

ADDENDUM TO THE SMS AND SMSR DETERMINATION

Common Safety Method on Risk Assessment (CSM-RA)

TABLE OF CONTENTS

1.	BACKGROUND.....	3
2.	INTRODUCTION	4
2.1.	Purpose	4
2.2.	Scope and Objectives.....	5
2.3.	Benefits of Applying CSM-RA	5
2.4.	Managing Risk for Railway Changes.....	6
2.5.	Definitions	7
2.6.	Abbreviations and Acronyms	8
3.	MINIMUM SUBMISSION REQUIREMENT	8
4.	APPLICABILITY OF CSM-RA	9
5.	PROCESS STEPS FOR APPLYING CSM-RA.....	9
6.	CSM-RA PROCESS FLOW	14
7.	ANNEXURE A: CSM-RA REPORT SUBMISSION TEMPLATE	15
8.	ANNEXURE B: MINIMUM SUBMISSION REQUIREMENT.....	24
9.	ANNEXURE C: LIST OF SUPPORTING DOCUMENTS	35

1. BACKGROUND

The Act, states in Section 5 that the objects of the Regulator are to:

- a) oversee safety of railway transport;
- b) promote improved safety performance in the railway transport industry;
- c) develop any regulations that are required in terms of the Act;
- d) monitor and ensure compliance with the Act; and
- e) give effect to the objects of the Act.

The overall purpose of a railway Safety Management System (SMS) is to ensure that organisations achieve their business objectives in a safe manner. Therefore, the Regulator regulates the railway safety by issuing operating Safety Permits to railway operators on the basis of an established and robust Safety Management System (SMS) that is fit for purpose and complying with the requirements of the Act and the Regulators Determination on the form and content of SMS and the Safety Management Systems Report (SMSR). The SMS & SMSR

Section 8 of the SMS Determination stipulates that Railway operators need to ensure control of the railway system by setting arrangements to comply with safety requirements and identifying and managing existing and future risks associated with the railway operations. Furthermore, the Determination requires that a risk management approach be applied in managing railway safety. This approach seeks to ensure that the technical and operational hazards are identified and that the associated risks to people, property and the environment are managed to a level that is as low as is reasonably practicable (ALARP).

Section 8.2.3 of the SMS & SMSR Determination requires that railway organisations must have systems in place to control changes to new projects and to manage the related operational risks. These should be applied to manage changes to techniques/technologies, operational procedures/rules/standards (either internal or involving interfaces) and organisational structure.

The Regulator is specifically mandated to develop regulations on matters relating to the to design, installation/construction/manufacturing, inspection, testing and commissioning, operations and, monitoring and maintenance, modification/alteration/upgrades and decommissioning and /disposal design, construction or, manufacturing, alteration, inspection, testing and commissioning, operations, monitoring and maintenance and operation, modifications/alteration and decommissioning/disposal of rolling stock, infrastructure and stations.

CSM-RA seek to justify the need for the adoption of a harmonised approach in risk evaluation and assessment by describing the risk management challenges associated with the introduction of significant changes in the railway systems, operational standards and organisational structures.

2. INTRODUCTION

This document provides a harmonised approach in risk evaluation and assessment by describing the risk management challenges associated with the introduction of significant changes in the railway systems, operational standards and organisational structures. The document further provides a template to be used by operators when making submissions to the RSR, that relates to introduction of the said changes to the railway systems.

2.1. PURPOSE

Application of the CSM-RA methodology for risk evaluation and assessment to be applied by the industry when changes are introduced to the railway systems. These changes could be related to introduction of new works and significant changes to techniques/technologies, operational procedures/rules/standards and organisational structure as follows, but not limited to:

- Construction of new lines/infrastructures
- Changes to operating speeds

- Significant changes to operating procedures
- Changes to train authorization and control systems or equipment
- Changes to the type of motive power used
- Introduction of new or modified rolling stock
- Infrastructure upgrades/modifications
- Infrastructure decommissioning/disposal

Changes in the organisational structures that affect operational safety

2.2. SCOPE AND OBJECTIVE

This document applies to all railway operators when introducing new changes to their SMS as discussed in paragraph 1.

The objective of this harmonised method is then to ensure that the railway industry applies, in a consistent manner, an approach that will ensure that safety levels are not compromised when introducing changes, and where practical, improvements in safety levels are achieved. Moreover, a harmonised method for conducting these assessments will also increase the Regulator's confidence in accepting the assessed levels of risk and facilitate the Approvals/"No Objection" for allowing changes to be operationalised. The safety method then seeks to prescribe an approach to be used to manage risk when changed is introduced.

2.3 BENEFITS OF APPLYING CSM-RA

Some of the benefits for adopting such an approach are the following:

- Safety demonstration will become easier and less onerous for the change proposers;
- The principles of cross-acceptance can be applied by the Regulator.
- An internationally recognised method may be adopted, this would make it possible for the Regulator to accept technologies on the basis of them

being accepted by safety authorities that apply the same safety method from around the world.

- Approvals/“No Objection” by the Regulator can be expedited.
- The perceived regulatory burden in obtaining Approvals/“No Objection” from the Regulator will be lessened.

