HUMAN FACTORS AND RESOURCE MANAGEMENT TRAINING: VIEWS FROM LAND, AIR AND SEA

From the beginning of crew resource management in aviation, the concepts and practices have spread throughout many safety-critical industries. In this article, a number of authors from different industries provide an overview of human factors and resource management training for operational and other specialists in France.

HF TRAINING IN AN AIR NAVIGATION SERVICE PROVIDER

By Florence-Marie Jégoux, HF facilitator, former ATCO, and member of a focus group gathering for pilots and controllers to address flight safety through human factors.

Air traffic controllers have some HF courses during initial training. This mostly covers theoretical knowledge. During unit training, they get one day of HF facilitation about their own training and its issues. Then, in recurrent training, they have HF facilitation about professional daily work issues. This lasts two days and is done every three years.

This training has been mandatory since 2009, although it has been possible for some controllers since 1996. Maintenance engineers also have the possibility to get HF training. However, as it is done on a voluntary basis, only a small percentage of them undertake it.

In simulators, instructors brief and debrief mostly technical competencies. Depending on their willingness, they may also debrief non-technical skills, although they are not trained to do that, and not specifically taught about conflict management with their peers.

As all controllers are instructors, an important improvement in instructors' attitude towards trainees has been noticed along this period of time.
HF probably played a role in that improvement, although many other factors may also have intervened.

HF training for employees other than front line personnel could be developed, starting perhaps with managers, flow managers and safety analysts. These groups and front line personnel may benefit from a non-technical cross-training, based on their needs.

dvtsystemiquehumain@gmail.com

HF AND CRM TRAINING IN AN AIRLINE

By Erick Hoarau, First Officer, CRM Trainer Examiner and member of a focus group gathering for pilots and controllers to address flight safety through human factors.

For European air operators, the European Aviation Safety Agency (EASA) regulates CRM training. The EASA's official documentation details the acceptable means of compliance (AMC) and guidance material (GM) related to CRM training for air operators in the Part-ORO (Organisation Requirements for Air Operators). ORO.FC.115 details flight crew CRM training and ORO.CC.115 details cabin crew CRM training. The following mainly focuses on flight crew CRM training.

CRM training is conducted both in the non-operational environment (classroom and computer-based) and in the operational environment (flight simulation training device [FSTD] and aircraft).

In classroom training, tools such as group discussions, team task analysis, team task simulation, and feedback can be used. Combined CRM training for flight crew, cabin crew and technical crew may also be used to address effective communication, coordination of tasks and functions. Crew members are thus given the opportunity to interact and communicate in an environment conducive to learning. Computer-based training may be conducted as a complementary training method.

In an operational environment, parts of the flight crew CRM training are conducted during simulator training and check sessions that reproduce a realistic operational environment and permit interaction. This includes, but is not limited to, line-oriented flight training (LOFT) scenarios. The flight crew member's CRM skills are assessed in the operational environment. CRM skill assessment includes debriefing the crew and the individual crew member. It also serves to identify additional training, where needed, for the crew or the individual crew member and is used to improve the CRM training system by evaluating de-identified summaries of all CRM assessments.

Air operators provide CRM training in the following situations:

- Initial operator's CRM training: This typically happens when a flight crew member joins an airline for the first time. Each flight crew member should complete the initial operator's CRM training once.
- Operator conversion course: This course is delivered when a flight crew member undertakes a conversion course with a change of aircraft type or change of operator.
- Annual recurrent CRM training: Flight crew review parts of CRM training elements every year. The whole CRM training syllabus shall be reviewed over a period not exceeding three years.
- Command course: When a first officer undertakes a command course to upgrade to the function of captain, elements of CRM training are integrated into the command course.

The CRM training syllabus is organised so that air operator addresses the following aspects:
Automation and philosophy on the use of automation, monitoring and intervention, resilience development, surprise and startle effect, cultural differences, operator's safety culture and company culture, and case studies (preferably aircraft type-specific case studies, based on the information available within the operator's management system, when available).

