



WORKING PAPER

TWELFTH AIR NAVIGATION CONFERENCE

Agenda Item 6: Future direction

6.1: Implementation plans and methodologies

HUMAN PERFORMANCE

(Presented by the Secretariat)

EXECUTIVE SUMMARY

The Twelfth Air Navigation Conference (AN-Conf/12) will set the stage for a transformation of the global air transportation system in the coming years. Humans will remain at the centre of this evolution. Human performance issues, a matter of importance for ICAO for many years, will demand continued attention as the transformation progresses. The system changes will affect the work of all aviation professions, altering their roles and the interactions between them, even bringing new professions into view. During this time, our understanding of human performance will grow as the science that informs this understanding grows. ICAO will keep abreast of these developments and apply them in shaping ICAO provisions for safe air navigation. All of us with a stake in a safe air transportation system will need to intensify efforts to manage risks associated with human performance. We will need to share with each other the lessons we will learn about managing these risks. This is a multi-disciplinary issue and should be considered in respect of all papers presented during the AN-Conf/12.

Action: The Conference is invited to agree to the recommendation in paragraph 3.

<i>Strategic Objectives:</i>	This working paper relates to the Safety Strategic Objective by updating and strengthening the implementation activities in the air navigation field.
<i>Financial implications:</i>	Support from States to the ICAO expert groups in the form of human performance expertise.
<i>References:</i>	Doc 9958, <i>Assembly Resolutions in Force (as of 8 October 2010)</i> Doc 9750, <i>Global Air Navigation Plan</i>

1. BACKGROUND

1.1 The ICAO standing policies in the air navigation field (currently Assembly Resolution A37-15) recognize the continued importance of human factors in aviation. The policy on flight safety and human factors (Appendix V) looks ahead to a world of increased use of automation and new technology and what this would mean for the professionals who will operate in this world. The policy calls on States “to take into account relevant human factors aspects when designing or certifying equipment and operating procedures...” and to “engage in far-reaching cooperation and mutual exchange of information on problems related to the influence of human factors on safety”.

1.2 The acceptance of the importance of “human factors” has grown. Consequently, “human factors” is often used to refer to anything related to a human, such as human resource and occupational health issues. “Human performance” terminology puts the focus on humans as an integral component of a safety

management system and as contributors to the system's overall performance. Therefore, this paper uses the term "human performance" along with "human factors" to direct attention to "the human in the system".

1.3 With modern aviation characterized by more dynamic human-machine interactions, many changes are occurring within all aviation activities. Today's more complex safety and efficiency challenges require approaches and mitigations that have human performance considerations embedded within them. This will include considerations in the design of workstations and equipment, training approaches and operational procedures.

1.4 While aviation is considered an ultra-safe industry, our residual safety concerns reflect complex issues featuring diverse human performance challenges. To address these issues, human performance considerations form a critical aspect of any safety management system (SMS). ICAO has long recognized this and the consideration of human performance risks form a cornerstone of ICAO SMS approach. One recent example of this approach is the ICAO work with the aviation community to develop provisions for fatigue risk management systems (FRMS) in order to address safety concerns related to the "universal human factor" of fatigue.

1.5 The role of human factors related to ICAO's number two safety priority – reducing the number of loss of control in in-flight (LOCi) accidents – is also under examination. Currently, under its loss of control avoidance and recovery initiative (LOCARI), ICAO is facilitating collaboration amongst the aviation community, including subject matter experts in relevant human factors areas, to provide views and recommendations on upset prevention and recovery training. ICAO will also be working with the aviation community to identify appropriate design and operational strategies based on human factors principles and lessons learned along the way.

2. DISCUSSION

2.1 New concepts, technologies and work interfaces designed without considering human factor implications may not only fail to be user-friendly, they may also result in a system that has unintended and detrimental consequences for safety. The challenges ahead will require:

- a) a clear strategy for change management to ensure that the work force is prepared and able to adjust to the many changes that will be introduced by the new concepts, systems and technologies; and
- b) an early analysis and proposed mitigation of the human performance-related risks associated with the implementation of new systems and technologies

2.2 ***A change management strategy:*** With regard to change management, an early priority would be the development of tools and strategies that allow all personnel in the aviation field to gain an understanding of the new systems ahead of time and, through increased familiarity, build acceptance for their future implementation. Examples of such tools include computer-generated visuals and interactive simulations to give operational personnel a feel for how the various system improvements would work and how the systems could enhance operator performance. An important side benefit would be that it would also provide early feedback to the developers on some of the human factors issues associated with the implementation of the new systems.

2.3 With the implementation of new and highly automated systems, such as aeronautical information management (AIM) and system-wide information management (SWIM), the roles and responsibilities, and interactions between, the pilot, air traffic controller and all other personnel will change. It will be necessary to analyze the human performance-related risks associated with these changes. These analyses will need to go beyond the normal operation of such systems. During the design of new systems, a proactive

approach will be needed in which various levels of automation degradation are anticipated and mitigating strategies are developed in parallel with those for normal operating procedures.

2.4 ***A human performance risk analysis:*** The more collaborative and systemic nature of today's performance improvement and air navigation modernization initiatives, as described in the aviation system block upgrades (ASBUs), has placed increased focus on the areas of risk-management and technology-derived progress. These are important areas, critical to the objectives we are seeking to achieve, but they can also distract us from the fact that the optimization of human performance continues to be an essential component and is driving success in either domain. It is important that we recognize, anticipate and manage the physiological constraints and the cognitive and psychological variations of the human condition in the continuous push for progress. Given the higher level of global system integration, the human performance issues will not be unique to any one air navigation service provider, air operator, State or region. Global cooperation and collaboration will be the most effective and efficient means to address the future human factors challenges.

3. CONCLUSION

3.1 Human factors considerations need to be embedded at the planning and design phases of new systems and technologies, as well as at the implementation phase. An early involvement of the operational personnel to get their engagement and feedback is also essential. Sharing of information regarding the various aspects of human factors and the identification of human performance risk management approaches will be an essential prerequisite for improving safety outcomes in today's aviation operational context and the successful implementation of the ASBUs and other future systems. Widespread and effective management of human performance risks within an operational context cannot be achieved without a coordinated effort from regulators, industry service providers, and operational personnel representing all disciplines. Given the potential effect of human factors on all disciplines, human performance risk management should be considered across all modules of the block upgrades. ICAO should work with all stakeholders to identify, collect and disseminate best practices to mitigate human performance risks associated with both current and planned aviation systems. Through this sharing of information, ICAO will be able to maximize the potential safety and efficiency gains. The Conference is invited to agree with the following recommendation:

Recommendation 6/x – Human performance

That the Conference:

- a) note the ICAO activities in the human performance field, with specific reference to loss of control avoidance and recovery initiative;
- b) urge States and industry, to support ICAO through the contribution of human performance expertise, to ICAO's work in this field;
- c) urge States and industry, to work with ICAO on a change management strategy to ensure that aviation professionals are prepared and able to adjust to the changes that will be introduced by future concepts, systems and technologies;
- d) encourage States to consider human performance at the planning and design phase of new systems and technologies, as well as at the implementation phase, as part of a safety management approach; and
- e) request ICAO to establish a means to facilitate the sharing of best practices in human performance approaches during the design and implementation of the block upgrades and other future aviation systems/technologies.