2.4 MANAGING RISK FOR RAILWAY CHANGES

The Regulator fulfils its safety oversight mandate on new railway works and technology developments by conducting safety assessment and providing Approvals/“No Objection” on all life cycle phases of railway projects. Safety reviews are conducted by the Regulator on submissions or Notifications by operators to introduce new or modified/altered systems, sub-systems and components. These regulatory safety assessments aim to ensure that the impact of the intended changes is considered within the immediate environment of its application and from a systemic perspective encompassing asset/operational system life cycle.

For each new technology/new works the operator submissions throughout the life cycle phases have to:

- Describe the scope of the intended action - bearing in mind the whole system that will affect and be affected by the new technology. The Regulator intends to promote the principles of systemic engineering in the application of the whole system approach and sustainable designs;
- Identify the safety risks and describe the mitigations;
- Identify and describe the life cycle phases pertaining to the specific new technology; and
- Improve the state of safety within the railway system.

Submissions on risk assessments are paramount in demonstrating that risks imposed by changes in the railway systems have been controlled to acceptable levels. These submissions are thus required by the Regulator when operators/change proposers submit Notifications at all life cycle phases of the

intended changes (new works or technology developments) – from concept phase to design, installation/construction/manufacturing, testing and commissioning, operations and monitoring and maintenance, modification/alteration/upgrades and decommissioning and disposal phases of the systems.

It has been noted by the Regulator that an approach of allowing the change proposers to conduct risk assessment in an arbitrary manner, not being guided by any standardised approach, is plagued with many flaws. The submissions on risk assessments have been found to be grossly inadequate in many cases. At the root of the issue is the absence of a common approach or the guidance for specifying and demonstrating compliance requirements and acceptable safety levels.

The Regulator is thus providing this document as a guideline for the industry to be applied when undertaking these assessments in preparation for submission to the RSR.

2.5 DEFINITIONS

Term	To be understood as
Approvals	An approval means a written consent by Regulator to proceed with a requested activity, while the operator remains responsible to meet all applicable standards and safety requirements for all the applicable life cycle phases of proposed new works and technology developments, operational and organizational changes.
No Objection	This is a legal notice issued to the operator by the RSR to go ahead with the changes applied for, which allows the operator to advance/progress from one life cycle phase to the next.

Notifications	This is a submission required from the operator who intends to make any major changes to his/her SMS long before detail planning commences.
Technology	Created capability and/or capacity relating to systems, processes, equipment, and procedures applicable to rolling stock, railway infrastructure elements and stations.
Regulator	Railway Safety Regulator (RSR) defined in terms of the National Railway Safety Regulator Act.

2.6 ABBREVIATIONS AND ACRONYMS

Abbreviation	Description
ALARP	As Low as Reasonably Practical
ACT	National Railway Safety Regulator Act No. 16 of 2002
CSM-RA	Common Safety Method for Risk Assessment
SMS	Safety Management System
SMSR	Safety Management System Report
SANS	South African National Standards

3. MINIMUM SUBMISSION REQUIREMENTS

The Minimum Submission Requirements are defined as requirements that must be adhered to by all operators who intend to implement changes to their railway operations from concept phase to design, installation/construction/manufacturing, inspection, testing and commissioning, operations and monitoring, maintenance, modification/alteration/upgrades, decommissioning and disposal phases. The requirements to be adhered to are illustrated in Annexure B.

4. APPLICABILITY OF CSM-RA

When does the CSM-RA apply?

- 4.1 The CSM-RA applies when **ANY** technical, operational or organisational change is being proposed to the railway system. A person (operator) making the change needs to firstly consider if a change has an impact on railway safety.
 - 4.2 If there is no impact on railway safety, the risk management process in the CSM-RA need not be applied and the operator must keep a record of how it arrived at its decision.
 - 4.3 Does the change have an impact on safety, the operator must assess whether the change is significant or not by using criteria in the CSM-RA.
 - 4.4 In case of significant changes, the operator must apply the risk management process in the CSM-RA. If the change is not significant the operator is not obliged to apply the risk management process in the CSM-RA, but it is strongly recommended to use the process to manage non-significant railway safety risks. The operator must keep a record of how it arrived at its decision.
- 4.3 This process is summarised in Figure 1.

5. PROCESS STEPS FOR APPLYING CSM-RA

In making change submissions to the RSR in line with the provisions captured in paragraph 2 above, the operators must capture/address the requirements detailed in paragraphs 5.1 to 5.8 with all supporting documents.

5.1 PROJECT/SYSTEM DEFINITION

This section in the report requires the proposer to define the aspects of the project or the proposed change to include details contained in Annexure A.

5.2 CHANGE SIGNIFICANCE EVALUATION

Criteria for assessing significance of the project using the CSM-RA

Methodology

The significance of the proposed change must be assessed based on the impact it will have on safety and must be evaluated using the criteria set out from section 5.2.1 to section 5.2.6 below:

5.2.1 Failure Consequence Evaluation

This evaluation looks at the most credible worst-case scenario in the event of failure of the system under assessment. What is the potential Impact on safety? if the failure of the system has the potential to lead to any injury / fatality, then there is a safety impact. Briefly describe the consequence of failure.

One should end with a statement by indicating whether the evaluation is judged to be significant or insignificant in this respect.

