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Exploring the influence of instant messaging and video conferencing on the quality of project communication

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Abstract

Growth in computer-mediated communication (CMC) technologies such as instant messaging (IM) and video conferencing (VC) has led to a need to explore the utilisation and influence of these tools on the quality of project communication, which must still be established. This article reports the results of a survey conducted among 210 project practitioners using CMC in various industries to determine how, why and what each medium is used for, and how these media influence factors that promote quality communication. Some results showed that the use of both instant messaging and video conferencing in projects is moderate and both improve the quality of communication in virtual teams, however in different ways.

Keywords: Project communication, computer-mediated communication, instant messaging, video conferencing, virtual teams

Abstrak

Die groei in rekenaar-bemiddelde kommunikasietegnologie soos kitsboodskappe en videokonferensies het gelei tot 'n behoefte om die benutting en invloed van hierdie tegnologie op die gehalte van projekkommunikasie te verstaan aangesien dit nog nie vasgestel is nie. Hierdie artikel rapporteer die resultate van 'n opname wat gedoen was onder 210 projekpraktisyns wat CMC's gebruik in verskeie industrieë om te bepaal hoe, hoekom en waarvoor elke medium gebruik word, en hoe hierdie media die faktore beïnvloed wat kwaliteitkommunikasie bevorder. Sommige resultate toon dat die gebruik van beide hierdie tipe media in projekte matig is en dat kitsboodskappe en videokonferensies albei die gehalte van kommunikasie in virtuele spanne verbeter maar egter op verskillende maniere.

Sleutelwoorde*: Projekkommunikasie, rekenaar-bemiddelde kommunikasie, kitsboodskap, videokonferensies, virtuele projekspanne.

1.   Introduction

In this article, the overall objective is to explore the extent to which new means of communication such as instant messaging (IM) and video conferencing (VC) have been adopted to facilitate communication in projects and to investigate their influence on the factors that determine quality communication in a project. IM and VC are both forms of computer-mediated communication (CMC), which involves sending messages through computer networks such as the Internet (Liang & Walther, 2015: 504). For the purposes of this article, a project is defined as a temporary endeavour to create a unique product or service of a sufficient size and scale that it requires multiple resources in order to achieve its objective (PMI, 2013). Literature regarding the utilisation of IM and VC for project communication is scarce. Moreover, the effect of these CMC media on the main factors that influence the quality of project communication would contribute to the body of knowledge, as quality communication increases the likelihood of project success (Bond-Barnard, Steyn & Fletcher, 2014; Dainty, Moore & Murray, 2006; Hill, 2010; Müller, 2003a, 2003b; Pinto & Pinto, 1990; OGC in Webber, 2008). The art and science of project management has grown significantly over the past 50 years. In addition, the emphasis in project management research has changed from a technical engineering orientation to one that encompasses a broader organisational perspective (Pollack & Adler, 2015: 238).

Hardly any attention has been paid to communication in project management (Dainty *et al.*, 2006; Lehmann, 2009). The lack of communication literature in project management has resulted in communication being cited as a primary cause of project failures on numerous occasions (Dainty *et al.*, 2006; Gilpatrick in Pinto & Pinto, 1990; OGC in Shehu & Akintoye, 2010: 28; Souder, 1981: 70). However, Pollack & Adler (2015: 247) reported relationship management topics, of which information and communication management is an important part, as being either of significance or increasingly significant in a study of emerging trends in project management research (spanning 50 years). Therefore, there is significant interest among researchers and practitioners for research relating to information and communication management in 21st-century projects.

At present, teamwork is increasingly characterised by globally distributed work, as organisations and project teams face the demands of increased competition and improved productivity (Galushkin, 2003; Ruhleder & Jordan, 2001: online). As globally distributed projects strongly rely on communication media such as

CMC (Earon, 2014: 2; Harrin, 2010a; Stawnicza & Kurbel, 2012), it is important to ensure that project team members are able to use the available media effectively. An informal survey to determine the use of social media in project environments found that 73% of the 246 respondents from 32 countries indicated that social media was a key issue for project managers (Harrin, 2010b). Since communication in virtual teams is still recognized as particularly challenging, and CMC data very limited, further in-depth analysis is required. Limited literature hinders full understanding of CMC and its contribution to communication management, thus highlighting the necessity for further investigation (Galushkin, 2003: 11).

Recent literature has gone some way in assisting project practitioners to better understand project communication and its effects on project trust, collaboration and success (Bond-Barnard *et al.*, 2013; Bond-Barnard *et al.*, 2014; Chiocchio *et al.*, 2011; Daim, Hab, Reutimanc, Hughesd, Pathaka, Bynumd & Bhatlad, 2012: 206; Dietrich, Eskerod, Dalcher & Sandhawalia, 2010; LePine, Piccolo, Jackson, Mathieu & Saulet, 2008: 278). However, more still needs to be done in order to better understand the utilisation and effect of CMC methods such as IM and VC on the quality of communication in projects.

Previous studies identified seven main factors as major determinants of project communication quality (Bond-Barnard *et al.*, 2014: 5-12; Daim *et al.*, 2012; Müller, 2003a; Turner & Müller, 2004: 329-333). These factors include communication channels, communications plan, audience, content, frequency of interaction, technology, and communication type.

A mixed methods research approach is proposed for this study. First, a focus group was used to gain in-depth insight into the topic and to assess the suitability of the proposed survey questions. Secondly, an international survey was conducted to measure the extent to which project practitioners use IM and VC and to investigate how this communication in a project influences the main factors that determine the quality of project communication, as identified from literature. Statistical analysis techniques such as cross-tabulation were used to examine the data in order to understand how, why and what IM and VC are used for in a project and how they influence the factors that contribute to quality project communication.

This knowledge would make a significant contribution to the information and communication management body of knowledge that is central to relationship management research. Barlett & Ghoshal and Ring & Van den Ven in Fulk & DeSanctis (1995: 339) define the latter as the management of relationships in organisations.

According to Pollack & Adler (2015), relationship management is consistently reported as being either significant or increasingly significant in a study of emerging trends in project management research. Practitioners can use this article to understand how, when and by whom IM and VC are used in a project and to gain insight into the influence of these mediums on the factors that promote quality project communication. The research also discusses the constituents of quality communication, which forms the basis of project trust and collaboration that determines the ultimate outcome of the project (Bond-Barnard *et al*., 2014; Chiocchio *et al.*, 2011; Dietrich *et al*., 2010).

2.   Literature study

2.1.   Computer-mediated communication

Organisations currently face severe competitive and economic pres-sures. As companies reduce extra costs and try to respond more nimbly to customers and competitors, they begin to adopt more network-type organisational structures to tighten inter-organisational linkages and improve management practices (Ehsan, Mirza & Ahmad, 2008; Johnston & Lawrence, 1988; Markus, 1994: 502; Miles & Snow, 1986). To support these network-type structures in the organisation, increasingly more firms, especially those that are large and geographically dispersed, are turning to CMC (Earon, 2014: 2; Ehsan *et al*., 2008; Markus, 1994: 502). Use of these media for intra-organisational coordination is perceived to increase personal and organisational productivity and efficiency (Earon, 2014: 2; Markus, 1994: 503).

