Cultural values, media richness and telecommunication use in an organization

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Abstract

This paper deals with adapting the telecommunication services of an organization to the diversity of individual value orientations related to culture. After a discussion of the processes linking telecommunication use to cultural values, we show on empirical grounds the relationship between the preference of the individual for organizational cultures and his or her telecommunication use (fax, email (electronic mail), vmail (voice mail) and telephone). The cultural values were measured for 223 individuals in a French company using Q sort with balanced block design while telecommunication use was measured through a diary method. The final analysis was performed on 799 internal communications of 145 individuals having access to the four telecommunication services. In particular we found that the use of new media was more related to an orientation towards innovation or reactivity or entrepreneurship than the telephone. Email appeared as associated to relation-oriented rather than task-oriented value and suggests that the amount of feedback plays a role in the process of telecommunication media choice. We argue that cultural analysis is not only an interesting complementary approach to information richness theory for understanding telecommunication choices, but can also lead to different decisions. As an example, we examine the decision to withdraw either vmail or email in a downsizing situation. © 1999 Elsevier Science Ltd. All rights reserved.

Keywords: Cultural values; Telecommunication use; Media richness; Media selection; Telephone; Electronic mail; Voice mail; Fax; Downsizing

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1. Introduction

Organizations are increasingly facing the difficulty of managing the diversity of new communication technology, e.g. electronic mail (email), voice mail (vmail), videoconferencing and radiocommunication services, etc., now commonly found in most large organizations. As the supply and use of these technologies expands, the question of selecting the best telecommunication media for each type of person in the company becomes more and more critical for obvious reasons of cost and effort. But giving the proper access to telecommunication equipment is not an easy task. In fact communication needs may vary considerably even for one person. At the level of the organization itself, communication needs depend externally on the equipment of the customer and of the supplier, and internally on the differentiation of functions, professions, structures and cultures.

When the economic outlook is bright, the issue of the cost of telecommunication media diversity may not be critical and often goes unnoticed. Each unit or individual can be equipped with any of the media available in the company and uses the ones which match its communication needs best. However, when the activity or the profitability of the organization has been shrinking for several years, the cost of diversity threatens the organization and places a burden on the overhead costs. A frequent policy is then to design a chargeback mechanism for Information Technology (IT). In addition in crisis situations the company might contemplate cutting a particular service. In fact, in critical situations in state-owned companies, executives prefer to get rid of a communication system rather than firing people. But how to decide what to keep and what to get rid of?

In the world of engineering, information and communication systems are supposed to fit the requirements of the tasks. Vendors rely on the wide spectrum of functionalities of their solutions, in order to argue how their systems suit the clients’ needs. They take for granted that the perception of needs are objectively determined. On the other hand, media selection and patterns of interaction involve more than the tasks and functional structures. “Media perceptions are in part subjective and socially constructed” (Fulk, Schmitz & Steinfield, 1990). Psycho-social approaches to organizational communication and media choices are close to an emergent view of IT and organization interactions (Markus, 1994b) and insist on the processes by which a technology is defined and used (Fulk et al., 1990). Organizational culture and the social context play an important role in the use of telecommunication media and explain why similar organizations use these technologies differently (Zack & MacKenney, 1995). Even if there is no evidence of an organizational culture, the use of telecommunication media should be expected to vary across different communication cultures in an organization (Carlson & Davis, 1998).

This paper pursues three objectives:

- To give a theoretical and practical motivation for studying the relationship between cultural values and media use;
- To discuss this cultural psychology approach on organizational communication with respect to a rational choice theory such as Information Richness Theory
(IRT), which can be considered as a basis or even the dominant theory in media selection or media choice, and their complementary (Kraut, Rice, Cool & Fish, 1998; Webster & Trevino, 1995) and respective merits for diagnosing the use of communication technologies;
- To present a case study of a French multinational firm facing a critical downsizing situation and considering cutting a telecommunication service.

First, we will define culture and discuss the potential relationships between cultural values and telecommunication media use. Secondly we will present a research model taking into account consequences of this psychological way of understanding culture and of the task-oriented approach of IRT. In the third part, we define the methodology of our field study. In the fourth part we discuss the results and show that some cultural values are linked to communication media. This result is all the more important in terms of prescriptive action, as the media best suited for the company strategy is not always the one that should be kept according to IRT.

2. Cultural values and media implications

2.1. A psychological approach of culture

Culture appears as the “collective programming of spirits which separates the members of a group or a category of persons from others” (Hofstede, 1994, p. 4). Comparative studies suggest a relationship between culture and telecommunication use (Straub, 1994; Carlson et al., 1999). On the one hand culture arises out of human interactions and depends on the communication systems that support and make these interactions possible. More precisely culture is built upon two elements (Louis, 1985):

- the ecological context: i.e. the physical, historical and social environment of a community;
- the differential interaction: the ratio of internal to external interactions of the community.

Thus, as opening agents lowering the differential interaction, new electronic media could change cultures.

On the other hand culture is an enduring phenomenon (Robey & Azevedo, 1994). “Over a period of time useful behaviors, values and artifacts become institutionalized and incorporated as part of cultural traditions”. (Herbig & Palumbo, 1994, p. 83). Therefore, work-unit values as well as conformity to institutionalized norms must have some influence on what telecommunication media people prefer in a company and how they use them. However, it is important to remark that the relationship with media depends on the concept of organizational culture we choose. That of Schein (1985) emphasizes both a social process (validation and teaching among a group) and a cognitive outcome (thinking and feeling), not behavioral per se. If we put
more emphasis on the ideational than on the sociocultural aspect of culture (Allaire & Firsirotu, 1984) — i.e. if we believe that culture is not fully incorporated in social behavior — then the relationship with media is not as natural and might be difficult to demonstrate. The challenge for research is not to show that social theories (and thus a socio-cultural concept of culture) can be linked to communication processes. Rather it is to adopt, as we do here, an ideational view of culture and to try to show that that cultural values have some impact on media use.

The central idea in this article is that media equipment cannot be provided as a result of a very hypothetical consensus in the company on their appropriateness given their functional capabilities, but should rather be chosen because its use is associated to the cultural values the company would like to develop.

2.2. Sub-culture and cultural values

According to Rokeach (1973, p. 5), “a value is an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence”. This definition is consistent with a concept of culture as an ideational system rather than as a sociocultural system (Allaire & Firsirotu, 1984). The identification of sub-cultures in an organization implies the ability to show the similarity of cultural values within a group of individuals (Hofstede, Neuijen, Ohayv & Sanders, 1990; O’Reilly, Chatman & Caldwell, 1991). Sub-culture qualifies a group. Even if members have slightly different cultural values inside the group, they are closer to each other than to those of other groups. Here, we cannot show that the values are really shared. Therefore we won’t speak about sub-culture. However, the values we are talking about are cultural values, and not another kind of value such as competing values (Quinn & Rohrbaugh, 1984). Firstly, they are based on the general cultural dimensions both at the society level and at the organizational level identified by Hofstede (1991). Secondly, we follow the analysis conducted by O’Reilly and his colleagues who wrote (1991, p. 496): “To assess individual preferences for organizational culture respondents were asked to sort the 54 items deck into 9 categories by responding to the question ‘How important is it for this characteristic to be a part of the organization you work for?’”. By this process they identify the cultural values of the individual. Of course, it does not mean that his or her cultural values fits with the culture of the organization or of a group characterized by a sub-culture, since these cultural values are not necessarily shared. We are following here the same overall methodology for we are trying to show that the preference of the individual for organizational values tends to have a strong effect on telecommunication use. This appears all the more relevant as we consider cultural values as values in the work-unit environment (Ferratt & Short, 1988) and not as values in the universal context of mankind or at the level of the personality of the individual (Hofstede, 1980).

