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Article *in* Journal of Business and Technical Communication · January 2012

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Journal of Business and Technical Communication 2012 26: 65 originally published online 7 December 2011
DOI: 10.1177/1050651911421125

Journal of Business and Technical Communication
26(1) 65-91

DOI: 10.1177/1050651911421125
http://jbtc.sagepub.com

Videoconferencing as a Mode of Communication: A Comparative Study of the Use of Videoconferencing and Face-to-Face Meetings

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Abstract

Based on a quantitative survey of Norwegian business travelers, this study compares their use of face-to-face (FTF) meetings and videoconferences (VCs). The study finds that access and use of VCs are determined mainly by industry and the geographical structure of the enterprise. It also finds that VCs and FTF meetings differ along several dimensions, suggesting that these two modes of communication fulfill slightly different needs. Based on the survey results, the authors propose a framework to understand the emerging role of VCs. This framework would address both relational and task-based dimensions.

Keywords

videoconferences, media choice, meetings, business travels, social networks

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Current trends toward globalization and the functional integration of dispersed economic activities, an increased number of multiunit companies, and more project teamwork have made the ability to transmit information between external business partners and within multiunit companies essential for enterprises in the postindustrial knowledge economy (Castells, 1996; Dicken, 2007; Drucker, 1994). In turn, these trends are increasing the spatial distribution of collaborating partners and raising the need for them to travel long distances in order to meet face-to-face (FTF).

The FTF meeting has long been acknowledged as the most effective way through which to do business. FTF contact enables business associates to transmit equivocal information, produce immediate feedback, and build a personal, authentic, and trustworthy atmosphere (Nardi & Whittaker, 2002; Nohria & Eccles, 1991). These are important activities in business life that have been proven to be harder to accomplish through information and communication technologies—even videoconferencing (throughout this article, we use the abbreviation VC interchangeably to mean videoconferencing or videoconference; Andreev, Salomon, & Pliskin, 2010; Kiesler & Cummings, 2002; Kraut, Fussel, Brennan, & Siegel, 2002).

VC technology is changing rapidly. It is becoming firmly entrenched within computer networks—most recently, through a steady influx of innovative communication and service concepts on the Internet and within the computer industry. Manufacturers of VC equipment now offer flexible communication services for conference rooms, desktops, and mobile terminals that can accommodate different groups and situations. In addition, VC can save time and costs, which is a strong argument for its implementation and use (Denstadli, 2004). Increasing concern about the negative impact of transportation on greenhouse gas emissions may also influence businesses' decisions on whether to use VC (Aguilera, 2008). Recent volcanic eruptions have demonstrated the vulnerability of air transport and drawn attention to the need for alternative ways of business communication.

Despite a growing acceptance of VC in modern organizations, empirical studies of its implementation and use are rare—particularly, studies that compare VC to FTF meetings. To understand the role of VC in tomorrow's organizations and the impact it will have on business travel, we need to develop a deeper knowledge of how meetings are accomplished in organizations today. This study explores these issues and raises the following research questions:

- What are the most important determinants for business travelers' access to and use of VC (company size, industry, position in company, etc.), and what technological systems do they use?

- How do business travelers use VC vis-à-vis FTF meetings (users, communication purposes, interorganizational vs. intraorganizational contact)?
- What do both users and nonusers consider the main strengths and weaknesses of VC?

As we show in the following sections, the use of VC is affected to a large extent by both the size and the geographical structure of the company. Further, we show that VC today fulfills needs that are different from those of FTF meetings, making a direct substitution unlikely on a larger scale. Rather, these two important modes of communication seem to have complementary functions in today's organizations.

Literature and Theoretical Background

The business meeting is a core activity in postbureaucratic organizations of all sizes and nationalities (Barley & Kunda, 2001; Heckscher, 1994). Defined as "a gathering of three or more people who agree to assemble for a purpose ostensibly related to the functioning of an organization or group" (Schwartzman, 1989, p. 61), meetings are an unavoidable part of modern working life. For example, top managers estimate that they spend as much as 60-75% of their time in FTF or telephone meetings (Fulk & Collins-Jarvis, 2001; Kloppenborg & Petrick, 1999). Even though business meetings are sometimes considered a waste of time, most managers and employees accept the necessity of regular gatherings.

Meetings serve a number of purposes in organizations. Some purposes are well acknowledged and accepted; others are more subtle and less recognized. On one hand, meetings are where participants plan projects, coordinate tasks, and solve problems, activities that require participants to reach agreement and form a common understanding. On the other hand, business meetings also have a more subtle function: Meetings are where participants confirm their values and identities and strengthen their personal relationships with one another. As Weick (1995) argued, meetings are forums for sense making, where participants strive to develop a common understanding of organizational transformations and where they must codevelop organizational identities. Schwartzman (1989) and others stressed that building relationships is a crucial goal of most business meetings. As many organizations tend to be moving toward flatter and leaner structures, personal relations are believed to be more important than ever (Adler & Heckscher, 2006; Cohen & Prusak, 2001)—to promote the social capital of the individual participants and (in most cases) their organization (Gabbay & Leenders,

2001). Business meetings are thus crucial for fulfilling the goals of individuals as well as the objectives of groups and organizations.

