



**FLYING FORWARD 2020**

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**White Paper**

**SAMWISE – An easy web-tool  
supporting SORA methodology  
by EuroUSC Italia**

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## 1. Executive Summary

Drones in Europe are a rapidly developing sector. Enterprises are increasingly using drones for their business [1]. To foster the market growth, the EU (European Union) Legislator gave EASA (European Union Aviation Safety Agency) rulemaking responsibility for civil drones of any mass [2]. The Agency has already proposed common rules which have been adopted by the European Commission in 2019 [3,4]. Drone operations are classified in three categories with different administrative procedures, proportionate to the risk. Most of the commercial applications such as pipeline and power-line inspection, media and entertainment, traffic monitoring and counting, last mile freight delivery, precision agriculture, etc., are likely classified in the “Specific” category. To perform drone operations in the “Specific” category, it is normally required for drone operators to submit a safety risk assessment. To develop this risk assessment, EASA recommends the SORA (Specific Operations Risk Assessment), a new methodology specifically established for drone operations and released by the Joint Authorities for Rulemaking on Unmanned Systems (JARUS), [5]. The SORA delivers a document that describes the entire risk assessment process, demonstrates that the safety requirements have been identified and implemented, and confirms that the operation can be conducted safely.

SAMWISE is a software tool developed by EuroUSC Italia that, by leveraging the Specific Operations Risk Assessment (SORA) methodology developed by JARUS, automatizes most of the risk assessment process required to fly drones in the “Specific” category. It is an online tool intended to easily support and guide users through their operational risk assessment following the Specific Operations Risk Assessment (SORA) methodology, developed by JARUS and recommended by EASA as AMC (Acceptable Means of Compliance) to Article 11 to Commission Implementing (EU) Reg. 2019/947.

SAMWISE has been adopted in the Flying Forward 2020 (FF2020) project to support LLs (Living Labs)<sup>1</sup> in developing the risk assessment required for operational authorisation from CAA (Civil Aviation Authority).

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<sup>1</sup> To validate the FF2020 solutions and approach, 10 demonstrators are carried out in collaboration with 5 Living Labs across Europe (Estonia, Finland, Italy, Netherlands, Spain): <https://www.ff2020.eu/demonstrators/>

## 2. Introduction

So far, risk assessment and safety methodologies were heavily based on subjective expert evaluations, both at applicant and authority levels. The European common rules introduced in early 2019 standardized drone operations, opening a wider market where drones are allowed to fly based on the same requirements. The already growing drone market benefits from these common rules and the number of operations conducted is increasing quickly as well. Concurrently, the need for developing safety assessments is increasing. The availability of the SORA methodology, which is much more deterministic than the case-by-case approach, opens the opportunity to adopt SAMWISE, a software tool with a high level of automation.

According to the new European regulation [3], all drone operators desiring to fly in the “Specific” category need to conduct a risk assessment, unless their operation falls within a standard scenario or a Pre-Defined Risk Assessment. SORA is the methodology developed by JARUS and recommended by EASA to conduct the risk analysis. The SORA methodology was developed by JARUS, a group of experts gathering regulatory expertise from all around the world, whose objective is to recommend a single set of technical, safety and operational requirements for all aspects linked to the safe operation of Unmanned Aircraft Systems (UAS). The purpose of SORA is to propose a methodology for the risk assessment to support the application for an authorisation to operate a UAS within the “Specific” category, as envisaged by EU Reg. 947/2019. With this respect, SORA can represent an acceptable means of compliance to Art.11 to evaluate the risks associated with the operation of an UAS within the “Specific” category and to determine its acceptability. The latest version of SORA Methodology [5] and the related guidance material ([6][7][8][9]) were published by JARUS in March 2019<sup>2</sup>. In addition, EASA published on the 9<sup>th</sup> of October 2019 the AMC (Acceptable Means of Compliance) and GM (Guidance Material) to Commission Implementing Regulation 2019/947 [10], which includes a revised version of the SORA. The most up-to-date EASA (in Europe) / JARUS (outside Europe) version is used as a reference to carry out the assessment by the SAMWISE tool.

FF2020 project aims to create a UAM (Urban Air Mobility) ecosystem which is safe, secure and acceptable for the citizens, for public safety, and to protect an urban area against external threats. As reported in Annex C of ISO 23629-12, one of the supporting services needed for an effective implementation of a UAM ecosystem is the Risk Analysis Assistance (RAA) service. In a nutshell this means making available to all FF2020 Living Labs a support to carry out their own risk assessment every-time this is needed. EuroUSC Italia has already initially developed this solution (a web-based tool to implement RAA) in partnership with Arakne Srl. However, adaptations of the software are provided to make it more usable and adequate for all Living Labs’ needs. This brings a significant added value to the project, since RAA could well be one of the digital platforms linked in the UAM ecosystem.

