

EUROCONTROL Guidelines for TRM Good Practices

Edition Number	:	1.1
Edition Date	:	18/03/2015
Status	:	Released Issue
Intended for	:	General Public
Category	:	EUROCONTROL Guidelines

DOCUMENT CHARACTERISTICS

TITLE			
EUROCONTROL Guidelines for TRM Good Practices			
	Publications Reference:		
	ISBN Number:		
Document Identifier	Edition Number:	1.1	
	Edition Date:	18/03/2015	
Abstract			
The document provides a series of guidelines based on experience gained from the implementation of TRM to assist new states to implement this HF tool and experienced states to enhance it.			
Keywords			
Team Resource Management	Teamwork	Teams	Human Factors
Human Performance	Facilitation	ATC	ATS
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STATUS, AUDIENCE AND ACCESSIBILITY				
Status	Intended for		Accessible via	
Working Draft	<input type="checkbox"/>	General Public	<input checked="" type="checkbox"/>	Intranet <input type="checkbox"/>
Draft	<input type="checkbox"/>	EUROCONTROL	<input type="checkbox"/>	Extranet <input type="checkbox"/>
Proposed Issue	<input type="checkbox"/>	Restricted	<input type="checkbox"/>	Internet (www.eurocontrol.int) <input checked="" type="checkbox"/>
Released Issue	<input checked="" type="checkbox"/>			

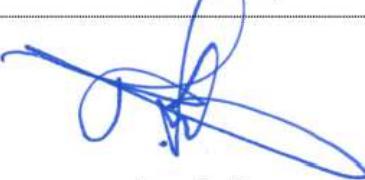
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DOCUMENT CHANGE RECORD

The following table records the complete history of the successive editions of the present document.

EDITION NUMBER	EDITION DATE	REASON FOR CHANGE	PAGES AFFECTED
0.1	10/02/2014	Working Draft	
0.2	8/07/2014	Proposed issue after internal review and review by SHPSG WA10	ALL
1.0	4/02/2015	Released issue	ALL
1.1	18/03/2015	Document revision	7; 9; 11 and 36

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EXECUTIVE SUMMARY

Team Resource Management (TRM) is defined as: Strategies available to ANSPs for the best use of all available resources - information, equipment and people - to optimise the safety and efficiency of Air Traffic Services.

EUROCONTROL has been working on TRM since 1994, and now many ANSPs have some form of TRM programme for ATCOs.

In 2009, despite all the previous work done, EUROCONTROL's Safety Human Performance Sub-Group identified Team Work Factors as one of the ten priority areas where more work needs to be done to ensure the current level of safety and improve on it. Consequently there is need to support TRM implementation and improve HF knowledge.

In 2015 Team Resource Management was recognised as an Acceptable Means of Compliance with the Commission Regulation 2015/340 addressing Human Factors part of Unit and Continuation Training requirement.

The document provides a series of guidelines based on experience gained from the implementation of TRM to assist new states to implement this HF tool and experienced states to enhance it.

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1. Introduction

Team Resource Management (TRM) is defined as: Strategies available to ANSPs for the best use of all available resources - information, equipment and people - to optimise the safety and efficiency of Air Traffic Services¹. TRM enhances controllers understanding of the sources of error in ATC and helps them to develop personal strategies for error reduction and to mitigate consequences. TRM supports in this way operational safety efforts and aims to reduce human error also by dynamically delineating roles and establishing effective cross checking procedures within a team.

TRM was introduced into ATC world following the success achieved in enhancing teamwork practices with Crew Resource Management (CRM) in the airline community. The practice is applied within virtually every airline with training available to pilots and other operational staff. The success of CRM within the airline industry was so significant a comparable result was sought in ATM. The practice has since been adopted into other safety critical industries to achieve higher levels of safety and efficiency.

EUROCONTROL started work on Team Resource Management in 1994 when a Study Group was created to investigate the possible benefits of, and the requirements for a TRM programme in the European Civil Aviation Conference (ECAC) area.

Further milestones in the TRM programme were establishing the User Group and a TRM course at IANS, followed by publication of TRM Implementation Guidelines and surveys on the status of TRM Implementation in the EUROCONTROL States.

In 2009, in contribution to the previous work EUROCONTROL's Safety Human Performance Sub-Group identified Team Work Factors as one of the ten priority areas where more work still needs to be done to ensure the current level of safety and improve on it. Additionally Implementation of TRM is part of the European ATM Masterplan Objective HUM02.1.

Beginning of 2015 is marked by the new ATCO Commission Regulation 2015/340 and the recognition of Team Resource Management as an Acceptable Means of Compliance to Human Factors training requirements in Unit and Continuation Training schemes.

1.1 Purpose of the document

Not all EUROCONTROL ANSPs have implemented TRM. Consequently there is still need to raise the awareness of such organisations to the benefits of TRM. Regulatory requirement by EU for introduction of Human Factors training in Unit and Continuation Training for ATCO increases the need for these awareness activities and support for TRM implementation. In fact, EASA as per ED Decision 2015/010/R in Subpart D Sections 2 and 3 has included TRM as part of the Acceptable Means of Compliance (AMC) to the requirements ATCO.D.045(c)(4) ATCO D.080(b)(3) Human Factors Training.

The reality of ANSPs today has shown that the safety of operations is influenced not only by the professional group of air traffic controllers, but by other staff and organisational and national cultures as well. Some ANSPs have already followed steps to move ahead of TRM, and others are getting ready to do so. The scope of TRM needs to expand beyond air traffic controllers. Its benefits could also profit others working in teams and for safety, such as air traffic safety electronics personnel (ATSEP).