Even though FTF meetings are often preferable, different types of mediated technologies are widely used for work-related communication, such as the telephone, e-mail, VC, or audioconferencing. The terms *teleconference* and *VC* are used interchangeably for meetings with two or more participants communicating in real time through the use of telemediated live pictures and sound (Andreev et al., 2010). In most cases, VC systems also allow for documents and illustrations to be shared and coedited.

VC technology is advancing rapidly, with functionality available on different platforms (mobile telephones, personal digital assistants [PDAs], and laptops) and networks (Internet protocol, wireless fidelity, etc.). At the same time, however, the boundaries between mediated meetings and personal communication systems are becoming blurred and hard to define. Still, the term *videoconference* is usually associated with a place-to-place communication system that is permanently installed in a room or studio. The room-based VC system is probably the most used form of VC in European and U.S. businesses. But this system is being challenged by the *telepresence system*—a more technically sophisticated form of conferencing with a higher level of picture and audio fidelity. In addition, audioconferences with multiple parties are widely available to anyone with access to a mobile or fixed telephone line. The room-based VC, then, is one of several ways of arranging meetings between distant collaborators.

The interconnections between mediated meetings, the use of personal communication media, and business travel are complex and not well understood, but at least for the near future, larger organizations will likely operate with a combination of FTF and virtual meetings. Andreev, Salomon, and Pliskin (2010) concluded that "although teleconferencing is considered by many as a potential travel substitute, empirical evidence shows that organizations, for the most part, see teleconferencing as an additional way of expanding organizational efficiency and productivity, not as a travel-saving means" (p. 10). Thus, rather than one replacing the other, the two modes of meetings will probably coexist within and across today's postbureaucratic organizations and serve different communication purposes.

Theories on Media Choice and the Need for FTF Gatherings in Organizations

In modern organizations, VC takes place in parallel with traditional FTF meetings and also in meetings where other technologies are used. Whenever

collaborators who are separated by distance need to talk to each other, they have to decide on the meeting form. Clearly, VC has both benefits and constraints. The factors that influence the choice of media in any given situation are a much discussed theoretical topic.

One central strand of research suggests that the content or purpose of a meeting, or the information that is to be exchanged, determines the choice of media (i.e., FTF or virtual). Media richness theory claims that complex forms of communication demand rich media, such as FTF contact, rather than mediated media (Potter, 2004; Short, Williams, & Christie, 1976; Trevino, Lengel, & Daft, 1987). According to these theories, the richness of the media (i.e., its ability to handle multiple information cues simultaneously, give rapid feedback, and establish a personal focus) determines the kind of content it can be used for. While media with low richness can be used to handle routine tasks, richer media are suited for nonroutine and ambiguous communication. If the medium is not rich enough for the content, communication failure is likely to occur. Because VC can handle visual cues and produce feedback instantly, it is usually seen as a rich medium—although not as rich as FTF interaction.

Media richness theory has been highly influential among scholars, who have suggested several improved versions (Carlson & Zmud, 1999; Kock, 2005; McGrath & Hollingshead, 1994; Walther & Parks, 2002). Yet empirical evidence for media richness theory is not strong; many studies have found that relatively narrow media (i.e., text based or voice only) can be used to successfully communicate messages that have a high level of equivocality (Fulk & Collins-Jarvis, 2001; Walther & Parks, 2002). And the theory has frequently been criticized for its technologically deterministic bias, that is, for its supposition that each medium has predetermined effects on users and their environment.

Another central theoretical approach sees choice of media as being influenced more by social norms and habits than by content of the communication and bandwidth of the technology. According to the social influence model (Fulk, Schmidtz, & Steinfield, 1990), choice of media in organizations depends not only on features of the media but also on the individual's past experiences with the media and the influence of others. Social influence theory may be seen as part of a larger set of constructivist approaches that relate choice of technology to social processes rather than to technical qualities (Bijker & Law, 1992; Silverstone & Haddon, 1996). According to these approaches, use of VC is strongly affected by the norms and attitudes that other users hold toward this medium rather than by its actual technical qualities. Thus, these

approaches expect that the use of VC would differ widely across organizations and departments with different norms for its use.

