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Guidelines for the Implementation and Enhancement of TRM

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Abstract
The document serves as guidelines for the implementation and enhancement of TRM.

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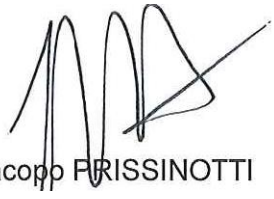
Director NMD	 Iacopo PRISSINOTTI	10/05/2021

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EXECUTIVE SUMMARY

Human performance, individually and collectively, is connected to and dependent on other parts of the aviation system. Aviation system is a “system of systems”. TRM programme provides space for ATM’s operational staff part of the system, through its series of facilitated sessions, to take a step back from the dynamic and pressured surroundings of the Ops room and evaluate his/her work environment and own performance and effect of it on others.

TRM enables people, to develop their own strategies, methods, approaches, ways, which might be different from those of their colleagues. What one takes from each session is exclusively one’s own, and that is one of the greatest advantages of TRM. It is not “one size fits all” because TRM allows people to use their own critical thinking and create multitude of better ways of addressing daily Ops situations.

An ongoing TRM programme is an effective countermeasure to errors resulting from team contributions. The benefits of TRM include:

- Enhanced Ops task efficiency,
- Enhanced continuity and efficiency of teamwork,
- Enhanced awareness of Ops systems and interdependencies,
- Improved communications and feedback,
- Increased awareness about safety,
- Enhanced TEM management capabilities,
- Enhanced individual awareness of HF impact on operations,
- Enhanced and structured Safety Culture, Just Culture and Oversight Surveys results aftercare.

TRM is an effective self-learning tool as well because during the session the participants are able to share their own experiences, permitting the other participants to learn from this sharing. Consequently, TRM is also ***a proactive safety tool*** because it helps ATM professionals to identify potential traps and pitfalls before these actually lead to an occurrence or worse.

We hope you will find the following set of documents of use to your current or future TRM programme.

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1 Introduction

1.1 General

This document provides service providers, especially ATS providers, with guidance on how to implement and enhance Team Resources Management (TRM) training programmes.

It is recognised that service providers have differing operational, technical and organisational environments, as well as possibly having different regulatory requirements if they are not EU members. Thus, this manual does not prescribe a “one-size-fits-all” training programme. Instead, it describes how service providers can establish a TRM training programme that is appropriate to their specific environment.

1.2 Intended Users

This document is aimed at personnel responsible for the implementation and enhancement of TRM training programmes. This includes service providers who:

a) are creating a completely new TRM training system,

b) have already an established TRM training system and intend to enhance their ATCO HF training, and

c) are evolving their system to include other ATM professions.

1.3 Purpose of these Guidelines

EUROCONTROL Team Resource Management programme is more than 20 years old and the first guidelines were written in the late 90s. Still, not all EUROCONTROL ANSPs were in a position to implement TRM. Consequently, it is necessary to raise the awareness to the benefits of TRM. EU regulatory requirements have introduced HF training in Unit and Continuation Training for ATCOs. Thus, there is an increased need for these awareness activities and support for TRM implementation.

Some ANSPs established TRM quite early. Regrettably, some of these ANSPs stopped the TRM programme due to cost considerations because it was not mandatory. One seems to forget that regulatory compliance only ensures a minimum level of safety. Safety improvement needs the use of good practices. Therefore, it is crucial to aid service providers to enhance their TRM programmes in order to ensure continual safety improvement.

The reality of ANSPs today has shown that it is not only the professional group of ATCOs, but also other professional staff, together with organisational and national cultures, which influence the safety of operations. Some ANSPs have already taken steps to move ahead with TRM; others are getting ready to do so. The scope of TRM ought to expand beyond air traffic controllers. Its benefits could also profit other safety professional team workers, such as ATSEPs and AIM/AIS staff.

The future of the ATM environment lies in the unbundling of ATM/ANS services. This situation is already being addressed by EU 2017/373[1], which introduces requirements not only for ATC/ATS, CNS, AIS and MET but also for a new set of service providers. In the future, HF training will be a requirement not only for ATCOs but also for other professions who work for service providers regulated by EU 2017/373 and its eventual replacements.

1.4 Terminology

From discussions and comments[2], it is evident that there are problems with terminology as there is confusion about the terms 'TRM', 'HF skills' and 'Competence'. There is also misperception between 'TRM' and 'Facilitation'.

Additionally, the various discussion amongst TRM expert groups has highlighted the definition of TRM has become outdated. In the past, TRM was defined as:

Strategies for the best use of all available resources - information, equipment and people - to optimise the safety and efficiency of Air Traffic Services. https://www.skybrary.aero/index.php/Team_Resource_Management_(TRM)

The authors and reviewers of this document wish to propose a new definition for TRM, namely

Team Resources Management (TRM) is an HF Safety Programme that aims at reducing or minimising the impact of teamwork related errors within the ATM system. It also strives to develop positive attitudes and behaviours towards teamwork skills and human performance in air traffic management.

For clarity, the terms 'Facilitation', 'HF Skills' and 'Competence' are defined below:

Facilitation - The provision of opportunities, resources, encouragement and support for the group to succeed in achieving its objectives and to do this through enabling the group to take control and responsibility for the way they proceed.

Trevor J. Bentley Facilitation July 2000

HF Skills - Human Factors in its widest definition describes all the many aspects of human performance that interact with their (aviation) environment to influence the outcome of events. These may be related to either the physiological or psychological aspects of human capability, both of which are able to directly affect the way in which the human operator performs in different circumstances.

https://www.skybrary.aero/index.php/Human_Factors

[1] COMMISSION IMPLEMENTING REGULATION (EU) 2017/373 of 1 March 2017 laying down common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight, repealing Regulation (EC) No 482/2008, Implementing Regulations (EU) No 1034/2011, (EU) No 1035/2011 and (EU) 2016/1377 and amending Regulation (EU) No 677/2011

[2] TRM Workshop Report, EUROCONTROL, Brussels, 25 – 26 September 2017

Human Factors and Human Performance are often confused with 'soft skills', which are people's abilities to communicate with each other and work well together. https://dictionary.cambridge.org/dictionary/english/soft-skills

Additionally, The term 'Human Performance' (and 'Human and Organisational Performance' (or HOP) has become increasingly common in recent years in a number of industries, especially those with a safety focus. It is often associated with 'Human Factors', or even used as a replacement for the term. But in some cases, different practitioners have identified with one term or both. Dr Steven Shorrock[3] uses 'Human Factors' and 'Human Performance' (mixed case) to refer to spheres of academic research/teaching and practice in applied contexts by internal and consultants (e.g., Human Factors Specialist, Human Performance Specialist). But there is another, more ordinary meaning of 'human performance' (lower case), as simply what people do and how.

Competence - A combination of skills, knowledge and attitudes required to perform a task to the prescribed standard. *ICAO Annex 1 — Personnel Licensing*

[3] 'Human Factors' and 'Human Performance': What's the difference?

2 Systems and Teamwork

2.1 Effective Teamwork

A system is a collection of separate, but interrelated parts that work together to achieve a common purpose. Because the aviation system is a “system of systems”, it is important to understand the differences and interactions between the different kinds of systems in it:

Simple systems: These are relatively easy to understand and have predictable performance. Simple systems have one or a small number of known goals or functions and these do not change over time. As such, they
are easy to repair and to ensure that they consistently meet pre-identified performance standards. An aviation example of a simple system is the passenger emergency lighting system used to guide passengers
out of an aircraft in an emergency.

Complicated systems: The structure, elements and interactions in a complicated system might be difficult to understand but can be understood and quantified with a high degree of accuracy and completeness by experts. Knowledge of these systems is normally developed in a linear way (where an understanding of one element leads to an understanding of the next element and their impact on another can be reasonably predicted) and, like simple systems, can be designed to meet pre-identified performance standards. An aircraft jet engine, which has several goals that remain the same over time (including to produce thrust and generate electricity and hydraulic pressure) is an aviation example of a complicated system.

Complex systems: In a complex system, the whole is greater than the sum of its parts. Everything is connected to, and dependent on, something else. Importantly, the behavior of the system cannot be predicted from examining the behavior of its separate parts and the system cannot be understood by only looking at one component or from one perspective. Complex systems are often subject to random and unpredictable events due to the multiple and changing influences and interactions within the system. Humans are themselves complex systems. An individual may change behavior, adapting to internal influences, such as health or personal mood, as well as to external influences, such as environment or equipment. Any interaction between a human and technology, regardless of whether the technology itself is simple or complicated, changes the nature of the whole human-technology system, making it a complex system.

The ATM system relies on good teamwork to achieve its goals. Operationally, the ATS team can be as small as the controllers and assistants working together in an Ops Room, or large enough to embrace associated ATC units and supporting operational staff such as flow managers, supervisors, ATSEPs, etc. on whom the controllers rely on effective co-operation to optimise their work.

Historically, aviation workers have been expected to function without error. However, aviation experts claim that each air traffic controller makes several errors every hour, thus there are literally hundreds of errors per day but very few serious incidents even per year where ATC contributes to the outcome. Consequently, we conclude that millions of errors are made before a serious incident or an accident occurs. But human performance, individually and collectively, is connected to, and dependent on, other parts of the aviation

system. As anything else, aviation system is a "system of systems". Nevertheless, safety is paramount and we still have to address these issues. Suppressing every error to prevent all incidents and accidents is not feasible. What we should focus on is positively influencing the conditions under which these errors occur and decreasing the impact of errors that will happen.

2.2 What is Team Resource Management?

Earlier we defined TRM as an HF Safety Programme that aims at reducing or minimising the impact of teamwork related errors within the ATM system. It also strives to develop positive attitudes and behaviours towards teamwork skills and human performance in air traffic management.

Therefore TRM is essentially a philosophy which helps us realise that we humans are error prone; a philosophy which will help us put in place more and better safety nets; a philosophy which will help each one of us play a better and more constructive part in our own team and the larger aviation team of which we are part[4]. Consequently, TRM is a safety management intervention that protects ATM systems from a common cause of system failure by implementing programmes that are effective in developing knowledge, attitudes and behaviours for each of the professional ATM groups.

Practicing TRM means enabling the ATCO to take a step back from the dynamic surroundings of the Ops room and to evaluate his/her work environment and own performance. It is clear that such a highly skilled professional will perform at high performance levels within restricting time intervals. To take a step back, analyse the daily work and reflect on what and on why and on how – the time to do so is not necessarily built-in in daily operations. In organisations where high reliability and safety are an obligation; the service provider should plan and add in such a time for the operational staff to analyse their impact on operations. This is applicable to all operational safety personnel (such as ATSEP, AIM).

TRM is an effective self-learning tool because during the session the participants are able to share their own experiences, permitting the other participants to learn from this sharing. Consequently, TRM is also a proactive safety tool because it helps ATM professionals to identify potential traps and pitfalls before these actually lead to an occurrence or worse.

A different approach to the classical management of safety is required because safety does not come only from the reactive elimination of errors or the pro-active seeking of error-inducing situations. No amount of regulations or technological solution can lead to the positive aspects of the ATCO culture as ATCOs and other ATM professionals themselves can. The nature of their work and the consequent demanding responsibilities often lead these professionals to develop beneficial behaviours, such as cooperation, helpfulness, and willingness to explain one's intentions and the reasoning behind such intentions. This positive approach leads to the mutual benefits of all involved.

The modern safety concepts all emphasise the resilience of the system. The gap between the work-as-done (WAD) and the work-as-imagined (WAI) is bridged by

[4] Irish Aviation Authority

human performance[5]. Systems are complex sociotechnical systems and people have to cope with the complexity of the actual work environment. TRM assists greatly in realigning WAI and WAD because it improves the quality of information about WAD and helps greatly in passing enhanced information to management who are 'designing' the system. At the same time, TRM encourages maintaining awareness and caution at the sharp end where the effect of something going wrong will have an immediate impact of safety.

