

Executives' use of information technology: comparison of electronic mail and an accounting information system

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The use of electronic mail and the non-use of an accounting information system (IS) by a group of executives at a major telecommunications company provided the opportunity of exploring the reasons why executives use information technology (IT). The paper draws on qualitative and quantitative research data to give a holistic and integrative explanation. This is based on the perceptions of executives and is interpreted through a wide range of prior research which incorporates media richness theory, social interaction theories and technology acceptance modelling. The case study draws particular attention to the concept of media style. Structuration theory is used to draw together the several factors which are to be found in the existing literature and in the case study. Individual action and structure interacted to create the changing conditions which typify the context for executive use of IT at the case study site. The structure comprises IT itself, task and social and technological factors.

Introduction

The importance of supporting the executive process is the subject of a substantial body of literature, most obviously in the area of executive information systems (IS), but also for the topics of communications media choice and group support systems. There is clearly a potential to transform the executive process through information technology (IT), but the barriers to success are substantial and a wide range of factors contribute to effectiveness in use. Amongst these factors, the importance of task has become axiomatic (Donabedian *et al.*, 1998; Hwang, 1998). A dominant task for executives is communications (Mintzberg, 1973, 1975). This includes both receiving and sending information. One theory, media richness theory, suggests that the nature of this task should lead executives to prefer face-to-face communication above technological solutions (Daft *et al.*, 1987). At a theoretical level, therefore, it appears that there is a paradox. IT has the potential to transform the executive process but the executive process itself may imply limited potential for the use of IT.

The present study explores this paradox in relation to the factors which impinge on executives' use of IT. The study places managerial perceptions at the heart of understanding the adoption of IT. Using the case study method, it is shown that executives made extensive use of IT in the form of electronic mail. In

contrast, an accounting IS was used relatively little. Understanding the reasons for the success of electronic mail and the relative failure of accounting IS provides the focus and purpose for the paper.

The next section outlines the literature which has a bearing on the findings of the case study. The research method is then explained. This is followed by the case study and an investigation into the choice of media for one of the executive activities – accountability. The final section of the paper assesses the limitations of the study and provides a conclusion.

Literature review

Executives' use of IT

Understanding the impact of IT requires an understanding of the process (Pinsonneault and Rivard, 1998). Mintzberg (1987, 1994) suggested that there are two views of the executive process. The first view is that executives deliberate carefully and use information to improve the quality of their planning, controlling and decision-making activities. IT provides decision support and thereby improves executives' mental models (Vandenbosch and Higgins, 1995) and reduces the time taken to make decisions (Leidner and Elam, 1993). Tools provide data analysis, vertical and horizontal 'drill down' and modelling capabilities (Rai

and Bajwa, 1997, p. 940). These provide access to internal and external sources of data, allowing executives to respond to specific situations within the changing environment (Rai and Bajwa, 1997, p. 963).

The second view is consistent with research findings over three decades which show that executives spend much of their time in face-to-face meetings and that their behaviour is typically 'frenetic, reactive and tactical' (Gamble and Gibson, 1999, p 218). Chief executives 'work at an unrelenting pace, . . . their activities are characterised by brevity, variety and discontinuity, . . . they are strongly oriented to action and dislike reflective activities' (Mintzberg, 1975, p 46). Executives' mental models and predispositions are highly influential (Ashmos and Duchon, 1998; Knight *et al.*, 1999) and their actions are therefore based on beliefs, knowledge, assumptions and values, which, in turn, are based on social influence (Chattopadhyay *et al.*, 1999). Executive IS can support the executive process through the opportunities it provides for collaboration (Rai and Bajwa, 1997), activities which lead to revised mental models and which sustain social influence. Group support systems facilitate collaboration through actions which generate ideas or resolve conflicting views (Hwang, 1998).

Whilst there is the potential to support either view of the executive process, executive IS have not been adopted by a significant majority (Rai and Bajwa, 1997; Vandenbosch and Huff, 1997) and non-technological alternatives such as face-to-face communications remain popular for collaborative activities. The remainder of the paper pursues the reasons for this.

Communications media choice

This section reviews the literature which seeks an answer to the question, 'why is one medium preferred to another?' It outlines media richness theory, social interaction theories, technology acceptance modelling and factors-based theories and addresses the question of whether task, social or individual considerations are paramount.

Media richness theory addresses the second view of the executive process outlined in the previous section and proposes that rational decision-makers match task and media characteristics. Tasks are classified according to their level of equivocality (Daft and Lengel, 1984, 1986; Donabedian *et al.*, 1998). Equivocal tasks cannot be modelled easily and cannot be resolved by accessing more information (Daft and Lengel, 1984, 1986). Equivocal tasks do not allow executives to ask the kinds of questions which IT might answer because the questions themselves are largely unknown. Equivocal tasks demand

interpretation, discussion and negotiation to provide a basis for agreeing a common frame of reference (Weick, 1979; Daft and Lengel, 1990).

Equivocal tasks demand a rich channel and face-to-face communication is preferred to electronic and written media (McLeod and Jones, 1987; Jones *et al.*, 1988–98). Electronic media filter out the cues which are provided by personal contact and so are generally considered to be low in richness. Richness describes the information carrying capacity and has been defined in terms of four criteria. Daft and Lengel (1990) listed these as feedback (which might, for instance, be immediate, fast or slow), channel (including visual, audio or limited visual such as videoconferencing), source (including personal and impersonal) and language (which is defined as body language, natural language and numeric). Face-to-face communication represents the highest level of richness because feedback is immediate, the channel is both visual and audio, the source is personal contact and language is both natural and embodied.

