THE HARMONISATION OF TRAINING AND COMPETNCE KEEPING IN FUNCTIONAL AIRSPACE BLOCK ENVIRONMENT

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ABSTRACT

The importance of the air traffic control can be seen in situations where the great disturbance in traffic schedule occurs; i.e. war situations, volcanic ash presence and the most common situation, especially during summer season, due to airspace congestion - long delays. In attempt to resolve constant need for additional capacity in overall Air Traffic Management system (ATM) and to improve flight efficiency, the European Commission has lunched the new programme called Single European Sky – SES. The creation of a Single European Sky requires complete reorganisation of existing airspace structure and organisation. The reorganisation will be based on specific measures:

- Configurations of ATC sectors (sector means a part of a control area and/or part of a flight information region/upper region) [1] being subdivided and routes established regardless of national borders. This will permit the airspace to be used more efficiently.
- The division of airspace between civil and military users taking account of the new geopolitical realities and forming part of a consistent and efficient framework.

The airspace will be reconfigured into Functional Airspace Blocks (FABs) based on operational requirements and established regardless of State boundaries, with the target objectives to achieve maximum capacity and efficiency, while maintaining a high level of safety. One of the key elements for the FAB creation is the harmonisation of training and competence keeping for staff involved in the service provision. There is a priority to train or re-train a significant number of Air Traffic Control Officer/Air Traffic Controller (ATCOs), while future actions will be progressively extended to other working staff, such as: Air Traffic Safety Electronics Personnel (ATSEP) Airspace Management Cell/Flow Management Position (AMC/FMP), where the level of harmonisation of the training and the competence keeping is lower.

This paper describes a present development in the process of the training and competence keeping of the staff involved in the service provision in the future FAB organization.

Keywords: Training, Competence, Single European Sky, Functional Airspace Block

1   INRODUCTION

At the beginning of the 21st century, the European Commission ~~has~~ launched an ambitious programme, called a Single European Sky [2], [3]. The goal of a Single European Sky programme is to improve safety and restructure European airspace, and to create additional capacity in order to increase the overall efficiency of the Air Traffic Management (ATM) system. The legislation proposes significant enhancements to international coordination aiming to remove great number of the administrative and organizational bottlenecks in the ATM system. Necessarily, this will require reconfiguration of airspace into Functional Airspace Blocks (FAB). Functional Airspace Blocks are based on safety and efficiency criteria, regardless of national boundaries. Functional airspace block means [4]:

- an airspace of defined dimensions, in space and time, within which air navigation services are provided,

- based on operational requirements and established regardless of State boundaries,
- where the provision of air navigation services and related functions are performance driven,
- where the provision of air navigation services and related functions is optimized with a view to introducing, in each functional airspace block, enhanced cooperation among air navigation service providers or, where appropriate, an integrated provider.

The obligation to establish FABs is no longer limited to the reconfiguration of the upper airspace, the amended provisions do not distinguish divisions between upper and lower airspace, nor are they limited to en-route services or to airspace where only en-route services are provided.

The Air Navigation Service Provider (ANSP) operating therein will have to comply with the same set of rules. Implementation of the European Directives as well the Single European Sky legislation as part of it, requires specific approach concerning of the training and competence keeping of the ATM staff, which ~~will~~ play the key role in providing air traffic services. Key staff categories are [5]:

- Air Traffic Control Officer / Air Traffic Controller – ATCOs,
- Air Traffic Safety Electronics Personnel – ATSEP,
- Airspace Management Cell –AMC, and
- Flow Management Position –FMP.

It is necessary to distinguish two main processes; training and competence keeping. Training leads to successful certification of the ATM staff for a particular working position. Competence keeping–allows ATM staff to work at that position. The competence, from the wide point of view is a set of requirements related to recruitment, selection, and licencing above mentioned ATM staff responsible for tasks which, within the provision of ATM service, are identified as safety related. Competence Scheme describes the process by which professional qualities are demonstrated by individuals, who are subject to assessment. A single FAB Competence Scheme will be implemented for ATCOs as the first step, and then gradually for other staff categories starting with ATSEP. The mutual recognition of ATCO licences is already almost in place.

