GUIDELINES FOR SAFETY OFFICERS

ITA-COSUF
Regulations, Guidelines and Best Practice

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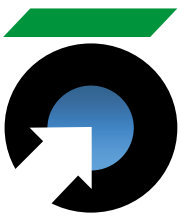

ITA COSUF

ITA Committee on
Operational Safety of
Underground Facilities

Introduction to COSUF

MISSION STATEMENT
ITA COSUF is the Centre of Excellence for world-wide exchange of information and know-how regarding safety and security of underground facilities in operation.

OBJECTIVES
The objectives of ITA COSUF are to:

- *Develop and maintain a network to:*
  - *exchange knowledge*
  - *facilitate cooperation worldwide*
  - *facilitate the creation of dedicated teams and groups to perform specific (research or other) activities*
  - *enhance research and development activities through combining of national, European and international funding and support*
- *Promote safety and security by:*
  - *fostering innovation*
  - *raising awareness of current and newly-developed safety and security issues amongst decision makers, professional end-users, financers, risk managers, international forums and other stakeholders*
  - *supporting the development of improved regulations and standards regarding safety and security of underground facilities in operation*

REPORT AUTHORS
This report has been produced in 2018 and 2019 by COSUF Activity Group 4 (AG4) Members. All of them are Safety Officers in accordance with the DIRECTIVE 2004/54/EC of the European Parliament. Reviews were provided by members of the COSUF Steering Board and AG4. AG4 is chaired by Peter Kole – Netherlands. The English native speaking editors of this report were Leslie Fielding and John Aldridge – both of them United Kingdom.

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This report provides guidance regarding the role of the Safety Officer as defined in DIRECTIVE 2004/54/EC of the European Parliament and of the Council of 29 April 2004 (amended in 2009)on minimum safety requirements for tunnels in the Trans-European Road Network. It builds on the profound knowledge of experienced Safety Officers carrying out the role in a significant number of different European countries and administrations.

The intention of this report is to give direction to both new and experienced Safety Officers and those who interact with them to understand the role, responsibilities, skills and attributes required to fulfil the duties as assigned in the DIRECTIVE as shown below:

a) ensure coordination with emergency services and take part in the preparation of operational schemes;
b) take part in the planning, implementation and evaluation of emergency operations;
c) take part in the definition of safety schemes and the specification of the structure, equipment and operation in respect of both new tunnels and modifications to existing tunnels;
d) verify that operational staff and emergency services are trained, and he/she shall take part in the organisation of exercises held at regular intervals;
e) give advice on the commissioning of the structure, equipment and operation of tunnels;
f) verify that the tunnel structure and equipment are maintained and repaired; take part in the evaluation of any significant incident or accident as referred to in Article 5 (3) and (4).

This guideline provides an explanation of the articles (written in italics in this guideline) from the DIRECTIVE. The discussion that the members of AG4 had during the preparation of this document led to the agreed-upon views provided in this guideline.

This edition of the guideline mainly defines the tasks of a Safety Officer and what a Safety Officer needs in terms of knowledge and skills to perform their role. The next edition of this guideline will further elaborate on how and in which different ways a Safety Officer can fulfil the role from examples that will be collected from the various participating countries.

Safety officers for tunnels that do not fall under the EU Directive or Member Nation implementation of the directive, may still find the guidance useful for their work.

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1 INTRODUCTION

The role of a Safety Officer is a role that is mandated in the DIRECTIVE 2004/54/EC of the European Parliament and of the Council of 29 April 2004 (amended in 2009) on minimum safety requirements for tunnels in the Trans-European Road Network (after this DIRECTIVE). This report provides guidance regarding the role of the Safety Officer as defined in the DIRECTIVE. It builds on the profound knowledge of experienced Safety Officers carrying out the role in a significant number of different European countries and administrations.

The role of a Safety Officer is defined in the DIRECTIVE as follows (Article 6.1):
''For each tunnel, the Tunnel Manager shall, with the prior approval of the AA (Administrative Authority), nominate one Safety Officer who shall coordinate all preventive and safeguard measures to ensure the safety of users and operational staff. The Safety Officer may be a member of the tunnel staff or the emergency services and shall be independent in all road tunnel safety issues also they shall not be under instructions from an employer in respect of those issues. A Safety Officer may perform his tasks and functions at several tunnels in a region.''

The role of a Safety Officer has to be satisfied by an individual, a "intuitu personae" which means that the safety officer can be personally held responsible. The Safety Officer can be held personally responsible for one or more tunnels within a road network. In Europe, the role is only compulsory for Trans-European Road Network (TERN) tunnels longer than 500 m. In many administrations it is also applied to all other tunnels or tunnels exceeding a certain length.

The Safety Officer role is focused on tunnel users' safety and should exist to ensure coordination of procedures and the liaison with emergency services, and to take part in the preparation of operational schemes, emergency procedures, emergency exercises, emergency operations and the definition of safety schemes. The Safety Officer should be involved in the specification of structures and equipment of both new tunnels and the preparation of modifications or refurbishment of existing tunnels.

It is noted that the Safety Officer and the Tunnel Manager can work in the same company, with the specific requirement that the Safety Officer is functionally independent from the Tunnel Manager.

Functional independence is the ability to carry out activities autonomously without the risk that superiors or supervisors are trying to influence.

The essential principle is that independent advice on tunnel safety matters should be available to tunnel managers, owners and operators with the person giving the advice being outside the influence of the Tunnel Manager (not withstanding how that Tunnel Manager function is delivered).

It is extremely important that the role of a Safety Officer is not confused with:

- the role of Tunnel Manager, who is responsible for the management of the tunnel, inclusing (resources for) daily operation,
- the role of Health & Safety Practitioners as delivered within the scope of Occupational Health Safety and Welfare work,
- the work of Security. The role of Safety Officer as meant in the DIRECTIVE does not include the responsibility for Security matters such as terror attacks, cyber crimes, etc.
- the Inspection Entity (who can be the administrative authority itself), that must have a high level of competence and high quality procedures and must be functionally independent from the Tunnel Manager, as well as from the Safety Officer.

It should be noted that the separation of tasks like described above is implemented in different ways in different EU member states.

1.1 PURPOSE

This report provides guidance solely on the role of the Safety Officer as defined in DIRECTIVE 2004/54/EC. It explicitly does not provide guidance on other roles defined in the DIRECTIVE. Contents of this report build on the profound knowledge of experienced Safety Officers carrying out the role in a significant number of European countries and administrations. However, local guidelines, legislation as well as an individual contract and/or job description can go beyond the general scope of the DIRECTIVE, as the DIRECTIVE by definition only gives minimum requirements, and can provide further detailed instructions.

2 SAFETY OFFICER

2.1 SAFETY OFFICER ROLE

The role that is called Safety Officer in the DIRECTIVE, describes the necessary function to ensure the appropriateness of the management actions of the Tunnel Manager, the operational readiness (complete with procedures adequate for the risk), and the training and testing in conjunction with the emergency services. As has been stated in section 1 already, the role of Safety Officer is defined in the DIRECTIVE as follows (Article 6.1) **detailed in Appendix A1**:

What are exactly "all preventive and safeguard measures" and where are they defined? In Annex II, 2.2 of the DIRECTIVE it is stated that the safety documentation shall describe the preventive and safeguard measures needed to ensure the safety of users, taking into account people with reduced mobility and disabled people, the nature of the route, the configuration of the structure, its surroundings, the nature of the traffic and the scope for action by the emergency services.