2.3. The dimensions of cultural values and research questions

Hofstede (1980, 1983) identified power distance, uncertainty avoidance, individualism versus collectivism and masculinity versus femininity as 4 dimensions of cul-
tural values. This work is certainly one of the most well-known pieces on culture and was used as the starting point for this research. The two latter dimensions are very classical in organization theory. They describe whether one is self- or group-oriented and whether the job is perceived as task or relation-oriented.

However, especially in the French context where our field research takes place, the two former measurements and/or concepts used by Hofstede have been severely criticized. D’Iribarne (1997) argues that we should use the hierarchical distance instead of the power distance concept and considers that the index used for uncertainty avoidance only very partially renders the phenomena for which it is supposed to account. Hofstede defines uncertainty avoidance as the degree of stress when facing an unknown or uncertain situation. He adds that strong uncertainty control cultures tend to avoid ambiguous situations by structuring companies. Structuration (Pugh, Hickson & Hinings, 1969), when it is already high in a big company, especially in France, can be considered a good index of uncertainty avoidance. But when the rules become too detailed and complicated, people react by applying the rules in a flexible way. So, being flexible (O’Reilly et al., 1991) and applying the spirit rather than the letter of the rule in the interest of the organization derives from the concept of uncertainty avoidance and can be very similar in some contexts, such as in the French one. But this concept can also be very confusing. D’Iribarne (1997) argues that French people feel nervous at work but do take risks. Hofstede (1991) answers that the need for structuration when facing uncertainty does not mean an inability to take risks. For all these reasons, in an organization context, we prefer to use the concept of flexibility instead of uncertainty avoidance.

Subsequently, in addition to flexibility, we added a fifth dimension to cultural values corresponding to the willingness to take risks as opposed to being cautious (O’Reilly et al., 1991), that we called entrepreneurship. We also tried to introduce a possible sixth value dimension with the idea of innovation versus stability (Burns & Stalker, 1961). We will see in the results that the dimensions of entrepreneurship and innovation are somewhat correlated but our goal was not to have a parsimonious cultural value tool but rather to investigate the relationship between measures of cultural values and media choice.

A fifth dimension (seventh here) was added by Hofstede (1991) recently from his study of the Chinese culture and Confucian values. It describes the time orientation (long term: rather future oriented towards slow results, not always preserving one’s face versus short term: past and present oriented, always preserving one’s face). Indeed the time orientation of action structures the work-unit (Lawrence & Lorsch, 1967; Quinn & McGrath, 1985). We will try here to conceptualize a seventh cultural dimension which is only partially related to this “time-orientation” and has also probably emerged precisely with the advent of the telecommunication era. In fact in France, at a macro level, politicians and sociologists discuss the two-speed society (Lipietz, 1996). We name this dimension reactivity and consider that, at the micro level of interpersonal interactions, it deals fundamentally with timing-feedback (Te’eni, 1992). In the following we explain how.

Having clarified what we understand by cultural values, and why they should be in general — although in a non trivial — manner related to telecommunication use,
we now develop some specific research questions. These propositions support the view that the use of equipment depends on the cultural values. In other words different cultures actually perceive and use media in different ways. For instance their ordering of richness of email and vmail may be reversed. In this view, telecommunication use is socially constructed and emergent rather than objectively determined. However, because of our positivist methodology, we can only find reasonable arguments as to why a media would be used by a culture rather than another one. These arguments again rely on the same determinants of media choice identified by IRT. Therefore the reasoning can still be considered as driven by IRT and our study can only find indirect evidence of the social construction process and simply show its outcome. But, contrary to IRT, or at least to its normative recommendations, the use of a media is not only determined by the media characteristics and the cognitive aspect of the communication task, it fundamentally depends on the cultural values of the people in interaction. In other words it depends also on how people think they should behave with others.

Considering the telephone as an old medium and the other telecommunication based media as the new media, we can make the following hypotheses:

**H1 (Reactivity). The use of asynchronous media is more associated with a cultural value oriented towards reactivity.**

In fact asynchronous media are more used when feedback should be short but when people should not be constantly solicited because they are engaged in the execution of a plan (Quinn & McGrath, 1985). People who are biased towards action see in asynchronous media the way to coordinate their tasks without interrupting them. People biased towards action execute a plan. Their conduct is rule based (Te’eni, 1992). In this type of conduct feedback should not be given during execution because immediate feedback is costly in terms of cognitive resources and may be counterproductive when cognitive load is high. Moreover people oriented towards the short term, such as sales people or production people, cannot answer the phone right away. They are out of the office or on the production line. Therefore, in addition to the telephone, they are used to asynchronous media, typically email or vmail, for receiving messages and checking them more often than people oriented towards the long term. But it is not only a way of minimizing disturbances in their own tasks. An orientation towards reactivity also means that the initiator of a set of interactions integrates a task closure approach (Straub & Kaharana-Evaristo, 1998), not so much in terms of availability of the equipment of his or her correspondent but more in terms of the freedom given to the recipient to check his or her messages rather than be interrupted. For collective meetings email provides much quicker planning than other media (Peaucelle, 1998). They also like new media, because they can answer just after seeing the message and reply even when the original sender is not available. In this more and more frequent situations, the sender might have a more accurate response in a shorter time. In other words people oriented towards the short term use more new media than others for they allow for higher responsiveness.

Conversely people whose work is unstructured or ill-structured, can’t prepare or
take decisions without some immediate feedback. Firstly because they can change their mind as the feedback does not commit them immediately. There are fewer risks to losing face. Secondly, because on difficult topics the control of the interaction and the understanding is absolutely necessary and can only be achieved in a simultaneous interaction.

In other words, immediate feedback does not confer a higher richness to the medium. The richness is “cultural” and depends on the relative value that the individual gives to the speed of the execution of the task regarding the accuracy of the actions he or she undertakes. The timing feedback is less determined by the media than by the psycho-social system linking the time to the working out of thought and action system.

H2 (Entrepreneurship or low risk-avoidance). The use of new media is more associated with entrepreneurship than the use of the telephone.

This hypothesis is consistent with a comparative study of the perception, diffusion and use of fax, email and the telephone in Japan and in the USA (Straub, 1994). In fact, capabilities of new media present some risks, such as compulsive documentation and accountability games (Markus, 1994b). Part of this impact is emergent and difficult to control (id.). People who are used to taking risks won’t be so much bothered by these potential problems. They will use the new media rather than the telephone. Finally, this hypothesis also finds support in the lag between the French and the American development of the telephone at the beginning of this century, a time when the telephone was the new media. French political leaders and top executives were afraid that the diffusion of a new media would undermine their power (Attali & Stourdze, 1977). This last argument also supports proposition H7.

H2a. Email use is more associated with entrepreneurship than fax and vmail use.

The result that fax is preferred to email in Japan, contrary to the situation in the USA is principally explained by the much stronger risk avoidance or lesser tolerance for ambiguities in Japanese companies in general (Hofstede, 1980) and by the greater potential of Japanese handwriting than electronic text for reducing ambiguities. Here Straub does not make the difference between risk and uncertainty (Hofstede, 1991). This hypothesis is also consistent with the risks of feelings of isolation or depersonalization often associated with electronic communication (Sproull & Kiesler, 1986). In fact telecommunication media filter out certain personal, social and behavioral cues used by persons to regulate their interactions in face-to-face communication (Culnan & Markus, 1987), such as voice tone and silences. This is why email is more associated with entrepreneurship than vmail.

