

# Vigilance in ATC: the quest for a definition –an applied perspective

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## Abstract

The commonly applied, but not necessarily independent, definitions of vigilance often focus on one of three components: 1) the cognitive component stresses the concepts of attention and perception; 2) the energetical focus emphasises the alertness as indicated by physiological measures for cortical arousal; and 3) the behavioural focus centres the performance in detecting irregular or rare events in the environment. A survey of 138 controllers at 4 European Air Navigation Service Providers (ANSP) also revealed a gap between the currently offered theoretical concepts and the controllers' perception of 'low vigilance' and provides insight into aspects related to the major approaches. Illustrative examples from different sources demonstrate the need for a clear integration of these aspects in the field of Air Traffic Control (ATC). These examples include experimental research on monotony, a discussion of incident reporting and coping strategies. Limitations of the currently available vigilance concepts are discussed to describe its relevance in ATC incidents and aspects that need to be considered are suggested. A definition of vigilance and its implications that may satisfy the needs not only of researchers, but also of controllers and incident investigators will be proposed. Therein, vigilance is seen as the active, preplanning behaviour undertaken by ATCOs to avoid potential incidents. As such, it is based on optimal cognitive functioning and energetical preconditions as well as appropriate work organisation and task design.

## Introduction

The High Level European Action Group for ATM Safety (AGAS) identified research on low vigilance periods as a specific issue to be included in the safety action plan (AGAS, 2003). Even though the interest in this problem area increased as one of the potential consequences of the mid-air collision at Lake Constance in 2002 (BFU, 2004), the vigilance issue seems to have a bigger impact in separation infringements reported in ATC incidents than expected. Already in 1990 the Canadian Aviation Safety Board (CASB), the former Transportation Safety Board (TSB) of Canada, estimated that in about 50 % of the ATC incidents vigilance or the lack thereof played a contributory role. The validation process of HERA, a technique

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