CHANGING MANAGEMENT PRACTICES TO IMPROVE SAFETY CULTURE: LESSONS LEARNED FROM A HUMAN FACTORS TRAINING PROGRAMME

Laurent Karsenty[(1)] and Christian Neveu[(2)]

(1) Ergomanagement, 4 rue de Guyenne, 31130 QUINT (France)
(2) SNCF – DSSP, Dept Human Factors Management and Europe, 20 rue de Rome, 75008 PARIS (France)

In 2012, the French National Railway Company (SNCF) designed, with the help of Ergomanagement, a human factors training programme for managers aimed at strengthening the safety culture. This programme complemented a dedicated non-technical skills training course for front-line workers. In this paper, we review the topics covered during the training workshops for managers and explain how they were arranged. An evaluation step was then conducted. Its main results are presented in two parts. The first focuses on the immediate outcomes of the workshops (participants' satisfaction rates, adherence to key posts). The second presents the outcomes after a period of 12 to 18 months. It shows that positive changes were obtained among a number of managers, but not all. These changes include a better assessment of the organizational factors causing incidents, better support for front-line operators and more timely responses to safety concerns, stronger involvement in incident analysis and a willingness to fully understand the circumstances of an incident before adopting a sanction. Obstacles that prevented broader change are also identified, and improvements to the training programme proposed.

Introduction

In 2012, the French National Railway Company (SNCF) designed, with the help of Ergomanagement, a human factors training workshop for managers aimed at strengthening the safety culture. This workshop complemented a dedicated non-technical skills training course for front-line safety critical workers (Duvenci-Langa, Karsenty & Salomé-Martin, 2013). Both training actions are grouped into a single

programme called, in French, "Conscience des Risques Métiers"[1] and designated by the initials CRM, with reference to the Crew Resource Management training initially developed by the aeronautical world (FAA, 2004).

Safety culture is "the attitudes, beliefs, perceptions and values that employees share in relation to safety" (Cox and Cox, 1991). More specifically, "organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficacy of preventive measures" (ACSNI, 1993). Based on these definitions, the main objectives of the human factors training workshops were to encourage managers to adopt the necessary new attitudes, beliefs and perceptions to build or reinforce trust relationships, promote incident reporting and a deep analysis of errors and violations, and adopt relevant and timely measures to improve safety including, when necessary, just decisions on sanctions. To date, approximately 360 general and safety managers and 420 local managers from 18 regions of France have attended the training workshops.

In this paper, we review the topics covered during these training workshops and explain how they were arranged. Their outcomes are then presented in two parts. The first focuses on the immediate outcomes of the workshops: participants' satisfaction rates and adherence to key posts. The second presents the outcomes after a period of 12 to 18 months. They were obtained from two sites where (almost) all managers and operators attended the training programme. These results show that positive changes were obtained among a number of managers, but not all. These changes include a better assessment of the organizational factors causing incidents, better support for front-line operators and more timely responses to safety concerns, stronger involvement in incident analysis and a willingness to fully understand the circumstances of an incident before adopting a sanction. Obstacles that prevented broader change are also identified, and improvements to the training programme proposed.

Review of the topics covered

The CRM training subjects were defined following consultations with operational unit managers and those responsible for safety at the heart of these units. The aim of these consultations was to better understand the tasks that these managers perform, the priority that they accord to safety in their management, the means at their disposal and the difficulties they encounter in achieving the best safety outcomes. In addition, incident reports and incident data were analyzed. By combining all of these data, the training programme has been drawn up as follows in the knowledge that a

[1] This wording may be translated into English by "awareness of occupational risks".

training session should take two days. While presenting these subjects, we summarize the content of the training carried out with the managers.

Topic 1. What is a performance of safe work?

