Integration of multiple independent alerting systems

P.N.R. Pedroso, M. Mulder, M.M. van Paassen, M. Mulder
Delft University of Technology
Faculty of Aerospace Engineering
The Netherlands

Abstract

In the past decades, automation support in aircraft flight deck has increased and, considering future demands regarding safety, pollution and noise, furthermore support will be need. Support and alerting systems have been developed and successfully introduced in the cockpits with the goal of supporting crew tasks. However this was not without drawbacks, as cockpit crew now need to spend considerable attention and time in recognising alert indicators, identifying the nature of the problems and deciding on the appropriate action to overcome these problems. This paper discusses one possible way of reducing crew's workload of alerts processing by integrating multiple independent alerting systems under a Multi-Agent like architecture, capable of prioritising and preventing unnecessary alerts.

Introduction

User interface technology for aircraft cockpits is likely to undergo drastic improvements in a near future to cope with the upcoming breakthroughs and changes in air navigation. An example of this is "Free Flight". Free Flight in its mature state is intended to provide aviation users Visual Flight Rules flexibility while maintaining the traditional protection afforded under Instrument Flight Rules by using advanced technology. (RTCA, 1995)

With the increase of cockpit complexity and growth of automation on the flight deck, pilots often have difficulties to maintain Situation Awareness. 'Situation Awareness' is the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future." (Endsley, 1995). Difficulties with situation awareness occur especially during critical situations, due not only to the large amount of information that has to be integrated but also to the overlap between independent alerting systems.

As they are today, alerting avionics systems onboard aircraft's cockpits, such as the Ground Proximity Warning System (GPWS) and the Traffic Alert and Collision Avoidance System (TCAS), despite their proven effectiveness in the increase of safety in air navigation, are still designed and implemented as stand-alone, hardwired monolithic applications of software. They communicate with the flight