

From work with display units in 1986 to work with computing systems in 2007

by Bengt Knave, MD¹

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It all started in June 1972 . . .

Employees in an insurance company in Stockholm had complained of eye discomfort a short time after the introduction of a completely new type of working tool—the CRT (cathode ray tube) terminal—in one of its landscape offices. The company health services asked the occupational health authority for help and advice, and the request resulted in the first international scientific study on work with display units (1). From an ergonomic point of view, there were many things to improve at the workplaces and, in the landscape as a whole, without casting any criticism on the company. The awareness of ergonomics was not widespread at the time, and experience with work with CRT was nonexistent.

The CRT terminals started their triumphant progress during the 1970s—at first slowly but steadily, with increasing general public and occupational interest. In 1983, a new committee of the International Organization for Standardization was launched for ergonomic standards of visual information processing (ISO TC 159 SC4) with committee work also to include work with visual display terminals (VDT). At the first committee meeting, held in Manchester in 1983, the first conference on work with display units (WWDU), in 1986, was announced.

Therefore, between 1983 and 1986, we were busy planning the WWDU86 conference. It was aimed at being the first comprehensive conference covering all aspects having something to do with work with computers and display units and occupational health and well-being. The international and national response was above expectations. Some months before the conference, shows of interest and applications were received from

1200–1300 persons. However, these numbers diminished by some hundreds due to an unforeseen event abroad. Three weeks before our opening, the fourth reactor of the Chernobyl nuclear power plant outside Kiev exploded. Unfavorable winds blowing towards Scandinavia that day brought in radioactivity, especially over the Stockholm area and the north of Sweden. As a matter of fact, the disaster was detected in routine measurements in one of the Swedish nuclear power stations well before the Soviet authorities made public what had happened. Therefore, all of a sudden, Stockholm was not the most popular place to go to, and applications were withdrawn, even by an invited key speaker.

WWDU86—topics under study and the development to follow

The following topics related to occupational health and well-being were addressed during the WWDU86 conference: (i) eye discomfort, (ii) work posture discomfort, (iii) musculoskeletal neck and back disorders, (iv) work organization and stress reactions, (v) electromagnetic fields effects, (vi) adverse pregnancy outcomes, and (vii) skin symptoms. When an attempt is made to group different topic areas into subgroups like this, difficulties are immediately encountered because some subgroup contents or components can easily be sorted into more than one subgroup. One example is the contents of the topic “eye and neck discomfort”, another is “work posture discomfort”, and another is “work organization”. Nevertheless, for my presentation this subgrouping—with its inherent weaknesses—serves the purpose of following the relative development of the public and scientific

¹ National Institute for Working Life, Stockholm, Sweden.

attention given to these four areas over the years, from the 1970s up until today.

Eye discomfort was definitely the earliest problem to appear in work at CRT terminals. Ergonomics with respect to poor elementary vision and image quality problems were relatively soon taken care of, and conditions improved. However, irritation still remained among some operators. A causal factor could have been increased palpebral fissure when the gaze is raised as a person looks at a display screen. The increased fissure means that the cornea protecting thin tear film is torn, thus exposing the very pain sensitive outer cornea layers. Studies on tear-film breakup times (BUT) support this hypothesis. Reports on such eye diseases as cataract (lens opacities) and open angle glaucoma have not been verified. Transitory myopia (nearsightedness) of the accommodative type could be related to any long-term near work, but not specifically to computer work.

Musculoskeletal discomfort from work posture was recognized somewhat later than the eye problems, but relatively soon became the most dominating among operators. Sitting still in front of the screen with an elevated gaze and the neck reclined is a plausible reason for frequently reported neck–shoulder discomfort. In addition, low-back problems can be related to fixed sitting positions. The so-called mouse arm seen after the intense use of the mouse could be caused by repeated muscle contractions and wrist entrapment of the median arm nerve. Problems with work posture still exist, and, therefore, it is an important task for occupational health services to identify employees at risk and to take proper prophylactic measures.

Work organization matters initially paid attention—for obvious reasons—to apparent poor work routines (eg, full-day, full-week data entry work, and other similar conditions). Resulting mental overload—or underload depending on the type of task—not only made the employees, the operators, to feel stress—or monotony—but also made them perform worse in their work. Occupational health authorities thus issued recommendations on the length of daily workhours and times for breaks. More and more, it was also realized that the best results were obtained if the operators themselves could influence and organize their own work. From a scientific point of view, the Karasek job demand–control model supported this approach. The combination of high job demands and low job control precipitates psychological and physical strain, and jobs in which both demands and control are high lead to well-being, learning, and personal growth.

For about 35 years now, extremely low-frequency (ELF) *electromagnetic fields* have been under discussion as possible health threats to occupationally and publicly exposed people. Needless to say, the topic has attracted considerable media interest. People living under high-

voltage power lines and workers in exposed occupations have been the focus of studies on different forms of cancer. It was soon shown that also the CRT-based video display units (VDU) emitted low-frequency fields and that operators were exposed. Some early preliminary studies indicated the possibility of increased risks of adverse pregnancy outcomes, later also the development of some skin disorders. The scientific community did not reach any consensus on the matter, but the safety principle led to the lowering of emitted field strengths. Electromagnetic fields are no longer discussed as intensely as they were 15 years ago. One reason is the fact that CRT have been replaced by flat screens.

Today—WWCS 2007—and beyond

Therefore, it now seems as if the work-health-centered WWDU era is over—as a matter of fact, it was already 3 years ago that the series name was changed from WWDU to WWCS (work with computing systems), necessitating a timely broadening of scope. Proper principles of vision ergonomics and work posture physiology were generally applied by then, and additional clarification on exposure and risks of exposure to electromagnetic fields had been achieved.

With respect to work organization, the practical acceptance and increasing use of the job demand–control model improved employees' work conditions, without having any self-evident implications for workers' ill health, if any. As a matter of fact, the WWDU86 conference also included a fifth subgroup, then denoted as “human–computer interaction or man–machine dialogue”, today best described as a usability streak throughout the conference series. Originally, software programs, and later also work routines, were more generally addressed with questions about their compatibility (as, eg, usability, user friendliness) from the point of view of practical experiences of the workers themselves.

At the WWDU 2002 and WWCS 2004 conferences, what was called worldwide work became the main themes, introducing e-business and e-commerce, and computer-supported cooperative work with virtual sessions from around the world during the conferences. This was quite a new step in the WWDU-WWCS series, and it was much appreciated by the conference attendants and the “peripheral” operators far away.

Irrespective of whether there will be more conferences or not—one can wonder what WWCS topics will survive or what new ones can be predicted for the future? Themes such as usability and virtual worldwide work could perhaps be forecasted for the near future, but, in the longer perspective, I feel I am a worthless fortune-teller. When “it all started” in 1972, I had no idea of what would develop during the coming 35 years—so I remain silent now. However, what I strongly feel is that

the international community, with its work environment organizations—one of which is the WWCS conference series—should act and give priority to subjects needing its effort the most. It has been said that, in 20 years' time, practically all people will have access to and will work with computers. In the poor developing countries, I doubt that this will be the case. A standing agenda on

topics for these countries could be a possible and appreciated move for future WWCS activities.

Reference

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