The safety of operations is influenced by professional, organisational, and national cultures, and safety requires focusing each of these toward an organisational safety culture that deals with errors non-punitively and proactively. Traditional training carried out using instructional techniques cannot change the culture, but facilitated self-learning can generate ownership with regard to the discussions that come out of the sessions. Change begins when the persons become aware of their thoughts. The facilitation process helps the participants to realise the integration between think and do. In other words, we can only improve or change our performance if we are aware of our mental model. They become clearer to us when we discuss and lay them down in front of our peers, when we hear their thoughts and this approach supports transferring new practices into the day-to-day job.

To be successful TRM is run using group facilitation. Roger Schwarz[6] defines group facilitation as:

> a process in which a person whose selection is acceptable to all the members of the group, who is substantively neutral, and who has no substantive decision–making authority diagnoses and intervenes to help a group improve how it identifies and solves problems and makes decisions, to increase the group's effectiveness.

In simple words, facilitation is the act of support and using a process to help people working in groups to achieve results. Skilled facilitation promotes critical thinking. Critical thinking is not to be confused with 'criticism' but rather, critical thinking is

> the intellectually disciplined process of actively and skilfully conceptualizing, applying, analysing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action[7].

Often, a facilitator with operational ATC experience carries out TRM sessions for ATCOs and, similarly, facilitators with ATSEP or AIM background run sessions for their respective professional colleagues. Sometimes sessions can be more fruitful when there are mixed facilitators. The facilitator is trained in assisting colleagues to develop their own ideas and positive attitudes, and in creating an environment that stimulates self-learning. A facilitated TRM session acts as means of peer-to-peer learning too. Section 4.1 expounds further on this notion.

[5] From Safety-I to Safety-II:A White Paper
[6] The Skilled Facilitator
[7] Scriven & Paul, 1987

2.3 Effectiveness of TRM

Safety is the main driving force behind the development of any change or improvement in ATM. Consequently, the question whether TRM programmes do work will surely be the first thing that comes to mind to the manager who has to approve funds of the magnitude required to implement an effective TRM programme. In financial terms, is there a worthwhile return on the training investment? ANSP experience, confirmed by various studies and surveys, has shown that yes, TRM programmes do work, provided such programmes are well designed, have management support, and are tailored to fit unit, organisational and national cultures.

TRM in not and never will be the mechanism to eliminate error. Error is an inevitable result of the natural limitations (and variability) of human performance and the function of complex systems.

TRM has significant benefits but this has only been proven qualitatively and not quantitatively so far because TRM is part of a recipe that leads to enhanced individual and team performance. While we can easily count the number of errors/incidents, it is quite difficult to demonstrate how many errors/incidents were avoided by normal/enhanced behaviour. TRM is only one of the numerous tools that the ANSPs have to improve their safety performance. It is very hard to be able to pinpoint exactly that improved safety has resulted solely from TRM. To make this proof, we would have to stop every other activity running in an ANSP except TRM, then we might see the direct correlation.

TRM is not intended as a replacement for technical training but should complement it. Furthermore, TRM is not intended to counteract poor procedures or loosely defined roles. The increased awareness of doing one's job in a more effective manner, coupled with an enhanced sense of working as a part of a larger team, will also lead to improved job satisfaction.

In 2004 M. West[8] described several advantages of implementing team-based working in an organisation. It is clear that his words can also be applied to the effectiveness of TRM programmes. The generic advantages of an effective TRM programme may include:

- Creating consistency between changing organisational environments, strategy and structure,
- Developing and delivering products and services quickly and cost-effectively,
- Enabling organisations to learn and to retain learning more effectively,
- Promoting innovation due to cross-fertilisation of ideas,
- Integrating and linking together in ways that individuals cannot to ensure that information is processed effectively in the complex structures of modern organisations,

[8] West, M. (2004) *Effective Teamwork: Practical Lessons from Organizational Research*

- Staff who work in teams report higher levels of involvement and commitment, as well as lower stress levels than staff who do not work in teams.

On the other hand, breakdown in teamwork may lead to frustration and irritation, together with low morale and poor job-satisfaction.

These consequences are likely to lead to a vicious circle, influencing negatively the team performance because in the absence of TRM, an individual or team is unlikely to be able to identify and correct weaknesses in the following areas:

- Communication between ATM professionals, including briefing on handover;
- Communication between controllers and pilots;
- Situational awareness;
- Decision making;
- Monitoring of pilot actions;
- Assisting and helping colleagues;
- Cooperation with other ATM professionals;
- Distribution of workload between ATM professionals;
- Flexibility - ability to adjust to changing workload.

ANSPs use various forms to review their TRM programmes and to ensure that the lessons learned from TRM sessions are taken on-board as necessary and action taken to improve the performance of the service.

2.4 TRM in ATM Safety Management Systems

Within the last two - three decades, there have been numerous advances in widespread acceptance and implementation, under the guidance of EUROCONTROL and ICAO, of a safety management system (SMS). ICAO has mandated the use of SMS Manual Doc 9859 to standardise the approach to safety. EUROCONTROL and the European Commission (EC), in turn, have issued their requirements, based on ICAO, for the European ATM SMS.

Team Resource Management is clearly a safety-related programme. An important conclusion of the work done by the TRM practitioners is that TRM is a convenient way and the most effective method to introduce HF-related issues in ATM. This would support reflections on attitudes and behaviours, reducing the impact of errors and contributing to better safety cultures.

Furthermore, TRM practitioners consider a robust TRM programme as a Safety II tool. Prof. Hollnagel gives a very simple explanation about the difference between Safety I and Safety II, namely:

> When we think of safety it is usually by reference to its opposite, the absence of safety. The traditional view of safety, called Safety-I, has consequently been defined by the absence of accidents and incidents, or as the 'freedom from unacceptable risk.' As a result, the focus of safety research and safety management has usually been on unsafe system operation rather than on safe operation. In contrast to the traditional view, resilience engineering

maintains that 'things go wrong' and 'things go right' for the same basic reasons. This corresponds to a view of safety, called Safety-II, which defines safety as the ability to succeed under varying conditions. The understanding of everyday functioning is therefore a necessary prerequisite for the understanding of the safety performance of an organisation.[9]

2.5 Benefits of TRM

A TRM programme, through its series of facilitated sessions, enables the ATCO and other professionals (such as ATSEP, AIM) to take a step back from the dynamic and pressured surroundings of the Ops room and to evaluate his/her work environment and own performance.

TRM enables people, to develop their own strategies, methods, approaches, ways, which might be different from those of their colleagues. What one takes from each session is exclusively one's own, and that is one of the greatest advantages of TRM. It is not "one size fits all" because TRM allows people to use their own critical thinking and create multitude of better ways of addressing daily Ops situation.

An ongoing TRM programme is an effective countermeasure to errors resulting from team contributions. The benefits of TRM include:

- Enhanced Ops task efficiency,
- Enhanced continuity and efficiency of teamwork,
- Enhanced lesson learning and dissemination process aiming to reduce recurrence of the same problems,
- Improved communications and feedback,
- Increased awareness about safety,
- Enhanced TEM management capabilities,
- Enhanced individual awareness of HF impact on operations,
- Enhanced and structured Safety Culture, Just Culture and Oversight Surveys results aftercare.

2.6 Misconceptions about TRM

We have already referred to the confused use of such terms as TRM, facilitation, HF and competence in section 1.4.

Besides the confusion, there has been a tendency to view TRM as the magic solution to many organisational/Ops room problems. A few internal incident investigators having fallen into the habit of often recommending TRM as a corrective action following an occurrence/incident, as if TRM was a panacea. There could be occasions where TRM can help dealing with some HF issues arising from the investigations but that is not TRM's primarily role. TRM is an HF safety net to reduce teamwork errors, therefore it is a preventive tool. TRM session can also be seen as an "HF simulator" helping ATCOs and other staff to

[9] Safety-I and Safety-II

be more aware about HF related interactions. When ATCOs are required to learn new knowledge about HF, then TRM is not enough and needs to be replaced by HF training delivered by an SME.

The primary objective of TRM is to reduce the effect of teamwork errors through the reflection on our attitudes. Thus, TRM should not be the primary source:

- of information to managers about the situation in the Ops room,
- managers understanding the need for better communication within their unit/organisation.

Furthermore, TRM is **NOT**:

- a team-building course,
- a way to judge people/tell them off for their errors.

3 Human Factors in ANS

3.1 Regulatory Requirements

EU 2015/340 mandates that Air Traffic Controllers are to learn about Human Factors in all three stages of training i.e. Initial, Unit and Continuation. Team Resources Management is mentioned or referenced to in all three phases.

TRM is also included in the ATSEP training as specified in Annex XIII of EU 2017/373.

3.2 Human Factors in the ATCO Initial Training Stage

EU 2015/340 *ATCO.D.005 Types of air traffic controller training* defines air traffic controller initial training as training leading to the issue of a student air traffic controller licence or to the issue of an additional rating and, if applicable, rating endorsement, providing:

(i) basic training: theoretical and practical training designed to impart fundamental knowledge and practical skills related to basic operational procedures;

(ii) rating training: theoretical and practical training designed to impart knowledge and practical skills related to a specific rating and, if applicable, to rating endorsement;

ATCO.D.010 Composition of initial training specifies that the basic training, comprises all the subjects, topics and subtopics contained in Appendix 2 of Annex I. There are nine main subjects mandated and Human Factors is Subject 7. TRM is included as Subtopic HUM 3.1 in the syllabus for ADV, ADI, APP, ACP, APS and ACS ratings. There are additional references to TRM in *Acceptable Means of Compliance to Part-ATCO, SUBPART D, Section 2 (Initial training)*. The relevant excerpt is reproduced below for ease of reference:

TOPIC HUM 3 SOCIAL AND ORGANISATIONAL FACTORS			
Subtopic HUM 3.1 — Team resource management (TRM)			
ADV HUM 3.1.1	State the objectives of TRM.	1	Optional content: TRM course, EUROCONTROL Guidelines for the development of TRM training
ADV HUM 3.1.2	State the content of the TRM concept.	1	Optional content: teamwork, human error, team roles, stress, decision making, communication, situational awareness

Table 1 Excerpt from the Acceptable Means of Compliance to Part-ATCO, SUBPART D, Section 2 (Initial training)

The number in the third column relates directly to a defined taxonomy for classifying training objectives and is according to EUROCONTROL specifications[10] where '1' indicates

> *A basic knowledge of the subject. It is the ability to remember essential points, to memorise data and retrieve it.*

For such a training level, traditional lecturing style is sufficient.

3.3 TRM, Stress and Fatigue Management in the ATCO Unit Training Stage

EU 2015/340 *ATCO.D.045 Composition of unit training* states:

(c) Unit training shall include training in:

(1) operational procedures;

(2) task-specific aspects;

(3) abnormal and emergency situations; and

(4) human factors.

In the EASA's Easy Access Rules[11], it is stated:

AMC1 ATCO.D.045(c)(4) Composition of unit training HUMAN FACTORS

(a) Training organisations should train the applicant during on-the-job training in team resource management, fatigue management and stress management.

(b) Training organisations should develop performance objectives for team resource management training.

(c) The team resource management training may also make use of synthetic training devices.

(d) Training organisations should develop training objectives for fatigue management and stress management training.

TRM is EASA's acceptable means of compliance to meet the requirement for HF training during the ATCO's unit training phase.

