



Transport
Asset Standards
Authority

T MU HF 00001 ST

Standard

Human Factors Integration – General Requirements

Version 3.0

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Standard governance

Owner: Manager Human Factors, Asset Standards Authority
Authoriser: Director Safety, Quality, Environment and Risk, Asset Standards Authority
Approver: Executive Director, Asset Standards Authority on behalf of the ASA Configuration Control Board

Document history

| Version | Summary of changes |
|---------|--|
| 1.0 | First issued 22 August 2014. |
| 2.0 | Second issue, 7 June 2017. Template updated. |
| 3.0 | Adoption of AS/RISSB 7470:2016 <i>Human Factors Integration in Engineering Design – General Requirements</i> |

Preface

The Asset Standards Authority (ASA) is a key strategic branch of Transport for NSW (TfNSW). As the network design and standards authority for NSW Transport Assets, as specified in the *ASA Charter*, the ASA identifies, selects, develops, publishes, maintains and controls a suite of requirements documents on behalf of TfNSW, the asset owner.

The ASA deploys TfNSW requirements for asset and safety assurance by creating and managing TfNSW's governance models, documents and processes. To achieve this, the ASA focuses on four primary tasks:

- publishing and managing TfNSW's process and requirements documents including TfNSW plans, standards, manuals and guides
- deploying TfNSW's Authorised Engineering Organisation (AEO) framework
- continuously improving TfNSW's Asset Management Framework
- collaborating with the Transport cluster and industry through open engagement

The AEO framework authorises engineering organisations to supply and provide asset related products and services to TfNSW. It works to assure the safety, quality and fitness for purpose of those products and services over the asset's whole-of-life. AEOs are expected to demonstrate how they have applied the requirements of ASA documents, including TfNSW plans, standards and guides, when delivering assets and related services for TfNSW.

Compliance with ASA requirements by itself is not sufficient to ensure satisfactory outcomes for NSW Transport Assets. The ASA expects that professional judgement be used by competent personnel when using ASA requirements to produce those outcomes.

About this document

This standard supports organisations undertaking work for TfNSW, including Authorised Engineering Organisations (AEOs), in the development and application of human factors integration (HFI). This standard describes the need for the following:

- a human factors integration process
- generic human factors requirements

Meeting these needs will optimise overall system performance through the systematic consideration of human capabilities and limitations within the design process.

Adequate integration of human factors complements the systems engineering approach to all phases of an asset's life cycle, ensuring the asset is fit for purpose.

This standard is the third issue.

This standard now requires compliance with AS/RISSB 7470:2016 *Human Factors Integration in Engineering Design – General Requirements*.

While AS/RISSB 7470:2016 is specific for the Australian rail industry, this TfNSW HFI standard is relevant to all modes of transport and needs to be read and implemented as such. This ensures that human factors are incorporated into the engineering design processes for all modes of transport and across the entire life cycle of the asset.

All references to 'rail' in AS/RISSB 7470:2016 are to be read as being applicable to all modes of transport. References to RIM (rail infrastructure manager), RSO (rolling stock operator) and RTO (rail transport operator), are likewise applicable to the transport asset operator and transport asset maintainer, regardless the mode.

Appendix A in AS/RISSB 7470:2016 references rail specific hazards, many of which can be easily adapted to other modes of transport.

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1. Introduction

For an operational system to deliver the expected levels of benefits to Transport for NSW (TfNSW) customers, it is essential that the human interactions with the system and system elements are well designed through the application of established human factors (HF) principles and knowledge. The process for achieving this is human factors integration (HFI).

The aim of the HFI process is to ensure the human-system interactions optimise system performance, and to identify and mitigate risk.

Organisations that provide assets to TfNSW need to ensure that they are safe to operate and maintain, and that all safety risks have been minimised so far as is reasonably practicable (SFAIRP) during the engineering design process, in addition to their professional duty of care.

Supporting evidence, demonstrating HFI in safety risk management activities, will provide an important contribution to the overall safety assurance argument in most cases.

The benefits of considering HF in the engineering design process are not limited to safety. Equally valuable are benefits regarding the overall operability and maintainability of the system. These include but are not limited to the following:

- minimising errors
- improving effectiveness
- improving user comfort
- increasing system acceptance

To achieve these benefits, it is important to take into account HF early in the asset life cycle, starting with feasibility, optioneering, conceptualising, and continuing through the full design process.

