ALIGNING MEDIA CHOICES WITH PROCESS CHARACTERISTICS

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ABSTRACT

The focus of this article is to present a theoretical model to describe the relationship between critical process characteristics and the communication quality implied by the major types of communication methodology commonly adopted in organizations. Moderating factors interact with these communication quality requirements to determine the specific media choice. The theoretical framework addresses the classification of processes along the dimensions of process complexity and knowledge intensity, while communication quality is defined in terms of richness, interactiveness, and precision. The underlying thesis of the model is that the nature of the process prescribes the communication quality to be adopted by an organization. Managers need to base their media selection choices on the specific process types in the organization for an optimal result.

Keywords: Process complexity, knowledge intensity, communication quality, media choice, media richness

INTRODUCTION

The factors motivating the choice of communication media have attracted the interest of management scientists for some time. This interest has led to the development of several theories, chief among them information richness theory, to explain the way managers choose communication media. We revisit this issue in light of several developments that have affected business communication in recent years. Among these are: the explosion of communication technologies in the last decade, the growing number of technologies that do not seem to fit very well into older models such as information richness theory, and the need to address communication at the process (rather than individual task) level.

Media choice research in the mid 1980s and early 1990s typically addressed five basic media types. Daft and Lengel's model addressed face-to-face, telephone, written personal, written formal, and numeric formal. Others have subsequently added technologies such as email and video conferencing. The list of technologies just keeps on growing. In addition to the scope of the increase in communication technologies, we have also found that several technologies do not find an ideal place in the one-dimensional continuum established by earlier works. A part of our focus is therefore to redesign the continuum in light of the new classification problems.

We proposed a three state model for assessing the choice of communication media. Our model is grounded on the logic that communication is needed to support business processes. The nature of these processes will therefore greatly influence the quality of the communications needed. Communication quality is also impacted or limited by type of communication media. Ideally communication managers will seek to attain perfect fit between the communication qualities required by the process and the communication quality delivered by the specific media

type. Figure 1 presents a prescriptive model aimed at informing the process of choosing communication media.

In the remaining part of this paper, we first address the nature of the process variables we focus in this paper, and their implications on the required quality of communication for their management. The process variables we are focusing are process complexity and knowledge intensity. We then address the construct of communication quality and the classification schema for media types. The paper is wrapped up by a discussion of the implication of the study and presents a prescriptive model for communication managers.
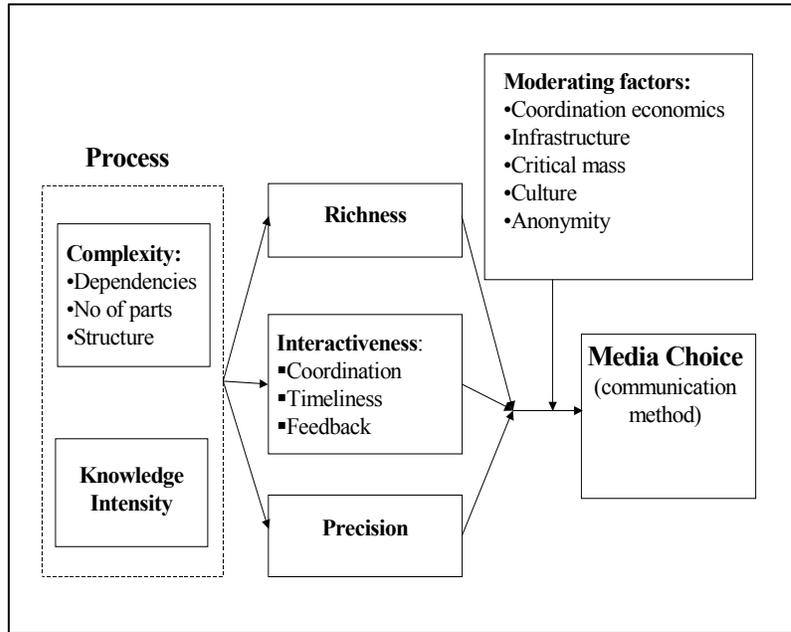
Figure 3 A prescriptive model illustrating the implications of process variables on media choice

BUSINESS PROCESSES

An organization can be viewed as a collection of business processes through which the goal of value adding is fulfilled (Figure 2). These processes collaborate to form an intertwined structure. The structure of processes has to be orchestrated if it is to achieve the organizational goal of adding value to the input resources. Each process in the structure has to comply with the restraints imposed by the various inter-process dependencies having information as an operating medium.

