consistencies and until now refers merely on sociological versions, which are just expressed by SCANT. Besides the common views concerning the relevance of social context for the many possible ways to adopt and diffuse technology, SCANT differs in some points from AST.

Basically, differences consist:

1) in breaking up the identification of the social dimension with the social context and of the technology with the content. At the opposite of AST, "we argue for definitions of content and context that recognize the technical and social composition of *both*, and which are sensitive to their essentially constructional nature. That is to say, the composition of content and context are not predetermined by technological design or by the prior existence of certain social groups, and not should the boundary between the two be legislated a priori by the analyst. Instead we argue that the heterogeneous composition of both content and context are variable and constructed in situ by the relevant actor-networks in the process of developing an organizational electronic communications project. A further corollary of this approach is that the boundary of contextual influences upon the communications project does not map on to the boundary of the organization in which it is situated, but may extend far wider as the actors engaged in the project mobilize the necessary resources to develop the project" (Lea, O' Shea & Fung 1995: 463);
2) in looking at structure and action as two reciprocal influencing forces, without a prevalence of the structure over the action. Social constructionism of technology "focuses on tracing the development of the forms and functions of technology through the construction of different meanings by pre-existing relevant social groups, such as different categories of end-user. Actor-network theory on the other hand argues that these social groups are themselves constructed in part by the technology; that the process of constructing technology and it users is a reflexive one in which both technology and social groups mutually elaborate each other" (Lea, O' Shea & Fung 1995: 464);
3) in giving the language and symbols a crucial role in the interplay between technology and society (organization). Particularly important are the language and behaviors of technology-use mediators Orlikowski et al. 1995), because they influence the way the technology of EM communication is adopted and diffused, and relevantly contribute to create a genre of EM communication (Yates,

Orlikowski & Okamura 1999), which is specific of any organizatio n (Yates & Orlikowski 1992), and is inserted into its genre repertoire (Orlikowski & Yates 1994).

Second order cybernetics (SOC) provides a very useful perspective to study holistic and feedback aspects of organizations, and problems of system (group) identity and recursive interactions (Foerster 1982; Ulrich & Probst 1984). Constructivism (Glasersfeld 1995) is the underlying epistemology, and it is consistent with social constructionism (Biggiero 1998). The roots of cybernetics, which are just into the mathematical theory of information and in computer science, make second order cybernetics a privileged candidate for studying virtual organizations, and facing issues concerning the creation and maintenance of system identity. "At some point in the course of their history virtual enterprises reach a crossroad, where they have to decide between maintaining their unity (autopoiesis) and accepting a transformation from a virtual organization into an enterprise organized in accordance with classic means (i.e. organized by others), *or* they will keep their virtual character with a concurrent loss of social entity, leading to a loosely related networked organization" (Paetau 1999: 41).

The issue of identity is extremely vast and complex, crossing many disciplines, such as psychology, sociology, management and cybernetics. The major theoretical contributions are: from (social) psychology: social identity theory (Abrams & Hogg 1990; Hogg & Abrams 1988; Tajfel 1982a, 1982b; Turner 1975; Turner & Giles 1981); from sociology: actor-network theory (Callon 1998; Latour 1987; Law 1991; Michael 1996); from management: organizational identity theory (Albert & Whetten 1985; Ashforth & Mael 1989, 1996; Dutton & Dukerich 1991; Dutton, Dukerich & Harquail 1993); and from cybernetics: the theories of self-organization (Foerster 1982; Ulrich & Probst 1984) and autopoiesis (Luhmann 1990; Maturana 1980, 1981; Maturana & Varela 1980). All these theoretical perspectives help towards building a cognitive framework, which can and should be integrated with the structural approach to organizational identity. OIT derives from social identity theory, which has been developed principally by Tajfel (Tajfel & Turner 1985) and Turner (1975, 1985) in the perspective of social psychology. The core concept is that "people tend to classify themselves and others in various social categories, such as organizational membership, religious affiliation, gender, and age cohort" (Tajfel & Turner 1985). The identification process helps people to make sense of the ir environment, and therefore to orient individual behavior. Social identification, which results from the identification process, is not an on/off condition, but a matter of degree extending over multiple aspects. The main traits of social identity theory are the following:

"a) social identification is a perception of oneness with a group of persons; b) social identification stems from the categorization of individuals, the distinctiveness of prestige of the group, the salience of outgroups, and the factors that traditionally are associated with group formation; c) social identification leads to activities that are congruent with the identity, support for institutions that embody the identity, stereotypical perceptions of self and others, and outcomes that traditionally are associated with group formation, and it reinforces the antecedents of identification" (Ashforth & Mael 1989: 20).

