Workshop "Applied Cognitive Systems Engineering in Air Traffic Control"

Cognitive Systems Engineering (CSE) and its main application, Ecological Interface Design (EID), are approximately 25 years old now. Starting with an example application in process control, and a seminal publication in 1992, EID found its way into process control first. This sparked interest in other safety-critical application domains, most notably, vehicle control in the aviation domain.

A distinctive trait of the approach has been the recognition that in all human endeavors we are bound by the constraints posed upon us by our surroundings. Our design choices, economics, goals and needs and the physics of the world constrain the possible courses of action. The starting point in CSE is to determine what these constraints are. In contrast to "Cognitive Psychology" approaches, CSE starts not by looking what is inside the head (of the operator or user), but at what the head is inside of. EID continues by finding a visualization for the constraints thus discovered.

This workshop centers around a test case of designing a visualization for Air Traffic Control separation support. First, a theoretical background will be provided dealing with the utilization of a constraint-based design method in the domain of air traffic control. Next, participants are invited to work on a work domain analysis, and reflect on how results of this analysis may influence display design. In response to this reflection, the workshop organizers will explain several approaches and EID designs in aircraft energy management, conflict resolution and Air Traffic Control applications. Finally, the workshop participants can experience work with an ATC simulation, with and without support from an ecological display. As such, this workshop completes a full design cycle comprising theory, modeling, and evaluation.

-About the presenters, René van Paassen, Jelmer Reitsma and Annemarie Landman:

The presenters are with the Delft University of Technology. TU Delft has been working on applying Cognitive Systems Engineering to aviation and vehicle control for well over a decade now. An overview of this progress is given in

Van Paassen, M. M., Borst, C., Ellerbroek., J., Mulder, M., & Flach, J. M. (2018). Ecological Interface Design for Vehicle Locomotion Control. IEEE Transactions on Human-Machine Systems, 48(5), 541–555. http://doi.org/10.1109/THMS.2018.2860601

Materials needed: the simulation will be provided on a usb medium that the participants can use to run the simulation on their own (mac, linux or windows-based) laptop. The simulation is kindly provided by Clark Borst <C.Borst@TUDelft.nl>. If you bring your laptop, please have it fitted with Java (https://www.oracle.com/downloads/).

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