5.2.2 Degree of Novelty

This evaluation looks at the innovative nature of the change within the railway environment and what is new to the organisation.

Has this been done before in our or other organisation/industry? Is this something new to us?

One should end with a statement indicating whether the evaluation is judged to be significant or insignificant in this respect.

5.2.3 Complexity of Change

This evaluation looks at the various number of skills required to apprehend the complexity of the change by a single person or discipline? e.g., does the proposed change require a combination of totally different competences thus different persons to be evaluated or applied? If yes, then the change probably significant

Here the organisation needs to describe the extent of complexity and resources required to implement the proposed change during each phase of the projects or products life cycle.

One should end with a statement indicating whether the evaluation is judged to be significant or insignificant in this respect.

5.2.4 Monitoring Capacity

In this evaluation, the organisation must demonstrate its ability or inability to monitor the effects of the proposed change throughout the change's life cycle and thus the ability or inability to intervene appropriately when undesired events transpire.

One should end with a statement indicating whether the evaluation is judged to be significant or insignificant in this respect.

5.2.5 Reversibility

The organisation should state the degree of difficulty to revert to the current status quo as well as what resources would be required to do so and duration the reversion.

One should end with a statement indicating whether the evaluation is judged to be significant or insignificant in this respect and also state at what stage is reversibility forfeited.

5.2.6 Additionality

The proposer should evaluate the significance of the proposed change(s) when also considering all recent safety related changes to the system under review, which may or may not have been deemed to be significant or not when considered in isolation.

One should end with a statement indicating whether the evaluation is judged to be significant or insignificant in this respect.

5.2.7 Significance Decision

Based on the evaluation conducted in sections 5.2.1 to 5.2.6 above, the proposed system/project/change is considered SIGNIFICANT/NOT SIGNIFICANT. (If the submission meets two or more of the significance test criteria, then the submission is considered SIGNIFICANT)

NB: In case of significant changes, the operator must apply the risk management process in line with the CSM-RA requirements (i.e.. continue with the process from section 5.3 onwards), and if the change is not significant the operator is not obliged to apply the risk management process according to the CSM-RA, however the operator must keep a records of how it arrived at its decision. It is strongly recommended to also use this process to manage non-significant railway safety risks.

5.3 RISK ANALYSIS

This section involves identifying and analysing potential events that may negatively impact the safety of individuals, assets, and/or the environment as a result of the proposal as well as making judgments "on the tolerability of the risk on the basis of a risk analysis" while considering influencing factors.

5.3.1 Hazard Identification

5.3.2 Hazard Classification

5.3.3 Risk Acceptability Decision

5.4 SELECTION OF RISK ACCEPTANCE PRINCIPLE

The choice of which Risk Acceptance Principle(s) to apply, or a combination thereof, must be appropriate to the strategy you intend to use to demonstrate that the change is safe. Select one of the more of the following criteria for use to support the submission:

- 5.4.1 Application of Codes of Practice,
- 5.4.2 Similarity Analysis with Reference System and/or
- 5.4.3 Explicit Risk Estimation.

5.5 RISK EVALUATION

In this section a verification by the proposer should be performed to ensure that the criterion/criteria chosen through the Risk Acceptance Principle is/are met and/or complied with using one or more of the following methods.

5.6 SAFETY REQUIREMENTS

In this section the proposer is required to, by way of demonstration, ensure that safety requirements identified through the Risk Acceptance Principle or combination thereof and risk analysis are met.

5.7 INDEPENDENT ASSESSMENT DECLARATION

In this section the proposer is required to assure the assessor that the entire CSM-RA regulatory tool has been applied correctly in evaluating the proposed change. For significant projects, this must be audited/checked by an independent person/body.