Many managers share the belief that a safe act is solely a result of acquiring technical skills and good application of procedures. They thus ignore the importance of the operators implementing their non-technical skills properly. Analyzing the situation, anticipating, managing doubt, or the ability to keep calm under pressure are a few examples of non-technical skills that are essential for achieving safe work performance. It is also important to recognize that their implementation may be influenced by the physical and mental state of the operators, the local working conditions as well as various organizational factors. These influencing factors may explain a certain number of operator errors beyond the reasons classically cited, such as a deficit in skills, a lack of professional discipline or a lack of motivation at work.

Topic 2. How are errors and violations handled?

Another managerial belief is to think that it would be possible to eliminate any deviation from safety standards and procedures, whether involuntary (error) or voluntary (violation). In reality, human performance is by its very nature variable and fallible. Furthermore, violations are often necessary to deal with the vagaries of work (e.g. unavailability of a tool) or a conflict of aims (e.g. delivering a train on time when realization of all the remaining maintenance operations would lead to it being late), which are inevitable. Moreover, we are just as likely to see errors and violations at the level of operational teams as in support services (engineering, training, maintenance, etc.) and management. While it is important for managers to act to prevent errors and violations, they must also accept the idea that these actions will not eliminate all of them. As a consequence, they must aim to be aware of them before any accident occurs and to foresee solutions that will avoid their consequences if they do occur.

Topic 3. Management surpassing control limits

In order to become aware of safety lapses before they cause an accident, SNCF has put certain controls in place and has aimed to reinforce them when it finds out, thanks to analysis of an incident, that some of them had not been detected by the existing processes. The participants are encouraged to think, based on their experience, about the limits of the implemented controls and how to reinforce them. Starting from this shared reflection, they are then requested to reflect on a complementary strategy that CRM training promotes: it is based on reporting by those responsible for safety errors and violations that they may have made, without any consequences. The conditions for ensuring that this reporting is possible and continuous have been discussed. In particular, the emphasis has been put on the existence of a trust climate.

Topic 4. Developing a trust climate

Organizational trust and trust within a team are essential for receiving rapid, informative and honest reports. But trust cannot be ordered: it develops organically if each party acts in accordance with the expectations of the other parties on whom he depends. Furthermore, even if the conditions for its development are met, trust should never be total in a risky activity because it could result in compromising the vigilance of everyone and in developing complacency towards others. Knowing how to trust others in a risky area thus seems to be an essential non-technical skill for safety (Karsenty, 2010). The conditions for developing a trust climate are discussed with the participants and each one of them is invited to reflect on actions that he could put in place to reinforce it.

Topic 5. Collecting and handling the operators' reports

Apart from trust, other conditions are necessary for receiving a continuous flow of reports: a collecting method maintaining the confidentiality of the operators must be proposed and an effective handling process must be put in place, with the assurance that every report will receive a response from the organization. Various options for implementing such a collecting and handling system for reports are considered with the participants, who may therefore choose the one that is best suited to their own work.

Topic 6. Handling an incident and deciding on a sanction

Even though the reports enable management to have a better knowledge of possible errors and violations and, normally, to improve safety standards, they will not prevent the occurrence of all incidents. Even so, the trust climate also depends on the way in which each incident is analyzed and on the measures that this analysis results in being taken: in particular, the decisions on sanctions. To assist the managers to make a judgement, a method for an in-depth analysis of incidents is presented to them and is illustrated with real incidents. Then the conditions for a sanction are discussed. The CRM training promotes the principles of a just culture (GAIN, 2004), which allows unsafe acts to be hierarchized and to set a clear boundary between acceptable and unacceptable behaviour.

Workshop arrangements

The training sessions are organized at the managers' workplaces in every region of France. Each region was broken down into worksites (for example, a worksite corresponds to a station and generally involves 100 to 200 operators). The training is carried out progressively, generally one worksite after the other, sometimes more.

Every training session brings together ten managers of the same hierarchical level but who are responsible for overseeing different activities (driving, maintenance, traffic management, shunting).

These sessions take place over two consecutive days. Regular coffee breaks and a meal taken together help group cohesion.

