Preparing and guiding changes concerning operational safety

Christian Neveu

Responsible for Organizational and Human Factors

SNCF

SUMMARY

Evaluating the risks generated by an operational or organisational change is a strong requirement for our companies.

One of the basic elements of our safety management systems should include procedures and methods for carrying out risk evaluation and implementing risk control measures when a change in operating conditions or new material imposes new risks on the infrastructure or on operations.

Taking into account human factors (HF) represents an effective way to evaluate how the system will operate in the future with a new operational or organisational frame.

In France, this is achieved by the GAME method which provides an appropriate framework for implementing a human factors approach. But for that, the safety analysis should be based on the reality of the daily activity.

Rather than promoting a specific human factors approach, SNCF makes the choice to give “human factors” advice to these managers and experts.

INTRODUCTION

A strong requirement and a regulatory framework.

One of the basic elements for the safety management system should include procedures and methods for carrying out risk evaluation and implementing risk control measures when a change in operating conditions or new material imposes new risks on the infrastructure or on operations.

That basic element of the safety management system is today covered by a European regulation, a “common safety method (CSM).

This CSM is called “CSM for risk evaluation and assessment “(regulation 402/2013).

Before that, Member States and national railways companies already legislated on this main topic.

THE FRENCH “GLOBALLY AT LEAST EQUIVALENT” METHOD

In France, the legislation requires that the safety level in the new situation should be globally at least equivalent that the earlier one.

The obligation to comply with the GAME objective has its origins in:

- the CSM 402/2013 for significant changes within the meaning of the European regulation.

- internal SNCF directive RG00010 “for management development projects that significantly affect either the organization or the management of safety-related activities”

An internal SNCF regulation prescribes a method, which consists of comparing the existing situation or baseline with the future (or projected) situation, for the different components of the system and the activities concerned.

This method is in conformity with the European regulation, notably with the risk acceptance principle of a “comparison with similar systems”.

WHAT DOES VERIFICATION OF “GAME” CONSIST OF?

The GAME method is made up of three stages:

Stage 1 - Definition of the impact of the change

- Description of the baseline situation for the party considered to be impacted by the change.
- Description of the target situation for the parties impacted by the change as well as of the completely new aspects.
- Comparing the two situations provides a description of the impact of the change on the activities identified.

Stage 2 - Definition of actions and evaluation a priori of the level of safety compared with the baseline situation

- Evaluation of the change and determination of the measures to be taken in order to implement the target situation at a satisfactory level of safety. Determine the action plan, the priorities and the schedule of implementation.
- Verification a priori of the GAME of the project taking into consideration the integration of actions aimed at reducing differences and risks.

Stage 3 - Implementation of actions and evaluation of the level of safety of the situation put in place in comparison with the baseline situation.

- Follow-up the implementation of actions, support progressive introduction into service, corrective actions and adaptations.
- Feedback on implementation. Description of the situation after reduction in differences and verification that all activities have been taken into account in the risk evaluation: activities assumed unchanged, new activities (activities that have disappeared?).

Some of the phases described above may be conducted in parallel and may enrich each other.

It is quite possible to implement this method without integrating HF. It’s not a HF method but, this 3-stages process is a good basis for the insertion of a HF approach.

We consider that because what is really the verification of the GAME?

Which are the topics we have to focus on to obtain a well-established certainty that the safety level will be at least equal in the future organisation?

And why and how human factors can be and must be inserted in this process?

What we want to assess is in fact the expected activity of the workforce in the planned organization.

It is the real activity that will produce either safety, or non-safety. It is not only the future theoretical organization that will influence the safety results, it is mainly what the workers will response, decide and do in the future organization. How they will communicate, how they will cooperate, collaborate.

We have to consider that the human activity is influenced by a lot of factors linked to organisation, management, workgroups, working conditions and individuals.