CMC involves sending messages through computer networks such as the Internet (Liang & Walther, 2015: 504). Popular forms of CMC include, among others, email, IM, collaboration tools, social networking, blogs, micro-blogs, wikis, and VC. For the purposes of this article, only IM and VC will be discussed in more detail, as these two mediums are the more popular and well-known CMC tools (Harrin, 2010b; Harrin, 2011).

According to Hu (2003) and Osterman Research (2004), IM has evolved from a teenage fad to a valuable communications tool that is central to everyday business. IM (or chat) is a way of sending short text messages to another person through a computer or smartphone. Examples include WhatsApp, AIM™, Windows Live Messenger, eBuddy©, ICQ®, MXit™, Skype™, Tecent QQ®, Xfire™, Yahoo Messenger™, and gTalk. IM is similar to email, but faster and with shorter messages, as the person on the other side has indicated that he is available to message (Harrin, 2010a). Some of the

perceived advantages of IM are that one can view another person's availability; it is very conversational; in most instances, the software is free; spam is not really a problem; one receives instantaneous responses; there is a documentary audit trail, and no communication is received when offline (Bilton, 2012). Some disadvantages include that one must regularly update one's availability status; it requires discipline to regulate usage; information security may be an issue, and status updates can cause one to micro-manage project situations (Harrin, 2010a).

According to a report by Osterman Research (2004), IM is used in up to 92% of all commercial and non-commercial enterprises in North America. Furthermore, Osterman Research (2004) estimated that, by 2007, approximately 80% of all enterprise email users will also be using IM to communicate. The percentage of enterprises using IM for business applications has more than doubled in less than three years (Osterman Research, 2004). One of the aims of this paper is to determine the utilisation of IM by project practitioners and in project environments, which is expected to differ from the figures provided earlier. The dominant interest in enterprise IM use is for business-to-business communications, not business-to-consumer communications (Osterman Research, 2004). A large percentage of IM users find that their use of the telephone and email is reduced because of their use of IM. A survey by Harrin (2010b) found that 80% of the respondents used IM for business and/or personal use and that it was one of the few tools that everyone had heard of (Harrin, 2011).

On the other hand, VC is defined as hosting a conference among people from remote locations by means of transmitted audio and signals (Merriam-Webster Dictionary, 2015). VC enables telecommuting individuals or people in different locations to participate in meetings at very short notice while saving time and money. Examples of VC software include Skype™, SightSpeed™, ooVoo, MegaMeeting®, iChat, Vbuzzer, Tokbox®, Eyejot™, Microsoft®, and LiveMeeting. Some of the advantages of VC are that it increases productivity and efficiency and that no travelling is required. Therefore, it is environmentally friendly, convenient and good for building relationships (Earon, 2014: 2; Harrin, 2010a). Some disadvantages are signal latency and that it can cause anxiety (Wolfe, 2007: 119-126); delegates must work harder to interpret the information presented in the conference (Ferran & Watts, 2008), and lack of eye contact and appearance consciousness (Benson-Armer & Hsieh, 1997). VC is growing in popularity: in 2007, Frost & Sullivan in Paul (2008) estimated it to be a $1.1 billion market, which was up by 29% from the previous year. Furthermore, according to TeleSpan

in Paul (2008), VC sales have risen from 115,000 systems in 2004 to 176,000 in 2007. The majority of the respondents of a survey on social media use in project environments indicated that they use CMC tools for hosting online meetings (Harrin, 2010b).

CMC has become more common in projects due to the importance of informal communication media in facilitating project cooperation and performance (Pinto & Pinto, 1990). In addition, the popularity and progress of information technology worldwide has also contributed to the proliferation of CMC in projects (Guo, D'Ambra, Turner & Zhanget, 2009; Daim *et al.*, 2012). Over the years, both formal and informal communication in projects has progressed from written reports and unplanned face-to-face discussions to meetings using VC and informal project discussions that are facilitated by IM or email. One of the main reasons for this shift to CMC in projects is the increasing use of virtual teams (Remidez & Jones, 2012; Ehsan *et al.*, 2008; Otter & Emmitt, 2007; Daim *et al.*, 2012).

The growth in CMC technologies such as IM and VC is astounding. However, what benefits can an organisation or project gain from using such communication tools?

Since 2007, McKinsey & Company has been conducting a yearly survey, with nearly 1,700 responses from executives across industries and regions, per year. These surveys determine what value the companies have gained by adopting various CMCs within their organisations, externally in their relations with customers, and in their dealings with partners and other stakeholders. Their responses suggest why CMCs remain of high interest: in 2009, 69% of the respondents reported that their companies gained measurable business benefits, including more innovative products and services, better access to knowledge, reduced time to market, reduced costs (notably communication costs), increased revenue, and customer satisfaction (McKinsey & Company, 2009: online). In 2010, the measurable benefits from the internal use of CMCs were as follows (McKinsey & Company, 2010: online):

- 77% increase in speed to access knowledge;
- 60% reduced communication costs;
- 41% increased employee satisfaction;
- 40% reduced operating cost;
- 29% reduced time to market, and
- 18% increased revenue.

The adoption and utilisation of CMC tools such as IM and VC by organisations provides support for the proposition that CMC is used significantly in organisational projects.[1] One can make this deduction, as projects are the vehicle through which an organisation implements its strategy; therefore, projects (in some shape or form) will be found in the vast majority of organisations (Shao & Müller, 2011: 947). Harrin (2011, 2010b) did some preliminary work to quantify the utilisation of CMC in project environments. However, much still needs to be done in order to determine the exact extent to which specific mediums such as IM and VC are being used in projects and what influence they may be having on other aspects of project communication.

2.2   Quality communication in projects

The role of the project management function is to manage the systems that relate to the features of uniqueness, novelty and transience, inherent to the term 'project'. These systems include scope of work, project organization, quality, cost, and duration of the project. Communication is an essential ingredient of all these managerial requirements and must be viewed as the essential prerequisite to successful project-based management (Dainty *et al*., 2006). Bond-Barnard *et al*. (2013) found that a balance of frequent informal and formal communication affects the performance of the project, by influencing the degree of collaboration and the level of trust in the project team, which also guides the project's performance. Consequently, communication is frequently identified as a major determinant for project success or failure (Müller, 2003a; Hartman in Müller, 2003b).