HF AND CRM IN DEFENCE

By Jean-Yves Jollans, fighter pilot engineer, human and organisational factors (HOF) consultant in industrial safety and investigator trainer. (Co-author of the book 'Training teams in safety and performance with CRM' / 'Former les équipes à la sécurité et à la performance avec le CRM'. Octares.)

On initial training, HF training is mandatory for ATCOs, for aeronautical technical employees and aircrews in defence. Qualifying HF training is delivered in all courses that require it, as in civil training, e.g. pilot.

For recurrent training, compulsory courses are delivered every two or three years. The first unit training lasts two days, and subsequent courses last one day. Topics are new each time so that operators don't get the same training twice. More than sixty themes have been developed, e.g., social influences, what is a fighter pilot?, facing the unknown and complexity management.

Crew resource management, team resource management and mechanic resource management courses are presented by facilitators. They confront participants with their practices. This leads them to modify their daily practices to improve safety and performance.

For pilots, classroom training is supplemented with specific simulator training. It ensures that HF concepts are implemented and that the benefits are realised.

While not mandatory for submariners, submarine resource management has also been implemented. HF observations in submarine simulators ensure implementation of HF principles in collective practices.

TRM training has also been developed for teams of doctors, nurses and ambulance drivers of the Paris fire service (which also provides emergency medical services in France).

The results are extremely promising. An assessment has been done over the last ten years of around 6500 people trained per year. It shows that:

- 90% say that they became aware of HF impacts
- 92% say that they learnt complementary non-technical knowledge
- 95% say that they had useful discussions
- 84% say that they are going to change their practices.

The criticisms are mainly about HF training being too rare and too short.

SHIP RESOURCE MANAGEMENT ON BOARD MERCHANT SHIPS

By Jean-Pierre Clostermann, Master Mariner, PhD, MNI, Research Regional Coordinator. (Author of 'Merchant ship conduct, Human Factors in a hazardous activity' / 'La conduite du navire marchand, Facteurs Humains dans une activité à risques', Infomer.)

Training in bridge resource management has developed since the 1990s for professional seafarers. Later in this decade, exchanges of good practice took place between airlines, merchant marine, nuclear industry and healthcare personnel. From 2012, Engine-room resource management and ship resource management was developed (in France, students train for deck and engine-room together). Ship resource management is now compulsory for officers, and recurrent training is recommended every five years.

Scandinavian maritime insurers have pushed ship-owners into airline-style CRM training. Most shipping countries have been a little late in understanding HF and CRM training. HF has sometimes been a mere addition of procedures in an attempt to eradicate human error in the same way quality management does with non-compliance.

Today, worldwide, the training is mandatory for an officer position on board, and leads to an official certificate of competence. One might be surprised that deck and engine-room workers (non-officer) do not receive any HF training; being part of very small teams (two operators), their contribution to safety is important.

No specific research study has been done on effectiveness. Nevertheless, considering the four assessment levels of Kirkpatrick:

- 1st level – REACTION: Satisfaction after the training is usually high, except for people who were seeking something else. Satisfaction usually remains high in the long term.
- 2nd level – LEARNING: On the whole, there are changes in perception of the relevance and importance of human factors for safety.
- 3rd level – BEHAVIOUR: The training itself, plus regular discussions afterwards, have brought real changes in some organisations, like the maritime pilots who today will no longer answer their cell phone while piloting a vessel.
- 4th level – RESULTS: There is some evidence of safety improvement in maritime transport, but it is not evenly spread, and little is documented yet. It is difficult to say whether it is specifically the HF training or a general acceptance of procedures on board ships that brought the improvement.

As for the HF training in a rather highly technical school like the French Merchant Marine Academy, all teachers, especially simulation trainers, should be HF trained, in order to correctly debrief an exercise. Today, is it still very difficult for trainers and assessors to determine whether the ship trajectory was due to good (or bad) technical skills, or to good (or bad) non-technical skills and teamwork. Another problem is that simulator instructor stations are not ergonomically designed at all, regardless of the manufacturer.

