HUMAN TECHNOLOGY

An Interdisciplinary Journal on Humans in ICT Environments ISSN: 1795-6889

www.humantechnology.jyu.fi Volume 5 (1), May 2009, 1–4

From the Editor in Chief

DESIGNS, SYSTEMS, SCAPEGOATS, AND BUSINESS CULTURES

Pertti Saariluoma
Cognitive Science, Department of Computer Science and Information Systems
University of Jyväskylä, Finland

In November 2007, an event happened in Nokia that threatened the health of thousands of people. Now the Nokia in this story is not the world-known telecommunications corporation, but rather the little city that shares its name: a city in southwestern Finland from which a large rubber company operating there named itself. A century later, that company made a strategic shift in its product focus, and expanded its operations beyond the little city and even outside of Finland. To my knowledge, the Nokia company no longer has factories or offices in the city of Nokia, but this story about the city of Nokia remains an important lesson in human-technology interaction.

The municipal water system in the city of Nokia is designed in such a way that a valve separates the waste water lines from the pure drinking water lines. The purpose of the valve is to allow occasional flushing of the waste water lines (Wikipedia, 2008). The water department employees do not have much use for this valve, which remains undisturbed for years on end. Nevertheless, in November 2007, the unthinkable happened when an employee opened the valve to flush the lines but, because of some glitch, allowed semi-treated waste effluent into the drinking water supply ("Nokia Water Crisis Eases," 2007). Perhaps a thousand residents were sickened by the bacteria- and virus-contaminated water ("A thousand Nokia residents sickened," 2007) and a handful of deaths were investigated ("Investigation underway," 2007; YLE News, 2008).

What is strange about this water system is that the valve was not clearly marked, nor was it locked. When the water system was designed, the world knew considerably less about human-technology interaction. But the events of that November day, and all the problems that followed, offer several perspectives on the human and technology designs and systems. The question is, then, what caused the incident: the employee, the structure and/or usage of the valve, the designer of the water system, or the builder of the water system?

I will acknowledge that I cannot draw conclusions on the event because the official investigation is not yet complete (YLE News, 2008). However, a basic understanding of the events provides a good opportunity to look at the usability of the system from a philosophical point of view. Just as when a competent surgeon may leave a needle within the patient because

URN:NBN:fi:jyu-20094141406

he/she is rushed, fatigued from a long surgery, or did not sleep well the night before, the Nokia water crisis comes down to the question about usability in critical work: Where do you place the blame for a failure in the usability of a safety-critical work system?

Let’s start the philosophical scapegoating with the agent, the user who opened the valve. One could hold that the worker should be able to perform the task assigned, and thus is responsible for completing that task well and without a poor outcome. Yet, what if the hypothetical work had several facets, and one of them was to dance on a tightrope once a year, but the other requirements of the job precluded the worker from being able to practice this task? Now the assumption that the worker is fully responsible for his/her tasks is no longer so clear. Of course, one could say that the individual should not have taken the job if he/she did not know how to dance or to manage on a tightrope. Sometimes workers are not fully aware of or competent in every single element of a job, although he/she can manage most of the tasks quite well, particularly the ones performed regularly. In the case of the municipal water company employee, he was responsible for a task that had not been performed by any other water employee within the previous decade: The valve had not been opened and, when it was in that previous time, it was under different conditions. So, one could blame the employee, but that does not necessarily mean the discovery of the real reason for the disastrous outcome.

So, let us turn our attention to the valve and its safety structure. The valve was not secured against unforced errors. Just as in the Chernobyl nuclear accident in 1986 (World Nuclear Organization, 2008), where the technology itself was deemed substandard, the Nokia water system was created as a system that could easily facilitate a dangerous outcome if workers did not properly use it under ideal conditions. Just one sudden change in the ideal conditions could jeopardize the entire process. But is the technology itself to blame?

What were the design intentions? The designer envisioned the valve to perform an important role in the operation of the system: to flush out the waste system on a periodic basis. But did the designer think through the conditions in which the intended use could be overcome by poor conditions during use, such as low water pressure in the clean water lines? Did the designer assume that the use of the valve, both technically and in practice, would always be performed under the best conditions, and thus neglected a backup system in the event of less-than-ideal conditions? Is the culprit the designer?