The social identity model of deindividuation effects (SIDE) provides a theoretical framework based on social identity theo ry to understand the implications of the relative anonymity and lack of copresence in computer-mediated interactions. According to the SIDE model, anonymity can have two classes of effects, termed "cognitive" and "strategic" (Spears & Lea, 1994).

"The cognitive effects relate to the salience of a particular identity (personal identity or a group identity) and more precisely refer to issues of self-definition. Anonymity can function to enhance group salience by reducing attention to individual differences within the group (literally "de-individuation" or "depersonalization"). The strategic dimension refers to whether the individual or group member feels able to express behaviour in line with a particular identity, given that this is salient. This is particularly relevant in intergroup contexts in which a power relation is present between groups. In this case

anonymity from a powerful outgroup may enable members of the other group to express group normative behaviour that might otherwise be punished or sanctioned by this group (Spears, Lea, & Postmes, in press).

One of the implications of the SIDE approach is that, although behavioral effects can be accentuated by anonymity, there should be no generic effects or outcomes of computer-mediated communication: this should depend on local norms relating to the particular personal or group identity. This forms a key divergence with the deterministic social psychological approaches, such as cues filtered out approaches. SIDE, in contrast, places emphasis on the construction of norms and definitions of self and others in the specific communication context and the role of the technical and social context therein (Lea & Giordano, 1997; Spears & Lea, 1994).

Political interactionist theory (PIT) "predicts that information systems would be resisted by potential users if they cause a re-distribution of power that either conflicts with the organizational structure (objective definition) or with the interests of individuals who are likely to lose power as a result of the implementation (subjective definition)" (Romm & Pliskin 1999: 28). Starting from Markus's warnings about negative social uses of EM communication technology, Romm & Pliskin (1999) claim that "EM can lend itself to deliberate abuse by individuals who take advantage of its unique technical features to promote their political agenda (1999: 29). Besides the "petty tyranny" acted by a single individual, in more general terms we can suppose that different groups of coalitions (Pfeffer & Salancik 1978) can take place, creating sub-networks within the organizational intranet or externally through internet. We argue that the group diversity can enhance the structuring of coalitions.

4. Research Design

General research framework (tab. 1) is structured comparing three types of organizations between themselves and between different countries, Italy, United Kingdom, the Netherlands and Greece. The three types of organizations are international teams, national research institutes and corporate accounting departments. In this section we discuss how explaining variables can affect the relationship between EM introduction/adoption/diffusion and a set of organizational consequences (tab. 2). Note that not every explaining variable affects all organizational consequences.

TAB. 1 **GENERAL RESEARCH FRAMEWORK**

	TYPES OF ORGANIZATIONS		
	INTERNATIONAL TEAMS	**NATIONAL RESEARCH INSTITUTES**	**CORPORATE ACCOUNTING DEPARTMENTS**
COUNTRY 1 **COUNTRY 2** **COUNTRY n**	high task complexity high self-organization international culture high geogr. distance	medium task complexity medium self-organization national culture medium geogr. distance	low task complexity low self-organization local culture low geogr. distance

TAB. 2 **RESEARCH DESIGN**

EXPLAINING VARIABLES	Degree of substitution FtF/Email	Formation of trust & identity	Formation of a genre repertoire	Degree of organizational participation
Task complexity	x	x		
Self-organization	x	x		
Cultural diversity	x	x		x
Social context	x	x	x	x
Technology-use mediators	x	x	x	x
Geographical distance	x	x		

