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## Introduction

There is a notion that the latest technology is supposed to make our life much simpler, such as cell phones, handheld devices, PDA's, etc., yet using them still presents challenges. For instance, it sure would be nice if there were an easy solution to drive and talk on my cell phone or respond to my email pager at the same time. This is definitely a human factors problem than needs improvement.

If one has tried to use a "seemingly simple to use" communications device, they will find that it is more trouble to learn and quite frustrating. That seems to be the only way to describe the attitude of current users of today's wireless communications devices.

The content and focus of this paper will address specifically the problem with wireless handheld devices such as cell phones and handheld devices, and attempt to position the argument that voice technology is the key to addressing the problem with examples to support.

## The problem

We were promised that technology would solve all of our problems and that the emergence of wireless technology would transform us. This could not be farther from the truth. Not that it doesn't solve some of our basic problems of being productive while on the go, it's just that it has presented itself with a host of other problems. These problems include social and ergonomic issues.

For the social issues, it means that technology has allowed users to become distracted in public, thereby annoying people in the process. To make matters worse, these "annoying" users are not even aware that they are doing it in some cases.

The other problem is the ergonomic issue. This means that while the new technology has immersed users in a new paradigm of productivity, it also has implicated a new form of exertion to the body.

## The social impact

For instance, users of wireless devices still have to struggle with the usability of the equipment as well as having to learn how to use different devices in different ways.

According to Letstalk.com, a web portal dedicated to wireless product reviews, a recent poll taken in 2002 was compared to one taken earlier in 2000, which revealed that cell

phone users have found it less acceptable to use their device in public places. While there is room for improvement, at least there is an awareness of the impact to society. Below is the content of this article:

"A scientific poll commissioned by online wireless retailer LetsTalk found that since 2000 there has been a significant decrease in the percentage of Americans who are willing to use their cell phones in public places including movies, restaurants and public transportation. The study, conducted by Wirthlin Worldwide, also found that less than half of Americans find it acceptable to use their cell phones while in a car and only 10% find it appropriate to use a cell phone while at school. In addition, 28% said it was acceptable to take a call while in a restaurant."

The poll cited in this article, asked Americans..."In which of the following places do you find it generally acceptable to speak on your wireless (cellular) phone?" and the following data was collected:

	Poll taken in:	
	2000	2002
Acceptable to talk on cell phone in car	76%	46%
Acceptable to talk on cell phone in restaurant	31%	28%
Acceptable to talk on cell phone while on public transportation	52%	45%
Acceptable to talk on cell phone in the supermarket:	60%	53%
Acceptable to talk on cell phone in bathroom	39%	47%
Acceptable to talk on cell phone while at the movies or in a theater	11%	6%
Acceptable to talk on cell phone while on school property including classrooms	(Not asked)	10%

Source: *Letstalk.com, September 2002*

"Despite an overall increase in cell phone usage, Americans appear to be much more cognizant of their cell phone etiquette," said Delly Tamer, president and CEO of LetsTalk. "It's important to recognize that Americans are beginning to self-police their wireless etiquette, especially as leaders evaluate the pros and cons of banning cell phone usage in public places."

"Wirthlin Worldwide conducted the survey in August 2002 by interviewing a representative sample of 1,001 Americans age 18 or older. The public is at wit's end with cell phone users. While there are no official statistics on how many meetings have been interrupted by cell phone callers, 39 percent of cell phone owners interviewed by research group Wirthlin Worldwide said they would answer a call in the bathroom. One out of every three residents in the United States now own cell phones, according to the Cellular Telecommunications and Internet Association."<sup>1</sup>

### The ergonomic impact

Using a handheld wireless device does present ergonomic issues. These handheld devices require prolonged use by the upper body that can eventually cause strain in the hands, elbows, shoulders, and neck.

For instance, using a cell phone for a few hours requires that a person hold up the phone to the ear, which puts strain to the elbow and shoulder. If a person does this long enough, they can then be guilty of two of the "Seven Sins" of occupational activities. These include "Any activity that requires a prolonged or repetitive exertion of more than about one-third of the operator's static muscular strength available for that activity." and the other, "Making a person maintain the same body posture for a long time."

It would seem that the use of the cell phone is so insignificant, that perhaps these activities may not be the cause of such problems and are unrelated to cell phone use, since one would not expect a person to use the phone so frequently. However, over a period of time, one can only suspect that it's quite possible. Handheld devices such as personal digital assistants are no exception to the rule. They also require the user to look down at the device, thus causing neck exertion. It is not unusual these days to find people using devices such as palm pilots, mini-computers, and email pagers, which in all cases may have the same affect.