Communication may be compared to a metaphorical 'pipeline' along which information is transferred between individuals or groups (Axley, 1984) through a common system of symbols, signs, or behaviour (Merriam-Webster Dictionary, 2015). Thus the communication process involves a person or entity sending out a message and another receiving and successfully understanding the message in response (Torrington & Hall, 1998). It stands to reason then that the determinants of communication quality between the message initiator and the correct message receiver(s) in a project are determined by the frequency and accuracy with which a message (with appropriate content) is conveyed, using the most suitable communication medium available, while being aligned with the project communications plan. This definition for quality communication was formulated based on the factors identified in the

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1   Not small one-man projects, but projects done by a team in the organisation.

literature, *viz.* frequency of interaction, content, type, technology, communication channels, audience, and communications plan (Bond-Barnard *et al.*, 2014; Bond-Barnard *et al.*, 2013; Daim *et al.*, 2012; Müller, 2003a; Turner & Müller, 2004). 'Culture' and 'leadership' factors, among others, may also influence the quality of communication, but are beyond the scope of this article. The literature relating to each of the factors identified earlier is discussed in more detail below, as the survey questions used to measure whether IM and VC can be used to facilitate quality communication centre on these factors.

2.2.1 Frequency of interaction

Frequency of interaction refers to the number and timings of project team members' communications with the stakeholders and each other (Turner & Müller, 2004: 328-333). The Project Management Body of Knowledge (PMBoK) Guide by the Project Management Institute (PMI) (2013) states that timely communications are a prerequisite for successful project completion. Similarly, Bond-Barnard *et al.* (2013); Chen, Liang & Lin (2010); Turner & Müller (2004), and Webber (2008) found that frequent informal and formal communication improves the communication quality, trust and collaboration in project relationships. This, in turn, contributes to high project performance. Timely communications are especially important when dealing with project teams from different geographical regions, as the frequency of interaction decreases when the project team is not co-located (Van den Bulte & Moenaert, 1998; Dietrich *et al.*, 2010). The lack of timely communication has been cited as a common factor among failing projects (Dalcher, 2009; Yalegama, Chileshe & Ma, 2016).

2.2.2 Communication content

Communication in a project can only be as good as the content that is being communicated; therefore, quality content results in quality communication (Bond-Barnard *et al.*, 2013; Bond-Barnard *et al.*, 2014). Müller (2001) found that the content of quality project communication falls into one or more of the following categories:

- Status and achievements;
- Project changes;
- Issues and open items;
- Next steps in the project;
- Quality and progress measures, and
- Project trends.

Penteado in Carvalho (2008) warns that project communications competencies, which refer to the group's ability to codify, transmit and decode information, are necessary, but not sufficient prerequisites to the effectiveness of project communication. This means that, if the project team is not able to codify or decode the communication content correctly, the effectiveness or quality of the project communication may be reduced.

2.2.3 Type of communication

Communication type is identified as a major determinant for quality communication in projects (Turner & Müller, 2004: 333). Post *et al.* (2009) state that participative communication improves the quality of project communication, as it is the strongest indicator of innovation effectiveness and patents produced. They add that participation often leads to a better understanding of potential problems that encompasses the concept of connective thinking. Participative communication can either be informal or formal and both forms can be facilitated both orally and in writing. Turner & Müller (2004: 333) established that a mixture of formal and informal communication best served the communication needs of project participants. Moreover, Torrington & Hall (1998) found that a message is conveyed more successfully if a variety of media such as verbal, non-verbal, written, audio-visual or electronic is used. It has been shown that frequent informal and formal communication improves communication quality, trust and collaboration in project relationships, which is linked to high performance (Bond-Barnard *et al.*, 2013; Chen *et al.*, 2010; Turner & Müller, 2004; Webber, 2008).

2.2.4 Technology utilised

Technology is one of five factors that significantly contribute to the breakdown of communication in a project (Carvalho, 2008; Daim *et al.*, 2012), because technology causes physical communication barriers that arise when information is transmitted (Ferreira in Carvalho, 2008). Conversely, technology can also enable communication by providing a means through which communication is facilitated, if it is used correctly. With the advent of global virtual teams and tendencies towards continuous communication or updates (e.g., Twitter, RSS feeds), technology plays a key role in enabling communication and, for this reason, it determines the quality of communication in 21st-century projects.

2.2.5 Communication channels

The PMBoK Guide states that one of the two main components of project communication is the knowledge and management of the project's communication channels (PMI, 2013). Project communication channels are defined as the connections between communicators in a project. The greater the number of project stakeholders/communicators, the greater the number of channels and the more complex the communication issues become (Daim *et al*., 2012). Since communication channels determine how much communication must take place in a project, it also, to some extent, determines the quality of the project communication.

2.2.6 Audience

The audience/communication recipient(s) plays an important role in determining the quality of project communication (Bond-Barnard *et al*., 2013; Bond-Barnard *et al*., 2014; Müller, 2003a). The potential or expected audience determines whether one will be communicating one-to-one or with a group and whether this communication will take place face-to-face (in person) or through voice or text.

2.2.7 Communications plan

The communications plan is crucial for quality communication, because the lack of a plan is a barrier to communication in projects (Carvalho, 2008). The project communications plan is used to determine who needs what information, how it will be collected, and how it will be transmitted. Modern communications planning focuses on organising and documenting the process, types and expectations of information dissemination throughout the project's life cycle (Lesko & Hollingsworth, 2010).

3. Materials and methods

The utilisation and application of CMC medium such as IM and VC has grown exponentially over the past few years. People use these mediums to communicate in their personal lives and more frequently also for work purposes. Very little is known about the utilisation of CMC for communication in projects specifically, and for this reason, the study aims to determine how, why and what IM and VC are used for in projects, and how they relate to the factors that promote quality project communication, namely frequency of interaction, communication content, type, access to technology, communication channels, audience, and the existence of a communications plan.

Mixed methods research was found to be suitable for this study (see 3.2). The first part of the study is exploratory in nature; therefore, a focus group was decided upon. The findings from the focus group provided input to the quantitative survey that followed. Statistical techniques such as cross-tables were used to answer both the exploratory and the relational aspects of the research questions proposed below.

3.1 Research questions

In this study, the following seven research questions are investigated:

1. For what purposes are IM and VC used in projects?
2. Where these tools are used in projects, whom are they used to communicate with?
3. To what extent are IM and VC included in the communications plan of the project?
4. How frequently are IM and VC used to communicate with the project members?
5. What project content is communicated using IM and VC?
6. To what extent is the use of IM and VC influenced by access to technology (access to the Internet and/or CMC applications or software)?
7. What effect does IM and VC communication have on the quality (efficiency and effectiveness) of the communication, if the team is geographically dispersed?

3.2 Research methodology

A mixed methods research methodology was used in the study. First, a focus group was used to qualitatively explore the proposed research questions. This was followed by a quantitative study consisting of a questionnaire and statistical analysis. The focus group consisted of six project practitioners from an international consulting engineering company that uses various CMC technologies for project communication and information sharing. The findings from the qualitative study were used to develop the survey questions. The aim of the empirical study was to generalise the findings.