3.4 TRM, Stress and Fatigue Management in the ATCO Continuation Training Stage

ATCOs are required to undergo continuation training and HF training is required as part of the ATCO Refresher Training (*ATCO.D.080 Refresher training (b) (3)*). Once again, TRM, is the stated acceptable means of compliance to meet this requirement (*AMC1 ATCO.D.080(b)(3) Refresher training*).

[10] EUROCONTROL Specification for the ATCO Common Core Content Initial Training, edition 2, 2015

[11] Easy Access Rules for ATCO, Air Traffic Controllers' Licensing and Certification

3.5 TRM for ATSEPS

As mentioned in 3.1 above, TRM is included in ATSEP training.

Appendix 3a — Qualification training — Shared includes TRM in the following areas:

SUB-TOPIC 1.3: Safety assessment process			
1.3.2	Appreciate the importance of adopting a total system approach covering human, procedure, organisation and equipment elements	3	ATM system description (including scope definition and limitation), end-to-end integrity of safety assessment e.g. Concept of TRM
SUB-TOPIC 2.1: ATSEP knowledge, skills and competence			
2.1.3	State the available means to maintain professional knowledge and skills	1	e.g. practice, personal study, briefing, seminars, courses, technical periodicals, technical books, OJT, simulation, CBT, e-learning, visits, feedback, TRM
SUB-TOPIC 5.2: Team resource management			
5.2.1	State the objectives of TRM	1	Experience sharing, feedback, improved interpersonal relations, indirect increase in safety

Table 2 Excerpt from Appendix 3A to EU 2017/373 Annex XIII

As in Table 1 above, the number in the third column relates directly to a defined taxonomy for classifying training objectives. A word of caution is perhaps needed with respect to Element 1.3.2. In this case, the training objective refers *Appreciate the importance of adopting a total system approach covering human, procedure, organisation and equipment elements* and not to TRM. Understanding TRM helps in achieving the objective.

3.6 ICAO Competency Model and TRM

ICAO issued in 2016 a new Competency Framework for ATCOs and ATSEPs as part of PANS-Training[12]. The Competency Framework consists of competency units, competency elements, performance criteria, evidence and assessment guide and a range of variables. Competency units, competency elements and performance criteria shall be derived from job and task analysis and shall describe observable outcomes.

In early 2017, the implementation guidance documents Doc 10056[13] (ATCOs) and Doc 10057[14] (ATSEPs) were published. These two documents explain how to develop competency-based training for ATCOs and ATSEPs.

The work done by ICAO on the Competency Framework is of interest and it could be used as a means to enhance HF training in view that the majority of the ICAO ATCO/ATSEP competencies incorporate elements of HF in them.

The *ATCO Competency Framework* from ICAO PANS-Training was used to make a gap analysis and map the current TRM modules with the ICAO ATCO competencies in order to demonstrate where it fulfils the ICAO requirements or what is required to meet these requirements.

The full mapping exercise is found in Annex A of this document.

[12] PANS-TRG, (ICAO Doc 9868), Procedures for Air Navigation Services — Training
[13] Manual on Air Traffic Controller Competency-based Training and Assessment (Doc 10056)
[14] Manual on Air Traffic Safety Electronics Personnel Competency-based Training and Assessment (Doc 10057)

4 TRM in ATCO Continuation Training

4.1 Method

'TRM' and 'facilitation' are used sometimes as synonyms (a word or phrase that means exactly or nearly the same as another word or phrase in the same language). However, the use of 'TRM' and 'facilitation' as synonyms is very incorrect because:

- 'TRM' is a safety HF programme aimed at reducing teamwork-related errors, while
- 'facilitation' is the learning method used in TRM to address HF topics and create knowledge to formulate their own personal methods to avoid the traps (errors, mistakes, etc.) highlighted and discussed during their continuation training.

Thus, one might say that 'facilitation' is the tool that permits 'TRM' to reach its safety objective.

During the facilitated session, the participants engage in peer-to-peer learning in contrast to the normal learning method of course instruction where the education is imparted in a series of lessons or class meetings with the instructor/lecturer teaching by giving a discourse on the subject. Peer-to-peer learning is a way of developing skill sets because the attendees pick up industry intelligence from their colleagues.

If the ANSP continues to revert to the "standard" learning methods of delivery (teaching/lecturing), it likely will fail to acquire or upskill its staff. The 70:20:10 model[15] reinforces how people enjoy learning, with 70% of it happening on the job. Research[16] has highlighted that employees prefer to gain knowledge from colleagues and share insight among teams, while classroom training was low down on the preferred training method.

4.2 Responsibilities

The responsibility for TRM rests mainly with the Training Unit, although often this responsibility is shared with other units/departments/divisions such as the HR/HP/HF Unit and/or the Safety Unit.

During the 2017 TRM Implementation Survey[17], the responses to the question about responsibility contrasted sharply with those of the previous surveys. In the preceding surveys, the responses indicated that it was the Unit Managers who were responsible for TRM. The following table presents a comparison between the replies received in the three surveys.

[15] The 70:20:10 Model - A different view of work, performance and learning
[16] An analysis of the value of the ways of learning at work: PART ONE – Modern Workplace Learning 2021
[17] TRM Report – Implementation Survey 2017

	Unit Manager	HR/HP/HF unit	Training Unit	Safety Unit	Senior Management	Other
2017	18.52	22.22	44.44	3.7	0	11.11
2014	36.84	26.32	21.05	5.26	10.53	0
2011	50	25	12.5	6.25	6.25	0

Table 3 Comparison between survey responses re responsibility for TRM

Percentage of replies

The following was noted from the comparison of replies:

- A diminishing trend where responsibility for TRM laid with the Unit Manager;
- An increasing trend of the Training Unit having the responsibility for organising TRM;
- None of the 2017 respondents indicated that senior management is responsible for TRM;
- Other units/entities shared responsibility for TRM in 2017.

The following figure highlights these trends.

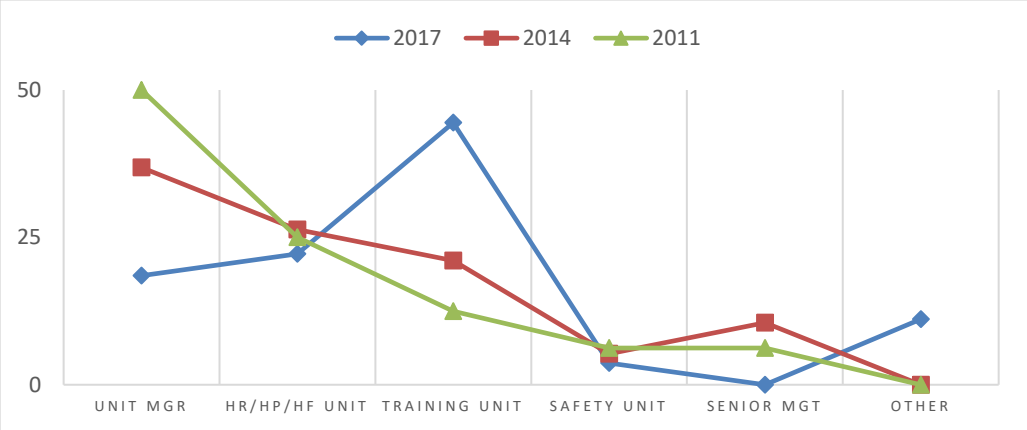

Figure 1 Trends re responsibility for TRM

Percentage of replies

In the past TRM was considered as a good practice, thus it was perhaps organised more at unit level. This happened particularly during the early implementation phase where TRM was 'experimented' in only a few units. Once the TRM programme matured, the responsibility would then be transferred to the training unit.

The transfer of responsibility from unit management to the training unit could be also due to the inclusion of TRM as an acceptable means of compliance (AMC) to HF training during unit and continuation training of ATCOs. (See 3.3 and 3.4.) When TRM was declared an AMC to EU 2015/340, this changed its status to a

"soft" law and perhaps the service providers felt a need to centralise the programme to harmonise/standardise it because it became part of the ATCO training certification requirements. The authors were aware that the transfer of responsibility to the Training Unit happened early during 2017 in at least three organisations. This change seems to indicate that the transfer of responsibility was due to the effect of the regulation (EU 2015/340).

The responsibility is in many cases shared between various units of the organisation, possibly due to a number of factors, predominantly that different units would be responsible:

- for ATCO, ATSEP, and AIS/AIM TRM,
- whether TRM is conducted during unit training or continuation training.

Other changes noted when comparing the results of the 2017 survey with previous ones were the absence of the mention of senior management and the inclusion of three other units/departments of the service provision organisation. Again, maturity could be an explanation because once the TRM programme is ingrained in the organisation there is less need for senior management to be involved.

4.3 TRM Coordinator

Establishing a TRM Coordinator helps extremely in the success of the TRM programme. This person essentially takes care of the administrative aspects of TRM such as organising the annual programme, overseeing participants' attendance, coordinating with unit managers for the release of personnel to attend session, assigning facilitators and booking locations. Feedback is essential and the TRM coordinator is the focal point for feedback, not only from the participants but also from the facilitators and management.

Additionally, the TRM Coordinator acts as a link between the TRM programme, the training unit and safety units because this person would gather information on interesting topics for discussion, safety issues, trends and regulatory updates. Therefore, the coordinator is in a better position to plan TRM campaigns and ensure adequate resources to address identified problems. Furthermore, the coordinator helps in establishing TRM as a Safety II tool because he/she can identify good lessons learned and incorporate them in the TRM campaign/sessions.

The TRM Coordinator will have a holistic view of the TRM programme and how TRM fits into the ANSP's training and safety activities. The role of the coordinator is enhanced if this person is a facilitator or has a psychology background.

4.4 Sequence

The TRM programme has three stages:

1. Introduction
2. The 6 Modules and
3. Review

Stages 1, Introduction, and 3, Review, of the TRM programme are dealt with in Chapters 5 and 6 respectively of this Document.

Stage 2 is the actual delivery of training and this is based on the six prototype modules, namely

- Teamwork
- Team Roles
- Communication
- Situational Awareness
- Decision Making
- Stress.

The studies done during the development of TRM back in the early 90s have indicated that there is a natural sequence of how ATCOs address HF issues. This natural sequence was captured in the sequence of the six prototype modules. The sequence as identified in the studies was confirmed through experience when delivering the TRM training.

Module 1. Teamwork – In the beginning, ATCOs need to explore what teamwork means in the air traffic control context and how newly-formed groupings differ from long lasting teams.

Module 2. Team Roles – Once the ATCO understands how teams form and perform, then it is crucial for the ATCO to recognise the roles played by several actors in the ATC environment. These roles are all the more complex because of the subtle but important divisions of role allocation in some ATC situations.

Module 3. Communication – When the ATCO is familiar with the roles in the ATC environment, then the ATCO is ready to look into how communication is done within the team and with others outside the team. Communication is often cited as the leading cause of error in aviation. Therefore, it is important that one gains an appreciation of the complexities which are inherent in this area.

Module 4. Situational Awareness – The ‘mental picture’ is an essential element of the ATCO’s work. Thus, it is necessary for the ATCO to comprehend how the equipment enhances, or otherwise, his/her mental picture and how important it is that situational awareness between individuals is maintained.

Module 5. Decision Making – After exploring Teamwork, roles, communication and situational awareness, the ATCO is now ready to look into the characteristics of decision making. In ATC there are several different types of decision making processes/methods, in particular tactical and strategic methods. The problems of judgement errors have to be addressed, also bearing in mind the attitudinal differences.

Module 6. Stress – It is only after having worked through the other basic HF issues that the ATCO is ready to analyse the work stressors found in ATC, and in particular that stress which is found in the individual, besides those stressors that effect the team.