Both theories (i.e., media richness and social influence) address factors affecting the choice of VC and other media in a given organizational setting. But to understand the use of such media, we should also look at theories about regular FTF meetings. Because of the increasing number of workers who must travel for FTF business meetings, this issue has come to the forefront in several theoretical contributions (Asheim, Coenen, & Vang, 2007; Faulconbridge & Beaverstock, 2010; Larsen, Urry, & Axhausen, 2008; Storper & Venables, 2004). In a recent stream of research, the necessity for modern workers to build and sustain personal relationships is stressed. Urry (2007) and others (e.g., Mok, Carrasco, & Wellman, 2009; Rettie, 2010) have emphasized the importance of relationships and individual social networks as driving forces behind business travel. Means of transportation and media are used in concert as network capital to keep network-oriented organizations together. The multicultural orientation of modern organizations and their focus on project work seem to motivate their use of FTF meetings. This recent research echoes several earlier studies on social capital development that highlight the value of personal relationships (Adler & Kwon, 2002; Cohen & Prusak, 2001; Lin, 2001; Nahapiet & Sumantra, 1998). Thus, according to this theoretical approach, the use of VC will be moderated by a growing need for modern professionals to build personal relationships and networks with other professionals in their field.

Insights From Prior Studies

The VC market has grown substantially during the past 20 years, increasing fivefold in the period from 1991through 2006 (Denstadli & Gripsrud, 2010) to reach a total value of $1.06 billion. Research has demonstrated that intraorganizational contact has been a prime motivator for the use of VC (e.g., Denstadli, 2004; Lu & Peeta, 2009), implying that the technology has served mostly as a communication tool for large, multiunit companies. High investment and user costs have made this technology less feasible for smaller companies. But many of the newer VC platforms are simpler and less costly than are the traditional room-based ones. Although large (multiunit) companies are still more likely to use VC, desktop and Web-based systems have expanded the VC market to the point that the technology has become more affordable to small- and medium-sized companies.

Despite substantial growth in sales and in the rate of diffusion of VC technology, empirical studies in business communication have shown that

FTF meetings are still unavoidable in many situations. While much of the earlier literature on VC was optimistic about its potential to reduce business travel (for a review, see Geels & Smith, 2000), recent studies have been more cautious in this regard. They suggest that factors such as task complexity and the particular type of knowledge involved make copresence unavoidable for many business meetings in today's knowledge-driven economy (Aguilera, 2008; Kiesler & Cummings, 2002; Handy, 1995; Nohria & Eccles, 1991). Researchers have observed several interaction patterns, including neutrality, complementarity, and modification (e.g., Haynes, 2010; Mokhtarian & Meenakshisundaram, 1999; Salomon, 1986). Thus, the question is not simply about whether VC can substitute for FTF meetings but is rather about what factors influence the choice between VC and FTF meetings.

Lu and Peeta (2009) have stressed the context of the meeting as the key factor influencing the choice between VC and FTF gatherings (i.e., those that would require participants' air travel). The results from their survey indicate that VC is chosen for contexts such as information exchange, management, and training and consulting whereas FTF meetings are chosen for contexts such as negotiations, marketing demonstrations, and business discussions. A Swedish study has indicated that virtual meetings may be best for "follow-up and information tasks" as well as for short and repetitive meetings (Arnfalk & Kogg, 2003, p. 865). Corresponding results were reported by Lian and Denstadli (2004), who found that VCs have less complex content than do FTF meetings, which often involve informal and unstructured negotiations.

As these prior studies suggest, a closer understanding of the practices of VC and FTF meetings will lead to a better understanding of the two communication modes and their future impact on work and organizations. In the following sections, we present the method and data and then the results for our study that examines these practices.

Method and Data

We collected data for this study byasking business air passengers to complete an Internet survey.[1] During 2-week periods in December 2009 and January 2010, respectively, we recruited our respondents at Gardermoen airport in Oslo by approaching passengers on selected flights at the departure gate to ask them whether they were traveling on a business trip. We handed a leaflet to those who responded positively that explained that the Institute of Transport Economics was conducting a survey on business travel and the use of information and communication technology. To avoid

any possible self-selection bias of users, we did not mention the term *videoconferencing*. We asked these prospective respondents to log on to our Web-site to complete the survey. Although we recruited passengers at both the domestic and the international terminals, only those working in Norway were included in the survey. As an incentive to take part, respondents could enter a raffle with the opportunity to win 10,000 NOK (about $1,600). We recruited respondents during peak hours (7:00 a.m. to 9:30 a.m. and 3:00 p.m. to 6:00 p.m.) on weekdays (Monday through Friday), when the number of business passengers is the largest. We prepared a sample plan to determine which flights we would survey in order to obtain a representative sample with respect to destination and airline.

