Appropriateness of Communication and Collaboration Tools in an International Virtual Research Community

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Abstract. In research communities, the use of information and communication technology (ICT) is part of daily routines, especially in multi-institutional research projects. Appropriate media choice is an important dimension of effective communication and successful collaboration. The central aim of this paper is to study the perceived appropriateness of different communication tools (online and offline) in relation to specific tasks within OPAALS1. Results drawn from an online survey reveal a differentiated picture: On the one hand, face-to-face interaction, face-to-face group meetings and email are the collaboration tools perceived to be most appropriate in general. On the other hand, regarding the dissemination of information within the community, mailing lists and wikis are regarded to be most appropriate.

Keywords: Media choice, collaboration

1 Introduction

With the diffusion of the Internet and its manifold communication tools and technologies, people have more communication means than ever before in the past. From email to web conferences, from a mere file repository to knowledge management platforms, media choice is far from being simple, i.e. not merely an intuitive, obvious choice. Especially in organisations media are of high importance for internal as well as for external communication. Appropriate media choice is essential for effective communication and hence for the success of an organisation (Trevino, Daft & Lengel, 1990, p. 71).

In research communities, the use of information and communication technology (ICT) is part of daily activities of the community members and scientists are sometimes referred to be early adopters of new technologies (Bos et al., 2007). This can also be concluded from the fact that science is becoming increasingly distributed and dispersed: geographically as well as regarding contributions of a variety of institutions in specific projects (Cummings & Kiesler, 2007, p. 3).

Individual media choices (and the aggregation of individuals) are crucial to study when we discuss the use of ICTs. The central aim of this paper is to study the appropriateness of different communication tools (online and offline) in relation to specific tasks within an international research project/community. We assume that the members of the research community have access to a broad variety of tools. Our particular research interest is how community members attribute specific tools to be appropriate to specific tasks in comparison with other tools, i.e. to study if and when for example email is perceived as more appropriate than face-to-face communication. Another focus is whether there are differences in this perceived appropriateness between members coming from different scientific domain backgrounds. Such differences would challenge multidisciplinary collaboration on a practical level in the day-to-day collaboration, but also regarding the development of communication patterns in an interdisciplinary group.

The field of communication research studies and particularly models of media choice provide the theoretical background of this paper. Results on media appropriateness drawn from an online survey answered by researchers from the OPAALS-NoE will be presented in the empirical section of this paper. In the concluding chapter we will discuss issues which further studies on media choice within OPAALS should address.

2 Theoretical background

Generally speaking, media choice theories can be differentiated into objectivist and subjectivist

1 OPAALS, Open Philosophies for Associative Autopoietic Digital Ecosystems, is a large European Network of Excellence funded by the European Commission (6th FP), running from 2006-2010.

In short, the premise of the objectivist tradition is that if things have a good match (e.g. tasks and media) they will be able to function effectively (ibid). Effective communication can be reached if the appropriate medium for a specific task is used. Taking this premise as point of departure, the models of social presence and media richness are often used as frameworks to study individual and organisational media use.

Social presence theory is based on the assumption that media vary in the degree the users perceive the physical presence of other individuals (Rice, 1993, p. 452). Social presence of a medium is reached by features that are regarded to be close to physical interpersonal communication as for example nonverbal signals, physical distance, and physical appearance (Bouwman, van den Hooff, van de Wijngaert & van Dijk, 2003, p. 96). A higher degree of the social presence of a medium would lead to a more “social” communication. However, the generalised assumption that a high level of social presence is always the best can be doubted and is not well supported with empirical evidence.

