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WORKING PAPER

ASSEMBLY — 40TH SESSION

TECHNICAL COMMISSION

Agenda Item 30: Other issues to be considered by the Technical Commission

INSPECTOR COMPETENCIES FOR EFFECTIVE SAFETY MANAGEMENT

(Presented by Australia, New Zealand, Singapore, and the United Kingdom,
and co-sponsored by Italy and North Macedonia)

EXECUTIVE SUMMARY

The aviation landscape will increasingly be more complex with the introduction of new technologies, business models and non-traditional entrants. As States/administrations evolve their safety management approach beyond the traditional compliance-based to a more outcome-based one, safety inspectors will need to enhance their competencies to adapt to such changes.

Action: The Assembly is invited to:

a) encourage States/administrations to share best practices in equipping their safety inspectors for more effective safety management;
b) request ICAO and States/administrations to develop more tools and guidance materials to build the new competencies of its safety inspectors; and
c) request ICAO to incorporate these new competencies in training programmes and guidance material.

Strategic Objectives:	This working paper relates to all Strategic Objectives.
Financial implications:	Not Applicable.
References:	Doc 10070, *Manual on the Competencies of Civil Aviation Safety Inspectors*

1. INTRODUCTION

1.1 The competencies required of safety inspectors have to evolve as global air traffic continues to grow amidst an increasingly complex aviation environment. While traditional technical competencies, such as aircraft knowledge and auditing skills, remain crucial, new inspector competencies will be needed to support a robust safety oversight system.

1.2 This paper outlines key trends shaping the aviation landscape and their impact on the role of safety inspectors, and discusses the new competencies required to prepare safety inspectors for the future.

2. KEY TRENDS AND IMPACT ON SAFETY INSPECTORS

2.1 Emerging and rapidly evolving technologies, such as artificial intelligence, big data, unmanned aircraft and remote/digital towers, will impact existing safety regulatory frameworks and challenge the way States/administrations ensure effective safety oversight of the use of such technologies. Today's changing business models of service providers also bring about blurring and delineation of roles and responsibilities of multiple parties along the entire aviation value chain. For instance, the increasing dependency on aircraft leasing by air operators, and the use of contracting/sub-contracting for safety-critical tasks, will require safety inspectors to have a good understanding of these business models and their implications on aviation safety.

2.2 Amidst these changes, some States/administrations have implemented their State safety programme as part of the evolution of their safety management approach towards one that is risk-based, beyond the traditional compliance-based approach. Safety inspectors will also need to enhance their competencies to support this new approach.

3. PREPARING SAFETY INSPECTORS FOR THE FUTURE

3.1 To support States/administrations in building their pool of qualified safety inspectors for effective safety oversight, ICAO has provided guidance in its *Manual on the Competencies of Civil Aviation Safety Inspectors* (Doc 10070) on the required core technical competencies of safety inspectors. Government safety inspector training programmes have also been developed by ICAO, and conducted by TRAINAIR PLUS Programme (TPP) training centres worldwide, to ensure a high-level of quality and standardisation in the training of safety inspectors in core technical competencies globally.

3.2 However, these competencies alone may not be adequate to ensure that safety inspectors remain competent to deal with future challenges. States/administrations, such as Australia, New Zealand, Singapore, and Europe recognised the need for additional competencies for safety inspectors. Some of these include:

3.2.1 **Systems thinking**. Beyond having a strong understanding of regulatory frameworks, systems thinking helps safety inspectors better understand how various components of the aviation system interact and interface with one another. This enables them to holistically identify, assess and analyse safety risks beyond their respective domain expertise.

3.2.2 **Analytical thinking**. Safety inspectors need to gather and analyse relevant safety information and data to draw insights on the risks present in the system. As more safety data are collected and made available, safety inspectors can leverage more sophisticated data analysis methods to identify safety trends. Some knowledge of risk management methodologies, for example BowTie analysis will enable them to do their job better.

3.2.3 **Data/digital literacy**. The ability to analyse safety and hazard data is a critical element of a risk-based approach in safety management. Safety inspectors need to be conversant with data analytical concepts and tools, as well as keep pace with new innovation and technologies introduced in aviation. Such competencies support in-depth analysis of safety vulnerabilities, as part of safety oversight. With quantitative data and actionable insights from in-depth analysis, safety inspectors are able to make better informed decisions.

3.2.4 **Safety management system (SMS) assessment techniques**. To assess the effectiveness of a service provider's SMS, safety inspectors are expected to go beyond the checklist approach, and critically evaluate whether adequate measures have been taken by the service provider to demonstrate its maturity of its SMS. Tools such as PSOE[1] methodology allow for more sophisticated assessment of the key components of an SMS. Furthermore, as technology advances, inspectors will need to keep pace with wider system developments and the assessment techniques of SMS' needed to reflect the level of assurance required for systems for which the inspectorate will not always have first-hand experience.

