Specific Operations Risk Assessment (SORA)
– ECA Position Paper –

Executive summary

- SORA (Specific Operations Risk Assessment) is a **multi-stage process of risk assessment** aiming at risk analysis of certain unmanned aircraft operations, as well as defining necessary mitigations and robustness levels.
- While ECA supports the underlying idea of SORA process, it is concerned that **inadequate consideration** is given to the **complexities** involved in the **respective UAS-operation**, especially as regards the Air Risk Class (ARC), i.e. the risk of mid-air collisions.
- Any statistical analysis used for SORA must take the intrinsic **risk of mid-air collisions (MAC) into account**, rather than solely looking at potential fatalities.
- ECA believes that SORA should not be regarded as a purely quantitative process (comparable to a computer-algorithm) but at the same time as a qualitative process. For this, an adequate **detailed knowledge and expertise within both the operator and the competent authority is required**.
- Every manned aircraft has a layered approach to collision avoidance which builds its resilience. Greater consideration should be given to how similar **resilience** can be achieved **for unmanned aircraft**, since simply relying on statistical analysis is deemed insufficient.
- To facilitate the SORA process - **Standard Scenarios** (STS) may be developed for certain types of operations and be used by operators and regulating authorities as a template when approving some UAS-operations. ECA warns **against the use of STS as an "easy and quick way" to operate** UAS, as a 'tool-box' to pick and choose from, and instead **calls for a holistic approach** to ensure the safety of operation is not jeopardised.
- It is crucial that all relevant experts and stakeholders are involved in the **process and in the review of the SORA content**.
- The gathered **expertise should be consolidated preferably at the European level**, while developing and maintaining a comprehensive database of the SORA content. Incorporating into such a database a **non-punitive reporting system** is highly recommended.
- **An operation solely based upon "declaration" by the operator should not be allowed.** Until there has been enough operational experience gathered with the SORA process and STS - all operations should require an authorisation by a competent authority.

European Cockpit Association AISBL
Rue du Commerce 20-22, 1000 Brussels, Belgium I T +32 2 705 32 93 I F +32 2 705 08 77 I eca@eurocockpit.be I www.eurocockpit.be

The Background

The Specific Operations Risk Assessment (SORA) concept was developed by Working Group 6 (WG6) of the Joint Authorities for the Rulemaking of Unmanned Systems (JARUS). It has been endorsed by the European Aviation Safety Agency (EASA) as an Acceptable Means of Compliance (AMC) to fulfil the requirements of the EU Regulations (Basic Regulation, Implementing Act, Delegated Act and Annexes).

What is SORA

The Specific Operations Risk Assessment (SORA) is a novel approach on how to safely create, evaluate and conduct an Unmanned Aircraft System (UAS) operation. It focuses on assigning to a UAS-operation two classes of risk, a ground risk class (GRC) and an air risk class (ARC). The GRC and ARC form the basis to determine the so-called Specific Assurance and Integrity Levels (SAIL) for both respectively. The SAIL represent the level of confidence that the UAS operation will stay under control within the boundaries of the intended operation. The SORA allows operators to utilise certain threat barriers and/or mitigating measures to reduce both risk-classes and thereby reducing the SAIL. The final step in the risk assessment is the recommendation of the Operational Safety Objectives (OSO) to be met in accordance with the SAIL. The SORA is a method to integrate UAS operations with (commercial) manned aviation independent of the weight of the UA and altitude in the airspace with a certain level of safety.

To facilitate the SORA process, additionally the so-called Standard Scenarios (STS) may be developed for certain types of operations, with known hazards and acceptable risk-mitigations. The STS may then be used by operators and regulating authorities as a template to reduce the amount of work involved with approving UAS-operations.

ECA Position

ECA supports the underlying idea of SORA as a world-wide, standardized, and harmonized risk assessment methodology. ECA also sees the potential benefits in a risk- and performance-based approach towards the integration of UASs.

However, ECA expects several problematic issues in the practical application of SORA, especially in determining the ARC. ECA is concerned that some of the underlying principles of SORA (as outlined in the JARUS-Guidelines) might not be fully understood and/or embraced by some of the stakeholders involved. This in turn could undermine the effectiveness of SORA as a tool to assess safety risks and ensure safe UAS operations.

In this context ECA re-emphasises the following points from the JARUS-Guidelines:

- SORA document shall neither be used as a ‘checklist’ nor be expected to provide answers to all the challenges
- SORA is a tailoring guide that allows an operation to have the best fit for the mitigation means and thus a risk reduced to an acceptable level. For this reason, it does not contain prescriptive requirements but rather objectives to be met at various levels of robustness;

- SORA methodology is based on the principle of a holistic / total system safety risk-based assessment model.

While the aim of the SORA-process is to make the risk-assessment more transparent and reduce some of the workload, there is a risk that inadequate consideration is given to the complexities involved in the respective UAS-operation. This is especially the case for the determination of the ARC which is very complex.