Explaining Variables

Task complexity. It is measured by the degree of uncertainty (variety) of problems which must be faced with. It is inversely related to the degree of standardization through quantitative parameters or rules/norms (Biggiero 2000). The differentiation of task complexity is useful to understand whether CMC is more (or solely) effective in communication related to low task complexity, as information richness theory predicts (Daft & Lengel 1984, 1986). According to March (1990), Nohria & Eccles (1992) and Weick (1995), even the degree of ambiguity declines with the decrease of complexity, and trust is not significantly requested (Bradach & Eccles 1989; Gambetta 1988). According to cues-filtered-out approaches (Culnan & Markus 1987; Daft & Lengel 1984, 1986; Dubrovsky et al. 1991; Nohria & Eccles 1992; Siegel et al. 1986; Sproull & Kiesler 1986) trust is best supported by FtF communication, because it is the richest of cues media and allows also for touch (Handy 1995). Therefore, if those approaches are right, we should find low trust and EM diffusion highly correlated in low task complexity. On the other hand, research within the SIDE framework has demonstrated higher levels of social identification within visually anonymous groups communicating by EM (Lea, et al., 2000; Spears, Lea, & Postmes, 2000). This allows for trust formation that is group identity based and therefore not dependent upon a rich medium for the exchange of interpersonal cues. At least, developing the analysis at a very micro-level, we should find that, ceteris paribus, the content of messages exchanged through EM are much less complex than those through FtF. This analysis can be compared with that previously realized by Markus (1994), Jarvenpaa & Leidner (1998), and especially with that made by Walther (1995), where the time variable is explicitly take into account, because trust and EM effectiveness could change over time.

It is also interesting to study how task complexity affects negative or political abuse of EM communication (Cezec-Kecmanovic et al. 1999; Pliskin et al. 1993; Romm & Pliskin 1999; Romm et al. 1991) . When considered as an open-end technology (Weick 1990), EM could allow equivocality and hence distort usage more in high than in low complex tasks. Moreover, the formation and characteristics of a group's genre repertoire can vary depending on task complexity: it can be expected that the more complex the task, the wider the genre repertoire. Finally, even the supposed effect of EM

communication of increasing the degree of participation in decision making can vary strongly with tasks' levels of complexity: high complex tasks imply per se a higher degree of participation (Shetzer 1993), so its possible increase would be much more significant in low complex tasks. In general terms, both communication media and task complexity affect the group decision support system.

Degree of self-organization. The degree of self-organization of a group means the extent to which the group defines autonomously its goals and/or tasks and decisional rules, and it is also an index of hierarchy and network density: the more the network (system, group) is self-organizing, the more is dense and the less is hierarchical. The possible equivalence between FtF and EM communication, in the short and in the long run, is expected to be influenced by the degree of self-organization, because the lower it is the lower is the need of communication, and particularly of rich communication. Another aspect is that of trust, which is also less requested in hierarchical (low self-organizing) groups. Thus, if trust cannot be supported by EM communication, this latter should be more diffused in groups where trust is less requested.

An influence of the degree of self-organization on the relationship between EM communication and petty tyranny or groups of coalitions can also be hypothesized. Due to asynchronicity, EM is an easier way of communication, respect to FtF, which requests the simultaneous presence of interacting parts. When the degree of self-organization is high can be supposed that an easy way of communication can favor the formation of groups of coalitions within the organization. Thus we could expect that in high self-organizing organizations the rate of creation of groups of coalitions is higher than in organizations with a lower degree of self-organization. By definition, the higher the degree of self-organization, the higher the degree of participation, because the less hierarchical is the system (Contractor & Seibold, 1993).

Cultural diversity. It reflects the cultural differences existing in the organization or into the group. They can be linguistic, symbolic, behavioral, etc. Cultural diversity between organizational members can limit the degree of substitution between FtF and EM, and hinder the formation of trust and identity. It is reasonably to expect also that cultural diversity enhance the formation of groups of coalition and allows for political or power use of EM communication, while hinders the degree of participation. Moreover, it is likely that, at the increasing of cultural diversity, the type of GDSS is oriented toward more formal types.

Social context. It "includes the culture, distribution of power, and the social norms, habits, practices, expectations and preferences held by a group regarding its present and past interaction (Zack & McKenney 1995: 396). Social context include aspects of physical environment and nonverbal behaviors that define the nature of the social situation and actors' roles and relative status (Walther 1995: 188). The characteristics of social context of organizational members affect the same consequences of the cultural diversity variable, even if possibly in different directions, depending just on the kind of characteristics. Moreover, they influence also the degree of diffusion of EM communication and the formation and structure of genre repertoire.