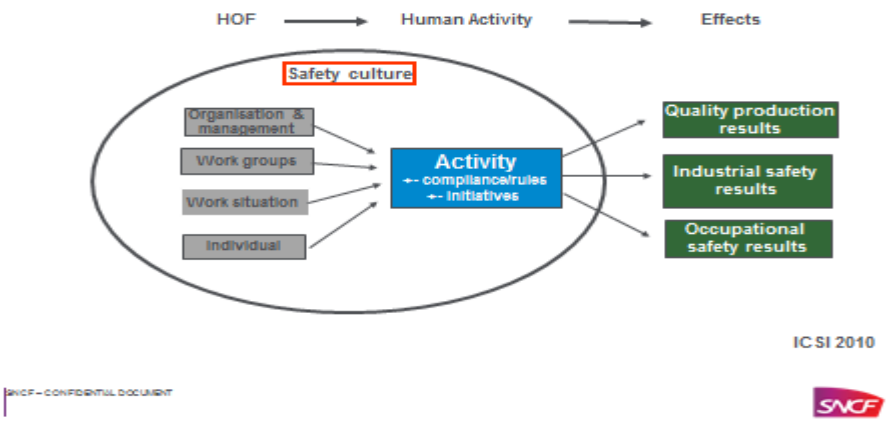

Figure 1: Factors influencing individual and collective behavior

"Certain operating situations may have some characteristics that increase the probability of certain types of human behavior. If these types of behavior are not desirable from a safety viewpoint, the only way of reducing their probability is to act on the characteristics of situations, of technical systems or of organizations which are not consistent with human properties." ICSI 2010

Verifying the GAME consists of investigating all the factors that will affect future activity.

An effective way to do this verification is to associate the players concerned at all levels (operational, functional, management) with the definition of the change.

SOME ADVICE TO INTEGRATE HUMAN FACTORS

The choice made by SNCF was not to promote a specific “human factors method or tool”

Some of them exist but we think that none of them is perfect and some of them are rather difficult to use.

We prefer to give advice to enable local safety managers to do the analysis by themselves.

Advice is an opportunity to enter the HF world in an easy and practical way.

It arises from three sources of information:

- the return of experience on incidents caused, partly by new organisation which are not correctly managed. We have some examples in our incident bases
- the findings of audits and monitoring processes
- the findings of ergonomic studies

In the training dedicated to the experts and managers, we give eight ways to foster the integration of human factors in this process of analysis. Each of them is linked with a specific stage of the GAME process.

1) **R**efer to the real situation and not only to that prescribed, to describe the baseline situation

Example: Project for using a verbal radio warning during intrusion in a danger zone instead of the Radio Warning Signal (SAR in French)

The current regulation provides for two cases:

- If persons are staying or walking in the dangerous area on the tracks or close to the tracks, the driver has to set off the radio warning signal
- If the danger is not imminent, the driver has nothing to do.

The proposal was to create a third case which consists in launching a oral message to other drivers and signallers when the persons are not on the tracks or close to them but however are likely to go there at one point or another.

The goal was to reduce the number of radio warning signals which considerably disturb the traffic by replacing some of them by verbal messages that affect fewer trains in a smaller area.

The supposition that underpins this project is the idea drivers use too often radio warning signal,

Before the change of the regulation, a human factors study was ordered to verify by means of interviews and observations the behaviour of the drivers in such situations.

This study was conducted by our ergonomists.

The findings were very surprising for those who have ordered the study.

In the danger zone and remaining there	Spread	Possible projection
SAR/SAL Radio warning signal/ radio-light signal	9 (12%)	9% (3 cases identified as probable danger in intrusion situations)??
Alert control or the signalman	25 (33%)	47% verbal alerts? (probable danger)
Alert the driver	11 (14%)	
No imminent or probable danger (according to drivers): no alert	31 (41%)	Considered to be « no danger » but verbal alert could be an alternative where there is doubt?? Percentage non identifiable.

Given as evidence of informal practices

Figure 2: table taken from the study (concerning 76 intrusion situations)

In half of the situations, drivers trigger a verbal alert by a message whereas the regulation doesn't allow it. It is simply a smart adaptation to the complexity of the context.

And on the contrary, almost all the radio warning signals were justified by the urgent situation

If we take these findings into account we can expect that, with the modified regulation, drivers may use verbal alert instead of doing nothing in some cases and we are sure that they will continue to use as much as radio warning signals.

The conclusion of this study shows that the original goal of the planned modification - reduce the number of radio warning signals which considerably disturb the traffic - would not have been reached.

The advice to give is that the real situation has to be taken into account, safety has to faces: a rule-based safety and a managed safety.

2) **C**onsider the transitory phase between the current situation and the future situation as well as the start up phase

Weaknesses are frequently found in transitory phases and in start-up phases. Three fields are to be considered more particularly:

- Training sessions (adapted and in time)

- Information and communication on everyone's missions (complete and in time)
- The regulatory framework (consistent with the new organization and…in time).

