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Application of the principles of Human Performance (HP) in the NOTAM Area

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- Background
- Resolution A40-4 (Doc. 10140), October 4, 2019, mentioned that :
 - "Considering that according to the purposes and objectives set by the Chicago Convention, ICAO must contribute to the evolution of air transport to "promote flight safety in international air navigation""
 - "Whereas it is recognized that human performance, influenced by physiological and **cognitive** capabilities and limitations, contributes significantly to the overall safety of the aviation system"
 - "Whereas it is recognized that the safety and efficiency benefits associated with new technologies, systems and procedures can only be achieved when they are designed to improve the performance of the individuals who make use of them"; Y
 - "Whereas it is recognized that the implementation of future aviation systems will generate changes in the functions of aviation professionals that will require working through multidisciplinary teams to support collaborative decision-making"



- To those considerations the Assembly resolves that:
 - "1. Member States ensure the integration of human performance considerations in the planning, design and implementation of new technologies, systems and processes as part of a safety management approach;
 2. Member States promote and facilitate the integration of human performance elements into competency-based training programs throughout an individual's professional career; Y
 3. Member States include strategies that promote safe, consistent, efficient and effective operational performance of the individual and teams of individuals in addressing safety priorities"
 - The three resolution considerations **would** apply to NOTAM and AIM **without difficulty**
 - Human Performance asks regulatory staff to recognize human performance in their daily work activities and seek help from a qualified and experienced human performance professional to guide and structure the human performance of individuals being regulated.



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- *In Human Action 3 basic concepts are integrated :*
 - human action (per se)
 - human factors
 - Ergonomics
- For regulatory bodies, Human Performance contributes significantly to the aviation system
- Introducing systemic thinking and human-centered design leads to the 5 principles of Human Performance



Five principles of Human Performance

- **Five principles of Human Performance** synthesize the way in which the Performance of people is influenced by different factors, they are :
 - **Principle 1:** Human performance is determined by people's capabilities and limitations;
 - **Principle 2:** People interpret situations differently and act according to what makes sense to them;
 - **Principle 3:** People adapt to meet the demands of a complex and dynamic work environment;
 - **Principle 4:** People assess risks and make trade-offs before making a decision; and
 - **Principle 5:** People's behavior is influenced by working with other people, technology and the environment.



- Human Performance (HP) is the human contribution to system performance
- **Throughout the aviation system, people are the source of some of the risks and an integral part of the identification and management of all risks.**
 - Support for HP is based on Human Factors (HF).
 - HF is concerned with applying what we know about human beings, their abilities, characteristics, and limitations, to the design of the equipment they use, the environments in which they function, and the jobs they perform.
- **HUMAN FACTORS**
- Amendment 159 of Annex 1 to the Chicago Convention, which entered into force on November 16, 1989, ICAO has made the study of Human Factors a mandatory part of obtaining a professional pilot license.
- Important so that in the AIM – AIS Areas Personnel Licenses are defined, including NOTAM



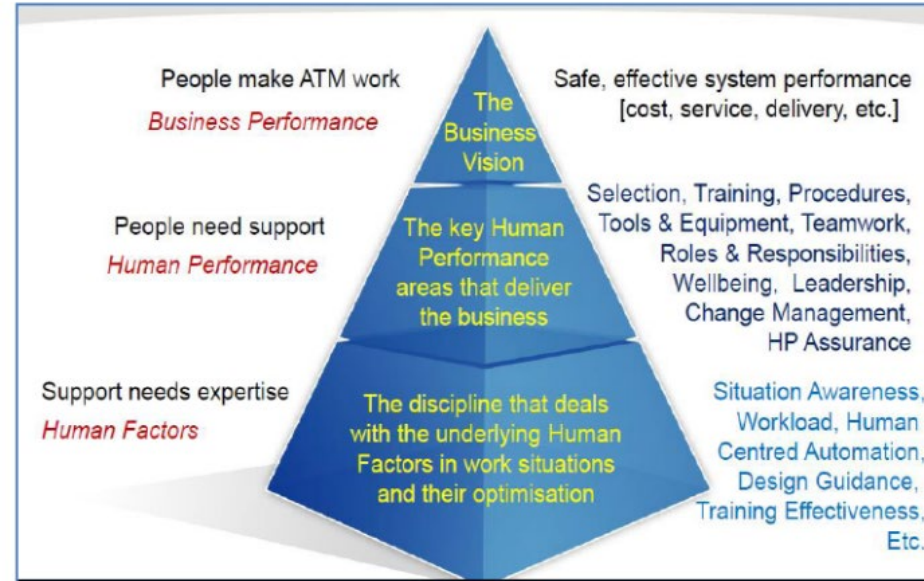
- In ATM, people create security and therefore there has always been an underlying link of Human Performance running through the activities of the Area.
- In 2010, a Technical Report of several States and aviation Organizations indicated, on Human Performance, that it would be necessary to "demystify" the relationship between this and Human Factors.