Practitioners, knowledgeable about CMC technologies and working in project environments, formed the unit and level of analysis for the quantitative study. The questionnaire was designed for respondents to indicate whether they made use of IM and/or VC for personal reasons and/or for business, and how these mediums influenced the quality of the communication they had experienced between

themselves and the other stakeholders of projects in which they had participated. The questions were either categorical or asked the respondents to rate their response, on a 10-point scale, in terms of the extent to which IM and/or VC relate to the factors that promote quality project communication (Bond-Barnard *et al*., 2014). A sample of the questionnaire is shown in Appendix A.

Data were collected from a total of 270 international respondents working on medium-size projects in various industries, for both government and private institutions. The target population of the survey in this study was project leaders (i.e. project/programme managers), project team members, project stakeholders (e.g., subcontractor, functional manager, regulatory authority, external party) and project sponsors/clients. The survey was conducted by means of an online, self-administered questionnaire using Qualtrics™. The questionnaire was distributed to the members of five different open and closed project management LinkedIn® groups. The questionnaire was sent to 19 project management experts (mainly academics[6]) who were identified from prominent project communication management literature (Harrin, 2010a; Ehsan *et al*., 2008; Walther, 1997; El-Saboni, Aouad & Sabouni, 2009; Glücker & Schrott, 2007; Greenberg & Antonucci, 2007; Dube & Marnewick, 2012). The questionnaire was also circulated to all the current students[2] and alumni of masters, postgraduate diploma and certificate programmes in the Graduate School of Technology Management at the University of Pretoria. Of the 270 responses received, only 210 were valid and complete.

Bias was addressed by distributing the survey through various means to a wide variety of project practitioners (101 project leaders, 88 project team members, 8 project sponsors, and 13 other project stakeholders) in order to accurately measure the utilisation of IM and VC in projects. Furthermore, all concepts relating to the survey were clearly defined and examples of technologies provided, so that all participants had a clear understanding of the questions being asked. The survey was distributed electronically and snowball sampling was encouraged; therefore, neither the population of the survey nor the response rate could be determined. The reported findings can, for this reason, not be generalised. The valid dataset was analysed using

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2   Please note that the survey was sent to academics and students. However, their responses were only included if they had/have experience working in project environments and based on the description of the project environment in which they work/worked, i.e. construction, mining, etc. Their participation in the survey is depicted in Table 1. Pure academics or students with no work experience were not included in the study. Therefore, these two groups of respondents are not depicted separately in Table 1.

IBM SPSS® Statistics 22, specifically cross-tabulation. All calculations in the Tables and Figures take into consideration individuals who use both IM and VC and, separately, those who use either IM or VC only. This may reflect in the respondent totals in Tables and Figures, as these totals do not always show the sum of the components.

Table 1 shows the profile of the respondents for each of the typical roles in the project in terms of gender, age, field of work, and nature of business entity. Only respondents who are working or who, at some stage, worked in a project environment were included in the study.

Table 1:   Summary of respondents' profile by typical project role (reported as percentage)

	Project leader	Project team member	Project sponsor/ client	Other project stakeholder	Total
Gender of respondents n=210					
Male	35.2	29.5	3.3	5.2	73.3
Female	12.9	12.4	0.5	1.0	26.7
Total	48.1	41.9	3.8	6.2	100
Respondent age n=210					
20-29	6.7	11.9	0.5	1.9	21.0
30-39	22.4	21.9	1.0	3.3	48.6
40-49	11.0	5.2	2.4	0.5	19.0
50-59	5.2	2.9	0.5	0.5	9.0
60+	2.4	0	0	0	2.4
Total	47.6	41.9	4.3	6.2	100
Principal industry n=210					
Agriculture	0.5	0	0	0	0.5
Construction	7.6	6.7	0	0	14.3
Finance, insurance, real estate	1.9	0.5	0	0.5	2.9
Government	8.6	5.7	2.4	0.5	17.1
Health care	1.0	0	0	0	1.0
Information technology	3.3	3.3	0	0.5	7.1
Manufacturing	4.3	3.3	0	1.0	8.6
Mining	4.3	5.7	0	0.5	10.5
Services industry[3]	5.2	4.8	0.5	0	10.5

	Project leader	Project team member	Project sponsor/ client	Other project stakeholder	Total
Transportation	2.4	2.9	0	1.4	6.7
Communication or utilities	3.8	1.4	0	1.0	6.2
Non-profit organisations	1.0	0	0	0	1.0
Other	4.3	7.6	1.0	1.0	13.8
Total	48.1	41.9	3.8	6.2	100
Business entity n=210					
Sole proprietor	0.5	0	0	0	0.5
Closed corporation	0	1.0	0	0	1.0
Private company	20.5	19.0	1.0	2.9	43.3
Public company	5.7	4.8	0.5	1.0	11.9
State-owned company	10.0	9.5	0.5	1.4	21.4
Personal liability company	1.0	0	0	0	1.0
A not-for-profit business	0.5	0.5	0	0	1.0
Government	9.5	6.2	1.9	1.0	18.6
Other business entity	0.5	1.0	0	0	1.4
Total	48.1	41.9	3.8	6.2	100
Number of stakeholders communicated with in a typical project n=136					
1-5	6.6	8.8	0	2.2	17.6
6-20	30.9	20.6	1.5	4.4	57.4
21-50	12.5	5.9	0	0.7	19.1
51-100	1.5	2.2	0	0	3.7
101-500	1.5	0	0	0	1.5
500 and over	0.7	0	0	0	0.7
Total	53.7	37.5	1.5	7.4	100

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3   This implies service-related environments, i.e. professional services, hospitality, etc.

4.   Results and discussion

The study aim is twofold. To determine, first, how, why and what IM and VC are used for in projects and, secondly, how these communication media relate to the factors that promote quality project communication. In order to establish how, why and what IM and VC are used for in projects, it was found that only 32% of the respondents use both IM and VC to communicate. A further 43% indicated that they only use IM for communication, whereas 13% stated that they only use VC to communicate. Of the respondents, 12% indicated that they use neither media for communication. They mentioned that the tools they do use for project communication include email, telephone, newsletters, SMS, face-to-face meetings, and teleconferencing. Some of the reasons that the respondents gave for not using IM or VC included:

• People are not familiar with IM communication such as BBM or WhatsApp.
• Some companies do not permit the use of IM.
• IM is not perceived to be a mature form of communication.
• IM is not perceived to be a professional form of communication.
• Some clients do not have the technology available for IM or VC communication.
• The security of the communication is an issue in some projects and for some companies.
• Project sites are often remote, with limited Internet access.
• Projects are never urgent and can be attended to by email.
• Their companies are always late adopters of new communi-cation technology.
• Their company does not have a standard IM system.
• IM and VC communication has never been necessary in their project.

Respondents were asked for what purpose they use IM and/or VC to communicate (see Table 2 and Figure 1), in response to the first research question.

