

Using audio-video recording on simulator training sessions: advantages, drawbacks, and dangers

Philippe Fauquet-Alekhine^{1,2}; Carole Maridonneau³

¹ Nuclear Power Plant of Chinon, Head Management Department, BP80 – 37420 Avoine, France

² Lab. for Research in Sc. of Energy, 86200 Montagret (Nueil\Faye), France
email: philippe.fauquet-alekhine@edf.fr¹, larsen.sciences@yahoo.fr²

Fauquet-Alekhine, Ph.; Maridonneau, C. (2012) Using audio-video recording on simulator training sessions: advantages, drawbacks, and dangers. In Fauquet-Alekhine, Ph. (eds) *Socio-Organizational Factors for Safe Nuclear Operation*, Montagret: Larsen Science Ed., 1, 94-97 (*)

<http://hayka-kultura.com/larsen.html>

Abstract

Simulator training sessions for teams and crews concerned with high risks systems are definitely up-to-date. For some big companies (refineries, chemical or nuclear plants) or big organizations (hospitals, universities), full scale simulators concern initial training as reinforcement. It involves countries in all parts of the world. One of the tools which can be very useful for the trainers working on such simulators is the audio-video system. This paper explains why, and gives advice in order to use such a system in good conditions. This advice is based on many observations and exchanges done with aircraft pilots, anesthetists and surgeons, navy officers, and nuclear reactor pilots.

1- Introduction

Simulators are now commonly used to train the teams involved in the process concerned by high risk work activities. Nuclear or chemical plants, for example, require to be managed from complex control room by a staff of operators who must make as less as possible mistakes: some of them, or several combined together, can yield to dangerous situations for the people working on the plant, or the ones living outside the plants. Another example is the aircraft pilots who must control their plane in order to keep all the crew and passengers alive. The same for the physicians (surgeons or anesthetists) who must have the appropriate behavior to keep or save the life of patients.

To train all these people, many companies or organizations have invested in full scale or part task simulators: people can thus be trained in difficult situations without any danger for anybody. One of the tools which can be useful for the trainers on such facilities is the audio-video recording. But some do not purchase it because they do not find this useful, or do not have the money to buy the facilities, or do not know what must be chosen.

* This work has been initiated in 2008 and the result have been gathered in an internal report of the Lab. of Research for Sc. in Energy (2008), reference: LA/.rapint-video01 ind00

We provide here advice in order to show the utility of such systems, and to help trainers to use them in good conditions.

2- Context and purpose of the use of video during simulator sessions

When pilots or operators are trained on full scale simulator, usually, a debriefing session takes place for them to discuss together with colleagues and with trainers about the work done during the simulated situation (Fauquet-Alekhine & Pehuet, 2011). This debriefing is important and we have already discussed its utility (Fauquet, 2006; Fauquet-Alekhine, 2012a): it is the time during which individual and collective work activities are put under discussion, within the group of workers. This makes then possible for the workers to transform or not their individual and collective practices, to decide together this evolution, in order to share the rules of their trade. It is a time to understand together what has gone right or wrong, and then be conscious of good practices, or find solutions to change inappropriate practices.

Usually, the analysis produced by the trained team and the trainers is based on what everyone of them is able to put together in the collective discussion. Most of the time, this narrative, which can be called "retrodiction", is enough for the people to discuss together about the work effectively done or not, and to point out most of the positive or negative characteristics of the collective or individual work activities.

But all trainers know that, sometimes, it could be comfortable to have a kind of "proof" of what has happened during the simulated situation, because i) sometimes, trainees are not so convinced of what is reported about what they did or about what happened by colleagues or by trainers, or ii) people do not understand the way they effectively did what is reported. In such a situation, trainers would be happy to make the demonstration by the use of video recording.

As we said above, some training centers do not have such equipment, and others have different types which can bring advantages as drawbacks.

3- Observations and analysis

Our analysis will be based on four kinds of observations on simulators equipped or not of video systems. The four kinds of simulation training sessions are linked with the following jobs:

- aircraft pilots of a big European company,

- commercial navy officers for big ships and vessels of a European country,
- nuclear reactor pilots of a big European company,
- anesthetist's training at a European university and medical center.