The sequence of topics is only a recommended one; TRM programme developers can start with any topic. However, experience has shown that when ATCOs or other ATM professionals are faced with one of the later topics, there

is a natural tendency to first explore the earlier topics. In view of this, it is not recommended to start TRM sessions with 'Stress', even though this may look like a quick win as it addresses also the regulatory requirements regarding ATCO stress management.

4.5 Duration

The duration of TRM sessions varies depending whether the sessions are being held during unit or continuation training. The duration of the session also depends on the audience being addressed. Figure 2 shows that often TRM sessions last one day.

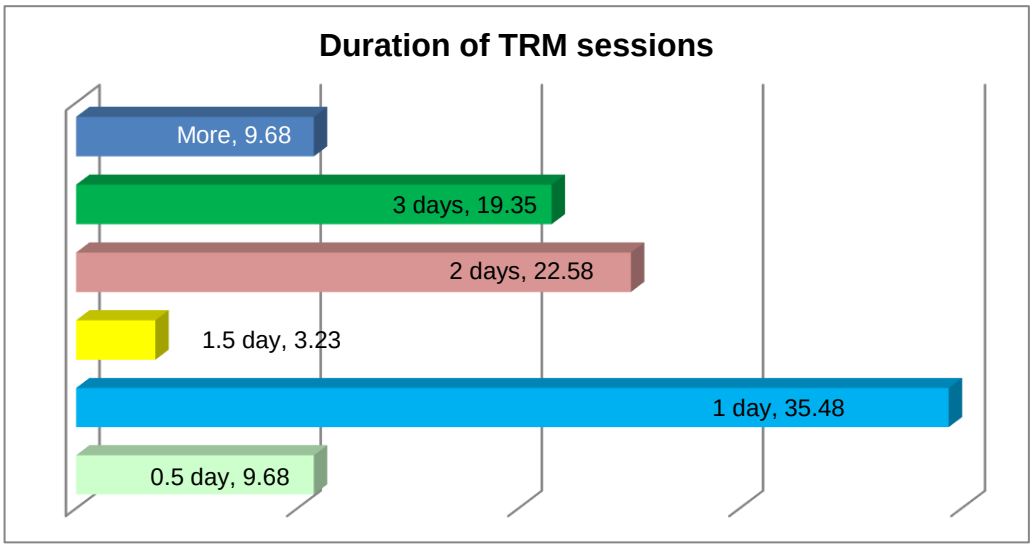

Figure 2 Duration of TRM sessions

Percentage of replies

The figure also clearly indicates that quite a number of providers prefer to have longer durations. The longer sessions are seen to bring more benefits mainly because they permit the facilitators to address more modules while allowing more time for learning activities and discussions.

From the free-text comments in the surveys, it was noted that the duration of TRM sessions is not as straightforward as shown in the figure. Often, TRM sessions are run as part of 'campaigns' which span over two or three years. Therefore, the first year of the campaign would have longer main sessions, while the following years would include shorter refresher sessions. Some examples quoted in the surveys were:

	Year 1	Year 2	Year 3
2-year campaign	3 days	0.5 day	
	2 days	1 day	
3-year campaign	2 days	1 day	0.5 day

	1 day	1 day	1 day

Table 4 Examples of the duration of the sessions during TRM campaigns

4.6 Participants

The 2017 survey indicated that the number of participants in a TRM session is often between 10 and 12. The number of participants varies according to several reasons, such as ATCO availability or unit in which the session is held. The larger audiences were mostly when managers, pilots, military ATCOs and other personnel attended the TRM session.

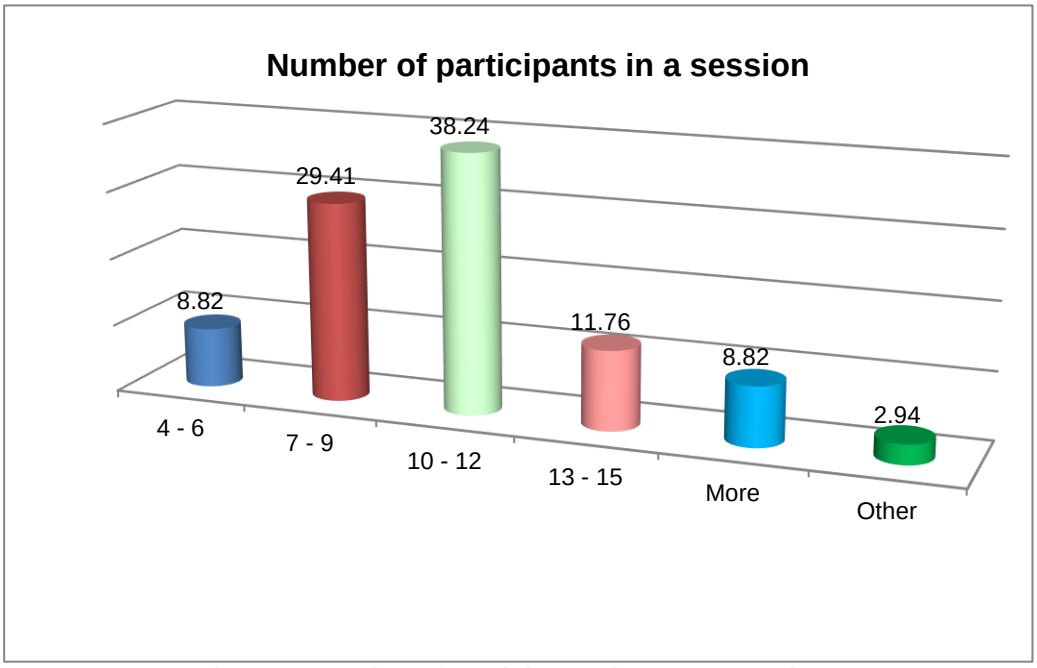

Figure 3 Number of participants in a TRM sessions

Percentage of replies

4.7 Facilitators

The number of facilitators in a session varies from one to four depending on how many people attend the session. Normally there are two facilitators in a TRM session and it is highly recommended to have two facilitators. Studies on facilitation (*IANS Facilitation Methodology and Processes*[18]) indicate that a lone facilitator can handle small groups of participants, although having someone else to take notes of the discussion is always beneficial.

[18] INSTITUTE OF AIR NAVIGATION SERVICES EUROCONTROL Facilitation Methodology and Processes

Co-facilitation is a process by which two or more individuals share facilitation duties with the presence of a second facilitator (co-facilitator) having various advantages:

- Enables bigger discussion groups,
- Permits writing on flip-charts of what is being said by the participants for easy reference to both the lead facilitator and the participants,
- Helps the lead facilitator to keep neutral, balanced and on-track,
- Ensures better time-keeping,
- Provides emotional support,
- Enhances facilitator competence as the facilitators can give peer-feedback to each other,
- Provides additional energy to the group.

In a number of ANSPs a qualified psychologist is available, sometimes even during the session, to answer very specific and technical questions regarding psychology or detailed HF matters. Additionally the psychologist, or sometimes even a dedicated trainer, can address stress management techniques. In such cases the facilitated discussion is paused while the psychologist presents or lectures on this specific topic/issue. Alternatively, the matter can be addressed in an ad hoc HF lecture, separate from the facilitated TRM session.

“Failing to prepare is preparing for failure” is an oft-quoted cliché but, regrettably, it has been proven true too many times. Organising and running TRM sessions cannot be done on the fly, thus preparation is essential for good and successful TRM sessions. The 2017 survey report has indicated that the facilitators have usually two days to prepare their sessions. More preparation time will be needed when the session has to address new topics and new training material/learning techniques are going to be used.

4.8 Location

Generally, TRM sessions were held at the unit, although outside locations came a close second as shown in the following figure from the 2017 survey. Most of the outside locations were hotels or similar establishments.

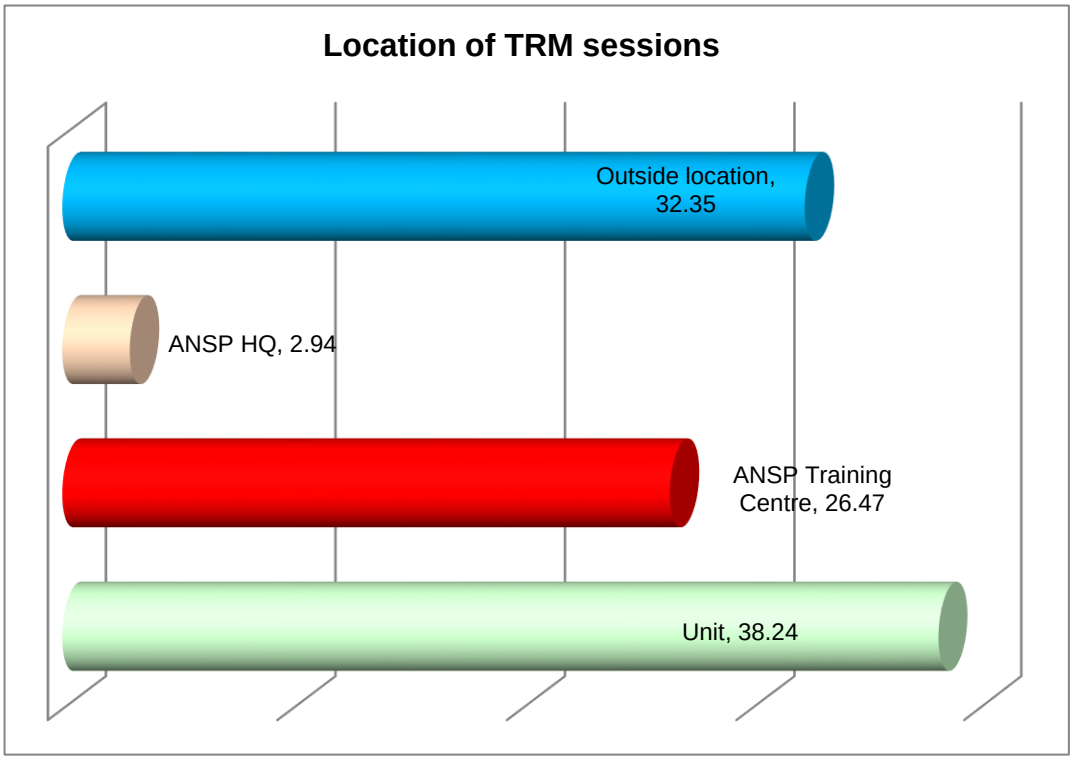

Figure 4 Location of TRM sessions

Percentage of Replies

In some organisations, the location varies depending on the type of session being held. TRM in unit training is conducted at the unit or training centre while TRM in continuation training is done at an outside location.

4.9 Learning Activities

In section 4.1, it is clearly indicated that facilitation underpins the TRM programme. To quote from a paper presented at the 50th IFATCA annual conference in 2011[19]:

5.1 TRM at an individual level focuses attention on personal performance, characteristics and beliefs. Because of this TRM effectively cannot be taught. However, safety related attitudes and behaviours can be learned. That is why TRM courses are focused on helping participants learn by themselves in a practical manner, rather than delivering classroom based teaching.

5.2 Involvement: Teaching TRM in a traditional manner is contrary to the essence of TRM. Listening to classroom lectures provides little interaction or involvement from participants. It is the involvement along with an open critical view towards oneself and others that is the core of TRM.

[19] WP No. 156 Evaluating Team Resource Management Implementation within ATC and to Define the Practice for IFATCA,

5.3 Facilitators: This is why TRM sessions are centered around a facilitator with operational ATC experience who is trained in assisting participants develop their own ideas and positive attitudes, and in creating an environment which stimulates learning.