H3 (Innovation). The use of new media is more associated with innovation than the telephone.

H3 is rather straightforward and can be supported by the literature on the diffusion of innovation (Rogers, 1983). In this literature, people oriented towards innovation are called adoption leaders. Currently, the new media are the asynchronous media.
But in several years when the videophone will be available at low cost, it will in
turn become part of the new media.

**H4** (Individualism). *The media which are accessible to the larger number are more associated with collectivism.*

Computer-mediated-communication moderates the normative influence only in indi-
vidualistic countries, regardless of the task (Yan, Wei, Watson, Clapper & MacLean,
1998). Similarly, whereas people oriented towards individual performance tend to
use the distribution list function of the new media to be more efficient, people ori-
ented towards the group will only use the media which reaches everyone. In fact,
only some people are very sensitive to possible information asymmetries due to an
unequal access to the media (Carlson & Davis, 1998; Straub & Kaharana-Evaristo,
1998). Social services or internal communication services of a company are good
examples of a collective culture and use telecommunication services accordingly.
Comparing power distance and individualism Hofstede (1983) notices that power
distance refers to the dependence of an individual with respect to his superior
whereas individualism refers to his/her dependence with respect to the organization.
He distinguishes between people who are easy-going and team-oriented, and those
who feel distinctive from others and take responsibility. Typically a strong organiza-
tional culture favors the perceived need of communicating with the largest number
of people, and thus to tries to use the most widespread media.

**H5** (Task orientation). *The media that provide more redundancy in the feedback are more associated with relation- rather than task-oriented values.*

Even for fairly simple messages, the amount of feedback (Te’eni, 1992) is more
important for relation-oriented people because they want to make sure of the position
or understanding of the other party. The use of email should be associated with
relation-oriented cultures. In fact one can reply to each sentence or idea of the sender
of a message very easily. Vmail and prompts may be too slow or fast paced for the
receiver, but email can be read at the receiver’s preferred speed (Trevino & Webster,
1992). Unlike email, vmail does not allow a point by point feedback. In terms of
amount of feedback email is more powerful than vmail.

**H6** (Flexibility). *Ease of use of the media is more associated with high flexibility cultural values.*

This proposition is very straightforward if one equates flexibility and the orientation
not to need a strong formalization in order to adapt to the situation. People who are
more flexible will not bother with communication policies of the company and will
use the more convenient media.

**H7** (Hierarchical distance). *Email use is more associated with a low hierarchical dis-
tance.*
Electronic communication diminishes the natural differences due to hierarchical level (Sproull & Kiesler, 1986) and lowers some social inhibitions and barriers to communication. Dubrovsky, Kiesler and Sethna (1991) suggested that status differences could be reduced somewhat in electronic decision-making groups. However, Weisband, Schneider and Connolly (1995) showed that status labels and impressions based on them had a larger impact on participation and influence than do communication media. But, precisely the fact that hierarchy and status have probably more impact on how people communicate than communication media cannot be considered as a hierarchical distance effect, but should rather be considered as a structural effect. So it seems that the argument of Sproull and Kiesler still holds in some way. In the context of high hierarchical distance, such as in the banking sector (Rowe & Béal, 1998), email cannot provide a deindividuation effect for its use is forbidden except for established procedures. Conversely, in a low hierarchical distance context, email will be used more, not for the kind of communications it is supposed to carry, but for for more personal interactions. Altogether there will be more email messages in this context.

3. A study design incorporating IRT

In a number of cases, researchers have shown that the subjective perception of the media and the social definition of what the technology was good for was more important to explain its use than the most well-known rational choice theories on media choice in organization (Information richness, Social presence) (Markus, 1994a; Lee, 1994; Fulk et al., 1990).

Instead of pitting one against the other, we claim that IRT should not be viewed as a theory opposed to a more subjective theory on communication, but as a complementary theory since:

1. Even in the context of organizations, communication is a too complex phenomenon to be reduced to one kind of theory or explanation (Carlson & Davis, 1998; Webster, 1998).
2. It emphasizes the content of the message or communication task which is evidently a strong argument of technology vendors, which indirectly shapes the attitudes regarding media.
3. It can be seen as a “subjective” theory since it emphasizes that media choice depends on the cognitive abilities and frame of reference of the participants (Rowe & Limayem, 1998). It is obvious, for instance in the HCP case, that from a perception and not behavioral viewpoint IRT can be a good theory (see the table of preferences in Markus, 1994a, p. 512) even if the social definition process better explains the high level of use of email (Lee, 1994). In a French case IRT appeared as a very good theory for explaining the structure of preferences of two populations (Rowe & Limayem, 1998).
4. In this paper we have integrated part of the arguments of IRT in the construction of the hypotheses. In fact, as IRT, the cultural orientation takes into account the
features of the media (H1: synchronicity, H2: memorizing, H2a: not revealing certain cues through voice tone or handwriting, H3: newness, H4: distribution list, H5: message processing, H6: ambiguity associated with the absence of a detailed rule, H7: potential for more communications). H6 itself can be considered as a test of the ability to tolerate ambiguity in the organization.

Therefore it is important to investigate in the present study whether IRT is still important for explaining some aspects of behavior and if that is so, what IRT cannot explain that our psychological approach on culture will. And if this is so, what are the consequences of a more comprehensive understanding. Thus a short recall and comment on IRT is needed.

3.1. Information richness theory as a complementary theory

IRT finds its origins in organizational design theory (Galbraith, 1973) and in an organizational imperative tradition (Markus & Robey, 1988). This model indicates that organizational effectiveness depends on the fit between the information-processing capacity of structural design choices and organizational information-processing requirements (Tushman & Nadler, 1978). These requirements can be characterized by uncertainty and equivocality (Daft & Lengel, 1984). Uncertainty has been defined as the difference between the amount of information required to perform the task and the amount of information already possessed by the organization (Galbraith, 1973). Media that transmit precise, objective and numerical data are assumed to reduce uncertainty. Equivocality or ambiguity arises out of different individuals’ frames of reference. Communication media necessary to provide sufficiently “rich” information to bridge these frames are called rich media. According to this theory, media choices are linked to the information richness of the communication objective. According to the positive branch of IRT, determinants of information richness or media richness are the capacity of the medium for immediate feedback, the number of cues and senses involved, personalization and language variety (Daft & Lengel, 1986). Oral media are generally preferred for communication situations high in equivocality, while written media are preferred for communication situations low in equivocality (Daft, Lengel & Trevino, 1987). In its original and normative sense IRT has found limited empirical support (Rice, 1992; Dennis & Kinney, 1998). In particular it is difficult to rank the media by richness order and to find a stable order.