Although developed independently of media richness theory the preference for face-to-face communication is supported by social presence theory. This suggests that tasks such as negotiating and bargaining, which require a channel that is capable of conveying non-verbal and social-context cues, are best supported by media which are high in social presence, such as face-to-face meetings (Short *et al.*, 1976, King and Xia, 1997; Carlson and Davis, 1998).

Several shortcomings in media richness theory have nevertheless been established, particularly in relation to placing electronic mail on the richness scale. The first problem is that no procedure has been established for weighting richness criteria scores (Fulk and Boyd, 1991), so the ranking of electronic mail is problematic. As a consequence, past findings have lacked consistency (Schmitz and Fulk, 1991). Fulk and Ryu (1990) found that electronic mail was ranked lower than expected but a number of studies have shown frequent usage of electronic mail for theoretically inappropriate tasks; those with a high socioemotional content (Fulk and Boyd, 1991, p. 411). The second problem is that electronic mail offers richness criteria which are excluded from media richness theory, including (1) multiple addressability and computer-processable memory (Markus, 1994), (2) speed, accuracy and ease of use (Carlson and Davis, 1998), (3) personal experience (Fulk *et al.*, 1987), (4) the geographical dispersion of individuals within communication networks (Trevino *et al.*, 1987; Kettinger and Grover, 1997) (5) the importance of a critical mass of users (Markus, 1986, 1994); and (6) the impact of job pressure (Trevino *et al.*, 1987). Social context provides an important set of factors which shape behaviours and

attitudes (Salancik and Pfeffer, 1978) and yet are excluded from media richness theory. A number of organizational, sociological and personal factors are therefore at least as important as task considerations (Schmitz and Fulk, 1991).

Social interaction theories (Carlson and Davis, 1998) have therefore supplemented or replaced media richness theory in studies which explain media selection. These theories are based on symbolic interactionism (Mead, 1934) and share the premise that groups of individuals define tasks and media according to systems of shared meaning. One group of individuals may define the richness demands of a task or the richness characteristics of alternative media differently to another group. This explains why supervisors and co-workers are influential in shaping attitudes towards electronic media such as videoconferencing (Svenning, 1982; Schmitz, 1987) and why work groups have been shown to be important sources of influence (Fulk and Boyd, 1991; Schmitz and Fulk, 1991). It also explains why personal computer usage is encouraged by supportive relationships (Kling and Gerson, 1977).

Shared meanings may reside at the organizational level and may be related to a variety of factors. Pinsonneault and Rivard (1998) showed that IT usage differed amongst three companies in the banking, utility and telecommunications industries. Organizational type is significant. Based on the typology suggested by Burns and Stalker (1966), organic organizations revolve around face-to-face meetings whilst mechanistic organizations rely upon rules and regulations (Daft and Lengel, 1990, pp. 276–7). It is therefore mechanistic organizations which might most obviously develop experience in the use of IT through their familiarity with systems such as inventory control. Organizational structure is also important. Project and matrix forms of organization, for instance, encourage meetings (Daft and Lengel, 1986, p. 560). More specific factors are organization size, top management support and environmental uncertainty (Rai and Bajwa, 1997). Each of these broad factors can be broken down into a more detailed set. For instance, Rai and Bajwa (1997) analysed environmental uncertainty into 11 detailed constructs, including the rate of product obsolescence, customer buying habits and the nature of the competition. At this more detailed level, Fitzgerald and Murphy (1994) found that the activities of IS departments were significant to the development of executive IS, whilst competitor pressures and internal politics promoted the support of executives for such developments.

Social interaction theories include a number of demographic variables in their analysis, including, for instance, age and gender (Fulk, 1993). This directs attention to the role of the individual. A basis for

individual-level choice is to be found in theories that individuals act to construct positive images of themselves (Dutton and Dukeridge, 1991; Tetlock, 1992; Brown, 1997). This possibility is implicit in the argument that face-to-face communication conveys trust or that the use of formal reports communicates a professional image (Trevino *et al.*, 1987). Executives may thus pursue a particular media style (Rice and Case, 1983) as a means of constructing their identity or image in the eyes of others. Stressing the importance of personal disposition and voluntarism may help to balance the situational determinism which is inherent in theories such as media richness and social interaction (Staw *et al.*, 1986).

Individuals may thus be assumed to be relatively free to act, irrespective of organizational norms (Ngwenyama and Lee, 1997, p. 152). More importantly, individuals are free to judge the validity claims of any communications which they receive and are capable of emancipating themselves from distorted communications. This perspective accords a degree of potential richness to electronic mail communications which is missed by media richness and social interaction theories. Ngwenyama and Lee (1997) used Habermas' (1984, 1987) theory of communicative action to illustrate the richness which is evident in a superficially banal series of electronic mail messages. What matters is not so much the richness of the communication channel but the propensity of individuals to construct richness based on communication content.

The danger of arguments based on media style or Habermas' (1984, 1987) theory of communicative action is that important task and social interaction influences may be overlooked. An alternative is to determine the situations where an individual's volition can be important. Managers may have the freedom to act on personal preferences when external constraints are low (Trevino *et al.*, 1990). External constraints include message content, particularly the level of equivocality and message context, including geographical distance, critical mass and job pressures. Trevino *et al.* (1990) showed that personality differences, as measured by the Myers Brigg-type indicator, were evident in tasks with low equivocality but not tasks with high equivocality. However, in contrast, Russ *et al.* (1990) found no explanatory power for the personality constructs of introversion and extroversion.