Table 2:   The purpose of CMC communication per project role

The purpose for using the following CMC tools to communicate (reported as percentage)	Project leaders	Team members	Sponsor/ client	Other stakeholders	Total
IM business use n=155	10	8	1	1	**20**
IM personal use n=155	12	5	1	3	**20**
IM business & personal use n=155	22	32	3	3	**60**
VC business use n=94	35	20	0	6	**62**
VC personal use n=94	4	2	0	0	**6**
VC business & personal use n=94	14	15	0	3	**32**
IM & VC business use n=68	6	6	0	3	**15**
IM and VC personal use n=68	4	1	0	0	**6**
IM business & VC personal use n=68	0	0	0	0	**0**
IM personal & VC business use n=68	6	1	0	3	**10**
IM business & personal use & VC business use n=68	16	10	0	0	**26**
IM business & personal use & VC personal use n=68	1	1	0	0	**3**
IM business use & VC business & personal use n=68	0	0	0	0	**0**
IM personal use & VC business & personal use n=68	1	1	0	1	**4**
IM & VC business and personal use n=68	15	18	0	3	**35**
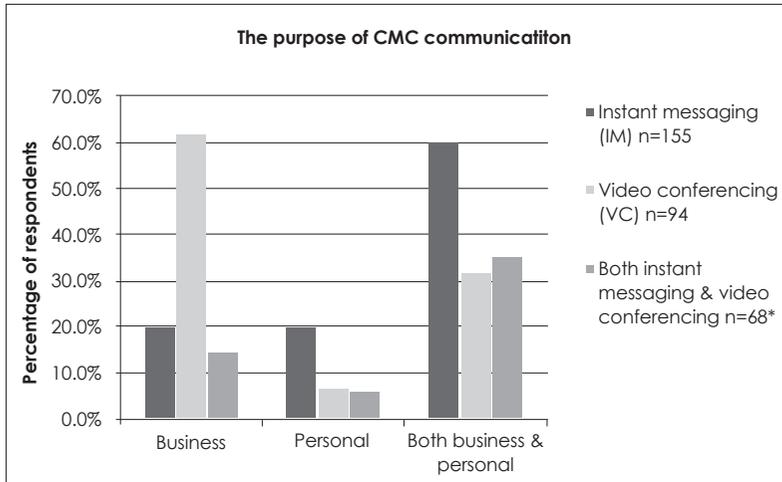
Figure 1:   Purpose of CMC tool communication

Of those respondents who indicated that they only use IM, 60% use it for business and personal communication, whereas, of the remaining 40%, 20% use IM only for business use and 20% use IM only for personal use. Of the respondents who indicated that they only use VC, 62% use VC for business communication; 32% for business and personal use, and only 6% for personal use. Similarly, of the respondents who use both IM and VC, 35% use IM and VC for business and personal communication; 26% use IM for business and personal use and VC only for business use, and 15% use IM and VC only for business use. These results are interesting, as they contradict the general presumption that CMC tools are used more for personal use than for business (Harrin, 2010a, 2010b, 2011).

The second research question aimed to determine with whom the respondents communicate in the project when they use IM and VC (relates to the communication channels factor). The results in Figure 2 indicate that the majority of the respondents using IM for work communicate mainly with their team members and the project leader. This changes slightly when one examines the use of VC, where VC is mainly used to communicate with stakeholders, thereafter the project sponsor/client, followed by project team members, and finally the project leader. These findings are interesting, as it appears that VC is, in general, used to communicate with large groups of people such as the other project stakeholders and the project team, whereas IM is used more to communicate with individuals such

as the project leader and members of the project team. The vast majority of CMC communication takes place between the project team members; this is to be expected, as most communication takes place in this instance.
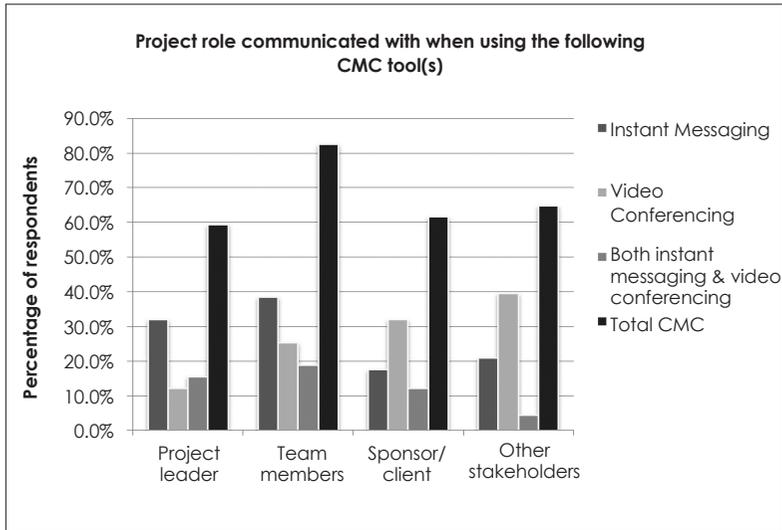

Figure 2:   Recipients of CMC communication in projects

The third research question sought to determine whether the use of VC and IM in projects is sanctioned by a communications plan (relates to the communications plan factor). When the respondents were asked whether a communications plan existed for the project, 67% responded affirmatively. Of the respondents, 87% indicated that they do not know if there is a communications plan in place, and 25% responded that there is no communications plan for the project. Of the respondents who answered in the affirmative, 55% stated that the use of CMC or social media tools such as IM and VC is not documented in the said plan. Of the respondents, 35% mentioned that CMC/social media tools are documented in their communications plan for the project; 4% did not know, and 6% indicated that the question is not applicable. These findings show that project practitioners still need to be made aware of CMC/social media tools and to be educated on the use thereof in their projects. This education would go a long way in assisting them to include these tools and mediums in the communications plan for projects because, whether they like it or not, CMC tools are being used in

organisations and projects, and it would be better to address the use of these tools rather than to ignore their existence. It is essential that the plan must clearly state how different types of communication mediums, including CMC, are to be used to collect and transmit project information. Moreover, a communications plan is crucial for quality communication, because the lack of a plan is a barrier to communication in a project (Carvalho, 2008).

The fourth research question investigated the frequency with which IM and VC are used to communicate with project members (relates to the frequency of interaction factor). From the results (see Figure 3), it came to light that:

- IM is predominantly used to communicate with the project leader, as indicated by the Likert scale items (always and most of the time) in Figure 3.
- Project practitioners use IM to communicate with other project team members.
- There is no agreement on the frequency with which IM communication is used for communicating with project sponsors/clients. It is, however, used frequently to communicate with other project stakeholders.
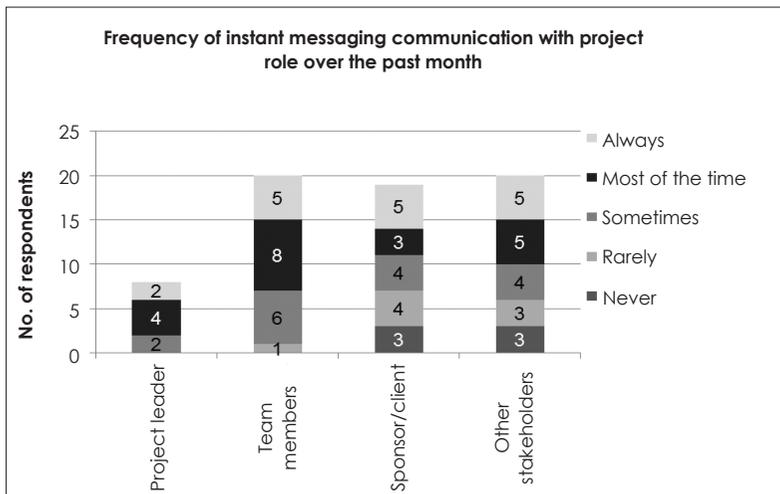

Figure 3:   Frequency of IM communication with the various project roles

The frequency of VC communication in projects yielded similar results (see Figure 4) in that:

- Most of the time, VC is used to communicate with the project leader. However, a greater portion of the respondents indicated that they never, rarely or only sometimes use VC to communicate with the project leader.

