

# Identification of performance parameters in complex and dynamic work environments: the example of aerodrome Air Traffic Control

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## Abstract

Measuring the performance of operators working in complex and highly dynamic systems is an important aspect of human factors research. It requires methods and performance parameters that are sensitive to changes and can be applied in different research contexts as well as under real working conditions. Using aerodrome air traffic control as an example, we present a methodical approach that meets these requirements. In the following, we will introduce a parameter set for performance measurement and describe how it was derived from the knowledge of aerodrome air traffic controllers. For the classification of the parameters, a revised model of situation awareness is presented and used to integrate the parameters into a common theoretical framework. Since our methodology is generic, it may be of interest for researchers of various domains.

## Introduction

One of the most important sources of information for air traffic controllers (ATCOs) is the direct view from their local tower onto the airfield (Pinska & Bourgois, 2005). For this reason, the tower is always one of the highest buildings at an airport. However, poor visual conditions or occlusions of parts of the airfield by terminal buildings may reduce the quality of this source of information. A loss of overall capacity is usually the result. A number of projects (e.g. Fürstenau et al., 2009) have addressed this problem by trying to reduce the ATCOs' dependence on the direct view out of the tower window. This can be accomplished by a sensor-based information system which provides a free and untarnished view of the airfield.

The introduction of an information system, which makes the direct view dispensable, changes the ATCOs' familiar work environment considerably. Such substantial changes are only reasonable if they bring about a qualitative improvement compared to the initial status (Kastner et al., 1998). Therefore, an objective evaluation of the impact of the new system on the performance of the ATCO in terms of safety, effectiveness and efficiency is essential. But how to determine which of the

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