For commercial navy officers and aircraft pilots, no video systems are available, but of course, trainers would like to have one; if they do not, it is not only a question of cost. Until recently, it has also been a question of performance of the systems, which have, for a long time, been based on tape recording video (we shall discuss about the drawbacks of those facilities farther). As we said, it has not only been a question of money: the aircraft trainers made several years ago some tests with cameras fixed inside the cockpit, but the cockpit is so narrow that it was quite difficult to find the right place for the cameras, and the records obtained at this time were not good enough to be exploited correctly. It means that using cameras for video recording implies the previous and careful study of the simulator in order to identify the relevant location of cameras.

4- Use the whole record or not?

Usually, the whole session on simulator is recorded, which is a good thing, because we never know in advance all of that could be useful during the debriefing. But, must the trainer watch the whole time recording with the trainees? Usually no, except for specific reasons, like the self and cross-confrontation developed by the French Work Psychology stream (Clot et al., 2002; Fauquet, 2008). Another specific reason can yield the trainers to watch the whole time records, but without trainees: this is what we did the past year with anesthetist trainers, in the frame of some researches concerning stress and its implications during training sessions on simulators (Fauquet & Frémaux, 2010, Fauquet-Alekhine et al., 2011). But for the debriefing following the simulator training, it is clear that this must not be done for the following reasons:

- The debriefing must be a space of time for discussion; only this discussion (we mean the effort made by everyone to bring into words the thoughts of what they did or not) will lead them to a progress in their work activity (Dejours, 2000; Clot et al., 2002; Fauquet, 2006; Fauquet, 2008). Thus, spending time watching the simulator movie is a waste of time.
- The video record must help the trainer in the demonstration of a fact, in the aim of a pedagogical goal. As we noticed above, sometimes, trainees are not convinced of what is said or reported during the debriefing, even if it is done by their peers rather than by the trainer. In such a case, the trainer needs to make the demonstration by the movie. And in such a case, watching the whole recorded movie is not useful: just the few minutes concerned by the situation must be used.

As we see, the video record must be used just in a punctual manner; it is a help for the debriefing while the debriefing is not the opportunity to see what has

happened on the screen in a passive way. The debriefing must remain a time of collective discussion.

5- Tape record or numerical record?

Despite the technological progress concerning video systems, numerical facilities compared to tape recording facilities are still much more expensive. The question then is : must we decide in favor of tape records for a question of price ? The answer is definitely NO. If a training center do not have enough money to provide a numerical system, the best is to wait for the price to go lower, because, with the tape record system, money will be lost as a waste of time. The following example will help to understand why.

It concerns the nuclear pilots' training. Some observations have been done since more than ten years on the same training center. During this time, the video facilities have changed, from the tape recording system to the numerical system. And we have been lucky enough to use both of them. The difference has been done very fast in favor of numerical facilities.

With the tape records, time had to be noted on a sheet of paper, since, as we explained above, the whole record must not be used, but just some few minutes here and there; thus, it is necessary to be able to find the sequences which are of interest. When this was done during the simulator session, then, during the debriefing, finding the right sequence in the tape record was rather hard, and was taking the time of the trainer during which trainees were waiting. This was not a problem when there was just one sequence to be shown: in such a case, the tape could be prepared during the time break planned between the simulator and the debriefing. But when several sequences were needed, it was rather difficult for the trainer.

Today, the training center uses numerical system. It is quite different; should we say : it is like the heaven compared to the previous system ? During the simulator session, trainers can make observations and, with a simple click, put a time index on the time line of the record to notice what is of interest for them later during the debriefing. And they can associate a title to this index, in order to find it more easily later. This allows them to have quasi instantaneous access to the sequences of interest during the debriefing, and even to several sequences.

6- Camera characteristics

The zoom accuracy of the camera must be chosen with regard of what is planned to obtain by the trainers. It depends of the kind of job for which people are trained, and it depends of the size of the room where the training session takes place.