3.2.5 **Communication**. Safety inspectors must actively engage the industry including non-traditional entrants who are unfamiliar with the aviation system, to ensure that the State's safety oversight system and regulations stay relevant. They need good communications skills to work well with regulated parties and stakeholders, and be able to convey their intent and key messages effectively.

4. BEST PRACTICES

4.1 A number of States/administrations have gone some way to prepare their safety inspectors for the future. Recognising the need to broaden inspector capability beyond a technical skillset, central and local government agencies in New Zealand have established a network for regulators (including the New Zealand Civil Aviation Authority (CAA)) called G-Reg, with three focus areas:

a) developing organisation capability: from sharing approaches to compliance activities and developing guidance material;

b) developing people capability: from structured and formal training, and shared informal learning; and

c) developing a professional community of regulators: both resulting from, and enabling the development of, organisation and people capability over time.

4.2 A key focus for G-Reg has been to oversee the development and delivery of a regulatory compliance qualification to formalise training and improve leadership, culture and capability in regulatory practice. This is an e-learning programme (six modules with assessments), accompanied by supporting material delivered by individual regulators about their own context. There is also a continuing professional development programme for regulatory practitioners which focuses on further professionalising the regulatory workforce. For the New Zealand CAA, G-Reg is building the level of understanding and expertise beyond the traditional aviation skillset that our safety inspectors need to be effective regulators.

4.3 In Australia, the Civil Aviation Safety Authority (CASA) training program for safety inspectors will continue alignment with the foundation / advanced / specialist and recurrent phases as prescribed by ICAO. The Foundation Program focuses on core regulatory knowledge and skills. The advanced program focuses on job role knowledge, skills and organisational tools, including building the "soft skills" required to enable success within a performance based regulatory framework. Specialist training is designed to deliver the knowledge and skills required to enable the practical assessment and

[1] The Present Suitable Operating Effective (PSOE) methodology is developed by the Safety Management International Collaboration Group (SM ICG) to evaluate the effectiveness of the service providers' SMS. The evaluation comprises both compliance and performance-based elements based on ICAO Annex 19 — *Safety Management* and ICAO *Safety Management Manua*l (Doc 9859)[1] and is aligned with the ICAO SMS Framework. Each indicator should be reviewed to determine whether it is present, suitable and operating and effective, using the definitions and guidance set out in the guidance document published by SM ICG.

approval of the regulatory parts. These three training modules, supported by ongoing recurrent training, assist in providing a framework for building a broader skill set for the aviation safety inspectorate.

4.4 In Singapore, the training framework for safety inspectors covers both technical and non-technical skillsets. New safety regulatory staff needs to undergo an induction programme called EQUIP, which inculcates an understanding of the regulatory philosophy and develops the mind-set of a safety regulator. Singapore has built a core team of safety subject matter experts and inspectors who can evaluate the effectiveness and maturity of service providers for SMS using the PSOE methodology. Investments have been made in developing more sophisticated methodologies and tools to enhance safety data collection and analysis capabilities (e.g. BowTie risk assessment, hazard identification and risk management) and are taking steps to incorporate such training as part of our safety inspectors' basic training framework.

4.5 In the United Kingdom, training in technical and non-technical skillsets has also been enhanced as part of the shift to risk-based surveillance methodologies. In addition, the CAA is working with an academic partner to develop a Master of Science level education programme in risk and safety management with a regulatory focus that will offer a recognised qualification for regulators and industry alike. Whilst this is focused on safety inspectors in regulators and senior safety leaders in industry, it is the first part of what will be a wider programme of work that will create a comprehensive framework of competency-based programmes across the span of regulatory operations.

4.6 Even as States/administrations enhance their safety oversight capabilities, more support can be given by the international aviation community to facilitate this evolution of safety inspector skillsets. ICAO can play an important role in supporting States/administrations by:

a) **Developing more tools and guidance materials** – ICAO and States/administrations can provide more guidance and tools to aid the safety inspectors in carrying out effective safety oversight such as in the areas of risk assessment, risk-based oversight and evaluation of management systems.

b) **Incorporating the new competencies in its training programmes** – ICAO can review its Government safety inspector (GSI) courses conducted under the TPP to incorporate new training requirements based on the identified new competencies of a safety inspector. For example, the training courses should include elements on safety data analysis and risk assessment methodologies in identifying safety risks and conversation techniques.

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