Iowa model

The Iowa Model was developed to predict time and accuracy means and standard deviations for the following mental tasks:

- COMPARE: "Is this part the same as that one?"
- LOCATE: "Find the location of the requested item."
- VERIFY: "Determine if minimum specified features exist."
- IDENTIFY: "Name the object in location X."
- CLASSIFY: "Find the frequency of some feature."
- ARITHMETIC: "Perform specified arithmetic operations."

A series of studies were performed during this effort. One question that was closely addressed in the laboratory studies was whether performance times and errors in any of the different types of tasks performed by a person changed because of any of the following:

- The effect of combining tasks
- The effect of performing particular task sequences
- The effect of pacing

The results have interesting implications to practitioners interested in synthetic time prediction using systems such as Mento Factor. The overall results are quite promising for synthetic time estimation and prediction. Less promising results were obtained for

predicting performance accuracy. The following points briefly summarize some of these findings.

Performance time values were found to be nearly normally distributed or logarithmic-normally distributed. More ambiguous results were obtained for the accuracy criterion.

Performance time statistics changed in a nearly linear fashion as a function of several variables. The results were more ambiguous with regard to task accuracy. Speed and accuracy both improved on arithmetic tasks involving fewer digits. It took longer to do multiplication than addition, and there were more errors. Speed and accuracy both dropped when the tasks required search of a larger set of symbols.

People who were faster on one type of information-seeking task tended to be faster and more consistent on the other information-seeking tasks. No trend of this type was found for accuracy measures.

People were able to perform these information-seeking tasks while simultaneously performing other tasks, including simple vehicle control tasks or manual tasks. Performance times of the information-seeking tasks did not change, but control errors increased significantly and in a distinctly different manner depending on the type of information-seeking tasks performed.

Performance times and errors were not influenced by increased uncertainty as to which task would come next in the task sequence.

When people had to make responses to different types of tasks on different response devices, performance times were increased by an almost constant amount of time.

Tasks that were initiated in response to auditory signals were faster by a nearly constant value compared to tasks triggered by visual signals.

Time and error statistics did not change substantially between different forms of pacing.

The task sequence normally had a minor impact on performance time or accuracy. However, if a second task used information generated by the first task, task times dropped substantially, but the number of errors also increased.

The latter finding is especially relevant. Most human reliability models assume that errors on successive subtasks are statistically independent (Swain and Guttman, 1983). It follows that if errors are a major concern, it is better not to modularize tasks when there is a single response to component tasks.