DOD HFE sub TAG Meeting Minutes Form

Purpose of sub TAG meeting minutes:

The purpose of the sub TAG meeting minutes is to inform the Department of Defense Human Factors Engineering Technical Advisory Group (DOD HFE TAG) membership of the activities of the sub TAG and the major areas of concern being discussed and addressed.

General Information:

Please complete all sections:

SubTAG Name	Controls and Displays II
Date of the DOD HFE TAG **Date (month/day/year)**	May 21, 2014
Number of Attendees at subTAG session	10
Organizations Represented (Agencies and/or organizations that employee members at the subTAG)	Georgia Tech Research Institute, AF Institute of Technology, NAWCTSD, DHS/TSA, NASA, PHC-AIPH, Intelligent Automation, NRC, Army Natick RDEC, MANPRINT, 711 Human Performance Wing/HP

SubTAG Chair's Name	SubTAG Chair's Organization	SubTAG Chair's Phone and Address
Marianne Paulsen	NAWCTSD, Code 4652	407.380.4743 12350 Research Parkway Orlando, FL 32826
SubTAG Co-Chair's Name	SubTAG Co-Chair's Organization	SubTAG Chair's Phone and Address
SubTAG Co-Chair's Name	SubTAG Co-Chair's Organization	SubTAG Chair's Phone and Address

AGENDA

Presentations and Panels (If none, state none).

Title of Presentation	Name of Presenter	Name of Agency or Organization Employing Presenter	Overview of Presentation (e.g., Paste Abstract Here or Generate a Brief Summary)
The Effects of Stereoscopic Radar Displays on Air Traffic Controller Effectiveness and Situational Awareness	Lt Col Brent T. Langhals	USAF, Air Force Institute of Technology	Air traffic controllers are responsible for directing air traffic based upon decisions made from traffic activity depicted on 2-Dimensional (2D) radar displays. Controllers must identify aircraft and detect potential conflicts while simultaneously developing and executing plans of action to ensure safe separation is maintained. With a nearly 100% increase in traffic expected within the next decade (FAA, 2012a), controllers' ability to rapidly interpret spacing and maintain awareness for longer durations under increased workload will become increasingly imperative to safety. The current display design spatially depicts an aircraft's position relative to the controller's airspace as well as speed, altitude, and direction in textual form which requires deciphering and arithmetic to determine vertical separation. Since vertical separation is as imperative to flight safety as lateral separation, affording the controller an intuitive design for determining spacing without tedious mental model creation is critical to reducing controller workload and efficiency. In an effort to improve upon the current ATC display, a simulated stereoscopic radar workstation was developed and field-tested with 35 USAF controllers. This workstation presents a view similar to traditional radar displays but depicts altitude through the use of stereoscopic disparity, permitting vertical separation to be visually determined through differences in disparity. This top-down view is intended to reduce clutter by omitting, through toggle selection, supplementary "data blocks" (superfluous when particular aircraft are not of primary or immediate concern) that hold altitude codes, replacing them with visual disparity cues. Furthermore, the workstation is intended to reduce "scan" frequency, (when a controller visually scans their entire area of responsibility to detect and identify potential conflicts), minimizing lost time and distraction, or SA decrement, from unnecessary scans. The DoD HFE TAG presentation included a demonstration of a mobile version of the workstation, exploration of its design philosophy, and an analysis of data collected from the field study involving 35 Air Force Air Traffic Controllers at Keesler AFB as well as additional experiments conducted at the Air Force Institute of Technology.
Improved Comprehension of Voluminous Data Using Perceptual Objects	Jerry B. Ray, Jr.	Georgia Tech Research Institute	People naturally perceive visual objects – higher order unitary "things" that are comprised of separately perceptible components. The smiley face, for example, is not perceived as a circle, arc, and two

