

# Predictive aids in Air Traffic Control: Situation Awareness and mental workload implications

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## Abstract

This paper looks at situation awareness and mental workload as it relates to the Free Flight concept. Free Flight is a fairly recent innovation that is aimed, among other things, at giving pilots more control over real time changes to flight paths and has raised many concerns amongst controllers regarding safety. A principal concern is a loss of the controller's 'picture' that could result from aircraft deviating from flight plans without prior controller consent. Such a loss may compromise the ability of the controller to intervene in the event that separation is lost between aircraft. This paper identifies potential adverse effects that the implementation of the shared separation concept may have on controller performance and proposes a modified interface that would aid in giving predictability back to the controller. A prototype interface is currently being developed at the University of Guelph and is representative of a combined data-link and conflict detection aid that may be implemented as the progression is made towards transferring control from the ground to the air.

## Introduction

The 'Free Flight' concept has been proposed as a means of increasing throughput in the Airspace System, while reducing delays. It is being pursued on both sides of the Atlantic—EU efforts include, e.g., Eurocontrol (FREER); European Commission (Mediterranean FF; FFFMS) as well as with EU air carriers (NEAN, NUP projects) and research establishments (NLR). In the present context we address a derivative of the Free Flight concept, namely Direct Routing, which is defined as Point A to Point B travel across a single sector. Regardless of the nature of the air traffic management system in effect, the controller's ability to effectively predict the future trajectory of an aircraft is critical to ensuring that separation minima are not violated. This ability is dependent on good situation awareness and the maintenance of manageable levels of mental workload. Within the free flight context, evidence is emerging that suggests that this ability may be compromised with potential impact on overall system safety.

In D. de Waard, K.A. Brookhuis, J. Moraal, and A. Toffetti (2002), *Human Factors in Transportation, Communication, Health, and the Workplace* (pp. 209 - 211). Maastricht, the Netherlands: Shaker.