The training process of ATM staff should be harmonized and consequently adapted. The training procedures will be implemented by all training organisations, who will then confirm, that the applicant has completed the training course. Such confirmation should then be recognised by all entities (e.g. another ANSP in the same FAB) where the relevant training is required, in order to meet the qualification for a particular working position. Therefore, an idea of a common beginner's course (ab-initio) should be promoted. All FAB's have to comply with EU legislation regarding certification of ATCOs training organisations, and no additional rules are needed. Mutual recognition of certificates of training organisations is ensured through the relevant legislation (EU States - under EU law; and NON EU States – under European Common Aviation Area (ECAA) Agreement, Annex I, to the ECAA Agreement). However, certification of training providers providing training to personnel other than ATCOs is not harmonised.

2   TRAINING OF THE AIR TRAFFIC CONTOLLERS

Air Traffic Controllers, play key role providing air traffic services assuring separation and avoidance of aircraft collisions in the air and on the manoeuvring area and expediting and maintaining an orderly flow of air traffic. Requirements for the ATCO training are likely to be

identical (Figure 1) in all FAB States as they are derived from the procedures imposed by the ICAO Standards and Recommended Practices and by the ATCOs Directive [1].
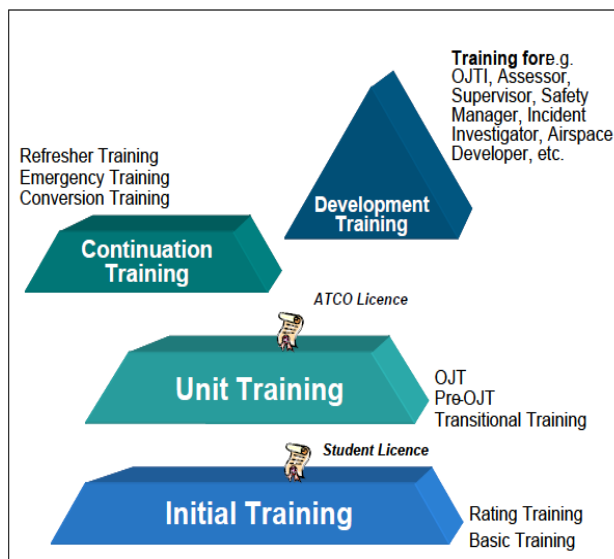

Figure1: Progression of ATCO Training [6]

ATCO training is divided into four phases, of which Initial Training is the first phase.

Initial Training is the first phase of the training which includes theory, part-task practice and simulation. The purpose of initial training is to prepare an "ab initio" for training at an Air Traffic Control (ATC) unit. It includes two phases (**basic** and **rating** training) leading to a student licence.

Basic training presents second phase of the training designed to impart fundamental knowledge and skills to enable "ab initio" to progress to specialise ATC training. Subjects of the training are chosen based on the ICAO Annex [7] requirements for an Air Traffic Control licence, and consist of following subjects: Introduction to the Course, Aviation Law, Air Traffic Management, Meteorology, Navigation, Aircraft, Human Factors, Equipment and Systems and Professional Environment. In some cases an extra training may be added in areas such as aeronautical English or local differences with ICAO.

Rating training is specialised ATC training that provides knowledge and skills related to a job category and appropriate to the discipline to be pursued in the ATS environment. Subjects are chosen based on the ICAO Annex 1 requirements for an Air Traffic Control licence.

Unit Training - Training comprising transitional training, Pre-On-the-Job Training (Pre OJT) and On-the-Job Training (OJT), leading a student/trainee to obtain an air traffic controller licence, with appropriate rating and with appropriate rating endorsements and unit endorsements. Main task of the Unit training is to evolve the knowledge and skills to be applied on duties at the appropriate unit, as an air traffic controller who holds air traffic controller licence.