- The frequency of VC communication with project team members ranges from sometimes (majority) to never and always.

- VC is used most of the time to communicate with project sponsors/clients, whereas it is only sometimes used to communicate with other stakeholders.

- VC is used sometimes or rarely to communicate with other project stakeholders.
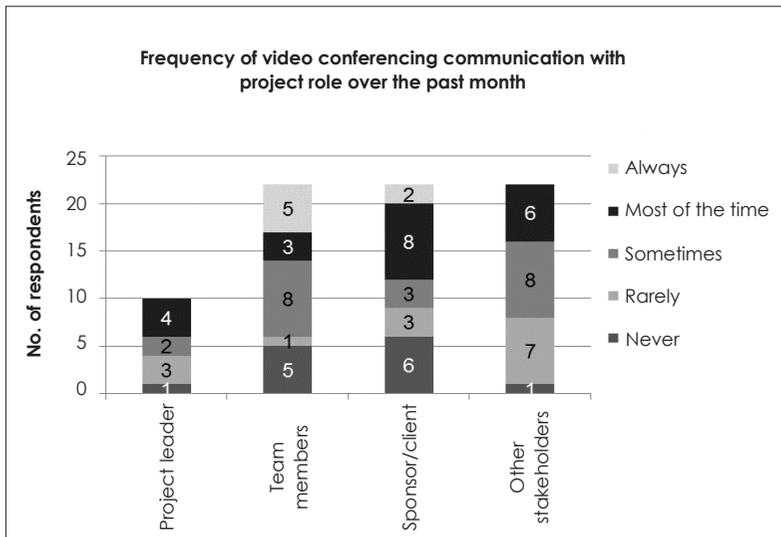
Figure 4:   Frequency of VC communication with the various project roles

The respondents were also asked if they use IM and VC to communicate one-to-one, or if they use these mediums to communicate with a group (relates to the audience factor). The results indicate that the majority of the respondents use IM to communicate one-to-one. The respondents were split over whether they would use the medium to communicate with a group of people. The results for VC indicate the opposite, in that the respondents use VC to communicate with

a group of people to a greater extent, whereas they use VC to communicate one-to-one to a lesser extent.

The fifth research question investigated the contents of IM and VC communication that occurs in projects (relates to the communication contents factor). Müller (2001) found that the content of quality project communication falls into one of the six categories listed in Figure 5.
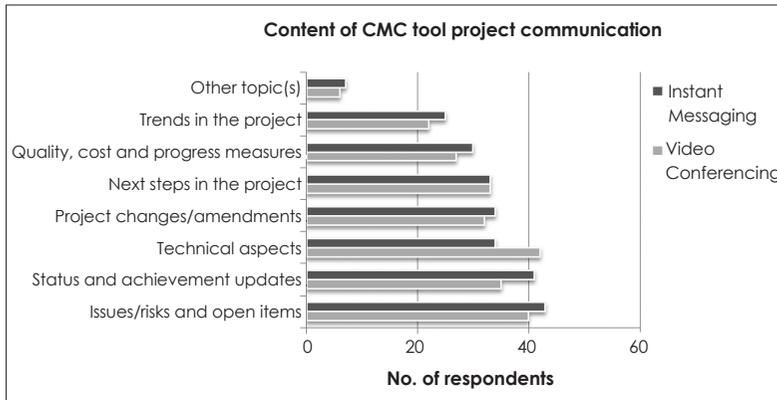

Content of CMC tool project communication

Figure 5:   Content of CMC communication in projects

The results of the survey showed that the majority of the IM project content consists of issues/risks and open items, status and achievement updates, project changes/amendments, and technical aspects. It appears that IM content generally consists of urgent questions regarding project activities that might have gone wrong or turned out differently than expected; hence risks, project changes and technical aspects. It appears that IM is also used for communicating project successes and updates as they happen. Some of the other IM content mentioned by the respondents was the communication of quick project information, task allocations, incomplete project handover details, and issues relating to expired warranties. Likewise, the results for VC, presented in Figure 5, indicate that the majority of VC content in projects is characterised by technical aspects, followed by issues/risks and open items, and status and achievement updates. The dissimilarity between IM and VC is that it appears that VC is used more often to obtain input (possibly from outside the project) regarding complicated technical aspects in the project. The reason for this may be that VC is a much richer medium than IM, as more information such as detailed explanations, body language and

voice inflections can be communicated. In-depth discussions can also take place more easily using VC rather than IM. The respondents mentioned that they also use VC to communicate project close-out issues, project timelines, and for crisis management.

The survey participants were asked if they perceived the content of their IM and VC communication to be of a formal (regimented, deliberate, and impersonal) or more informal (spontaneous, casual, familiar) nature (see Figure 6) (relates to the type of communication factor).
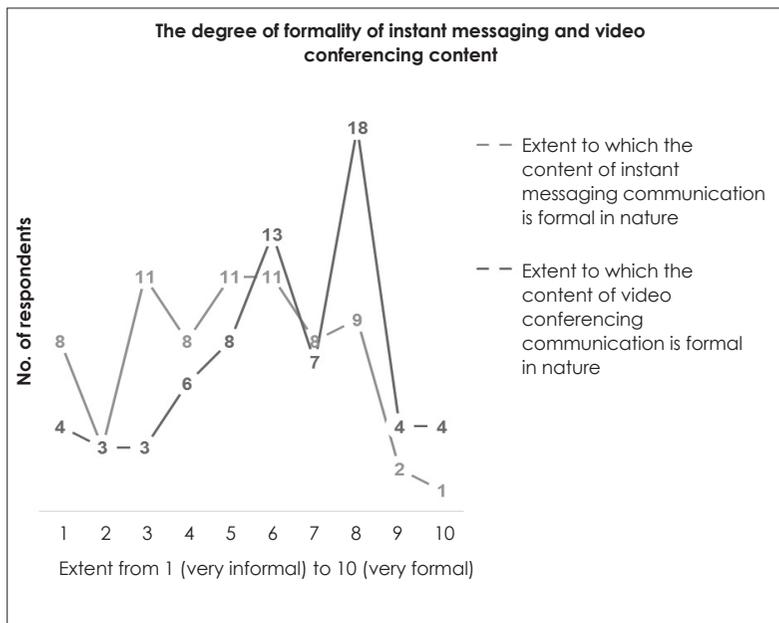
Figure 6:   Extent of project CMC content formality

Of the respondents, 57% perceived the content of their IM communication to be more informal, whereas 66% of the respondents perceived their VC communication to be more formal. This finding challenges existing literature, as written communication such as letters and emails are conventionally perceived to be more formal than verbal communication such as face-to-face or telephonic conversations (Turner & Müller, 2004). In this instance, the written or typed instant messages are perceived to be a more informal form of communication than the verbal and visual communication of VC.