If we consider the aircraft simulator, the distance between the camera and an object far from it can be around 2 meters. But if we consider the nuclear reactor simulator, it can be 10 meters. Concerning anesthetist and navy officers, distances can be between those two extremes. So, we can see that the choice of the camera will be quite different from one case to another, just because of the room size.

Another point is the one of the objects that may be of interest. For the case of nuclear reactor pilots, experience has shown that it was quite comfortable for the trainer to be able to make a zoom to specific points like the sheet of paper on which the pilot is writing, or on a given indicator that a pilot is trying to read. This of course must be coupled with another functionality which is the possibilities of movement of the camera: zooming means pointing a specific target, and so, high accuracy must be chosen only if the camera is equipped of moving remote control.

7- Ambiance or individual microphone?

Most of facilities provide a full audio-video system with ambiance microphones. This can be convenient for the anesthetist simulator, or sometimes, for the nuclear reactor pilots, because they are working in a low sonorous ambiance, and their voices are audible. Yet, on reactor simulators, it has been chosen by the company, since a long time, to have individual microphone for each of the people trained in the piloting simulator, so that the quality can be every time as good as possible.

For the aircraft and navy simulators, it is quite different since the full scale simulators reproduce the sound of the engine: to be more realistic, this choice has been done, and thus the trainees can have a closer feeling on simulator to the one they have in non simulated situation. Furthermore, on the aircraft simulator, when the cockpit is moving as it is supported by hydraulic jacks, some sonorous vibrations can be heard inside the simulator: if there is no individual microphone, it can be difficult to hear the pilots' voice. But these are just assumptions based on the observations made, because the company we have worked with has not yet equipped the simulators of audio-video facilities.

The conclusion is that if the simulated situations are noisy, individual microphone must be chosen.

8- Telephone discussions

According to the job concerned by the simulation, telephone or HF radio will be used for discussion between the trainees and others involved in the process of the simulated job. Usually, the "others" are played by the trainers during simulator sessions. When the discussion takes place via the radio, there is no problem most of the time to record the whole conversation with the microphone, but when the telephone is involved, one part of the exchange is missing, and this can be a drawback because, most of the time, operational communication is a parameter of great importance (Fauquet-Alekhine, 2009, 2012b) that must be used during the debriefing if needed.

On the nuclear reactor simulator, this option was not available at first within the numerical facilities, and our observations have quickly lead to put this as an effective mean of the system. Thus, the telephone line must be recorded on one track.

9- Movie distribution or not?

The question concerns what must be done with the recorded movies obtained during the simulator sessions. As it has been exposed above, those movies are of course

used during the debriefing. But after, what must be done with them. One can think that it will be a good idea to provide the movies in a common format to each trainee, for further analysis. It means then that every of them will be able to show his own job on the computer to the people he wants. Of his own job, but of the colleagues' job too! And this is the problem! From the ethic standpoint, and in some countries from the legal standpoint, it is forbidden to put this sort of audio-video material at their disposal. And from the self-esteem point of view, it can be a problem for some people of the trained team. The problem comes from the fact that people are not so much used to watch themselves on the TV screen, neither to hear their own voice. And for some of them, it can be a problem: the problem of a metallic voice, a problem of clothes not so nice, a problem of stoutness or baldness; we have observed some case of debriefing blocked just because of self physical discovery on the movie (Fauquet-Alekhine & Pehuet, 2011).

A second problem is related to the future position of the trainees. If among the trainees stands a future manager, it will be possibly difficult to say things that could trouble him/her.

To cope with these kinds of problems, the nuclear company has written in its organization documents that all records would serve only to the session in progress: records are then deleted after each session. For the anesthetists, the trainers co-sign a letter with every of the people trained on the simulator, before every session; in this letter, trainers engage themselves not to distribute the video, to use it only in a research goal, and to treat the data with an anonymous approach.

Experience has shown that it is much better not to distribute the files of the records, and that trainers must always keep a hand on them. This is suggested for the legal standpoint, for self-esteem, and also for pedagogical considerations.