It is evident that facilitation revolves around group discussion and the facilitator has a number of tools to use to ensure a good group discussion. Group discussion is facilitator-controlled process during which those taking part think about a particular aspect of their work and share experiences in order to achieve a training objective. All the participants do not only share the knowledge and experience present in the group but also share in applying their knowledge and experience to a specific topic or problem, thus adding to the value of their knowledge. The facilitator, therefore, fulfils the role by asking good questions to clarify understanding and challenge assumptions. The quality of discussion is very dependent on the quality of the questions asked by the facilitator because good questions make people think, take part in the discussion, clarify understanding and stimulate an active approach to the topic.

Prior to the session, the facilitator has to prepare scenarios for discussion. Various support tools are used in creating these scenarios. The 2017 survey confirmed that ATC case studies are the most popular learning tool, followed closely by videos and problems identified in internal investigation reports. Often the facilitators use a combination of tools in order to enliven and energise the participants. Some providers indicated that they use also:

- Room escape exercise,
- Psychological techniques of self-development,
- Case studies in method of psychodrama,
- Games.

On the other hand, at the bottom of the scale, was the use of ATC simulators in TRM sessions.

The low use of ATC simulators supports the view expressed by various TRM practitioners who state that it is very difficult to do TRM in combination with simulations. The simulator environment makes it quite difficult to have a team discussion because it constraints the number of persons who could be present. Even if a group of people is present in the simulator, only one, two at most, can actually participate in the simulation while the others can only observe. Consequently, they would not have the same shared experience. Even if the observers were to repeat the same exercise as ATCOs on the simulator, there is no guarantee that the outcome would be the same as the preceding/following one. Simulators mimic the high performance/high speed Ops environment whilst stepping off the “hamster wheel” is conducive to fruitful HF related discussions

The figure shows the responses received during the 2017 survey.

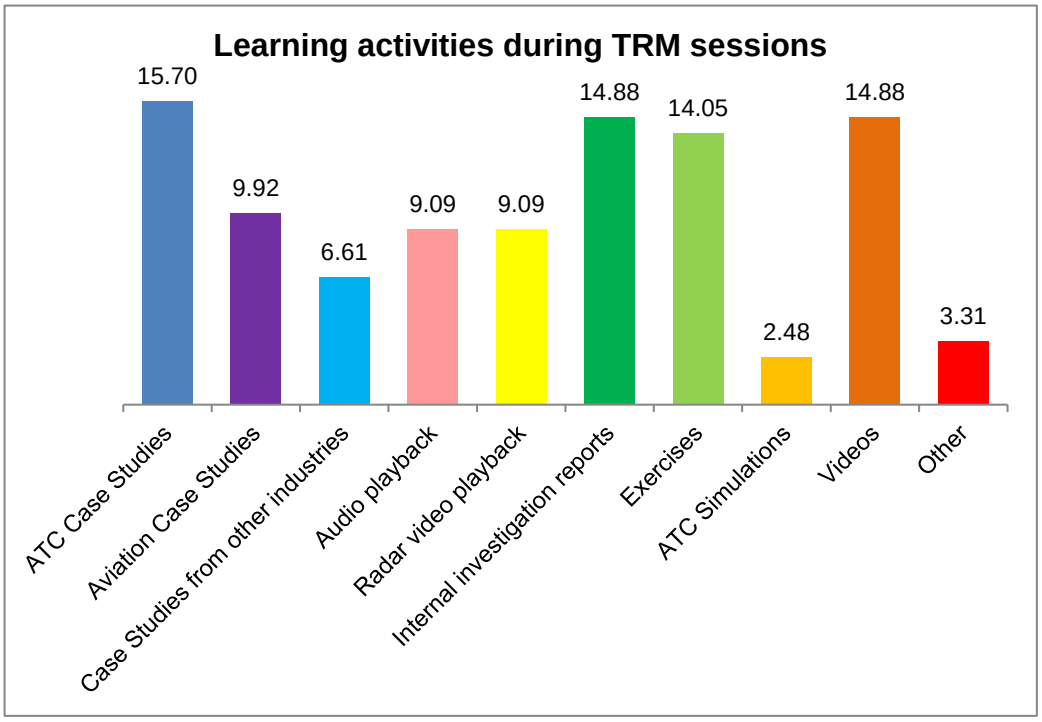

Figure 5 Learning activities during TRM sessions

Percentage of replies

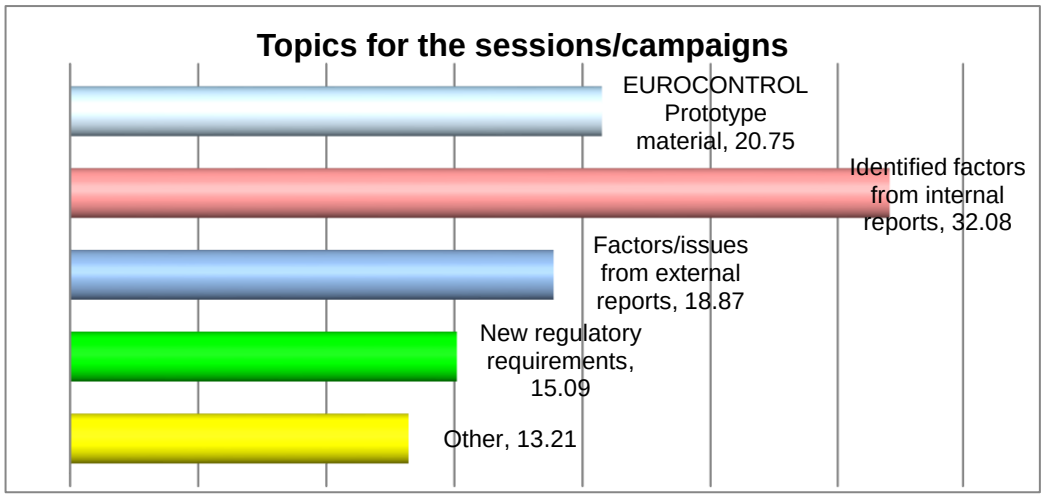

Figure 6 Sources for topics for TRM sessions/campaigns

Percentage of replies

The topics for discussion come from a number of different sources, the main one being the identified causal/contributory/contextual factors from internal reports (investigation reports, safety survey reports, safety assessment reports). Safety reports from other high-risk industries and regulatory requirements also drive the

TRM programme. Additionally some providers have indicated that they also use information from other sources, such as:

- Emerging issues
- Training needs, detected in the Ops room through observation over the shoulders techniques, interviews and focus group, and during training sessions,
- Input from Unit/training managers of the specific unit, based on their daily impressions and identified potential issues,
- Changes (technology, team dynamics, adaptation to change, etc.)
- Internal Requirements such as:
  - Leadership and Managerial Skills,
  - Application of Leadership,
  - Teamwork Skills,
  - ATCO Assessor reports,
  - Happiness and Resilience campaigns.

Many ANSPs use the EUROCONTROL prototype material, which according to the survey respondents was the second-most common source of topics. Many providers have delivered their own modules that dealt with a wide variety of topics including:

- Local issues,
- The human, Error management (Human errors),
- Drift into failure/bending the rules,
- Aging (getting older as an ATCO),
- Automation, Impact of New Automation, New Technology,
- Change of working style between planner and executive controller after switch to new system,
- Fatigue, Conflict Management, Leadership,
- Safety, Attitude and Communication,
- Transactional analysis, stress, communication, attitudes, behaviours, conflicts, CRM-TRM, feedback,
- Resilience, Supervisory Specifics, Adaptation to change, Workload dynamics.

The development of own modules is in line with the EUROCONTROL TRM philosophy; ANSPs are actually encouraged to do so. The EUROCONTROL prototype material, which is generic in nature, is meant to be used in the early days of TRM implementation thus providing a solid but neutral base from where the organisations can start to address HF problems. Once the TRM programme is well established and the participants have sufficient trust in the programme, then the ANSP can develop its own modules to address organisation-specific, or even unit-specific, problems and issues.

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5 Implementing TRM – Some Good Practices

5.1 Introduction

Typically, the introduction of a TRM programme consists of the following steps:

1. Initiation, which mainly consists of briefing the senior management, Ops management and the (ATCOs/ATSEPs/AIM, etc.),

   Note: There is no particular sequence to these briefings and may happen concurrently.

2. Promotion campaign
3. Pilot Session(s), namely the delivery of the pilot session(s) and their review following feedback from the participants and the facilitators.
4. Delivery of TRM

5.2 Initiation

The involvement and commitment of top/senior management in setting up a TRM programme cannot be too stressed. Without the support of management, the TRM programme would be severely handicapped and constrained.

From the 2017 survey, it emerged that that many service providers did pre-implementation briefings to introduce the TRM programme to various levels of the organisation.

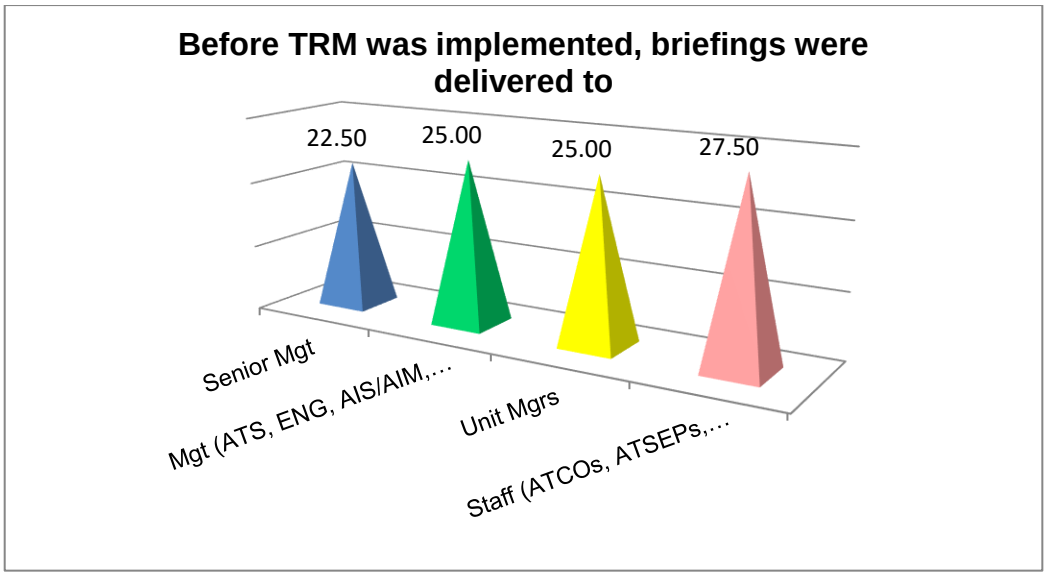


Figure 7 Pre-implementation Briefings

Percentage of replies

Figure 7 clearly shows that management, at various levels, was the main audience of the pre-implementation briefings. In a number of organisations where the staff was briefed, often the briefing was delivered only to a selected number of persons, mainly due to the size of the organisation and the large number of staff concerned. The personnel briefed were expected to further disseminate/share the information with their colleagues.

The preferred way of delivering the pre-implementation briefings was verbal with PowerPoint being a very close second. Others used electronic/printed bulletins and mails to inform staff and management about the start of the TRM.

5.3 TRM Promotion

Like any other safety programme, TRM requires a 'PR' campaign, first to launch it and then to maintain the interest in it.

Posters are a good way of advertising TRM and an example from ENAIRE (Spain) is shown below. Other ANSPs used other material including videos, bulletins and news flashes on their intranet as part of the campaign.

Figure 8 Examples of TRM Promotional Material

The giveaways serve as a reminder to people of the reflections and insights they made during the TRM sessions when they were discussing personal strategies when dealing with particular HF issues. The giveaways therefore have little value if they were to serve as a 'badge' of having attended a session or for collection

purposes. The choice of the giveaway should not be an ad hoc one. One needs to reflect on it to ensure that the giveaway will be an item that can be easily carried and taken into the Ops Room while reminding people the reason behind TRM training.