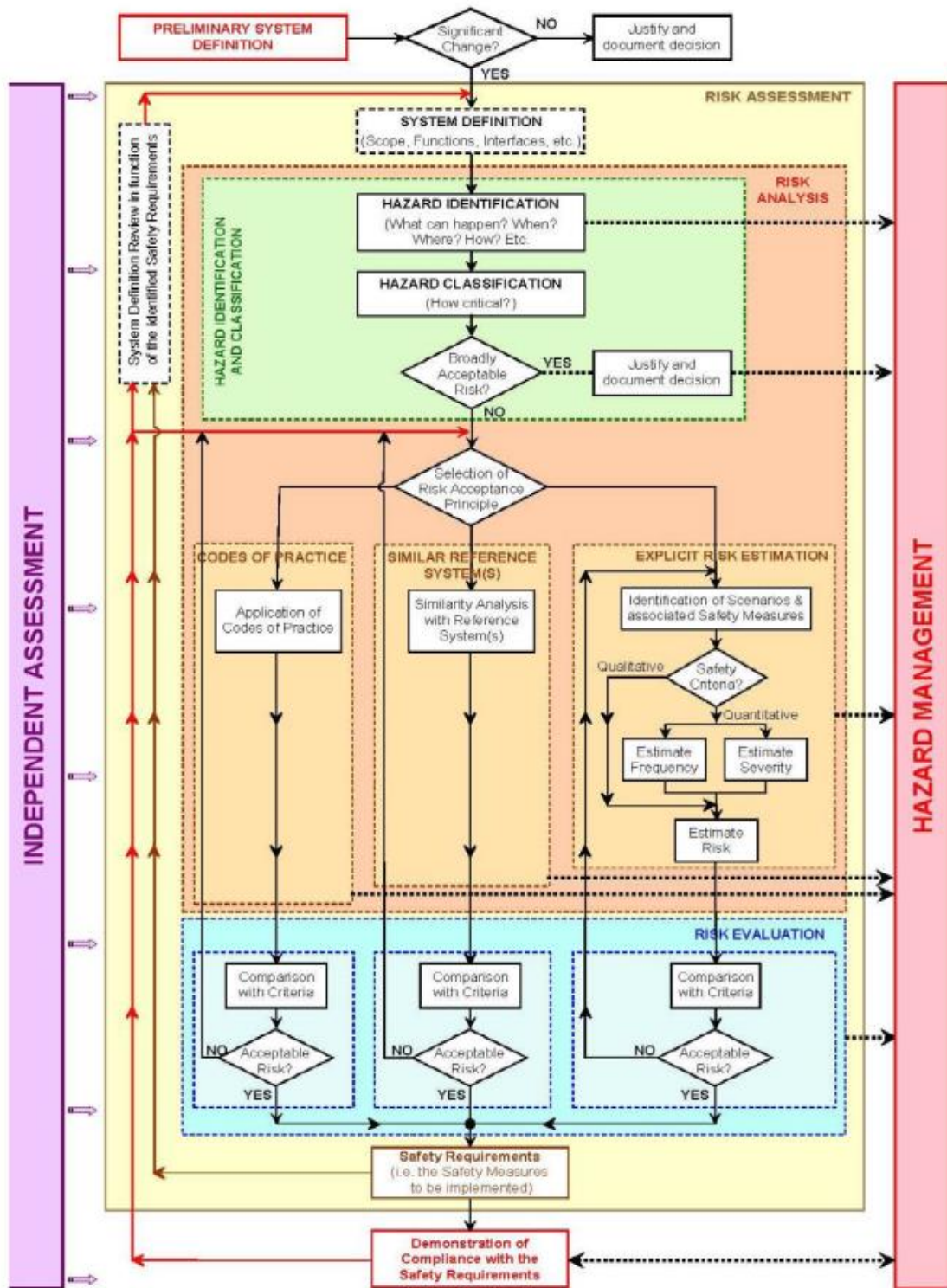
This portion of the report should be completed by a suitably qualified independent Assessor, registered with the relevant council.

The Appointment of this Independent Assessor shall be from Conception stage of the proposed change and will be maintained through all life cycle phases prior to operational phase and handover to the asset owner.

5.8 DOCUMENTATION

All Life cycle stages of the application of the CSM-RA and the hazard record established for use through the implementation of the change, should be documented.

6. CSM-RA PROCESS FLOW: FIGURE 1



7. ANNEXURE A:

CSM-RA

Report Submission Template

(Common Safety Method – Risk Assessment)

TABLE OF CONTENTS

1. PRELIMINARY SYSTEM DEFINITION/EXECUTIVE SUMMARRY
2. DEFINITIONS
3. PROJECT/SYSTEM DEFINITION
4. CHANGE SIGNIFICANCE EVALUATION
 - 4.1. Failure Consequence Evaluation
 - 4.2. Degree of Novelty
 - 4.3. Complexity of Change
 - 4.4. Monitoring Capacity
 - 4.5. Reversibility
 - 4.6. Additionality
 - 4.7. SIGNIFICANCE DECISION
5. RISK ANALYSIS
 - 5.1. Hazard Identification
 - 5.2. Hazard Classification
 - 5.3. RISK ACCEPTABILITY DECISION
6. SELECTION OF RISK ACCEPTANCE PRINCIPLE
 - 6.1. Application of Codes of Practice
 - 6.2. Similarity Analysis with Reference System
 - 6.3. Explicit Risk Estimation
7. RISK EVALUATION
8. SAFETY REQUIREMENTS
9. INDEPENDENT ASSESSMENT DECLARATION

1. PRELIMINARY SYSTEM DEFINITION/EXECUTIVE SUMMARY

The executive summary should summarize the entire report or proposal or a group of related reports in such a way that readers can rapidly become acquainted with the large body of material without having to read it all. It usually contains a brief statement of the problem or proposal covered in the major document(s), background information, concise analysis, and main conclusions. It is intended as an aid to decision-making by readers.

2. DEFINITIONS

Abbreviation/Word	Meaning

3. PROJECT/SYSTEM DEFINITION

This section of the report requires the proposer to define the following, but not limited to, aspects in detail:

- The change objective.
- The system’s physical boundary/area of implementation.
- The interfaces with other systems, including human capital and general public.
- A list of systems, Human-machine interface, which have a link with the system under consideration.
- Content of these interfaces (what are the possible outputs & inputs?)
- The system’s functions (necessary for the hazard identification)
- The system environment which it operates, such as Intended working temperature range, rural/built-up environment, other influential environmental criteria, etc..

