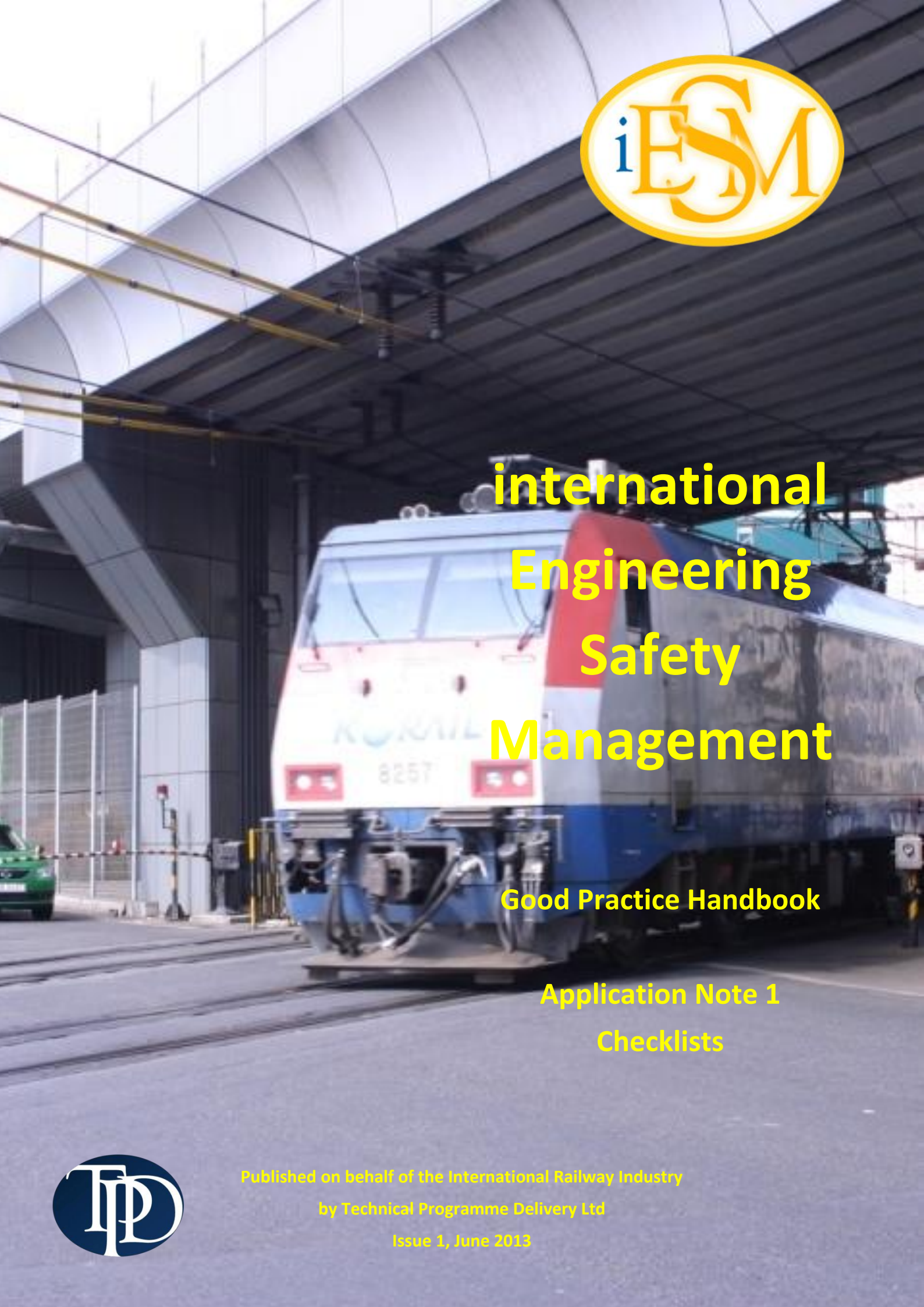

international Engineering Safety Management

Good Practice Handbook

Application Note 1
Checklists

Published on behalf of the International Railway Industry
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We are grateful to the organizations listed who have supported iESM in various ways:

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Disclaimer

Technical Programme Delivery Limited (TPD) and the other organizations and individuals involved in preparing this handbook have taken trouble to make sure that the handbook is accurate and useful, but it is only a guide. We do not give any form of guarantee that following the guidance in this handbook will be enough to ensure safety. We will not be liable to pay compensation to anyone who uses this handbook.