Media richness theory argues that different tasks demand different media (Rice, 1993, p. 453). They can be distinguished in uncertainty (a lack of information creating the need for information) and equivocality (the lack of clear definitions of situations requiring richer information). As a result, media which are more suitable for equivocal tasks are richer in the following aspects: (1) they provide instant feedback, (2) they are able to convey multiple cues, (3) it is possible to use natural language, and (4) the medium has a personal focus (Bouwman, van den Hooff, van de Wijngaert & van Dijk, 2003, p. 97). The richest medium based on these criteria would be face-to-face communication. When it comes to the matching of media and tasks, a lean medium would be chosen for tasks with low equivocality, a rich medium for tasks with a higher level of equivocality. Similar to the social presence models, empirical support of media richness is inconsistent. Trevino, Daft, and Lengel (1987, 1990) modified the original model of media richness by enhancing it with a symbolic interactionist perspective. Accordingly, media characteristics are not regarded to be objective as media have a symbolic value and this symbolic value can lead to choices which are not optimal in the fit of task and medium. The authors regard the organisation as a dynamic web of communications. The basis for interaction is a shared system of meaning. Over time, organisational members decrease ambiguity through negotiation and feedback. This also means that they create new organisational meanings. Hence, in a specific organisational context it becomes clearer over time for which task a specific medium fits, because shared meanings are established. Accordingly, when there is consensus among organisational members, no negotiation is necessary (Trevino, Daft & Lengel, 1990, p. 73f).

The orientation towards a symbolic interactionist approach already signals the way towards subjectivist approaches to study media choice. The social influence model (Fulk, Smith & Steinfield, 1990) argues that media richness as well as the equivocality of tasks cannot be determined objectively. There are various ways as to how media can be perceived. The perception depends on individual variables as well as on opinions and behaviour of others. A lack of media related skills and different levels of experience with task and technology can influence media choice as well. This perspective on media richness contends that media richness is socially defined, i.e. appropriateness for a specific task evolves from the experience the community has with a specific medium and those definitions may differ from the „objective“ definitions media richness theory would claim.

From the social influence model we can draw the conclusion that media choice depends on individual variables and the behaviour of others. However, when it comes to study media choice of scientists, science-specific aspects also have to be considered, since science can be divided into specific scientific communities with a respective shared set of working practices. In multi-disciplinary projects scientists with different epistemological, theoretical, linguistic, and methodological backgrounds collaborate. Hence, there may be also differences in the media choice(s) of the different project members, which are shaped by each individual’s domain specific experiences, customs, and accepted communication policies and patterns. These differences might not be consciously reflected, albeit they are likely to operate in the background and cause tensions.

3 Research Question and Method

Based on the theories presented above, we developed two research questions dealing with the perceived appropriateness of communication tools for specific tasks as seen by OPAALS researchers within the project:

RQ1: Which collaboration tools do people perceive as appropriate for their work in OPAALS?
RQ2: Are there differences in the perceived appropriateness of collaboration tools between participants from different domains within OPAALS?

OPAALS is an interdisciplinary EU Network of Excellence in the cluster of Digital Ecosystems, comprising different domains such as social science, linguistics, computer science, software engineering, and biology. The OPAALS consortium is currently composed of 20 partners located on four continents (Europe, Asia, Africa, and South America). In addition to the dispersed organisation of the project participants and institutions, the members’ affiliation with different research fields within and/or across scientific domains provide a challenging background for an analysis of collaborative processes within the community.

In a first step we operationalised topics, i.e. functions or elements of the work process that appear during the work in OPAALS. The following items were surveyed:

1. Management of the work package task(s)
2. Getting to know and staying in touch with collaborators
3. Work on work package tasks and/or deliverables
4. Creating and discussing new ideas with collaborators
5. Dissemination of information to the OPAALS community

In order to specify the communication preferences we developed a list of all collaboration tools that appeared to be relevant within the OPAALS community: (1) face-to-face interaction, (2) face-to-face group meetings, (3) video/audio-conference, (4) web conference, (5) phone/internet phone, (6) email, (7) mailing lists, (8) instant messenger, (9) forums, (10) weblogs, and (11) wikis.

These items were integrated into the OPAALS survey, a longitudinal study designed to observe emerging communication and collaboration patterns within the OPAALS community. The results presented here are drawn from the second wave (December 2007). This study aims to support the evolution of the OPAALS Network of Excellence and to realise a documentation and interpretation of the process of community development and building.