5.4 Pilot Session

A pilot session is recommended when starting a TRM programme. Such a session serves two principal objectives:

- Introduce the concept of TRM/facilitation to a staff group to gauge the participants' reaction to this new/different form of safety programme and continuation training,
- Enable the facilitators to gain some experience in preparing and conducting a TRM session and subsequently prepare better the ensuing TRM sessions.

It may be necessary to run a few pilot sessions depending on the size of the organisation. Additionally, if there are more than two facilitators in the organisation, they will also need to get some first-hand experience of preparing and conducting sessions.

It is very important to review the pilot session(s). The TRM champion (coordinator) needs to get feedback primarily from the participants and the facilitators, unless the coordinator was one of the facilitators in the pilot session(s). Feedback from management also helps, particularly with respect to any administrative problems encountered such as release of staff from the Ops room to attend, logistics and choice of location. This feedback helps to retain the positive elements of the session(s) and to identify corrective action to those areas needing improvement. All of this eventually leads to a smoother launch of the TRM programme.

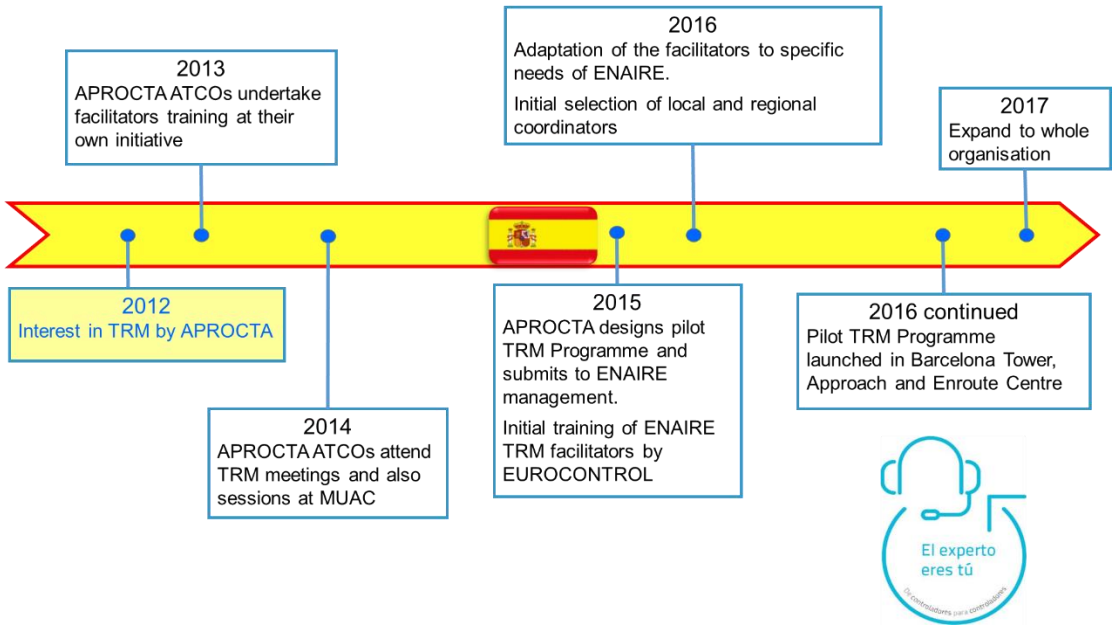
The pilot sessions would flow better:

- when the participants are volunteers,
- if the facilitators and the participants know each other, as it would make everybody more tolerant of each other while sharing this novel experience.

Pilot sessions need not be limited only to the brand new implementation of TRM. Such sessions may be used too for testing new TRM campaigns or new HF topics/modules.

5.5 TRM Case Studies

ENAIRE, Spain



Initial Feedback (2016)

• Being more assertive when the situation requires to inform a colleague • More openness and suggestions from colleagues • Improvement has been detected in the content and form of coordination • Individual improvement can infect others and lead them to adopt good practices • People are aware of the importance of pilots to have proper situational awareness • Changes in attitude identified, no radical changes yet nor extended to everyone but there are influences on techniques and attitudes	• I haven't noticed any change in organisational culture as a result of TRM but this may probably require a little more time and sessions • No change yet. Too few TRM sessions so far

Developments 2019

• TRM has been a fast growth program successfully implemented ○ Well received by ATCOs	• Difficulty to carry out TRM sessions for 2000 ATCOs.

○ Many facilitators well trained • Good experience with mixed participants (ACC, TWR, pilots, cabin crew, military, managers)	• Increasing traffic/need for ATCOs/limited available training hours • Limited to 6 hours, once every three years • Refresher training facilitators • Adapt training to very small units

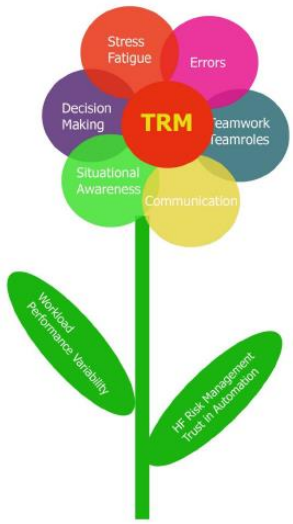
Other Considerations

- Many safety recommendations with TRM actions involved
- Misunderstanding of facilitation vs TRM (facilitation in non-ATCO activities)
- Start up a TRM office
  - Create a structure to collect the knowledge and experience of TRM facilitators,
  - Channel and prioritise all requests from different departments for TRM activities (recommendations, non-ATCOs mixed sessions...),
  - Implement ORMA (organisational resource management).

Israel Airports Authority

	2019 (WAI)	2019 (WAD)
	14 TRM-A courses	15 TRM-A courses
	148 participants	~120 - ATCO's + AIS
	Train 2 facilitators	Facilitators: 2 started training
		Interlab Demo

Austro Control Vienna ACC

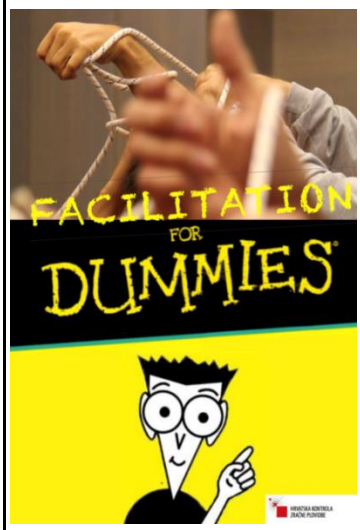


TRM Coordinator : 1 TRM Facilitators : 12

- A highly significant change was found in the satisfaction with the shift cycle

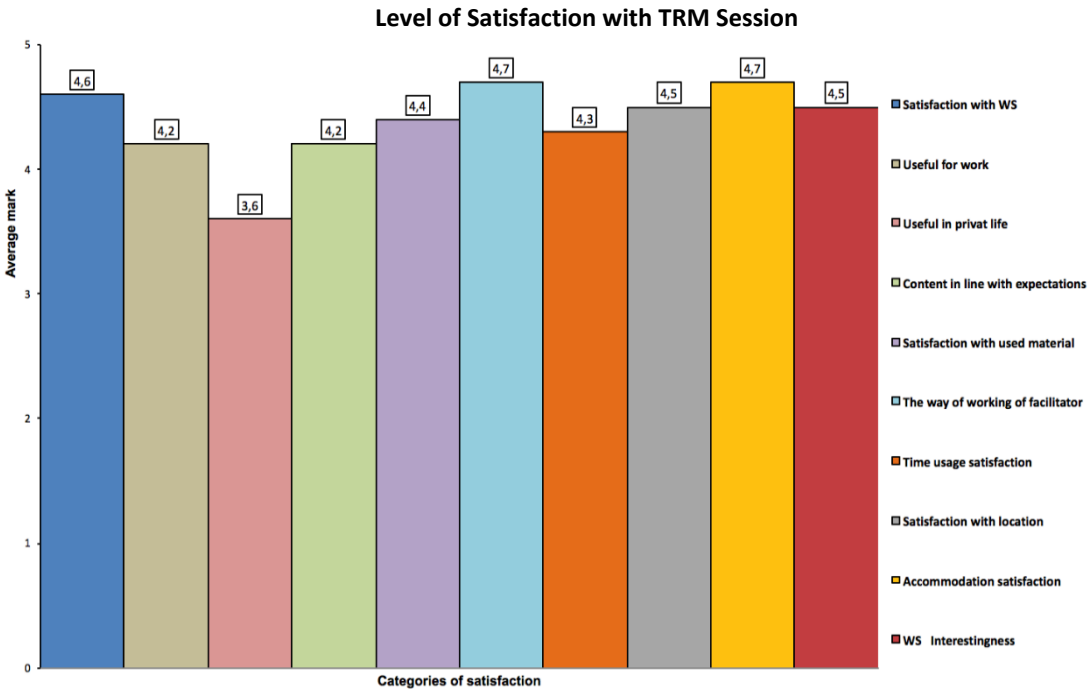
- Some highly significant results indicating changes in attitude concerning operative issues e.g.
  - Team members share responsibility in situations of high workload to prioritise activities
  - Working in an environment where group services are more appreciated than personal success
  - Always follow the correct phraseology when controlling

Croatia Control



Available only in Croatian!

2006	First attempt, failed
2008	3 facilitators trained
2012	On-site promotion by EUROCONTROL Project Team established 10 ATCOs selected to train as facilitators
2013	Project Management Plan official version 1.0
2014	Official launch of TRM programme 25 sessions planned by end of 2015
2015	TRM sessions held
2016	2014/15 TRM Programme completed 2016/18 TRM Programme launched – 24 sessions by Spring 2018 TRM Facilitators refresher training 3 additional TRM facilitators recruited
2017	TRM Sessions held



PANSA, Poland

TRM programme reaches about 800 ATM staff	2009	TRM started, addressing ATCOs, FISOs, Flight Data Officers and Air Traffic Controllers Assistants. Only volunteers from different units took part in the first few trial sessions
TRM Coordinator 1 (ATC background, also facilitator)	2010 - 2012	TRM sessions held regularly
TRM Facilitators: 20 ATCOs, 3 FISOs	2013	TRM programme suspended for almost two years due to the implementation of the new ATM system
	2015	TRM programme restarted, 8 sessions held
	2016	16 TRM sessions held
	2017	16 TRM sessions held
	2018	10 TRM sessions held All facilitators took a TRM Facilitator refresher training

Initial Feedback

• Spending three days without work and family gives us chance to rest and focus on the topics being discussed. (Do not have to think about shopping, kids etc.) • 2016 Cross-training programme for ATCOs started on their request. Mixed sessions are either ATCOs-ATCOs (different units) or ATCOs-Administration. • Participants emphasise the possibility to meet and talk with other colleagues from different units. • Gives both sides a chance to learn something about their work. • The TRM sessions themselves were found to be the best form of recruitment for TRM facilitators	• Closer cooperation with the safety unit is required to have future sessions more case driven and to use own Ops data.