Transitional training phase following Initial training during which site-specific theoretical knowledge and understanding will be transferred to the student/trainee. The main objective of transitional training is that the student/trainee will be fully conversant with unit procedures before starting the next phase. The transitional training may consists of the following subjects; Introduction, Air Traffic Management, Local operational procedures and airspace, Meteorology, Navigation, Equipment and Systems, Professional Environment, Unusual/Degraded/Emergency Situations.

Pre-On-the-Job Training (Pre-OJT) is the phase of training during which students/trainees will integrate all previously learned procedures and routines, including unit specific ATC procedures, into the decision making process and learn to allocate priority. This phase consists of locally based training during which simulation using site-specific facilities will be used extensively. During the Pre OJT phase it is expected that each student/trainee pass 40 training periods (as Executive Controller and Planning Controller).

On-the-Job Training (OJT) is integration and development in live traffic conditions previously acquired job-related routines and skills under the supervision of an On-the-Job-Training Instructor (OJTI) in a live traffic situation. During OJT, students/trainees should be assessed at regular intervals. These intervals should be defined by the setting up of a number of assessment levels.

Continuation training presents training given to licensed or certificated personnel designed to supplement existing knowledge and skills. It includes refresher, emergency and conversion training.

Refresher training is designed to review, reinforce or upgrade existing knowledge and skills. Content of Refresher training (on annual basis – before high traffic season (Winter/Spring) is:

- Theory part in classroom (group lectures),
- RTF in classroom (group lectures),
- Practical part on simulator (small groups/teams of max. 4 ATCO's – exercises specially designed to prepare ATCO's for increased traffic and to "fix" observed mistakes reported in previous season and to synchronize application of standards and practices in each operational team),
- Practical part in Degraded System Operations,
- Safety.

Emergency training is designed to communicate knowledge, skills and behaviour in case of an emergency, unusual or degraded situation. Emergency situation are serious, unexpected and often dangerous situation requiring immediate actions. Unusual situation are set of circumstances which are neither habitually nor commonly experienced for which an ATCO has not developed an automatic know-how. The essential difference with an emergency situation is that the element of danger or serious risk is not necessarily present in an unusual situation. Degraded situation is the situation that is the result of a technical system failure or malfunction or a set of circumstances arising from human error or violation of rules affecting the quality of the service provided.

Content of Emergency training (on annual basis - after high traffic season (autumn) is:

- Theory part in classroom (group lectures)
- Practical on simulator (small groups/teams of max. 4 ATCO's – exercises with 8 different emergency/situations which have high probability of occurrence in own airspace)
- Recurrent training (group workshops - in case of large changes in operational system/ procedures/ airspace)
- Theory part in classroom (group lectures for each operational team)
- Practical on simulator (small groups/teams of max. 4 ATCO's – special exercises prepared for targeted operational changes)

Development training is the training designed to provide additional knowledge and skills, e.g. new licence endorsement (OJTI), assessor/examiner and supervisor.

3 TRAINING OF THE AIR TRAFFIC SERVICES PERSONNEL

ATSEP Training – At the beginning we have to point out that there are different categorization or definitions of Air Traffic Services Electronic Personnel, these are:

- European Organisation for the Safety of Air Navigation (EUROCONTROL) Safety Regulatory Requirement (ESARR 5) - ATSEP is engineering and technical personnel undertaking operational safety related tasks. Personnel who operate and maintain ATM equipment approved for operational use.
- International Civil Aviation Organization - The principal duties of ATSEP, as defined in ICAO Doc 7192, are:
  - Performing maintenance on Communication, Navigation and Surveillance / Air Traffic Management (CNS/ATM) system/equipment, this includes:
  - Calibrating flight and ground radio navigation aids;
  - Certification of CNS/ATM system/equipment;
  - Modification of operational CNS/ATM equipment;
  - Corrective maintenance;
  - Preventive maintenance.
- Civil Air Navigation Services Organisation (CANSO) - Engineer and technical personnel undertaking operational safety related tasks. Personnel who have been proven competent to operate and maintain safety related ATM equipment that is approved for operational use.
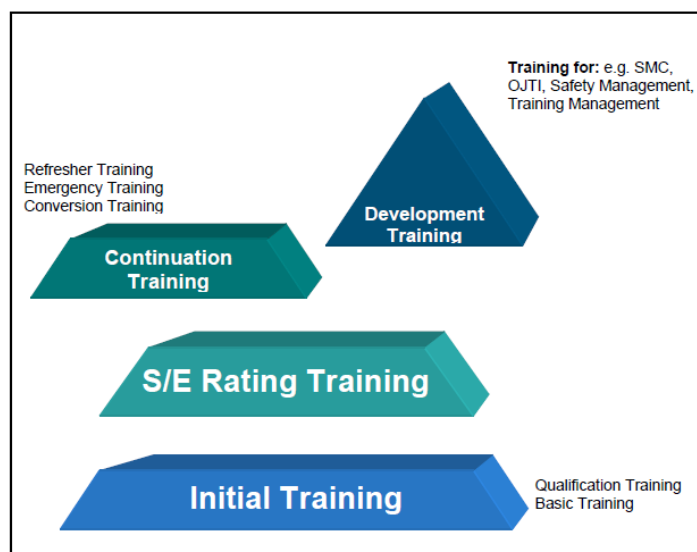
ATSEP training is divided into four phases.

Figure 2: Progression of ATSEP Training [8]

Initial training presents training that precedes the System/Equipment Rating Training. It includes Basic training and Qualification training.

Basic training is the training designed to impart fundamental knowledge of the Communications, Navigation and Surveillance Systems for Air Traffic Management (CNS/ATM) environment and skills applicable to all ATSEPs staff.

Qualification training is the training designed to impart domain related knowledge and skills appropriate to the qualification stream to be pursued in the CNS/ATM environment.

Five specialised domains have been identified.

- Communication,
- Navigation,

- Surveillance,
- Data Processing,
- System Monitoring & Control (SMC).

In addition, a group of generic subjects were identified that are applicable to all ATSEPs, 16 streams have been identified to the ATSEP roles (A stream is a cluster of training objectives that support a particular area of work within a domain). In a minimum of one specialised technical domain, ATSEPs are trained for one or more streams that correspond with the system/s and equipment that they will eventually work with.

System/Equipment Rating training is the training designed to impart system/equipment-related knowledge and skills leading towards operational competence. With respect to the ATSEP role/s, training progression is performed through the completion of Initial Training and the series of actions described as S/E Rating training.

Continuation training, presents training designed to augment existing knowledge and skills and/or to prepare for new technologies. This training is given to operationally competent personnel and it includes Refresher, Emergency and Conversion training.

Refresher training is designed to review, reinforce or upgrade existing knowledge and skills.

Emergency training is designed to broaden knowledge, skills and behaviour in the case of an emergency, unusual or degraded situation.

Emergency -presents serious, unexpected and potentially dangerous situation requiring immediate action/s. (complete loss of any of the following – radar display picture, Electronic Flight Progress Strip system, loss of main, standby and emergency communications on multiple frequencies due to external interference blocking the R/T channels).

Unusual situation is set of circumstances which are neither regularly nor commonly experienced and for which an ATSEP has not developed a practiced response. The essential difference to an emergency situation is that the element of danger or serious risk is not necessarily present in an unusual situation.

Degraded situation –is a situation that is the result of a technical system failure or malfunction or a set of circumstances arising from human error or violation of rules affecting the quality of the service provided.

Conversion training is designed to provide knowledge and skills appropriate to a change in domain (new stream or new S/E rating), environment (new procedures, new location) or system (system upgrade or change).

Development training is designed to provide additional knowledge and skills demanded by a change in job profile, e.g. safety management, OJT, training management.

The distinction between the Initial training and System/Equipment Rating training is relevant for the training of ATSEP. The Initial training (ab-initio) will very likely have identical features in all States and thus common training may be promoted and implemented. Since ATSEP staff can be trained through the public training system, Basic Training and Qualification Training is possible (beginner's course). Candidates, who successfully complete this training, continue with System/Equipment Rating Training in the unit on a certain device. Since the manufacturer performs training and since a further training is in a certain unit, common training is not possible, so each training organisations performs training in a certain unit.