Technology-use mediators (and leaders). They are those "individuals who implement the technology, provide training, propose usage guidelines, and alter the technology to adapt it to changing conditions of use" (Yates, Orlikowski & Okamura 1999: 83). It is likely to expect that technology-use mediators and leaders affect all the seven organizational consequences, because "the use of a new electronic medium within a community is strongly influenced not just by users but also by those individuals who

implement the technology, provide training, propose usage guidelines, and alter the technology to adapt it to changing conditions of use" (Yates, Orlikowski & Okamura 1999: 83).

Geographical distance. The geographical distance means the different spatial location which prevents organization members to be simultaneously in the same place. It seems to have main effects on the first three kind of organizational consequences: positively on the degree of diffusion of EM communication and on the degree of substitution between FtF and EM, and negatively on the formation of trust and identity.

Organizational consequences are the following:

1. *degree of diffusion of EM communication* and *degree of substitution between FtF and EM.* Here the main questions are two: (1) whether EM can completely substitute FtF communication, and (2) what kind of messages are channeled through EM, once it enters the genre repertoire of the organization. The first question is partly related with that of trust formation and maintenance (see next point), and in the dispute Nohria & Eccles (1992), Handy (1995) argue that FtF can not completely substitute, while Walther (1995) holds that over time EM and FtF equal, and Smagt (1999) suggests that things change from a dyadic to a multi-parti dialogue: in the latter FtF is not so crucial. The second question concerns the different contents which FtF and EM can support: according to information richness theory, and more generally with cues-filtered-out approaches, Daft & Lengel (1984, 1986), Nohria & Eccles (1992) and Handy (1995) state that, being a poor channel of communication, EM can support merely simple messages and therefore can widely diffuse just in low complex tasks. Other authors, basically those sustaining AST (Contractor & Seibold, 1993; DeSanctis & Poole 1994; Gopal et al. 1993; Poole et al. 1991; Poole & DeSanctis 1990; Zack 1993; Zack & McKenney 1995) and SCANT (Lea, O'Shea & Fung 1995; Yates, Orlikowski & Okamura 1999), and self-organizing systems theory (Contractor & Seibold, 1993) argue that both questions depends on the social context of appropriation of the technology, and on other contingent issues. Therefore nothing can be said without an accurate study of these influencing variables, which is just at the beginning;
2. *degree of trust and identity formation.* Trust is a very important concept in current managerial and sociological analysis, as is witnessed by recent works (Gambetta 1988; Kramer & Tyler 1996; Lane & Bachmann 1998), and it is a complex and multidimensional concept (Lane 1998; Tyler & Kramer 1996). Here it is seen as "an orientation toward society and toward others that has social meaning beyond rational calculations" (Tyler & Kramer 1996: 18). Among the three types of trust defined by Zucker (1986), what is more relevant for our research is that process-based, which is built on three sources: personal experience of recursive positive interactions, expectations based on reputation and identification processes with a group identity. Actually, in the literature on organizational identity (Abrams & Hogg 1990; Albert & Whetten 1985; Ashforth & Mael 1989, 1996; Hogg & Abrams 1988) trust is viewed as an outcome of strong identification processes. Biggiero (1999b), recalling concepts of second order cybernetics, shows that trust and group identity are connected in a positive feedback loop. Paetau (1999) develops the same perspective and wonders "to what extent the virtualization of organizations can take place without undermining their own identity and stability". Out of that theoretical perspective, other authors relates group identity and stability with the impact of communication technology of the growth of trust. Although in nearly opposite directions, both Nohria & Eccles (1992), Jarvenpaa & Leidner (1998) and Meyerson, Weick & Kramer (1996) explicitly address these issues: the former argues that EM communication does not allow for trust formation and growth, while the latter, noting that many temporary groups, like virtual teams in research projects, "exhibit behavior that presupposes trust, without having any of the traditional sources of trust. This seeming paradox is resolved by the