These sessions are taken by two trainers (the two authors of this communication). Since one of the objectives of this workshop is to promote the collection of ideas and to actively involve every manager in the CRM approach, the trainers' stance is different from that classically adopted in a workshop: their role is not to teach a piece of knowledge or a predefined skill, but to give the participants some elements of reflection so that each one of them makes up their own mind about the subjects dealt with and decides which actions to put in place at the heart of their team. To achieve this, the trainers take on the role of facilitators and mainly aim to make all of the participants interact and to share their experiences. For this reason, fairly long periods of time are regularly dedicated to exchanges during which the trainers do not intervene, except to guide the debates or to feed in new ideas[2].

At the end of each session, the participants are invited to formalize a plan of action to put in place the safety management principles discussed during the workshop. There is no prescription as to the type and number of actions to be defined by each manager. These plans of action are shared among the participants and, at the same time, set down in writing by the trainers to enable a follow-up with each participant for a period of six months after the session.

Finally, each participant is requested to complete a questionnaire. It comprises two parts: the first contains several questions on satisfaction; the second contains several questions aimed at verifying the participants' adherence to the main messages of the workshop (see below). All of the questions are formulated according to the Lickert scale[3].

Immediate outcomes: participants' satisfaction and adherence to key posts

The participants' immediate reactions will influence their willingness to act or not with regard to the CRM approach. It is thus important to ensure that they are

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[2] One of the two trainers himself has held various managerial positions at the heart of SNCF, which permits him to rely on a base of shared experiences during the exchange with the participants.

[3] The Lickert scale proposes 4 possible responses to each statement: strongly disagree, disagree, agree, strongly agree.

positive on the whole. In fact, we have registered a very high satisfaction rate for the training among a sample of 274 managers[4] (cf. Fig. 1).

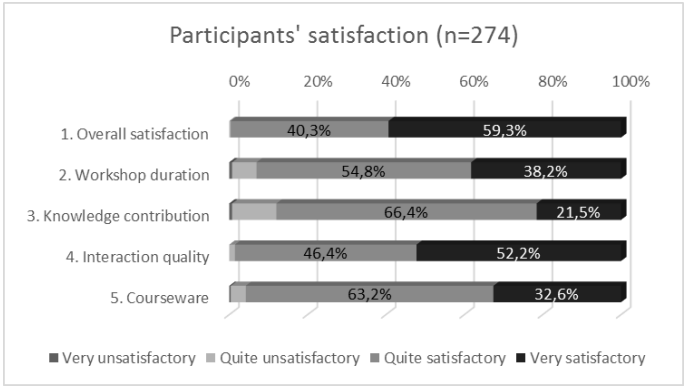

Figure 1. Immediate outcomes of the training workshops: satisfaction rates

The participants' adherence to the key messages of the training are also canvassed by a questionnaire at the end of every session. The results obtained show an extremely high rate of adherence (cf. Fig. 2).

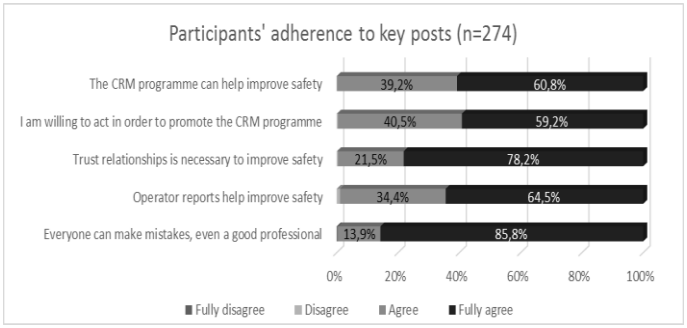

Figure 2. Immediate outcomes of the training workshops: adherence to key posts

Positive outcomes observed 12 to 18 months after the workshops

While the managers' satisfaction and their adherence to the messages of the training are the conditions required for them to change certain behaviours, they are not sufficient conditions. It is essential that they do not forget what they have learned in

[4] This sample corresponds to the managers trained between September 2013 and May 2015. Other managers were trained before this period, but the satisfaction questionnaire that was proposed to them contained Lickert scales that were different in certain respects from those presented here.

this workshop and succeed in putting it into place when they return to the workplace. This is what we tried to determine when meeting them again 12 to 18 months after their training session. This evaluation phase was organized in two regions – one in the south of France and the other in the north – for which all of the managers (n=40) and operators (n=237) belonging to the first operation worksite had been trained.