The sixth research question investigated whether the use of IM and VC is determined by a person's access to technology (see Figure 7) (relates to the technology utilised factor).
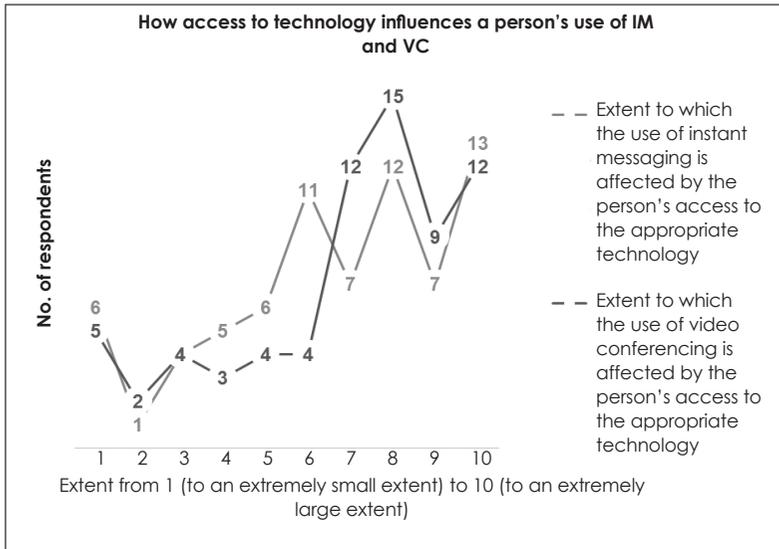

Figure 7: How access to technology determines a person's use of CMC tools

Of the respondents, 69% were of the opinion that access to IM technology such as the Internet, a computer and/or IM software does affect one's use of IM as a communication medium. Similarly, 74% of the respondents are of opinion that access to VC technology such as the Internet, a webcam, a computer and/or VC software affect one's use of VC as a communication tool. These findings correspond with Ferreira in Carvalho (2008), in that technology can cause physical communication barriers to information transmission. It is also important to note that technology can significantly contribute to the breakdown of communication in a project if all aspects of its use are not taken into consideration when writing the communications plan (Carvalho, 2008; Daim *et al.*, 2012).

The seventh research question investigated whether IM and VC communication has an effect on the quality of communication if the team is geographically dispersed. As part of this question, the survey participants were also asked to what extent IM and VC communication leads to more appropriate (increased amount) project communication (see Figure 8 for results).
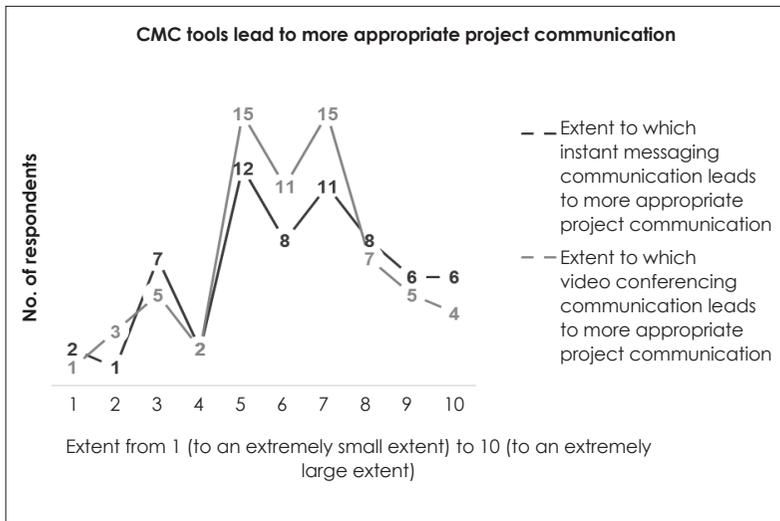
Figure 8:   The extent to which CMC tools lead to more project communication

Of the respondents, 62% stated that IM communication, to various degrees, leads to an increased amount of project communication. Likewise, 62% of the respondents also perceived VC communication to lead to an increased amount of project communication. This finding is very positive for project communication, as frequent communication between project team members is beneficial, because timely communication in projects results in the completion of projects and project success (Dalcher, 2009; PMI, 2013).

An additional question was also posed to the survey participants to determine whether IM or VC communication in projects increases or decreases the quality/effectiveness of the communication if the team is geographically dispersed (see Figures 9 and 10).
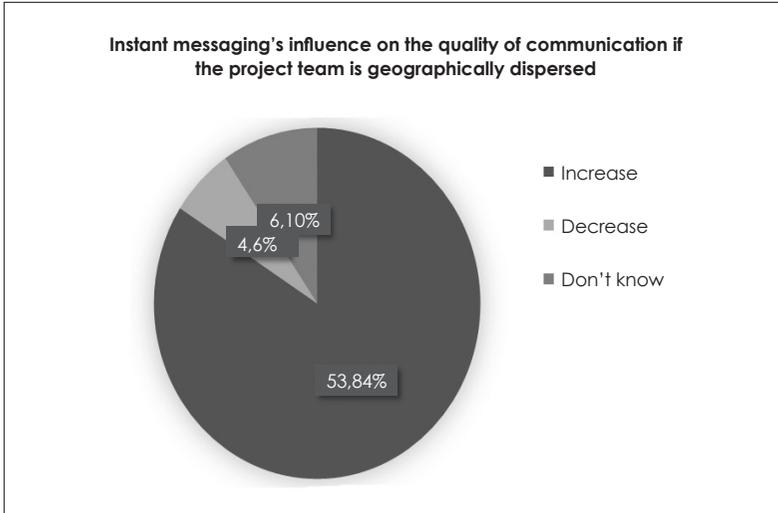
Figure 9:   Influence of IM on the quality of communication in geographically dispersed projects
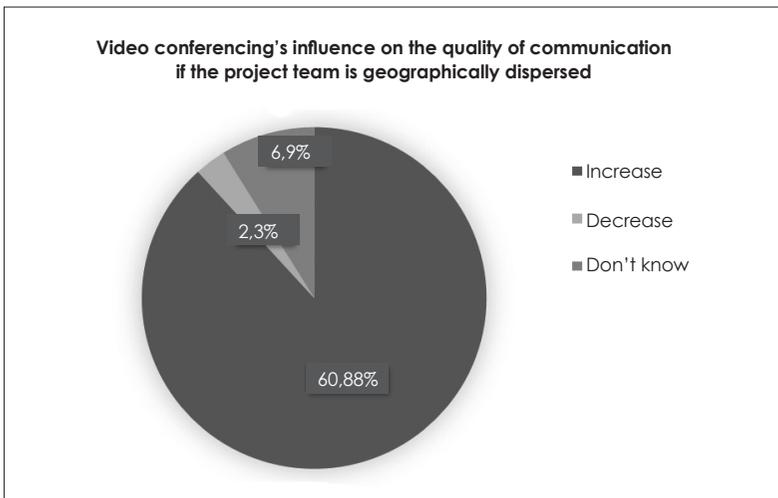