4 Results

The sample size of the study was 87 researchers from the OPAALS community; we received 56 completed questionnaires, adding up to a response rate of 64%. Half of the respondents are computer scientists (50%, n=28), 28.6% are social scientist (n=16), 1.8% natural scientists (n=1). The remaining respondents are to be located in more than one domain, 7.1% in computer science and social science (n=4), 5.4% in computer science and natural science, whereas 3.6% work in all three domains. The majority of the respondents are male (69.6%, n=39), 30.4% are female (n=17).

4.1 Appropriateness of collaboration tools for specific tasks

Table 1 provides an overview of the general appropriateness of the collaboration tools. Face-to-face interaction, face-to-face group meetings and email are the collaboration tools perceived to be most appropriate for all tasks. An exception is the topic “dissemination of information to the community”. In this case, mailing lists and wikis are regarded to be most appropriate.

For the management of the work package tasks, email is regarded to be the most appropriate medium. Very appropriate in this respect are also face-to-face interaction and group meetings. It is probably the potential of the email to overcome the limitations of time and space that contribute to a high ranking of an asynchronous communication tool. A very similar picture is drawn in the topic “work on work package tasks and/or deliverables”. For both tasks, email - the medium that in social presence and media richness theory is conceptualised as providing less social cues and no direct feedback - is perceived to be most appropriate by the researchers of the OPAALS community. It can be argued that the lower richness of email provides advantages in another aspect: Since email use does not invoke immediate feedback, the senders as well as the recipients have the possibility to take time to formulate thoughts and reflect on the content.

The temporal deferment might be an important factor in the preference of email regarding specific tasks and communication contexts. However, when it comes to the topics “getting to know and staying in touch with collaborators” and to “creating and discussing new ideas with collaborators”, face-to-face interaction and meetings are regarded to be most appropriate. Hence, the results from the survey display that these topics require a richer medium with more social cues as they are related to a higher degree of sociability. Especially in multilingual research projects these aspects should be considered and elaborated on. Computer mediated communication tools, aside email, do not seem to provide
appropriate alternatives.

Very interesting are the results concerning the “dissemination of information to the community”: Mailing lists and wikis are perceived as most appropriate for this topic. The mode of communication “one-to-many” provides the possibility to reach a wide audience rather conveniently. This might not seem very surprising on first glance. However, given the fact that the survey was conducted in a multi-disciplinary research community, one-to-many communication tools do not appear to be the most adequate means to establish an interdisciplinary dialogue: For example, each partner conducts and verbalises her research in her respective domain language, which usually consists of a distinctive vocabulary set, publication rules, style rules, and even methodological and epistemological “rules”, with which partners from other domains are not necessarily familiar. Hence, regarding the dissemination of “simple” or formal information, such as event management, one-to-many communication tools are useful, but not regarding the dissemination of research results in order to cooperate with partners from other domains.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Management of the work package task(s)</th>
<th>Getting to know and staying in touch with collaborators</th>
<th>Work on work package tasks and/or deliverables</th>
<th>Creating and discussing new ideas with collaborators</th>
<th>Dissemination of information to community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-face interaction</td>
<td>4.15</td>
<td>4.54</td>
<td>4.02</td>
<td>4.48</td>
<td>3.12</td>
</tr>
<tr>
<td>Face-to-face group meetings</td>
<td>4</td>
<td>4.46</td>
<td>3.79</td>
<td>4.43</td>
<td>3.67</td>
</tr>
<tr>
<td>Video/audio conferences</td>
<td>3.4</td>
<td>3.32</td>
<td>3.25</td>
<td>3.4</td>
<td>2.65</td>
</tr>
<tr>
<td>Web conferences</td>
<td>3.1</td>
<td>2.89</td>
<td>3.2</td>
<td>3</td>
<td>2.46</td>
</tr>
<tr>
<td>Phone/Internet phone</td>
<td>3.69</td>
<td>3.58</td>
<td>3.45</td>
<td>3.29</td>
<td>1.98</td>
</tr>
<tr>
<td>Email</td>
<td>4.28</td>
<td>3.95</td>
<td>4.11</td>
<td>3.77</td>
<td>3.75</td>
</tr>
<tr>
<td>Mailing lists</td>
<td>3.44</td>
<td>3.15</td>
<td>3.07</td>
<td>3</td>
<td>3.98</td>
</tr>
<tr>
<td>Instant Messenger</td>
<td>3.4</td>
<td>3.36</td>
<td>3.46</td>
<td>3.13</td>
<td>2.14</td>
</tr>
<tr>
<td>Forums</td>
<td>2.85</td>
<td>2.7</td>
<td>2.51</td>
<td>2.98</td>
<td>3.27</td>
</tr>
<tr>
<td>Blogs</td>
<td>2.38</td>
<td>2.66</td>
<td>2.23</td>
<td>2.71</td>
<td>3.56</td>
</tr>
<tr>
<td>Wikis</td>
<td>2.98</td>
<td>2.93</td>
<td>3.18</td>
<td>2.87</td>
<td>3.96</td>
</tr>
</tbody>
</table>

