The Emerging Toolbox of Cognitive Engineering Models

Alex Kirlik (kirlik@illinois.edu)

University of Illinois at Urbana-Champaign

In his seminal "Skills, Rules, and Knowledge" paper nearly 30 years ago, cognitive engineering pioneer Jens Rasmussen wrote: "*we do not need a single integrated quantitative model of human performance, but rather an overall qualitative model which allows us to match categories of performance to types of situations. In addition, we need a number of more detailed and preferably quantitative models which represent selected human functions and limiting properties within the categories."* In this talk, I will illustrate in detailed fashion how contemporary cognitive engineering methodology has indeed come to exist as a toolbox of models largely as Rasmussen observed. My review and analysis is based heavily on collaborative work with my co-editor John D. Lee in developing *The Oxford Handbook of Cognitive Engineering* (in press). The presentation will include a discussion of the handbook's sections and chapters, as well as various analyses of the entire text considered as a corpus of data. These include topic analysis, hierarchical cluster analysis, and network analysis. Results indicate that modeling to support cognitive engineering and human factors does not consist of one or even a few monolithic models or architectures, but instead as a highly diverse ecology of techniques each tailored to a particular niche in human-technology interaction.