10- Concluding advice

We can now gather advice from these above comments.

A previous and careful study of the simulator is necessary in order to identify the pertinent location of cameras.

Those cameras are link to a recorder. Even if tape recordings are low cost, they must be avoided because they are too heavy to use. The numerical record system must be chosen, and in case of lack of money, it is worse to wait for the price to be lower. Experience has shown that using a tape recorder is most of the cases a waste of time.

The zoom accuracy of the camera must be chosen with regard of what is planned to obtain by the trainers. It depends mainly on the room size and on the target which has to be seen by trainer. High zoom accuracy must be coupled with moving remote control of the camera.

Concerning the audio system, if the simulated situations are noisy, individual microphones must be chosen. And if exchanges between people involve discussion on the telephone, the telephone line must be recorded on one track.

The trainer must not watch the whole time recording with the trainees during the debriefing, except for specific reasons, like the self and cross-confrontation, or other reasons like specific researches, which do not involve the trainees most of the time.

And finally, it is much better not to distribute the files of the records, and trainers must always keep a hand on them. This is suggested for a legal point of view, for a self-esteem point of view, and also for the pedagogical point of view.

References

- Clot, Y.; Fernandez, G.; Carles, L. (2002) Crossed self-confrontation in the clinic of activity. *Proceedings of the 11th Eur. Conf. on Cognitive ergonomics*. Catalina, Italia, 13-18
- Dejours, Ch. (2000) *Travail, usure mentale*. Ed. Bayard, France, 282p
- Fauquet, Ph. (2006) Confrontation croisée ou analyse collective sur la base de restitutions d'entretiens individuels: deux approches pour l'analyse événementielle. *Electronic Review @activités*, 3 (2), 2-14, <http://www.activites.org/v3n2/activites-v3n2.pdf>
- Fauquet, Ph. (2008) Analyzing training activity on simulators : the complementarity of clinical approach and regulations approach. *Symp. Activity2008 - Activity analyses for developing work*. Helsinki, Finland, 32
- Fauquet-Alekhine, Ph. (2009) Надежность рабочего сообщения для операторов ядерных реакторов: изучение на тренажерах, анализ случаев и укрепление безопасности. (Reliability of operational communication for pilots of nuclear reactors : studies on simulators, events analysis, and reinforcement of safety). Presented at the *XXXIle Coll. Int. De Linguistique Fonctionnelles*, Minsk, 7-10 octobre 2009. Printed in *Prosodie, Traduction, Fonction*. Morozova, L. & Weider, E. (eds), Bruxelles: EME, 2011, 207-210
- Fauquet-Alekhine, Ph.; Frémeaux, L.; Geeraerts, Th. (2011) Cognitive disorder and professional development by training: comparison of simulator sessions for anaesthetists and for nuclear reactor pilots, *Proceedings of the XVe European Conf. on Developmental Psychology*, Pianoro (Italia): Medimond Srl., 83-87
- Fauquet-Alekhine, Ph. (2012a) Simulation for training pilots of French nuclear power plants. In Fauquet-Alekhine, Ph. (eds) *Socio-Organizational Factors for Safe Nuclear Operation*, Montargret: Larsen Science Ed., 1, 69-74
- Fauquet-Alekhine, Ph. (2012b) Use of simulator training for the study of operational communication - the case of pilots of French nuclear reactors: reinforcement of reliability. Presented at the *Int. Conf. on Simulation Technology for Power Plants*, San Diego, USA, Feb. 2010. Printed in Fauquet-Alekhine, Ph. (eds) *Socio-Organizational Factors for Safe Nuclear Operation*, Montargret: Larsen Science Ed., 1, 84-87
- Fauquet-Alekhine, Ph. ; Frémeaux, L. (2010) *Study of stress and consequences on full scale simulator for students anesthesiology training*. Internal report of the

Laboratory for Research in Sciences of Energy, France. 10 p.

Fauquet-Alekhine, Ph.; Pehuet, N. (2011) *Améliorer la pratique professionnelle par la simulation*, Toulouse: Ed. Octares, 176p