



Is SA shared or distributed in team work? An exploratory study in an intelligence analysis task

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ABSTRACT

This study compared two theoretical approaches to Situation Awareness (SA): the psychological school of thought and the systems ergonomics school of thought, by assessing measurement of team SA within these frameworks. Two teams were assigned and organised into either a traditional Hierarchy or a Peer-to-Peer organisational structure in a single case study design. Measures derived from the psychological and systems ergonomics perspectives were applied to assess their sensitivity for assessing team SA. No statistically significant differences were found between the two teams when measures originating in the psychological tradition were considered: differences were found, however, for measures originating in the systems ergonomics tradition. Literature concerned with team SA reveals a lack of consensus with regards to explaining the nature of the phenomenon as well as its measurement. This paper argues for a debate in the field to clarify what constitutes appropriate measurement techniques for team SA and suggests that these are taken from the systems ergonomics tradition, as suggested by the present studies findings.

Relevance to industry: Teams are a major feature of most industrial applications of work, and maintaining good situation awareness is important to successful performance. A method for examining the situation awareness of teams is proposed and compared with the individual models. Analysing the team as a functional unit of situation awareness is presented for future work.

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1. Introduction

There is still considerable debate concerning the nature of Situation Awareness (SA) in teams and as yet there is neither consensus nor any single measure developed to assess the phenomenon (Patrick et al., 2006). Reviewing the extensive literature on SA identifies a number of conceptual issues which differentiate perspectives on SA. A recent paper by Stanton et al. (2010) presents three schools of thought on SA: the psychological, the engineering and the systems ergonomics schools of thought. The present study examined two of these: the psychological and the systems ergonomics approaches. Two models were considered from these: the model of Shared SA which represents the psychological approach, while the more recent model of Distributed SA takes a systems ergonomics perspective. In this paper the two schools of thought and their associated models are discussed in terms of how each explain SA, what they consider to be the unit of analysis for SA and how each approach measures SA, followed by an empirical investigation with discussions and conclusions for team SA.

1.1. Explanations of SA

SA can be explained in terms of several aspects, two of which are considered here; as individual or as team SA. The psychological school of thought considers SA as being contained entirely within the mind of the agent (Stanton et al., 2010). Endsley's (1995) three-level model has received most attention of the contributions within this approach. This model presents SA as consisting of three separate levels: perception, comprehension and projection (Endsley, 1995). By perceiving the available elements in the environment (Level 1) and understanding these (Level 2) the individual can make projections about the future (Level 3) and ultimately take actions in-line with his or her predictions. This information processing approach to describing SA provides an intuitive definition of the concept (Salmon et al., 2006).

In contrast, the systems ergonomics school considers SA as an emergent property arising from people's interaction with the world (Stanton et al., 2006). Bubb (1988) defines systems ergonomics as "the application of system technics on ergonomical problems" (p. 233); both the term and its sentiment are in wider use within the human factors and ergonomics community (Helander, 1997; Clegg, 2000; Waterson, 2009). SA has been described as a systems

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