Collision avoidance, especially avoidance of mid-air-collisions with manned aviation, has been identified by ECA as a key area to address when integrating drones into common airspace. Airspace-structure, ATC-services, right-of-way-procedures are *inter alia* all means to lower the risk of collisions between aircraft. Every manned aircraft has a layered approach to collision avoidance. For example, the principle of *see and avoid* as means to avoid collisions - is valid in manned aviation even in complex airspaces with complex rules and several safety nets. The resilience which is achieved by this layered approach is a very important safety factor, which cannot be entirely substituted by statistical methods (upon which SORA's risk determination relies). Therefore, greater consideration is to be given on how this resilience can be achieved, rather than relying on pure statistical analysis, which is based on assumptions extrapolated into the future integrated airspace.

Any statistical analysis used for SORA must take the intrinsic risk of mid-air collisions (MAC) into account, rather than solely looking at potential fatalities.

The JARUS guidelines distinguish between 14 aggregated collision risk categories, taking into account a multitude of different factors, such as airspace structure, traffic type, operational volume, ATM/UTM infrastructure, environment, etc. The JARUS WG6 has highlighted this complexity by a statement in the guidelines: "*It is important that both the competent authority and operator take great care to understand the Operational Volume and under what circumstances the definition of the ARC assignment process could be invalidated*". It is therefore crucial that both the UAS operator and the authority are able to fully understand this Operational Volume and do draw the right conclusions as to the determination and validity of the ARC, and hence the safety of the envisaged operation, especially when it comes to an operation in an airspace volume integrated with manned aviation.

Importance of competence

The assessment of risk classes is a key element of the entire process. ECA believes that SORA should not be regarded as a purely quantitative process (comparable to a computer-algorithm), but at the same time as a qualitative process. For such an adequate assessment, detailed knowledge and expertise within both the operator and the competent authority is required. However, in numerous cases, this may not be the case and may exceed their capabilities.

Consequently, an independent group of experts from competent third parties (e.g. manned aviation stakeholders, manufacturers, ANSPs (ATM/UTM), academia, associations) should be consulted on the risk assessment for certain UAS operations. It is imperative that representatives from these and other relevant stakeholders are involved in the process and in the review of the SORA content.

Ideally, this knowledge and expertise will be consolidated in “SORA competency-centres” (this could be “qualified entities”), preferably at the European level. These competency-centres could offer their services to the entire UAS community, which would also facilitate international standardisation and harmonisation.

The competency-centres could also develop and maintain a comprehensive database of the SORA content (both input and outcome). What it would mean in practice is when the UAS operation is deployed based on the SORA - the expected outcome would be matched with the gathered, relevant experience (e.g. information about the incidents). This in return would have a *learning* added value. Such a database could prove to be very helpful for the overall SORA process and especially for the development and validation of STS.

Furthermore, incorporating into such a database a non-punitive reporting system (similar to the Aviation Safety Reporting System (ASRS) in the US, or the European Coordination Centre for Accident and Incident Reporting (ECCAIRS) in the EU), is highly recommended. This would allow safety incident (and accident) data to be collected and analysed, enabling this fast-growing sector to benefit from a quick feed-back loop in order to ensure and increase the safety performance of the whole system.

Standard Scenarios

ECA has concerns about certain developments surrounding Standard Scenarios (STS). It appears that some stakeholders may, at least initially, view STS as an “easy and quick way” to operate UAS. ECA supports STS as envisioned by JARUS (see above), where STS serve competent authorities and operators as a template.

However, STS only works for the scenario it was intended and validated for. STS is not a “toolbox” from which certain elements can be picked and applied to various and differing types of operations as seen fit.

It is therefore imperative that the holistic view is kept, where changing one element may have a significant impact on the entire operation, which, in-turn, requires a re-assessment and re-validation of the entire operation. If such a holistic approach is not taken and STS are used as a convenient quick-fix solution for a variety of types of operations - the safety of such operations could be jeopardised.

Declarative Authorisations

ECA foresees potential problems with the EASA - EU-STS (Standard Scenarios for Operations of Unmanned Aircraft Systems in the Specific Category) regarding “declarative” authorisations, whereby the UAS operator self-declares compliant and safe.

The SORA process, in general, and the STS in particular, are too new to allow an operation solely based upon “declaration” by the operator. At least until there has been sufficient operational experience with SORA and STS gathered by all relevant stakeholders, all operations should require an operational authorisation by a competent authority.

Conclusion

ECA understands that SORA could be a way forward to assess and mitigate the risks for the operations in the Specific Category. ECA's objective is to maintain a high uniform level of safety in the air, achieved due to the experience built by manned aviation. Introducing a new (standard) way of risk assessment – in particular air risk – can only lead to that objective if all above stated considerations are taken into account.

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GLOSSARY

ARC	Air Risk Class
ASRS	Aviation Safety Reporting System
ECCAIRS	European Coordination Centre for Accident and Incident Reporting
GRC	Ground Risk Class
JARUS	Joint Authorities for Rulemaking on Unmanned Systems
MAC	Mid-air collision
OSO	Operational Safety Objectives
SAIL	Specific Assurance and Integrity Level
SORA	Specific Operations Risk Assessment
STS	Standard Scenario
UA	Unmanned Aircraft
UAS	Unmanned Aircraft Systems
UTM	UAS Traffic Management System

European Cockpit Association AISBL
Rue du Commerce 20-22, 1000 Brussels, Belgium I **T** +32 2 705 32 93 I **F** +32 2 705 08 77 I eca@eurocockpit.be I www.eurocockpit.be