It can be said that because the Safety Officer shall co-ordinate the preventive and safeguard measures, the safety documentation is the basis of the Safety Officer's work (as all measures should be described there). The overall view shall ensure that all measures are being well co-ordinated i.e. working together. This includes structural, technical and operational issues. According to the DIRECTIVE the Tunnel Manager is responsible for compiling the safety documentation and forward it to the Safety Officer.

On basis of the safety documentation, the Safety Officer shall verify (examples):

- that the safety documentation contains the documents mentioned in Annex II, chapter 2.3 to 2.5 of the DIRECTIVE;
- that the safety documentation addresses all necessary issues to show that a tunnel complies with the EU DIRECTIVE and national tunnel regulations, respectively;
- that the safety documentation contains not only a description of the tunnel's infrastructure and equipment, but contains a holistic view on tunnel safety (e.g. necessary risk analyses or studies on special measures to compensate for deviation from the DIRECTIVE);
- that all relevant persons, institutions, etc. are in possession of an up-to-date version of the safety documentation;
- that all roles mentioned in the safety documentation are installed and/ or perform as stated in the safety documentation.

2.1.1 SAFETY OF USERS

The safety of tunnel users will be provided with the minimum safety arrangements if the tunnel complies with the DIRECTIVE and national laws through for example guidelines on safety documentation, mandatory inspections by the inspection entity (e.g. safety documentation, mandatory inspections, etc.) operational and maintenance schemes are in place and operational/emergency staff are being informed and trained to manage incidents.

A Safety Officer shall identify potential risks inside the tunnel management concept in order to prevent incidents that may have a negative impact on tunnel user's safety. A Safety Officer shall also make sure that appropriate actions are undertaken to mitigate or reduce risk.

2.1.2 SAFETY OF OPERATIONAL STAFF

To verify the safety of operational staff the Safety Officer needs information on who is part of operational staff for each tunnel under their responsibility.

Examples for measures which enhance safety for operational staff:

- Training and exercises on regular basis regarding their duties including a good knowledge of the tunnel structure;
- Existence of and compliance with operating procedures for works within the tunnel structure (e.g. conditions of access to the tunnel infrastructure with traffic restrictions, definition of a "safe maintenance mode" for technical equipment, as well as alerting and evacuation of operational staff in case of an incident or a work accident);
- The Safety Officer shall also verify that procedures are in place which address contractors, maintenance companies, etc. in order to ensure their safety and not to endanger tunnel users. This can be accomplished by a precisely written description of the work in context with special and general safety issues within the tunnel structure (code of practice) including a mandatory briefing of "third party staff".

"Safety of Operational Staff" should not be confused with "Health and Safety of workers at work" as this is normally covered by another official (e.g. Health and Safety Officer). This should not restrain the Safety Officer from trying to liaise with the officials responsible for Health and Safety.

2.2 OVERVIEW OF DUTIES

To meet best practice of Article 6 sub section 1 - 2 and Paragraphs a - g of the DIRECTIVE the Safety Officer duties are to carry out in broad terms the following duties **detailed in Appendix A2:**

A) ENSURE COORDINATION WITH EMERGENCY SERVICES AND TAKE PART IN THE PREPARATION OF OPERATIONAL SCHEMES:

The bases for discussion with the Tunnel Manager, emergency services and the Administrative Authority are: the safety documentation, emergency plans (at least partially included in the safety documentation), exercises and more generally lessons learned from experience and incidents and any information the Tunnel Manager considers worth being transmitted to the Safety Officer. Once all technical and regulatory aspects have been conformed with to commission a tunnel, lessons learned from experience are of paramount importance.

Preparation of exercises and debriefing of these exercises and real events are major issues for the Safety Officer to discuss with all services on coordination, operational schemes and to give his/her view.

The Safety Officer acts as an advisor for the Tunnel Manager and for the other stakeholders. He formulates remarks and recommendations and submits them. The final decision and responsibility on safety issues stays with the Tunnel Manager.

Function

The Safety Officer shall identify interfaces between tunnel operations and emergency services and ensure that these interfaces are covered and "current". The DIRECTIVE mentions emergency services in many paragraphs other than Article 6 where the function and tasks of a Safety Officer are described. These can be collated into the following four core areas:

Basic concepts of tunnel infrastructure and equipment

- safety measures ensure that emergency services can act effectively (11).
- access time for the emergency services (Annex I, 1.1.2, Annex I, 3.4).
- whether emergency services shall be stationed at the two extremities of the tunnel (Annex I 3.4).
- access to the tunnel for emergency services (Annex I, 2.3.3, 2.3.9, 2.4).

The Safety Officer should verify/coordinate that in an early design phase of a tunnel all basic interests of the emergency services are taken into account. It is advisable to come to an agreement on all safety measures for the future tunnel – for instance on basis of the safety documentation for the design phase. Key safety measures for emergency services are access, extinguishing devices, radio and other means of communication, ventilation.

Communication and Provision of Information

- better communication with emergency services (9).
- copy of the decision of the Administrative Authority with regard to opening or closing a tunnel for emergency services (Annex II, 3.4).
- information on consequences of modification (Annex II, 4.3).
- receive incident report/investigation report prepared by the Tunnel Manager (Article 5.3 and 5.4).

The Safety Officer should monitor that the Tunnel Manager and the Administrative Authority deliver adequate information for the emergency services in a timely manner.

Organisational and Operational Schemes

- Administrative Authority to ensure that organisational and operational schemes (including emergency response plans) are put in place for the training and equipping of emergency services (Article 4, 6(b))
- safety documentation shall describe the scope of action by the emergency services (Annex II, 2.2)
- emergency response plan drawn up jointly with emergency services (Annex II, 2.4)

The Safety Officer should verify that the emergency services are involved when organisational and operational schemes are drawn up and verify that the results are documented within the safety documentation.

Training and exercises

- training of emergency services ((9) and Annex I, 3.1)
- joint organisation of periodic exercises (Annex II, 5)
- joint evaluation of exercises, draw up a report and make appropriate proposals (Annex II, 5 (b))

This leads directly to Article 6 (f) and (g) where the function and tasks of the Safety Officer regarding training and exercises are stated.

Observation based on good practice:

In co-operation with the Tunnel Manager, the Safety Officer will:

- support regular liaison with all emergency services.
- Contribute to the emergency service consultation meetings, to review the Tunnels Safety Strategy with the emergency services.
- Verify procedures, systems etc. are in place (according to the risk assessment) for the Tunnel Manager and emergency services.

B) TAKE PART IN THE PLANNING, IMPLEMENTATION AND EVALUATION OF EMERGENCY OPERATIONS:

- Contribute to emergency planning meetings.
- Verify adequate procedures are in place for the effective implementation of the emergency operations.
- Assist in the evaluation of the operational effectiveness and verify that any identified improvements are implemented in a timely manner.
- Support the Tunnel Manager and encourage full joint participation from all parties in the planning and evaluation processes.