EUROCONTROL has drawn up this compendium of good practices collected from the experiences of the ANSPs which have implemented TRM and can now be considered as leaders in this area. It is part of the TRM Mentor documents which will support ANSPs in developing plans to introduce and enhance TRM in their organisation.

¹ EUROCONTROL TRM Leaflet (2007)

1.2 TRM in ATM Safety Management Systems (SMS)

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. TRM, as defined by ICAO, is an integral component of SMS. It is worth identifying other elements and seeing what interdependence exists to clearly identify the place of TRM in the broader scope of established SMS.

Safety Culture: The way safety is perceived, valued and prioritised in an organisation. It reflects the real commitment to safety at all levels in the organisation. It has also been described as "how an organisation behaves when no one is watching".²

Just Culture: One key to the successful implementation of safety regulation is to attain a "just culture" reporting environment within aviation organisations, regulators and investigation authorities. This effective reporting culture depends on how those organisations handle blame and punishment.³

Human Factors: Human Factors is about people in their living and working situations; about their relationship with machines, with procedures and with the environment around them; and also about their relationships with other people. In aviation, Human Factors involves a set of personal, medical and biological considerations for optimal aircraft and air traffic control operations.⁴ ICAO has formally acknowledged the role of HF in aviation, by mandating Human Factors training with the introduction of Human Factors Training Manual (Doc 9683). The European Commission has done the same through EU 2015/340⁵ and this requirement has now been significantly expanded through EASA ED Decision 2015/010/R Requirements on Air Traffic Controller licensing

Threat and Error Management (TEM): TEM is an overarching safety concept regarding aviation operations and human performance. It is not a revolutionary concept, but one that has evolved gradually, as a consequence of the constant drive to improve the margins of safety in aviation operations through the practical integration of Human Factors knowledge. The main objective of TEM is to enhance aviation safety and efficiency by providing an operationally relevant and highly intuitive framework for understanding and managing system and human performance in operational contexts. TEM-based tools involve the monitoring of safety during normal operations.⁶

Observational safety surveys: These safety activities are over the shoulder observations in a normal working situation by trained observers (usually controllers) focusing on safety improvement. The observations are not a competency check; they focus on the ATC system, not the individual. Controller participation is voluntary and the observations are anonymous, confidential and non-punitive. Two main methods have been developed. The Normal Operations Safety Survey (NOSS) focuses on threats, errors and undesired states. The Day 2 Day Safety Survey (D2D) focuses on techniques and practices that benefit safety.⁷

Normal Oversight Safety Survey (NOSS): Similar to the development of TRM from the airline equivalent, CRM, NOSS was developed as a specific ATC variation of the airline equivalent of Line Operated Safety Audit (LOSA). NOSS is a methodology for the collection of safety data during normal ATC operations i.e. operations during the course of which no accident, incident or (mandatory reportable) event takes place. By conducting a series of targeted observations of ATC operations over a specific period of time, and the subsequent analysis of the data thus obtained,

² http://www.skybrary.aero/index.php/Safety_Culture

³ http://www.skybrary.aero/index.php/Just_Culture

⁴ CAP 719 Fundamental Human Factors Concepts

⁵ EU 2015/340, commonly referred to as the ATCO Licensing Regulation

⁶ Threat and Error Management in Air Traffic Control

⁷ Ensuring Safe Performance in ATC Operations: Observational Safety Survey Approaches A White Paper

the organisation is provided with an overview of the most pertinent threats, errors and undesired states that ATCOs must manage on a daily basis. Some ANSPs have reported good results from the implementation of safety survey methods similar to NOSS.⁸

Day 2 Day Safety Survey (D2D): The aim of the D2D Safety Survey is to observe, in a non-threatening and non-judgemental way, controllers in their normal working situation, and to record the employment of some agreed and observable techniques in practice. The focus of the survey is on the positive behaviours and techniques that operational staff employs to maintain safety. The observations allow the ANSP to see how often controllers employ the positive practices and techniques, and see how well the practices work.

Note: TEM, NOSS and D2D are neither HP/HF research tools, nor HP evaluation/assessment tools. TEM, NOSS and D2D are operational tools designed to be primarily, but not exclusively, used by safety managers in their endeavours to identify and manage safety issues as they may affect safety and efficiency of aviation operations.

TEM and HF are undeniably linked to the content and delivery of TRM. Connections involving Safety Culture and oversight have just as compelling foundation within TRM as it is the “means” to address the Safety Culture survey results – human factors related issues. The concept of TRM makes it a good delivery tool element of SMS that supports ANSPs to remain proactive within the workplace.

1.3 Benefits of TRM

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 what if and on why and how – the time to do so is not necessarily built-in in daily operations. In organisations where high reliability and safety are a must; it should be a must to plan and to add in such a time for the operational staff to analyse their impact on operations. This is applicable to other operational safety personnel (such as ATSEP, AIM).

An ongoing TRM programme should be applied as a training countermeasure to errors resulting from team contributions. The benefits of TRM are seen as:

- Enhanced OPS task efficiency,
- Enhanced continuity and efficiency of team work,
- 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.

Team Resource Management is clearly a safety-related programme. An important conclusion of the work done by the TRM practitioners is that TRM is also a convenient way to introduce human factors related issues in Air Traffic Management (ATM). This would support changes in attitudes and behaviours in the longer term, reducing the impact of errors and contributing to better safety cultures.

⁸ [http://www.skybrary.aero/index.php/Normal_Operations_Safety_Survey_\(NOSS\)](http://www.skybrary.aero/index.php/Normal_Operations_Safety_Survey_(NOSS))

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2. Good Practices

2.1 Definition

Good practices are to be understood as to signify practices which are appropriate for application within a particular organisation given its specific business culture, size etc.