- Is there electricity in the vicinity and thus possibly EMP disturbance possible?
- Are there shocks/vibrations to which the system will be submitted?
- How as well as by whom will the system be operated?
- The safety measures already in place with the system before change.
- Assumptions that may limit the validity of the risk assessment

4. CHANGE SIGNIFICANCE EVALUATION

The significance of the proposed change will be assessed based on the impact it will have on safety and will be evaluated using the criteria set out from section 4.1 to section 4.6 below:

4.1 Failure Consequence Evaluation

This evaluation looks at the most credible worst-case scenario in the event of failure of the system under assessment. What is the potential Impact on safety? if the failure of the system has the potential to lead to any injury / fatality, then there is a safety impact. Briefly describe the consequence of failure.

One should end with a statement by indicating whether the evaluation is judged to be significant or insignificant in this respect.

4.2 Degree of Novelty

This evaluation looks at the innovative nature of the change within the railway environment and what is new to the organisation. Has this been done before in our or other organisation/industry? Is this something new to us?

One should end with a statement indicating whether the evaluation is judged to be significant or insignificant in this respect.

4.3 Complexity of Change

This evaluation looks at the various number of skills required to apprehend the complexity of the change by a single person or discipline? e.g. does the proposed change require a combination of totally different competences thus different persons to be evaluated or applied? If yes then change probably significant. Here the organisation needs to describe the extent of complexity and resources required to

implement the proposed change during each phase of the projects or products life cycle.

One should end with a statement indicating whether the evaluation is judged to be significant or insignificant in this respect.

4.4 Monitoring Capacity

In this evaluation, the organisation must demonstrate its ability or inability to monitor the effects of the proposed change throughout the change's life cycle and thus the ability or inability to intervene appropriately when undesired events transpire.

One should end with a statement indicating whether the evaluation is judged to be significant or insignificant in this respect.

4.5 Reversibility

The organisation should state the degree of difficulty to revert to the current status quo as well as what resources would be required to do so and duration the reversion. One should end with a statement indicating whether the evaluation is judged to be significant or insignificant in this respect and also state at what stage is reversibility forfeited.

4.6 Additionality

The proposer should evaluate the significance of the proposed change(s) when also considering all recent safety related changes to the system under review, which may or may not have been deemed to be significant or not when considered in isolation.

One should end with a statement indicating whether the evaluation is judged to be significant or insignificant in this respect.

4.7 Significance Decision

Based on the evaluation conducted in sections 4.1 to 4.6 above, the proposed system/project/change is considered SIGNIFICANT/NOT SIGNIFICANT.

5. RISK ANALYSIS

This section involves identifying and analysing potential events that may negatively impact the safety of individuals, assets, and/or the environment as a result of the proposal as well as making judgments "on the tolerability of the risk on the basis of a risk analysis" while considering influencing factors.

5.1 Hazard Identification

This section requires the identification of all reasonably foreseeable safety risks and potential hazards to all stakeholders. The proposer(s) should ask themselves: if my system fails, what are the potential accidents that can occur? This exercise should typically be carried out through a multi-functional approach also taking into cognisance all affected stakeholders and representation during the identification exercise.

The result should be a comprehensive risk register and hazard log developed by all affected stakeholders.

5.2 Hazard Classification

This section requires the classification of all identified safety risks and hazards using potential consequences at train level during hazard identification and using the severity classes defined in the applicable standards.

5.3 Risk Acceptability Decision

Following the analysis of the risk associated with the proposed project/system/change conducted in sections 5.1 to 5.2 above, indicate whether the risks introduced as a result of the proposed system/project/change are considered to be ACCEPTABLE/NOT ACCEPTABLE.

6. SELECTION OF RISK ACCEPTANCE PRINCIPLE

The choice of which Risk Acceptance Principle(s) to apply, or a combination thereof, must be appropriate to the strategy you intend to use to demonstrate that the change is safe. Select one or more of the following criteria:

- (i) Application of Codes of Practice,
- (ii) Similarity Analysis with Reference System and/or
- (iii) Explicit Risk Estimation.

6.1 Application of Codes of Practice

In this section the proposer is required to justify the use or application of a Code of Practice or Industry Standard as an adequate measure to mitigate the identified risks or hazards which would otherwise not be acceptable if left untreated.

6.2 Similarity Analysis with Reference System

In this section a comparison of the proposed change to a similar change made in the past, which has been authorized by a relevant regulatory body/institution is made and justified as a sufficiently mitigating measure for the identified potential safety risks and hazards.

To be considered a valid reference, but not limited to, a system must:

- have already been proven in-use to have an acceptable safety.
- have similar functions and interfaces as the system under assessment.
- be used under similar operational conditions as the system under assessment.
- be used under similar environmental conditions as the system under assessment.

6.3 Explicit Risk Estimation

Explicit Risk Estimation is a Risk Acceptance Principal method used to evaluate whether the identified safety risk or hazard is at an acceptable level either qualitatively through

use of acceptable methods and techniques or quantitatively through probabilistic studies.

The objective is to perform a comprehensive safety study which would satisfy readers that adequate steps are taken to ensure the potential safety risks or hazards are mitigated to acceptable levels using acceptable.

7. RISK EVALUATION

In this section a verification by the proposer should be performed to ensure that the criterion/criteria chosen through the Risk Acceptance Principle is/are met and/or complied with using one or more of the following methods.