Trevino, Lengel and Daft (1987) have extended IRT to include two other categories of reasons to choose a media among those at our disposal: situational constraints (time zone and place) and symbolic considerations (desire to convey authority by writing e.g.). They call this extended theory “structural symbolic interactionism”. Apart from the idea of the symbolic aspect of a medium [on car phones for example, see Rowe (1994) and Manning (1996)] which is a social phenomenon, we can argue with Markus (1994a, p. 505) that “at the core of IRT is the notion that what makes media more or less appropriate for communication tasks are inherent media characteristics (Fulk et al., 1990)” and that in that respect structural symbolic interactionism does not really depart from IRT. Even in its extended form, IRT remains a functionalist theory and will be treated as such in this paper.
Should IRT be rejected as a non scientific theory? We believe not. Surely the ranking of media by richness order was far too simplistic and not explicit enough. Nevertheless we still find two basic ideas in IRT which are fundamental. Firstly all the communication theory literature (Birdwhistell, 1970; Winkin, 1996) tends to support the analysis (yet to be developed in a more dynamic vision (Carlson & Zmud, 1992; Gales et al., 1992; Marciniak & Rowe, 1999)) of Daft and Lengel regarding the “determinants” of media choice and the contribution of these determinants to ambiguity and uncertainty control. Secondly, in organizations, in order to understand media choices, it is obviously necessary to take into account the structural arrangements which also serve as a means of coordination. The first version of IRT emphasized that structural arrangements play an important role in dealing with information needs (Daft & Lengel, 1986; Rowe & Struck, 1995). However many studies testing IRT seem to forget this aspect. IRT is not a theory on communication media only, but encompasses all kinds of structural arrangements which give a frame to media use. In the second version of IRT the authors called for additional development and research. In particular they suggested that researchers might be able “to determine the relative importance of content, symbolic and situational reasons, whether media use is related to corporate culture and whether personal characteristics such as cognitive complexity or organization level are related to media choice” (op. cit., p. 570). This is what this paper is trying to achieve, except that it is not investigating corporate culture but individual values which, as we explain later, can be considered as cultural values.

3.2. Research model

In order to pursue our second objective of research, in the tradition of psycho-social approaches on communication which link the cultural and subjective world of the individual with his or her behavior, the research model explores the influence of cultural values on telecommunication use (cf. Fig. 1). The tested model incorporates the reference basis of IRT with the ambiguity of the communication objective and the structuring of the work unit. It should be noted that it does not take into account how the perception of the media by the individual influences his/her behavior and how this perception is socially built and transformed.

4. Method

4.1. A French case

Field research was carried out at the French commercial division of a large state-owned company. This division was distributing and servicing computers in France, employing 6000 people. The company had been posting losses for 3 years and the Board of the company had set the Telecommunication Director the objective of cutting telecommunication costs by 30%. In fact, after several “social plans” (which meant thousands of layoffs negotiated with the government) and under the pressure
of the unions, the top management committed itself to reduce “non wage costs” in order to restore the profits of the company. It felt there was something that could be done with the 100 million dollars spent globally by the company in the telecommunication services. All kinds of extreme measures were contemplated and the choice of eliminating email or vmail was considered. Both choices were very difficult: first, because a leitmotiv of the company was “travailler autrement”, which in the context of an IT company meant “use innovative IT solutions for work”; second, because the email system used in France was a product of the company and had been sold to several large European companies; third, because the telecommunication function strongly marketed the email use and had to dedicate a lot of effort to explaining the use of the attachment file function when the correspondent used
another email system; and fourth, because the voice mail system had been bought and put in place only 2 years ago. The survey was made possible by the first author who spent 4 months in the company advising the Telecommunications Director. They both felt that better knowledge of telecommunications use profiles would help avoid perverse side effects of cost reduction measures.

4.2. Data collection

Data was gathered in Spring 1994 by means of a questionnaire sent by internal mail. The study was fully supported by senior management who added a letter to the questionnaire and announced the study in the corporate journal. Trained telecommunication engineering students contacted every person at least once by telephone in order to ensure an adequate understanding of the questions, and of the Q-sort method. The participants could also call us if they had any problems. The Q-sort method seemed to be accepted very well. For instance, one employee called us directly to ask for another questionnaire. He had brought his game home and his son enjoyed it so much that the father needed another one to participate.

The sample included 320 persons. It was random but stratified by functional area (administration, finance, marketing, sales force, technical sales force, maintenance), site (Parisian sites, provincial sites), hierarchical level (department managers, other managers, operational). Participation was voluntary and anonymous, though participants were asked to indicate their professional group, hierarchical level and site. 223 questionnaires were returned (70% response rate). Only department managers were significantly less represented than originally desired. Thus bias due to respondent selection can be excluded.

The first part of the questionnaire allowed the selection of the cultural value of his or her work-unit. The second part included an inventory of attitudes describing why certain media were preferred as well as some structural characteristics of the work-unit. The last part was a diary of actual communication events of the individual. Each person had 3 weeks to return the completed questionnaire. This time scale was necessary for them not to feel stressed by the length of the questionnaire and to pick one day of their choice that would be an “ordinary” day for filling the diary. We gave them this flexibility because our purpose was not to measure the exact number of communications on each medium but rather to explain why a particular medium was chosen.

The design of this study had been tested in a pilot study and, additionally, two other organizations had been studied using very similar research tools, but not identical (Struck, 1995). In fact the first tests of the instruments showed that minor improvements should be made to apply them to these organizations. But we also realized that the questionnaire necessarily had to be adapted to the situation of the company.

4.3. Measures

Regardless of the approaches, the four dependent variables of the model are the four media used (telephone, fax, email, vmail). The unit of analysis is the interaction
or message. Thus we want to know which factors are significantly associated with the choice of each medium taken in turn.

4.3.1. Media choice and telecommunication use

Telecommunication use was measured by means of a diary method (Conrath, 1973; Claisse & Rowe, 1993), since declared behavior measures are lacking criterion validity (Corman & Bradford, 1993). For one day, participants were asked to codify a brief description of each telephone, fax, email and vmail communication just after each communication event. Thus most of the biases [memory, desirable behavior (Azjen, 1988)] due to declared behavior could be greatly reduced while obtaining a richer information than an automatically registered number of communications can provide. These biases are not inherent to self-reported measures and can also affect objective measures such as computer-recorded usage (Straub, Limayem & Kaharana-Evaristo, 1995), unless people are unaware that they are being recorded.

4.3.2. IRT based model

On the IRT based model (cf. left side of Fig. 1), we have measured the two following independent variables:

4.3.2.1. The main communication objective of the communication event

The description of which was interpretable by IRT. 12 different objectives were proposed. They were distributed into three categories:

- Low ambiguity (54% of the sent messages): “Being late, announcing a minor problem”, “Giving precise information, Informing someone”, “Searching or obtaining precise information”, “Cancelling, modifying or making an appointment”.
- Medium ambiguity (28% of the messages): “Suggesting solutions, making propositions”, “Unveiling an important problem”, “Getting news, getting to know someone”, “Discussing, exchanging information”, “Controlling or following a business activity”.
- High ambiguity (15%): “Encouraging, sanctioning”, “Solving a problem together, deciding together”, “Negotiating, persuading”.

The rest of the messages (3%) fell into the “others” category.

Since this is done immediately after a communication has taken place, errors due to cognitive limitations are reduced (Phillips, 1981). Overall response for this part was 94, 7%. Telephone calls account for three quarters of all telecommunications messages. This ratio is the same as that collected on automated exchanges showing that the structure by media of the communication events was correct and that there was little structural bias in the diary.

4.3.2.2. Structural characteristics

They included hierarchical level, span of control and number of days in the office. Hierarchical level is generally linked to media equipment, given its symbolic status. But, as for our sample, when everyone has the
same set of equipment, do superiors use their equipment more and which kind of media? Media which provide distribution lists can also be used according to the span of control of a superior. Finally for people who are frequently (numbers of days per week) out of the office, an asynchronous medium may offer more feedback than the telephone.