Guidance material to assist with implementing this standard is provided in T MU HF 00001 GU *Guide to Human Factors Integration*.

This standard requires compliance with AS/RISSB 7470:2016 *Human Factors Integration in Engineering Design – General Requirements*.

2. Purpose

This standard details the requirements for the demonstration of a systematic process for scaled human factors integration and for the application of recognised human factors principles, within the engineering design process.

2.1. Scope

This standard is applicable to all transport modes and provides the requirements for human factors integration (HFI) within the following activities:

- provision of engineering design services including the management of the process
- provision of new or altered assets to TfNSW
- provision of like-for-like replacement of assets

The Asset Standards Authority (ASA) human factors (HF) interest is assurance of the safe, effective and efficient use and maintenance of a delivered asset, including the verification and validation of the HF requirements.

This standard is not applicable to the following activities:

- HFI in manufacture, construction, installation, or commissioning phases of assets
- HFI relating to the organisation of the day-to-day operation or maintenance of assets following hand over to the operating and maintenance entities

Although this document does not cover these activities, there are benefits that an organisation conducting these activities can realise, by applying an HFI process and HF knowledge in their day-to-day business.

2.2. Application

The ASA intends for organisations, including Authorised Engineering Organisations (AEOs), undertaking work on any new or altered TfNSW transport asset to apply this standard. ASA intends this standard for use by human factors specialists, design professionals including engineers, and managers acting on behalf of an organisation that is contracted to provide applicable services and assets to TfNSW.

This document is to be used in conjunction with other applicable ASA documents including but not limited to the following:

- T MU HF 00001 GU *Guide to Human Factors Integration*
This provides guidance on how this standard could be implemented.
- T MU MD 20001 ST *System Safety Standard for New or Altered Assets*
- T MU AM 06006 ST *Systems Engineering Standard*

While AS/RISSB 7470:2016 *Human Factors Integration in Engineering Design – General Requirements* is specific for the Australian rail industry, this TfNSW HFI standard is relevant to all modes of transport and needs to be read and implemented as such. This ensures that human factors are incorporated into the engineering design processes for all modes of transport and across the entire life cycle of the asset.

All references to 'rail' in AS/RISSB 7470:2016 are to be read as being applicable to all modes of transport. References to RIM (rail infrastructure manager), RSO (rolling stock operator) and RTO (rail transport operator), are likewise applicable to the transport asset operator and transport asset maintainer, regardless the mode.

Appendix A in AS/RISSB 7470:2016 references rail specific hazards, many of which can be easily adapted to other modes of transport.

3. Reference documents

The following documents are cited in the text. For dated references, only the cited edition applies. For undated references, the latest edition of the referenced document applies.

Australian standards

AS/RISSB 7470:2016 Human Factors Integration in Engineering Design – General Requirements

Transport for NSW standards

T MU AM 06006 ST Systems Engineering Standard

T MU HF 00001 GU Guide to Human Factors Integration

T MU MD 20001 ST System Safety Standard for New or Altered Assets

4. Terms and definitions

All terms and definitions contained in AS/RISSB 7470:2016 are relevant in the application of this standard.

5. Human factors integration – process requirements

Human factors integration processes shall comply with Section 2 of AS/RISSB 7470:2016 *Human Factors Integration in Engineering Design – General Requirements*. All references to 'rail' in AS/RISSB 7470:2016 shall be read as being applicable to all modes of transport. References to RIM (rail infrastructure manager), RSO (rolling stock operator) and RTO (rail transport operator), shall be read as applicable to the transport asset operator and the transport asset maintainer, regardless the mode.

6. Generic human factors requirements

Human factors activities shall comply with Section 3 of AS/RISSB 7470:2016 *Human Factors Integration in Engineering Design – General Requirements*. All references to 'rail' in AS/RISSB 7470:2016 shall be read as being applicable to all modes of transport. References to

RIM (rail infrastructure manager), RSO (rolling stock operator) and RTO (rail transport operator), shall be read as applicable to the transport asset operator and the transport asset maintainer, regardless the mode.