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INTERNATIONAL CIVIL AVIATION ORGANIZATION

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Application of Human Performance (HP) principles in AIM

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Human Performance

Background

- Resolution A/40-4 (Doc. 10140), 4 October 2019 mentioned that :

"Considering that, according to the purposes and objectives established by the Chicago Convention, ICAO must contribute to the evolution of air transport to promote flight safety in international air navigation"

"Considering that 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 use them"; and

"Considering that 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.

Human Performance

The considerations of the ICAO Assembly resolve that:

*"**1**. Member States ensure the integration of Human Performance considerations into 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 elements of Human Performance into competency-based training programs throughout an individual's professional career; and*

***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 previous resolution considerations would apply to AIM and NOTAM without difficulty
- Human Performance asks the regulator 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 the people who are being regulated

Doc. 10151 - Human Performance Manual for regulatory bodies

(1st. Ed. 2021)

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Human Performance

- This Handbook helps regulators make it easier for people in the aviation system to “do the right thing” today and avoid negative safety consequences.
- HP regulatory activities such as:
    - development of appropriate regulatory material, through the evaluation
    - acceptance and approval of organizations and systems
    - processes and people
    - through continuous surveillance
- The HP in the responsibilities and supervision activities of a State Security Program

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Human Performance

- *Human Performance (**HP**) represents the Human contribution to the performance of the Aviation System and refers to how people perform their jobs.*
- *Throughout the System, people are both the source of some of the risks and an integral part of the identification and management of all risks..*
- *The way HP is supported is based on Human Factors (**HF**)*

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Human Performance

- *3 basic concepts are integrated into Human Performance*:
  - **human performance** (per se)
  - **human factors**
  - **ergonomics**
- For regulatory agencies, Human Performance contributes significantly to the aviation system
- Introducing systemic thinking and human-centered design (HCD) leads to the 5 principles of Human Performance

Initial considerations

- **Human error is normal**
- **Learning and improving are vital**
- **Context influences behavior**

Human-Centered Design (HCD)

https://www.icao.int/safety/OPS/OPS-Normal/Pages/HCD.aspx

5 Principles of Human Performance

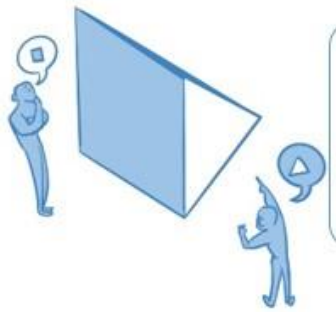
Understanding and applying the 5 principles implies focusing on regulatory and operational aspects with the objective of supporting Human performance and facilitating system security

Capabilities and limitations

1

- They are key to human performance
- They are based on research and operational experience
- They do not operate in isolation
- They overlap and interact providing a broad and multidimensional understanding of HP, in the aviation environment

Interpretation and sense-making



2

Adaptation to changing demands

3

Risk assessment and trade-offs

4

Interaction with people, technology and environment

5

5 Principles of Human Performance

Five principles of Human Performance summarize the way in which people's Performance is influenced by different factors:

- **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 evaluate risks and make trade-offs before making a decision; and
- **Principle 5:** People's actions are influenced by working with other people, technology and the environment.

Human Performance

- In ATM and **AIM** the staff creates security and there is an underlying Human Performance link

- In 2010, a Technical Report from several States and aviation Organizations indicated that the relationship between Human Factors and Human Performance must be "demystified"

Human Performance

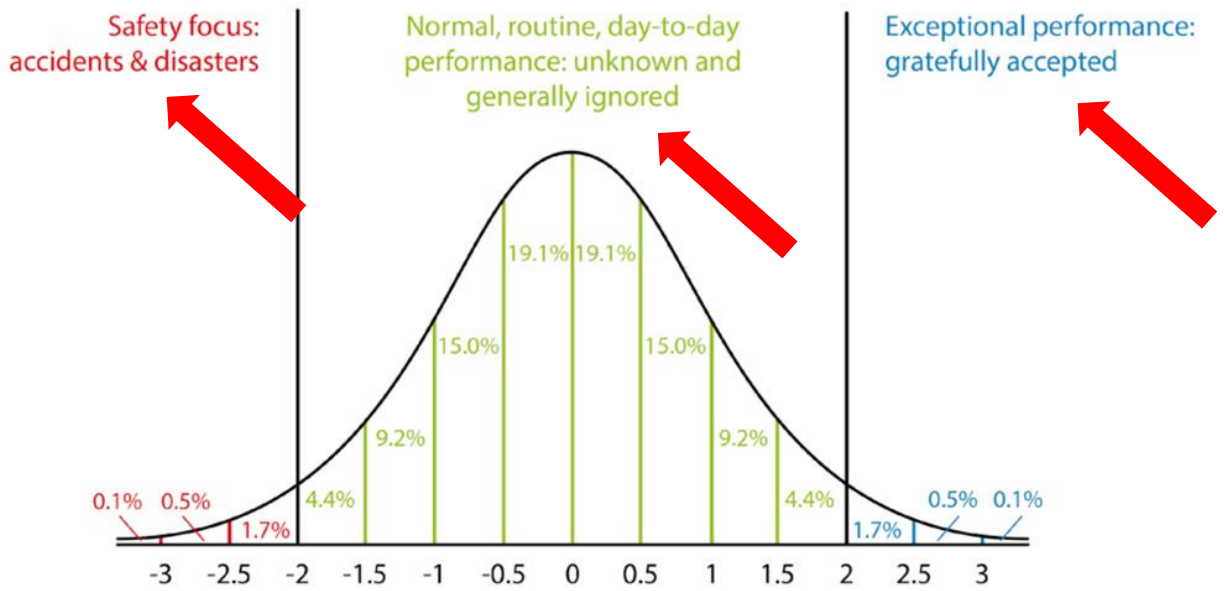
Human Performance (HP) is the Human contribution to System performance.