This implies participation in (preparation of) operational schemes and in debriefing of significant accident or incidents. The question of significance is decided by the Safety Officer in conjunction with the Tunnel Manager. If accidents or minor incidents in consequence but major in significance are not given enough attention, the result will be a loss in terms of lessons learned. It could be difficult to assess the significance of a minor event before analysing it. From the Safety Officer point of view, the more that are analysed the better and they should do their best to convince the Tunnel Manager that a minor event may have a potential to be transformed into a major safety improvement.

Stimulating a "safety culture" within the tunnel actors (e.g. Tunnel Manager's and Tunnel Operator's team, emergency services) requires participation of all involved.

Lessons learned should be evaluated:
A good practice is to:

- In absence of national guidance on significant incidents, the Administrative Authority, Tunnel Manager and Safety Officer) define what a "significant incident" is;
- Set up the system of permanent feedback of experience through which incidents and accidents can be recorded and analysed (AII, 2.4 of EU DIRECTIVE);
- Follow this system with the relevant reporting, analysis, investigation, follow-up.

C) TAKE PART IN THE DEFINITION OF SAFETY SCHEMES AND THE SPECIFICATIONS OF THE STRUCTURE, EQUIPMENT AND OPERATION FOR BOTH NEW TUNNELS AND MODIFICATIONS TO EXISTING TUNNELS:

- The Safety Officer should from the safety point of view have an overview of the specification of tunnel structures and safety equipment and operation, without substituting the Inspection Entity (the advice comes in addition of the Inspection Entity).
- Verify the methods of working . related to that structure or equipment and the development of the schemes into suitable and sufficient procedures.
- Assist in drafting of safety schemes, procedures, methods of working etc. related to that structure or equipment consistently with the tunnel design, and the development of plans into practical procedures.
- Review specifications, equipment or operations. If needed, the Safety Officer should suggest to/ask the Tunnel Manager to engage the service of specialised engineers.

If deemed necessary, the Safety Officer should not refrain to request for additional expertise. In any case, the framework of Safety Documentation provides ample opportunity for asking clarifications and provides an easier way for most The documentation will eventually be reviewed by the Safety Officer before being submitted to the authorities.

The DIRECTIVE 2004/54/EC makes the Tunnel Manager responsible for keeping the Safety Officer informed and transmitting information between the Safety Officer and emergency services and the administrative authority. This should not deter the Safety Officer to get in touch directly with emergency services with regards to their training program and their emergency plans if he (she) considers this the best way of action.

D) VERIFY THAT OPERATIONAL STAFF AND EMERGENCY SERVICES ARE TRAINED, AND SHALL TAKE PART IN THE ORGANISATION OF EXERCISES HELD AT REGULAR INTERVALS:

The Safety Officer shall:

- verify the existing type and level of training of tunnel operating staff, and the preparedness of the emergency services with regards to tunnel operations and emergency response.
- contribute to the continuous training needs analysis through periodic exercises and emergency services consultation meetings.
- contribute to regular emergency exercises, verifying they are reviewed to ensure that emergency response procedures are suitable and sufficient.
- inform and give advice to emergency services about tunnel(safety) and smoke behaviour

Training

The Safety Officer shall verify that operational staff and emergency services are trained.
This includes verification of:

- the accessibility of tunnel for training purposes (including becoming familiar with the tunnel geometry, equipment and environment);
- existence of training programs;
- the implementation of these programs;
- exercises are paramount for training programs. They must include all entities and result in common conclusions.

Test of equipment can be part of an exercise but is not an exercise in itself.

The Safety Officer task should not only be to verify that staff are trained but also to check on the content and intervals of training. A Safety Officer should advise the Tunnel Manager on all issues regarding training. A good source in this context are PIARC reports "Guide for Organizing, Recruiting and Training Road Tunnel Operating Staff (2007R04) "and more detailed "Best Practise for Road Tunnel Emergency Exercises (2012R25)" .

A document like a training plan should describe the process to keep track of any previous trainings for each staff and all planned training.

A training plan shall describe the process to keep track of any previous trainings for each staff and all planned training.

Other sources for optimising training could be the evaluation of incidents and exercises. The evaluation of incidents and exercises is a valuable source for optimising trainings and for identifying lack of training.

Another good method to verify training needs is to talk to operational personnel directly about any difficulties encountered in carrying out their role or simply ask basic questions about their procedures or plans.

Exercises

The Safety Officer shall take part in the organization of exercises held at regular intervals. This includes the responsibility to:

- attend meetings on the preparation of exercises;
- give advice on content, conduct and documentation of exercises;
- make sure that the aims of the exercise are clear so that an evaluation is possible;
- give advice on the type and frequency of exercises;
- give advice on safety during exercises, for instance not to endanger "normal" traffic or volunteers;
- contribute to the analysis of the exercises and implementation of lesson learnt.

Exercises are understood to be in situ and real scale. Between these exercises that typically do not take place each year, other tests and training units such as table top (which are

good practice), or test of equipment which are advisable and can be part of an exercise but cannot be considered as an exercise in itself.

E) GIVE ADVICE ON THE COMMISSIONING OF THE STRUCTURE, EQUIPMENT AND OPERATION OF TUNNELS:

- The Safety Officer shall give advice on the acceptance, testing, certification, monitoring etc. of new tunnels and equipment within the limit of his own experience and knowledge.
- The Safety Officer will verify that the equipment is being operated in a manner considered safe. e.g. operational procedures and training.

This includes, the Safety Officer giving advice on:

- Tunnel commissioning,
- Commissioning and testing of tunnel safety equipment including:
  - control infrastructure and;
  - operator interface.

The Safety Officer may request clarifications, further analysis or sometime second expertise.

F) VERIFY THAT THE TUNNEL STRUCTURE AND EQUIPMENT ARE MAINTAINED AND REPAIRED:

- With reference to the maintenance system the Safety Officer is aware of the need for inspecting, testing, monitoring, maintenance, servicing etc. and will verify the records to ensure these are kept in accordance with the procedure and the maintenance plan. This includes at least the verification that a maintenance program exist and is implemented.
- Verify that responsibilities and organisation of maintenance is properly defined.
- Verify that maintenance schemes are in place.
- Verify that damages and malfunctions are followed Verify that any damage or malfunctions are dealt with in accordance with the minimum operating requirements. in an adequate period of time/ that an operational process is in place to deal with repairs.

G) TAKE PART IN THE EVALUATION OF ANY SIGNIFICANT INCIDENT OR ACCIDENT AS REFERRED TO IN ARTICLE 5 (3) AND (4):

- The Safety Officer shall be involved in the establishment of any investigation.
- The Safety Officer, in conjunction with staff and advisors and any other interested parties, will evaluate the findings of any such investigation.
- The Safety Officer investigates the need for any further study deemed necessary as a result of the evaluation and verifies that any actions or changes to procedures are instigated in a timely manner.
- The Safety Officer will then give a written opinion or a verbal explanation during a meeting that is being officially reported.
- The Safety Officer may clarify what defines a 'significant incident' taking into account Member State legislation and ordinance.

It should be emphasised that the Safety Officer may also -and should be able to- suggest/require specialist assistance regarding complex or special structures and safety systems and equipment to enable the verification of new schemes and improvements or investigations.

