

EDITORIAL ESSAY

What is E-Collaboration?

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ABSTRACT

This article defines e-collaboration and provides a historical glimpse at how and when e-collaboration emerged. The discussion suggests that the emergence of e-collaboration had more to do with military considerations than with the solution of either organizational or broad societal problems. It also is argued that e-collaboration, as an area of research and industrial development, is broader than what is often referred to as computer-mediated communication. The article concludes with a discussion of six key conceptual elements of e-collaboration: (1) the collaborative task, (2) e-collaboration technology, (3) individuals involved in the collaborative task, (4) mental schemas possessed by the individuals, (5) the physical environment surrounding the individuals, and (6) the social environment surrounding the individuals.

Keywords: communication media; computer-mediated communication; e-collaboration; electronic communication; human factors; social influences

E-COLLABORATION DEFINED

Electronic collaboration (e-collaboration) is operationally defined here as collaboration using electronic technologies among different individuals to accomplish a common task (Kock & D'Arcy, 2002, 2001). This is a broad definition that encompasses not only computer-mediated collaborative work, but also collaborative work supported by other types of technologies that do not fit most people's definition of a "computer," such as the telephone, which is not, strictly speaking, a computer – even though some of today's telephone devices probably have more processing power than some of the first com-

puters back in the 1940s. Another example is the teleconferencing suite, whose main components are cameras, televisions and telecommunications devices.

The above operational definition, which I will use as a basis to discuss other related issues in this article, is arguably very broad. Yet, it is probably clearer than the general view of e-collaboration in industry, which some may also see as a bit unfocused. For example, some developers of e-collaboration tools, such as Microsoft Corp. and Groove Networks, emphasize their technologies' support for the conduct of electronic meetings over the Internet. There seems to be a concern by those developers with offering features that make electronic meetings as similar to face-to-face meetings as possible.

Industry information-technology (IT) publications, such as *CIO Magazine* and *Computerworld*, on the other hand, often tend to favor e-collaboration technologies as tools to support business-to-business electronic commerce and virtual supply chain management over the Web. These are business activities that arguably are substantially different from electronic meetings, both in terms of scope and main goals. The primary audiences of industry IT publications are IT managers and professionals – the consumers of e-collaboration technologies. Given that, one can imagine the possible misunderstandings that may take place when those managers and professionals get together with developers' sales representatives to discuss possible e-collaboration technology purchases.

FIRST E-COLLABORATION TECHNOLOGY

As far as buzzwords are concerned, "e-collaboration" is still in its infancy, even though the technologies necessary to make e-collaboration happen have been around for quite some time. Strictly speaking, e-collaboration could have happened as early as the mid-1800s, with the invention of the telegraph by Samuel F.B. Morse. The telegraph allowed individuals to accomplish collaborative tasks interacting primarily electronically. If one assumes that the telegraph was too cumbersome to support e-collaboration, it may be more reasonable to argue that the birth of e-collaboration could have been soon after that, in the 1870s, with the invention of the telephone by Alexander Graham Bell.

Yet, for a variety of reasons, true e-collaboration had to wait many years to emerge. Did the commercialization of the first mainframe computers in the 1950s, following the ENIAC project, help much in that respect? Not really, and that was not necessarily due to technological obstacles to de-

veloping e-collaboration systems for mainframes. The real reason seems to have been the cost of mainframes (Kock, 1999), which was then seen as too high for them to be used (a) by anyone other than very specialized workers, who often dressed like medical doctors; or (b) for anything other than heavy data processing-intensive and/or calculation-intensive applications. Of course, e-collaboration was not seen as one of those applications. Moreover, worker collaboration was not a very fashionable management idea by the time mainframes hit the market big-time in the 1960s (Kock, 2002).

Then the ARPANET, the precursor of today's Internet, happened in the late 1960s. The ARPANET Project's main goal was to build a geographically distributed network of mainframes within the United States (U.S.) that could withstand a massive, and possibly nuclear, military attack by what was then known as the Soviet Union. By that time, mainframes were used in ballistics calculations, without which intercontinental missiles would not be as effective in reaching their targets as they were expected to be. The Project was motivated by the Cold War between the U.S. and the Soviet Union, which reached a tense stage in the early 1960s. The main sponsor of the ARPANET Project was the U.S. Department of Defense.

One of the tools developed to allow ARPANET users to exchange data was called "electronic mail" (e-mail). E-mail was initially perceived as a "toy" system that researchers involved in the ARPANET Project used to casually interact with each other. This perception gave way to one that characterizes e-mail as the father (or mother) of all e-collaboration technologies (Sproull & Kiesler, 1991). To the surprise of many, serious use of e-mail grew quickly, primarily as a technology to support collaboration among researchers, university professors and students – the primary users of ARPANET while it was in its infancy.