4.3.3. Cultural values

On the psycho-social theories based model (cf. right side of Fig. 1), we have one independent variable. Discussing the works of Fielder, Hofstede (1980) agreed that the problem of measuring individual preferences for organizational cultures, especially in a difficult economic context, is to determine what people think about sensitive issues. The risk of non-neutral behavior when responding to a questionnaire is then very high. Therefore, we asked each participant to describe his or her perception of his or her work-unit preference for organizational values. We interpret it as a proxy to the individual’s preference for organizational values for two reasons. Firstly we do not think that individual actors need to share intentions and visions to act collectively. All that is necessary is the cognition for mutual prediction of behavior (Weick, 1979). So collective values, even at the level of the work-unit, become transitory artefacts. Again, when we are speaking of cultural values, we are using “culture” as an indicator of the object of the values, but by no means do we claim that a culture exists. Secondly the participants, under the tough financial circumstances and the continuous layoffs, had little chance to discuss the cultural values with their colleagues and were not asked to do so. Rather the anonymity, the treatment of the data by an independent institution and the idea of the work-unit was rather a way to make the survey acceptable to them and to make them feel comfortable with it. Apart from this the method can be considered very similar to that of O’Reilly et al. (1991) for revealing the values of the individual. Each of the 7 dimensions of cultural values was measured by 4 items using a forced Q-sort method with balanced block design (Olson & Gravatt, 1968). This method requires participants to sort statements into a forced-normal distribution. Thus many of the problems associated with questionnaires (e.g. central tendency, leniency) can be avoided (Kendall & Kendall, 1993). The 28 “values” cards are shuffled and placed in an envelope (cf. Fig. 2). The participants were asked to divide the pack in two equal parts, one containing the most characteristic value of the culture of their work unit and the other the least characteristic value of the culture of their work unit. Each part was once more divided into two equal parts, again, on the basis of more and less relevant, thus producing four sets of seven cards each. The final stage was to select the three most relevant from the previous most relevant set and conversely the three least relevant from the previous least relevant set.

Many of the items where taken from O’Reilly et al. (1991) and were more detailed to help individuals make a realistic choice (cf. Fig. 3). The idea was to have two items a priori positively correlated to the dimension and two items negatively correlated. Three major analyses were done to test the validity of the measures. Firstly, following O’Reilly a principal components analysis on the space of the 28 items was performed. The correlations of each item with the first factor shows that the
<table>
<thead>
<tr>
<th>REACTIVITY</th>
<th>Action (1)</th>
<th>Speedy decision-making (2)</th>
<th>Reflecting (4)</th>
<th>Analyzing (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prefering action</td>
<td>acting quickly</td>
<td>Being quick to take advantage of an opportunity which presents itself.</td>
<td>Not leaping in without thought</td>
<td>Analyzing the situation before taking action</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENTREPRENEURSHIP</th>
<th>Risk (5)</th>
<th>Daring (6)</th>
<th>Caution (7)</th>
<th>Foresight (8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Willing to take risks</td>
<td>In order to succeed, you have to dare</td>
<td>Being careful and trying to minimize exposing to risk</td>
<td>Taking precautions to avoid unpleasant surprises</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INDIVIDUALISM</th>
<th>Compromise (15)</th>
<th>Social interaction (16)</th>
<th>Individualism (13)</th>
<th>Personal Objectives (14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeking a compromise in the interest of the group</td>
<td>Being sociable and fitting with the group</td>
<td>Insisting on your own personality rather than adapting to the group</td>
<td>Giving priority to personal goals</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FLEXIBILITY</th>
<th>Flexibility (9)</th>
<th>Simplicity (10)</th>
<th>Organizational framework (12)</th>
<th>Rules and Procedures (11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being able to adapt the procedures to the situation</td>
<td>Doing without ceremony and formality</td>
<td>A well thought out organizational framework ensures a good use of resources</td>
<td>Strictly respecting the rules and regulations avoids many problems</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INNOVATION</th>
<th>Innovation (17)</th>
<th>Change (18)</th>
<th>Continuity (20)</th>
<th>Stability (19)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Looking for progress and new ideas</td>
<td>Welcoming change favorably</td>
<td>Wishing to preserve what is as it has always worked</td>
<td>Wishing to avoid ruptures and changes which can disturb the work process</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TASK ORIENTATION</th>
<th>Accomplishment (25)</th>
<th>Recompenses (28)</th>
<th>Recognition (26)</th>
<th>Personal dignity (27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working hard and achieving set targets is an essential source of well-being</td>
<td>A financial reward is preferable to an increase in leisure time</td>
<td>Valuing the contributions and the qualities of each individual and never ignoring the human factor</td>
<td>Respecting the rights of the individual and their personal dignity</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POWER DISTANCE</th>
<th>Conflict (21)</th>
<th>Equality (22)</th>
<th>Subordination (23)</th>
<th>Differentials (24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not avoiding conflicts with superiors in the hierarchy</td>
<td>Everybody has the same rights without regard to their position</td>
<td>Conforming to the point of view of a superior in order to avoid conflict</td>
<td>Those who have more responsibility have the right to certain advantages</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 2. Set of cards describing cultural values (numbers in parentheses are used for Table 5).
structure of these correlations is excellent. Indeed we expect each item in a pair (either positively or negatively correlated to the cultural value) to be correlated with the same sign to the factor. However the correlations of “compromise” and “recompenses” are weak. Then we run the discriminant validity test of the multitrait-monomethod (Bagozzi, Yi & Phillips, 1991). The idea here is to check if the item is indeed correlated to the dimension (cf. Table 5 in the Appendix). In addition to “compromise” and “recompenses”, which are indeed not correlated to the dimension, “foresight” and “rules and procedures” are weakly correlated to their respective dimension. Therefore these four items were removed from the computation of the cultural values. The measure of each cultural value orientation was computed as follows. For the cards logically positively correlated to the value dimensions, we assigned (0;0.5;1;1.5;2;2.5) to envelope numbers (1;2;3;4;5;6) respectively. Conversely, for the cards logically negatively correlated to the value dimensions, we assigned (0;0.5;1;1.5;2;2.5) to envelope numbers (6;5;4;3;2;1) respectively.

Cronbach alpha measures were the third analysis performed for internal validity. Power distance and flexibility had to be excluded since their Cronbach alphas (Cronbach, 1951), were not acceptable (cf. Table 2 in the Appendix). Thus only hypotheses H1–H5 are tested. Cronbach-alpha values of the remaining dimensions varied from 0.47 (reactivity) to 0.74 (entrepreneurship), a level acceptable for
research (Hackman & Oldham, 1975; Peter, 1979). Indeed, the Cronbach-alpha coefficient is a purely syntactical criterion. In particular, in homogeneous populations, where systematic variance is small, this measure is artificially low, since the error rate due to subjectivity remains constant (Hofstede, 1980, pp. 22–23, 31–32). In addition, since the Q-sort method with balanced block design allows for the control of battery effects, some of the systematic error artificially increasing the reliability coefficients is eliminated (Struck, 1995). Finally, the correlation interscales between the five remaining dimensions are sometimes extremely low (reactivity with task-orientation and individualism), sometimes significant (reactivity with entrepreneurship and innovation; individualism and innovation) or even high (entrepreneurship and innovation) (cf. Table 3 in Appendix A), which confirms the results of O’Reilly et al. (1991). The correlation interscales show the expected signs. In conclusion, at this stage we could pursue the analysis with three dimensions only, but we thought it would be better to proceed with the first five in order to show the cultural values dimensions which were both acceptable from an internal validity viewpoint and had the strongest relationships with media use.