2.2 Reflections

Geography, culture and size have a direct impact on an organisation's philosophy and behaviour. Additionally a practice which works well within one organisation might be less successful in another, if the latter has a significantly different business context. One size may not fit all.

TRM is not intended as a replacement for conventional training but should complement it. TRM is a means of increasing personal skills and professionalism by the application of facilitated sessions to identify threats, errors and undesired states in order to find possible solutions. The increased awareness of how can "I" be safer, coupled with an enhanced sense of a "support work structure" (working as a part of a larger team) will also lead to improved job satisfaction. An ongoing TRM programme in an ANSP can provide a good platform for identifying "what goes well" in daily operations as well, thus it caters for capturing and feeding back the identified practices in the ATM system.

In order for an ANSP to meet its primary obligation of providing safe services it is necessary to build good communication inside the organisation and an atmosphere of cooperation. This atmosphere has embedded attributes, which are inherent in the activities of all actors and include: consistency, clarity of purpose and accountability, an acceptance of each actor's roles and responsibilities, sufficient resources, mutual trust and confidence yet encouragement to express doubts and worries; and a shared view of the objectives set to deliver positive outcomes.

Therefore the selection of practices needs to be subject to these reflections.

2.3 A Number of Good Practices

2.3.1 Starting it – top levels

The role of management support in team training initiatives such as TRM cannot be overestimated. It is important that TRM is not viewed as a cosmetic and expensive "add on" to existing training, but rather as an integral part of training structure within the organisation. For Safety Culture to be successful it should start from the top of the organization and filter down through all levels. Similarly it follows that the TRM process should initiate at the highest levels of an organisation. The next step is an education phase to ensure ATCOs are fully aware of the aim. This communication between management and operational staff is vital in achieving programme goals.

ANSP Tip

A business package should be prepared with senior management to ensure the timely and effective implementation of TRM. The package can consist of:

- description of TRM process,
- term of references,
- procedures,
- key performance indicators,
- feedback loop from participants and facilitators and
- a quality assurance process.

2.3.2 Responsibility

TRM users, ICAO and EUROCONTROL have identified TRM as a successful means for ANSPs to proactively identify and rectify safety/human factors issues in the ATM environment. However, from the original inception of this model, it appears that there is a need for commitment globally to pursue implementation of TRM programmes and to exchange ideas and concepts within the collective of ATM and Aircrew (ORMA and MCRM).

TRM implementation falls into three categories. ANSPs that have embraced the concept totally; ANSPs that have implemented the programme, but are struggling to allocate sufficient resources for ongoing sessions and analysis; and ANSPs that have yet to implement any such programme.

In the majority of cases it is the Unit Management which is primarily responsible to ensure that TRM is performed. In some ANSPs this responsibility is shared, most commonly with the HP/HF/HR unit or the Training unit. In a few ANSPs the responsibility rests with the Safety Unit or even Senior Management. The responsible manager for TRM may vary in those ANSPs that have implemented TRM for other professionals besides ATCOs. For example, the Unit Manager may be responsible for ATCO TRM but the HF unit may be responsible for ATSEP TRM.

ANSP Tip

For large ANSPs it makes sense to split human resources involved in TRM between a core team and facilitators. The core team, which will maintain basic idea and philosophy of TRM, could be managerial staff and/or HR/HF specialists. The facilitators are operational staff (ATCO, ATSEP etc.), who conduct TRM sessions. This approach fosters sustainable development of TRM within the ANSP and flexible involvement of available human resources and increased cost-efficiency.

ANSPs that embrace TRM are providing their staff with an effective means to proactively minimise impact of work related errors and, by doing so, such ANSPs are making a clear commitment to safety.

2.3.3 TRM Promotion

Active management support and a carefully prepared information campaign exert critical influence over the attitudes towards the TRM concept. Active promotion should convince management, operations and (future) TRM facilitators. A personal invitation to the different TRM events works better than only relying on pamphlets.

An article in the national or in-house magazine or local information bulletins - as indicated in the 'Introduction' Module of the TRM course - has proved to be a good promotion method. Additionally TRM has been promoted via a series of posters and presentations on this topic during the course of 'team days' at operational units. Information has been also provided at several continuation training seminars.

ANSP Tip

To this end an ANSP has developed following promotion tools:

- TRM web-site;
- Unique TRM brand (name of TRM programme that reflects national features: e.g. TRM was rebranded into "Team Strategies Development Programme");
- Unique TRM logo;
- TRM facilitator's role advertisement;
- System of financial and/or non-financial motivation for facilitators (e.g. creation of facilitators' community, annual team building meetings etc.).

Some states have also successfully experimented with aide-memoires like T-shirts with TRM logo, TRM posters, and TRM 'credit cards' with TRM logo and key message. Other ideas are TRM ties or shawls, TRM coffee or tea cups (a well-known attribute in any 24-hour operation) and TRM sweets.

2.3.4 National Working Groups

The national working groups act as local steering committees and ideally consist of an operational/engineering manager, a training manager, an occurrence investigator and some safety-critical personnel (ATCOs and ATSEPs who have attended the TRM facilitators' course). An active interest in human factors by the participants is a necessary requisite.

