RA 5012 - Type Airworthiness Safety Assessment

Rationale

Type Airworthiness (TAw) is a key element of an Air System Safety Case (ASSC)[1]. A Type Airworthiness Safety Assessment (TASA) will provide a reasoned and evidenced argument that the Air System is safe to operate in a clearly defined context. Failure to articulate a comprehensive argument supported by evidence is likely to undermine the ASSC. This RA sets out the specific requirements for a TASA to include claims, arguments and evidence, subject to independent evaluation and Assurance, in support of the ASSC.

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5012(1) The TAw Authority (TAA) or TAw Manager (TAM)[2] **shall** own and manage a TASA.

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Type Airworthiness Safety Assessment

1. The TAA or TAM **should** initiate and maintain a TASA for each Air System type they have responsibility for[3].

2. Under arrangements for Civilian Operated Air Systems which invoke a TAA and TAM[4], the TAA **should** maintain the TASA and produce the necessary TASAR. Under arrangements for Special Case Flying[2], the TAM **should** maintain the TASA and produce the necessary TASAR.

3. The TASA **should** consist of a claim (or number of claims), a structured and explicit argument, and supporting body of evidence, that together provide a compelling, comprehensible and valid case in support of the ASSC that the Air System is safe to operate within defined limits.

4. The TAA or TAM **should** ensure that regardless of structure, the TASA:

   a. Defines the configuration and operating environment (referencing the Statement of Operating Intent / Statement of Operating Intent and Usage[5]) of the applicable Air System.

   b. Has scope and boundaries aligned with those defined in the TAw Strategy[6].

   c. Describes the Safety requirements, targets and attributes.

   d. Provides a justification for the Airworthiness of the design.

   e. Is supported by Safety analysis[7].

   f. Identifies the limitations and procedures[8] necessary to achieve the required level of Safety for the subject configuration.

   g. Takes account of the Minimum Equipment List if applicable[9].

Type Airworthiness Safety Assessment Report

5. The TASA **should** be summarized in a Type Airworthiness Safety Assessment Report (TASAR).

6. The TASAR **should** be produced to support the ASSC[1] as part of the Military Aircraft Registration activation request.

7. The TASAR **should** be updated as a complete new issue:

[1] Refer to RA 1205 – Air System Safety Cases.
[2] Refer to RA 1163 – Air Safety Governance Arrangements for Special Case Flying Air Systems.
[3] A single TASA can be maintained to cover variations in the Type Design providing the assessment of each variation is clear, whether using a compatibility matrix or other method.
[4] Refer to RA 1162 – Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems.
[5] Refer to RA 5726 – Integrity Management.
[6] Refer to RA 5010 – Type Airworthiness Strategy.
[7] Refer to Def Stan 00-056 – Safety Management Requirements for Defence Systems.
[8] Including where appropriate reference to the Support Policy Statement. Refer to RA 5407 – Support Policy Statement.
[9] Refer to RA 1300 – Release To Service.

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a. At least every 5 years for an In-Service Air System.

b. Following Major Type Design Change (TDC)[10].

c. Additionally, as determined by the TAA or TAM.

8. For all other Air System changes, the TASAR **should** be reviewed and updated with an Addendum to the previous Report, ensuring that the content of the addendum does not alter the validity of the claims, arguments and evidence within the TASAR main body.

9. The TAA or TAM **should** make a declaration regarding the validity of the TASAR and any addenda at the Type Airworthiness Safety Panel[11]. If this declaration cannot be made then a new issue of the TASAR **should** be produced.

Independent Evaluation and Audit

10. The TAA or TAM **should** ensure that the TASA is subjected to evaluation by a competent and suitably qualified Independent Technical Evaluator (ITE), independent of the outcome or processes they are reviewing, and recognized by the TAA or TAM as a Subject Matter Expert in the field which is being reviewed.

11. The TAA or TAM **should** ensure that the TASA is subjected to Audit in accordance with Defence Standard (Def Stan) 00-056, by a competent and suitably qualified Independent Safety Auditor (ISA), independent of the outcome or processes they are reviewing.

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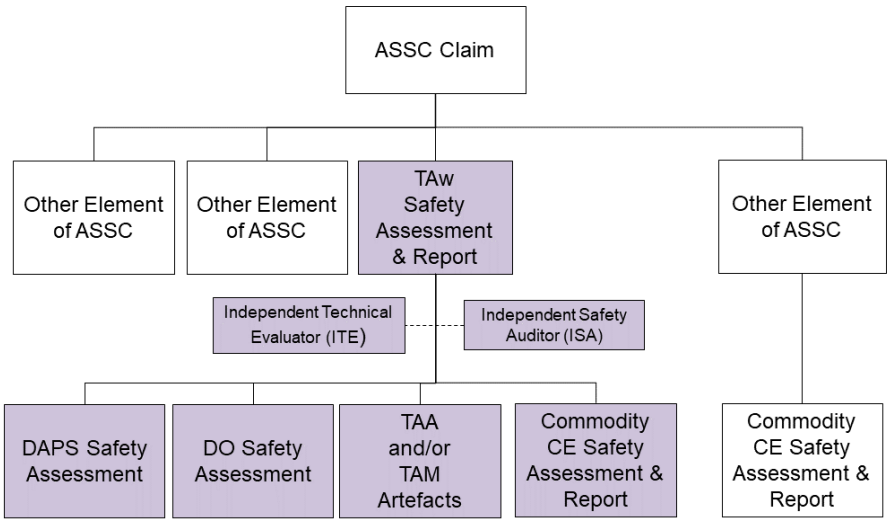
12. The TASA will need to be treated as Airworthiness information[12].