We approached 14,949 business passengers on these selected flights. Of these passengers, 1,068 passengers refused and 13,881 accepted the leaflet we offered to them. The survey Web-site was open for 3 weeks after the final recruitment week, during which time we received 1,411 usable responses (10.2% of the passengers receiving leaflets). The low response rate calls into question the representativeness of the sample and consequently any conclusions that may be drawn based on the data. To check for possible sample bias, we compared the age, gender, and travel-purpose distribution of our respondents with that of the respondents in the 2009 Norwegian Air Travel Survey (NATS). The NATS is the most representative survey of Norwegian air travel, including information on more than 130,000 passengers traveling on scheduled flights to and from Norwegian airports in 2009 (22,000 of whom were business passengers departing from Gardermoen airport). Comparing our Web-survey sample with the latter group, we found that our results overrepresent the views and characteristics of business passengers in the higher age groups (over 50 years) and underrepresent those of the youngest age groups (under 30 years). The gender balance of the sample closely matches that of the NATS, and the travel-purpose distribution is similar across surveys.

Our Web survey comprised questions about the respondents (age, gender, education, occupation, and position) and their workplace (size, branch, location, single or multiunit company). It asked whether they had access to VC equipment in the workplace and about their experiences with using VC. In addition, it asked respondents to provide information on the latest VC they had attended as well as on the business meeting they were traveling to attend or were returning home from attending when we recruited them to do the survey. These latter questions asked about the purpose, participants, scheduling, and duration of that meeting. A final question in the survey asked the respondents to give their opinions on VC and business travel. On average, the respondents took 12 minutes to complete the survey.

Table 1. Characteristics of the Respondents

Gender	%
Female	27
Male	73
Educational level	
Primary/secondary/high school	22
University/college	78
Age	
Up to 30 years	9
30 to 49 years	51
50 years and over	40
Position in company	
Top/middle management	40
Project manager	7
Supervision	8
Other position	45
Number of employees in company	
1-19	24
20-99	26
100 or more	50
Type of industry	
Oil, gas	11
Public administration	22
Banking and insurance	5
Other private services	32
Manufacturing industries	14
Other industries	16
Type of company	
Single-unit company	23
Multiunit company	77

Table 1 lists the key characteristics of our survey respondents. Nearly 3 of the 4 respondents were men—reflecting the gender imbalance in business travel (Denstadli & Rideng, 2010). Almost 80% of respondents held a university degree, confirming that those who use air travel for business tend to be college educated. Moreover, 55% are in a managerial or supervisory position in the company (*other position* comprises respondents whose job tasks do not involve managerial duties). Half of the respondents work in a company with 100 or more employees, which in Norway is considered a large enterprise. These characteristics correspond fairly well with figures on business travel in the NATS.

Table 2. Access to Videoconference (VC) and Type of Technical Platform Used (Multiple Answers Possible)

		Type of VC Platform (% of Those Who Have Access to VC)			
	Have Access to VC %	Use VC for Meeting Rooms %	Use VC for PCs %	Use VC for Portable Equipment (e.g., mobile phones) %	Use Other Types of VC %
All respondents	68	81	36	17	29
Industry					
Oil, gas	89	94	42	8	13
Public administration	71	87	24	12	20
Banking and insurance	73	91	26	7	18
Other private services	68	70	47	25	42
Manufacturing industries	61	84	31	19	28
Other industries	58	74	31	19	36
Number of employees					
1-19	46	45	38	21	46
20-99	61	78	33	17	31
100 or more	83	91	36	16	24
Multiunit company					
Yes	74	83	37	17	24
No	48	66	27	18	39

Results

Our first research question asks about the most important determinants for VC access and use. Our survey results show that 68% of the respondents have access to one or more VC systems at their workplace (see Table 2). Access is greatest for those working in the oil and gas industry—a pioneering industry with respect to VC in Norway (Denstadli & Gripsrud, 2010). Company size is also an important determinant for VC access, with 83% of respondents working for large companies (100 or more employees) having access to VC compared to only 46% of those employed in a small enterprise (1-19 employees). Similarly, 74% of those working for multiunit companies have access to VC facilities compared to only 48% of those employed in single-unit companies.

The conventional meeting room is still by far the most common platform for VC technology, with 81% of respondents who have access to VC using it

Table 3. Summary of the Results From Regression Analyses of Videoconference (VC) Access and Usage According to Respondent and Company Characteristics

Independent Variable	Model A: Access	Model B: Usage
Number of employees	+	*ns*
Industry	+	+
Multiunit company	+	+
Management position	*ns*	+
Age	+	*ns*
University degree	+	*ns*
Gender	*ns*	*ns*

Note: + indicates significant impact ($p < .05$); *ns* indicates not significant impact.

in this way. But 36% of the respondents with VC access work in a company that has adopted VC for PCs, 17% are potentially able to access VC through portable equipment, and 29% use other types of VC. These results clearly show that the computer-based conference has moved well beyond the experimental stage to establish itself as one central way of conducting electronic business meetings. Results further reveal that the type of platform varies across company segments. In particular, a relatively high percentage of respondents who work for small firms have access to VC through their PC, portable platforms, or other types of VC technology (e.g., Skype). These are simpler and less costly platforms (some may even be downloaded free of charge) that seem to be targeted more toward smaller enterprises.