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This handbook does not necessarily represent the opinion of any of these people or organizations.

Good practice in engineering safety management advances as people build on the work done before by others. This handbook has drawn on the work carried out by the contributors to the Yellow Book [YB4] and to guidance on European Common Safety Methods [CSM-RA] among many others and we acknowledge our debt to them.

Contents

1 Introduction

This Application Note is a component of the international Engineering Safety Management Good Practice Handbook, or 'iESM', for short. The handbook as a whole describes good practice in railway Engineering Safety Management (ESM) on projects. It covers both projects that build new railways and projects that change existing railways.

The iESM handbook is structured in three layers:

- Layer 1: Principles and process
- Layer 2: Methods, tools and techniques
- Layer 3: Specialized guidance

The first layer comprises one volume, Volume 1. Volume 1 describes some of the safety obligations on people involved in changing the railway or developing new railway products. It also describes a generic ESM process designed to help discharge these obligations.

Volume 2 provides guidance on implementing the generic ESM process presented in Volume 1 on projects. Volume 2 belongs in the second layer. At the time of writing, Volume 2 was the only document in the second layer but further volumes may be added to this layer later.

The third layer comprises a number of Application Notes providing guidance in specialized areas, guidance specific to geographical regions and case studies illustrating the practical application of the guidance in this handbook.

The structure of the handbook is illustrated in the figure on the right.

This document is Application Note 1. It supports the main body of the handbook by providing checklists that may be used when carrying out some of the ESM tasks.

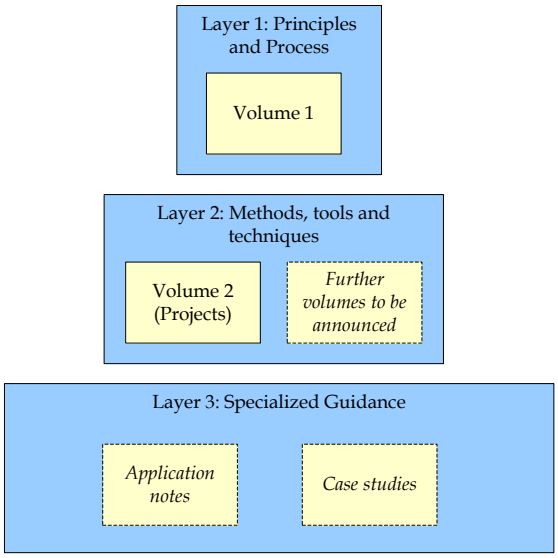

Figure 1 The Structure of iESM Guidance

If you have any comments on this Application Note or suggestions for improving it, we should be glad to hear from you. You will find our contact details on our web site, www.intesm.org. This web site contains the most up-to-date version of this Application Note. We intend to revise the handbook periodically and your comments and suggestions will help us to make the Application Note more useful for all readers.

2 Checklists

2.1 Hazard identification checklists

These checklists are designed to be used when performing the **Identifying hazards** activity described in volume 2.

They may be used if there are no existing, well-established checklists. They may be applied to the whole system or to a component of it. Each item should be interpreted as widely as circumstances permit in the endeavor to identify possible hazards. No checklist can be exhaustive and the analyst should bring his or her full experience to bear in searching for hazards.