Technology acceptance modelling (Davis, 1986, 1993) is an adaptation of the theory of reasoned action and combines a range of personal, social and technological factors whilst remaining a predominantly individual-level theory. It proposes that users' experience and perceptions explain the adoption of technology. Personal experience of using media influences judgements about the fit between media and task (King

and Xia, 1997). User perceptions include perceived ease of use of the technology, the relative advantage which might be gained by the user from adopting the technology and the impact on the image of the user (Moore and Benbasat, 1991). The published evidence suggests close fits between theory and data using LISREL modelling. The topics of investigation include both the general field of IT (Agarwal and Prasad, 1997; Jackson *et al.*, 1997; Al-Gahtani and King, 1999) and communications media choice specifically (Gefen and Straub, 1997; King and Xia, 1997).

Structuration theory and the integration of factors which impact on executives' use of IT

The previous section discussed the theories which have been implicated in executives' use of IT. This section presents an analysis of the factors which have appeared in that literature and summarizes the analysis in Table 1. Table 1 groups the factors under four headings: IT characteristics, task, social and organizational factors, and personal characteristics. Each heading is followed by a list of factors which have been investigated by studies which have been published in the last 3 years. This grouping provides a convenient level at which to integrate the factors based on structuration theory.

Structuration theory (Giddens, 1984) shows that structures enable or constrain particular kinds of individual action and also result from the actions of individuals. Structuration theory implies that the use of technology is defined not only through its inherent functionality, but also through the ways in which individuals act (Poole and DeSanctis, 1990; Fulk and Boyd, 1991; Orlikowski, 1992). Technology is designed and then used by human beings subject to the capabilities and limitations of the technology, as defined both by the technology itself and also the human beings who make sense of the features which are offered (Griffith, 1999). This can be seen through the example of the telephone. The intention of its inventor was that it should be used to broadcast music. However, social and individual practices defined its functionality over time, discouraging actions which were subsequently accepted as 'unrealistic' (Harris, 1980). Telephony thereby realized its potential as a technology which enables two-way communication (Markus, 1994, p. 509).

Through the analysis of structuration theory, task considerations, technological characteristics and organizational and social factors are appropriated under the single heading of 'structure'. These factors share the characteristic that they are independent of the actions of any single human actor (King and McAulay, 1997). The actions of the human actor are related to the characteristics which are familiar through the concept of

media style, technology acceptance modelling or the emancipated agents of Ngwenyama and Lee's (1997) analysis. This allows the development of the diagram which is shown as Figure 1. This links Table 1 and structuration theory by showing the relationship between the four headings developed in the previous section. Figure 1 shows that structuration theory is a reflexive cycle in which individual action and structure are interdependent.

DeSanctis and Poole (1994) observed that structuration theory provides an integrative perspective. The value of the research which is reported next is to illustrate the way in which this integration works in practice. The research shows that a number of factors, which are largely familiar to the existing literature, are relevant to the perceptions of executives at the case study site. A number of structural factors are shown to interact, influence and be influenced by individual action.

Method

The previous section provides a framework for interpreting the findings of the research. This used the multiple sources of data which distinguish case study research (Yin, 1994). The sources of evidence include 40 interviews, comprising two series of 20 interviews separated by 10 months and each averaging 75 min in duration (range 30 min to 3 h), informal discussions, observations, the use of documentary material and a questionnaire. The interviewees are listed in Table 2 and covered a variety of departments, management levels and ages. The case study motivation was exploratory (Scapens, 1990, p. 447). The case study company, which will be referred to as Telco to maintain confidentiality, is a potentially valuable site because it is amongst the leaders in its industry and is highly dependent upon IT for its product development.

The case study research raised a number of questions about individuals and their attitudes to media usage and a particular task – accountability. Discussions with senior managers suggested a questionnaire as the most suitable way of pursuing these questions and this approach therefore constituted the final stage in the case study work. The questionnaire was piloted with 26 managers and the questionnaire completion time was approximately 15 min, with a range of 5–25 min. Negotiations with the company established this completion time as reasonable but access to managers was restricted because of resource implications, so the questionnaire was sent to 212 managers, representing the executive process in three out of five strategic business units. One hundred and forty-nine usable

Table 1 Variables assessed by recent communications media choice and executive IS literature

Variables	Reference
IT characteristics	
Design features	Griffith (1999)
Availability and access	Kettinger and Grover (1997) and Carlson and Davis (1998)
Ease of use	Kettinger and Grover (1997) Carlson and Davis (1998)
Economy	Kettinger and Grover (1997)
Trialability	Agarwal and Prasad (1997)
Configuration	Kettinger and Grover (1997)
Systems differentiation, integration and flexibility	Vandenbosch and Huff (1997)
Ability to overcome geographic barriers	Kettinger and Grover (1997)
Ability to overcome time barriers	Kettinger and Grover (1997)
Symbolic cues	Carlson and Davis (1998)
Feedback immediacy	Kettinger and Grover (1997) and Carlson and Davis (1998)
Media richness	Kettinger and Grover (1997) and Carlson and Davis (1998)
Ability to convey social presence	Kettinger and Grover (1997)
Information quality	Kettinger and Grover (1997)
Task	
Structure	Kraut <i>et al.</i> (1998)
Complexity	Kettinger and Grover (1997)
Analysability	Kettinger and Grover (1997); Donabedian <i>et al.</i> (1998) and Kraut <i>et al.</i> (1998)
Predictability	Kettinger and Grover (1997)
Interdependence	Kettinger and Grover (1997)
Variety	Donabedian <i>et al.</i> (1998)
Uncertainty	Kettinger and Grover (1997)
Equivocality	Carlson and Davis (1998)
Nature: information exchange, decision making, negotiating, idea generation and resource allocation	King and Xia (1997) and Kraut <i>et al.</i> (1998)
Nature: formal or informal (task, social or broadcast usage of electronic mail)	Kettinger and Grover (1997)
Socioemotional content	King and Xia (1997), Carlson and Davis (1998) and Sarbaugh-Thompson and Feldman (1998)
Social and organizational factors	
Environmental uncertainty	Rai and Bajwa (1997) and Vandebosch and Huff (1997)
Job pressure	Carlson and Davis (1998)
Organization size	Rai and Bajwa (1997)
Scope (number of people involved in the communication)	Kettinger and Grover (1997)
Geographic dispersion	Kettinger and Grover (1997) and Carlson and Davis (1998)
Top management support	Rai and Bajwa (1997)
IS support	Rai and Bajwa (1997)
IS department size	Rai and Bajwa (1997)
Working relationships	Carlson and Davis (1998)
Work group integration	Kraut <i>et al.</i> (1998)
Personal characteristics	
Age	Kettinger and Grover (1997) and Kraut <i>et al.</i> (1998)
Gender	Gefen and Straub (1997) and Kraut <i>et al.</i> (1998)
Education	Kettinger and Grover (1997)
Media experience	Kettinger and Grover (1997), King and Xia (1997) and Carlson and Davis (1998)
Organizational level	Carlson and Davis 1998; Kraut <i>et al.</i> 1998; Donabedian <i>et al.</i> (1998)
Functional background	Donabedian <i>et al.</i> (1998)
Innovativeness	Vandenbosch and Huff (1997)
Perception that IT usage will improve performance	Agarwal and Prasad (1997)
Perceived usefulness of IT	Kettinger and Grover (1997)
Values, needs and experience	Agarwal and Prasad (1997)
Tolerance of ambiguity	Vandenbosch and Huff (1997)
Personal image and identity	Agarwal and Prasad (1997)
Self versus other orientation	Carlson and Davis (1998)