13. The TAw Strategy will define the TASA boundaries and articulate commodity items that are controlled by the TAw Safety Management System. Therefore, the claim(s), arguments and supporting body of evidence within the TASA can include Equipment Not Basic to the Air System (ENBAS)[13]; Air Launched Weapons (ALW)[14]; and Commodity Delivery Team[15] Safety Assessments and integration evidence, in addition to TAA-sourced Type Design artefacts and other externally provided assessments, such as those provided by Defence Aircrew Publications Squadron (DAPS)[16] or ITE. This relationship of artefacts is shown in Figure 1.

Figure 1. Relationship of ASSC



[10] By exception, agreement for the use of the TASAR addendum procedure may be gained from the MAA as part of the Form 30 process. Refer to RA 5820 – Changes in Type Design (MRP 21 Subpart D).
[11] Refer to RA 5011 – Type Airworthiness Safety Management System.
[12] Refer to ►RA 1225 – Air Safety Documentation Audit Trail.◄
[13] Refer to RA 1340 – Equipment Not Basic to the Air System.
[14] Refer to RA 1350 – Air Launched Weapon Release.
[15] Refer to RA 5013 – Air Safety Management of Equipment and Commodity Items.
[16] A Safety Assessment provided by DAPS is an example of an appropriate independent operator evaluation.

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14. Figure 1 highlights that it is possible for some commodity items to be excluded from the TAw Strategy. In these cases the Commodity Delivery Team Safety Management System (SMS) will interact directly with the ASSC (and hence the Aviation Duty Holder / Accountable Manager (Military Flying) Air Safety Management System) without recourse to the TAw SMS.

TASAR

15. The initial TASAR supports the ASSC to enable activation on the Military Aircraft Register. The TASAR does not then require reissue prior to each ASSC review. Reviewing the TASAR for continued validity at the TAwSP provides the basis for the TAw input to the ASSC.

16. In addition to the requirements listed in this RA, the TAA or TAM may choose to update the TASAR with an Addendum, including a declaration that the content of the Addendum does not alter the validity of the claims, arguments or evidence within the TASAR main body. Such an update may be required following counter-evidence identified through Fault Reporting and Data Exploitation activities[17], or a change of information from TAwSP review or other source of evidence, as long as the circumstances are not listed in this RA as requiring a complete new issue.

17. Following a major TDC, it is expected the TASAR will uplifted. By exception, if the change has minimal impact to the TASAR, the TAA / TAM may request the Safety Assessment for the change is captured in an addendum rather than a re-issue of the TASAR. This request will be submitted as part of the Form 30 process[10].

18. The guidance provided within Def Stan 00-056 is one method of achieving a suitable TASAR structure.

Safety Analysis

19. The TAA or TAM will need to ensure that, where applicable, the TASA:

a. Addresses any differences in the operating environment and usage from those in the certification basis of the competent certifying body.

b. Addresses the Risks and mitigations of not complying with UK legislation and standards.

20. Safety analysis will be carried out on new Air Systems and subsequent changes, in support of claims and arguments within a TASA, by the equipment DO, or by specialist agencies contracted by the TAw organization.

21. The justification of the TAw of the design requires addressing both new equipment and systems, and the effect of subsequent changes to the Type Design[18].

22. The evidence for demonstration of TAw may include design analysis, successful application of specified procedures and standards (such as Def Stan 00-970[20]) with any shortfalls addressed and agreed by the MAA, historical evidence of successful use of particular design features, and results of tests and trials carried out by the DO and ITE organizations, to arrive at an overall assessment of Airworthiness.

Commercial Off The Shelf (COTS) Systems and Software

23. The TAA or TAM for projects involving the use of COTS systems or software will need to ensure that the Safety Assessment contains an adequate Safety justification for the COTS components.

24. Guidance on the Safety Assessment of COTS systems is contained in Def Stan 00-056[7]. Guidance on the assessment of Programmable Elements of Unknown Pedigree is available within the Knowledge in Defence portal[19]. Ultimately, Def Stan 00-970[20] refers to acceptable standards for Programmable Elements.

[17] Refer to RA 1207 – Air Safety Data Management and Exploitation.
[18] Refer to RA 5810 – Military Type Certificate (MRP Part 21 Subpart B).
[19] Knowledge in Defence Portal:https://www.gov.uk/guidance/knowledge-in-defence-kid.
[20] Refer to Def Stan 00-970 – Certification Specifications for Airworthiness.

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Independent Evaluation and Audit

25. ITE Assurance will consist of independent analysis of the data evidence supporting the TASA, including, where appropriate[21], a qualitative assessment of Air System handling, Human Machine Interface (HMI) and crew workload.

26. Care will need to be taken to ensure that independent auditing of the TASA is undertaken by Suitably Qualified and Experienced Person(s) or organization(s) that are not unduly influenced by commercial, peer or rank / status pressures.

27. Multiple ITEs may be employed to provide evaluation of different aspects of a TASA.

28. Where a contractor is employed as ITE, it is important that this is exclusively by the TAA or TAM to act on their behalf and not via the Prime Contractor and / or DO; with any advice the ITE may have about the design and / or Safety directed to TAA or TAM. It is noted that if the MOD has the required competence and level of independence, then this independent technical evaluation could be provided from within the MOD.

29. It is acceptable for the ISA and ITE to be involved in the joint working environment between the TAw organization and DO; for example, in a Hazard Log Working Group or in a Combined Test Team approach. Duplication of effort will be avoided if the ISA and ITE work collaboratively with the MOD and DO so that their assessments can be incorporated in the overall project schedule.

[21] As decided by the Senior Responsible Officer (SRO) or receiving Operating Duty Holder (ODH).