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Pilot Situation Awareness of Commercial Aircraft Flight Management Systems

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ABSTRACT

Complex, dynamic domains present an individual with a challenging operational environment. To be able operate effectively and achieve a desired goal, an individual must understand what is taking place in the surrounding situation. This task can become very demanding when the status of many elements in the situation may be continually changing simultaneously. The awareness and individual possesses of this situation is recognised as a fundamental prerequisite to achieve consistent proficient performance, and is the focus of this study.

Specifically, this study set out to evaluate the Situational Awareness (SA) that experienced commercial pilots possess of aircraft Flight Management Systems (FMS). To achieve this objective the Situation Awareness Global Assessment Technique (SAGAT), developed by Endsley (1995a), was adapted to the commercial FMS cockpit environment. This required development of a query database and design of an administration technique suitable for use in this study.

The increasing use of automation in the aircraft cockpit has produced some stunning improvements in operational efficiency. However, the increasing complexity of aircraft management systems has exposed problems associated with the operator-automation interface. Current FMS have evolved through the integration of several separate aircraft flight control systems to provide the pilot with a capable semi-autonomous flight management tool. While the introduction of these tools has helped to improve safety, they have also introduced some unexpected operational consequences. One of these consequences is the tendency for flight-crews to experience automation surprises. Such events occur when the automation's behaviour violates the operator's expectation, and are usually the result of an inconsistency between the operator's understanding of the system and the actual status of the system. In essence, automation surprises arise when the operator has poor SA of the system with which they are working.

Due to the limited number of evaluations that were completed during this study no conclusive findings could be made. Despite this, the data revealed that the automation appeared to dominate the participant's attention and, that relevant flight instructor experience could have beneficial effects on SA related knowledge.

Attempts were also made to determine if there was any correlation between SA and psychological motivation. However, in isolation the results from these tests did not show any promising relationship. Despite this, the prospect that psychological state might influence SA cannot be eliminated due to a lack of data available from the present evaluation. Furthermore, one of the participants displayed very different motivation results that could imply that a combination of motivational states might have an affect on an individual's SA.

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