HUMAN FACTORS IN THE FRENCH NATIONAL RAILWAYS COMPANY

By Christian Neveu and Stella Duvenci-Langa, General Safety Direction, Organisational and Human Factors department, French National Railways Company (SNCF).

After recent accidents (Brétigny 2013; Eckwersheim 2015), the public French Public Railways Group affirmed in 2015 its ambition to consider human and organisational factors (HOF) in safety management. Training managers is one of its biggest projects.

All managers with safety functions (technical system creators, operations supervisors…) were targeted; a total of 8000 individuals in 600 training sessions, in Paris and in the provinces. That was done in about a year. This short period was important to create a rupture in the way safety was considered.

This training has been included into the training catalogue of the group. This training is mandatory and included in new managers' training.

This HOF training lasts a day. The method of training is based on case studies and exchanges. The morning session refers to HOF theoretical knowledge based on the Reason accident model. It is illustrated with a real incident case study, and experience sharing among participants. The afternoon session is a practical study on morning subjects and a presentation of the 'Just and Fair' approach.

Other actions complete and reinforce the effects of this training. These include HOF induction into safety supervision, lessons learned, non-technical competencies development for field experts and managers, and the implementation of HOF competencies.

The results are encouraging: training assessments are very positive, the quality of events analysis has improved, the 'Just and Fair' approach has been implemented for many events, HOF experts are requested to assist managers for change.

Nonetheless, these benefits are fragile. It is important to maintain this commitment on a long-term basis and to accentuate the HOF induction in all training, including technical training for the different professions.

It is also necessary to develop simulation training, which is in an early stage, or yet to begin in some professions, such as maintenance or train manoeuvre.

CREW RESOURCE MANAGEMENT AND HUMAN FACTORS TRAINING IN THE FRENCH HEALTH SYSTEM

SIMULATION AND CRM IN THE FRENCH HEALTH SYSTEM

By Pr JC Granry, Head of Department of Angers University Simulation Training Centre.

CRM and human factors training is essential in health systems, for patients and for professionals. They imply intrinsic factors (physical state, stress, etc) and extrinsic factors (environment, systems, organisation, etc).

During medical and paramedic initial training, intrinsic factors such as physical, physiological and psychological aspects are studied. Nonetheless, cognitive competencies (decision-making processes and influences, like stress, fatigue, addiction…) and extrinsic factors are rarely taken into account.

Recurrent training is not mandatory. Continuous training is sometimes done through simulation. Anaesthetist junior doctors perform three to four simulations a year in our centre. The recent development of simulation has improved initial and continuous training. Non-technical competencies are now studied in Anaesthesia, for instance (from Fletcher, 2003):

Cognitive and mental skills
- Planning and preparing, anticipating
- Prioritising
- Provide and maintain standards
- Identify and use resources
- Gathering information
- Identifying options, balancing risks and selecting options
- Re-evaluating

Interpersonal and social skills
- Coordinating activities with team
- Exchanging information
- Using authority and assertiveness
- Assessing capabilities
- Supporting others

These competencies are linked to methods like checklists, working in pairs, cross-checking, double-checking, interruption management, safe communication, etc. During simulations, HF is part of educational objectives. On each simulation, there is a briefing and debriefing on HF between trainers and trainees. This debriefing is the keystone of the simulation and always suggests improvement.

It has been demonstrated that simulation improves the competencies and behaviours of health professionals. The 'Health High Authority' leads a specific program to improve teamwork, where the study of HF by simulation is an important part. Work on the impact of these programs on patients' safety is still rare, however.

The safety and quality of work conditions of health professionals should also be taken into account. We cannot improve safety and quality for patients if work conditions are poor.

More and more professionals are getting trained using simulation, mostly in surgery and anaesthesia. As a result, less and less 'first time on a patient' scenarios happen. Professionals come back to the simulator more frequently and more happily.