- For a Code of Practice (CoP): assurance that the requirements of the standards are met as well as that the CoP has been correctly applied.
- For a Similar Reference System: assurance that the system is at least as safe as the reference system. In case of deviation from the reference system where a lower safety is reached, then additional safety measures shall be identified to ensure a sufficient overall safety.
- For an Explicit Risk Estimation:
 - Qualitative: Ensure that the qualitative criterion/criteria is/are.
 - Quantitative: ensure that the requirements of the performed safety studies are met.

8. SAFETY REQUIREMENTS

In this section the proposer is required to, by way of demonstration, ensure that safety requirements identified through the Risk Acceptance Principle or combination thereof and risk analysis are met.

Examples of such a demonstration would include, but are not limited to:

- maintenance requirements which are coherent with maintenance strategy in place (or its update).
- Operational requirements are present in the operational procedures.

- Specific organisational structures are to put in place for some categories of personnel...

9. INDEPENDENT ASSESSMENT DECLARATION

In this section the proposer is required to assure the assessor that the entire CSM-RA regulatory tool has been applied correctly in evaluating the proposed change. For significant projects (as confirmed through the *Change Significance Evaluation*, in paragraph 4) this must be audited/checked by an independent person/body.

This portion of the report should be completed by a suitably qualified independent Assessor, registered with the relevant council. The Appointment of this Independent Assessor shall be from Conception phase of the proposed change and will be maintained through all life cycle phases prior to operational phase and handover to the asset owner.

8. ANNEXURE B: MINIMUM SUBMISSION REQUIREMENT

To obtain an Approval/ a “No objection” from the RSR, operators shall make submissions to the RSR through all the Life Cycle Phases (LCP) of the project as listed below:

1. General

Submissions made by Railway Operators shall include the following project details:

- a. Company Profile
- b. Project Description
- c. Project Objectives
- d. Location of Project (General Layout)
- e. Brief Technology Description
- f. Project Plan
- g. Interactions – Project Organizational Structure with a list of all the service providers including their roles and responsibilities

2. Concept Phase

The Concept Phase notification submission shall be made to the RSR by the Operator. The RSR shall review the submission and issue a notice of No Objection/Approval provided all requirements/conditions are complied with. The Concept Phase submission to the RSR shall include the following:

- a. A project definition and scope description
- b. An indication of the design standards to be implemented
- c. A robust design change procedure identifying all persons concerned with the Project Team outlining the appropriate roles and responsibilities assigned
- d. A project hazard log and risk assessment, managed by a competent person nominated by name and managed by a competent person with the appropriate authority to expedite the completion of corrective or mitigating actions and counter signed by all affected parties
- e. Signed approval/consent/acknowledgement letter in principle by relevant Stakeholders (e.g. Train operator, Network operator, Road authorities, Landowners, etc.)

The following is applicable for a new and existing Level crossing application:

- a. Level Crossing physical assessment
- b. Level Crossing hazard identification and risk assessment
- c. Consideration of the existence of any exclusion criteria/requirements as per the latest SANS 3000 2-2-1
- d. A traffic impact study (applicable for public Level Crossings)

3. Design Phase

The Design Phase notification submission shall be prepared by the Operator upon receipt of a No Objection notice on the Concept Phase. The submission to the RSR must include the following:

- a. A policy deliberate statement of principles to guide decisions and achieve rational outcomes.
- b. A User Requirement Specification (URS) document, signed off by the appropriate delegated authority(ies)
- c. A project organisational structure and an operational framework guiding decisions document
- d. An audit trail substantiated by an organisational management procedure, defining the organisational involvement in the project, be it: define, design, sub-contract, build, integrate, operate, maintain and transfer or any combinations thereof
- e. A project purpose definition or functional description
- f. Compilation of a risk analysis (RA) and hazard log (HL)
- g. Statutory requirements (including environmental) to adhere to or obtained prior to realization of the product.
- h. Standards to be used.
- i. Product performance evidence envelope (functional, maintainability, reliability, availability)
- j. Infra structure requirements (facilities, processes etc.) to sustain the product over the Life Cycle (LC)
- k. Development of cost estimation: New Works and Technology Developments Requirements

- l. Operator machine interface over the LC leading to ergonomic requirements and work creation and sustainability over the LC
- m. Environmental impact assessments of alternatives in terms of the relevant National Legislation
- n. Signed approval letter in principle by relevant stakeholders to proceed with designs (e.g. Train operator, Network operator, Road authorities, Landowners, etc.)

Additional considerations for the design phase:

- a. Documented evidence of decisions, analysis reports, drawings and motivations of design alternatives including system specifications, standards, process, materials, Integration acceptance, quality assurance (QA) plan, updated RA and HL, compliance or verification checks (or both) as required and cost optimisation analysis to reach best alternative selection
- b. Process for procurement if applicable
- c. Procedure for technology validation and verification
- d. Documented evidence of all rights associated with the implementation of the product.
- e. Evidence of a documented change management process which captures all changes in detail design, manufacturing requirements, standards, technology, compliance conditions and impact on the RA, HL and cost optimisation
- f. Application of document control system, change management process and notification process for the introduction of new technology
- g. Preparation of drawings, revised bill of materials, list of standards that the design is based upon, builder's instructions, project schedules and sub-contractor's business continuity management (Risk Management) compliance certificate
- h. New Works and Technology Developments Requirements
- i. Generating reports on all type and prototype testing as required by statutory, safety and performance standards adopted including, scope of test, measurement norms, measurement methodology, failure criteria and any variations approved.

