

# Preface

This thesis presents the culmination of an extensive research endeavour to explore the subject of cognitive assessment and its practical implications. In this preface, the research work is briefly introduced, highlighting its subject, scope, aims and the philosophy that guided the approach of this study.

The subject of this research revolves around comprehending and evaluating cognitive processes concerning task performance. This study probed the intricate workings of the human mind, specifically focusing on general cognitive abilities such as attention and working memory. It aims at developing an objective assessment tool that can precisely predict cognitive performance in upcoming tasks.

The scope of this research is comprehensive, encompassing various aspects of cognitive assessment and performance optimisation. The study explored the interplay between cognitive processes and task demands to uncover the underlying mechanisms that determine successful performance. The investigation spanned multiple disciplines, including psychology, neuroscience and human factors engineering, as it strived to develop a holistic understanding of cognitive capabilities and their relevance in real-world contexts.

The primary aim of this research is to contribute to the development of standardised and reliable assessment tools for evaluating cognitive processes. The study recognised the need for objective measures to capture an individual's cognitive abilities, enabling organisations to make informed decisions regarding training interventions, resource

allocation and safety enhancement. This study aims to bridge the gap between theoretical knowledge and practical implementation, providing actionable insights that can improve human performance and safety outcomes.

The philosophy of the approach of this research is rooted in the information-processing perspective of human performance. Since cognition relies on individual attention resources and working memory capacity, a methodology was adopted that involves collecting and analysing physiological measures, specifically EEG data from the prefrontal cortex. These measures unintentionally reveal an individual's attentional and working memory status, providing valuable insights into his/her cognitive capabilities. This approach emphasises integrating advanced analysis techniques and innovative assessment methodologies to create a model that can predict cognitive performance with reasonable accuracy.

This dissertation is expected to embark on a journey that explores the intricacies of cognitive processes, the development of assessment tools and their practical applications. Upholding the highest ethical standards and promoting responsible data use with the ensured. With a deep appreciation for the complexity of human cognition, the study aims to contribute to the academic understanding of cognitive assessment while offering practical insights that can improve performance and safety in various domains.

The readers are invited to go through the findings, methodologies and implications of this research. This dissertation is expected to serve as a valuable resource for researchers, practitioners and individuals interested in the fascinating world of cognitive assessment and its impact on human performance.

Thank you for embarking on this journey with the researcher.