

Organizational Solutions for Employee Training to be Included in the Safety Management System

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The Seveso III Directive has been implemented in each of the EU Member States. This means that the safety management systems (SMS) implementing the Major-Accident Prevention policy (MAPP) function in every establishment with upper and lower tier in the EU. Unlike Notification, MAPP, Safety Reports or Emergency plans, a SMS does not need to be a separate written document. The only guideline is Annex III of the Seveso III Directive. The SMS may be the part of the general management system which includes the organizational structure, responsibilities, practices, procedures, process and resources for determining and implementing the major-accident prevention policy.

In upper tier SMS often is a part of standardized, normalized systems, but in lower tier not necessary. For this reason, guidelines for Small and Medium Enterprises (SME) have been developed to allow fulfil the law requirements and to check - audit whether these requirements are met. For prevention of the major industrial accidents, it is extremely important to analyse the training demand, including assigning the training level to the hierarchy of employees. From the other hand the analysing the available training in terms of its content and methods of conducting is also very important. The analysis of the available training should take into account the way of conducting classes - in the sequential mode for beginners, and in the simulation mode for the advanced, because each style is aimed at teaching and developing different attitudes. Presentation-only training is very common and the cheapest, but it is also the least effective. Missing and ineffective training frustrates both the employee and the employer. The more so because employee training is a serious burden for the employer, especially the SME one, because it is associated with considerable costs of the training itself, as well as with the absence of employee at the workplace. The level of training of employees translates directly into the level of safety in the establishment.

1. Introduction

According to the provisions of Directive 2012/18 / EU of the European Parliament and of the Council, known as the Seveso III Directive (Seveso III Directive, 2012), establishment operators should be subject to a general obligation to take all necessary measures to prevent major accidents, to mitigate their consequences and to take recovery measures. In art. 8 Member States were obliged to require the operators to draw up a written document setting out the Major-Accident Prevention Policy MAPP and to ensure its proper implementation.

The policy must define the overall objectives and principles of the operator's actions, the role and responsibilities of management, as well as the commitment to continuous improvement of the major-accident hazards control and ensuring a high level of protection. The policy is to be implemented through appropriate measures, structures or through the Safety Management System SMS defined in Annex III to the Directive.

System implementing MAPP should include such issues as organisation and personnel, identification and evaluation of major hazards, operational control, management of change, planning for emergencies, monitoring performance and audit and review. The policy and system should be commensurate with the level of major accident hazards and the complexity of the organization or operation profile of the establishment.

Operators of upper-tier establishments must report to appropriate authorities by filing a safety report. The first point of the safety report is to demonstrate that, according to the information set out in Annex III, an accident prevention policy has been implemented by means of a safety management system. The obligation to file the

report applies only to upper-tier establishments. Lower-tier establishments are required to develop a policy and implement it through the system without the need to prepare a safety report. The simple diagram of relations between the policy, the system and the report is presented in Figure 1.

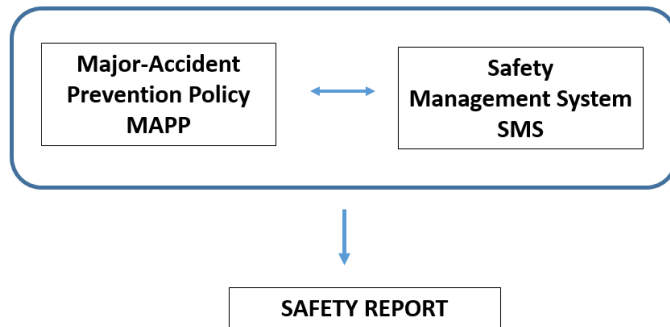


Figure 1. The diagram of relations between the policy, the system and the report in accordance with the Seveso III Directive (own drawing)

2. Training requirements included in the Safety Management System

In Annex III to the Seveso III Directive, the learning and training requirements are stipulated in the organisation and personnel sub-section. Accordingly, the safety management system should take into account:

- the roles and responsibilities of personnel involved in the management of major hazards at all levels in the organisation, together with the measures taken to raise awareness of the need for continuous improvement;
- the identification of training needs of such personnel and the provision of the training so identified;
- the involvement of employees and of subcontracted personnel working in the establishment which are important from the point of view of safety.