This is normally based on initial information given by the Tunnel Manager. While the depth of information and view of the same situation often could differ between each stakeholder, it is good practise for the Safety Officer to go beyond the official incident report and to try to obtain a detail information and opinion on the incident from all other possible sources/ stakeholders. This allows the Safety Officer to get a really detailed overview of the incident emergency response time scale. This allows Safety Officer to identify even minor defects in the whole safety chain and operational schemes, which were not critical for the emergency response in this case but could be improved to better handle the similar incident in the future. PIARC report "Tools for Safety Management" may provide useful guidance.

To take part in the evaluation an any significant incident or accident includes contribution to:

- dverify that the incident qualifies as an significant incident and
- definition of the content of the incident reports (for instance according to PIARC report "Tools for Tunnel Safety Management"), so that the Safety Officer is able to evaluate the incident reports and to produce a relevant output, in absence of Member Nation guidance in this matter.

2.2.1 INCIDENT REVIEWS

This follows the same steps as the evaluation of emergency operations (2.2.2) and a consistent way of debriefing incidents should be developed by the Tunnel Manager and agreed with the Safety Officer.

All debriefs should:

- Take consideration of the feedback from personnel involved in the emergency operation (including emergency services);
- Point out good practices, learning points and effectiveness of procedures;
- Identify any trends of similar incidents at the same location;
- Identify any weaknesses in plans and procedures (main focus: access routes, means of evacuation, order of operations);
- Identify training needs that may need to be addressed;
- Identify any deficiencies in tunnel safety equipment and infrastructure;
- Identify any communication difficulties;
- Make recommendations for improvements;
- Document action plans and follow them up.

Good practice could be to establish regular Safety Meeting between Tunnel Manager, Safety Officer and key operational staff to discuss tunnel safety, evaluate incidents, check the maintenance register, and follow-up any open actions.

3 RELATIONS AND PROCESS

3.1 RELATIONSHIP WITH THE TUNNEL MANAGER IN THE EVENT OF INCIDENTS

Article 5

"3. Any significant incident or accident occurring in a tunnel shall be the subject of an incident report prepared by the Tunnel Manager. This report shall be forwarded to the Safety Officer referred to in Article 6, to the administrative authority and to the emergency services within a maximum period of one month.

4. Where an investigation report is drawn up analysing the circumstances of the incident or accident referred to in paragraph 3 or the conclusions that can be drawn from it, the Tunnel Manager shall forward this report to the Safety Officer, the administrative authority and the emergency services no later than one month after he/she receives it himself/herself."

It is the Tunnel Managers' responsibility to prepare and forward reports on incidents and accidents to the Safety Officer. To enable the Safety Officer to evaluate all relevant incidents, the Safety Officer should advise the Tunnel Manager on which kind of accidents and incidents are significant and the facts which should be part of the report.

The Safety Officer shall analyse the reports with potential for optimisation of structural, technical and organisational aspects, especially for recurring incidents or collisions.

It is the responsibility of the Tunnel Manager assisted by the Safety Officer to liaise with the emergency service regarding evaluation of their contributions to investigations.

3.2 ADMINISTRATIVE AUTHORITY APPROVALS PROCESS

3.2.1 APPROVAL TO OPEN A TUNNEL

Article 10

"Tunnels whose design has been approved but which are not yet open
(2) Where the administrative authority finds that a tunnel does not comply with the provisions of this DIRECTIVE, it shall notify the Tunnel Manager that appropriate measures must be taken to increase safety and shall inform the Safety Officer."

The Administrative Authority, Tunnel Manager and Safety Officer have to agree that the Tunnel Structure, Equipment, Operation and Emergency response capability has been fully commissioned, tested, and emergency plans have been exercised and proved; before a tunnel is approved to be open. The Safety Officer advises the Tunnel Manager on the opening of a tunnel based on the safety documentation. The Tunnel Manager requests approval from the Administrative Authority based on the safety documentation. The Administrative Authority decides on the opening of the tunnel.

If there are residual points of disagreement, The Safety Officer advices, the Tunnel Manager decides and the Administrative Authority provides the final approval.

In any case, the approval for (re)opening should be fully documented in relation to that decision.

3.2.2 PERIODIC INSPECTIONS

Article 12

"3. Where, on the basis of the report of the inspection entity, the administrative authority finds that a tunnel does not comply with the provisions of this DIRECTIVE, it shall notify the Tunnel Manager and the Safety Officer that measures to increase tunnel safety must be adopted. The administrative authority shall define the conditions for continuing to operate the tunnel or for re-opening the tunnel which will apply until the remedial measures and any further relevant restrictions or conditions are implemented."

The Tunnel Manager should implement the safety measures necessary, changes to the safety operation of the tunnel should be reviewed and verified by the Safety Officer as if it is deemed to be a substantial change.

3.2.3 APPROVAL OF DESIGN

Annex II

"Approval of the design, safety documentation, commissioning of a tunnel, modifications and periodic exercises.

1. Approval of the design.
1.2 Before any construction work begins, the Tunnel Manager shall compile the safety documentation described under points 2.2 and 2.3 for a tunnel at the design stage and shall consult the Safety Officer. The Tunnel Manager shall submit the safety documentation to the administrative authority and attach the opinion of the Safety Officer, and/ or of the inspection entity when available."

In relation to tunnel design the Safety Officer can take part in the definition of safety schemes and the specification of the structure, equipment and operation in respect of both new tunnels and modifications to existing tunnels. As such the Safety Officer can be an integral member of the design team providing advice and support at all key design stages as well as verify that the requirements of emergency services are taken into account.

3.2.4 COMPILATION OF SAFETY DOCUMENTATION

Annex II

"2. Safety documentation
2.1. The Tunnel Manager shall compile safety documentation for each tunnel and keep it permanently up to date. He/she shall provide a copy of the safety documentation to the Safety Officer."

The Safety Officer can provide advice to the Tunnel Manager or can take part in the preparation process of safety documentation by giving advice to the Tunnel Manager so that all necessary issues are properly addressed within the safety documentation. Where development of safety documentation, i.e. emergency plans and procedures requires the input from emergency services the Safety Officer has a key part in coordinating Emergency Planning Meetings to develop and approve emergency documentation.

At all times the Safety Officer should maintain their independence.

3.2.5 SAFETY DOCUMENTATION APPROVAL

Annex II
"3. Commissioning
3.3. The Tunnel Manager shall transmit the safety documentation mentioned in point 2.4 to the Safety Officer, who shall give his/her opinion on the opening of the tunnel to public traffic."

The Safety Officer should verify that safety documentation in relation to commissioning is complete and agreed before the opening of the tunnel. Where safety documentation requires the approval of emergency services the Safety Officer can coordinate communication to and feedback from them. In principle, production and approval of safety documentation is a responsibility of the Tunnel Manager.

3.2.6 OPENING TO PUBLIC TRAFFIC

Annex II
"3.4. The Tunnel Manager shall forward this safety documentation to the administrative authority and shall attach the opinion of the Safety Officer. The Administrative Authority shall decide whether or not to authorise the opening of the tunnel to public traffic, or whether to do so with restrictive conditions, and shall notify this to the Tunnel Manager. A copy of this decision shall be forwarded to the emergency services."

