Despite the recent economic recession and its adverse impact on air travel, the Federal Aviation Administration (FAA) continues to forecast an increase in air traffic demand that may see traffic double or triple by the year 2025. Increases in air traffic will burden the air traffic management system, and higher levels of safety and efficiency will be required. The air traffic controllers' primary task is to ensure separation between aircraft in their airspace and keep the skies safe. As air traffic is forecasted to increase in volume and complexity [1], there is an increased likelihood of conflicts between aircraft, which adds risk and inefficiency to air traffic management and increases controller workload. To attenuate these factors, recent ATM research has shown that air and ground-based automation tools could reduce controller workload, especially if the automation is focused on conflict detection and resolution.

Conflict Alert is a short time horizon conflict detection tool deployed in the Terminal Radar Approach Control (TRACON), which has limited utility due to the high number of false alerts generated and its use of dead reckoning to predict loss of separation between aircraft. Terminal Tactical Separation Assurance Flight Environment (T-TSAFE) is a short time horizon conflict detection tool that uses both flight intent and dead reckoning to detect conflicts. Results of a fast time simulation experiment indicated that T-TSAFE provided a more effective alert lead-time and generated less false alerts than Conflict Alert [2]. TSAFE was previously tested in a Human-In-The-Loop (HITL) simulation study that focused on the en route phase of flight [3].

The current study tested the T-TSAFE tool in an HITL simulation study, focusing on the terminal environment with current day operations. The study identified procedures, roles, responsibilities, information requirements and usability, with the help of TRACON controllers who participated in the experiment. Metrics such as lead alert time, alert response time, workload, situation awareness and other measures were statistically analyzed. These metrics were examined from an overall perspective and comparisons between conditions (altitude resolutions via keyboard entry vs. ADS-B entry) and controller positions (two final approach sectors and two feeder sectors) were also examined. Results of these analyses and controller feedback provided evidence of T-TSAFE's potential promise as a useful air traffic controller tool. Heuristic analysis also provided information on ways in which the T-TSAFE tool can be improved. Details of analyses results will be presented in the full paper.

[1] Joint Planning and development Office. Nextgen. http://www.jpdo.gov/nextgen.asp

[2] Tang, H.; Robinson, J.E.; & Denery, D.G. (2011). Tactical Conflict Detection in Terminal Airspace. Journal of Guidance, Control, and Dynamics, Vol 34, No. 2, pp403-413.

[3] Prevot, T.; Homola, J.; Mercer, J., Manini, M.; & Cabrall, C. (2009). Initial Evaluation of NextGen Air/Ground Operations with Ground-Based Automated Separation Assurance. Eighth USA/Europe Air Traffic Management Research and Development Seminar (ATM 2009). June 2009, Napa Valley, CA, US