4   TRAINING OF THE AIRSPACE MANAGEMENT CELL/FLOW MANAGEMENT POSITION

The objective of Airspace Management (ASM) is to achieve the most efficient use of the airspace based on actual needs and to avoid permanent airspace segregation. Inflexible airspace structures and airspace reservations have resulted in the inefficient use of airspace. The need for improved ASM in Europe was recognised when the continuing growth of aircraft movements exceeded the capacity of Air Traffic Control Centres causing serious delays. Airspace Management Cells (AMC) provides publishing of the airspace allocation on daily basis. This tactical level of the ASM of the respective States is provided when activation and deactivation of assigned restricted areas is performed in order to more effective use of the airspace. Strategic and pre tactical level [9] is applied within the airspace management. There are three levels of Airspace Management:

- Level 1 - Strategic ASM is the act of defining and reviewing, the national airspace policy taking into account national and international airspace requirements.
- Level 2 - Pre-Tactical ASM is the act of conducting operational management within the framework of pre-determined existing ATM structure and procedures defined in Level 1 and of reaching specific agreement between civil and military authorities involved.
- Level 3 - Tactical ASM is the act, on the day of operation, of activating, de-activating or real-time reallocating of airspace allocated in Level 2 and of solving specific airspace problems and/or of individual Operational Air Traffic/General Air Traffic (OAT/GAT) situations in real-time between civil and military ATS units and/or controllers, as appropriate.

The process of Flow Management involves continual monitoring and regulation of the flow of air traffic. A Flow Management Position (FMP) exists in every Air Traffic Control Centre throughout Europe. The FMP provides a vital flow of information from their operational ATC Unit to the Central Flow Management Unit (CFMU). The FMPs are aware of the current situation within their Air Traffic Control Centre (ATCC) concerning such matters as workload, staffing, technical failures, etc. The FMPs are also aware of the operational situation at the airports within their area of responsibility. The FMPs can, via their direct access (CFMU Interface – Network Operating Portal) to the CFMU system, display the up-to-date traffic load situation at any time. An important part of information flow is the declared capacity of ATC units and airspace sectors as a function of time.
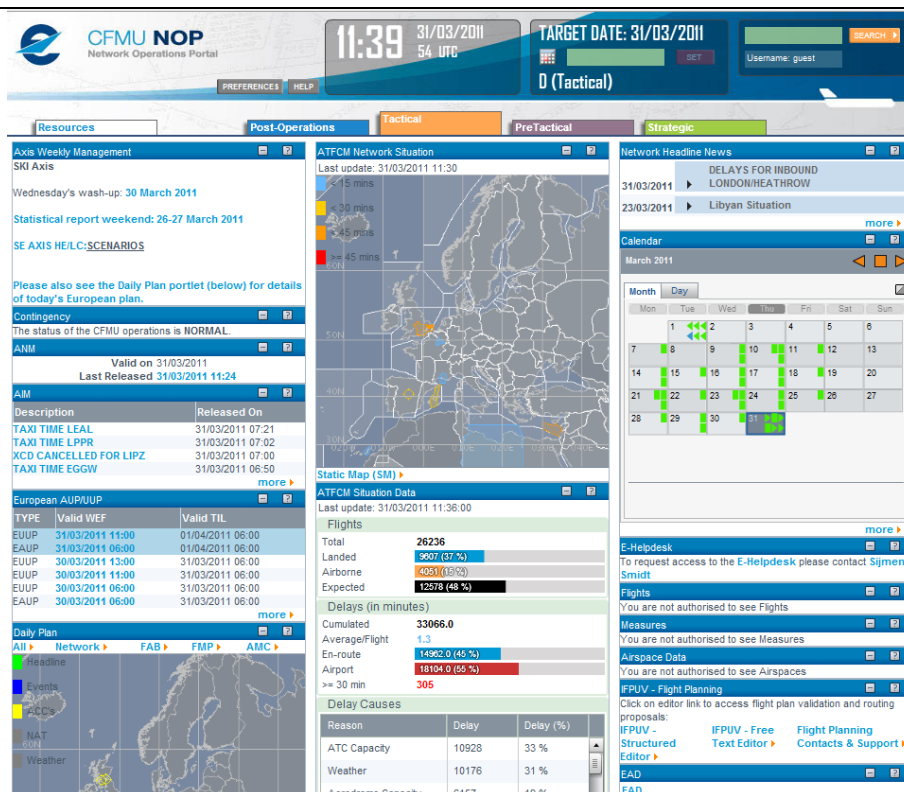
Figure 3: Network Operations Portal