- Human Performance considerations are key to enabling safe operations, whether focused on flight operations, air traffic control, NOTAM, etc. At HP-related areas of work are scattered across a variety of topics including the following:
 - Security data collection and analysis
 - Change management and introduction of new systems
 - Fatigue Management
 - HP considerations in automated systems
 - Security risk management
 - Staff Training and Licensing
- The new NOTAM systems comprise a set of digital software products. With a focus on the development of the future Digital NOTAM, in which the technical staff will use new technologies to create digital NOTAM.
- This new consideration presents the requirements of the new NOTAM capabilities and discusses the benefits and challenges of NOTAM Human Performance and Human Factors for NOTAM originators and end users.
- This should consider the issues of Training and Selection of new NOTAM personnel.

Considerations

- The Human Performance orientation and approach is also relevant to designated persons providing aviation services in a State or ANSP [p. Examiner pilots, aeronautical medical examiners, maintenance inspectors, certifying engineers, etc.]. That is, operational areas such as NOTAM





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FAA Analysis Case Study



- There is an analysis by the FAA and EUROCONTROL on human factors of the format and dissemination of the NOTAM system (1) to determine the possible causes of dissatisfaction with the aviation system
- Design principles developed for the FAA (and Canada) in the FAA Human Factors Design Guide (Wagner, Birt, Snyder, & Duncanson, 1996) were used. EUROCONTROL and CANSO also carried out a similar study jointly with some Member States.
- The document provides guidance and information to those involved in all areas of the aviation industry for the design and evaluation of systems and equipment.
- This evaluation of the NOTAM system demonstrated that NOTAM Areas do not follow many of the basic human factors principles contained in the referenced design guide.
- Additionally, analyzes of NOTAMs based on FAA design principles increased results that suggested that performance and satisfaction with the system could be greatly increased if changes to the NOTAM system based on human factors were implemented. . (Hoeft, Kochan, and Jentsch, 2003)
- (1) Federal Aviation Administration [FAA], 2002



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FAA Analysis Case Study



- Based on the FAA NOTAM System Human Factors Analysis reference, it can be summarized as follows:
- NOTAMs provide essential information that can affect the decision on when, where and how to operate.
- The system has remained largely unchanged for more than 30 years and has faced criticism. In that cited study, the authors conducted a human factors analysis of the format and dissemination of the NOTAM system to determine possible causes of dissatisfaction with the system.
- The NOTAM System Assessment demonstrated that NOTAMs do not follow many of the basic Human Factors principles
- This analysis of NOTAMs based on the findings of a survey of pilots highlighted concerns with these same aspects of the system, including NOTAM formatting and organization.
- These findings suggest that performance and satisfaction with the system could be greatly increased if changes to the NOTAM system based on human factors were implemented.
- Suggestions for improvement include: use of plain English instead of contractions/abbreviations; use of a standard mix of upper and lower case letters; date and time stamp; presentation of NOTAMs in a logical order; and provide NOTAM training for pilots



- Develop an environment that describes the elements of human action that an ANSP must consider in the various operational areas such as NOTAM, among others.
- The human performance concept can be used effectively by ANSPs of different sizes, based on their operational scale and complexity, and levels of maturity.
- It will help ANSPs determine:
 - their current level of human performance
 - their target level of human performance
 - The actions required to sustain and/or improve human performance



- It concludes that effective human performance drives performance, using Key Performance Indicators (**KPIs**) such as safety, efficiency, and service delivery
- To achieve this in NOTAM, it is required to know:
 - What elements of human performance should they focus on?
 - In what areas are you doing well and where do you need help to improve service performance?
 - How far should they go, considering their size and scale of operations?
 - What are the first steps they should take?



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