Within the context of communication method selection, we focus only on the data and information processing activities of each process. In that sense, a process either shares information required as parameters or contributes to the creation of information that may be taken by another as input or end products. A process can be characterized in terms of process complexity and knowledge intensity.
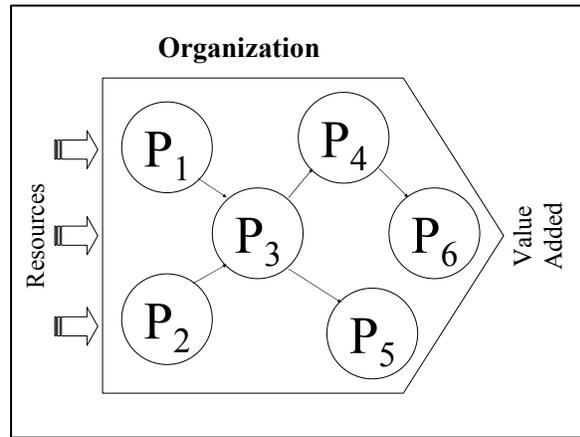
Figure 1 A process perspective of organization.

Process Complexity

Business process complexity is partly determined by the number of tasks that are included in that process, partly by the number of interdependencies that process has with other processes, and

partly by the characteristics of these interdependencies. Dependency arises in the situation where resources are to be shared by multiple activities (1). By resources, we are referring to information resources within the context of information processing. Prior studies (e.g. 1, 2) have identified three fundamental types of dependencies: Fit, share, and flow. A 'fit' dependency arises when two processes contribute to the creation of a designated resource such as P_1 and P_2 in Figure 2. A 'flow' dependency arises when the output of a process is taken as input of another process such as P_3 creates the resource that is taken as input by P_4 in Figure 2. The 'share' dependency arises when two processes share a designated resource such as P_4 and P_5 in Figure 2 share the resource created by P_3.

Each of the three types of dependencies has different implications on information requirements for its coordination. In a 'fit' dependency, the interdependency between the participating processes is relatively not as strong. The performance of an involved process does not require the successful performance of the other involved process as a precondition. Nor does the performance quality of the involved processes have any thing to do with that of another. The same situation applies to the 'share' dependency type. In a 'flow' dependency; however, the processes engaged are much more tightly coupled in terms of information sharing. Since the coordination of each flow dependency requires at least three different aspects of it to be considered: Prerequisite, accessibility, and usability (1). Each of these aspects will generate not only information processing needs, but also, frequently, in a more restrictive manner than the other two types of dependencies.

The temporal aspect of the performance of the processes is another important consideration in determination of the process complexity. For example, processes P_1, P_2, and P_3 are engaged in a snare of dependency relationships: P_1 and P_2 in a 'fit' dependency, while the three of them in a 'flow'. If the satisfaction of the prerequisite of the 'flow' required not only the successful performance of P_1 and P_2; but also that their performance need to be complete simultaneously, the interdependency among the three is much more intense than if the temporal aspect is not stringently designated.

Knowledge Intensity

Knowledge can be handled by a process as subject matter as financial reporting information being the subject matter handled by an accounting process. Knowledge on another hand is used as a processing and coordinating medium for a given process. In that sense, both the number of tasks in a given process and the interdependencies it has with other processes have an implication on the knowledge intensity of that process.

Accomplishing a task requires different types of knowledge (3, 4). The higher the number of tasks within a process, the more knowledge intensive is the process. The organization and operation of the business processes require different types of knowledge. Such process knowledge includes the knowledge about particular business functional areas and that about technical constraints imposed on a given process by the hardware and software that implement that process.

As the knowledge intensity of the various processes may likely differ, the knowledge about other processes that each of the processes coupled in an interdependent relationship must acquire may also be asymmetric. The coordination of the dependency between two processes can be made easier by minimizing the requirements of knowledge about a process that another must acquire in order for the two to work together. This can be achieved by setting up a well-

defined process interface. While a given process may still be knowledge intensive, the knowledge required for another process to work with that knowledge intensive process can be mitigated. An example of managing the issue arising in inter-process knowledge requirements is the use of information hiding and function interface in software engineering.

