From: Igor Kozine <igor.kozine@risoe.dk>
To: <nrcrep@nrc.gov>
Date: Wed, May 31, 2006 6:38 AM
Subject: Response from "Comment on NRC Documents"

Below is the result of your feedback form. It was submitted by

Igor Kozine (igor.kozine@risoe.dk) on Wednesday, May 31, 2006 at 06:37:41

Document_Title: Evaluation of Human Reliability Analysis Methods Against Good Practices (NUREG-1842)

Comments: By quickly reading the Report I could notice that simulation models of human performance providing, in particular, probabilistic characterisitcs of human perfomance have been passed by in silence. In my opinion, the similation models are emerging as a promising tool possibly occupying a steady position in human reliabilty analysis. It would be a shame to overlook this tendency. Enclosed are some bits from a short literature review I have done. I thought they might sound convincing and be worth attention. I do not provide any review in detail but some pieces.

One of the common characteristics of an operator's task in human-machine systems is the need to perform a number of concurrent or consecutive activities within a limited time interval. Several engineering theories and models of multitasking have been developed. Engineering theories of human behaviour are generally concerned with describing gross human behaviours, not the cognitive or psychomotor mechanisms that underlie them.
Multitasking theories and models can be viewed as an extension of theories and models of attention. A prominent theory of multitask performance is the single-channel theory of selective attention which has been the fundamental basis of many engineering models of human performance. The models view human multitask performance as a single server queuing problem or multitask sequencing problem in which multiple tasks or diverse sources of information are queued for service from the single-server human information processing system.

The behaviour of the systems of this kind can either be modelled by queuing theory or simulated with some modelling software. Due to rather limited abilities of queuing theory residing in a limited number of assumptions, the use of a discrete event simulation environment is often the way to model the systems of this kind.

Applying queuing theory to human performance when designing human-computer systems, explaining the behavior of pilots under actual flight conditions and military simulations have also yielded excellent predictions of time-based performance measures. It has been demonstrated that the concepts in queuing theory of server utilization and capacity could indicate useful information about the workload experienced by the human operator. A carried out case study on the simulation of operators' performance under a medium Loss of Coolant Accident scenario at a nuclear power plant gives another perspective for the use of queuing systems in predicting human performance. Probabilities of execution failures is one outcome of the simulation experiments.

A good review (may be a bit obsolete) is given in this paper: Y. Liu, Queuing Network Modeling of Human Performance of Concurrent Spatial and Verbal Tasks. IEEE Transactions on Systems, Man, and Cybernetics – Part A: Systems and Humans, Vol. 27, No. 2, March (1997), 196-207

organization: Risoe National Laboratory

address1: Systems Analysis Dept., Building 110, P.O. Box 49

address2:

city: Roskilde

state: ---

zip: 4000

country: Denmark

phone: +45 46 77 51 60

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Created By: igor.kozine@risoe.dk

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MESSAGE   3495   Wednesday, May 31, 2006   6:37 AM
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