recognition of a new form of trust characteristic of such groups –swift trust. Such trust involves a series of hedges in which people behave in a trusting manner but also hedge to reduce the risks of betrayal. It also centers around the competent and faithful enactment of clear roles and their associated duties" (Tyler & Kramer 1996: 8). The SIDE approach offers a contextual approach to resolve these competing deterministic predictions that depends upon the relative salience of individual, group and organizational boundaries Postmes, Spears & Lea, 1998). When group salience is high, conditions of EM such as anonymity and lack of copresence, promote group identification and the formation of group-based trust. However, when group salience is low, anonymity further encourages perceptions and expressions of individuality and a consequent lack of group-based trust, as well as a lack of interpersonal trust (because the medium does not allow for the adequate exchange of interpersonal cues on which it depends). Lea et al. (in press) reports studies showing that the relative anonymity in EM enhances social identification within highly salient groups and thereby promotes various correlates of trust such as greater attraction and accountability within groups.

3. *formation and characteristics of a genre repertoire.* Genres are considered "as socially recognized types of communicative actions –such as memos, metings, expense forms, and training seminars- that are habitually enacted by members of a community to realize particular social purposes. A genre may be identified by its socially recognized purpose and shared characteristics of form. The purpose of a genre is not the individual's private motive for communicating, but a purpose constructed and recognized by the relevant organizational community, whether small or large. Form refers to observable aspects of the communication, such as communication medium (e.g., pen and paper, telephone, or face to face), structural features (e.g., text formatting devices such as lists and structured fields), and linguistic features (e.g., level of formality, specialized vocabulary, or graphic devices). A genre established within a particular community serves as an institutionalized template for social interaction -an organizing structure- that shapes the ongoing communicative action of members through their use of it for social interaction within the community. Despite the stabilizing influence of institutionalized genres, genres can and do change over time and with changing circumstances. A community's genre repertoire reflects the common knowledge, expectations, and norms (derived from the organizational and broader cultural context) that members of a specific community share about communication (Yates, Orlikowski & Okamura 1999: 84);
4. *degree of organizational participation to decision making* and *formation and characteristics of groups of coalition, and/or political/power abuse of communication technology*. Here we intend the forms of direct participation, that is, participation non-mediated by representatives of unions or other forms of collective representations (Heller, Pusic, Strauss & Wilpert 1998). Decisional participation must be distinguished into two categories (Wagner 1995): 1) that happening between unchanged and that expresses basically in consulting leadership style (Locke, Alavi & Wagner 1997); 2) that implying delegation, that is, a substantial redistribution of power between hierarchical positions within and between organizational units (Leana 1987). The latter can be further distinguished between indirect participation (through union representations) and direct, which is negotiated without unions. The latter can be either formal or informal. Organizations are groups of coalitions which share some common goals but fight for internal power (Cyert & March 1963; March & Simon 1958; Pfeffer & Salancik 1978; Pfeffer 1983). Within any single coalition or department, the question of power reproduces, and it is influenced by communication technology (Markus 1994b). In this topic we include also the issue of the influence on GDSS (group decision support system) (Contractor & Seibold, 1993; Contractor, Seibold &Heller, 1996).

5. Research Methodology

Until now researches have been not conclusive about nearly all issues concerning organizational consequences of CMC adoption and diffusion. Likely it depends also from the number of theories in play and the methodologies used. Among many factors, we believe that there are three main methodological orientation, which vary empirical findings:

1) laboratory versus field research. Although the former is very important to stimulate further research and build sound theories, its results systematically differ a lot from field research, likely due to the high complexity of these issues;
2) statistical versus longitudinal research. The former allows for extensive inquiry lowering the number and the details of variables, while the latter does vice versa. Because of different reasons, both have limits to generalizability and problems of reciprocal comparability;
3) static versus evolutionary research. The former, neglecting all learning and dynamic effects, does not fit with results of evolutionary approaches.

In this project we choose the second methodological orientation for any of the three questions: field and longitudinal research, referred to 2-3 years of organizational life. We identify 7 organizational consequences of EM adoption and diffusion in 3 types of organizations. For many inconsistencies between empirical researches, besides the selection of what are pertinent and significant organizational consequences, are merely related to the extent to which organizational consequences occur, we introduce 6 explaining variables to understand such differences. In other words, this project has two main goals. The first one is to study and measure 7 organizational consequences of EM adoption, and the second one is to explain why the characteristics and the size of such consequences vary between the three types of organizations.