So, in spite of the fact that other technologies already existed that could have been used for e-collaboration, e-mail was arguably the first technology to be used to support e-collaborative work. Interestingly, e-mail's success as an e-collaboration technology has yet been unmatched – at least in organizational environments (college dorms do not qualify). This is somewhat surprising, given e-mail's granddaddy status as far as e-collaboration is concerned. Helping it hold that enviable position is e-mail's combination of simplicity, similarity to a widely used "low-tech" system (the paper-based mail system) and support for anytime-anyplace interaction.

E-COLLABORATION VS. COMPUTER-MEDIATED COMMUNICATION

The *International Journal of e-Collaboration*, as an academic outlet, is primarily concerned with e-collaboration research. What I refer to in this article as "e-collaboration research" is in fact made up of several research streams, with different names and traditions. One such research stream is that of computer-mediated communication (CMC), which has been traditionally concerned with the effects that computer mediation has on individuals who are part of work groups and social communities. One common theme of empirical CMC research is the investigation of the effects of computer mediation on group-related constructs by using as a control condition the lack of computer mediation – what some prefer to simply call "face-to-face interaction."

E-collaboration is not the same as CMC. Earlier, I defined e-collaboration as collaboration using electronic technologies among different individuals whose goal is to accomplish a common task. I would argue that, following that definition, e-collaboration research should be seen as encompassing traditional

CMC research as well as other lines of research that do not necessarily rely on CMC to support collaborative tasks. One example would be the study of telephone-mediated communication. This argument also applies to another area of research normally referred to as computer-supported cooperative work (CSCW), for similar reasons. That is, e-collaboration research should also be seen as encompassing traditional CSCW research.

Another distinction to point out – that may be seen as controversial – is that e-collaboration may take place in situations where there is no communication per se, much less CMC. Consider, for example, a Web-based e-collaboration technology that allows different employees of an insurance company to accomplish the same collaborative task; namely, preparing a standard insurance policy for a customer. Since we are assuming that the collaborative work is on a standard insurance policy, it is not unreasonable to picture a case in which different employees would electronically input pieces of information through the e-collaboration technology that will become part of the final product (i.e., the policy), without those employees actually communicating any information to one another. In this case, the e-collaboration system would pull together different pieces of information from different individuals into what would in the end become an insurance policy, and in such a way that the individuals may not have been aware of one another. Some, of course, will argue that this is not "really" e-collaboration. But it fits our definition of e-collaboration, presented earlier in this article: "... collaboration among different individuals to accomplish a common task using electronic technologies."

The above distinction is important, so that we can have a general idea of the kinds of topics that would be acceptable for manuscripts submitted to the *International Journal of e-Collaboration*. Today, many technologies exist that do not involve CMC but

nonetheless are becoming increasingly important as tools for e-collaborative work. Mobile e-collaboration devices, from cell phones to wireless personal digital assistants (PDAs), are good examples. Some may see those devices as computers, while others may not. Regardless, those devices are likely to be a key target of e-collaboration research in the near future.

SIX KEY CONCEPTUAL ELEMENTS OF E-COLLABORATION

What are the main “conceptual elements” that define an e-collaboration episode? This is a general question whose answer, I believe, can further shed light on what e-collaboration is (and what it is *not*). Moreover, identifying the key conceptual elements that make up e-collaboration will inevitably lead us to the identification of constructs that can be targeted in e-collaboration research, which is a desirable outcome for an inaugural issue of a journal that wants to establish a clear identity.

Based on past research on e-collaboration, one could contend that the following conceptual elements define e-collaboration in the sense that changes in those elements can significantly change the nature of an e-collaboration episode: (1) the collaborative task, (2) e-collaboration technology, (3) individuals involved in the collaborative task, (4) mental schemas possessed by the individuals, (5) the physical environment surrounding the individuals, and (6) the social environment surrounding the individuals. Each of these elements is discussed next.

- ***The collaborative task.*** An example of a generic collaborative task that is often conducted with support of e-collaboration technologies today is that of writing

a contract, particularly when the parties involved are geographically distributed. The nature of the collaborative task (e.g., whether it is simple or complex) can have a strong effect on its outcomes when certain e-collaboration technologies are used (Zigurs & Buckland, 1998, 1999).