The capacity and the planned traffic situation can be seen dynamically at the CFMU and FMP unit positions and thus allowing the important tactical decisions to be made which balance capacity and demand on a continuous basis. Flow measures are implemented to protect ATC from "overload" situations. The mechanics of reducing the number of aircraft that can be handled safely varies, some ANSP's issue times at which en-route points must be crossed; other ANSP's calculate departure times to ensure compliance with other countries' requirements. FMPs are responsible for ensuring the CFMU has all the data and information required in each of ATFM phases to make the most effective use of available capacity and implement the most effective ATFM Plan.

The existing International Federation of Air Traffic Controllers' Associations (IFATCA) [10] policy for the staffing of FMP is:

- FMP staff, not performing clerical or administrative functions, must be qualified as active ATCO's in Area or Approach Control or must have undertaken the duties of a qualified ATCO in Area or Approach Control functions.
- The responsibility for aircraft in flight remains solely with ATC, and any subsequent FMP staff involvement shall be at the request of ATC only.
- In order that ATC is able to maintain its presence and control over ATFM units, an FMP staff rating or ratings should be introduced.
- FMP staff, not performing clerical or administrative functions, should be obliged to familiarise themselves with major changes in ATC procedures and maintain their acquaintance with problem areas with relation to FMP within their region.

Regarding AMC/FMP staff training there are no ICAO or EUROCONTROL documentation available so each ANSP has different training process and the level of harmonization required for the implementation of FABs is the lowest.

5   CONCLUSION

The Competence Scheme is a key prerequisite for harmonised FAB operations; it defines common assessment techniques and methods how will ATCO´s, ATSEP and other ATM staffs (AMC/FMP) maintain their operational competence. Raw models have to be developed for all Staff categories extending to Instructors and Trainers. The comparison between the raw models and the current situation in the various ANSPs will give evidence to what is not compliant or not fully compliant with the relevant model. The actions required from the concerned ANSP and, wherever available, timing for that action is also indicated and will hopefully be followed. The process of harmonization should be coordinated with and approved by the Member States / National Supervisory Authorities (NSA) to satisfy objectives detailed by target situation and approaches how these requirements should be achieved. There are no huge gaps to be filled as far as Competence of ATCOs is concerned. More differences have been detected and indicated as far as ATSEP and subsequently AMC/FMP Staff are concerned. The FAB Competence Scheme, once implemented, should be monitored and assessed.

Harmonisation of training is a recognised prerequisite for any FAB; all training activities should be approved and certified by NSA's. NSA certified training facilities shall mean compliance with the Directive 2006/23/EC [1]. The cooperation of Training facilities, does include the definition of training requirements vis a vis the Competence Scheme. From the investigation conducted [5], it is evident that only on ATCOs harmonisation is quite advanced. Anyway, all the remaining differences are to be solved.

Primarily effort of all existing training staff should be focused into the:

- Harmonization of existing training material and standards;
- Common creation of missing training material and common update of material that is readily available (through Eurocontrol, ICAO etc);
- Exchange of information, experience, best practices and standards;
- Development and execution of the »Training the trainers« programme;
- Support to cross-national basic and rating courses;
- Potential coordination of existing training allowing exchange of students and instructors and other training staff.

It is proposed to start with Training Plans for ATCC Area Control Surveillance ATCOs, starting with Initial training, as minimum for FAB, later the Unit training. Some document could be updated jointly. Harmonisation of basic training for ATCOs is seen as a priority.

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