Research methodologies are centered on the longitudinal analysis of the three organizations in each country. The field research is constituted by interviews with organization members, focused on structures and differences between FtF and CMC communication. A special attention is paid to the time dimension, in order to understand how both ways of communication evolved over time, and particularly what changed from the beginning of the introduction of EM. Likely, in national research institutes and accounting departments, the problem of members' turnover should be faced, because it affects organizational memory. Besides interviews, documents will also used, to evidence group decision support systems (GDSS) and relational patterns. To this aim, written paper documents, like meetings' agendas and reports, will be analyzed, with a special use of the innovative tool of webometric analysis, which is allowed by mailing lists. In short, it is possible, through the archive of each mailing list, to analyze the structure and the style of the communication. Beyond the issue of exploring the content of communication, in terms of personal/professional, formal/confidential, etc., this analysis allows for the understanding of meaning and genre creation and change, and of the role played by technological users and group leaders in such an evolutionary process.

General research framework (tab. 1) is structured comparing three types of organizations between themselves and between different countries, which are those involved as research partners. The three types of organizations are international teams, national research institutes and corporate accounting departments. The former are chosen among those organizations which have a strong international orientation (MNCs, international public organizations like OECD, UN, EC, etc.), and widely work through international teams. These organizations are supposed to be characterized by high task complexity, high degree of self-organization, the nature of group of peers, an international culture and a high geographical distance. At the opposite the latter are supposed to be characterized by low task complexity, low self-organization, a strong hierarchy, local (organizational, or even departmental) culture, and low geographical distance. National research institutes are supposed to be in the middle between the other two, that is, to show a medium degree of task complexity and of self-organization, a weak hierarchy, a national culture and a medium geographical distance.

International teams can be selected in order to have those which use a mix of communication media, ranging from most advanced, like videoconferencing, to the most traditional, like FtF. The characteristic of using mailing lists allows for employing new quantitative and qualitative analytical tools, like mailing list analysis. Compared with the other two kinds of organizations, International teams have also the peculiarity to be projects, and therefore to be temporary and small sized. These peculiarities are very interesting, because allow us to understand the complete life cycle of the group, and hence to explore the full potential of all forms of communication. Usually the time span ranges over 2-3 years of collaboration. Moreover, people likely did not know each other until the start up of the projects, and thus the dynamics of interaction patterns emerge in a pure way, that is, not influenced by previous reciprocal knowledge. Consequently, the potentiality and the nature of the various communication channels can manifest in a full way. International teams are organizations fully comparable with global virtual teams (Jarvenpaa & Leidner 1998), which are characterized by no common past or future, culturally diverse and geographically dispersed, and electronic communicating. These characteristics seem to hinder, if not prevent, trust formation, but empirical findings show that where trust was high teams were "more capable of managing the uncertainty, complexity and expectations of the virtual environment" (Jarvenpaa & Leidner 1998: 27). Previous researches dealt with the same issue (Capron, Massart & Nauelleau 1999), pointing at the crucial role played by information technologies in virtual teams.

6. Policy Issues and Implications

Information technology is the most pervasive and hard change driver of European society, influencing both economic and social life. Company performance and strategy, characteristics of labor markets, rate of unemployment, workplace structure, personal and social interaction patterns, forms and dynamics of inter-organizational alliances, formation and development of virtual organizations, are some of the many issues affected by the adoption and diffusion of information and communication technologies. For email is in Europe the most diffused among the new ones, this research aims directly to explain the forms of its introduction/adoption/diffusion, and indirectly to understand a number of issues, which are of common interest to all member states. Such issues have many policy implications and can be grouped in the following categories:

1. how to implement and develop forms of teleworking;
2. how to design future workplace and groupware;
3. the creation of new professional figures;
4. future organizational structures of firms and institutions;
5. the creation, diffusion and effectiveness of virtual organization;
6. the formation and evolution of inter-organizational networks;
7. the new roles and methods of education and vocational institutions;
8. the forms of introduction/adoption/diffusion of information technologies.