For this evaluation, a questionnaire on the safety culture was distributed among the two categories of manager: the managers who took part in the training (hereinafter referred to as post-CRM) and managers who took part in the operation worksites who had not yet received training (pre-CRM). This measure is designed to compare the responses obtained and thus better evaluate the effects of training on the attitudes and behaviour linked to safety. It should be noted that a six-point Lickert scale have been used in this questionnaire (see below) to be able to identify fairly subtle differences between the pre-CRM and post-CRM managers.

Furthermore, an interview was carried out with about twenty managers of different hierarchical levels on the operation worksites involved in the training. The interview was generally one-to-one and semi-structured. The questions concerned what had been retained from the training, actions that had been taken since the training by each manager and any difficulties encountered.

All of the data gathered so far reveals several positive changes with respect to the aims of the training.

Better assessment of the organizational factors causing incidents

A primary effect of the training has a bearing on the managers' viewpoint concerning the possible implication of the organization in the occurrence of incidents and their capacity to act effectively in safety matters (cf. Fig. 3).

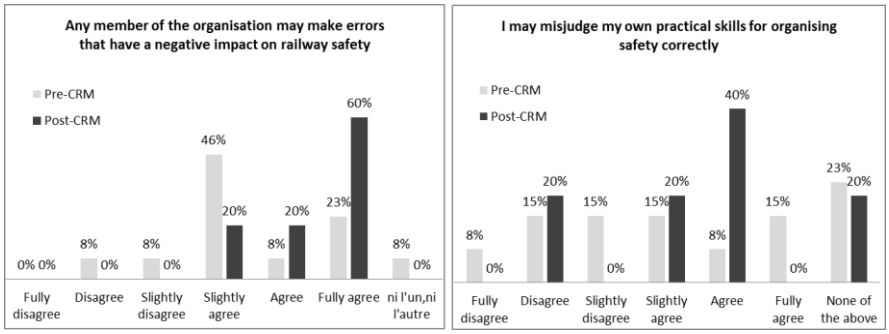

Figure 3. Safety culture questionnaire: comparison between the pre-CRM (n=26) and post-CRM (n=10) managers

As you can see from Figure 3, there are more post-CRM managers than pre-CRM managers who are strongly convinced that their organization could be the root cause of an incident. Moreover, after CRM more of them recognize that they themselves can make mistakes in their safety management.

This awareness of organizational factors for safety is an essential condition for management to seek to analyze the incidents by adopting a more holistic point of view (i.e. less focussed on the sole failures of the operators) and to seek solutions for improvement with a bearing on the organization and the working conditions, and not only on their operators.

Better support for front-line operators

Another development attributable to training specifically concerns front-line managers: several corroborating testimonies indicate that they are seeking to become closer to their teams on the ground, understand their difficulties and give them more pronounced support. They also make themselves more receptive to their demands.

Some of the managers have furthermore encouraged operators to voice any difficulties in applying certain safety procedures. For this purpose, they have added a comments page to the end of each procedure, asking the operators to report any questions and/or desired improvement to it. Others have instigated weekly meetings of a reduced length (e.g. 1 hour) to discuss safety. To ensure that operators are willing to approach all manner of subjects, including their safety procedure lapses, two front-line managers even asked a couple of operators to lead these meetings that would therefore be held in their own absence. These operators who lead the meeting should then anonymously inform their managers of the circumstances leading to the safety lapses as well as any solutions proposed by the operators.