4.4. Statistical tool

Our testing strategy was to see if we could find some significant results with elementary statistics. We used the software SPAD.N (Lebart, Morineau & Warwick, 1984), which identifies and systematically sorts, among the variables included in the model, those (discrete or continuous) significantly related to a specific discrete variable (the media chosen). The test compares various proportions using on the one hand chi-square for discrete variables and on the other hand a statistic related to Student’s t for continuous variables. The computed statistics are converted into a probability level, allowing for a simultaneous sorting of both types of variables. Typically it can be used for answering a complex question such as “Is the proportion of communication which are characterized by some cultural value greater when these communications happen on the telephone than when they use a new media?” If the test is significant and positive, then one can say that the telephone is associated with that cultural value. Hence, in this paper the categories of the media choice variable are the four media and the variables that can “explain” these categories can either be a set of continuous variables such as the cultural values or the structural characteristics or even a discrete variable such as the telecommunication objectives.

5. Results and discussion

5.1. An analysis of the internally sent messages when the sender has access to all media

As corporations obviously need the telephone and the fax for external communication, we applied our model only to internal communications. Use is generally related to access (Carlson & Davis, 1998). Since we investigate the links between
use and cultural values, we had to control for access. In addition, the degree of internal telephone use depends on access differences inside the company (cf. Table 4, in Appendix A). Maintenance people have less access ($-16\%; p<0.0005$), while people further up the hierarchy, and those working at the headquarters are better equipped (both $+26\%; p<0.0005$). In addition, people that share their office have less privileged access to telecommunication services ($-18\%; p<0.0005$). The cultural traits innovation ($+10\%; p=0.008$), entrepreneurship ($+4\%; p=0.011$) and reactivity ($+4\%; p=0.011$) are related to better access. Another analysis of the data based on a total of 885 internal phone calls, showed that people who have access to email and vmail use the phone 60% less than people who don’t ($p<0.0005$). Those who have access to vmail only use the phone 76% less than people who don’t ($p<0.0005$).

Therefore, the final analysis (cf. Table 1) includes 799 internal communications of 145 individuals having access, not only to the telephone and to the fax, but to both email and vmail.

5.2. Results

Table 1 displays all the zero-order correlations linking the medium chosen (the dependent variable with four modalities: telephone ($n=574$), vmail ($n=137$), email ($n=53$) and fax ($n=35$)) to each significant characteristic of the three independent variables of this model (ambiguity of the objective, structural characteristics, cultural values). Correlation analysis was conducted separately for each of the four modalities of the medium chosen. The table indicates the probability $p$, ($p<0.05$), that we cannot reject a significant relationship. Relationships with $p>0.055$ are considered not significant and not shown in the table. Structural characteristics and cultural values are measured at the individual level ($n=145$) and are thus associated with each communication of the individual. Each entry is preceded by a + or a − sign to indicate either a positive or a negative correlation. For instance, telephone use is typical of people less (negative sign) oriented towards innovation ($p=0.008$); while vmail use is typical of people more (positive sign) oriented towards innovation ($p=0.026$).

5.3. Arguments consistent with IRT and the organizational design perspective

5.3.1. Communication objectives

By far the most frequent objectives are “get precise information” (21%), “transmit precise information” (20%) and “discuss/exchange information” (11%). For this reason, relationships concerning these objectives are of major interest.

The use of the telephone is especially associated with the objectives “get precise information” (0.000), “resolve problem/decide” (0.002), “discuss/exchange information” (0.006). “Transmit precise information” leads to the use of asynchronous written media (email and fax: 0.000). These results are consistent with IRT: more ambiguous and interactive objectives promote the use of the telephone which all studies rank higher in richness than vmail, email and fax (Rice, 1992; Zmud, Lind & Young, 1990). Moreover, according to IRT, in equivocal situations, vmail should be preferred over email, because it provides more cues, higher language variety and
Table 1
Determinants of media choice for internal communications (n=799)

<table>
<thead>
<tr>
<th>Media</th>
<th>Telephone (574)</th>
<th>Voice mail (137)</th>
<th>Electronic mail (53)</th>
<th>Fax (35)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication objectives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+Get inf.</td>
<td>(0.000)</td>
<td>−Get inf. (0.004)</td>
<td>−Get inf. (0.000)</td>
<td></td>
</tr>
<tr>
<td>−Transmit inf.</td>
<td>(0.000)</td>
<td></td>
<td>+Transmit inf. (0.000)</td>
<td></td>
</tr>
<tr>
<td>+Resolve/decide</td>
<td>(0.002)</td>
<td></td>
<td>−Resolve/decide (0.001)</td>
<td></td>
</tr>
<tr>
<td>+Discuss/exch. inf.</td>
<td>(0.006)</td>
<td>+Discuss/exch. inf. (0.010)</td>
<td>+Minor problem (0.058)</td>
<td></td>
</tr>
<tr>
<td>+Being late</td>
<td>(0.050)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+Minor problem</td>
<td>(0.058)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Structural characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>−Span of control</td>
<td>(0.034)</td>
<td></td>
<td>+Hierarchical level (0.022)</td>
<td></td>
</tr>
<tr>
<td>+Span of control</td>
<td>(0.000)</td>
<td></td>
<td>+Span of control (0.000)</td>
<td></td>
</tr>
<tr>
<td>−Days in office</td>
<td>(0.012)</td>
<td></td>
<td>−Days in office (0.012)</td>
<td></td>
</tr>
<tr>
<td><strong>Cultural values</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>−Innovation</td>
<td>(0.008)</td>
<td></td>
<td>+Innovation (0.026)</td>
<td></td>
</tr>
<tr>
<td>−Reactivity</td>
<td>(0.000)</td>
<td></td>
<td>+Reactivity (0.000)</td>
<td></td>
</tr>
<tr>
<td>−Entrepreneurship</td>
<td>(0.013)</td>
<td>+Entrepreneurship (0.054)</td>
<td>+Entrepreneurship (0.010)</td>
<td></td>
</tr>
<tr>
<td>+Entrepreneurship</td>
<td>(0.054)</td>
<td></td>
<td>+Entrepreneurship (0.010)</td>
<td></td>
</tr>
<tr>
<td>−Task orientation</td>
<td>(0.004)</td>
<td></td>
<td>−Task orientation (0.004)</td>
<td></td>
</tr>
<tr>
<td>+Task orientation</td>
<td>(0.006)</td>
<td></td>
<td>+Task orientation (0.006)</td>
<td></td>
</tr>
</tbody>
</table>
personalization. Previous research found it difficult to rank email versus voice mail (El-Shinnawy & Markus, 1992). But here, whereas vmail is more frequently used for the objective “resolve problem/decide” (no significant relationship with vmail against a negative correlation (−0.001) with email), the frequency is higher for “discuss/exchange information” (0.001) than that of email (no significant relationship). Besides one could argue that “being late” and “announcing a minor problem” are objectives that benefit from the emotion probably transmitted by the voice, but these relations are not highly significant. In addition when one is really late, the use of vmail is more secure than that of email. Overall, IRT is supported by our results, with a clear ranking of the media in terms of adaptation to content.

