Aviation Research Project: abstract and introduction

What is an abstract?
The abstract is a brief summary of the entire research project report. It is highly structured & typically includes:

- background information
- a statement of the problem or a gap in existing knowledge
- the focus or purpose of the research, presented in statement form or as research questions
- a brief overview of the methods used in the research
- findings and conclusions, briefly stated
- a brief summary of recommendations (if required)

An abstract is typically 150-200 words. Therefore the challenge is to concisely present a summary of your entire research project.

Sample abstract

<table>
<thead>
<tr>
<th>In air traffic management (ATM) knowledge of the impact of human factors on performance is critical to address safety incidents. Previous research has largely focused on the effects of single factors on performance which has resulted in a comprehensive understanding of single factor effects. In current control environments however, the residual threats for incidents often result from the interaction of multiple human factors and the resulting cumulative impact on performance. This research uses a literature review, an analysis of over 400 European aviation incident reports and finally a survey of ATM professionals to assess the need for a multifactorial model of performance. Literature findings suggest that Human Factors approaches are fundamentally single-factor in nature, which is out of step with real ATM working contexts. An incident report analysis, supported by a survey of air traffic experts, suggests that multiple factor incident causation exists. An incident report analysis, supported by a survey of air traffic experts, suggests that multiple factor incident causation exists.</th>
<th>Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem/gap</td>
<td></td>
</tr>
<tr>
<td>Methods/purpose</td>
<td></td>
</tr>
<tr>
<td>Findings</td>
<td></td>
</tr>
</tbody>
</table>

(Adapted from Edwards et al. 2012, p. 159)
The Introduction

The introduction contains many of the same elements as the abstract; however, these are presented in a lot more detail in the introduction. The introduction typically includes:

- background/contextual information
- a statement of the problem
- the purpose of the report
- a brief review of previous work/research and relationship to the project
- a brief overview of methods or approach
- scope and limitations
- outline of the rest of report

The introduction DOES NOT include:

- findings, conclusions or recommendations

Sample Introduction

1. Introduction

Air traffic control (ATC) is a safety critical environment (Chang & Yeh 2010). Air Traffic Controllers (ATCOs) are at the sharp end of this safety critical system. To ensure flight safety, ATCOs are required to maintain a consistently high standard of performance. The potential consequences of poor performance are severe, with high costs and potential loss of life (Cox et al. 2007). In such a safety critical environment, human performance and error are primary concerns. Although Kirwan (2011) notes that ATC is a highly reliable operation, of incidents that do occur, human error has been attributed as a primary or secondary cause in 75-90% of cases (Mackieh & Cilingir 1998), human factors have been repeatedly evidenced to affect human performance (Chang & Yeh 2010) and are ‘major determiners of human error’ (Park & Jung 1996, p. 330). Knowledge of the impact of human factors on human performance and error is therefore critical in addressing safety incidents in air traffic control.

Most previous human performance and error research has focused on the effects of single factors on performance (Svennson 1997). This focused research has resulted in a comprehensive understanding of the impact of single factors on performance. As such, single factor issues such as fatigue, vigilance, and situation awareness problems have now largely been designed out or sufficiently mitigated by design, operational and Human Factors & Safety expertise. In current control environments, although accidents are rare, when they do occur they are often multi-causal in nature, or are seen as having no direct causes but many contributors, as highlighted by so-called ‘Swiss Cheese’ and Resilience Engineering models (Reason 1990). Therefore, the residual threats for incidents often result from the interaction of multiple human factors and the resulting cumulative impact on performance.
A potential solution is the development of a multifactorial model of human performance. This conceptualization would permit the modelling of the interactions between relevant human factors. Human performance limits may also be acknowledged and integrated in the model as ‘performance boundaries’. Currently, this proposal is limited by its anecdotal nature and the lack of specification of factors and thus accurate performance boundaries. However, considering the previous calls in the literature for research into multiple factor interrelations [e.g. 15] the authors believed it would be worthwhile to investigate the need for a human performance model to represent multifactor interactions and multi-factor impacts on performance, in the safety critical domain of air traffic control.

1.1. Current investigation
The current investigation aims to:
1. assess the need for a multifactorial model of performance
2. identify and refine key factors which impact ATCO performance for later integration into an envelope model.

The aims of this investigation were addressed using three separate methodologies. A literature review was conducted to summarize the sporadic research to date on factor interaction effects on performance. An incident report analysis subsequently aimed to investigate the multifactorial nature of incidents in the field. Finally, a survey for ATM professionals (controllers and incident investigators) was utilized to refine and prioritize factors that should be considered for further investigation and potentially integrated into a multifactorial model of ATCO human performance.

(Adapted from Edwards et al. 2012, pp. 159-160)

References