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<sup>2</sup> JARUS, SORA v2.5 (new version) under consultation, <http://jarus-rpas.org/jarus-external-consultation-sora-version>.

### 3. Problem Definition

Some pains have been identified in relation to the development of safety assessments according to SORA methodology.

**Pain #1: Completing a risk assessment requires an extensive expertise in Unmanned Aircraft System (UAS) operations, which even experienced manned-aviation operators may not be familiar with.** This is because the SORA requires to collect, from many different sources, an extensive amount of information, e.g., structure and properties of airspace and ground area on the day of the operations (e.g., Airspace Class, Prohibited or Restricted areas, active NOTAMs), ground population density, presence of critical infrastructures, drone characteristics, envisaged operation, operator capability and competence of its personnel.

**Pain #2: Gathering manually all the necessary information may take several days, while often drone operators need to promptly answer their clients about the feasibility of a specific operation.** This problem is particularly acute for those UAS operators, the majority, that are not aviation professionals.

**Pain #3: With drone operations rapidly increasing, CAAs will have to evaluate hundreds of applications per day, with the consequent increase in the time required to operators to get the approval.** To streamline the authorisation process, EASA and JARUS provided standard scenarios (STS) and Pre-Defined Risk Assessment (PDRA) for which the authority already performed the SORA analysis, but many current drone applications are not covered by them. Therefore, risk assessments autonomously performed by UAS operators are necessary. Without a methodology to efficiently process the applications for operational authorisations, the waiting time to get the CAA authorisation will effectively hinder the operators' business opportunities.

SAMWISE tool helps to overcome all these issues. In FF2020 project, it supports the LLs in the authorisation process required to perform the UAS operations.



## 4. SAMWISE: A web-tool supporting SORA methodology

### 4.1 Innovation

SAMWISE is a software tool able to automatize most of the risk assessment process by leveraging the SORA methodology. The SAMWISE software tool is delivered as a service via an online portal. The core innovation consists in SAMWISE's ability to provide a full detailed portfolio, to be sent to CAA, that assesses both the risk for third parties on the ground (Ground Risk) and in the air (Air Risk), evaluates the Specific Assurance and Integrity Level (SAIL) and the related Operational Safety Objectives (OSOs), demonstrates compliance to specific robustness levels of all relevant mitigations and requirements.

*How does it work?* UAS Operators access SAMWISE from an online portal and insert basic information about their envisaged operation. SAMWISE processes the data, automatically gathers information, and immediately returns a first assessment on whether the operation is feasible under the "Specific" category. If the outcome is positive, SAMWISE provides the user with a list of requirements to be fulfilled. The user will then need to provide additional information to prove that the safety requirements are fulfilled, and SAMWISE generates automatically a complete risk assessment report, based on all data provided by the operator about the intended operation. SAMWISE is designed to collect information and deliver a complete risk assessment with minimum effort from the user. In the future, SAMWISE will be able to automatically provide a full analysis of the airspace, using information about the planned date, location, and intended flight path of the operation by interfacing with appropriate databases containing static and dynamic airspace data and a full analysis of ground area by using additional data such as the population density in the overflow area, the presence of critical infrastructures (e.g. power lines, highways, nuclear plants, etc.), and planned gatherings of people (e.g. concerts or other events).