BHANSA, Bosnia and Herzegovina

2017	Unit Training Plans and Unit Competence Schemes for all ATC units with TRM as a topic in HF subject
2018	TRM implementation action plan with detailed timeline including facilitator training, appointment of TRM coordinator etc., Croatia Control and Hungarocontrol shared their experience of TRM implementation, EUROCONTROL held Implementing TRM Working Session.
2019	TRM facilitators trained, TRM Program approved by BHDCA, First meeting of TRM facilitators.
2020	First session at the end of February Our TRM program specifies that TRM shall be conducted outside of BHANSA premises, for example in a Hotel. Due to COVID-19 measures all traveling deemed not urgent for BHANSA employees was banned. However, since this year was supposed to be the first time BHANSA controllers experience TRM, we decided to an online "coffee session" with an introduction to TRM. It was voluntary and controllers could if they wanted join to hear about what TRM is, ask questions about TRM and our plans for the future and chat in general about the crisis we are in and how we are coping. To make things a bit more playful we introduced a game in which everyone sent in a picture of their coffee cup and via a raffle, we randomly picked three

	winners, who then received symbolic little prizes (TRM key chain, coffee cup, chocolates). This was very well received by the participating controllers. 21 ATCO participated in TRM coffee session. Next step is to conduct a survey on this topic, and if ATCOs shows interest we will conduct another TRM coffee session.

We have

- 1 TRM coordinator (ATCO, also facilitator)
- 10 other TRM facilitators (7 ATCOS, 2 Professional associates for sports and physical activity, 1 psychologist)

5.6 TRM Sessions

Once the introduction and the pilot session(s) have been done, then it is time to deliver the TRM programme following the tips and tricks outlined in the preceding chapter.

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6 Continual Improvement of TRM

6.1 Why 'continual' improvement

The words 'continual' and 'continuous' are used as synonyms although they have a very subtle but important difference, which is often confused. 'Continual' means start and stop, while 'continuous' means never-ending.

'Continual' things come and go while 'Continuous', on the other hand, is nonstop.

> In the late 90s, the pros and cons of using *continuous* or *continual* improvement in the proposed ISO 9001:2000 were discussed (debated). It was agreed to use *continual* instead of *continuous* because the regulatory community believed that *continuous* improvement was unenforceable. They felt that *continuous* was unenforceable because it meant an organization had to improve minute by minute, whereas, continual improvement meant step-wise improvement or improvement in segments.
>
> Paraphrased from *Continual Improvement Auditing* [20]

ISO 9001, therefore, speaks of continual improvement because it would be unrealistic to expect an organisation to make progress in all potential improvements simultaneously. Each improvement will require the commitment of resources, prioritised by management, especially if investment is required. Thus, the improvements start and stop while the organisation is consolidating the improvement. The effectiveness of continual improvement is often determined by looking for evidence that the organisation has ensured that improvement objectives are consistent with the overall goal of enhancing and increasing the level of performance.

6.2 Need for Improvement

With the evolving emphasis on performance based management, a survey of the benefits resulting from TRM could be a way forward to secure the much needed resources to improve and enhance the TRM programme.

Although one could argue that there is no legal mandate for motivated staff, everyday life easily shows the negative effects of unmotivated personnel. Empirical evidence indicates that TRM assists in staff motivation. This statement needs to be backed up by scientific study, which may provide conclusive proof of the benefits of implementing TRM, safety being the priority but also in terms of cost-effectiveness.

6.3 Advantages of TRM

Various studies together with the results from EUROCONTROL surveys have identified several benefits from the use of TRM. These advantages can be split into three broad categories, namely:

[20] J. P. Russell *Continual Improvement Auditing* 2003

- Organisation
  - Related to daily operational practice and controllers' own experience,
  - Increased awareness from management that HF are at least as important for the safety as technical skills
  - Improved use of staff resources,
  - Enhanced task efficiency,
  - Enhanced efficiency of team work, continuity and stability of team work in ATM
  - Higher efficiency leading to better communication resulting in better cooperation
  - Enhanced safety/just culture,
- Safety
  - Reduced number of teamwork related incidents,
  - Reduced consequences to unavoidable errors,
  - Enhanced lesson learning and dissemination process aiming to reduce recurrence of the same problems,
  - Increased awareness about safety,
  - Enhanced and structured Safety Culture, Just Culture and Oversight Surveys aftercare.
  - Improved cooperation between ATCOs and other operational staff.
- Staff
  - Better understanding from the ATCOs of what they are doing and how they do it
  - Enhanced sense of working as a part of a larger and more efficient team,
  - Increased job satisfaction,
  - Increase of safety awareness,
  - Enhanced individual awareness of HF impact on operations,
  - Promotes professional behaviour,
  - Stimulates reflection on personal behaviours and may lead to change, improving interactions,
  - Awareness of incident trends,
  - Cross sector open forum (meeting controllers from other sector groups),
  - Peer support (understanding others' needs and perceptions),
  - Harmonises behaviours of participants in the Ops room,
  - Improved communications and feedback,
  - Improved level of wellness in the group/unit.

6.4 Side Benefits of TRM

In addition, the survey respondents pinpointed at the following improvements, which were attributed to TRM too:

- Adverse events involving team related errors were reduced.
- Feedback and results are used as inputs to the safety survey programme.
- The suggestions and actions raised during TRM sessions are used as inputs to ATCO refresher courses by integrating them into the simulator exercises and the continuation training case study analysis.
- Passing the feedback to the airlines where appropriate.
- Improving procedures.
- Identifying areas that need to be clarified and which need to be addressed.
- Raising specific questions/problems that are then forwarded to the appropriate contact person(s).

6.5 Review with Success Analysis

TRM facilitators are very familiar with the Issue Analysis process because this is one of the basic tools that they are trained in during their TRM facilitation course. Issue Analysis is a structured approach to defining and analysing problems where the TRM participants weigh their expertise, capacity and experience against the issue complexity. The Success Analysis is a similar process where the participants are engaged in the collaborative analysis of the reasons behind success to understand better the circumstances and actions linked to this success, and to apply this understanding to future practice.

During the Success Analysis, the participants would typically go through the following broad steps:

- Identify the success,
- What actually happened?
- Describe the specifics of the success
  - What made the difference?
  - What worked well?
  - What were the conditions that lead to success?
- What did we learn?
- What are we going to do? (Recommendations for future action to retain the success.)
- Whom are we going to tell? (Communicate the success to the different stakeholders.)

6.6 Other Methods of TRM Evaluation.

The respondents to the EUROCONTROL TRM surveys replied that the review/evaluation of TRM was through:

- Monthly reports which detail the causal factors found in investigation which are attributable to the interface between the pilots and controllers and also controller only team working.
- Evaluation through the quality system.
- Trend monitoring of the types of incidents featured in the programme to observe if improvements have resulted.
- A regular HF coordination meeting organised regularly by Corporate Safety Management.
- Safety surveys on specific skills and behaviours including team-working issues.
- After each TRM session, reports are produced with suggestions and actions for departments/management to commit to. These reports are then discussed with unit managers for implementation.

A large ANSP uses the following KPIs to measure the effectiveness of the TRM programme:

- Percentage of participants, who consider that the content of TRM session was appropriate and of significant help;
- Percentage of participants who develop personal and/or common behavioural strategies for teamwork enhancement;
- Percentage of participants who try to use personal and/or common behavioural strategies for teamwork enhancement;
- Percentage of teamwork related incidents in comparison with previous period.

The evaluation is based on the participants' feedback captured through questionnaires. The researchers indicated:

- The participants were asked to fill in two questionnaires, one straight away after each TRM session and the other three months after the participants' last session;
- The questionnaire should not be too long or complicated and was a very abridged form of the ATCSQ. (A full version of the ATCSQ is available in Annex D.)

6.7 Feedback

Receiving feedback, particularly constructive feedback, is essential. From the surveys, it was ascertained that most commonly feedback was collected in writing on specific forms/templates. Written feedback was also provided in open text manner. There were cases were there was only verbal feedback but often it was a combination of all three methods.

Most of the time, the feedback is given to the facilitators and/or management while in some cases other organisations, as shown below, received the feedback too. The other entities that received feedback about the TRM sessions were:

- Training organisation, Chief Training Instructor, Head of Training,
- TRM Coordinator,
- Directorate of Safety,
- Human Factor specialists, Academy/Human Performance Unit.

The feedback received is integrated in various ways in the TRM sessions/programme, namely as:

- new topics,
- more preparation time for the facilitators,
- longer sessions,
- better location,
- new TRM activities,
- less/more participants,
- Other
  - Non-controllers participation,
  - Reducing the time spent discussing the theory and spending more time on professional side of each topic,
  - Introducing Cross Training Programme (ATCOs-ATCOs and ATCOs-Administration) to help everybody to understand their work,
  - Modification of the case studies, change of the material use, feedback to the rest of the unit, decision for future cases.

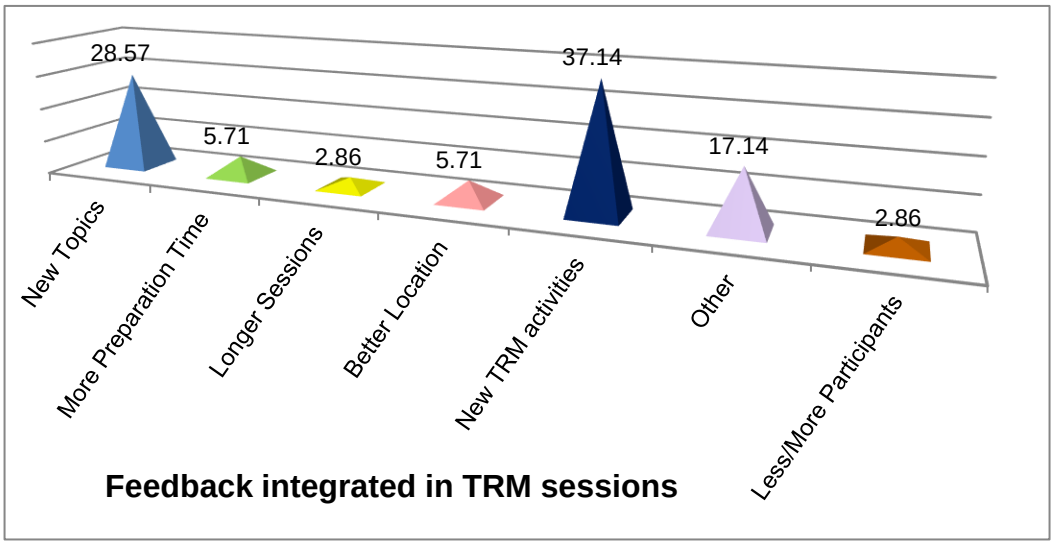

Figure 9 Integration of Feedback

Percentage of replies

From figure 9 above it is quite apparent that the feedback leads primarily to new TRM activities and then to new topics addressed during the TRM sessions/campaigns.

6.8 Reporting

A report about the TRM sessions or programme is usually submitted to management, usually after each campaign but there are ANSPs where such a report is sent after every session. Some ANSPs make annual reports too.

Figure 10 shows the responses and the points addressed in the TRM report.