If the company had to decide between keeping vmail or email, this functional analysis would support keeping email for it is more adapted to transmit precise information. In the same way as fax, vmail is adapted to the motive “being late”, but is far less frequent than “transmitting information”. In addition this analysis suggests that if email were removed, fax traffic would increase and costs accordingly so, since fax uses the public network.

5.3.2. Structural characteristics

Conceptualized in an organizational design perspective, an application of IRT should take into account structural characteristics. The results reveal simultaneously the importance and the limits of IRT and of the organizational design perspective. In fact a low “number of days in the office” should lead to the preference of asynchronous media, but does not account for the preference of vmail (p=0.012) over email (non significant). The results indicate that a greater proportion of managers use vmail (higher hierarchical level p=0.022 and greater span of control (p<0.0005) more than other people. A similar result is not found for email. In fact they often delegate the use of email to their secretary. The use of vmail stems largely from time pressure. Therefore the conclusion of Markus (1994a) that email is “the medium of managerial choice” can be interpreted in two different ways. From an ontological viewpoint, a positivist would suggest that differences might be linked to her case study and that her finding very much depends on the structural situation of the company (availability of equipment and/or secretary, office hours). She even pretends in the beginning of her article to take this viewpoint when she shows very clearly that the attitudes in the company she surveyed were consistent as they are also in this case with IRT! Either the positive branch of IRT is not precise enough or a more psycho-sociological approach taking into account the diversity of values and not individual cognitions can explain these differences.

5.4. Arguments consistent with cultural values in a psycho-social approach to communication choices

Hypotheses 1 to 3 assert that cultural values favoring reactivity, innovation and entrepreneurship are less associated to the use of the telephone than to newer media. The first column of Table 1 strongly supports these propositions. Reactivity is the dimension of culture most significantly linked to telecommunication use. It is very
strongly and positively correlated with vmail (0.000) and opposed to the use of the telephone (−0.000). Vmail is used by people oriented towards the short-term more than it is by others. A similar relationship is found for innovation and entrepreneurship which are related to vmail (0.026 and respectively 0.054) and opposed to telephone use (−0.008 and respectively −0.013). Therefore, we can conclude that from a cultural analysis viewpoint the telephone and vmail are two very different socio-technical systems.

The linkages between these cultural dimensions and email do not appear, except for entrepreneurship (+0.01). Innovation and reactivity are not correlated to higher email use. This can be explained by the fact that the email system used in the company (Bulltex 90) is not considered user-friendly enough by many of the employees and that they have had insufficient training on it. Thus innovation and reactivity cannot be related to that particular system. The use of fax does not show any correlation on these three dimensions. It seems that accessibility does not have the same meaning for the fax and explains the absence of a link with reactivity. For innovation and entrepreneurship this simply shows that fax is not a new media anymore but cannot be considered equivalent to the telephone yet.

Individualism is not related to a particular service. Thus, H4 is not verified. This might be explained by our selection of people who had access to all services. In fact since they are equipped with all the possible means their choice depends more on the equipment of others of a particular service. The result could simply mean that the medium chosen does not depend here on a sentivity to others (Carlson & Davis, 1998).

Finally and very interestingly, the results obtained on task-orientation suggest that the use of the fax is seen as valuable by task-oriented people (0.006) whereas email is linked to a relational orientation (−0.004). In fact, once people are trained on email, like Finance or Administrative personnel, they can use it and like to personalize messages. This partially refutes the richness scale in the sense that emotions can be transmitted through a written media (Lee, 1994). This result also seems to confirm our theoretical justification of H5 that media use is linked to the way people value the amount of feedback in their work. Then the idea of oral channels always being richer than written seems to be questionable and implies that IRT should distinguish the respective importance of timing feedback and of amount of feedback in the selection process.

5.5. Prescriptive implications

There are two basic ways to align telecommunication uses to the strategy of the company. One is to influence directly the communication behavior of people by rules. The other is to provide the media that are most closely linked to the cultural values that the company wants to develop.

On the one hand, managers try to influence directly the behavior of others. The role of management and of management tools is to deal with the differentiation between departments and individuals (Lawrence & Lorsch, 1967), and to make a priori different interests converge into a consistent behavior. As telecommunication
media are concerned, one way to make behavior consistent with an IT management policy can be to influence subordinates by using oneself the appropriate medium for that policy. If the policy is to minimize costs, the influence might be to have the supervisor use email for communicating with his/her subordinates. Another strategy would be to inform them about the costs of their media uses.

But on the other hand social influence is not always under the control of an individual or a company. Colleagues and supervisors also exert an influence on use which is not particularly linked to a policy (Schmitz & Fulk, 1991). Because of the diversity of cultural values people can be difficult to manage and also influence media use. Organizations which take into account their cultural diversity might be performing better (Watson, Kumar & Michaelson, 1993). However when it comes to equipping people with telecommunications media, valuing diversity might be very costly. In fact externality effects both in use (Rholfs, 1974) and production, as well as universal equipment requirements by specific actors, often make the valuation of diversity risky. When the company is engaged in cost reduction measures and also wants to stimulate some cultural values, it may have to make a choice.

Knowing how cultural traits and media choices are related in an organization, and the extent to which telecommunication innovations can induce structural contradictions (Robey & Azevedo, 1994), a way to spread the cultural values associated with the strategy the company wants to develop, might be to provide the media associated with these cultural traits to everybody rather than to select them according to the fit with the individual values or to let the adjustment process be done by use. The media cannot easily be seen as an agent of change on some individuals or sub-cultures (id.). But even when top management introduces a new technology they unwittingly reinforce some values and transform others (ibid.). Companies want to choose or influence their organizational culture by promoting, or keeping in downsizing situations, communication media that are used by work-units and individuals with the cultural values they want. For instance a very common problem is to communicate effectively throughout different functions. Again, to the extent that media use can have an impact on culture, it might be possible to influence task-oriented work-units to change their value by promoting relation-oriented media such as email. In order to bring about structural contradictions in task-oriented units messages could be sent for a very important topic such as social benefits.

Here, in a case study of a French multinational firm facing a critical downsizing situation and considering cutting a telecommunication service, a cultural analysis can lead to a different decision than IRT. In case the company decided to eliminate one service, the task-requirement approach of IRT would lead to the removal of vmail. In fact vmail serves objectives which are in between those typically adapted to the telephone and those typically adapted for email (Sales personnel could keep an answering machine for clients). Alternatively the cultural analysis would result in the dropping of email, since the company develops a strategy based on reactivity and innovation, which are positively linked to vmail and not to email. After a meeting where we presented the results of this analysis to the head of Human Resources, to the Vice-President of Information Systems and to the Telecommunications Director,
the company could appreciate better the value of both services and decided to keep both systems.

Therefore telecommunication access or withdrawal decisions should not be simply based on a “rational” analysis using IRT in an organizational design perspective, but should also take into account opportunity costs resulting from telecommunication means unsuitable for socially defined needs as expressed by cultural values. Psychosocial theories of communication are not just different or more complicated explanatory theories of media choice; they can provide different normative answers.

5.6. Conclusions and future research

The outcome of this research supports theoretical and empirical relationships between cultural values and media use. Our general hypothesis that cultural values are linked to telecommunication use is much better supported here than in two other cases (Struck, 1995) where the planning of equipment is centralized. In fact in these former studies use was mainly related to structural characteristics, and especially to the hierarchical rank, which formed the basis of the allocation procedure.