And what about the builder? Perhaps the builder viewed his/her role as simply fulfilling the design specifications, irrespective of the need for safety in application. Should the builder have questioned the technology of the design, even if it was fairly typical of the era? Should the builder have seen a need for some locking device or clear signage for safety reasons? As an example, is the manufacturer of a ship responsible for the effects of various future pressures and effects on the keel of the boat when the metal keel is being formed in the factory? Is the builder of any tangible item responsible for thinking through the particular materials and uses of a product being created, when it was designed and commissioned by someone else? Could the blame fall here?

As this short philosophical look at a human-technology failure clearly indicates, no simple answers are possible. While one could logically place the blame on any of these four areas, it would be more of scapegoating than truly understanding the causes and the outcomes. Placing blame surely closes the case, and most people are happy with a resolution—any resolution—even if it does not resolve the true nature of the failure, simply because it allows the ability to move on.

The reality is that poor outcomes in human-technology interaction take place for a variety of reasons. And even though the usability design community has addressed many of the potential and actual problems over the years, more still exist in critical work processes. In some ways, it is a matter of looking at the usability design process in a different way. Technologies, and particularly technological systems, are never guaranteed to be bug free, particularly at the beginning, and users are always an unpredictable element of any system. Designers and manufacturers of technologies, particularly safety-critical work technologies, need to consider not just the current need being met and the successful application of the technology, but also potential future failures and the use of the technology in less-than-ideal situations by less-than-perfect users. Such an outlook on the design of usable systems decreases the likelihood of underdeveloped usability design of the technology side of the human-technology interaction, and improves the favorable outcome of usability by the human side of the equation.

Finally, while establishing blame for any one or combination of factors in a technological system is how business and legal practices traditionally address the fallout of a poor system outcome, that blaming does nothing to proactively address other current and future disasters of similar type. Newsworthy events such as the Nokia water crisis, Chernobyl, airplane crashes, equipment malfunctions, structural failures, and a host of other past, present, and future crises resulting from the mismatch of humans and technologies call attention to what current standards have to say about risks, norms, ideals, and good practices. Sadly, they say too little, and often say it too late. This reality must change, and soon. Therefore, human technology standards and criteria for critical interaction processes are definitely required, and quickly.

REFERENCES

A thousand Nokia residents believed to have had symptoms after consuming contaminated drinking water. (2007, December 3). *Helsingin Sanomat*, International Edition [online]. Retrieved on April 14, 2009, from http://www.hs.fi/english/article/A+thousand+Nokia+residents+believed+to+have+had+symptoms+after+consuming+contaminated+drinking+water/1135232307520

Investigation underway into deaths possibly linked to tainted Nokia city water. (2007, December 19). *Helsingin Sanomat*, International Edition [online]. Retrieved on April 14, 2009, from http://www.hs.fi/english/article/Investigation+underway+into+deaths+possibly+linked+to+tainted+Nokia+city+water/1135232706082

Nokia water crisis eases. (2007, December 10). *Helsingin Sanomat*, International Edition [online]. Retrieved on April 14, 2009, from http://www.hs.fi/english/article/Nokia+water+crisis+eases/1135232483252

Wikipedia.com (2008). Nokia water supply contamination. Retrieved April 14, 2009, from http://en.wikipedia.org/wiki/Nokia_water_supply_contamination

World Nuclear Association. (2008). Chernobyl accident. Retrieved on April 14, 2009, from http://www.world-nuclear.org/info/chernobyl/inf07.htm

YLE News [online]. (2008, February 29). Criminal charges over Nokia water crisis. Retrieved April 14, 2009, from http://yle.fi/uutiset/news/2008/02/criminal_charges_over_nokia_water_crisis_281531.html

All correspondence should be addressed to:
Pertti Saariluoma
University of Jyväskylä
Cognitive Science, Department of Computer Science and Information Systems
P.O. Box 35
FIN-40014 University of Jyväskylä, FINLAND
pertti.saariluoma@jyu.fi

Human Technology: An Interdisciplinary Journal on Humans in ICT Environments
ISSN 1795-6889
www.humantechnology.jyu.fi