The Safety Officer shall take note of the decision of the administrative authority.

3.2.7 MODIFICATIONS

Annex II
"4. Modifications
4.2. The Tunnel Manager shall inform the Safety Officer of any other change in construction and operation. Furthermore, prior to any modification work on the tunnel, the Tunnel Manager shall provide the Safety Officer with documentation detailing the proposals.

4.3. The Safety Officer shall examine the consequences of the modification and in any event give his/her opinion to the Tunnel Manager, who shall send a copy to the administrative authority and to the emergency services." prior to any modification work on the tunnel, the Tunnel Manager shall provide the Safety Officer with documentation detailing the proposals."

3.2.7 PERIODIC EXERCISES

Annex II
"5 Periodic exercises
(a) The Tunnel Manager and the emergency services shall, in cooperation with the Safety Officer, organise joint periodic exercises for tunnel staff and the emergency services.
(b) The Safety Officer and the emergency services shall evaluate jointly these exercises, draw up a report and make appropriate proposals."

It is the responsibility of the Tunnel Manager, the Safety Officer and the emergency service to ensure actions and recommendation arising from exercises are followed up and closed out. A disciplined Emergency Planning Group process is essential to ensure all stakeholders have ownership of lessons learned from emergency exercises.

3.2.6 OPENING TO PUBLIC TRAFFIC

Annex II
"3.4. The Tunnel Manager shall forward this safety documentation to the administrative authority and shall attach the opinion of the Safety Officer. The Administrative Authority shall decide whether or not to authorise the opening of the tunnel to public traffic, or whether to do so with restrictive conditions, and shall notify this to the Tunnel Manager. A copy of this decision shall be forwarded to the emergency services."
The Safety Officer shall verify that the decision of the administrative authority is communicated to the emergency services. In any case, the Administrative Authority has to forward its decision to emergency services.

3.2.7 MODIFICATIONS

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4.2. The Tunnel Manager shall inform the Safety Officer of any other change in construction and operation. Furthermore, prior to any modification work on the tunnel, the Tunnel Manager shall provide the Safety Officer with documentation detailing the proposals.

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3.2.8 PERIODIC EXERCISES

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"5 Periodic exercises
(a) The Tunnel Manager and the emergency services shall, in cooperation with the Safety Officer, organise joint periodic exercises for tunnel staff and the emergency services.
(b) The Safety Officer and the emergency services shall evaluate jointly these exercises, draw up a report and make appropriate proposals. "

It is the responsibility of the Tunnel Manager, the Safety Officer and the emergency service to ensure actions and recommendation arising from exercises are followed up and closed out. A disciplined Emergency Planning Group process is essential to ensure all stakeholders have ownership of lessons learned from emergency exercises.

3.3 BEYOND THE DIRECTIVE'S REQUIREMENT

The DIRECTIVE is not directly applicable outside the Trans European Road Network. Member Nations are however encouraged to apply or develop requirements for other road tunnels and adopt more stringent measures if circumstances demand this.

4 SAFETY OFFICERS' RESPONSIBILITIES

4.1 INDEPENDENCE

The EU DIRECTIVE states: *"The Safety Officer may be a member of the tunnel staff or the emergency services, shall be independent in all road tunnel safety issues and shall not be under instructions from an employer in respect of those issues. A Safety Officer may perform his/her tasks and functions at several tunnels in a region."*

We find many forms in practice to fulfil this role varying from a person procured from an external company or free-lance to an employee of the Tunnel Management Company itself fulfilling the role of Safety Officer. Each situation has its pros and cons, and in the end the Administrative Authority has to sign for acceptance of a functionally independent Safety Officer proposed by the Tunnel Manager.

The Safety Officer should:

- have no personal, financial or other interest in any of the companies involved in the tunnel operation, providing services or tendering for work;
- notify the Administrative authority immediately if her/his circumstances change to introduce any actual, perceived or potential conflict of interest to the tunnel operation;
- review all tunnel safety schemes, design on an equal and consistent basis without bias.

Another way to define the right independence is: *"Ability to write unpopular opinions without recrimination".*

4.2 RESPONSIBILITY

The Safety Officers has the possibility to give solicited and unsolicited advice. The method of advising is not prescribed in the DIRECTIVE but it is recommended that any advice is fully documented.

Powers of the Safety Officer may be differently interpreted by different administrations. For example; Article 6(1) of the EU DIRECTIVE states: *"For each tunnel, the Tunnel Manager shall, with the prior approval of the administrative authority, nominate one Safety Officer who shall coordinate all preventive and safeguards measures to ensure the safety of users and operational staff..."*.

This place's a high level of accountability on the Safety Officer by stating:
The Safety Officer shall coordinate all preventive and safeguards measures to ensure the safety of users and operational staff.

Therefore, Safety Officers must be fully aware of how the EU DIRECTIVE has been implemented in the case of any tunnel they have responsibility for.

Their responsibility cannot be limited to the simple check of requirements listed in the EU DIRECTIVE or elsewhere; it is when those requirements are not fulfilled that the Safety Officer must use the best ability and competences to keep the tunnel safety to an acceptable level with all parties involved; eventually, in case of disagreement, the Safety Officer will document its position for the Tunnel Manager and the Administrative Authority to make their informed decision.

Safety Officers should make sure that they are being included in the specification process to ensure a holistic view.

4.3 CONFIDENTIALITY

The Safety Officer must maintain confidentiality and therefore:

- Will ensure that all information relating to the tunnel design, construction, operation will be treated as confidential;
- Third parties who will assist must be also free from any involvement with bidders or contractors;
- When involved in the design of a new tunnel or significant refurbishment project will make no contact with bidders during the process except by the Procurement Leader, through meetings arranged by the Procurement Leader.

4.4 MINIMUM OPERATING REQUIREMENTS

The EU DIRECTIVE states:
"Administrative authority – suspension or restriction of use of a road tunnel

Article 4(5) Without prejudice to further arrangements on this subject at national level, the Administrative Authority shall have power to suspend or restrict the operation of a tunnel if safety requirements are not met. It shall specify the conditions under which normal traffic may be resumed."

Safety in road tunnel is based on complex technical, human and organisational systems which may be subject to failure and lead to a more or less degraded operating situation. It is important therefore to take these failures into account in a preventative manner to ensure that the operational response is effective and appropriate in the event of an accident.

The Safety Officer should have a deep understanding of the effect that systems deficiency may have on the safe operation of the tunnel and verify the defined minimum availability of the installed safety systems. Systems deficiencies could range from minor faults through complete loss of functionality.

Any system deficiency which requires suspension of the operation of one tunnel tube or the complete tunnel structure means that the Minimum Operating Requirements (MOR) cannot be achieved and additional measures will have to be implemented to achieve a comparative level of safety or in certain circumstances operation of the tunnel restricted.

In other cases where the MOR is met but the system is not necessarily fully functional, recommended mitigation measures need to be defined and agreed, the Safety Officer should be part of this process.

It is accepted that immediate suspension of tunnel operation is not always practicable or sensible. In these cases, interim mitigation measures are proposed (possibly staged) that will allow continued operation while the necessary response teams are mobilised to correct the deficiency.

Where a tunnel in a degraded state below MOR is kept open for traffic, there should be clear mechanisms and decision-making processes and to record of additional measures and responsibilities that have been put in place.