Finally, an evolution in the attitude of certain front-line managers has also been noted in the inspections that they carry out. Since the training, if a lapse in a safety procedure is found during an inspection, they have paid more attention to the explanation provided by the operator concerned. Moreover, there is also a trail of these explanations in the traceability document that these managers complete after their inspections, something that was quite rare before the training.

More timely responses to safety reports

CRM training encourages managers to consider putting into place a reporting channel on safety lapses that could be contributed to by the operators themselves. To help them be clear about the importance of such a mechanism, a first reporting channel uses the information gathered during the training sessions aimed at operators, naturally with their agreement. This channel has been formalized in such a way that these reports are gathered by the trainers at the end of each session and are transmitted anonymously to a local expert in the CRM approach not hierarchically linked to the operators. This local expert then undertakes to pass on the reports to the relevant people to be dealt with. He is then required to return the solutions provided by these relevant people to the operators.

This procedure has enabled 82 reports to be gathered on two worksites using the CRM approach. Given that there have been 33 training sessions with the operators from these two worksites, this corresponds to an average of 2.5 reports per session. In reality, the number was higher for the first sessions, then lower afterwards. Nearly

70% of these reports received a response from the management and almost 30% of them led to improvement measures (e.g. revision of a safety procedure, putting technical training in place, reorganizing a work team, revising technical installations). We have noted that these responses were generally received quickly and that the improvement measures were most commonly instigated in the current year. Having said that, the reactions of the people who initiated these responses did not always result in a satisfactory solution being reached. As a matter of fact, several of the responses gathered involved attributing a problem to a different party or in receiving information that did not solve the problem and hence left the operators without a satisfactory solution. Responsiveness is therefore not always a measure of quality.

A second reporting channel has been put in place by some managers to gather information resulting from day-to-day activity. The number of reports received through this channel is more difficult to establish because the majority of them have not been recorded in writing. According to the testimony gathered, not all of the managers who have undergone CRM training have received such reports. On the contrary, a little more than half of the ones we have met attest that reports were received whether directly from the operators in their team or in passing from a trusted third party (i.e. someone in the team who has the confidence of the operators). There, too, these reports were dealt with immediately or very quickly, generally by the front-line managers themselves. Moreover, they have been deemed capable of dealing satisfactorily with 50 to 60% of these reports. Logically, the remaining 40 to 50% of reports would have to be passed on to competent people for a solution to be reached. However, this has not always been carried out except for a very low number of cases, but it is not easy to find out why. The comments received lead us to think that it may be due to a lack of confidence in how the organization will deal with these reports and the fear of a purely administrative workload.

Stronger involvement in incident analysis

Several managers are aware of being more involved in the analysis of incidents after CRM training. When they are senior managers, whose role is to validate files investigating incidents, this means that they have spent more time reading the content of the analysis. On this occasion, some managers have asked for additional information when they felt that the explanations for the incident received were insufficient or not sufficiently clear.

As far as middle managers and front-line managers are concerned, their involvement in the improvement of incident analyses primarily led to participation in a new human factors training lasting 2 days and covering methods of analyzing incidents[5]. More precisely, only half of the managers on the two worksites we have followed asked to take part in this training. Unsurprisingly, the testimonies of a change in

[5] This training was designed and organized by Ergomanagement.

attitudes and behaviour with regard to analyzing incidents were mostly recorded among these managers. Their analyses placed more emphasis on seeking environmental, organizational and human factors as the cause of incidents. To make these analyses more in-depth, many managers do not hesitate, for example, to go to the site where the incident occurred and re-enact the scene by trying to "put themselves in the skin" of the operator (or operators) involved. A similar practice was in place previously, but it was generally reserved for incidents that appeared inexplicable on the basis of the facts ascertained and deemed to be serious.