3. Solutions used in upper-tier establishments

The safety management system connected with the prevention of major industrial accidents and limitation of their consequences may be integrated with another system or other systems, e.g. with the occupational health and safety management system in accordance with the PN-ISO 45001 standard. Currently, the establishments often have an integrated management system that includes an environmental management system, an occupational health and safety management system and a quality management system, compliant with the requirements of ISO 45001 for occupational health and safety, ISO 14001 for the environment and ISO 9001 regarding the quality. Nowadays, the information security management system according to ISO / IEC 27001 is becoming important.

Taking into account the occupational health and safety management system, in accordance with point 7 of the standard (ISO 45001 standard), an organization should:

- b) ensure that workers are competent (including the ability to identify hazards) on the basis of appropriate education, training or experience;
- c) where applicable, take measures to acquire and maintain the necessary competencies and evaluate the effectiveness of the actions taken.

One of the hazard elimination and health and safety risk mitigation processes that the organization should establish, implement and maintain is the application of administrative risk mitigation measures, including training (8.1.2. Letter d).

In the management system standards, incl. ISO 45001 or EN ISO 9001 the approach to the management system is based on the concept of Plan - Do - Check - Act (PCDA), the so-called Deming's loop or cycle.

In general, it consists of 4 consecutive steps that can be illustrated by the example of an occupational health and safety management system (ISO 45001: 2018):

- Plan: identify and assess OH&S risks, identify OH&S and other risks and opportunities, and establish OH&S goals and processes necessary to achieve results consistent with the organization's OH&S policy;
- Do: implement processes as planned;
- Check: monitor and measure activities and processes against OSH policy and objectives, and report the results;
- Act: take action to continuously improve the health and safety performance to achieve the intended results.

In ISO standards, the PCDA concept is presented graphically - below is an example from PN-ISO 45001: 2018 (Figure 2).

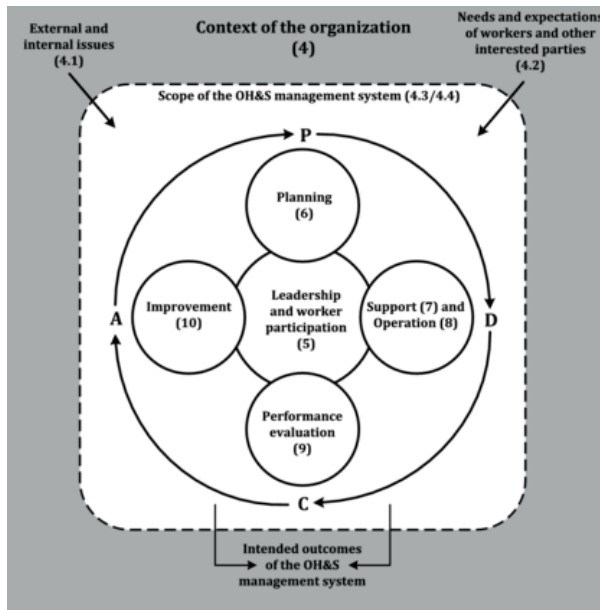


Fig. 2. Graphic concept of PCDA from the ISO 45001:2018(en) standard

4. Solutions for lower-tier establishments

In upper-tier establishments, training on major-accident prevention and emergency response shall normally be provided in accordance with a specific procedure developed in the establishment. This procedure indicates the types of mandatory training for each work station and outline the training programs. According to this framework, all training ensures that employees are provided with appropriate knowledge and skills in the following areas:

- all hazards, general safety principles and basic principles of accident prevention and response, for an entire establishment - as part of the introductory training, basic training in occupational health and safety;
- hazards and safety rules for individual processes - workplace instruction;
- emergency procedures - as part of introductory, basic and periodic training.

In addition, each employee involved in packing, loading and unloading of hazardous materials (hazardous substances in accordance with the nomenclature of the CLP Regulation) as well as in the inspection of vehicles and issuing of documents related to the transport of such materials, should be trained in accordance with the requirements of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR).

4.1 The measures taken to raise awareness of the need for continuous improvement

The first of the proposed organisational solutions could be the establishment of a training and personal development team in the establishment. However, the aim is not to employ teachers, educators or trainers, but to select a group of employees. In small establishment it would be enough to select two members of staff who would receive professional training on techniques and methods allowing for effective training of other employees. It is crucial to select such people who would have a predisposition to conduct training and teach others. It should be remembered that the final goal is the acquisition of knowledge and development of skills by all employees, rather than creating a coaching personality. People from the training and development team would be involved in the work related to the training of employees in various areas related to the operation of the establishment.