- ***The e-collaboration technology.*** This comprises not only the communication medium created by the technology, but also the technology’s features that have been designed to support e-collaboration. The implementation of a particular feature (e.g., video streaming) in a particular type of e-collaboration technology (e.g., instant messaging) can have a strong effect on how the technology is actually used by a group of individuals to accomplish a given collaborative task (DeSanctis & Poole, 1994; Poole & DeSanctis, 1990).
- ***Individuals involved in the collaborative task.*** This conceptual element refers primarily to certain characteristics of the individuals involved in the collaborative task, such as their gender and typing ability (which would be relevant in text-based e-collaboration contexts). This conceptual element also refers to the “number” of individuals involved in the e-collaboration episode, or the size of the e-collaborative group. An individual’s gender, for example, may have a significant effect on how that individual perceives a particular e-collaboration technology (Gefen & Straub, 1997), which may affect that individual’s behavior as part of a group of e-collaborators (Kock, 2001).
- ***Mental schemas possessed by the individuals.*** This conceptual element refers to mental schemas (also referred to

as “knowledge” or “background”; see Kock, 2004; Kock & Davison, 2003) possessed by the individuals involved in the collaboration task, including socially constructed schemas that may induce the individuals to interpret information in a particular way (Lee, 1994). This conceptual element also refers to the degree of similarity of the mental schemas possessed by the individuals. The degree of similarity among the task-related mental schemas possessed by different individuals engaged in a collaborative task (e.g., whether task experts are interacting with other experts or with novices) may significantly affect the amount of cognitive effort required to successfully accomplish the task using certain types of e-collaboration technologies (Kock, 2004).

- ***The physical environment surrounding the individuals.*** This comprises the actual tangible items that are part of the environment surrounding the individuals involved in the collaborative task, as well as the geographical distribution of the individuals. Geographically dispersed individuals are more likely than co-located ones to use e-collaboration technologies that are perceived as “less rich” than face-to-face interaction, and spend time and effort adapting the features of the technologies to their task-related needs (Kock, 2001; Trevino et al., 1990).
- ***The social environment surrounding the individuals.*** This conceptual element refers primarily to aspects of the social environment surrounding the individuals involved in the collaborative task that can be characterized as being social influences on those individuals. Those aspects may involve expressed perceptions and/or

behavior by peers, managers and other individuals (e.g., customers) toward e-collaboration technologies. For instance, an individual’s behavior toward a particular e-collaboration tool, or certain features of that tool, may be significantly influenced by peer pressure (Markus, 1994), which may take the form of other individuals heavily using the e-collaboration tool and expressing positive opinions about it. That behavior may also be significantly influenced by the position that the individual occupies in an organization’s hierarchical management structure (Carlson & Davis, 1998).

The above discussion on key conceptual elements has a couple of caveats. First, the list of key conceptual elements presented is not comprehensive. There are certain elements that are relevant for e-collaboration research not covered by the above list. Second, the conceptual elements above may be (or have been) given different names by different researchers, or the same name but different meanings.

Nevertheless, I hope to accomplish one main goal by discussing the conceptual elements – to provide a glimpse at the complexity of e-collaboration and its many behavioral facets. Each of the conceptual elements above, if significantly manipulated in, say, a laboratory experiment or action research project (Kock, 2003), would potentially lead to variations in key variables. Among those key variables are two favorites of e-collaboration researchers: task outcome quality and task efficiency. Task outcome quality is frequently assessed based on how “good” the task “product” is, often in terms of customer perceptions. Task efficiency is usually assessed based on how much time and/or cost is involved in accomplishing the task.

CONCLUSION

The field of e-collaboration has a promising future, in terms of both academic research and commercial software development. As an area of academic research, e-collaboration has flourished since the 1980s and particularly the 1990s, which led to the need for new publications outlets – a need that the *International Journal of e-Collaboration* tries to address by its very existence. As an area of commercial software development, e-collaboration is likely to benefit from a critical assessment of how it can be applied to the benefit of individuals, organizations and society – a need that the *International Journal of e-Collaboration* will try to address in the future by encouraging and disseminating the results of applied research on e-collaboration.

In this article, I provided an operational definition of e-collaboration and a historical glimpse at how and when e-collaboration emerged. I also argued that e-collaboration, as an area of research and industrial development, is broader than CMC – an argument that also applies to CSCW. Finally, I discussed key conceptual elements in connection with e-collaboration that I hope will provide a relatively easy-to-understand conceptual basis for future research design and implementation. While the conceptual elements discussed have consistently been targeted individually in past research, rarely have interaction effects among those conceptual elements been investigated. There are tremendous research opportunities and challenges (mostly methodological) for researchers who decide to conduct research projects addressing those interaction effects.

The view that I propose here of e-collaboration is hopefully focused enough to allow for a clear understanding of what types of articles the audience of the *International Journal of e-Collaboration* should expect

to see published in the future. At the same time, I hope that such a view of e-collaboration is comprehensive enough to leave room for likely technological developments that are not seen today as enabling e-collaboration, but that may be seen as doing so in a not-so-distant future. One such likely development is that of virtual reality applications (Briggs, 2002) and their increasing use to support e-collaborative work. Other related technological developments are likely to arrive in other areas, such as wearable computing and speech recognition, with significant impacts on how e-collaboration takes place in the context of certain collaborative tasks (Parente et al., forthcoming).

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