5 SKILLS AND ATTRIBUTES

5.1 SKILLS AND ATTRIBUTES

5.1.1 QUALIFICATIONS

Currently agreement has not been reached on detailing specific qualifications for Safety Officers, however, within the EU the persons currently undertaking the role of Safety Officer have reached a broad consensus on the needs for the following:

Table 1: Safety Officer Skills & Competencies

SAFETY OFFICERS - SKILLS, EXPERIENCE, KNOWLEDGE AND TRAINING			
ID	Driver/Requirement	Skill/Knowledge/Experience Needs	Training etc. Needs
1	Basic general knowledge and experience required:	Have a good knowledge and understanding of EU DIRECTIVE 2004/54/EC and other national related regulations.	Formal training and assessment by the Tunnel Manager on both counts and on the job experience of their application.
2	Basic local knowledge required:	Have a good knowledge of the specific tunnel authority organisational structure, relationships and responsibilities, plus admin arrangements and internal and external communications (normal and emergency) arrangements.	Structured proper initial induction by the tunnel manager(s) to the position plus ongoing experience.
3	Basic technical knowledge and experience required:	Have a very good basic knowledge of tunnel design construction and equipment; of relevant operation and maintenance processes and procedures; of modes and consequences of failure; of health & safety requirements; of tunnel ventilation principles and air quality standards; of hazardous goods transport; of traffic management and traffic safety.	A very good basic grounding in tunnel design operation and maintenance supplemented as necessary by a set of specifically tailored study syllabuses and/or training courses to cover each of the needs at each individual tunnel.
4	Coordination:	Able to ensure there is coordination with the emergency services and take part in the preparation of the operational schemes. Communication skills.	As for 1, 2, and 3 above. Plus, training and/or experience to understand the emergency services operational roles, responsibilities, procedures and other needs, to include crisis management' of 'multi-agency' operations and management.
5	Planning:	Able to take part in the planning, implementation and evaluation of emergency operations.	As for 4 above. Plus, training and/or experience in the planning and evaluation of emergency operation procedures and exercises.
6	Engineering:	Able to take part in the formulation of safety schemes and the specification of the structure, equipment and the operation of new or modified road tunnels.	As for 1, 2 and 3 above. Plus, training and/or experience to provide an understanding of the regulations and of the use and application of risk analysis and risk assessment techniques and the preparation of safe systems of work and procedures.
7	Training:	Able to verify that operational staff and relevant emergency services are trained in relation to the operational schemes, take part in the organisation of training exercises for this purpose, and ensure that such exercises are held at regular intervals.	Included within 4 and 5 above.
8	Engineering:	Able to give advice on the commissioning of the structure, equipment and operation of that tunnel. Able to seek and understand specialist assistance.	Substantially covered by 1, 2, 3 and 4 above. If appropriate could be supplemented by training in systematic commissioning procedures.

SAFETY OFFICERS - SKILLS, EXPERIENCE, KNOWLEDGE AND TRAINING			
ID	Driver/Requirement	Skill/Knowledge/Experience Needs	Training etc. Needs
9	Auditing:	Able to verify that the tunnel structure and equipment is maintained and repaired.	Substantially covered by 1, 2, 3 and 8 above. If appropriate could be supplemented by training in systematic inspection and testing procedures.
10	Investigation:	Able to take part in the evaluation of any significant incident or accident.	Basic training in incident/accident investigation and evaluation.
11	General administration functions:	Able to prepare, organise and maintain rigorous, detailed and accurate record systems. Able to prepare reports. Be a good communicator.	Training in appropriate office systems and IT applications.
12	Relationships/ people:	Ability to work with/understand the roles and responsibilities of the Administrative Authority, Tunnel Manager, emergency services and Inspection Entity. Communication skills to interact, report and present. Common sense, attitude to teamwork, capacity to accept compromises.	Worked within a tunnel organisation and understand the requirements for an integrated approach.
13	Project management:	Understands the process of project management and in particular the timeline likely to affect operational safety schemes.	Needs to have project management experience and be familiar with the processes involved.
14	Risk assessments:	Has knowledge of risk assessment/evaluation techniques and processes and understands the prioritisation and cost implications of projects and programmes.	Training on both quantitative and qualitative risk assessment methods.
15	Reporting:	Ability to investigate accidents and their effect on the operational safety of the tunnel. Needs to be able to compile reports.	Report writing and management skills when dealing with different organisations.
16	Tunnels Operations:	Understands tunnels and network operations and how they interact.	Experience of control room functions and on road operations.

5.2 CONTINUED PROFESSIONAL DEVELOPMENT

As with the all tunnel management staff it is essential for the Safety Officer to keep their knowledge and understanding relevant and up to date. It should be evident to all that a Safety Officer will be unable to comment or sign off on new equipment if the Safety Officer does not understand the thought process or technology behind that equipment.

In order to achieve this, the Safety Officers could take various opportunities, such as:

- Be able to require specific expertise or explanations as necessary;
- Be part of national and/or international forums related to (road) tunnel management and safety;
- Attend regular training to keep its competency;
- Liaise with other Safety Officers.

6 CONCLUSIONS

This edition of the guideline mainly defines the tasks of the Safety Officer and what a Safety Officer needs in terms of knowledge and skills to perform this role. The next edition of this guideline will further elaborate on how and in which different ways a Safety Officer can fulfil their role and examples will be collected from the various participating countries.

Specific topics that will be considered in the next edition of this guideline:

- llegal considerations;
- fulfilment of the role if there are restrictions, for example if there is no access to information or no access to some stakeholders;
- what action perspective does the Safety Officer have when the level of safety is (too) low;
- which ways of communication are best suited to the different activities of a Safety Officer, for example is it solely to write email or letters;
- further specify the role of Safety Officer in new tunnels, existing tunnels and refurbishments including the elaboration of the definition for substantial modification;
- further elaboration of the process concerning the Minimum Operating Requirements (MOR).

APPENDICES

A1 SAFETY OFFICER ROLE

Table 2: Safety Officer Role

Roles	Tasks	Focus and Nature of Responsibility
Fulfilment of Safety Officer role whilst acting independently:	Full range of the following roles and tasks.	Ensure that independence is delivered by displaying impeccable professional integrity.
Coordinate all preventive and safeguard measures:	Identify potential problems and make proposals about possible solutions.	Identify TM's inherent risks (of organisational or structural nature).
Ensure there is coordination with the emergency services, and take part in the preparation of the operational schemes:	Plan; Liaise; Communicate; Meet.	Communication and planning skills.
Take part in the planning, implementation and evaluation of emergency operations:	Plan; Liaise; Communicate; Meet.	Communication and planning skills.
Take part in the formulation of safety schemes and the specification of the structure equipment and operation of new or modified road tunnels:	Plan; Liaise; Communicate; Meet. Participating in tunnel design with a safety point of view.	Communication and planning skills. Technical awareness & Team working skills.
Verify that operational staff and relevant emergency services are trained in relation to the operational schemes, take part in the organisation of training exercises for this purpose, and Ensure that such exercises are held at regular intervals:	Liaise; Assess; Validate.	Assessor & Trainer skills.
Give advice on the commissioning of the structure, equipment and operation of that tunnel:	Participating in tunnel design and safety consultation.	Technical awareness & Team working skills.
Verify that the tunnel's structure and equipment is maintained and repaired:	IIndependence; Diligence.	Technical awareness & Team working skills.
Take part in the evaluation of any significant incident or accident:	Accident and "near miss" investigation.	Report writing - Recording of investigation, interpretation of results communication of findings.