In this case we have shown that media choice is associated with different cultural values. This is another explanation of why the ordering of media richness does not appear as stable in different organizations. In addition several hypotheses have important implications. The one on innovation implies that the value of a telecommunication service depends on the history of its diffusion relative to other media and that the new media are not the same everywhere and forever. H1 seems very natural, but surprisingly little research has been done on the relationships between reactivity, timing-feedback and the use of asynchronous media. It seems very important to pursue research in this area in order to help better understand what reactivity means and to investigate the cognitive links between action and thought. H5 confirms the argument that email can be viewed as a relational media, precisely for its property of a potentially high amount of feedback. Research on media selection should therefore take this finding into account.

We hope to have shown that IRT and a cultural approach on organizational communication have different merits for diagnosing the use of communication technologies. The basis of IRT concentrates on the content of the communication task, and on the situational constraints in its extended version (Trevino et al., 1987). This second version also extends the theory to the symbolic use of the media. Do we then need to call for another approach that takes into account the social context? Yes, simply because the context cannot be merely described by an attitudinal scale directly involving the media, but should indicate what is really important to the individual or to the group. In the case presented here we also selected, as did Markus (1994a), symbolic reasons for selecting media choice. It happened that, as for Markus (1994a) and Trevino et al. (1987), symbolic reasons were rated lower than content or situational reasons in terms of perceived media usefulness, despite the results presented here that cultural values play a role in media choice. However we see IRT and more explanatory psycho-social theories rather as complementary than substi-
tutes (Lee, 1994). In fact in this research process we have used IRT, in the context of different values orientation, to work out some propositions.

One of the interests of this research is also to consider the broad diversity of the telecommunication media of a firm and to provide a comparison not only between two media (vmail and email), but in the context of the other main telecommunication media and of its structural characteristics. Generally researchers perform comparisons on a more limited number of media that are functionally similar media, because it seems easier to infer functional properties of older media such as telephone and fax (Trevino & Webster, 1992). But in this case we see that we also have to know how older media relate to cultural values to infer the additional value of a media. In the case reported here intuition would have been very misleading since innovation, reactivity and entrepreneurship strongly oppose the use of the telephone and support that of vmail. Therefore field research should deal with these issues and develop a configurational approach based on structure, culture, media and strategy rather than a contingent approach reducing arbitrarily the number of variables on the media dimension.

The relationship between some cultural values and media use is now clearly established in one organization. It goes without saying that it would be important to replicate the study, probably in a less specific situation such as downsizing. Then it would be easier to directly apply the O’Reilly et al. (1991) method to test our propositions. On the other hand this methodology is interesting for surveying this kind of organization and numerous high-tech firms are in a downsizing process. However, many questions remain unanswered.

Firstly, we considered in the model that media use was the endogeneous variable. But, we still do not know the principal influence: does the cultural value reactivity motivate frequent vmail use or does the frequent use of vmail communicate the importance of reactivity? Then from a prescriptive viewpoint we imagined that new media could support a cultural change. Future research should also examine how new communication technology affects cultural values change and organizational performance (Robey & Azevedo, 1994).

Secondly, for researchers taking a different position on culture than here, it would be possible to investigate the linkages between subcultures and IT. This could be important because, if some values are shared among the group, introducing a new media as a change agent can be even more difficult than just trying to transform some values of individuals.

Thirdly, if we agree that organizations should diagnose the fit of a new or an existing technology to their social context (Poole & De Sanctis, 1991), the question of the most appropriate skills and tools for this purpose is quite open. In sensitive contexts such as the firm we surveyed a sociometric approach was inapplicable. In other situations it could be very effective for providing insights into the social context (Contractor & Eisenberg, 1990). But, in order to understand the social construction of communication technology (Fulk, 1993), approaches such as ethnography (Orlikowski & Yates, 1994) or measurement of other constructs (Zack & MacKenney, 1995) are an interesting alternative to auditing culture. We believe that this
practical question is very important for organizations who wish to take their social context into account before acquiring or getting rid of a communication technology.

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Appendix A. Tables 2–5

Table 2
Mean, standard deviation and Cronbach-alpha values of internal reliability for the culture measures

<table>
<thead>
<tr>
<th></th>
<th>Reactivity</th>
<th>Entrepreneurship</th>
<th>Flexibility</th>
<th>Individualism</th>
<th>Innovation</th>
<th>Task orientation</th>
<th>Power distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.89</td>
<td>5.98</td>
<td>5.68</td>
<td>3.18</td>
<td>6.31</td>
<td>4.08</td>
<td>5.77</td>
</tr>
<tr>
<td>(0…10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>1.54</td>
<td>1.99</td>
<td>1.74</td>
<td>2.07</td>
<td>1.79</td>
<td>1.86</td>
<td>1.47</td>
</tr>
<tr>
<td>Cronbach-alpha</td>
<td>0.47</td>
<td>0.74</td>
<td>0.43</td>
<td>0.62</td>
<td>0.64</td>
<td>0.48</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Table 3
Intercorrelation of the cultural dimensions

<table>
<thead>
<tr>
<th></th>
<th>Reactivity</th>
<th>Entrepreneurship</th>
<th>Individualism</th>
<th>Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactivity</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrepreneurship</td>
<td>0.39</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individualism</td>
<td>−0.01</td>
<td>−0.29</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>0.36</td>
<td>0.54</td>
<td>−0.38</td>
<td>1.00</td>
</tr>
<tr>
<td>Task orientation</td>
<td>−0.02</td>
<td>−0.24</td>
<td>0.42</td>
<td>−0.24</td>
</tr>
<tr>
<td>Access to telecommunication services</td>
<td>Administration</td>
<td>Finance</td>
<td>Marketing</td>
<td>Sales force</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>----------------</td>
<td>---------</td>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>Voice mail</td>
<td>64%</td>
<td>86%</td>
<td>90%</td>
<td>100%</td>
</tr>
<tr>
<td>Electronic mail</td>
<td>80%</td>
<td>89%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Fax</td>
<td>91%</td>
<td>95%</td>
<td>95%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table 5
Multitrait-monomethod (numbers in columns represent the items in Fig. 2)

|                  | 1   | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    | 20    | 21    | 22    | 23    | 24    | 25    | 26    | 27    | 28    |
|------------------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Reactivity       | 70  | 62    | +58   | +56   | 33    | 32    | -31   | -28   | 07    | -05   | -29   | -06   | -04   | -08   | -09   | -13   | 20    | 28    | -25   | -22   | 06    | 04    | -11   | 06    | 09    | 02    | -02   | 14    |
| Flexibility      | 06  | 11    | -01   | -06   | 11    | 04    | -04   | 04    | 54    | 70    | -38   | -58   | 06    | 06    | 03    | 02    | 05    | 02    | -10   | -05   | 14    | 02    | -06   | 03    | -16   | -10   | -11   | -11   |
| Innovation       | 41  | 42    | -06   | 09    | 43    | 47    | -44   | -26   | 26    | -06   | -34   | 05    | -37   | -34   | -12   | 12    | 64    | 68    | -72   | -73   | 13    | 02    | -39   | -12   | 02    | -15   | 13    | 37    |       |
| Task orientation | -03 | -21   | -01   | -21   | -12   | -17   | 31    | 15    | -14   | 10    | 27    | -08   | 41    | 36    | 07    | -14   | -32   | -15   | 08    | 15    | -09   | -34   | 49    | 17    | 58    | 08    | +73   | +76   |
References


Poole, M. S., & De Sanctis, G. (1991). Understanding the use of group decision support systems: the