We tested these results statistically, using regression analyses of VC access and usage according to company size and other respondent and company characteristics. From these analyses, we drew two models:

Model A: Access—whether the respondent has access to VC technology in the workplace (dummy-dependent variable)

Model B: Usage—the number of VCs that the respondent who has VC access has attended during the previous 12 months (count-dependent variable)

We used logistic regression to draw Model A (access) whereas we used generalized linear regression with Poisson distribution to draw Model B (usage). Table 3 provides a summary of the results of these analyses.

Overall, industry and multiunit company are the most important variables in explaining VC access and usage. Respondents employed in

multiunit companies have greater access to VC and are more frequent users than are those employed in single-unit companies. Likewise, the impact of industry is significant in both models. Compared to respondents employed in the oil and gas sector, respondents employed in other industries have less access to VC and are therefore less likely to use the technology. This finding supports previous findings that oil and gas companies are the most advanced VC users in Norwegian trade and industry (e.g., Denstadli & Julsrud, 2003). Company size is significant in Model A but not in Model B. Our results show that although people working in larger companies are more likely to have access to VC equipment than are those in smaller companies, the overall usage does not differ significantly between larger and smaller companies that do have access. (For this regression analysis, we did not distinguish between different technical platforms.)

The variables for university degree and age demonstrate a significant impact on Model A, and the management position demonstrates a significant impact on Model B. The impact of gender is nonsignificant in both the models. While VC access is not related to the individual's position in the company, results demonstrate that usage is. Respondents who are company managers (top and middle management) and project managers display significantly higher usage than do respondents in nonmanagerial positions. Univariate tests (not displayed in the tables) reveal that these two groups attend some 15 VCs per year on average compared to 8 and 9 for supervisors and nonmanagers, respectively.

Virtual Versus FTF Meetings

Respondents provided information on the latest VC meeting they had attended as well as on the business meeting they were going to or had been to when we recruited them to take part in the survey.

Purpose of meeting. Table 4 provides a summary of the main purpose of these meetings. The most common purpose for both the VC and the FTF meetings was project work of some kind (53% of VC meetings and 30% of FTF meetings). The purpose of nearly three fourths of the VC meetings was either information exchange (21%) or project work (53%) whereas the FTF meetings had a wider range of purposes. Also, board and management meetings were often arranged as VCs (10%). With the exception of service tasks, VCs were used for all the same purposes as FTF meetings.

Table 4. Main Purpose of the Respondents' Latest Videoconference (VC) and Face-to-Face (FTF) Meetings

Main Purpose	VC (%)	FTF (%)
Conference/seminar	1	17
Education/course	6	13
Project work	53	30
Information exchange	21	6
Negotiation/discussion	3	6
Marketing/sale/product demonstration	3	5
Service	—	4
Consultancy	1	5
Board meeting and management meeting	10	7
Other	2	7
Total	100	100

Table 5. Participants in the Latest Videoconference (VC) and Face-to-Face (FTF) Meetings (Multiple Answers Possible)

Participants	VC (%)	FTF (%)
Customers	14	29
Supplier/contractor	10	18
Main/satellite office in the company	70	42
Public authorities in Norway	7	17
International authorities/organizations	1	3
Consultants	7	11
University, academic experts	5	12
Other	5	11

Participation. The types of participants at the last VC and FTF meetings are shown in Table 5. A majority of the VC meetings were intraorganizational (70%), including participants from the main office or a satellite office. The corresponding share for the FTF meetings was 42%. But even though a high percentage of the VC meetings were of an intracompany nature, VCs were also used, to a lesser extent, for contacts with customers (14%) and suppliers (10%). Because the FTF meetings were used for a wider range of purposes, the types of participants at these meetings tended to be more varied.

Planning. An advantage of VCs is that they can be convened promptly whereas FTF meetings often entail booking travel tickets or hotels and

Table 6. Planning Time for the Latest Videoconference (VC) and Face-to-Face (FTF) Meeting

Planning Time	VC (%)	FTF (%)
The same day	5	—
1-3 days before	18	5
3-7 days before	26	14
1-2 weeks before	20	22
2-4 weeks before	14	24
1 month or longer before	17	35
Total	100	100

Table 7. Reason For Setting Up a Face-to-Face (FTF) Meeting as Opposed to a Videoconference ([VC] Multiple Answers Possible)

	%
VC was not suitable for this type of meeting.	66
We wanted more social contact with the meeting partner.	59
The meeting partner did not have access to VC.	7
The quality of the VC was not good enough.	3

taking the time to travel. Our results show that whereas almost half of all the VC meetings were planned within 1 week, less than 20% of the FTF meetings involved such a short planning time (see Table 6).