Tasks performed by the TRM national working group include:

- acting as a national or local TRM focus point and a reference to TRM Task Force;
- organising the local introduction of TRM;
- creating local introduction material;
- deciding on local introduction methods (newsletters, articles, posters, briefings, etc.);
- recruiting and selecting of TRM facilitators;
- selecting participants;
- organising the training for facilitators;
- organising the customisation of the TRM course;
- choosing (local) incidents for the customisation;
- identifying cultural issues;
- organising a pilot-course (participants, place, time, personal invitations, etc.);
- evaluating the pilot-course and the management of eventual amendments;
- defining feedback to participants and management;
- communicating on progress to OPS and other stakeholders.

The National Working Groups can also act as liaison with the pilot/aircraft operators' community and other safety critical operations communities.

ANSP Tip

Two large ANSPs sometimes hold mixed sessions where pilots and controllers conduct together their CRM/TRM. The course analyses incidents from an ATC and aircrew perspective, looking primarily at communication and situational awareness, and provides a forum to discuss both technical and procedural issues together combining desired aims and intentions of the two groups. It encourages "what if" discussions and OPS check list creations. These combined sessions are sometimes referred to as Multi Crew Resource Management (MCRM).

2.3.5 TRM Case Studies

TRM shall be delivered using methodology that allows the participants to learn by themselves in a practical manner and not via traditional classroom methods. Experiences from various states have showed that the use of local occurrences generated better in-depth discussions, and the learning experiences from local incidents and case studies were more powerful. Global examples remain good choice as well.

Additionally the involvement of occurrence investigators in the TRM customisation stage can be very valuable in the choice of local examples for the different case studies and exercises.

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 ownership and involvement along with an open probing view towards oneself and others that is the core of TRM.

2.3.6 Facilitation and Facilitators

TRM at an individual level focuses on personal performance, characteristics and beliefs. Consequently TRM cannot be taught in a conventional classroom/teacher manner and TRM sessions are run using group facilitation. Roger Schwarz⁹ 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.

The facilitator's role is to make the group's work easier because he/she separates the process of the session from its content and provides the mechanics of steering, while the content experts point the direction. Therefore the facilitator works with the group to help them analyse favourable and undesirable operational scenarios, preferably come to a variety of solutions to a single issue to avoid "single point of failure scenarios", or plan for the future. Thus he/she is a gentle guide, making it easier for the group to have the discussion. Facilitators do not use: 'you should' or 'you must' because their role is to help the group members to come up with their own and individual solutions to the issues discussed.

TRM sessions are carried out by a facilitator with operational ATC experience who is trained in assisting colleagues to develop their own ideas and positive attitudes, and in creating an environment which stimulates self-learning.

Involvement of the facilitators is necessary from the beginning of the customisation as they are the ones to effectively carry out both the customisation of the material to be used and the TRM sessions. Therefore the choice of the proper person to act as TRM facilitator is essential to the success of the TRM programme. Consequently interest and enthusiasm for this area of work is a major criterion for choosing facilitators. Facilitators, thus, have to be trained and competent because they have to be:

- skilful in evoking participation and creativity,
- practiced in honouring the group and affirming its wisdom,
- capable of maintaining neutrality,
- skilled in reading the underlying dynamics in the group,
- adroit in adapting to the changing situation and
- releasing blocks to the discussion.

ANSP Tip

Core requirements for TRM facilitators' recruitment:

- Strong motivation;
- Flexibility and focus;
- Communication skills.

TRM Facilitators' selection and training process:

- Discussion with the candidate (a volunteer) to verify the level of development of core competencies;
- Basic facilitators training course based on EUROCONTROL best practices (classroom training delivered by facilitators);
- Assessment (one TRM module co-delivery) evaluated by a TRM facilitator, ;
- Gaining practical experience by first participating in TRM sessions as a co-facilitator, i.e.

⁹ The Skilled Facilitator

- providing support on technical issues and some parts of discussions;
- Graduation to facilitator, after a check made by at least two facilitators.

Normally TRM sessions are conducted by a mix of experienced and new facilitators.

This approach to the selection and competence of the facilitators were designed to ensure the appropriate quality of involved personnel because the organisation believes it is not enough just to pass training course to become a facilitator, the prospective facilitator should gain practical experience in this field. This technique helps to improve the effectiveness of TRM programme.

2.3.7 TRM Sessions

Safety related attitudes and behaviours are continuously learned and adopted thus TRM sessions are focused on helping participants to learn by themselves in a practical manner, rather than delivering classroom based teaching. Facilitation allows the group to determine individual solutions in dealing with the issues because this is a powerful way of encouraging change where it is needed. In a typical TRM session, participants are encouraged to take a stand and maintain their point of view by reasoning, even though others see things differently. This forces the individuals to think about their own opinion in light of other views and ideas. During this phase deeper analysis of work issues occurs as a result of shared experiences.

ANSP Tip

- A TRM session should be planned, designed and delivered by at least two facilitators.
- Several experienced facilitators should plan a mix of discussions and exercises.
- The most effective exercises are short; practice shows 20 minutes is enough to make a point. After each exercise, the facilitator provides room for elaborate discussion and reflection.
- Some ANSPs started with a one-day seminar covering stress and the TRM module 'Teamwork'.
- Another ANSP started with one half-day with ATCOs discussing a case. Over time, the sessions evolved into a two-day "TRM campaign" run every 18 months. Each "campaign" is designed around and dedicated to a specific topic (e.g. "Our OJTs – the good and the "bad" about them".
- To increase the effectiveness of the programme it makes sense to use not only the six basic TRM modules but also customised modules, which reflect special needs of the ANSP and can be based on real cases (e.g. "How is the Local Competency Scheme affecting me?".
- In one ANSP the TRM 'Stress' module is facilitated by a psychologist.
- Some environments have mixed functional units and may want to split the sessions and customise the programme to suit these different units.
- A few ANSPs have indicated that the percentage use of EUROCONTROL material inside their organisation differs according to the profession being addressed. While this material is used to a large extent for ATCOs, its use for ATSEP TRM is significantly lower.
- There has generally been a positive experience when outside professionals are involved in supporting TRM programmes.
- Experience has shown that careful and accurate translation of TRM material is useful because it is to be expected that discussions on Human Factors will be carried out in native language.