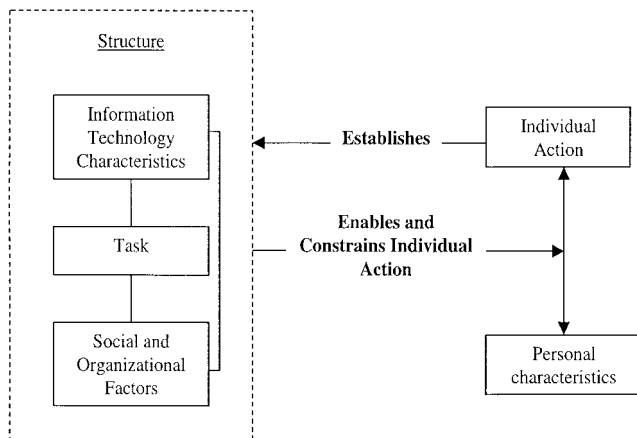


Figure 1 Structuration theory and the variables assessed by recent communications media choice and executive literature

questionnaires were completed, giving a usable response rate of 70.3%. No indication of response bias was found using a χ^2 test on the number of returns from strategic business units.

All questions were motivated by the prior case study findings. The questionnaire was grouped into five sections. The first section asked questions about age, level in the management hierarchy and appointment details. The second section asked 15 questions about accountability. These questions included issues such as whether subordinates should comply with established objectives or take personal initiative when circumstances demanded and whether long-term

effectiveness was more important than short-term achievements. The third section asked managers to rate the importance attached to different media. The rating used a five-point Likert scale where 1 represented 'of no importance' and 5 represented 'very important'. The fourth section asked 15 questions related to job pressures using the instrument developed by Kahn *et al.* (1964). The final section comprised three questions which asked managers to consider their performance. The responses were treated confidentially but questionnaires were coded and later analysis was able to investigate further questions raised by the literature.

Case study

The case study is presented in four sections. The wider context and Telco's system of accountabilities is explained first. This is followed by an explanation of the difficulties which prevented accounting IS from playing their full part in accountability and the final two sections investigate the success of electronic mail.

Context

Telco is based in the UK and is a subsidiary of a multinational company which operates in the telecommunications industry. Sales are approximately £1.7 billion and profits are in the region of £300 million. Twelve thousand people were employed in the early and mid-1990s. Competition and demands from the parent company for sustained profit performance led

Table 2 Descriptive details of interviewees

Interviewee	Job title	Level	Age (years)	Sex
1	Service processes manager	3	35	M
2	Strategic development manager	3	37	M
3	Automation manager	3	45	M
4	Network capacity planning manager	2	42	M
5	Chief operating officer, senior management team	1	49	M
6	Customer services manager	2	46	M
7	IS operations manager	3	36	M
8	Development manager	4	31	F
9	Innovative services manager	3	33	M
10	Customer services director	1	53	M
11	Programme manager for IS operations	3	47	M
12	Principle planner	3	34	M
13	Software engineering manager	3	43	M
14	Controller: financial planning and analysis	3	43	M
15	Engineering director	2	48	M
16	Customer marketing manager	2	40	M
17	National customer director	2	43	M
18	Customer director	2	44	M
19	Software engineering manager	3	29	M
20	Market manager	3	35	M

to a reduction in the number of employees to 10 000. The managers which are the subject of this paper and who comprised the executive numbered 450 after the downsizing exercise. The reduction of 100 in their numbers was accommodated by voluntary changes in employment, including the impact of head hunting. The managers were highly employable, with remuneration packages for the executive including a minimum salary of £40 000 and a company car. Competitive pressures, incessant demands for change and the impact on morale of redundancy ensured that the executive role was subject to considerable job pressure.

The environment within which Telco operated was uncertain and change was the norm. Changes in regulation, competition and technology led to the introduction of a cultural change programme and encouraged the achievement of financial targets. The cultural change programme directed attention towards empowerment and the issues of mutual cooperation, continual improvement and entrepreneurial behaviour. The programme was supported by consultants and an internal management group, which was known as the 225 group; this represented the number of seats in the largest room available to the group. A series of activities resulted, including the redefinition of mission statements, internal magazine articles, strategy meetings, award ceremonies, 'fun' days and 'roadshows'.