			dots, but as a single object. Changing the orientation of the arc transforms the smiley face to the frowny face object; this change is readily and intuitively perceived by casual observers. This tendency can be harnessed to improve user interfaces that are used to view voluminous data sets. Creating a reliable perception of an object requires that the arrangement of the components matches human perceptual tendencies. It is particularly useful if object perception is intuitive for the observer. Outside certain constraints, a circle, arc, and two dots do not lead to the perception of a face. Photographs of famous people lead to quick identification if viewed in the normal orientation, but identification is very slow if the photograph is upside down. Thus, alignment with human perceptual tendencies is important for visualization techniques to be effective. Visualization techniques should make perception easier – not more difficult. One potential measure of effectiveness for a visualization technique is the extent to which it promotes a rapid, intuitive understanding of relationships in the data in comparison to a tabular form. This is particularly valuable when dealing with voluminous data sets; creating a tabular representation for a user to view might not be practical. Display techniques that promote object perception could greatly reduce the time required to review and comprehend those data. The present research examined the creation of perceptual objects from large sets of acoustic (sonar) data, using depictions of the data familiar to users, combined in new ways to help speed comprehension. We created both static and dynamic objects to represent this data. Static objects were created by embedding the basic spectrogram depiction of the acoustic data in a frame whose height and width were scaled to show the signal to noise ratio and the statistical significance of the data, respectively. We then superimposed a time-based depiction of overall signal rise and amplitude. This allowed operators, in a single glance, to perceive the correspondence between the spectral energy of the signal, its overall rise time envelope, its amplitude relative to noise, and other statistical goodness scores. This gave rise to perception of frames described in such terms tall and wide, tall and skinny, short and wide, and short and skinny. The size of the spectrogram itself was invariant, but led to perception of the extent to which the frame was well-filled. The well-filled tall and wide objects were immediately identifiable when looking at a screen full of these depictions, and the correspondence with the rise time could be immediately perceived without requiring looking at a separate plot of that same data. Dynamic presentation of patterns of contacts also led to perception of moving objects on the display in the presence of a random noise background, but only when the playback speed was controlled so that playback speed was about 1.5Hz and persistence was set to allow 3 or 4 previous sensor contacts to remain on the display. This led to ready perception of an object of 3 or 4 dots in length that was hopping across the display, even though an individual dot was

			simply plotted according to its time of contact and removed 3 or 4 cycles later. This effect was immediately and intuitively perceived by observers.
Eye Movements of Individuals Undergoing Whole Body Vibration While Wearing an HMD	Dr. Michael E. Miller	Department of Systems Engineering and Management, Air Force Institute of Technology	Previous research has demonstrated a loss of helmet-mounted display (HMD) legibility for users exposed to whole body vibration. This presentation will discuss a pair of human factors studies that were conducted to evaluate the effect of whole body vibration on eye, head and helmet movement for seated users of a Helmet Mounted Display while conducting simple fixation and horizontal tracking tasks. These experiments suggest that vertical eye motion can be measured and that the magnitude of eye movements is correlated with the acceleration of head pitch angle and acceleration of helmet pitch slippage. The largest amplitudes in eye movements are observed when the user is exposed to sinusoidal vibration in the 4 to 6 Hz range, which is consistent with the frequencies that past research has demonstrated results in the largest decrease in legibility. This research demonstrates that loss of legibility while wearing helmet-mounted display likely results from a combination of VOR-triggered eye movements and movement of the display with helmet slippage. Future compensation algorithms should consider adjusting the display in response to VOR-triggered eye and helmet motion.

******Please provide the briefing to the TAG coordinators for posting on the TAG website, if the briefing is unclassified and cleared, via the provided CD******

Issues and Concerns (If none exist, state none)

Title of Concern or Problem	Advocate or Organization That Raised Issue	Group Discussion Summary Related to Topic	Actions, if any to be taken
Speaker for Stereoscopic Radar Displays was asked about differences between age groups.	NAWCTSD	Unexpectedly, there were no significant differences.	
Speaker for Stereoscopic Radar Displays was asked about differences between experience levels.	NAWCTSD	There was no difference in performance, but there was a difference in acceptance.	
Speaker for Improved Comprehension of Voluminous Data was asked if any existing algorithms have been implemented to support effort.	AFIT	There has been minimal use.	POC information was exchanged to further discuss.

Elections (If none held state none)

Position Being Filled	Current Person	Current Agency/Organization	Candidates Nominated (Name/Agency-Organization)	Final Sub TAG Selection (Based on Voting)
None				

******Please also provide the new individuals contact information******

Open Actions (If none exist state none)

Title of Concern or Problem	Advocate or Organization That Raised Issue	Group Discussion Summary Related to Topic	Actions, if any to be taken
None			

General Notes (Optional):