- j. Specifications and drawings - system drawings, layouts, schematics and specifications for civil, perway, signalling, telecommunications, rolling stock and electrical (OHTE, traction substation, Transmission lines/equipment, etc.) signed off by a registered professional as per ECSA requirements
- k. Standards compliance statement and
- l. Any requests for derogations to standards and regulations

The following shall be considered for Level Crossings applications:

- Pedestrian traffic patterns and volumes
- The line of sight for pedestrians, road vehicle drivers and train drivers

4. Execution/Manufacturing Phase

The Execution/Manufacturing phase shall not proceed until the RSR has issued an Approval notice on the Design Phase, provided all requirements/conditions are complied with. Notification submissions for the execution/manufacturing, assembly or production phase shall include the following:

- a. Proof of Environmental Authorisation where required.
- b. A plant, product, or process documentation pack inclusive of:
 - All drawings
 - Bills of Material
 - Manufacturing, assembly, or production assembly execution plans
 - Quality Plans, processes, norms, and methodologies
 - Supply Chain sustainability and competence procedures and
 - Interface agreements with all affected parties
- c. Define and implement such procedures required for safe working and certified hand over between sub-system or component groups. Such procedures shall clearly indicate integration and resolution process responsibility.
- d. A robust and enforced design change procedure (as required during manufacture/ assembly for which the detail design did not accommodate) shall be in place with sign off from all persons as identified within the project team with the appropriate role & responsibility

- e. The project hazard log and risk register shall be current, managed by a competent person with the appropriate authority to expedite the completion of corrective or mitigating actions and counter signed by all affected parties
- f. Signed approval letter in principle by relevant Stakeholders to proceed with construction (e.g. Train operator, Network operator, Road authorities, Landowners, etc.)
- g. Any deviation from the approved Level Crossing/s design, during construction shall result in a new physical assessment being conducted and the design revised, verified, and validated accordingly and submitted to the RSR for approval
- h. Work Method Statement

5. Inspection, Testing and Commissioning Phase

The Inspection, Testing and Commissioning phase shall not proceed until the RSR has issued an Approval notice for the execution/manufacturing phase. Procedures, processes, documents and notification submissions for the Testing and Commissioning phase shall include the following:

- a. A Test & Commissioning plan must be in place and be signed off by the relevant role players.
- b. The test plan shall cater for asset functionality and asset safety as experienced by operators or users (or both) of the asset or service.
- c. The plan shall include the scope, parameters, measures, methodology, norms and acceptance criteria for the asset or system or process or a combination thereof
- d. The plan shall define certification contents and signatories for each component, system and sub-system
- e. The plan shall be submitted to the RSR for review and issuance of an approval prior to commencement of the ITC phase
- f. Where applicable, the Railway Operator shall make a submission to the RSR, in the appropriate format, for a Testing and Commissioning Permit. The RSR will advise on the need for a permit.
- g. The Testing and Commissioning entity shall notify the RSR of any intended change or new test requirements after original submission.

- h. The hazard log and risk register shall be current, managed by a custodian with the appropriate authority to expedite the completion of corrective or mitigating actions and counter signed by the responsible person
- i. Define and implement such procedures required for safe working during execution of the testing and commissioning tests. Such procedures must clearly indicate completion or demarcate areas where other sub-system groups may operate
- j. Appropriate certification shall be available and rendered to the RSR for ratification that the system, sub-system or component is fit for use from a safety aspect
- k. Certification shall also include correct functional operation of the sub-system if the output of the sub-system is an input to another sub-system and certify that if required the change process was followed to implement a design or manufacturing or assembly change.
- l. The Test Engineer Certification (including ECSA registration) and a resume.
- m. A comprehensive and complete document pack shall be available for audit which includes all documentation pertinent to the system development excluding any modification or decommissioning or disposal documentation where that has not yet been implemented or initiated

6. Operations Phase

The Operations phase shall not proceed until the RSR has issued an Approval notice for the Testing and commissioning phase. Any envisaged changes to monitoring and maintenance standards, procedures, processes, agreements and associated activities shall require notification submissions to the RSR for consideration and shall include the following:

- a. Human resource plan, including recruiting and training plan where applicable.
- b. Documented proof of the existence and effectiveness of operational standards, procedures and processes and an audit trail of any change management activities, implementation and training thereof (Note: A competent person must be empowered to manage, sustain and monitor the above)

- c. Any change envisaged must be pre-empted with a submission to the RSR and must include the purpose, scope, methodology of implementation, training norms and acceptance criteria and risk assessment for the envisaged change
- d. The submission must define certification contents and signatories for the envisaged changes for each system, sub-system or component
- e. The submission must be made to the relevant RSR department/unit for review prior to service implementation, in the appropriate format.