Figure 10: Influence of VC on the quality of communication in geographically dispersed projects

It was established that 84% of the respondents found IM and 88% found VC to increase the quality of the communication if the team

was geographically dispersed. These findings show that the use of IM and VC encourages timely communication in projects that would counteract the decrease in frequency of interaction that occurs when project teams are not co-located such as in the case of virtual teams (Van den Bulte & Moenaert, 1998; Dietrich *et al.*, 2010).

5.   Conclusions

The popularity of, and growth in the use of CMC and the increasing importance of projects and project management contribute to the relevance of this study. Limited literature on the utilisation of IM and VC for project communication and their influence on the perceived quality of project communication served as the motivation for this study. This study also forms part of a larger goal to better understand communication quality in projects at present, as this increases the likelihood of project success (Bond-Barnard *et al.*, 2014; Bond-Barnard *et al.*, 2013; Dainty *et al.*, 2006; Hill, 2010; Müller, 2003a, 2003b; Pinto & Pinto, 1990; Office of Government Commerce (OGC) in Webber, 2008). This article set out to determine how, why and what IM and VC are used for in projects, and how these communication media relate to the factors that promote quality project communication.

In response to the first objective of the study, the results indicate that the prevalence of IM and VC use in projects is moderate. This shows that the use of these CMC mediums in projects is substantially less than the utilisation of IM and VC in North American organisations, as reported by Osterman Research (2004), Frost & Sullivan and TeleSpan in Paul (2008). The study also found that IM tends to be used in equal measure for business and personal communication, whereas VC is primarily used for business communication. This was an interesting finding, as the authors' perception prior to conducting the research and the findings of Harrin (2011, 2010a, 2010b) were that both these mediums are used more for personal communication than for business. This contradicts Harrin (2011, 2010a, 2010b) who states that these tools are used more for personal use than for business.

The second objective of the study was to determine how IM and VC relate to the factors that promote quality project communication, namely frequency of interaction, communication content, type, technology, communication channels, audience, and communications plan. Data relating to the frequency of interaction indicated that both mediums lead to an increased amount of communication in the project and that this subsequently increases the quality or effectiveness of the communication where the project team is geographically dispersed. These findings show that the use of IM

and VC encourages timely communication in projects, which would counteract the decrease in frequency of interaction that occurs when project teams are not co-located such as in the case of virtual teams (Van den Bulte & Moenaert, 1998; Dietrich *et al.*, 2010). Furthermore, it would be expected that the likelihood of project success should increase (Dalcher, 2009; PMI, 2013).

The results for the audience and communication channels factors for the two mediums indicated that IM is mostly used to communicate one-to-one with the project leader, team members and stakeholders, whereas VC is mostly used to communicate with groups in the project such as team members, stakeholders and representatives of the client.

The study found a difference between the content of IM and VC communication. IM content was characterised by quick discussions regarding day-to-day issues and providing status updates as well as quick responses to technical questions on the project, whereas VC content was characterised by in-depth discussions of technical issues as well as by discussions regarding issues/risks, open items, and status updates.

The study investigated the respondents' perception of the formality of the two mediums (as it relates to the communication type). It was found that IM is perceived to be a more informal way of communicating as opposed to VC which is perceived to be somewhat more formal. This finding contradicts Turner and Müller's (2004) findings, as written communication such as letters and emails are conventionally perceived to be more formal than verbal communication such as face-to-face or telephonic conversations.

The study found that appropriate technology determined, to a large extent, the respondent's use of IM and VC tools. This corresponds with Ferreira in Carvalho (2008), in that technology can cause physical communication barriers to information transmission. It is also important to note that technology can significantly contribute to the breakdown of communication in a project if all aspects of its use are not taken into consideration when writing the communications plan (Carvalho, 2008; Daim *et al.*, 2012).

The study found that a communications plan was in place for 67% of the projects with which the respondents were involved. However, the majority of the respondents mentioned that these communications plans do not cover the use of CMC tools. This finding indicates that project practitioners should familiarise themselves with the use of CMC/social media tools in projects, so that these tools are addressed

in the project communications plan. This is crucial, as the lack of a plan is a barrier to communication in a project (Carvalho, 2008).

In conclusion, the study found that IM and VC are being used to a moderate extent to communicate in projects and that both can have a positive effect on the quality of project communication, as they, in many instances, address the factors that predict communication quality in projects. The study contributes to the information and communication management body of knowledge, which is central to relationship management research. This was done by exploring and quantifying new means of communication such as IM and VC in projects and their influence on the quality of project communication. The applications for using both mediums to facilitate quality communication in projects were also discussed. The research was limited by a small sample size and responses are not stated for each respondent group surveyed. Further research regarding the impact of other forms of CMC on project communication, using a large sample size, is encouraged. Moreover, research on how and when to use different types of CMC during the various stages or phases of a project would also be interesting.

Appendix A: Sample of questionnaire questions

Question no.	Factor investigated	Question	Scale
Q11	CMC general	Which of the following computer-mediated communication (CMC) tools do you use to communicate with others? (Please select all that apply) (multi-choice, multiple answer)	Instant messaging, Video conferencing, neither (please state why)
Q12, Q39, Q52	CMC general	For what purpose do you use the following CMC tool(s) to communicate? (Please select all that apply) (side by side, multiple answer)	IM Business use IM personal use VC Business use VC personal use
Q28_1	Audience	To what extent do you use IM to communicate one-to-one? (matrix table, single answer)	Extent on a scale of 1 (to an extremely small extent) to 10 (to an extremely large extent)

Question no.	Factor investigated	Question	Scale
Q28_3	Audience	To what extent do you use VC to communicate one-to-one? (matrix table, single answer)	Extent on a scale of 1 (to an extremely small extent) to 10 (to an extremely large extent)
Q33_1	Frequency of interaction	To what extent does IM communication lead to more appropriate (increased amount) project communication? (matrix table, Likert)	Extent on a scale of 1 (to an extremely small extent) to 10 (to an extremely large extent)
Q33_2	Frequency of interaction	To what extent does VC communication lead to more appropriate (increased amount) project communication? (matrix table, Likert)	Extent on a scale of 1 (to an extremely small extent) to 10 (to an extremely large extent)

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