In addition to the strain it can cause to the neck, the fingers of the hands are also affected, because there is a constant need to input information in these devices in order to use them appropriately. These devices were just not designed with ergonomics in mind.

The solution

Fortunately, one technology that is sure to be a solution to these problems is voice recognition technology. This means that a person can perform other activities completely hands-free to use the devices.

Cell phone solution

For instance, a persons voice can be used to make a phone call and this actually has several advantages. For one thing, the person no longer has to look down at the phone to use it. Activating the phone with voice commands allows the user in a vehicle to answer and place calls, while keeping his/her hands on the wheel and eyes focused on the road. In fact there is such a technology already on the market called Voice Command by Cellport (<http://www.cellport.com/>).

According to their claim, "In addition to its ability to work with a wide variety of cell phone models, the Voice Command's voice-activated feature allows drivers to make and receive calls using simple spoken commands. With the Cellport Voice Command, drivers can keep their eyes on the road and hands on the wheel while using their cell phone."<sup>2</sup>

Although, it does address the ergonomic issue, unfortunately, this still does not solve the dilemma of having a phone conversation in a public place without disturbing others, such as in a theater or restaurant. It would be beneficial to see this corrected possibly by using voice commands to choose specific recorded messages so that the caller will

have a personalized response without the recipient actually having to answer the phone. This of course is assuming the recipient knows who the caller is by caller id or some other form of recognition. This means that a person receiving an call in a restaurant, only has to give a command to their phone, and the appropriate recorded response will be played for caller, alleviating the user from having to answer the call.

#### Handheld solution

For the handheld wireless PDA's, voice activation technology will also be useful for the same reasons as the voice activated cell phone. This means that users no longer have to use their hands to read email. In fact, there are some products already on the market that address this issue. One such product is from a company called Research in motion. They tout a PDA with voice activation that also has a built-in headphone jack. This means that users can drive and listen to their email or be in a public space without bothering anybody.

According to an article from ITworld.com, Research in Motion Ltd. (RIM) released a product at the end of 2002, which is simply a handheld device that includes both voice and data capabilities, thanks to an agreement with Nextel Communications Inc. and Motorola Inc. 3

The benefit of this is that users no longer have to endure stress or strain on their upper body including their hands and fingers to operate these devices.

#### Antithesis

Using voice technology as a solution has merit in supporting the problems stated above, however, it too will have its limitations. For instance, voice technology depends on the clarity and accuracy of the voice of the user. This means that the user must speak the same way each time and with clarity such that the voice recognition mechanism will be able to understand the user. Furthermore, since the user will be using devices with sensitive information within them, (i.e. phone numbers, email, bank account numbers, etc.) the voice technology must be able to distinguish its owner from any other user attempting to operate the device via voice.

Furthermore, as users become more accustomed to using voice activated technology, the focus of human factors may shift to the voice. This means that there is a possibility that a voice disorder could evolve with sufficient use. This is probably not likely though, since the purpose of the voice technology is to use short and quick speech to operate the technology.

#### Conclusion

In conclusion, as society advances further in technology, human factors affected by such technology will continue to mount, thus will be the need for human factors

intervention to address the ergonomic issues. One would think that technology is supposed to make our life much easier. Unfortunately, this is a misnomer.

As we continue to use technology to solve daily problems, we are also creating new problems with the way that we use such technology. Using wireless cell phones and handheld devices did seem promising at first, but it did have its own set of issues as presented in this paper.

Fortunately, there are some solutions, such as voice recognition technology, that can solve these problems. One can only wonder why the designers of these wireless technologies did not consider the human factors impact of such technology both socially and ergonomically.

But even if we do solve the human factors issues of new technology, it still may not be perfect. New solutions always present new problems or shortcomings, and only by analysis can we determine the shortcomings of the newest technology. Perhaps the law of diminishing returns will prevail, such that each quality human factors improvement for each solution will yield less problematic outcomes in the long run. However, technology is quite fluid and thus paradigm shifts in technology may outpace the effort to solve the issues of its predecessor technology. In other words, just as quality improvement finally catches up to near full acceptance, technology will take on a new form.

Nonetheless, we must continue to strive for quality in design especially when we are considering the human factors impact. Not only will these considerations have a positive impact socially, physically, and functionally, but it will also have an effect economically. Less attention to quality improvement may result in less revenue and thus less investment in new technology. More attention to quality improvement will cost more to the firm producing such technology, but over time, the benefits will outweigh the costs in all respects including revenue, market leadership, and customer loyalty. Last but not least, it's doing the right thing.

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