- **Throughout the aviation system, people are the source of most risks, errors and mistakes and are an integral part of risk identification and management.**
- **Important so that in the AIM Areas** -eAIP, AIC, SUP, FPL, PIB, eMAP, GIS, DDS, PANS OPS, etc.- **are defined Personnel Licenses including NOTAM** (-NOTAM-SNOWTAM-BIRDTAM-ASHTAM-…DROTAM-SPACETAM)

  - Human Performance (HP) and Human Factors (HF) are, in short, the application of what we know about **Human beings**, in terms of their abilities, characteristics and limitations, to the design of the equipment they use, the environments in which they function and the jobs. that are making.

Error:
A human error is an action or decision that was not anticipated..

Equivocación:
based on knowledge or errors in judgment or decision making.



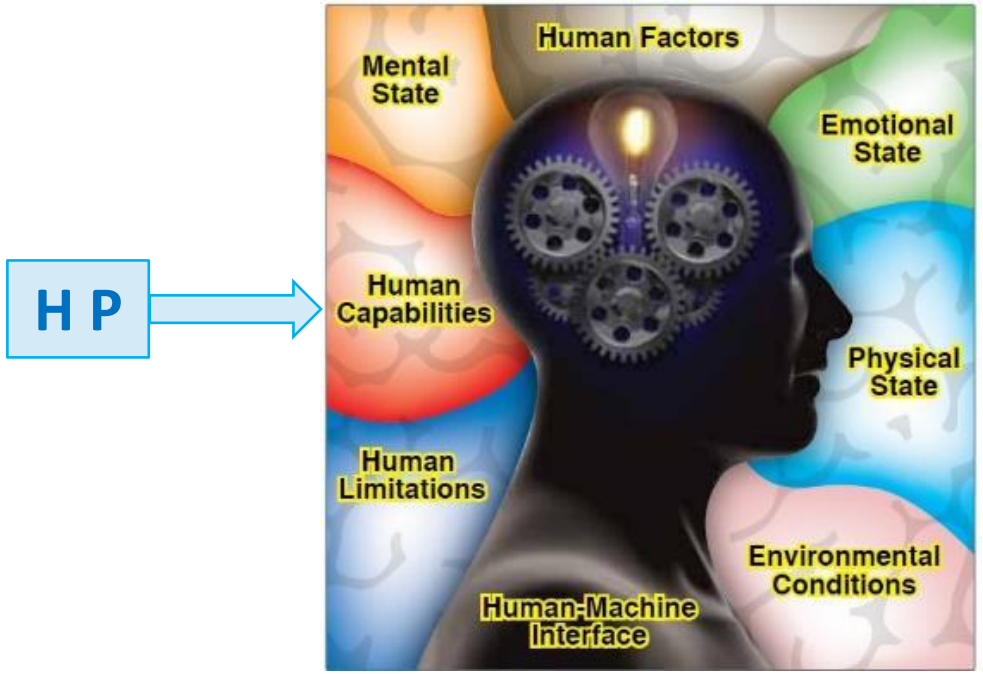
From Safety-I to Safety-II A White Paper (Eurocontrol)

Related HP Work Areas and HP Key Concepts

- **HP is key to secure operations, whether they are:**
  - flight operations,
  - air traffic control,
  - maintenance
  - remote operations,
  - management of data and sensitive information, etc.

- **HP-related work areas are spread across a variety of topics including:**
  - 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

- Key concepts that highlight the Human contribution to the aviation system and provide a basis for approaches and actions that support HP include:
  - **Principles of human performance**
  - **Human-centered design**
  - **Systemic thinking**



Considerations

In the ANS areas (which includes AIM**) the HP is dispersed across a variety of topics including the following:**

