"Anytime, Anywhere" in the Context of Mobile Work

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INTRODUCTION

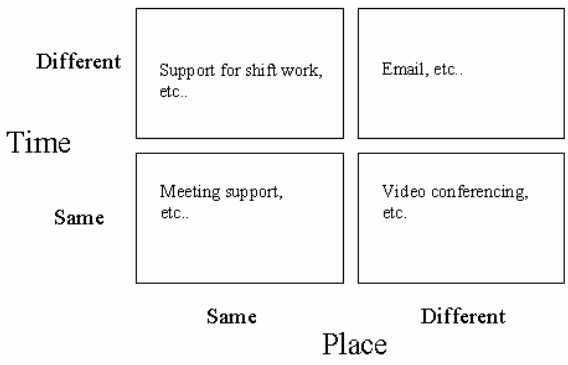
Kleinrock (1996, 1998) claims that advanced wireless technologies, the Internet, Global Positioning Systems, portable and distributed computing, and so forth will realize the vision of "anytime, anywhere" computing. We can today see the first signs of this vision. For example, telework is now possible, remote organizations can be engaged in close cooperation, and people can form communities on the Internet. The world has become a "global village," some claim (Castells, 1996; Preece, 1994), where you can interact with anybody independent of time and space.

The vision of anytime and anywhere describes a situation where people can do tasks wherever they want and without any consideration for time. Related to the vision is the 2x2 matrix often used in the field of CSCW (computer-supported cooperative work) to denote different kinds of computer-supported collaboration (e.g., Baecker et al., 1993; Johansen, 1988). This model has the dimensions of time and place, where each can be same or different. The model is shown in Figure 1 below.

The vision of anytime and anywhere is tasks that can be done independent of time and place, that is, in any of the four scenarios. This does not say anything about where or when the tasks should be done, only that these dimensions should not restrict them.

It is interesting to notice that the model does not take into consideration *mobility*. It assumes that people are either in the same place or in a different place, and whether or not they are mobile does not seem to make a difference.

Figure 1. Model showing different scenarios for groupware (Ellis et al., 1991)



BACKGROUND

In the past, people traveled because they had no choice. If you wanted to do business or talk to remote friends, you had to meet them face to face. However, transportation costs prohibited certain meetings and activities. A long series of technological developments (including the pony express, railroads, automobiles, and the telephone) have aimed at lowering the costs associated with transaction and conversation. Computer-mediated communications are the most recent development in that progression. Even so, people still travel and still meet in person.

To summarize, the adoption of Internet technologies, mobile phones, and so forth have increased and, in a sense, made the world smaller. Compared to 10 years ago, it is today much easier to communicate with remote sites, and the frequency of communication in many organizations has increased accordingly. Some people have even talked about the global village (Preece, 1994). A parallel trend is that people travel more than they used to do. According to predictions, this trend will sustain and even increase. For example, the national road agency of Sweden reports the number of flights will increase by a factor of four in the next 10 years. How can it be that the global village is so mobile? If people can interact and work independent of time and space, why then do they spend more and more time traveling? Is that not a paradox?

Reviewing the literature on the topic, we find no research that has explored this apparent paradox. Authors are either concerned with remote interaction (e.g., Brave, Ishii, & Dahley, 1998; Ellis et al., 1991; Kuzuoka, 1992; McDaniel, 1996; Tang & Minneman, 1991), mobility (e.g., Bejerano & Cidon, 1998; Luff & Heath, 1998; Porta, Sabnani, & Gitlin, 1996), or mobility as anytime, anywhere work (e.g., Dix, Rodden, Davies, Trevor, Friday, & Palfreyman, 2000; Perry, O'hara, Sellen, Brown, & Harper, 2001). Furthermore, research on mobility has mainly dealt with technology issues, for example, limited battery life, unreliable network connections, varying channel coding and characteristics, volatile access points, risk of data loss,

portability, and location discovery (e.g., Bhagwat, Satish, & Tripathi, 1994; Dearle, 1998; Francis, 1997; Varshney, 1999). Accordingly, no research so far has explored the relation between, on one hand, the global village, with its idea that distance plays no role, and on the other hand, the trend of increased mobility. How do the two trends hang together?

EXPLORING THE "ANYTIME, ANYWHERE" MOBILITY PARADOX

In order to investigate this seeming paradox, we conducted an empirical study of mobile telecommunication engineers in a Swedish company (Wiberg & Ljungberg, 2000). Using qualitative research methods, we studied to what extent the work tasks they do are dependent on time and place. We analyzed the data using a 2x2 matrix, with the two axes, "time" and "space," which both have the categories "dependent" and "independent." One of the four situations is "anytime, anywhere," while the other three are dependent on time, place, or both (see Figure 2).

We found instances of work in all four categories. Some traveling seems very difficult to escape, simply because there are places that staff need to visit physically to do their job. For example, to repair a telephone pole, you need to go to it. We also found there are time frames that staff cannot escape. For example, rebooting parts of the telephone network has to be done at night. Lastly, there are work tasks that seem pretty much independent of time and space, for example, scheduling and rescheduling of activities.

As observed during this empirical study, there were just tiny parts of service work possible to perform anytime and anywhere. Most of the work is dependent on spatial factors such as the location of a breakdown in the telephone network system, the location of the client, and so forth, or has time-related dependencies such as fixing problems within 24 hours or coordinating schedules to cooperate around larger problems. For a more thorough description of the empirical material, see Wiberg and Ljungberg (2000). Overall, we found there are the following:

- traveling that seems difficult to remove because of places that people have to visit physically, for example, telephone poles, customers' houses since not all customers are mobile, network routers, locations where new cables need to be drawn, and so forth,
- time frames that seem very difficult for staff to not do certain tasks within, for example, customer service within 24 hours, rebooting parts of the telephone network has to be done at night, and so forth, and
- tasks that do not seem to be restricted by time and place, for example, scheduling and rescheduling of the activities over the day, coordination of activities between the technicians, experience and knowledge sharing among the technicians, and so forth. These tasks, however, are important for them since they are alone in their cars most of the day.

Accordingly, the vision of anytime and anywhere is not easy to realize in the case of the mobile workers we studied.

FUTURE TRENDS

Both work and leisure activities are becoming increasingly mobile. To describe the mobile worker, new concepts have been coined. Some examples are "road warriors" and "nomads" (Dahlbom, 1998) that distinguish mobile workers as moving from terms like distributed work, telework, and colocated work. One reason for this

Figure 2. Theoretical framework of the study

		Place	
		Independent	**Dependent**
Time	**Independent**	**1. Anytime, anywhere**: tasks that can be done independent of time and place; they can be done anytime, anywhere	**2. Anytime, particular place**: tasks that need to be done in a particular place but can be done anytime
	Dependent	**3. Particular time, any place**: Tasks that can be done independent of place but at a certain time or in a certain order	**4. Particular time, particular place**: Tasks that must be done in a particular place within a particular time