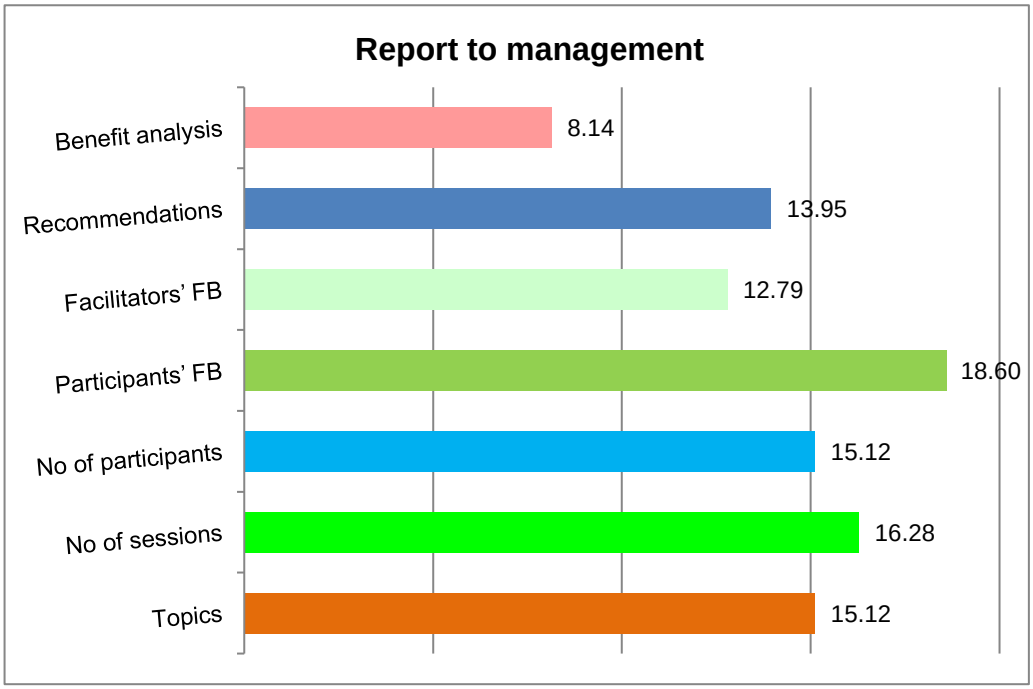

Figure 10 Main Points of TRM report

Percentage of replies

The TRM report contains a number of points although most of the time it addresses the main points from the participants' feedback. The report included one or more of the following items:

- Topics addressed during the sessions/campaign,
- Number of sessions done,
- Number of participants.
- Main points from participants' feedback,
- Main points from facilitators' feedback
- Recommendations for the next campaign,
- Benefit analysis.

Annex A - Mapping between TRM Modules and the ICAO ATCO Competency Framework

A1. Abstract

The Guidelines for Developing and Implementing Team Resource Management were issued in 1996 in order to provide management and operational staff with relevant information to consider when developing and implementing TRM.

Over the years, there have been a number of small changes in the training objectives but the basis had remained the same. In the meantime, ICAO had worked on new Procedures for Air Navigation Services (PANS) with respect to ATCO and ATSEP competencies. Naturally such standards, and the methodologies that evolved from them, had to be taken into account also for TRM training.

The revised guidance document details the current prototype TRM modules and maps them with the ICAO ATCO Competencies. Several new modules have been identified as necessary to update the current TRM Guidance Material. Additionally some of the current content needs updating to be aligned closer with ICAO standards on ATCO competence.

In September 2017, during a TRM workshop in Brussels, an exercise was undertaken to identify the gaps and the matches between the ICAO ATCO/ATSEP competencies and the existing TRM modules.

The work was continued during a TRM working session held at IANS Luxembourg in April 2018, where a group of TRM, HF and Training experts mapped the TRM module objectives with the Competency Elements and Performance Criteria/Observable Behaviour specified in ATCO Competency Framework. This exercise indicated that the present TRM modules already address many of the Performance Criteria/Observable Behaviours.

Two ICAO Competences, namely Traffic and Capacity Management and Separation and Conflict Resolution, were considered to be purely technical and any HF Performance Criteria/Observable Behaviours associated with these competencies were adequately addressed by the criteria specified for the other competences.

The conclusion from the April 2018 event was that there were some gaps, which had to be addressed by either revising the current modules or creating new ones. Consequently, a working group was formed to analyse the results of the workshop and propose a way forward.

A2. Note

The Mapping document is available as a standalone document and is not reproduced in full for the sake of brevity.

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Annex B - Facilitator Competence and Training

B1 - Abstract

A key idea is that people do (notice, pay attention, act on, solve, etc.) what makes sense to them at the time. The facilitator's job is not to discover the things that people did not do, but what they actually did, and how they perceived their actions at the given time. Ultimately, facilitation is about getting people to tell their stories.

The facilitator does this by employing various methods; group discussion, exercises, case studies, written and the unwritten, because there are stories to tell in every person.

Facilitators are not looking for causes. Identifying the explanatory and descriptive factors in an occurrence is the task of an occurrence investigator, and cannot be done during a Team Resource Management (TRM) session. On the other hand, finding out about the things people actively do to keep the ATM system safe and running is quite difficult, and a TRM session provides a unique opportunity to reveal the underlying factors of success or the lack of it.

In ATM, there is no singular, sole perspective but rather multiple perspectives, sometimes overlapping and occasionally not.

Competency and associated competence schemes provide the ANSP with a way to define, in behavioural terms, what it is that the personnel need to do to achieve the results that the organisation desires and in such a way that is in keep with its culture.

The objective of this document is to identify TRM Facilitators competencies so that the TRM Facilitator course and the Refresher course are designed in such a manner as to address the identified competencies.

B2 - Note

The Facilitator Competence and Training document is available as a standalone document and is not reproduced in full for the sake of brevity.

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Annex C - Air Traffic Control Safety Questionnaire (ATCSQ)

C1 - Overview

The Air Traffic Control Safety Questionnaire (ATCSQ) was developed as part of the 1996 guidance material to enable the evaluation of the TRM programme. The questionnaire consists of four main sections:

- The first section concerns attitudes towards the quality of training, working conditions and documentation.
- The second and third sections contain the main evaluative information, the second being concerned with attitudes and the third with those responses associated with behaviour.
- The fourth section concerns demographic information.

The ATCSQ has been subjected to both test-retest and Cronbach Alpha reliability tests. It has proven to be a stable and reliable instrument for the purpose of electing responses in the seven domains for which it was designed. Several questions have been identified as needing alteration, particularly in multilingual and multicultural environments.

The ATCSQ has been found to be a useful indicator of attitude change within certain domains. The results of the evaluation of this questionnaire clearly indicate the ATCSQ to be a robust, reliable instrument and informative for the purpose for which it was designed.

Responses concerning the change in attitudes between the two courses are a little more difficult to determine. However, the results indicate that the questionnaire is sensitive to changes in attitude. Clearly, with a small number of responses, little can be deduced with any certainty, but with larger samples and strict adherence to data gathering more meaningful results can be achieved. Statistical analysis indicated that there were strong changes with respect to teamwork and team roles between the first and last responses.

C2 - Note

The ATCSQ is available as a standalone document and is not reproduced in full for the sake of brevity.

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REFERENCES

EU Documents

COMMISSION IMPLEMENTING REGULATION (EU) 2017/373 of 1 March 2017 laying down common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight, repealing Regulation (EC) No 482/2008, Implementing Regulations (EU) No 1034/2011, (EU) No 1035/2011 and (EU) 2016/1377 and amending Regulation (EU) No 677/2011

COMMISSION REGULATION (EU) No 691/2010 of 29 July 2010 laying down a performance scheme for air navigation services and network functions and amending Regulation (EC) No 2096/2005 laying down common requirements for the provision of air navigation services

COMMISSION IMPLEMENTING REGULATION (EU) No 390/2013 of 3 May 2013 laying down a performance scheme for air navigation services and network functions

REGULATION (EU) No 996/2010 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC

COMMISSION REGULATION (EU) 2015/340 of 20 February 2015 laying down technical requirements and administrative procedures relating to air traffic controllers' licences and certificates pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council, amending Commission Implementing Regulation (EU) No 923/2012 and repealing Commission Regulation (EU) No 805/2011

Executive Director Decision 2015/010/R OF THE EXECUTIVE DIRECTOR OF THE AGENCY of 13 March 2015 adopting Acceptable Means of Compliance and Guidance Material to Commission Regulation (EU) 2015/340

Easy Access Rules for ATCO, Air Traffic Controllers' Licensing and Certification, issued August 2015

https://www.easa.europa.eu/sites/default/files/dfu/Easy%20Access%202%20ATCO.pdf

EUROCONTROL Documents

EUROCONTROL Specification for the ATCO Common Core Content Initial Training, edition 2, 2015

https://skybrary.aero/bookshelf/books/2676.pdf

EUROCONTROL TRM Report – Implementation Survey 2017

https://www.skybrary.aero/bookshelf/books/5731.pdf

INSTITUTE OF AIR NAVIGATION SERVICES EUROCONTROL Facilitation Methodology and Processes

Safety Human Performance Sub-Group TRM Workshop, EUROCONTROL, Brussels, 25 – 26 September 2017

ICAO Documents

PANS-TRG, (ICAO Doc 9868), Procedures for Air Navigation Services — Training

Manual on Air Traffic Controller Competency-based Training and Assessment (Doc 10056)

Manual on Air Traffic Safety Electronics Personnel Competency-based Training and Assessment (Doc 10057)

Manual on Human Performance (HP) for Regulators (Doc 10151)

Other Documents

Lencioni, P. (2005) *Overcoming the Five Dysfunctions of a Team*

Irish Aviation Authority (via https://www.eurocontrol.int/articles/team-resource-management-trm accessed 4/12/2018)

Schwarz, R. (1994) *The Skilled Facilitator*

West, M. (2004) *Effective Teamwork: Practical Lessons from Organizational Research*

Evaluating Team Resource Management Implementation within ATC and to Define the Practice for IFATCA, WP No. 156 50th Annual Conference, Amman, Jordan, 11-15 April 2011, Presented by PLC

http://wiki.ifatca.org/index.php/kb/wp-2011-156/

Critical Thinking as Defined by the National Council for Excellence in Critical Thinking, Michael Scriven & Richard Paul, presented at the 8th Annual International Conference on Critical Thinking and Education Reform, Summer 1987.

Hollnagel, E., Leonhardt, J. Licu, T. & Shorrock, S. (2013).

From Safety-I to Safety-II: A White Paper. Brussels, Belgium: EUROCONTROL.

http://skybrary.aero/bookshelf/books/2437.pdf

J. P. Russell (2003) *Continual Improvement Auditing*

https://www.qualitywbt.org/FlexTraining/ASP/content/sections/A12/pdfs/01al-vs-ous.pdf

Jos Arets, Charles Jennings, Vivian Heijnen *The 70:20:10 Model - A different view of work, performance and learning*

https://702010institute.com/702010-model/

An analysis of the value of the ways of learning at work: PART ONE – Modern Workplace Learning 2021

https://www.modernworkplacelearning.com/cild/mwl/litw-analysis/

Dr. Steven Shorrock (2019) *'Human Factors' and 'Human Performance': What's the difference? | Humanistic Systems*

https://humanisticsystems.com/2019/04/24/human-factors-and-human-performance-whats-the-difference/

Professor Erik Hollnagel *Safety-I and Safety-II*

https://erikhollnagel.com/ideas/safety-i%20and%20safety-ii.html

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ABBREVIATIONS and ACRONYMS

AIM	Aeronautical Information Management
ACS	Area Control Surveillance
ADI	Aerodrome Control Instrument
ADV	Aerodrome Control Visual
ACP	Area Control Procedural
AMC	Acceptable Means of Compliance
ANSP	Air Navigation Services Provider
APP	Approach Control Procedural
APS	Approach Control Surveillance
ATC	Air Traffic Control
ATM	Air Traffic Management
ATCO	Air Traffic Controller
ATCSQ	Air Traffic Controll Safety Questionnaire
ATSEP	Air Traffic Safety Electronics Personnel
CBT	Computer Based Training
CNS	Communication, Navigation and Surveillance
CRM	Crew Resource Management
FISO	Flight Information Service Officer
HF	Human Factors
HP	Human Performance
HR	Human Resources (Unit)
HUM	Human Factors Subject
IANS	(EUROCONTROL) Institute of Air Navigation Services
ICAO	International Civil Aviation Organisation

IFATCA	International Federation of Air Traffic Controllers' Associations
ISO	International Organisation for Standardisation
OJT	On the Job Training
ORMA	Organisational Resource Management
SME	Subject Matter Expert
SMS	Safety Management System
TEM	Threat and Error Management
TRM	Team Resource Management

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