The most common organisational solution used in establishments is the use of external experts to train employees on site or directing employees to external training. However, in this case, the knowledge is provided by a person from outside the establishment, who often presents general solutions without expertise referring to the specifics of the establishment. After such training, it is often difficult to use the given general knowledge to solve specific problems occurring in the establishment.

In this case, the key is to apply the Employee 4.0 approach. The training of representatives of each generation should be approached in a different way, as their goals and priorities are completely different. What works for training for young people will not work for training for people 40+, 50+. The ability to adopt appropriate training methods is in this case an indicator of training effectiveness.

The second potential organisational solution could be to make the training information public in the establishment, taking into account the entire hierarchy of the establishment. Due to the regulation on the protection of personal data, it might be sufficient to assign positions to the proposed training. This should show how much importance the establishment management places on safety.

Another possible organisational solution is anticipation in the form of different development programs. For example, a program in which former employees could maintain contact with the establishment as mentors, trainers and tutors. Another option is a mentoring program where experienced managers become guides for those just starting out in managerial roles. The next one is the "creation of a 50+ club", i.e. an organisation for employees over 50. The club's goals include building motivation for continuous development among members, inspiring them not to give themselves a "discount ticket" due to their age, eliminating the feeling of pressure from younger employees, supporting professional activity and encouraging a lifestyle which will sustain this activity in the long-term perspective. This allows knowledge and experience to be shared (Pęciłło M. & Galwas-Grzeszkiewicz M., 2019).

4.2 The identification of training needs of such personnel and the provision of the training so identified

The one of the common disadvantages of mandatory training programs is high level of generality and the excessive amount of content inadequate to the needs of the trainees. An organisational solution that can be used to more effectively adapt training programs to the needs of employees is to instruct the future internal trainers as to a scope of the necessary knowledge.

Example to use (Clark, 2020): Each of us learned the names of twelve months in primary school and everyone could easily list them in the order of their occurrence during the year - this is basic knowledge. The next level of knowledge may be the ability to list the names of months in alphabetical order - in this case it is no longer so simple and not so obvious. The next level of knowledge would be to e.g. name them in order from the lowest to the highest number of letters.

Similarly, in an establishment, a completely different knowledge is needed by a regular or subordinate employee (knowledge of the order in which months of the year occur), a middle-level manager or a manager (knowledge of the sequence of months in the year and alphabetical order), or a director or manager (knowledge of the order of occurrence of months in the year and alphabetical order and the order from the lowest to the highest number of letters in each name).

It is a definitely infantile example, but it clearly shows the relation between the required knowledge and skills and the hierarchy in the institution. One may wonder what the purpose of explaining such an obvious issue is, but choosing the right training program is not at all simple or common. In this case, if a training team were created, it would take over the obligation to prepare a training program adequate to the positions held and the activities carried out.

4.3 The involvement of employees and subcontracted personnel working in the establishment which is important from the point of view of safety

In upper-tier establishments, internal emergency plans are prepared and systematically exercised. However, for lower-tier establishments there is no obligation to prepare such plans. Absence of legal requirement may result in the failure on the part of establishment management to recognise the significance of this element of the major industrial accidents prevention system.

Similarly, in many cases the systematic analysis of the response in the event of an accident is not carried out. Consequently, establishments may fail to ensure that the appropriate number of people undergo systematic theoretical and practical training as well as medical examinations to be able to participate in and to manage the company's rescue operations

There have been situations in which such analyses were not updated while people assigned to the activities left the establishment, e.g. retired and were not replaced, which caused an evident safety gap.

A good organizational solution is the method developed by Christian Kunz et al. to support systematic cultivation of collective tacit knowledge (Kunz et al., 2017, Pęciłło M. & Galwas-Grzeszkiewicz M., 2019), which fits to the concept of resilience engineering. This method covers three stages:

- workshops before starting work (pre-job workshop),
- systematic exchange of cooperation relevant information during job execution;
- post-work workshops.

Stage 1. The first part of the workshop is about a realistic scenario in which an experienced team member has to be replaced for some time by an inexperienced colleague. Each of the workshop participants takes turns playing the role of an absent experienced colleague. The scenario is the basis for individual reflection and for discussing the disturbances that may be caused by an inexperienced employee working solely on the basis of standards. At the same time, team members involved in the discussion identify what is missing from the official documentation and what they consider necessary for proper operation.