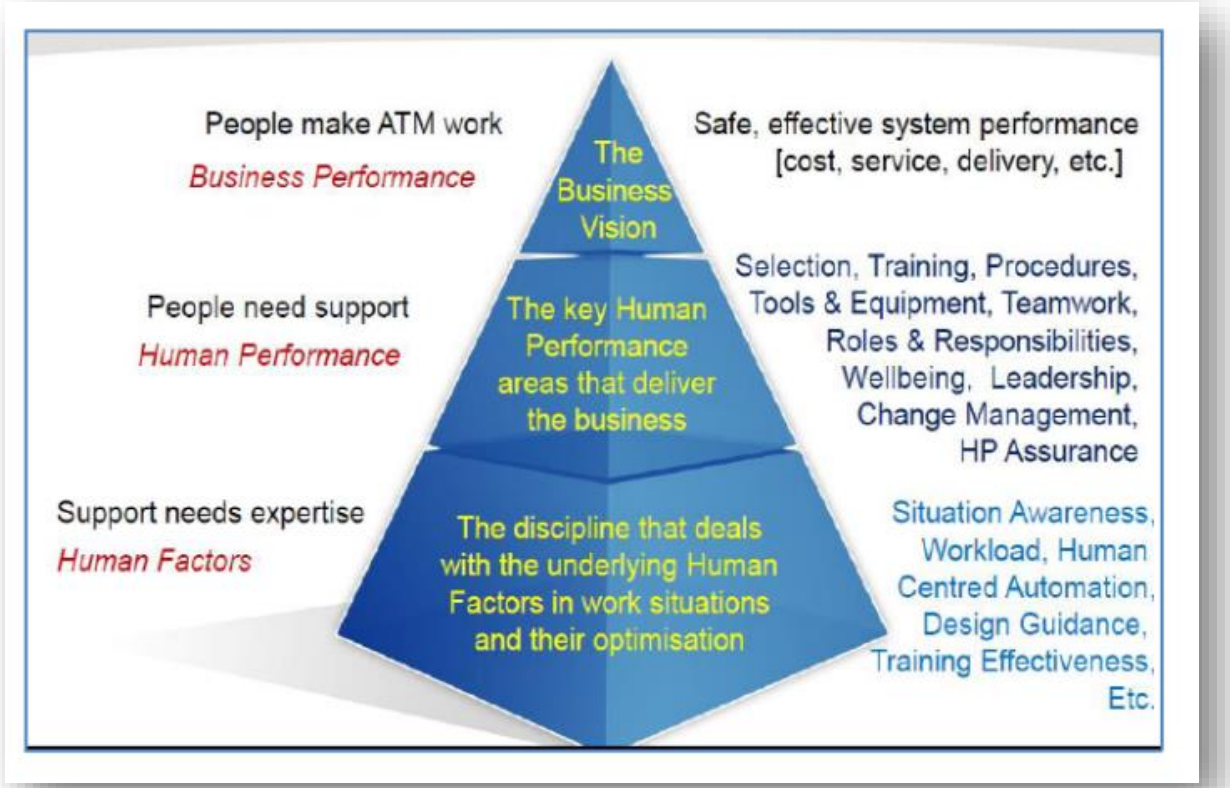
- ✓ Security data collection and analysis
- ○ Change management and introduction of new systems
- ○ Fatigue management
- ○ HP Considerations in Automated Systems
- ✓ Security risk management
- ✓ Staff training and licensing

- The new AIM and D-NOTAM (Digital) systems comprise a set of systems and software products for the management of digital data sets (DDS)
- The requirements for new capabilities in AIM and NOTAM present challenges of Human Performance and Human Factors for all AIM and NOTAM Areas as well as for the originators and end users of NOTAM, due to the immediacy of the information and data
- Instruction and Selection of new NOTAM personnel

Considerations

The orientation and focus of Human Performance is also important for :

- Pilots
- Controllers
- Aeronautical examiners
- Aeronautical inspectors
- Certifiers
- AIM operational areas such as NOTAM and FPL, etc..



Conclusions

- Develop an environment that includes the elements of Human Performance that an ANSP must consider and in the various AIM and NOTAM Areas

- The concept of Human Performance can be used effectively by ANSPs of different sizes, depending on their operational scale, complexity, and maturity levels

- It will help ANSPs determine:

  - Your current level of human performance
  - Your target level of human performance
  - The actions required to sustain and/or improve human performance

Conclusions

- La actuación humana efectiva se mide con el desempeño, utilizando Indicadores Clave de Desempeño (**KPI**) como la seguridad, la eficiencia y la prestación de los servicios

- Para lograr esto en AIM y NOTAM, se requiere saber:
  - ¿En qué elementos de actuación humana deberían enfocarse?
  - ¿Qué áreas están bien y dónde requieren ayuda para mejorar el desempeño del servicio?
  - ¿Hasta dónde se debe llegar, considerando el tamaño y escala de operaciones?
  - ¿Cuáles son los primeros pasos que deben dar?

FAA Analysis Practical Case

•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) were used in the FAA Human Factors Design Guide (Wagner, Birt, Snyder, and Duncanson, 1996 - HF-STD-001B). EUROCONTROL and CANSO also carried out a similar study jointly with some 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 factor's principles contained in the referenced design guide..

•Additionally, analyzes of NOTAMs based on FAA design principles increased results suggesting that performance and satisfaction with the system could be significantly increased if changes to the NOTAM system based on human factors were implemented. . (Hoeft, Kochan and Jentsch, 2003 - DOI:10.1207/s15327108ijap1501_5) International Journal of Aviation Psychology

•*(1) Federal Aviation Administration [FAA],* ***2002***

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