We were able to partially verify these testimonies by gathering a number of feedback files put together by these managers. However, a more complete analysis was not possible in view of the small number of incidents registered on the two worksites where we evaluated the impact of CRM training. Nevertheless, some of the files gathered in fact bring up several factors involved in the cause of an incident and organizational considerations, which could have been minimized or denied earlier but now generally appeared important. Having said this, we have also noted that other feedback had not greatly developed in relation to previous practices and still strongly emphasized the leading role of human error. As one safety manager said in explaining the absence of any development noted among certain managers (himself included): "It's hard to change your way of thinking. We used to think that an operator was not allowed to make a mistake. Today, even after the training, we sometimes return to 'business as usual'". This comment underlines a basic condition for succeeding in developing managerial practices with respect to safety: it will probably be necessary to hold several training sessions over several years and even, for certain managers, complementary coaching to succeed in profoundly and permanently transforming the safety culture.

Willingness to fully understand the circumstances of an incident before adopting a sanction

Finally, one last impact of the training was apparent across the testimonies of the managers who we met: practically all of them told us to be more patient when analyzing an incident file before adopting a sanction. They do not try to intervene before the analysis has progressed sufficiently, allowing a holistic view of the factors causing the incident. They also aim to use the statement of facts to investigate whether the operator (or operators) involved have committed an error or a violation. Managers did not often make this distinction before the CRM training. This distinction seemed important to them because many of them have decided to no longer sanction an error if the operator who made it has not repeatedly committed the same error and is cooperative during the inquiry.

However, this development has not been evident with every manager. On the one hand, this can be explained by a reason already cited: the difficulty in changing attitudes and beliefs that have been ingrained for many years. However, on the other hand, it can also be explained by social phenomena: the manager who is convinced that there is no interest in sanctioning an error may have strong opponents of this policy in his own management committee. These opponents may be colleagues who

have not taken part in CRM training or managers who have taken part but have not been convinced of its benefits (which did happen in a small number of cases). It is then sometimes difficult for the manager to maintain his position at the risk of weakening the cohesion of his team or of losing authority among some of his colleagues. For these reasons, he prefers to adopt the majority position within his team rather than his own standpoint.

These findings have a strong implication for anyone who wishes to develop a safety culture: this evolution must not just be based on actions carried out at the individual level by each manager; because the individual attitudes and behaviour are subject to social norms and group dynamics, complementary actions must be targeted at work groups as a whole.

Conclusions and future directions

CRM workshops aimed at managers have undeniably had positive effects with respect to the evolution of a safety culture as originally intended.

However, these effects must not hide certain shortcomings that have emerged from the evaluation of the training that we have carried out. For instance, not all managers are actively involved in developing the safety culture within their teams. This observation has been underlined by the phenomenon of manager turnover that was not foreseen in the procedure. Hence, managers who have arrived after a training session have not been trained and, as a consequence, have not always acted as consistently as their predecessors. Moreover, several managers have not tried to obtain reports from their operators. And when they received a few reports, usually thanks to CRM training sessions aimed at operators, they have not made sufficient effort to find a satisfactory solution. As a consequence, the operators have felt a certain amount of frustration, which could have led to certain of them becoming disillusioned with regard to the CRM approach. Another limit is the fact that the reports relating to everyday activity have appeared relatively limited, which could indicate a still relatively low level of trust from the operators with respect to their leaders. Finally, the managers who were convinced of the need for an evolution in the safety culture after their training session have not always acted in line with this belief. The main reason for this seems to be that a single training session was not enough to erase attitudes and behaviours acquired over many years and anchored in practical experience.

On the basis of these observations, SNCF has decided to take another look at the mechanism put in place to deploy the CRM approach in order to make it more effective. The following areas of improvement are now being studied:

– encouraging leadership in the managers to bring about an evolution in the safety culture within their teams;

- actively managing the problem of managerial turnover in order to guarantee continuity in the application of the CRM approach;
- more actively accompanying managers to reinforce the trust climate within their teams;
- helping managers to formalize a reporting cycle relating to everyday activity and to handle it effectively;
- more effectively proposing complementary training in methods of analyzing incidents for all players involved in the investigations;
- making provision for new sessions of CRM training reinforcing the principles acquired during the first session.

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