Because a VC can be convened promptly, it seems like a reasonable replacement for an FTF meeting. But only 6% of the respondents stated that they had considered having the meeting as a VC rather than traveling to meet FTF. The reasons that they mentioned most for opting for an FTF meeting were that the particular type of meeting they were holding was not suitable for a VC (66%) and that they wanted more social contact with their meeting partners (59%; see Table 7).

In 18% of the reported VCs, the respondents had considered meeting FTF instead (see Table 8). In one fifth of the project meetings and one fourth of the board meetings, respondents had considered meeting FTF. Their main reason for not traveling to do so was to save time and costs. This finding indicates that there is an overlap between travel and meetings and that in at least some cases, VC was used to avoid business travel. At the same time, most decisions for VCs were made without considering the FTF alternative, suggesting that VC is generally used as an

Table 8. Purpose for Last Videoconference (VC) and Whether Respondents Had Considered Meeting Face-to-Face (FTF)

	Consider Meeting FTF?		
Purpose for VC	Yes (%)	No (%)	Total (%)
Training or education	5	95	100
Project team meeting	20	80	100
Information exchange	10	90	100
Negotiations	19	81	100
Marketing/sales meeting	47	53	100
Board meeting/other managerial meeting	25	75	100
Other	20	80	100
All	18	82	100

Table 9. Purpose and Mean Duration of Last Videoconference (VC) and Face-to-Face (FTF) Meeting

	Duration of Last Meeting (Hours)			
Purpose of Meeting	VC	*SD*	FTF	*SD*
Conference/seminar	1.0	0.7	5.9	2.5
Education/course	1.7	1.1	5.6	1.7
Project/work	1.6	1.4	5.4	2.0
Information	1.1	0.9	4.8	2.0
Negotiation/discussion	1.5	1.6	4.0	2.0
Marketing/sale/product demo	1.7	1.5	4.2	2.6
Service	–	–	6.3	3.3
Consultancy	2.2	2.4	5.0	2.1
Board/management meeting	2.1	1.3	5.2	1.7
Other	1.4	0.7	5.6	5.2
Total	1.5	1.3	5.2	2.4

independent communication tool, adding to the traditional form of meeting and available systems for mediated communication.

Duration. The results showed significant differences in the duration of the two modes of business meetings (see Table 9). In general, FTF meetings were more than three times as long as VCs, with an average duration of about 5 hours. The most time-consuming FTF meetings were for the purposes of conferences and service. In contrast, VCs on average lasted less

than 2 hours, the most time-consuming being consultancy (averaging 2.2 hours) and board meetings (averaging 2.1 hours).

Respondents' Attitudes About the Advantages and Disadvantages of VC

To determine the respondents' attitudes toward VC use, our survey asked them whether they agreed or disagreed with statements about the advantages and disadvantages of VC. The statements about the advantages of VC meetings can be sorted into two groups: (a) improves efficiency in exchanging information and making decisions and (b) saves time and the environment and reduces strain. The statements about the disadvantages of VC relate to its negative social aspects (see Table 10).

The results for the two groups of statements about the advantages of VC show that respondents with VC access at their workplace are significantly more positive than are those without access. Those with VC access agree more than do those without such access that VC meetings improve efficiency in the decision-making process, in the handling of information, and in contacting collaborating partners. The results also show that more people with VC access think that VC use reduces the inconvenience of travel and helps to reduce environmental strain.

Those with VC access disagree more often about the negative social aspects of VC than do those without, but for several of these factors, the majority of respondents with experience and equipment agree about the social deficiency of VC meetings. The majority agree that VC is a poor substitute for personal meetings, is not suitable for meeting with unknown people, and is a more difficult scenario in which to develop contacts.

In sum, the results show that, compared to the respondents who did not have VC access, those with VC experience tended to have more positive attitudes toward VC and were more likely to disagree with statements emphasizing the negative social aspects of VC. At the same time, most of the respondents believed that VC is a tool for improving decision making, saving time, and reducing travel stress. Among VC users, the strongest arguments for VC are the opportunities it affords to reduce stress due to travel, reduce environmental strain, and save time. The results show that the main disadvantages of VC are that it is not suitable for meetings between participants who do not know one another and that it makes developing contacts difficult.

Table 10. Responses to Statements About Videoconferencing (VC) According to VC Access

Improves Efficiency		Disagree (%)	Neither Agree nor Disagree (%)	Agree (%)
VC makes decision processes more efficient	Have VC	13	27	60
	Do not have VC	12	33	55
	All	12	29	59
VC gives better flow of information	Have VC	18	34	48
	Do not have VC	16	39	45
	All	17	36	47
VC improves contact with collaborating partners	Have VC	23	27	49
	Do not have VC	22	34	44
	All	23	29	48
Saves time and the environment and reduces strain				
VC saves time	Have VC	19	3	77
	Do not have VC	3	10	87
	All	2	6	92
VC reduces the strain connected with traveling	Have VC	2	4	94
	Do not have VC	6	10	84
	All	3	5	92
VC saves the environment and climate	Have VC	3	5	92
	Do not have VC	4	9	87
	All	3	6	90

