1.0 PURPOSE

This Circular is meant to provide guidelines to the ANSP in adopting policies and procedures on human factors principles in the provision of Air Navigation Services.

2.0 REFERENCES.

2.1 The Civil Aviation (Certification of ANSP's) Regulations, 2017
2.2 ICAO Doc 9758- Human Factors Guidelines for Air Traffic Management (ATM) Systems
2.3 ICAO Doc 9683- ICAO Human Factors Training Manual

3.0 BACKGROUND

The overall safety and efficiency of the civil aviation system depends on human operators as the ultimate integrators of the numerous system-elements. This dependence is unlikely to decrease, and may even increase in unanticipated ways, as additional advanced technology is implemented. To a greater extent, understanding and accounting for the role of humans, including their positive and negative contributions, will be important to maintaining and improving safety while improving efficiency.

4.0 GUIDANCE AND PROCEDURES

4.1 Definitions

Human Factors Principles mean principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

4.2 General

The human factors concept concerns the interaction between:

a) People and people
b) People and equipment
c) People and the environment
d) People and procedures

4.3 Three key concepts are involved in human factors understanding and eventual implementation. These are; Human-centred Automation, Situational Awareness and Error Management.

4.3.1 **Human-centred Automation,**

Automated aids can be designed from a technology-centred perspective or from a human-centred perspective. A technology-centred approach automates whatever functions it is possible to automate and leaves the human to do the rest. This places the operator in the role of custodian to the automation; the human becomes responsible for the "care and feeding" of the computer. In contrast, a human-centred approach provides the operator with automated assistance that saves time and effort; the operator's task performance is *supported*, not *managed*, by computing machinery.

4.3.2 **Situational Awareness**

Situational awareness (SA), can be defined as the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future. Thus, the most important Human Factors issue in regards to human-technology interface is the ability of the human operator to maintain situational/system awareness. It is an established fact that human-technology interfaces have not always been intuitive. Non-intuitive, „opaque‟ interfaces lead to operational complexity which often forces the operator to allocate increased attention to maintain an adequate mental model of the situation/system status. This becomes the breeding grounds for loss of situational awareness, decreased system performance and eventually human error and safety breakdowns.

4.3.2.1 Elements of Situational Awareness

The elements listed below are highly dynamic and present subtle to large changes that may occur at short notice, and that can or will influence how an employee works or performs at any particular moment. How these changes interact with an employee's SA may only be recognized after having gained considerable experience in general, and at a specific location in particular:

a) personal factors
b) weather
c) airport infrastructure
d) individual differences
e) traffic

f) operators and pilots
g) environment
h) navigational aids
i) aircraft performance
j) equipment
k) adjacent units

4.3.3 Error Management.

It has always been considered that human error was an individual trait that could be prevented by the right training, attitudes or by automating as many human tasks as possible. However this has not been able to eliminate error. The aviation industry thus shifted its focus from *eliminating* error to *preventing* and *managing* error. Human error is recognized as an inevitable component of human performance. Complex socio-technological systems therefore should take this into account by design. The concepts of *error tolerance* and *error resistance* in technology design best exemplify this new focus. The following are some of the causes of error:-

a) Lack of Communication
b) Lack of Knowledge
c) Complacency
d) Distraction
e) Lack of Teamwork
f) Fatigue
g) Lack of Resources
h) Pressure
i) Lack of Assertiveness
j) Stress
k) Lack of Awareness
l) Norms

4.3.3.1 Error management has two components: *error reduction* and *error containment*. Error reduction comprises measures designed to limit the occurrence of errors. Since this will never be wholly successful, there is also a need for error containment measures designed to limit the adverse consequences of the errors that still occur. Error management includes:

a) measures to minimize the error liability of the individual or team;
b) measures to reduce the error vulnerability of particular tasks or task elements;

c) measures to discover, assess and then eliminate error factors within the workplace;
d) measures to diagnose organizational factors that create error-producing factors within the individual, the team, the task or the workplace;
e) measures to enhance error detection;
f) measures to increase the error tolerance of the workplace or system;
g) measures to make latent conditions more visible to those who operate and manage the system;

4.4 The ANSP provide training on human factors principles to ATS personnel and take into account human factors principles in developing operational policies, procedures and guidelines.

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