NB: Any change effected should consider the following:

- Revised organisational structure, roles and responsibilities and competency impacts.
 - Revised processes or procedures
 - Impact (risk assessment) of the introduction of new assets, procedures, processes, technology, or service providers
 - Level Crossing physical assessment (applicable for new and existing Level Crossing projects) and
 - Notification to the RSR of such changes
- a. Risk assessments of the operating procedures
 - b. A hazard log and risk register must be developed for the envisaged changes, kept updated and managed by a custodian with the appropriate authority to expedite the completion of corrective or mitigating actions and counter signed by the assigned competent person.
 - c. Define and implement such procedures required for safe working during execution of the envisaged changes.
 - d. Appropriate certification must be available and rendered to the RSR for ratification that the envisaged changes to system, sub-system or component maintenance or monitoring (or both) is fit for use from a safety aspect. Certification shall also include the correct functional operation of the sub-system if the output of the sub-system is an input to another sub-system and certify that if required the change process was followed to implement a design or execution change.

7. Monitoring and Maintenance Phase

Any envisaged changes to monitoring and maintenance standards, procedures, processes, agreements and associated activities shall require notification submissions to the RSR for approval and shall include the following:

- a. Documented proof of the existence and effectiveness of the monitoring and maintenance policy, strategy and plan **(Note: The monitoring plan, parameters and analysis must cater for the system functionality and safety as experienced by operators or users (or both) of the system within the operating environment)**
- b. The scope, parameters, measures, methodology, norms and acceptance criteria for the asset or system or process (or a combination thereof)
- c. Defined certification contents and signatories for the envisaged changes for each system, sub-system and component
- d. Submission made to relevant RSR Department/unit for review and issuance of Approval notice prior to service implementation
- e. The Operator shall make the submission to the RSR, in the appropriate format and any change submission shall include the following:
 - Revised organisational structure, roles, and responsibilities.
 - Revised asset management policy, strategy, objectives, and plans
 - Revised processes or procedures (or both)
 - Impact (Risk Assessment) of the introduction of new assets, procedures, processes, technology, or service providers
 - Description of the change including specifications, drawings, or schematics where applicable.
 - Proof of the availability of spares and
 - Proof that the maintenance personnel is trained to maintain the system and operations personnel trained to operate the system
- f. A hazard log and risk register shall be developed for the envisaged changes, kept updated and managed by a competent person with the appropriate authority to expedite the completion of corrective or mitigating actions and counter signed by the assigned responsible person.
- g. Define and implement such procedures required for safe working during execution of the envisaged changes

- h. Appropriate certification shall be available and rendered to the RSR for ratification that the envisaged changes to the maintenance or monitoring (or both) of the system, sub-system or component is fit for use from a safety aspect. Certification shall also include correct functional operation of the sub-system if the output of the sub-system or component is an input to another sub-system and certify that, if required, the change process was followed to implement a design or execution change (or both).
- i. A comprehensive and complete document pack shall be available for audit which includes all documentation pertinent to the Rolling Stock development and maintenance excluding any modification, decommissioning or disposal documentation where that has not yet been implemented or initiated

8. Monitoring and Maintenance Phase

Modified systems shall not be put into Operations without an Approval notice from the RSR. Standards and procedures for the control of the process for modification or re-assembly of systems and components shall include consideration for the following:

- a. Effects of the proposed modification on the railway system as a whole
- b. Effects of the environment on the proposed modification
- c. Design, implementation and commissioning of the modification or re-build in accordance with clause 6 to clause 10 (inclusive)
- d. Effective recording, promulgation and communication of changes and modifications where especially operational safety is affected

9. Decommissioned/Disposal Phase

Systems shall not be decommissioned/disposed without an Approval notice from the RSR. Standards and procedures for the decommissioning, disposal and means of preventing inappropriate usage after disposal shall be developed. The Railway Operator shall include in their Safety Management System (SMS) as referenced in the SANS 3000-1 Standard, the following as considerations for decommissioning:

- e. Appropriate marking of each decommissioned item for identification purposes

- f. The movement of decommissioned rolling stock, including rolling stock systems, subsystems or components, and the identification of a person(s) appointed to authorize such movement.
- g. Ensuring safe operations during decommissioning, scrapping and disposal
- h. Ensuring that the condition of decommissioned material and equipment is clearly identified.
- i. Prevention of inappropriate re-use of decommissioned material
- j. Minimizing environmental risks, including health, safety and pollution hazards associated with the decommissioned items and the process thereof as well as considering both short-term and long-term impact:
 - Description and identification of assets involved.
 - Disposal strategy and plan including environmental considerations.
 - Complete risk assessment including socio economic, environmental and statutory impacts or requirements.
 - Safe working operations during disposal
- k. The Railway Operator shall make a submission of intent to the RSR that must include the following:
 - All required certification, signed off by a competent person, that the disposal is compliant to all statutory or other requirements
 - Updated operator asset register.

Configuration Management

Where new technology is introduced, a submission of such intent shall be made to the relevant RSR department/unit in the required format provided by the RSR, which include the following:

- Description of the technology including schematics, drawings, and specification sheets
- Standards to which the technology is compliant.
- Scope of the technology impact with associated risk assessment
- Test & Commissioning and implementation plan, and
- Proof of training maintenance team/employees on the maintenance of the new asset technology installed (*Could be*

employees in the organization or a contractor to conduct maintenance when required)

- Risk assessments to be conducted per phase.

9. ANNEXURE C: LIST OF SUPPORTING DOCUMENTS