The uncertain nature of the business context necessitated the continuous communication of strategic priorities. Electronic mail was chosen by the chief executive to do this on a weekly basis. At one stage, the chief executive decided to discontinue its use to ameliorate personal time pressures. The managers lobbied for its reinstatement and the chief executive acceded to their requests. Many managers considered the electronic mail communication from the chief executive officer to be a useful source of information because it enabled them to relate their activities to the overall picture of corporate strategy and events.

Activities were undertaken both within and across functional boundaries. Functional areas were responsible for routine and project work for existing products and services. This kind of activity might be undertaken in project teams or through individual responsibilities. Project work on existing products also involved cross-functional teamwork and these teams were necessary for the development of new initiatives, products and services. A major forum for progressing projects was meetings, even when a project team was dispersed amongst geographically spread locations. During meetings, the managers would normally discuss progress and determine which issues required attention. Time scales would be formalized and

personal responsibility for delivering action would be agreed.

Executive responsibilities were discharged by managers working at four levels, where level 1 managers were directors who were accountable to the chief executive officer and level 4 managers were responsible for the work of supervisors who in turn managed the 'engineers'. Managers were accountable to their superiors for performance and formal performance appraisal meetings were conducted at least once per annum.

Management by objectives provided the focus for the discharge of responsibility. A manager at a higher level would make his or her objectives for the forthcoming period known, which could be 3–6 months in duration. Each of the manager's subordinates would then develop their set of objectives. Objectives were known as accountabilities. For example, if a level 1 manager's accountability was to reduce service installation time, a subordinate manager's accountabilities would include elements such as reducing lead times between ordering and installation or improving the availability of the products which supported the service. The managers were also encouraged to develop accountabilities which contributed towards corporate strategy but which fell outside their immediate superior's concern. Measures of performance were developed on the basis of agreed accountabilities. These were known internally as either key performance indicators or milestones. Key performance indicators related to routine responsibilities and milestones related to project work and to the attainment of time targets. The actual results were compared against targets and were reported in departmental performance reports. Costs were monitored against budgeted targets and were reported as financial information. The accounting IS underpinned the financial information and managers were able to use the computerized system to query the figures reported. In practice, however, the managers referred queries to accountants, who were invited to most management meetings.

Table 3 lists the full range of media which were used in Telco and shows the interview responses to the question of which media were most important to the system of accountabilities. Four points are important. The first point is that only six managers mentioned the departmental performance reports and only three suggested that financial reports were important. The second point is the importance of face-to-face dialogue, electronic mail and meetings. The third point is the possibility of individuals making choices which differed from the norm. The final point is that all of the managers used a combination of media. These points raise a number of questions which will be discussed in the succeeding sections.

Table 3 Importance of different media for accountability – interview results

Media	Interviewee number																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Face-to-face dialogue	✓	✓	✓	✓		✓		✓		✓		✓	✓							✓
Performance appraisal meetings	✓		✓	✓		✓	✓	✓			✓	✓			✓			✓	✓	✓
Management meetings with subordinates	✓		✓	✓		✓	✓	✓			✓	✓			✓			✓	✓	✓
Departmental and project meetings	✓		✓	✓		✓	✓	✓			✓	✓			✓			✓	✓	✓
Social events			✓																	
Telephone		✓														✓	✓			
Electronic mail		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
Minutes of meetings																				
Departmental performance reports	✓		✓		✓										✓			✓		✓
Financial information															✓			✓		✓

Accountability and the accounting IS

Accountability is concerned with 'giving and demanding reasons for conduct' (Roberts and Scapens, 1985, p. 447). Financial systems are important for hierarchical forms of accountability (Roberts, 1991), in which higher levels within the organization use information such as profit and loss outcomes as evidence of the conduct of subordinates. Profit calculations depend upon the aggregation of data about detailed transactions which have been successfully computerized through accounting IS (Wilson and Sangster, 1992). Accountability to shareholders is an important part of corporate governance for organizations, such as Telco's parent company and is discharged through annual financial reporting. Telco was accountable to its parent company and profit was monitored on a monthly basis through Telco's accounting IS, which compared the results with budgets. Strong alignment between accountability within Telco and between Telco and its parent company should have led to a heavy reliance on the accounting IS as a medium for accountability.

A number of factors reduced the effectiveness of the system as an internal monitor of executive conduct. The first factor was that the accounting IS was designed to meet the needs of external stakeholders. The system was required to produce information which met the needs of the parent company and the UK Regulator. Systems which meet the needs of external stakeholders for aggregated data are not always successful in meeting internal needs for detailed data (Johnson and Kaplan, 1987). The second factor was initiated through the cultural change programme. The accounting IS was designed to report on functional lines and did not possess the flexibility to respond to the activities of empowered managers. A

manager's salary, for instance, was charged to the manager's functional department and no attempt was made to analyse the salary into the multiple and inter-departmental accountabilities which became central to the strategy which was enshrined in the cultural change programme. Where project work was previously relatively easy to account for, because it remained within the responsibility of a single department, the accounting IS was unable to adapt to be able to monitor mutual and interdependent project responsibilities and empowered management teams. The following statement from the automation manager illustrates the practice of accountability and emphasizes this mutual dependency.

The fact that we are all reliant on others for the completion of our tasks means that no hard and fast rules can be rigidly applied. The whole system [of accountability] is ill-defined and subjective. It is the little snippets of information, along with the more formal budgets, which helps one to build up a profile of how you are rated and how you would evaluate the performance of others.