EUROCONTROL provides TRM courses at IANS. More information about these TRM courses is available in Annex A while Section 4 gives more details of EUROCONTROL TRM courses and the customisation of EUROCONTROL material to the local environment.

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3. Evaluation

3.1 Justification

European regulation has not yet taken on board the ESARR requirement for motivation as part of competency. Although one could argue that currently there is no EU 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 efficiency of maintaining the programme.

Only a few ANSPs have indicated that a review is carried out to identify the effects of TRM on the system (People, Procedures, Equipment and Environment) to confirm the benefits of using it. In this current economic climate, all organisations are facing resource constraints which lead to a severe impact on the TRM programme at some of them. 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 maintain the TRM programme.

3.2 Advantages of TRM

The evaluation of the TRM programmes at some of the ANSPs has shown the following advantages:

- Reduced number of teamwork related incidents,
- Reduced consequences to unavoidable errors,
- Enhanced continuity and stability of team work in ATM,
- Improved interaction between different departments,
- Working processes have been revised or updated due to better mutual understanding,
- Improved culture within the units but still more work needs to be done to improve culture between units.

3.3 Evaluation Methods

Many of the ANSPs use feedback gathered from the TRM sessions to make improvements to the programme or as a source of lessons learnt. However, this method does not clearly identify the benefits resulting from TRM.

A second source of information comes from the use of an evaluative questionnaire concerned with attitudes and behaviours, which can be administered before and after the training sessions. Often a more robust method of evaluating the changes of these attitudes and behaviours can be captured by administrating a third identical questionnaire some four to six months after the training course.

A third and more rigorous evaluation comes from the correlation of these attitudinal changes with observation or interview of the same personnel to gauge meaningful behavioural changes. From this methodology, measurable positive changes in interaction should be present following the training. Lastly, the ultimate validation can be found in the correlation of the training programme and a reduction in the frequency of incidents within the system. The latter two methodologies are highly complex and take considerable time to achieve.

ANSP Tip

The evaluation of the TRM programme and its effectiveness is based primarily on the participations' feedback; who are asked to fill in two questionnaires: one after each TRM session and the other after three months after their last TRM session. The first questionnaire is intended to measure following areas:

- Were the actual issues reviewed and discussed during the session?
- Have I developed my personal behavioural strategy(ies)?
- Have we (ATCOs shift) developed team strategy(ies)?

The second questionnaire is focused on the practical result in time perspective:

- Did I try to use my own behavioural strategies? If yes, was it successful?
- Did we try (ATCOs shift) to use our strategies? If yes, was it successful?

These questionnaires should not be too large or too complicated; although this might lead to lower granularity of gathered data. It should not take more than 3 minutes to complete one questionnaire.

The following KPIs may be used

- Percentage of participants, who consider that content of TRM session was appropriate and actual;
- 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 of time.

3.4 Air Traffic Control Safety Questionnaire (ATCSQ)

3.4.1 Overview

The Air Traffic Control Safety Questionnaire (ATCSQ) was developed to enable the evaluation of the Team Resource Management (TRM) programme. The questionnaire consists of four main sections. The ATCSQ is attached as Annex B.

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 last section concerns demographic information. All seven areas found in the TRM course appear in the questions. These individual areas are randomly allocated but balanced across the second and third sections.

3.4.2 Stability and Reliability

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 eliciting 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.

4. EUROCONTROL TRM Courses

4.1 IANS Courses

4.1.1 Generic Overview of Courses

EUROCONTROL offers at the Institute of Air Navigation Services, Luxembourg, two courses specifically on Team Resources Management, namely Awareness of TRM and TRM Practical Facilitation Skills. Additionally EUROCONTROL offers courses on Airport Resource Management where the aim is to improve airport safety. Full details of these courses are available from the IANS training catalogue and also through the EUROCONTROL website (<http://www.eurocontrol.int/training>).

4.1.2 Awareness of TRM

A 3-day course that provides an understanding of TRM, an awareness of its benefits and methods employed.

4.1.3 TRM Practical Facilitation Skills

An intensive 5-day course where, after completing this course, participants will be well equipped to customise and deliver TRM facilitated sessions.

4.1.4 Aerodrome Resource Management

Also a facilitator training, and lasts a total of 5 days.

4.2 Customisation

The IANS Facilitator course could serve as a basis for developing customised TRM courses. EUROCONTROL recommends the states to apply the 80:20 rule. 80% of the course contains common material and instructions for facilitators and the remaining 20% provides sufficient scope for the states to adapt the course to their needs and to include national examples and cultural influences. It is to be noted that most of the states required external support for their customisation.

TRM should be delivered in such a manner to allow the participants to learn by themselves in a practical manner and not via traditional classroom methods. For that reason four-step method was developed to guarantee efficient customisation and local ownership of the TRM concept and materials. Practical TRM course delivered by IANS explains how to customize and use existing TRM material.

4.3 The Four-Step Method

4.3.1 Rationale

Human Factors is, independent of culture, often seen as a rather 'fuzzy' subject and operational and engineering personnel have a tendency to be wary of such 'soft' topics. Therefore a structured approach would certainly help to overcome any reluctance. There is also a benefit in explicitly applying a facilitation technique because it will emphasise that it is quite possible to use such a technique with complex discussions.