COMMUNICATION QUALITY

Prior works on information/media richness have twined the features of representation and interactiveness. Daft and Lengel (5); and (6) positioned media richness as a linear construct starting with lean medium written data and progressing to richer media such as telephone and face-to-face. Leaner medium are low on speed of feedback, types of channels used, personalness of source, and richness of language carried. Conversely, richer medium are high on all four variables. Recent developments in technology have, however, reduced the effectiveness of this one-dimensional variable. Technologies such as written documents and email, positioned at the lean end of the continuum, for its single channel and slow feedback have made large strides over the last five years. Email now supports voice and video and response capability are limitless. Newer technologies are also emerging that cannot find a place in the one-dimensional model. Instant messaging and other collaborative technologies such as NetMeeting have emerged with high speed of feedback, multiple communication channels but lacking the personal touch. We posit that communication medium needs to be studied as a multi-dimensional construct. Three variables have emerged as critical in determining the appropriateness of a technology to support a specific business process. These are richness of the communication medium, degree of interactivity supported by the communication medium, and the ability to support high level of precision in data representation.

Richness

Richness is positioned here as a measure of the number of channels utilizable in the communication and the depth/intensity of the data represented in these channels. Face-to-face, video conferencing, streaming video, computer conferencing and online/steaming presentations are all examples of very rich communication channels. The support visual information – allowing users to process gestures and body language along with voice and alpha numeric data. The multiplicity of information stimuli and the temporal criterion of processing such stimuli, and the depth/intensity of the stimuli justify their position as rich media, not withstanding the varying degree of feedback supported by the communication media and difference in the measure of personalness of each media.

Interactiveness

Interactiveness is a measure of the communication medium's ability to support level of contact needed by group members. Research on teamwork shows that communication technologies play an important role in bridging the gap between group members that are separated by space and/or time (1). Higher degree of interactivity serves bridges this gap allowing dispersed team members to work more efficiently and effectively. Our thesis is that interactiveness is a measure of three variables: level of coordination supported, timeliness of information being transmitted and speed of feedback allowed by the communication technology.

Dependent processed dictated that users share information. This need for information sharing demands timeliness of information transfer between participants and speed of feedback. Timeliness is an essential factor in information quality (7) and information quality is essential for effective process management. As such timeliness is incorporated in the interactiveness of the technology.

Precision

Accuracy is a necessary element of information quality (8). As such all processes demands accuracy built into the information content. In addition to accuracy, process dependencies often dictate high degree of precision in the representation of the information being shared. An engineering team working on the design of sensitive machinery may find video information on the workspace in which the machine will function and/or operation of similar equipment at other sites to be very valuable. While the accuracy of the video file is not in question, the data is not represented in a way that accommodates the level of precision needed to support design. Technical drawings, detailing the specifications of the machinery and the physical layout of the rooms provide the degree of precision needed to execute the project.

Mapping Process Factors to Communication Quality

Each of the two dimensions (i.e. process complexity and knowledge intensity of a process) used in characterizing a process has a different implication on the quality required of a communication media method. For the dimension of process complexity, the requirement for interactiveness and precision of the information needs for operation and coordination is more critical than that for richness if stringent temporal criterion for coordinating the dependencies does not exist. Otherwise, the more stringent the simultaneity requirement for the coordination, the more richness is required of the communication quality. For the dimension of knowledge intensity of a process, the knowledge that is required for operation and coordination of the dependencies is likely to be more sensitive to the communication quality factors of interactiveness and precision. While in processes where the knowledge that is the subject matter for that process to be dealt with, the communication methods that are responsible for handling information exchanging for that process may require to have a high quality in all three aspects (i.e. richness, interactiveness, and precision).