The support from management or experienced staff during the start-up phase is always valuable and in some cases absolutely necessary.

Good practice which is developed at SNCF is the comprehensive and written information handover between the current and the future teams. A detailed handover is a good aid to avoid some misunderstandings and lack of information. It also avoids unclear situations, hesitation or uncertainty.

3) Anticipate and deal with risks generated by a temporary situation.

A temporary situation due to works on track, peak traffic periods…may generate risks that are sometimes underestimated. This type of situation has to be prepared with the same rigour.

4) Preserve as far as possible the existing positive points (the things that work) in the new situation.

The positive points are the functions, processes and activities that underlie the good results that are often obtained by our companies. Things that go right are the vast majority of our operation. This information is not always known by the managers because they think that good results in safety are merely due to good established rules and a compliance with these rules by the staff.

The attention paid to the “normal activity” allows detecting factors that foster the success in safety.

It could be a case of:

- collective functions
- reliable communications and an effective data circuit
- technical and non-technical competencies.

There is a real risk of destroying a good contribution to safety, just because this contribution is not known,

5) Do not be content with just attributing the mission to a post but verify the feasibility and consistency with the other missions of this post

The feasibility of a mission will depend:

- on the size of the post and the workload
- on the acquisition of competencies required for the tasks (training, support…)
- on clear and precise information on the responsibilities and missions (who does what?)
- on adapted tools

6) Make sure maintenance capacity is available on a sustained basis, with verification of the corresponding conditions

It is a matter of directing particular attention to:

- the sustainability of competencies which could be weakened by the turnover or numerous retirements.

A new organization may work over a first phase because competencies are still available and after some months difficulties appear when experienced workers leave.

- a strong engagement at the beginning; close attention… and afterwards?

At the beginning of the new situation the management is very watchful but it doesn't last a long time.

- evolution of the context from conception and the setting up of the new organization

For instance, a new procedure was designed for 5 trains per day in a station, now there are 10 trains but the procedure is always the same.

7) Verify that the new organisation and the new deployment conditions do not impact on the implementation of missions and processes that are considered to be unchanged

Vertical effect: a reorganization of the management structure which theoretically does not impact on the operating teams and management processes may have negative effects, for example:

- distancing management from the fact of enhancement of the perimeter (the merging of establishments, units, teams)
- the change of players at upper levels of the hierarchy which can affect the confidence of staff and relationships
- the administrative management and the information circuits

8) Verify the impact of the new organization on all the other organisations linked with it and not just that of the "absorbing" organisation.

Horizontal effect: carried out by the departure of agreed trainers, experienced staff, more complex processes, etc.

IMPLEMENTATION OF THE GAME METHOD AND OF THE EUROPEAN REGULATION

What is the situation currently?

About 500 managers and safety experts from SNCF have been trained. All the operational and organisational changes are assessed using this method.

What about the use of the human factors advice?

Some obstacles have to be addressed for a good and efficient practice.

- The powerlessness in anticipating or managing some situations

  The factors that may influence the human behaviour are numerous and sometimes complex. All of them cannot be taken into account. There is a part of uncertainty that may discourage, particularly for engineers who like accurate and reliable solutions (!).

- The lack of time

  The files are due to be completed in a very short period of time whereas investigating the human factors may be time consuming.

- Big economic and financial stakes

  In most cases the objective of the change is not the improvement of safety.

  Some project managers, particularly if they don't have a good knowledge or the railway operations, don't understand why safety could be an obstacle for their project. This leads them to exert a pressure on a safety analyst.

CONCLUSION

Evaluating the risks generated by an operational or organisational change is a strong requirement for our companies.

The evaluation is often implemented in a theoretical manner without taking into account the real activity of the staff: how they really do the job on the ground. Taking into account human factors represents an effective way to evaluate how the system will operate in the future with a new operational or organisational frame.

For that, the safety analysis should be based on the reality of the daily activity.

Rather than promoting a specific human factors approach, SNCF makes the choice to give "human factors" advice to these managers and experts.

This way allows integrating human factors in a majority of operational and organisational changes because no human science expert is required for that.

Our human factors experts are dedicated to major changes with a national dimension or a special complexity.

But there is still a long way to go.