4.3.2 Application

EUROCONTROL recommends that customisation commences about one month after an initial presentation of the TRM concept and the outline of the prototype for management and staff performing safety-critical tasks (ATCOs and ATSEPs). A national working group to act as steering group is essential to successful customisation. Such a group ideally consists of an operational/engineering manager, a training manager, an occurrence investigator and some safety-

critical personnel (ATCOs and ATSEPs who have attended the TRM facilitators' course). An active interest in human factors by the participants is a necessary requisite.

4.3.3 Step 1 – Overview

The main objectives of step 1 are to introduce the issues and the scope of the expected discussions and to emphasise the structure of each module. This structure is obviously not compulsory and can be changed, but the predefined structures were successfully used in steps 1, 2 and even in 3. It was very important for the course participants to keep enough distance from the material (not to be taught/instructed) during steps 2 and 3 so that they could put things into context.

One technique is to use a slide per module to discuss the most important messages. The underlying human factors issues and the different exercises and activities are then elaborated for each question.

4.3.4 Step 2 – Look Through

The objectives are to understand the aims of each module (content) and to understand the suggested techniques of facilitation (process).

In this step the participants are lead through the course material of the whole module. The participants are able to see and experience the different games, look at available videos, perform exercises and debate and debrief case studies and incident reports.

4.3.5 Step 3 – Relate to You

The main objective of step 3 is to assess the relevance of each part of the course to the participants' culture - both in terms of content (is the message relevant for us?) and in terms of process (does this technique suit our culture?).

In step 3 the content and the relevance of the different topics and techniques, suggestions for alternative messages, questions, exercises, examples, pictures etc. are discussed in detail. In this phase the different facilitation techniques that were taught on the Practical TRM course at the beginning of the week are applied explicitly.

4.3.6 Step 4 – Just for You

The main objectives of this step are to screen the course material and to modify the selected material that requires customisation. A realistic schedule per module needs to be set too. The modifications and the order in the material are made immediately. Items can be put on a 'to-do' list when the customisation requires much local information (local incidents, new developed exercises, and relevant statistics).

ANNEX A – Introducing TRM Modules

TRM modules flow better if introduced in following sequence:

1. Teamwork*
2. Team Roles*
3. Communication
4. Situational Awareness
5. Decision Making
6. Stress Management

* First time running Teamwork and Team Roles modules – it is advised to plan the two on the same day. This is because it will be natural and should be possible to go “back and forth” through the two once the discussions start.

1 Teamwork

Some objectives are to:

- Determine typical characteristics of ATM-related teamwork;

Example: Define the relevant positions and status of team members within an ATM team and determine the different roles, duties, responsibilities and the effect of their position in a team.

- Identify behaviour that has impact on teamwork and consequently develop and practice behavioural strategies that help effective teamwork;

Example: Identify typical attitudes and behaviours of team members that may have effects on teamwork. Their characteristics should be discussed and determined. Participants can discuss variety of topics e.g. intra- and inter-cultural differences between teams (their own or other units and sectors). Once the skills are determined and identified, operational staff should have the opportunity to analyse, develop and practice them to support their teamwork skills and their attitude towards colleagues.

2 Team Roles

Some objectives are to:

- Describe formal and informal hierarchical structures in an ATM environment;

Example: Discuss the role of team supervisors or other team leaders and identify specific characteristics that influence leadership within teams. Determine safety implications in situations when unclear who is “in charge”

- Identify effective leadership.

Example: Develop strategies to avoid misunderstandings arising from multiple authority. Develop strategies to deal with submissiveness, assertiveness and aggressiveness.

3. Communication

Some objectives are to:

- Identify the functions of communication and analyse how communication is performed within teams and how it can affect safety;

Example: Understand the main functions of communication: provide information, establish interpersonal relationships and maintain attention to tasks and monitoring. The effect of using Standard Operational Procedures (SOPs) to communicate information and the risk of not adhering to SOPs should be discussed.

- Develop strategies on how to communicate effectively, how to intervene efficiently in typical ATM-related situations and how to give and receive constructive feedback.

Example: The nature of information and how it is transferred should be analysed. Analyse how misunderstandings can be avoided, suggestions communicated constructively and what effects constructive feedback can have. Barriers to communication and ways of eliminating them. Group should be supported in analyzing effective communication skills - to improve interpersonal diplomacy, appropriate assertiveness and team-oriented decision-making.

4 Situational Awareness

Some objectives are to:

- Understand situational awareness
- Identify factors that may influence maintaining situational awareness
- Identify symptoms of loss of situational awareness

Example: Discuss the effect of high and low workload on situational awareness and develop appropriate strategies on how to prevent loss of awareness in such situations (see also Robertson & Endsley, 1995).

5 Decision-making

Some objectives are to:

- Understand factors which contribute to effective decision-making

Example: Analyze the importance of situation and risk assessment skills, shared problem models and resource management skills in the process of team decision-making (see also Orasanu, 1993).

6. Stress Management

Some objectives are to:

- Define job-related stress situations and explain what stress is and its effect on teamwork
- Develop skills to recognise and cope with stress situations in teams.

Example: Discuss stress coping strategies in a team environment. The general principles of the assimilation of shocking and stressful events should be described together with the principles of stress management (e.g. relaxation techniques). Discuss and practice team-related exercises dealing with stress detection and methods to help team members overcome the problem.

ANNEX B – Air Traffic Control Safety Questionnaire

Please indicate how satisfied you are with each of the following aspects of ATC operations.

Please answer by writing beside each item the letter from the scale below.