The accounting procedures could not track the activities of managers who were encouraged to act strategically, as explained by an information systems operations manager:

Spending as the budget dictates would not allow you to alter policies and strategies as circumstances dictate. I just cannot envisage a situation where financial budgets are able to keep pace with the rapid change which is occurring at the moment in this industry. Sticking to budget would be too much of a constraint.

Telco's rate of change and its emphasis on empowered and interdependent managers therefore limited

the ability of the accounting IS to play a major part in accountability. The accounting department was aware of this and was working towards changing the system. This provided a major challenge and had implications for the IS department and the information needs of external stakeholders.

Electronic mail

In contrast to the accounting IS, a number of factors explained the success of electronic mail. The use of electronic mail by the chief executive officer for communicating strategy was likely to reinforce its use (Markus, 1994; Rai and Bajwa, 1997). Electronic mail provided an effective means of dealing with cross-functional project activities because of its multiple addressability. It shared the advantage with written memoranda of providing a permanent record which could be retained for some time to remind others of commitments. It performed more effectively than written memoranda in terms of speed. The managers would respond instantly to electronic mail and interactions could be spontaneous. This point was expressed by a planning manager who associated electronic mail with speed, informality and spontaneity relative to memoranda.

Internally, there is little in the way of formal memos: the company lives and dies by very rapid, informal, turnaround electronic mails; very fast moving and free-flowing, but also very informal and unstructured. I feel it is often easier to communicate rather than think and then communicate; a slower form of communication such as a memo needs serious thinking prior to sending the message.

Finally, electronic mail was used in combination with other media. An example is provided by a software engineering manager.

Nowadays, most of the stimuli or interrupts which go on during the working day happen because of electronic mail. I have had one today which says, 'We need to say whether to respond to a bid or not. This will have dramatic effects on the network. Please let me know if you can commit to be able to do this by close of day today'. Now, in the sixties and seventies, you would normally have had a crisis taskforce meeting, where everybody would pile into a room. You would chew over the fat for three and a half hours. What happens now is you get that sort of request on the electronic mail with an urgent sticker. Everybody works independently and then probably coordinates using electronic mail. Then there is a quick half hour meeting on it at the end of the day.

Electronic mail and accountability

As suggested by the earlier quotation from the automation manager, accountability was an equivocal task at Telco because there were 'no hard and fast rules'. Accountability depended on the 'little snippets of information' which, taken together, constructed a 'profile' of an individual's conduct as part of a team. Therefore, face-to-face interactions were likely to play a decisive role in accountability and this was precisely the finding reflected in the interviewees' preference for face-to-face dialogues and meetings, which is shown in Table 3. This is confirmed by the questionnaire findings, as shown in Table 4. Table 4 shows the ratings given by the respondents for the different forms of media which were used in accountability. It shows that media which are high in richness scored most highly, irrespective of whether expectations were being conveyed or performance was being measured; these are separated in Table 4 because sending and receiving communications might be associated with different kinds of preference (Daft and Lengel, 1990). Electronic mail rated less highly than the telephone, but more highly than media which do not facilitate rapid feedback, such as financial information and written memoranda. Accounting information was rated low, as predicted by media richness theory.

Table 3 shows that some individuals' preferences did not conform to the norm and Lengel and Daft (1988) predicted that only effective executives would match task and media richness. They divided managers into two groups according to their sensitivity to media usage. Low sensitivity managers were shown to be low performing managers. The responses from Telco's executives were therefore sorted into high and low sensitivity groups, where individuals in the high sensitivity group ranked media in accordance with Trevino *et al.* (1990). They rated face-to-face media higher than technological solutions, which in turn were ranked higher than impersonal media such as accounting IS. The results are summarized in Table 5. This shows that the group which displayed high sensitivity rated electronic mail behind the telephone, as predicted by media richness theory. In contrast, the low sensitivity group rated electronic mail second only to face-to-face dialogue. This higher than expected ranking requires further investigation.

It is possible that Telco's 'low sensitivity' group is genuinely less effective than the 'high sensitivity' group. Lengel and Daft's (1988) study benefited from the availability of an independently verified measure of executive performance, but this level of objectivity has not been available to other studies or to the study of Telco. Other studies have argued that high performing executives tend to be promoted and Rice and Shook's (1990) meta-analysis of 40 studies showed that higher

Table 4 Mean scores for importance attached to media

	Mean	Standard deviation
Conveying Expectations		
Face-to-face dialogues	4.68	0.75
Performance appraisal meetings	4.09	0.94
Management meetings with subordinate	3.78	1.06
Departmental and project meetings	3.72	1.11
Informal gatherings	3.47	1.06
Telephone	3.77	0.87
Electronic mail	3.70	0.94
Written memorandum	2.67	0.98
Performance measurement		
Face-to-face dialogues	4.17	0.95
Performance appraisal meetings	3.79	0.99
Management meetings with subordinate	3.51	1.03
Informal gatherings	3.38	1.06
Telephone	3.42	1.01
Electronic mail	2.98	0.96
Minutes of management meetings	2.87	1.06
Departmental performance reports	3.11	1.16
Financial information	2.71	1.07
Written memorandum	1.97	0.74