MEDIA CHOICE

Media type is classified as a two-dimensional variable as shown in Figure 3. The classification yields four groups of media with each having several instances. The y-axis provides the categorization based of degree of interactiveness. The x- axis provides categorization based on richness and precision. Richness and precision are mapped on the same axis rather than utilizing a three-dimensional mapping (with richness on the x-axis and precision on the z-axis). While this may appear questionable, the decision was made because examination of the existing media types supported the trend of leaner medium being suited to representation demanding high level of precision. The four resulting groups are:

i.   Static media that are lean (i.e. low in richness) and accommodate high level of precision. These include written/printed documents, facsimile, and email.

ii.   Dynamic media that are lean (i.e. low in richness) and accommodate high level of precision. These have largely been added in recent years and include document conferencing, instant messaging, shared database, and shared documents.

iii.   Rich, dynamic media types (low on precision). These are largely the media types at the rich end of the continuum generated from the use of information richness theory. They include face-to-face, video conferencing, and computer conferencing.

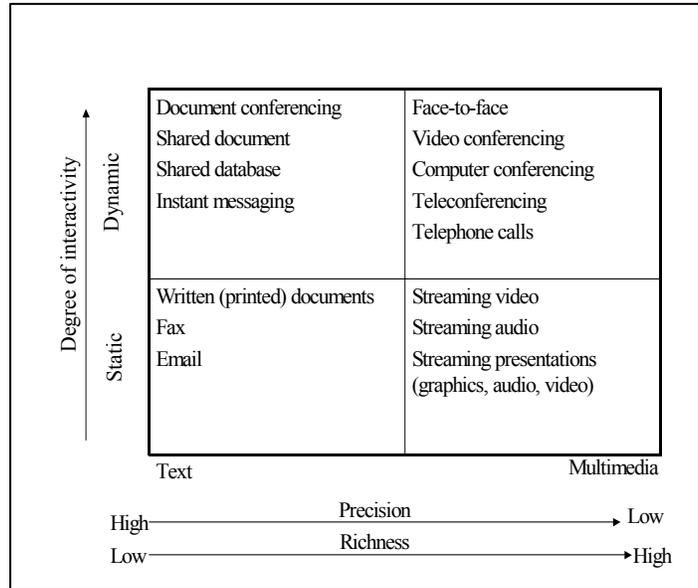iv.   Static media that is rich and low on precision. These include streaming audio and streaming video.

	Text	Multimedia
Dynamic	Document conferencing Shared document Shared database Instant messaging	Face-to-face Video conferencing Computer conferencing Teleconferencing Telephone calls
Static	Written (printed) documents Fax Email	Streaming video Streaming audio Streaming presentations (graphics, audio, video)

Degree of interactivity

Precision: High → Low
Richness: Low → High

Figure 2 A classification schema for media types.

Frequently more than one media type may be available to meets the needs of a specific user group. For example, both face-to-face and video conferencing are media choices that are rich and interactive. Selecting among the multiple media choice candidates may not be always at management's will. There are situations in which moderating factors may dictate the final choice. Prior studies (9, 10) have identified five essential factors have a moderating effect for media choice decisions. These are coordination costs, infrastructure, critical mass, culture and need for anonymity.

IMPLICATIONS AND SUMMARY

This paper focuses on modeling the relationship between the process characteristics (i.e. complexity and knowledge intensity) and the choice of communication methodology needed to support the processes. Our thesis is that the nature of the process determines the communication quality required for its operation. Individual communication methodologies will satisfy the user needs based on the level of richness, interactiveness and precision that they provide. In the situations where multiple media choices can satisfy the minimum level of communication quality required by the process, moderating factors will determine the specific media choice.

The research has three major implications for managers. First, there is a need to recognize the fact that communication needs are unique to specific user groups. As such managers need to develop a logical process for choosing media type. An examination of present practices does not point to the existence of such a structured process. Second, we provide a method for performing this analysis. The business processes themselves will form the basis of the analysis for choosing communication media. The presence of dependent process dictates that managers adopt measures

to effectively coordinate these processes. The nature of the dependencies dictates the nature and level of the communication needed and hence influences media choice. Third, communication media should support the operation and coordination of the business processes, which are characterized by their complexity and knowledge intensity.

However, communication media do not always exist that truly delivers the desired communication quality. Further, in cases where media is available to meet needed quality of communication, moderating factors such as cost or infrastructure may prevent the group from adopting optimal choice. Managers should therefore be able to address the fit between desired communication quality and actual communication quality (as delivered by available media). Ideally this fit should be perfect i.e. no gap should exist between desired and actual quality. Where this is not possible, managers need to identify the implications that this gap will have on the processes requiring coordination.

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