A	B	C	D	E
Very Unsatisfactory	Unsatisfactory	Neutral	Satisfactory	Very Satisfactory

	1. Your own basic ATC training		8. Shift cycle
	2. Your own basic ATC instructor skills		9. Shift schedule
	3. Your own validation or recurrent training		10. Length of leave
	4. Your own OJT instructor skills		11. My skills in handling normal operations
	5. Simulator training (if relevant)		12. My skills in handling emergencies
	6. Operational Manuals (including Standard Procedures)		13. Feedback on my daily operational performance
	7. Safety Manuals		

Please answer the following questions by ticking the box which best describes your opinion.

1. Controllers leave personal problems behind when operating the position.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
2. Automation reduces the requirement for team members to monitor the traffic situation closely.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
3. I am less effective when stressed or fatigued.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
4. It is not my place to give pilots advice other than airways information and clearance details.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree

5. Team members share responsibility for prioritising activities in high workload situations.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
6. Effective team coordination requires that controllers take the personalities of other controllers into account.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
7. I am reluctant to disagree with my superiors.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
8. Controllers should be aware of, and sensitive to, the personal problems of other controllers.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
9. I work in an environment where the group's achievements are valued over my individual success.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
10. It is easier to make decisions when you first take over on an operating position.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
11. Asking for assistance makes one appear incompetent.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
12. My suggestions about safety will be acted upon if I express them to management.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
13. To resolve conflicts controllers should openly discuss their strategies with each other.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
14. It is easier to communicate with my own team than other teams and units.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
15. I make better decisions at my workstation when I am given more time to think.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree

16. Trainees should not question senior team members' decisions.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
17. If I perceive a problem with operations, I would speak up, regardless of who may be affected.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
18. During periods of low work activity I would rather relax than keep busy with small tasks.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
19. Flight crews never demand too much.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
20. Controllers do not use their strips to help maintain a mental picture.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
21. Casual, social conversation in the operating environment during periods of low workload can improve team coordination.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
22. My decision-making skill is as good in critical situations as in routine situations.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
23. It is important to avoid negative comments about the procedures and techniques of other controllers.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
24. Discussing the traffic picture with other controllers helps to keep your own picture clearer.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
25. Controllers visibly impaired by alcohol or drugs should be kept from going on duty.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
26. Good communication is as important as technical proficiency in the controlling environment.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree

27. I like my job.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
28. Only controllers on position should make decisions about opening or collapsing sectors.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
29. My unit would be capable of handling the situation if there was a system breakdown.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
30. I should maintain the traffic picture of the controllers I work with.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
31. Controllers should feel obliged to mention their own psychological stress or physical problems to their co-workers before or during a shift.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
32. The regulatory organisation rules should not be broken.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
33. Our training has prepared us to work as a well coordinated team in an emergency.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
34. Supervisors who encourage suggestions from team members are ineffective.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
35. I should inform those controllers who are affected by my plans and control actions, and ask for their acknowledgement.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
36. Increased automation reduces the need for team communication.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
37. It is better to agree with other team members than to voice a different opinion.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree

38. I perform as well with other units as with my own.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree

39. Leadership of the team comes from the sector supervisor.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree

40. I always follow correct phraseology when controlling.	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree

Please answer the following questions by marking on the scale (X) the point which best represents the frequency with which you would agree with the statements in the last six months.

Never						Always	
0%				50%			100%

41. In abnormal situations, I rely on my superiors to tell me what to do.	Never						Always
	0%				50%		100%

42. I maintain good interpersonal relationships with fellow controllers.	Never						Always
	0%				50%		100%

43. I make poor decisions when I am fatigued.	Never						Always
	0%				50%		100%

44. I retain a mental picture of the pilot's situation.	Never						Always
	0%				50%		100%

45. I expect to be consulted on matters that affect the performance of my duties.	Never						Always
	0%				50%		100%

46. When my workload is high I ask for assistance.	Never							Always
	0%				50%		100%	
47. The gender of the pilot affects my communication ability.	Never							Always
	0%				50%		100%	
48. I critique other controllers' techniques.	Never							Always
	0%				50%		100%	
49. Incidents, near-misses, etc., are reported according to the regulations.	Never							Always
	0%				50%		100%	
50. I perform effectively during critical operations even when fatigued.	Never							Always
	0%				50%		100%	
51. I make judgement errors in emergencies.	Never							Always
	0%				50%		100%	
52. I work with people who cooperate well with one another.	Never							Always
	0%				50%		100%	
53. I am distracted from the traffic situation by my thoughts.	Never							Always
	0%				50%		100%	
54. My colleagues are adequately trained in emergency procedures.	Never							Always
	0%				50%		100%	

55. The OJT instructor should take control of the position in critical and non-standard situations.	Never						Always
	0%			50%		100%	
56. We should trust all decisions made by adjacent sectors.	Never						Always
	0%			50%		100%	
57. Pilots make more call sign errors than controllers.	Never						Always
	0%			50%		100%	
58. I am encouraged by management to report any unsafe conditions I observe.	Never						Always
	0%			50%		100%	
59. My performance is not adversely affected by working with an inexperienced or less capable controller.	Never						Always
	0%			50%		100%	
60. Controllers encourage questions by team members during normal operations and critical operations.	Never						Always
	0%			50%		100%	
61. Morale in this unit is good.	Never						Always
	0%			50%		100%	
62. Uncertain situations require quick decision-making.	Never						Always
	0%			50%		100%	
63. Controllers make decisions on their own.	Never						Always
	0%			50%		100%	