Table 5 Responses of high and low sensitivity groups to the importance of media

	High sensitivity group <i>n</i> = 80	Low sensitivity group <i>n</i> = 69	ANOVA for groups <i>p</i> value
Conveying Expectations			
Face-to-face dialogues	4.91	4.42	0.000
Performance appraisal meetings	4.29	3.86	0.005
Management meetings with subordinate	4.05	3.46	0.001
Departmental and project meetings	3.90	3.51	0.031
Informal gatherings	3.69	3.22	0.006
Telephone	3.68	3.88	0.145
Electronic mail	3.53	3.90	0.015
Written memorandum	2.44	2.94	0.002
Performance measurement			
Face-to-face dialogues	4.27	4.06	0.165
Performance appraisal meetings	3.89	3.68	0.205
Management meetings with subordinate	3.51	3.51	0.975
Informal gatherings	3.54	3.20	0.054
Telephone	3.35	3.49	0.390
Electronic mail	2.81	3.17	0.022
Minutes of management meetings	2.74	3.03	0.095
Departmental performance reports	2.85	3.42	0.002
Financial information	2.46	3.00	0.002
Written memorandum	1.99	1.96	0.801

level managers use face-to-face communication more frequently than lower level managers, who tend to use the telephone and written media. This expectation was not confirmed at Telco. The χ^2 test revealed no statistical relationship between management level and high or low sensitivity. Additional exploratory measures of managerial performance were used. Since the cultural change programme placed a significant emphasis on

personal responsibility, the questionnaire asked the executives to rate their own performance in absolute terms and relative to other managers. In addition, since the 225 group included respected members of the executive, it might have been expected that high-performing managers would be invited to form its membership. Neither self-reported performance nor membership of the 225 group proved to be predictors

of high or low sensitivity to media richness. The limitations of these approaches to assessing executive effectiveness do not allow a categorical dismissal of media richness theory, but does allow the tentative conclusion to be drawn that some executives at Telco were able to select theoretically suboptimal media without showing obvious lack of effectiveness.

Since structuration theory suggests that individuals can define the functionality of technology through their actions, the first justification for the existence of the low sensitivity group is that individuals in this group accorded electronic mail a high richness rating consistent with the particular ways in which they used electronic mail. Social interaction theory would then suggest that group norms would influence the use of IT.

Group norms might become established at an organizational or work group level. Telco is an organic company, where tasks need to be continually redefined and renegotiated by empowered managers who, in the words of the IS operations manager, were 'encouraged to think strategically' and to refine strategy through action. As a consequence, it adopted a matrix structure to deal with the competing demands of project work and hierarchical accountability. A preference for face-to-face communications might therefore be expected and appeared to be the norm. However, this does not explain the differences in the ranking of electronic mail between the high and low sensitivity groups. The executives at Telco formed groups of co-workers who were responsible to an individual superior. These groups varied in number from two to nine managers. The results from the questionnaire suggest a limited socializing effect at the level of these work groups, as predicted by Fulk and Boyd (1991) and Schmitz and Fulk (1991). This socializing effect is indicated for two media: performance appraisal meetings for the assessment of performance ($F = 1.74$ and $p < 0.05$) and minutes of management meetings ($F = 2.01$ and $p < 0.05$). However, neither electronic mail nor accounting IS were differentiated by the analysis of variance at the work group level. The fluid nature of project work at Telco makes it difficult to capture social interaction effects fully, but the conclusion is that neither organizational norms nor the socializing effect of work groups entirely explain the preferences for the use of IT.

The media style concept and technology acceptance modelling indicate that individuals choose to use IT because they wish to convey to others an image and identity founded in technology. This identity might be particularly important within Telco, which owed much of its commercial success to technology. The possibility that some individuals might show an active preference for electronic mail was investigated by means of cluster analysis. This range of methods

groups individuals according to the similarity of their responses. The analysis followed Punj and Stewart (1983) and, to ensure the reliability of the outcome, a combination of two different cluster methods was used. The Wards and *K*-means methods of cluster analysis were in agreement for the classification of 91.3% of individuals in the four clusters solution, which is presented in Table 6. Brackets have been used in the table to aid interpretation of the clusters and means are provided to show the differences between groups. Written memorandums are not included in the brackets because the groups were not statistically differentiated in their responses.

For setting accountability expectations, it can be seen that clusters A and B gave higher ratings to media which depend upon interpersonal interactions than did clusters C and D. In contrast, clusters C and D gave higher ratings for the technological solutions represented by the telephone and electronic mail. For receiving information about the performance of managers, clusters A and D show a stronger preference than B and C for all media. The relatively passive approach of groups B and C to receiving information about subordinates' performance is explained by the view that formal systems of accountability fail to measure managers' performance because, in the words of the earlier quotation, 'no hard and fast rules can be rigidly applied'. Figure 2 illustrates the relationships between the groups in a matrix form. The identity of each cluster is defined according to two dimensions: the interpersonal or technological orientation of individuals in setting expectations and the active or passive preferences for receiving information about performance.

Groups C and D reveal different kinds of support for the executive use of IT. Group C is the group which constructs an identity on the basis of technology. Group C ranks the telephone and electronic mail as the most important means for conveying information. Group D scores face-to-face dialogue less highly than groups A and B, but face-to-face dialogue remains the most important medium for this group. Group D appears to be a sociotechnical group (Trist and Bamforth, 1951); it respects the use of technology but also expects social interactions to be important. This pattern is not repeated for receiving information, which largely conforms to media richness theory predictions.