(continued)

Table 10 (continued)

Improves Efficiency		Disagree (%)	Neither Agree nor Disagree (%)	Agree (%)
Negative social aspects				
VC is a poor substitute for personal meetings	Have VC	30	18	52
	Do not have VC	22	20	58
	All	27	19	54
VC is not suitable for meetings with people I don't know	Have VC	18	12	70
	Do not have VC	13	18	69
	All	16	14	70
VC makes it more difficult to develop contacts	Have VC	23	23	55
	Do not have VC	18	26	56
	All	21	24	55
Does not suit my type of work	Have VC	54	24	22
	Do not have VC	27	21	53
	All	45	23	32

Note: Some rows in the table add up to 99% or 101% due to the rounding up of decimals.

Discussion

The data in this survey have given us the opportunity to look more closely at the use of VC among a sample of Norwegians who were traveling on business. The findings have provided us with a clearer picture of the role that this technology and such meetings play in working life today and of how VC interrelates with regular FTF meetings. In discussing the findings further, we suggest a framework for understanding the situations that motivate VC and FTF business meetings. Finally, we discuss the implications of the results for further research.

Is VC Technology for Everyone?

A new wave of technologies and services has made VC available on platforms other than traditional room-based ones and, as we have seen, has had some impact on the overall access and use of such VC media. Even though the room-based facility is still the most widely used VC platform in businesses, Internet protocol–based and mobile VC now have a strong foothold.

With the advent of Internet protocol–based conference systems (e.g., Skype and instant messaging) and the distribution of VC computer programs (e.g., Netmeeting and Cucmee), VC is generally much more available for business users now than it was just a few years ago. Yet, there are marked differences in access and use in the business market as a whole. The technology is still most common in larger multinational companies in the areas of engineering, technology development, banking, and finance. An interesting question is whether the uptake of new VC technologies will change this picture in the coming years. Our results show that microenterprises and small-to-medium enterprises are the most active adopters of alternative ways of using VC.

Our results also show that VC is used most frequently by top and middle managers, reflecting earlier investigations of the use of VC in work organizations (Denstadli & Julsrud, 2003). Yet project managers too are frequent users, and the results indicate that VC is used more as a working tool for projects than for board and management meetings. At least for the larger enterprises, VC appears to be a working tool for collaboration on geographically distributed intraorganizational projects.

How are FTF Meetings and VCs similar?

In one way, VC and FTF meetings are similar—both cater to a variety of types of business meetings (i.e., internal staff meetings as well as meetings

with external partners). VC is even used for meetings with customers and clients. Still, our study found some striking differences between VC and FTF meetings. First, VC is a stronger component of internal meetings. In this way, our study replicates some earlier investigations on the use of VC systems in organizations (Arnfalk & Kogg, 2003; Denstadli & Julsrud, 2003; Lu & Peeta, 2009).

VC is generally preferred to FTF meetings when the meeting participants already know each other or have perhaps met FTF on former occasions. But this study reveals that a high number of project-based meetings also are held as VCs. In addition to FTF management meetings, VC is often used to communicate in teams and groups, and project work is the most common purpose of VCs. These findings, perhaps, suggest how VC relates to the growing use of distributed and virtual teams in many modern organizations (Duarte & Snyder, 2001; Hinds & Kiesler, 2002). Moreover, results have shown that VCs save time, both in planning and in the duration of the meeting itself. In today's organizations, VC often takes place in situations that call for emergency meetings because it circumvents the more elaborate and time-consuming process of setting up an FTF meeting that participants must travel to attend.

Although the uses of VC and FTF meetings clearly overlap, VC appears more oriented toward ad hoc gatherings to work on geographically distributed projects because it saves time and reduces the strain of business traveling for managers in larger (dispersed) organizations. This finding indicates that these two modes of communication—FTF and VC—are motivated by nonhomogeneous needs in the organizations.

What Determines Preferred Modes of Communication?

As this study shows, VC and FTF represent two alternative modes of communication in a large number of organizations. This situation raises the question as to what motivates an organization to arrange a VC rather than an FTF meeting and vice versa. Existing theories have pointed at communication content as an important factor determining the potential use of VC as well as at social norms embedded in organizations. From a more organizational point of view, the value of physical meetings in developing social relations and social capital has been discussed as a potential barrier to using electronic meetings.

