

Enhanced 9-1-1 emergency communications system. Designing a user interface for emergency communications requires a thorough understanding of the circumstances in which PSAP attendants operate. Researching the work environment of PSAP attendants has served to identify several human factors issues that became design goals for the user interface. Conducting iterative usability testing with PSAP attendants ensured the design of a usable system.

Work design and organisation

23.1.49 (123010)

Beattie, J.D.

Human factors engineering in the Darlington equipment status monitoring system. In: Proc 23rd Ann Conf of the Human Factors Assoc of Canada, Ottawa, Ontario, 26-28 Sep 1990. The Association, Mississauga, Ontario, 1990, pp 87-91, 1 ref.

A nuclear generating station contains thousands of operable devices (eg, valves, circuit breakers). Many are manually operated, with no electronic status indication in the control room. The control room operator must keep track of which of these devices are in unusual states. Paper-based systems are used, but they have several sources of error and need considerable effort to keep the records current. The Equipment Status Monitoring (ESM) System is a computer-based system now being installed at Ontario Hydro's Darlington Station, intended to support operators in carrying out this function. Overall benefits expected from ESM include fewer injuries, fewer safety system impairments, and reduced loss of production. Human factors specialists have played a central part throughout the design process, undertaking project management as well as human-machine interface engineering. This paper outlines their roles as active participants in the engineering process. It demonstrates the value of continuous involvement and close collaboration with computer system engineers and with the eventual system users. It also highlights the potential value of recent developments in computer hardware and human-computer interface software.

23.1.50 (123025)

Keran, C.M., and Duchon, J.C.

Age Differences in the adjustment to shiftwork. In: Countdown to the 21st Century. Proc Human Factors Soc 34th Ann Meeting, Orlando, Florida, 8-12 Oct 1990. The Human Factors Soc, Santa Monica, Cal, Vol 1, 1990, pp 182-185, 10 refs.

Due to the ageing USA workforce and the increase in the percentage of

shiftworkers in the workforce, an understanding of the effects of shiftwork on older employees is considered important to the US Bureau of Mines. As part of a larger study on shiftwork by the Bureau of Mines, survey data were obtained from 295 rotating shiftworkers. The workers were categorised into three age groups with means of: 27.4, $n = 76$; 36.4, $n = 177$; and 49.3, $n = 42$. ANOVAs revealed that older workers reported greater frequency of six out of 23 physical symptoms than younger workers. Older workers also reported themselves to be more 'morning' type than younger workers, which may help explain some of the Age by Shift differences. MANOVAs were used to determine Age by Shift interactions of sleeping habits, stress, and physical symptoms. Though most of the workers have problems with the night shift, the older workers seemed to have more trouble adjusting to it, and also the afternoon shift, than the younger workers. For the most part, however, the older workers seemed to adjust to the day shift as well if not better than the younger workers.

23.1.51 (123053)

Lee, C.H., and Hosni, Y.A.

A microcomputer application in metabolic workload estimation. *Computers & Indust Engng*, 1990, 19.1-4, 331-335, 5 refs.

The measurement or estimation of metabolic workload is an essential basis for evaluating activities for assigning work and developing work-rest schedules and work methods. This paper describes a microcomputer program which performs a systematic workload estimation based on the input descriptions of an activity.

23.1.52 (123201)

Kobierski, R.D., Youngston, G.A., and White, L.R.

The application of task and workload analysis methodologies In: Proc 23rd Ann Conf of the Human Factors Assoc of Canada, Ottawa, Ontario, 26-28 Sep 1990. The Association, Mississauga, Ontario, 1990, pp 81-85, 6 refs.

The human factors engineering research community has made strides into the complex area of operator workload analysis. This paper presents the collation of two of these analysis methods, Attentional Demand and Time Line, into a unified methodology for Mission, Functional and Workload Analysis. A technique utilizing a top-down decomposition of mission functions and the subsequent network analysis of tasks is presented. Probabilistic task completion times and network branching are used to produce model output data, which in turn are compiled into measures of task conflict and work-

load, and plotted against normalised mission time. Although this methodology has been developed to meet the analysis phase of the Human Engineering Requirements for Military Systems, Equipment and Facilities (MIL-H-46855B), these methods are equally valid for the study of civilian operational environments.

Health and safety

23.1.53 (123100)

Lexa, P.

Investigation of risk factors in man-press machine systems and methods of risk control in these systems. In: Safe Working with Automated Systems, Proc. Int Social Security Assoc, Int Section 'Machine Safety', Geneva, 1990, pp 141-146, 0 refs.

The results of analyses and statistical data have proved that work with press machines is very dangerous for those who operate them. Of all kinds of machinery, only circular saws caused more injuries than eccentric presses in Czechoslovakia. These injuries are very severe and very often result in permanent invalidity. Investigations were carried out to find the main risk factors and define the risk involved in the system as a function of measurable factors. The paper illustrates the method which enables calculation and expression in numbers of the risk to which the worker is exposed during the operation of a concrete press machine. The methods for possible risk control are also shown.

23.1.54 (123202)

Lamonde, F.

Cognitive task analysis for rare accident problems and for diverse circumstances. The example of train drivers (Elements pour l'Analyse de l'Activite Cognitive dans une Problematique d'Accidents Rares et aux Circonstances Diverses. L'Exemple des Conducteurs de Train). (In French.) In: Proc 23rd Ann Conf of the Human Factors Assoc of Canada, Ottawa, Ontario, 26-28 Sep 1990. The Association, Mississauga, Ontario, 1990, pp 63-67, 6 refs.

This article presents the steps taken in the preliminary phase to develop an appropriate methodology for the analysis of the activities of train drivers to understand their real role in the reliability of railways. Methods of collecting data and methodological choices are exposed. An analysis of the difficulties encountered during the preliminary phase is presented and methodological considerations specific to the analysis of rare accidents occurring in different circumstances are drawn. The hypothesis is put forward that the generalisation of