The second part of the workshop is devoted to revealing the tacit knowledge of the team as a result of dysfunction, including mutual expectations and doubts. The discussion covers areas such as existing forms of cooperation, expectations of team members regarding this cooperation, limitations resulting from a lack of knowledge about team members, possible disruptions resulting from different or incompatible expectations and from different experiences of team members, and uncertainty about future cooperation.

Stage 2. The systematic exchange of tacit knowledge and mutual expectations during the work builds on the results of the pre-workshop. A short interview is conducted with each team member three times: before, during and after the work. The interviews cover past cooperation in the team (successful and unsuccessful), doubts and knowledge from the workshops, new doubts and uncertainties about the work and the cooperation.

Stage 3. The final workshop is devoted to discussing the work done, analysing those elements that have been done correctly and identifying areas for improvement.

In the case of training for employees responsible for actions in the event of an industrial accident, the entire workshop/training would concern actions in the event of such an event. Practising various scenarios, especially representative ones, first theoretically and then practically, can have a significant impact on making the right decisions and taking appropriate actions in the event of a major accident.

5. A proposal of a solution for small and medium-sized enterprises categorised as lower-tier establishments

For upper-tier establishments and for lower-tier establishments operating under integrated management systems, compliance with the legal requirements is not as much of a problem as it is for small and medium-sized enterprises, which are mostly lower-tier establishments and often do not have ISO systems in place.

The preliminary procedure has been proposed to help establishments meet legal requirements.

Procedure

1. Selection of at least two members of staff to be responsible for training in the field of major-accident prevention. In the event of one person leaving (e.g. dismissal, retirement), the knowledge shall remain in the establishment.

The following steps concern employees responsible for training.

2. Assigning employees to groups based on:

Option 1. being a member of the accident response team - active participation (action, reaction) in the activities when an accident occurs,

Option 2. the same hazards to which they are exposed in the event of an accident (e.g. the same type of hazardous substance)

Option 3. the same hazards to which they are exposed on a daily basis during work (e.g. the same type of hazardous substance).

3. Identification of the area of knowledge required for the employees under each option separately, including the identification of dedicated knowledge.

4. Verification of employees' knowledge before training.

5. Selection of people to be trained; in option 1 - internal training of all employees.

5. Identification of available training and analysis of the available training programs, including their division into theoretical and practical parts.

7. Verification of employees' knowledge after training.

8. Preparation of a report for the employer.

9. Analysis according to concept of Plan - Do - Check - Act (PCDA), the so-called Deming's loop or cycle – repeating points 2 to 8.

Conclusions

For the purposes of major industrial accidents prevention, it is important to adopt a systematic approach which will allow the acquired knowledge to be used in the event of a major accident, when people operate under great pressure and stress. Requirements concerning continuous improvement and training are one of the key elements of the safety management system. A proper analysis of training needs in the establishment, including correct allocation of the training level (basic, advanced) and its programme to the level of seniority in the organisational structure is one of the most important factors. The methodology of adult education and training is paramount as it translates directly into the effectiveness of training, which in turn translates into the ability to successfully apply the relevant knowledge and skills in a failure situation.

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References

- Clark R.C., 2020 Evidence-Based Training Methods: A Guide for Training Professionals, ASTD DBA Association for Talent Development (ATD), USA
- ISO 45001:2018(en) Occupational health and safety management systems www.iso.org (accessed 30 November 2021)
- Kunz Ch, Wafler T., Saric N., Fischer K., 2017 Improving team resilience by supporting mindful cooperation awareness, 7th Resilience Engineering International Symposium, Liège (Luik) (Belgium), 26-29 June 2017, <https://resilience-engineering-association.org> (accessed 30 November 2021)
- Pęciłło M., Galwas-Grzeszkiewicz M., 2019 Assessment of the potential of organizational solutions with regard to the application of resilience engineering principles in upper-tier and lower-tier enterprises. Part III. Good practices (Ocena potencjału rozwiązań organizacyjnych w zakresie zastosowania zasad resilience engineering w przedsiębiorstwach o dużym lub zwiększonym ryzyku wystąpienia poważnej awarii przemysłowej. Część III. Dobre praktyki), CIOP-PIB in Polish only
- Seveso III Directive, 2012, Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing council directive 96/82/EC