A2 BEST PRACTICE

(a2) Take part in the preparation of operational schemes

Examples for incidents or conditions an operational scheme should be in place:

- Tunnel closure and operational restrictions due to technical or infrastructure or operational failure (MOR)
- Congestion
- Wrong-way vehicle
- Vehicle Breakdown
- Person, animals, fallen objects in tunnel
- Hight Control / Oversized vehicles
- Accidents
- Fires
- Incident with Dangerous Goods (ADR)
- Terror / Criminal attack
- Environmental Conditions (Flood, Fog, Icy conditions, ...)
- Maintenance and Inspections

Operational schemes should be defined within the safety documentation or external documents (contingency plans) and be verified by the Tunnel Manager, the emergency services and the Safety Officer. It is important to define for each operational scheme:

- Unified manner of incident localization and description
- Who has incident command and when (operator, fire brigade, police, disaster control? ...)
- Reporting channels (who alerts who, flow of information)
- Required operating conditions of the tunnel (SCADA: tunnel closure, lane closure, warning signs, ventilation, evacuation, ... and other accompanying measures)
- Required services and role of each of them
- Simple and clear procedures for operating staff
- Robust document control management

(b) Planning, Implementation and Evaluation

"Take part in the planning implementation and evaluation of emergency operations "

(b1) Planning of Emergency Operations

The Safety Officer should ensure that emergency services get all relevant information on the tunnel (layout, technical installation, operational modes, interfaces with other parties, annual update of contacts ...) so that they are fully informed and able to properly plan their operations.

One useful way of achieving this is to form an Emergency Planning Group including all emergency services and to hold regular emergency planning reviews to ensure knowledge Emergency Service hold about the tunnel is current and that the tunnel operator is aware of any changes in emergency services response capability. Two meetings a year are optimum, but such updates should be carried out at least annually.

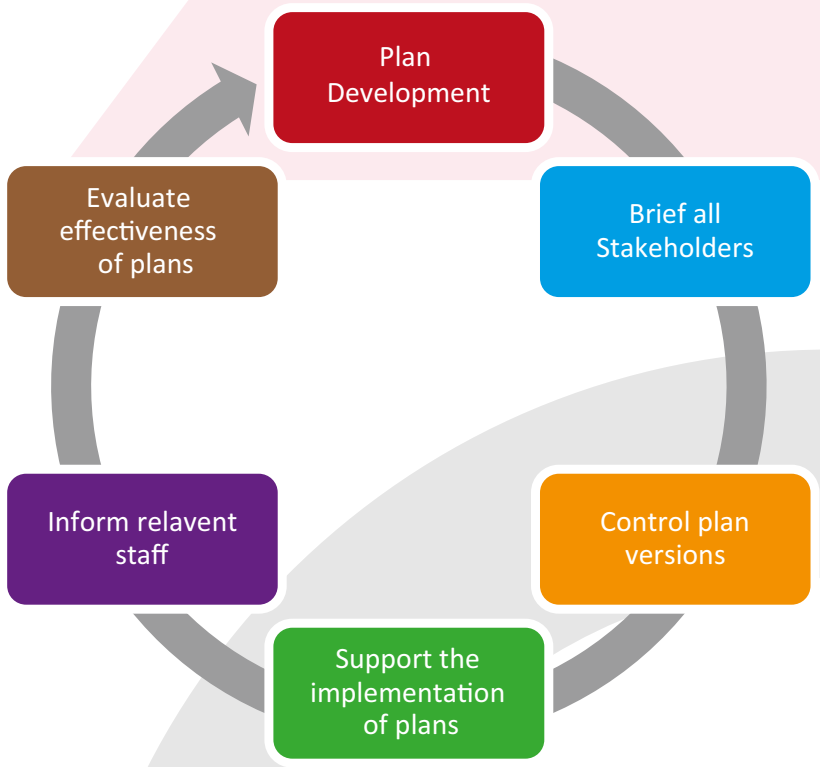


Figure 1: Emergency Planning Loop

(b2) Implementation of Emergency Operations

All emergency plans and procedures should be approved by the Emergency Planning Group before implementation. This will ensure that all actions taken by each emergency service compliments the actions of other services and the tunnel operator.

It is essential that the accurate and complete information is given to emergency services when requesting their assistance and that all services work to the same intelligence to ensure safe systems of work are established in the incident response.

This needs to include as a minimum:

- The exact location of the incident in the tunnel;
- The availability of the access routes/ network, with the information on the traffic conditions;
- What type of incident is it, i.e. Fire, Road Traffic Collision, Spillage etc...?
- Are there any casualties, if so, how many and how serious are the injuries?
- Are there any obvious or potential hazards emergency services should be aware of?
- Which emergency services are required and who is most urgently needed.

The Joint emergency services interoperability programme (JESIP) in the UK uses the METHANE Pneumonic as a means of sharing relevant information in a consistent manner the following lick provides details of JESIP.

Table 3: METHANE Pneumonic

M	Major Incident	Has a major incident or standby been declared? (Yes/No – if no then complete Ethane message)
E	Exact Location	What is the exact location or geographical area of the incident?
T	Type of Incident	What kind of incident is it?
H	Hazards	What hazards or potential hazards can be indentified?
A	Access	What are the best routes for access and egress?
N	Number of Casualties	How many casualties are there, and what condition are they in?
E	Emergency Service	Which and how many, emergency responder assets/ personnel are required or are already on-scene?

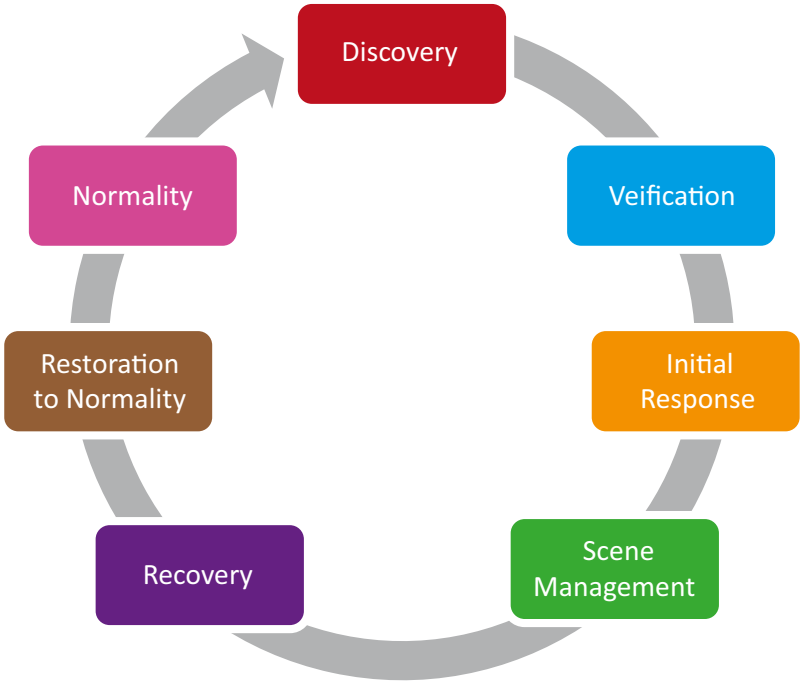


Figure 2: Incident Management Cycle

(b3) Evaluation of Emergency Operations

Together with the Tunnel Manager the Safety Officer should take part in the review of all significant incidents. As a minimum this should be to review how the incident was managed and evaluate the effectiveness of the response by comparing it against the plans and procedures. It is useful to note:

- Good practices
- Learning points
- Effectiveness of procedures

From the review of the incident it is then possible to make recommendations in respect of:

- Training needs identified
- Equipment or infrastructure deficiencies and defects encountered
- Improvement of plans and procedures
- Improvement in communications and liaison

If emergency services or any other parties have been involved during emergency operations, a meeting should be organized to have a complete feedback.