The **Functional Checklist** should be applied to a functional specification of the item being considered in an attempt to identify hazards arising from unspecified functionality or specified functionality but in unforeseen circumstances:

a. Alarms and warnings
b. Cab indications
c. Indication of failure
d. Interlocks
e. Maintenance and support
f. Point setting
g. Signal aspects
h. Terrorist action
i. Software malfunction
j. Software crash
k. Theft

The **Mechanical Checklist** should be applied to mechanical drawings to identify hazards involving physical interactions:

l. Ageing
m. Corrosion
n. Cryogenic fluids
o. Derailment
p. Dust and contamination
q. Exhaust gases

r. Fire
s. Insect, rodent or mold damage
t. Lasers
u. Overheating
v. Pressure systems
w. Shock and vibration
x. Vandalism
y. Ventilation

The **Construction Checklist** should be applied to civil engineering drawings and plans to identify construction hazards:

z. Access hazards at site
aa. Site preparation hazards
bb. Construction hazards
cc. Environmental effects
dd. Vandalism
ee. Interference with normal railway operating procedures
ff. Training and control of contractors

The **Electrical Checklist** should be applied to circuit diagrams to identify hazards involving electrical interactions:

a. Electromagnetic interference and compatibility
a. Fire and explosion initiation
b. Insulation failure
c. Lightning strikes
d. Loss of power
e. Traction current
f. Protection against earth faults
g. Indirect and direct contact
h. Emergency switching and isolation
i. Overcurrent protection and effects of disconnection
j. Current rating

The **Operation and Support Checklist** should be applied to operating and maintenance instructions to identify hazards occurring during or triggered by operating and maintenance activities:

a. Accessibility for maintenance
b. Documentation
c. Failure to activate on demand
d. Human factors
e. Inadvertent activation
f. Lighting

g. Manuals
h. Operability
i. Spares
j. Test tools
k. Training
l. Start-up / boot
m. Closedown
n. Re-setting

The **Occupational Health Checklist** should be applied to a general description to identify hazards to personnel installing, operating, maintaining or disposing of the item:

a. Allergenic substances
b. Animal bites
c. Asbestos
d. Asphyxiates, toxic, corrosive or penetrating substances
e. Corrosive materials
f. Cryogenic fluids
g. Cutting edges and sharp projections
h. Degraded operation
i. Dehydration
j. Electrical sources or batteries
k. Electrocution / shock
l. Emergency operation
m. Exhaust gases
n. Explosives
o. Fatigue
p. Fault conditions
q. Flammable substances
r. Foreseeable misuse
s. Heavy weights
t. High temperatures
u. Lasers
v. Noise
w. Normal operation
x. Pressurized systems
y. Radiation sources
z. Rotating machinery and moving parts
aa. System configuration parameters
bb. Working in confined spaces
cc. Working at height

The **External Factors Checklist** should be applied to identify hazards arising from external causes:

a. Earthquakes
b. Floods
c. Heat
d. Ice /cold
e. Landslides
f. Rain
g. Snow
h. Storms and high winds
i. Vandalism

3 Glossary

This glossary defines the specialized terms and abbreviations used in this Application Note.

3.1 Abbreviations

ESM	Engineering Safety Management

3.2 Specialized terms

Engineering Safety Management (ESM)	The activities involved in making a system or product safe and showing that it is safe. Note: despite the name, ESM is not performed by engineers alone and is applicable to changes that involve more than just engineering.
human factors	The field of study and practice concerned with the human element of any system, the manner in which human performance is affected, and the way that humans affect the performance of systems.
hazard	A condition that could lead to an accident. A potential source of harm. A hazard should be referred to a system or product definition.
system	A set of elements which interact according to a design, where an element of a system can be another system, called a subsystem and may include hardware, software and human interaction.

system lifecycle	A sequence of phases through which a system can be considered to pass. A product may also pass through some of these phases.
systematic failure	A failure due to errors, which causes the product, system or process to fail deterministically under a particular combination of inputs or under particular environmental or application conditions.
triggering event	An event, outside the system or product of interest, which is required in order for a Hazard to result in an Accident.

4 Referenced Documents

This section provides full references to the documents referred to in the body of this volume.

[CSM-RA]	Commission Regulation (EC) No 352/2009 of 24 April 2009 on the adoption of a Common Safety Method on Risk Evaluation and Assessment
[YB4]	*Engineering Safety Management, issue 4, "Yellow Book 4"*, ISBN 978-0-9551435-2-6 Yellow Book 4 now has the status of a withdrawn document.

iESM

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