International Civil Aviation Organization

Eleventh Meeting of the Air Traffic Management Sub-Group (ATM/SG/11) of APANPIRG

Singapore, 2 – 6 October 2023

Agenda Item 5: ATM Systems (Modernization, Seamless ATM, CNS, ATFM)

DATA-DRIVEN STRATEGY FOR ESTABLISHING A COMPREHENSIVE AND STANDARDIZED TRAINING SYSTEM ACROSS THE ENTIRE CAREER CYCLE OF AIR TRAFFIC CONTROLLERS

(Presented by China)

SUMMARY

This paper presents a data-driven strategy aimed at establishing a standardized training system for air traffic controllers that encompasses their entire career cycle. With "Job Competency" as its core principle, this approach utilizes performance data from training throughout the full career cycle of air traffic controllers. The strategy seeks to construct a standardized training framework structured around three layers: training implementation, platform support, and quality assurance. This framework is designed to align with the competency development requirements of the next generation of air traffic controllers.

1. INTRODUCTION

1.1. In the current air traffic control community, there is a rapid pace of innovation in new technologies and operational modes, accompanied by an increasing demand for competency enhancement. The escalation of air traffic controller competency, serving as a critical element for ensuring operational safety and propelling development, is receiving heightened attention.

1.2. In 2015, ICAO Next Generation of Aviation Professionals (NGAP) working group formulated a competency framework for Air Traffic Controllers (ATCOs), providing guidance on competency units, elements, and performance criteria in Doc.9868. Doc.9941 introduced a competency-based training development approach. In Doc.9841, regulatory requirements for the management of training institutions, quality assurance, and related oversight measures are provided.

1.3. Based on the operational realities of Civil Aviation Administration of China (CAAC) and the working characteristics of the air traffic management system, within the framework of ICAO, and with "Job Competency" as the core principle, a standardized training system is proposed. This system is underpinned by performance data from air traffic controller training throughout the entire career cycle. It consists of three layers comprising training implementation, platform support, and quality assurance. This standardized training system is designed to align with the competency development requirements of the next generation of air traffic controllers.

2. DISCUSSION

Comprehensive and Standardized Training System Across the Entire Career Cycle of Air Traffic Controllers

2.1 Constructing a comprehensive air traffic controller training system comprised of three layers: training implementation, platform support, and quality assurance. The training implementation layer, rooted in the ICAO "competency" concept, entails the standardized transformation of the entire training process across procedures, methods, and documentation. The platform support layer furnishes regulatory systems, technical infrastructure, content provisions, and big data resources to bolster training implementation. The quality assurance layer ensures monitoring, assessment, and feedback standardization for training quality, encompassing procedures, methods, and documentation. The core of the training system is a Training Big Data Management System, serving as a central hub that establishes data correlations among the layers while furnishing data support to the qualification management framework.

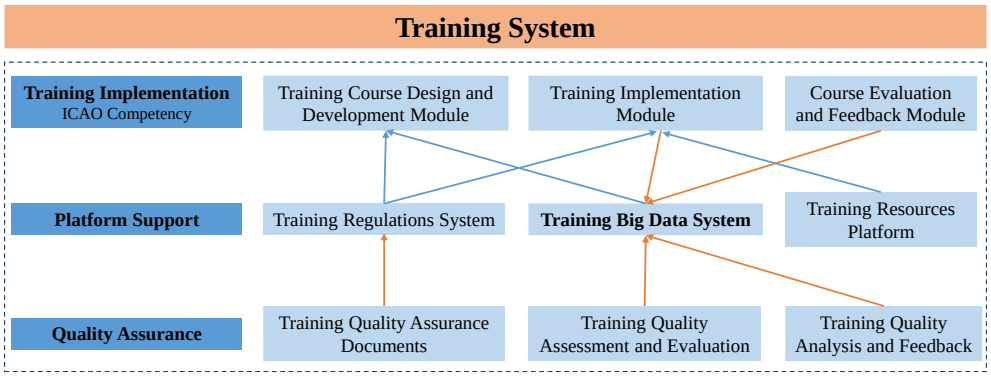

Fig. 1 Overall Architecture of Air Traffic Controller Training System

2.2 At the training implementation layer, centering around ICAO's competency concept and tailored to Civil Aviation in China operational realities, a structured air traffic controller training implementation process is established. This process comprises five stages: demands analysis, course design and development, training implementation, course evaluation, and effectiveness feedback. Taking a holistic approach to the training system, "Training Implementation Guidelines" are developed for various types of training courses. This results in standardized documents encompassing training needs analysis, course design, course syllabus, and lesson plans. This integration ensures a seamless connection between initial training at universities and colleges in civil aviation and on-job training. A diverse training effectiveness assessment mechanism involving instructors, students, and job roles is to be established. This mechanism is designed to be executed by the quality monitoring department of training institutions or universities and colleges in China, responsible for conducting training effectiveness evaluations and providing quality feedback.

2.3 The platform support layer comprises three parts: training regulations system, training resources platforms, and training big data management system. A comprehensive regulatory framework is established, encompassing training management rules, initial and on-job training syllabus, as well as training quality assurance. Using virtual reality technology, a standard case library, and adaptive learning mode, we develop a smart learning platform that includes an online aerodrome control simulator training platform and an online radar control simulator training platform. These platforms enable us to innovate our training mode.

2.4 We shall establish a mechanism for collecting, storing, and managing air traffic controller training and evaluation data, thereby generating a comprehensive training dataset spanning from colleges to air traffic control units. This process facilitates the construction of a "Competency Development Curve" and a "Competency Profile" for air traffic controllers based on training data. This gradual transition towards personalized and customized training is achieved. Leveraging the "Competency Profile", this system can offer air traffic control units references for safety risk management and provide training institutions with suggestions regarding training needs.

2.5 Elevating the quality of air traffic controller training is the fundamental objective in establishing a standardized training system. The development of a quality assurance framework for training is aimed at creating a systematic approach to managing training quality, ensuring both the quality and effectiveness of training, achieving the elevation of air traffic controllers' comprehensive competency and professional proficiency, while meeting the demands of job competency.

2.6 Creating a mechanism for expert assessment of training quality, this initiative assembles experts from civil aviation authorities, training institutions, operational units, and civil aviation colleges. Collaboratively, this group devises methodologies and benchmarks for evaluating training quality and conducts routine monitoring and assessment of training quality across training institutions and civil aviation colleges. The experts scrutinize the outcomes of training quality assessments, furnishing training institutions and civil aviation colleges with feedback via comprehensive reports, while continuously propelling refinement and improvement, thereby creating a closed-loop training process.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) consider to convene relevant workshop led by ICAO to encourage members to share experiences and lessons learnt in standardizing training for air traffic controllers

c) discuss any relevant matters as appropriate.

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