Based on empirical data presented here, we argue that both content and social relationships are important. A majority of the respondents who use VC agree that with VC it is more difficult to develop new relationships and

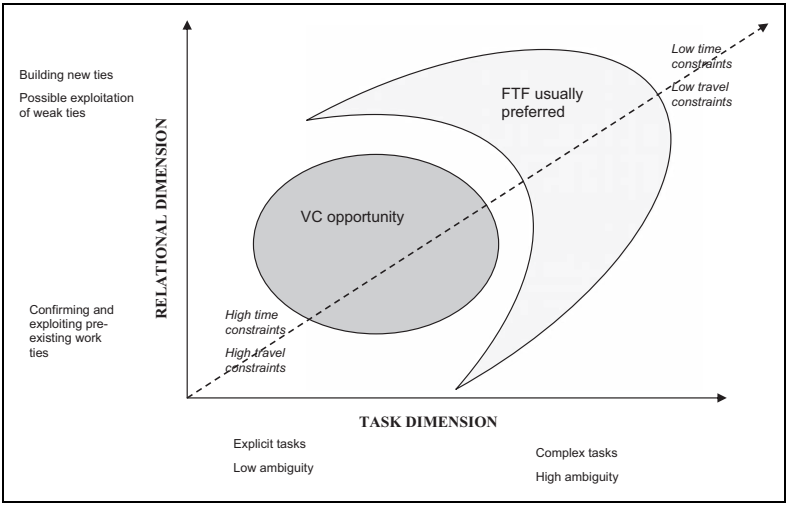

Figure 1. Relational and task-related dimensions that motivate choices for videoconferencing (VC) or face-to-face (FTF) business meetings.

that VC is not suited for meetings in which participants do not already know each other. This finding strongly suggests that social considerations affect the decision to set up a VC or an FTF meeting. The respondents also see communication tasks as important, however, and many find that VC does not match well with their particular tasks (see Table 10). But the fact that many feel that VC makes the communication process more efficient suggests that this way of meeting would have qualities that make it beneficial for particular tasks.[2]

Thus, both communication content and the need for developing social relations are important motives in deciding whether to use VC. In addition, we have documented that the use of VC is affected by organizational time and space constraints. VCs are often spurred by the participants' lack of time for traveling and a dispersed organizational structure. Figure 1 illustrates how relational and task-related dimensions (i.e., content) as well as time and travel constraints motivate choices for using VC or FTF meetings. The desire to develop new relationships and to handle tasks with high ambiguity will increase the tendency to prefer an FTF meeting, particularly if travel constraints are low. On the contrary, the need for communicating about low-ambiguity tasks and sustaining or exploiting preexisting relationships will increase the tendency for selecting VC, particularly if the travel

constraints are high. Figure 1, then, depicts how these two distinct modes of communication, FTF and VC, tend to fulfill slightly different needs in today's business life.

Conclusions

This article has reported the findings from our study of 1,411 Norwegian business air travelers' use of VC at business meetings. These findings have certain limitations: Since the response rate was only 10%, we do not know how well the findings represent business air travelers even though they match the NATS sample on important characteristics. Also, this sample of business travelers does not necessarily reflect the larger basis of employees in business organizations in Norway. For instance, the data comprise information from business air travelers only. We have no information on those business people who do not indulge in air travel—a group that may include people who use telecommunication to replace business trips. In that respect, this group is particularly interesting and is worth specific attention in future research.

Our study indicates that VC is a central choice for meetings with partners and collaborators located at remote sites. As we have seen, the use of this form of meeting is significant, particularly in large organizations with multiple locations. Even though room-based systems are still predominant, new technical platforms for VC based on third-generation mobile telecommunication and regular Internet protocol networks are often preferred by smaller organizations. Further adoption of these systems may change how VC is used and, on a larger scale, how meetings are conducted in the modern workplace.

Even though a number of theories have been concerned with the impact of new electronic media on organizational communication, few studies have explicitly compared the way VC and FTF meetings are used in modern organizations. By conducting a systematic comparison of these two modes of meetings, we have found that VC and FTF meetings seem to operate complementarily in collaborations over distance. Even though VC may be used for a variety of purposes, it is currently used mainly as a tool for collaboration in intraorganizational (distributed) projects and managerial meetings. Thus, the benefits of VC—in relation to saving time and reducing travel-related stress—do not seem to be making FTF meetings redundant in modern work organizations. FTF meetings provide opportunities for developing new business connections and engaging in informal conversations—crucial motives for choosing FTF meetings and (in turn) business travel. As such, many FTF meetings probably cannot readily be replaced by VC, and a

large share of VC is not initiated as an alternative to an FTF business meeting.

Many previous studies on the use of VC in organizations have looked at opportunities to substitute VC for FTF meetings on a larger scale and thereby reduce the cost of business travel (Andreev et al., 2010; Mokhtarian, 2003). Our findings, however, indicate that most companies tend to use both VC and FTF meetings. Future study in this area should be about developing a better understanding of how the two meeting modes serve complementary functions over time and of the factors that motivate decisions to use one over the other.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Notes

1. Note that we received all the necessary approvals to do human subjects research.
2. We have not considered here whether norms in organizations are important for VC use because our data do not provide such information. Yet, it seems likely that the norms of organizations and collaborators will affect user frequency.

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