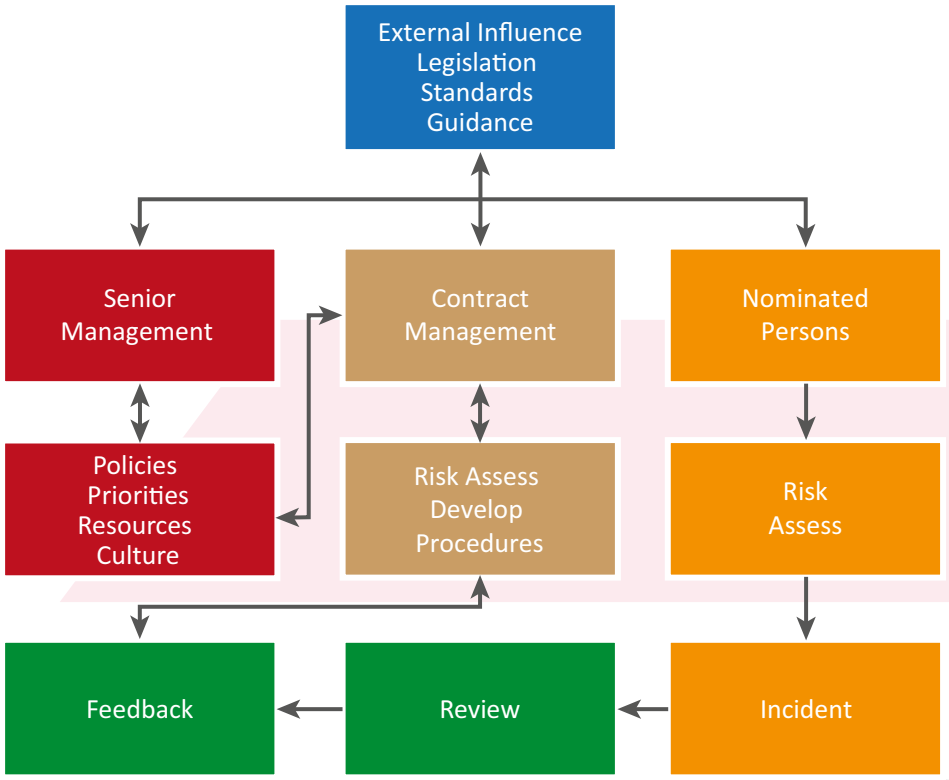
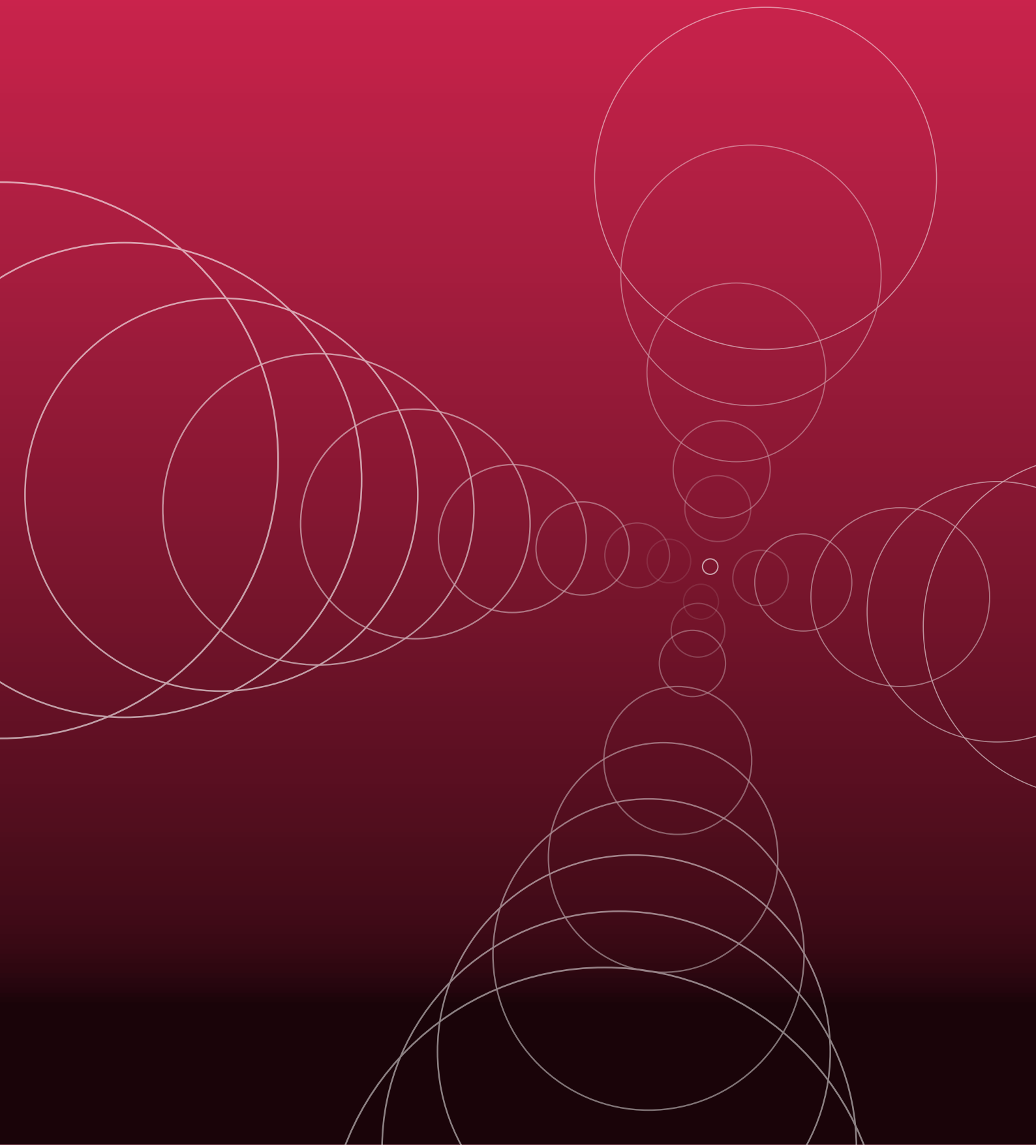


Figure 3: Evaluation and Feedback Loop



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