1. *Teleworking.* It concerns "all activities which require electronic communication between the central office of an employer and an employee working at a distance" (Richter 2000: 829), and is diffusing in Europe as one of the most promising forms of employment. The lack of knowledge about trust formation, communication styles, human supports to electronic communication and sense of membership in virtual organizations determined phenomena of demotivation, non accountability, mistrust and low commitment in many cases of teleworking and a wide resistance of unions and social institutions towards this kind of labor contract. The resulting undermining of productivity and effectiveness can be avoided through the knowledge stemming from our research, because it deals just with these issues.

2. *Workplace Design.* The investigation on email communication patterns helps also to understand how to build trust and identification processes in virtual teamworks, or in teams using information systems for collaboration and interaction, and especially for email groupware teams (Eom 2000). Through the findings of this research can be better understood which human and technical supports can be designed for improving cooperative behaviors in the workplace.
3. *New Professional Figures.* For all technologies are introduced and diffused by means of technology mediators, they constitute a sort of imprinting in next paths of communication patterns, which the organization will experience. The studying of their role in email communication can help in understanding how to choose and manage their selection, action and career for email and other types of CMC. New professional figures can be created and developed, either within the organization, as facilitators and technology mediators, or between organizations, as the case of the Net Brokers (Franke 1999), who play a catalyst role for searching potential network members.
4. *Future Organizational Structures*. Beyond vague indications that future organizational structures will be changed by CMC adoption, this research explains how the transformation take place in some prototyping organizations. It will be possible to generalize some finding and draw implications for economic or social organizations. It will be possible to answer questions as: will they flattered? How will it happen? How power and autonomy will be redistributed within each organization? Who will hinder such a transformation? Why? An agenda for this research is described by Monge &Contractor (in press) and Contractor, Wasserman & Faust (2000).
5. *The Formation and Development of Virtual Organizations*. The diffusion of CMC is reducing the need of spatial proximity, which can be replaced by a virtual proximity in the electronic space. Many cases of virtual organizations appear in the economic and social field (Chutchian-Ferranti 1999; Franke 1999; Paetau 1999; Sen 2000). Up to now the nature of these new organizations is still unknown, but the understanding of their communication patterns and value chain coordination systems can be substantially improved through the present research. Their organizational identity and trust are strongly affected by communication technologies, and thus by email mostly.
6. *The Formation and Development of Inter-organizational Networks.* As for the case of virtual organizations, so even virtual inter-organizational networks are starting up. The pressure for building strategic alliances, jointly with the growth of a global economy leads organizations to create trans-regional networks, whose operating life is characterized just by communications in the virtual electronic space. Here the same issues of virtual organizations hold, ones transferred at an inter-organizational level: how communication technology, and specifically email, affect the formation of inter-organizational trust and inter-organizational identity?
7. *The New Roles and Methods of Education and Vocational Institutions*. The diffusion of new organizational forms, of new professional roles, of virtual organizations and of virtual inter-organizational networks implies a new role also for education and vocational institutions: new contents and in a new ways of teaching must be defined, and the need of both can be discovered only through an interactive networking process between those institutions and the organizations.
8. *The Forms of Technological Innovations.* During last decade it has been increasingly recognized that the issue of technological innovation is far more complex than was previously thought and proposed by neoclassical economics (Edquist 1997; Nelson 1993). Most prominent scholars agree that in order to understand the forms of introduction/adoption/diffusion of technological innovations an evolutionary, institutional and organizational view should be assumed (Archibugi, Howells & Michie 1999; Edquist 1997; Etzkowitz & Leydesdorff 1997; Leydesdorff & van den Besselaar 1994). At the same time, management and sociological studies argued that every technological innovation must be contextualized in the specific environment of introduction and adoption (Bijker, Hughes & Pinch 1987; Bijker & Law 1992; Callon 1998; Latour 1987; Law 1991). It means moreover to add a very micro-level analysis to the macro-level. The European

Commission accepted both suggestions (Lundvall & Borras 1992), and this research holds the same perspective allowing to treat email communication as an innovation in the field of communication technology, and studying the micro/macro conditions of its introduction/adoption/diffusion. Thus this research can give a substantial support in the field of science and technology policy.

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