(Scale: 1 = inappropriate, 5 = very appropriate, Question: “Please rate the appropriateness of the following collaboration tools.”)

4.2 Differences in the perceived appropriateness of collaboration tools between social scientists and computer scientists

The question of differences between social scientists, natural scientists, and computer scientists within OPAALS concerning the perceived appropriateness of collaboration tools arises because such differences might constitute a challenge for the self-governance of the community. As media choice is one dimension of success, salient differences in the attitudes towards communication tools might cause tension that counteracts successful collaboration. In order to gain insight into this important question, we compared the means of OPAALS’ two main groups: social science and computer science. For the topics of “getting to know and staying in touch” and “dissemination of information to the community” we found no statistically significant differences between the social scientists and the computer scientists involved in the project. However, for “management of the work package tasks”, “work on work package tasks and/or deliverables”, and “creating and discussing new ideas with collaborators” there is a significant difference in the means concerning phone/internet phone. Social scientists perceive phone/internet phone in all these three tasks as more appropriate than their colleagues from the computer science domain. One explanation would be that computer scientists present themselves more “code”, i.e. sections of computer programmes and the knowledge production process within social science in the project necessitates more direct coordination and collaboration with the possibility
of immediate feedback. Another significant difference is to be found in “management of the work package tasks”, where computer scientists perceive the appropriateness of web conferences lower than social scientists of the project.

5 Discussion

This analysis has focused so far on the choice of a single collaboration tool in comparison to other options without considering the possibility of the combined use of different media in variable contexts and spaces. Furthermore, the role of media is more than simply supporting information flows, but also to create social environments (Woerner, Orlikowski & Yates, 2004).

In organisational contexts, tasks are very complex and require a sequence of activities to be realised in the workflow. The combination and parallel usage of a variety of collaboration tools and their relation to time have to be considered. Additionally, the actual working environment can be characterised as a hybrid space, including possibilities of face-to-face interaction as well as media and ICT supported interaction.

When we characterise a medium it is generally difficult to capture all aspects in questionnaire items that might contribute to their perceived appropriateness. The result that email is perceived as very appropriate for specific tasks emphasises that there are more variables responsible for this result which are not only characteristics of the medium email itself. This means that the context (task characteristics, situation, etc.) has to be taken into account. For example, when referring to more context-relevant data the process character of a task is getting more important to note. Moreover, a task is composed of various communication situations, interaction, and activities which require the usage of multiple tools in different moments and their combination.

With common quantitative methods we cannot catch all context related information, nor can we capture new and creative usages that the community members might develop with the available communication tools, space and situations in the process of knowledge production.

Taking these aspects into account, we developed a mixed method design including the observation of the communication and collaboration activities the community members realise in the online and offline environment. This gives us more insights into the actual situation and interaction regarding creative use and combination of communication and collaboration tools.

In our mixed method design quantitative and qualitative approaches are combined within different phases of the research process. This approach allows for the contrasting and completing triangulation of quantitative and qualitative data in order to arrive at a better description and categorisation of the context relevant characteristics of collaboration tools as the (1) fixed characteristics of the tool, (2) needs related to the specific task and interaction, and (3) preferences of the actors in specific social situations. Additionally the qualitative data collection captures more context related data and new social situations, created “spontaneously” by the community members.

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References