Table 7 shows the small number of dimensions which were differentiated across clusters. The technology group, group C, experienced lower levels of concern than the other groups about the volume of work and its impact on the quality of work. It is possible that the productivity benefits of electronic mail allow the technology group to experience lower levels of job pressure arising from volumes of work, in

Table 6 Media ratings analysed by cluster membership

	Cluster A (n = 59)	Cluster B (n = 38)	Cluster C (n = 21)	Cluster D (n = 31)	ANOVA p value
Conveying expectations					
Face-to-face dialogues	[4.96]	[4.89]	3.74	4.62	0.000
Performance appraisal meetings	4.48	4.37	3.17	3.72	0.000
Management meetings with subordinate	4.25	4.13	2.74	3.28	0.000
Departmental and project meetings	4.21	4.08	2.43	3.34	0.000
Informal gatherings	[3.95]	[3.76]	2.78	2.78	0.000
Telephone	3.38	3.87	[4.43]	[3.87]	0.000
Electronic mail	3.20	3.82	[4.22]	[4.06]	0.000
Written memorandum	2.39	2.79	3.09	2.72	0.025
Performance measurement					
Face-to-face dialogues	[4.43]	3.47	4.00	[4.69]	0.000
Performance appraisal meetings	4.18	2.87	3.43	4.47	0.000
Management meetings with subordinate	3.93	2.21	3.43	4.38	0.000
Informal gatherings	3.70	2.61	3.22	3.87	0.000
Telephone	3.66	2.89	3.00	3.91	0.000
Electronic mail	3.02	2.63	2.65	3.56	0.000
Minutes of management meetings	3.05	2.29	2.35	3.63	0.000
Departmental performance reports	2.95	2.66	2.48	4.41	0.000
Financial information	[2.64]	2.39	1.96	[3.75]	0.000
Written memorandum	2.16	1.79	1.78	2.00	0.058

accordance with prior findings within the social interaction theories tradition (Fulk, 1993, p 929). Beyond the dimensions reported in Table 7, the clusters exist independently of a number of task, social and organizational factors. Analysis revealed no impact on the constitution of the clusters for working relationships (supervisor attitudes and co-workers), media experience, task predictability (routineness), age, gender, functional background (length of employment and strategic business unit), organizational level and attitudes towards accountability or performance.

Conclusion

The research upon which this paper is based cannot claim generalizability. The case study showed that individuals can apply technological and sociotechnical

media styles for tasks where interpersonal media should be the norm according to media richness theory. Whether this finding is true outside Telco remains a researchable question. The characteristics of Telco, particularly its emphasis on the cultural change programme and empowered individuals, create the conditions where media style can have a significant impact on preferences for IT irrespective of many of the factors suggested by media richness theory, social interaction theories and technology acceptance modelling. Further research is necessary to address these issues in other contexts.

Unlike prior studies, which have selected a single theory or a subset of factors considered by the existing literature, the current study adopted a grounded approach (Glaser and Strauss, 1967; Charmaz, 1995). The analysis began with the perceptions of executives. The impacts of change programmes and conflict between the information needs of different stakeholders provide additional factors to be considered by future studies. However, the majority of factors which emerged from research align well with the existing literature. This should be taken as an indication of the comprehensiveness of the literature available to the researchers and practitioners who wish to understand executives' use of IT more fully.

Positioning executives' perceptions as the focus allowed the study to show how a range of factors interacted at the research site. The major conclusion to be drawn from this study is the importance of the interrelationship between structure and action, the

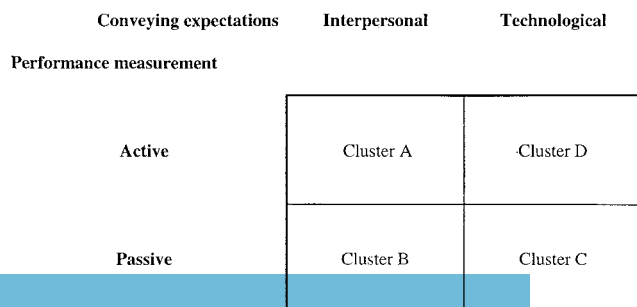
**Figure 2.** Cluster dimensions

Table 7 Attributes and attitudes which differentiate members of the media style groups

	A	B	C	D	ANOVA <i>p</i> -value
Length of relationship (months)	12.8	19.6	15.8	14.8	0.046
Information sharing	1.67	1.38	1.95	1.48	0.013
Volume of work	2.98	3.38	2.45	3.13	0.004
Best judgement	2.51	2.91	2.45	2.97	0.021

Length of relationship. Question: how long have you been manager to whom you are answerable?

Information sharing. Question: you expect your managers to be more inclined towards sharing information with colleagues than inclined towards treating it in a restricted manner. Response is on a five-point scale where 1 is strongly agree and 5 is strongly disagree.

Volume of work. Question: thinking that the amount of work you have to do may interfere with how well it gets done. Response is on a five-point scale where 1 is 'never' and 5 is 'most of the time'.

Best judgement. Question: feeling that you have to do things on the job that are against your better judgement. Response is on a five-point scale where 1 is 'never' and 5 is 'most of the time'.

interaction between IT characteristics, task, social and organizational factors and the importance of the individual. Accounting IS were not used by executives at Telco because of a structural misalignment between technological design and social and organizational conditions which were partly created by the actions of the executives themselves. Environmental uncertainty, in the shape of competitive pressures, was matched by a change programme, which in turn led to new working relationships and norms which could not be monitored by the accounting IS. Realignment implicated further action, this time to redesign the accounting IS, but this action in turn implicated further structural elements in the shape of the IS department and external stakeholders. In contrast, the manner of use of electronic mail and its association with other media enabled the executive process. The ways in which executives used electronic mail reinforced the technological design features, which included multiple addressability, storability and speed and supported working relationships and strategy. The cultural change programme, combined with the lack of 'hard and fast rules' to govern accountability, allowed a significant group of managers to favour electronic mail and, through its use, convey messages to subordinates about media style and individual identity.

Structuration theory dissolves the paradox which began this paper. Neither the executive process nor IT exists in isolation from individuals and change. Executives are able to define and redefine their process in decision support and collaborative terms to some extent and are able to define and redefine the relevance of technology through its use and through actions which impact on other structural elements. The paradox set out in the Introduction relies upon fixed views of the executive process and technology which this paper seeks to challenge.

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