64. I let other controllers know when my workload is becoming (or about to become) too high.	Never							Always
	0%			50%				100%
65. Communication between controllers is reduced when the traffic is busy.	Never							Always
	0%			50%				100%
66. I find it more difficult to maintain the traffic picture when I am tired.	Never							Always
	0%			50%				100%
67. The executive controller should always take control in an emergency.	Never							Always
	0%			50%				100%
68. I know if pilots are under-confident when they are on the radio.	Never							Always
	0%			50%				100%
69. I feel nervous or tense at work	Never							Always
	0%			50%				100%
70. I become impatient with flight crews who expect a lot.	Never							Always
	0%			50%				100%
71. Each controller should monitor other controllers for signs of stress or fatigue.	Never							Always
	0%			50%				100%
72. Personal problems adversely affect my performance.	Never							Always
	0%			50%				100%

73. Handovers are provided improperly.	Never							Always
	0%			50%				100%
74. Controllers should question the decisions or actions of other controllers.	Never							Always
	0%			50%				100%
75. Management compromises safety for profitability.	Never							Always
	0%			50%				100%
76. Controllers in my work environment are afraid to express disagreement with their supervisors.	Never							Always
	0%			50%				100%

The next section describes briefly styles of leadership. Please read the descriptions, thinking of your ideas as well as your typical supervisor.

Style 1. *Usually makes his/her own decisions promptly and communicates them to his/her subordinates clearly and firmly. Expects them to carry out the decisions loyally and without raising difficulties.*

Style 2. *Usually makes his/her decisions promptly, but, before going ahead, tries to explain them fully to his/her subordinates. Gives them the reasons for the decisions and answers whatever questions they may have.*

Style 3. *Usually consults with his/her subordinates before he/she reaches his/her decisions. Listens to their advice, considers it, then announces his/her decision. He/she then expects all to work loyally to implement it whether or not it is in accordance with the advice they gave.*

Style 4. *Usually calls a meeting of his/her subordinates when there is an important decision to be made. Puts the problem before the group and invites discussion. Accepts the majority viewpoint as the decision.*

77. Which of the above styles of leadership would you **most prefer** to work under?

(Circle one answer only.)

Style 1	Style 2	Style 3	Style 4
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78. In your organisation, which one of the above styles do you find yourself **most often** working under?

(Circle one answer only.)

Style 1	Style 2	Style 3	Style 4
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The last section collects demographic information for general and statistical purposes.

Years in ATC	Years in TWR	
Years in APP	Male (M)	Female (F)
Years in this ATC unit	Years in ACC	

What is your present position in your ATC unit? (You may tick more than one.):

<input type="checkbox"/>	Tower controller	<input type="checkbox"/>	Sector chief
<input type="checkbox"/>	Approach controller	<input type="checkbox"/>	OJT-instructor
<input type="checkbox"/>	Area controller	<input type="checkbox"/>	Supervisor
<input type="checkbox"/>	Student	<input type="checkbox"/>	Other (Please specify) _____

Where is your present unit?

References

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[http://www.skybrary.aero/index.php/Team_Resource_Management_\(TRM\)](http://www.skybrary.aero/index.php/Team_Resource_Management_(TRM))
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Opinion of the European Aviation Safety Agency for a Regulation laying down technical requirements and administrative procedures related to air traffic controllers' licences and certificates pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council and repealing Commission Regulation (EU) No 805/2011
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- 4 Just Culture- Human Error in Aviation and Legal Process-EUROCONTROL
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- 5 CAP 719 Fundamental Human Factors Concepts
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- 6 EU Regulation 2015/340 repealing Commission Regulation 805/2011 and laying down detailed rules for air traffic controllers' licences and certain certificates pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council
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Abbreviations and Acronyms

ACC	Area Control Centre
AIS	Aeronautical Information Services
APP	Approach Control Centre
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer / Air Traffic Controller
ATCSQ	Air Traffic Control Safety Questionnaire
ATM	Air Traffic Management
ATS	Air Traffic Services
ATSEP	Air Traffic Services Electronic Personnel
BELGOCONTROL	Belgian Air Navigation Services Provider
BULATSA	Bulgarian Air Traffic Services Authority
CRM	Crew Resource Management
CROCONTROL	Croatian Air Navigation Services Provider
DFS	Deutsche Flugsicherung (<i>German ATC Corporation</i>)
DNM	EUROCONTROL Directorate Network Manager
EATCHIP	European Air Traffic Control Harmonisation and Integration Programme
EATMP	European Air Traffic Management Programme
ECAC	European Civil Aviation Conference
FAA	Federal Aviation Administration (<i>USA</i>)
HF	Human Factors
HP	Human Performance
HR	Human Resources
ICAO	International Civil Aviation Organisation
IANS	EUROCONTROL Institute of Air Navigation Services
IFATCA	International Federation of Air Traffic Controllers' Associations
LVNL	Luchtverkeersleiding Nederland (Netherlands Air Traffic Control)
MCRM	Multi Crew Resource Management Training
MUAC	EUROCONTROL Maastricht Upper Airspace Control Centre
NASA	National Aeronautics and Space Administration (<i>USA</i>)
NATS	National Air Traffic Services Ltd. (<i>UK</i>)
OJT	On-the-Job Training
OPS	Operations
ORMA	Organisational Resource Management in ATM
SHPSG	(EUROCONTROL) Safety Human Performance Sub-Group
TRM	Team Resource Management
TWR	Aerodrome Control Tower
UKSATSE	Ukrainian State Air Traffic Service Enterprise
WA	(SHPSG) Working Area

Reviewers

SHPG WA10 Safety and Team Work Factors

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