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## **REQUIREMENTS FOR THE DEVELOPMENT OF SAFETY CASES**

### **1 Introduction**

1.1 ICAO Annex 11 requires that any significant safety-related change to an air traffic service system, including the implementation of a new procedure shall only be effected after a safety risk assessment has demonstrated that an acceptable level of safety will be met. The reason behind this requirement is that such a significant safety-related change has the potential to introduce new safety risk to ATC operations.

1.2 International best practices to fulfill this requirement is through the conduct of a safety case. The successful completion of a safety case by the air navigation service provider (ANSP) would provide the safety assurance to both the ANSP and regulator and any other interested parties (in the event of an accident or incident) that an acceptable level of safety would be met.

1.3 In relation with the above requirement, paragraph 5.2 of the Manual of Standards – Aeronautical Telecommunication (MOS-ATE) in particular requires the ANSP to develop a safety case whenever a new safety critical system is being introduced or commissioned. The MOS-ATE also lists some examples of safety critical systems which require a safety case, such as automated air traffic control system and instrument landing systems.

1.4 In line with best practices, the requirement to develop a safety case is extended to other significant safety-related change to the air traffic services. A list of examples of these significant safety-related changes which is not exhaustive is given below.

- Resectorisation of airspace
- Significant changes to ATC procedures, for example
  - o Continuous Descent Operation (CDO)
  - o Changes to civil/military operations
  - o Triple runway operations

- Operations of Remotely Piloted Aircraft (RPA)
- Introduction of major ATC facilities, for example
  - New or major upgrade of ATC Area or Approach Centres
  - New or major upgrade of Control Tower
- Introduction of major ATC functions and capabilities such as ADS-B

## **2 Purpose**

- 2.1 This ATSSP supersedes ATSSIC 02/2009 and is issued for compliance by the ANSP for the development of safety cases.

## **3 Scope**

- 3.1 This ATSSP is addressed to the Director (Air Traffic Services) and Director (Aeronautical Telecommunication Engineering), Civil Aviation Authority of Singapore, and is intended for dissemination to relevant staff involved in development of safety cases.

## **4 Safety Plan**

### **4.1 Need for a Safety Plan**

- 4.1.1 A significant safety-related change such as a project to acquire an ATC system normally involves a number of phases from the system definition phase, system design, etc, through to system commissioning. Safety needs to be planned for and addressed separately in all of these phases of the project as the hazards and associated risks may differ in type and degree in each of these phases. A Safety Plan shall be developed to provide the basis for the development of the safety case and different parts of the safety case at various phases. The Safety Plan shall include the following details:

- (a) An overview of the scope of the significant safety-related change such as the system functions, equipment and procedures;

- (b) the safety activities and processes to be carried out during the various phases;
- (c) the authorization structure and processes to approve the various safety document; and
- (d) the roles and responsibilities of the staff to be involved in the various safety activities and processes

## 4.2 Phase Approach to Develop a Safety Case

4.2.1 A four-phase approach to develop a safety case is suggested in this ATSSP, but as each significant safety-related change is different in size and scope, the ANSP is free to adapt and adopt different number of phases to suit a particular change. The four phases are:

- (a) **Phase 1** : System definition and operational requirements phase – this is when the broad functionality and operational requirements of the new system is defined. This phase should identify the safety objectives of the system. A hazard and risk assessment has to be conducted to identify the hazards and establish safety requirements;
- (b) **Phase 2** : System design and equipment development phase – this is when the system configuration and operation are defined, in support of the safety requirements defined in the earlier phase. The human factors aspects of the design and the safety implications of the design should be considered. The hazard and risk assessment conducted at the earlier phase will need to be updated;
- (c) **Phase 3** : Installation, testing and pre-commissioning phase – this is when the system is being installed and subjected to various tests prior to commissioning. The safety requirements are also tested during this phase and specific control procedures are developed to obviate or mitigate the identified risks. Important pre-commissioning and transition activities with safety implications such as the development of contingency plans and the competency level of trained operational and technical staff need to be assessed; and

- (d) **Phase 4** : Commissioning, operation and maintenance phase – this is when the system is put into actual operation. This last phase should provide all the complete evidences that the system is safe for operational service. During this phase, the safety of the system is also continuously being monitored and improved as new hazards are identified and the risks mitigated.

## **5 Hazard and Risk Management**

- 5.1 Hazard and risk management is the identification, analysis and elimination or mitigation of risks to an acceptable level of safety to the ANSP. It usually encompasses
  - (a) hazard identification
  - (b) risk assessment
  - (c) risk control
- 5.2 There are different methodologies to conduct a hazard and risk analysis and it is up to the ANSP to determine the appropriate methodology for each safety case, depending on the size and complexity of the significant safety-related change and the severity of the safety implications from the introduction of the system, facilities or procedures into operation.

## **6 Approval of Safety Case**

- 6.1 The ANSP shall put in place an authorization structure and process to approve the safety case. The officer responsible for the overall development of the safety case and the accountable officer who approves the safety case shall be clearly identified.

## **7 Submission of Safety Case**

- 7.1 All documents produced from the development of the safety case such as the Safety Plan and the safety case reports at the end of each phase shall be submitted to AAR Division for comments and acceptance. The final report shall be submitted at least 1 month before the commencement of the significant safety-related change.

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Following AAR Division's comments, the ANSP may need to revise the safety case to the satisfaction of AAR Division before it is accepted.

## **8 Queries**

- 8.1 If there are any queries with regard to this ATSSP, please address them to:

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