Fletcher, G., Flin, R., McGeorge, P., Glavin, R., Maran, N., & Patey, R. (2003). Anaesthetists' Non-Technical Skills (ANTS): Evaluation of a behavioural marker system. British Journal of Anaesthesia, 90, 580–8.

CRM AND HF TRAINING IN THE HEALTH SYSTEM

By an analyst and CRM trainer

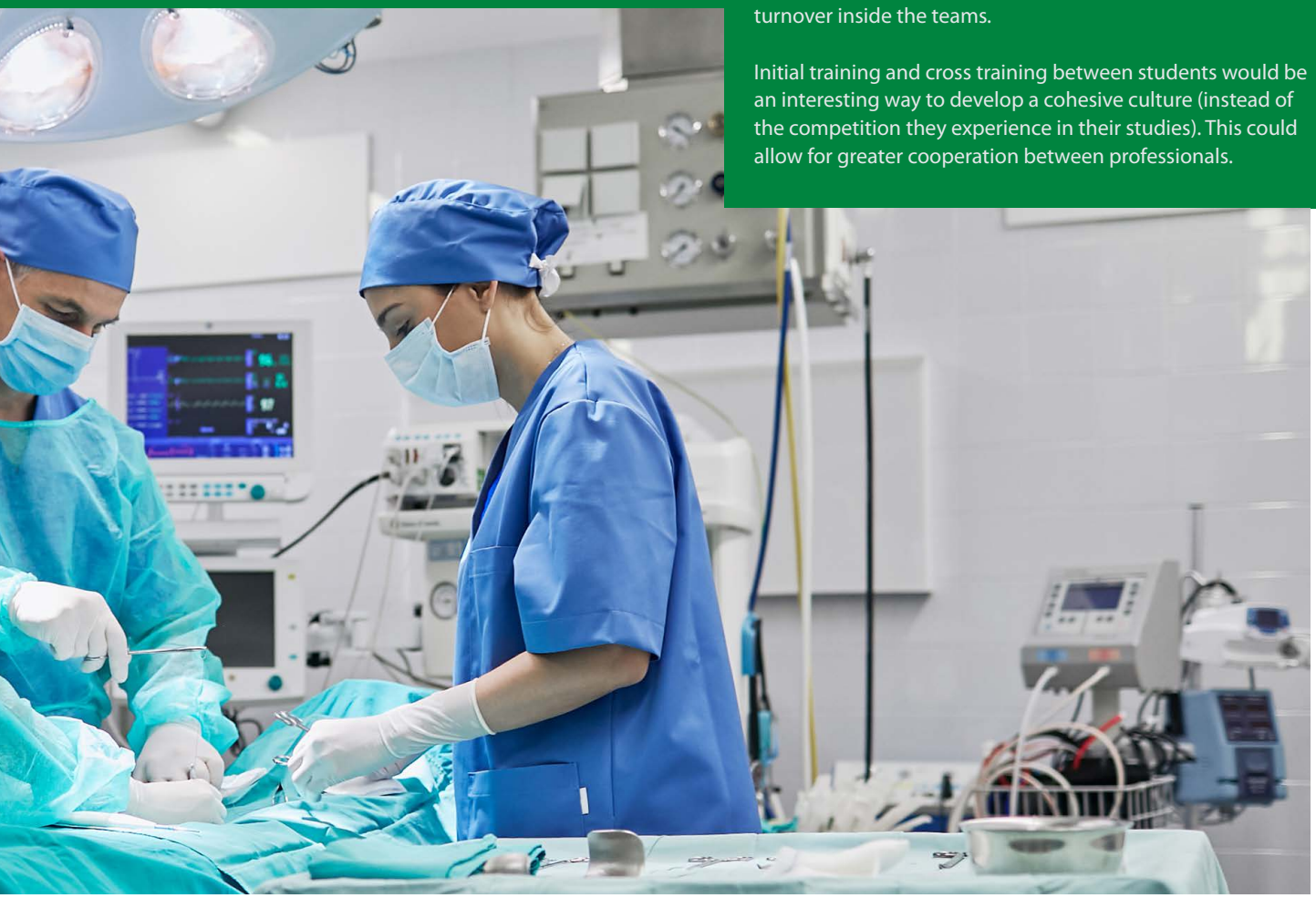
In the French health system, HF training is done on a voluntary basis. A specific program has been developed by the 'Health High Authority': Continuous Improvement Program for Team Work. About 50 teams of doctors, nurses, managers, helpers, cleaners, support services, have experienced this program.

The CRM included in this program is mostly about errors and lessons learned, communication inside the team, with patients and family, leadership, etc. It lasts 3 hours and is done with the whole team. The facilitator helps the team to understand how each profession thinks about others, to soothe the relationships inside the team. The syllabus also includes cooperation, task interruption, stress and fatigue, reporting and leadership.

There is almost no HF training in initial studies, medical or paramedical. Some training centres offer theoretical knowledge on a continuous training basis, but it is rather rare. Experience sharing exists with the analysis of professional practices in some areas, for some teams, usually when there is a specific problem. Safety analysts must now have a specific diploma (university degree, master in risk management) including HF training.

In my experience, CRM has helped people to confront their points of view and realise that they were no different from others. From there on, adjustments can be made. Communication has improved inside teams and CRM is their favourite part of the program, although they said that the allocated time was too short. A limit of the CRM is the turnover inside the teams.

Initial training and cross training between students would be an interesting way to develop a cohesive culture (instead of the competition they experience in their studies). This could allow for greater cooperation between professionals.



HUMAN AND ORGANISATIONAL FACTORS (HOF) TRAINING IN NUCLEAR INDUSTRY: AN EXAMPLE FROM THE FRENCH ATOMIC ENERGY AND ALTERNATIVE ENERGIES COMMISSION (CEA)

By J.-F. Vautier, HOF specialist, coordinator of the HOF expert group of the CEA (French Atomic Energy and Alternative Energies Commission).

At the CEA (the French Atomic Energy and Alternative Energies Commission), HOF training is mainly designed for people working in safety departments or in facilities (like safety officers, field experts who run operations, e.g., the facility manager or a control room shift supervisor). We distinguish HOF training from resource management training. Resource management training include safety culture training, which develops in particular a questioning attitude, and a rigorous and prudent approach and communication from individuals. This training is based on provision of knowledge and experience-sharing among trainees.

Two basic kinds of HOF training may be mentioned:

- External HOF training, like a Masters in Human Factors or Ergonomics, are performed by universities. They are compulsory to become an HOF specialist in the CEA;
- Internal HOF training is mainly performed by the HOF specialists of the CEA. This training lasts from 1,5 hours to 3 days. When the duration is less than one day, it is a module included in a safety training session. When it is more than one day, the training session is only about HOF. The training is dedicated to HOF non-specialists called 'relays'.

The tasks performed by the HOF specialists and non-specialists are not the same. These tasks are indicated by safety policy documents. For example, 'relays' (non-specialists) perform an initial analysis of an unwanted event whilst the HOF specialists perform a more in-depth analysis. Other kinds of studies have to be performed by HOF specialists. For example, an in-depth HOF analysis has to be done for the ten-yearly safety re-examination of the facilities. In this case, the relay who works at the facility will have to explain the benefits of the results of the HOF study to the workers and introduce the HOF results in the safety documents of the facility.

An HOF training, whatever the duration, generally consists of a presentation and illustration of:

- HOF: "factors that influence human performance, such as competences, work environment, task characteristics, and organisation"
- human performance, especially errors and rule compliance behaviour;
- ways of studying HOF: e.g., first identify human performance, next the factors of work situations that may explain human performance, and finally the organisational factors and conditions that affect work situations.

Even if it is difficult to connect an investment such as HOF training to its effects, we have noticed an increased quality of event analysis for the last few years.