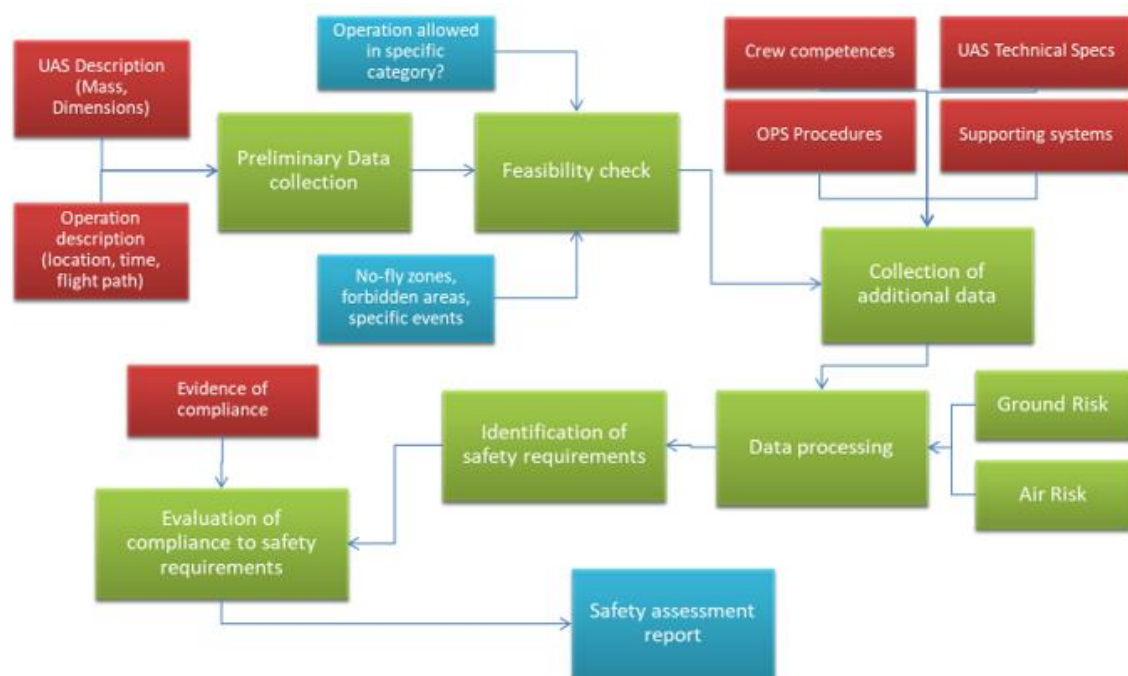


Figure 1 - SAMWISE tool process: Operator's view

An overview of the SAMWISE tool functionalities is shown in Figure 1 where red boxes represent input from the user, green boxes automatic functions provided by the tool and blue boxes available outputs.

## 4.2 Value Proposition

Drone operators, especially those that are not aviation professionals and thus are unfamiliar with risk-assessment methodologies and protocols, will be able to seamlessly complete a safety risk assessment within about one day, hence reducing by up to a factor of ten the time currently required to complete this process. For Civil Aviation Authorities, SAMWISE allows to set up a standardised and efficient strategy to quickly and accurately evaluate the received applications, also those that have not been produced with our tool, thus significantly accelerating the authorisation process. Finally, the integration of SAMWISE in the set of services provided by U-Space service providers can further speed-up the authorisation process while ensuring adequate safety standards.

**Value#1: Accessible and easy to use.** SAMWISE can be seamlessly employed by all drone operators, as it does not require specific expertise in UAS regulations. Consequently, this tool will enable a wide range of users to perform drone operations removing the burden to perform intricate risk assessments.

**Value#2: Fast and accurate.** SAMWISE drastically reduces the time required to perform a complete risk assessment, from several days to less than a day. Concurrently, at CAA level SAMWISE automatizes, and hence speeds up significantly, the evaluation process. In addition, because the tool is developed according to the SORA methodology, it ensures that all aspects of the analysis are accurately addressed.

**Value#3: Cost effective.** SAMWISE is a cost-effective solution that supports drone operators and CAAs by facilitating the preparation of a risk assessment and its subsequent evaluation. Reducing the time and the resources required to prepare a safety assessment can reduce costs for operators while increasing their ability to respond quickly to customer needs, thus fostering the use of drones for a variety of applications with a beneficial impact on the whole drone sector. The SAMWISE tool therefore indirectly contributes to the growth of the drone market, which in turn is expected to benefit several areas, e.g.: package delivery with the reduction of environmental impact, as cleaner drone applications can substitute current solutions, monitoring activities (e.g. of electricity lines or wind-power generators) where the use of drones can reduce the risks for people employed in dangerous activities.

## 4.3 SAMWISE solution

Users are supported through each phase of the SORA methodology, including uploading the required technical documentation. For each step, the tool helps to identify the right requirements needed to carry out the risk analysis, taking all aspects into consideration. SAMWISE significantly reduces the time required to perform a full risk assessment and drives the user to a complete report, ready to be submitted to the competent authorities.

SAMWISE allows to have complete coverage of all SORA phases, including:

- Preliminary identification of the EASA category of operation;
- Identification of applicable mitigations and requirements;

- Identification of the required documentation and data collection; and
- Technical definitions to support users.



Figure 2 - SAMWISE logo

In specific, SAMWISE offers its functionalities for:

**1) Preliminary support in the planning phase**

- Identifying if the mission requires a risk assessment.
- Identifying the main elements of the Concept of Operations (ConOps) (also useful to construct a ConOps with a bottom-up approach).

**2) Guided approach**

- Identifying the applicable safety requirements.
- Requiring only basic knowledge of the SORA methodology and related regulations.
- Identifying and collecting all the technical documents required at each step as means of evidence.
- Providing a slightly different logical sequence of the SORA steps to simplify the process.

**3) Reducing time to obtain operational authorisation**

- Significant reduction in time and effort to perform a complete risk analysis.
- A complete SORA risk assessment report is provided, ready to be submitted to the authority.
- All safety aspects are taken into account by the algorithm, hence minimizing the risk of error.

SAMWISE follows the logical sequence of the SORA process as shown in the figure below.

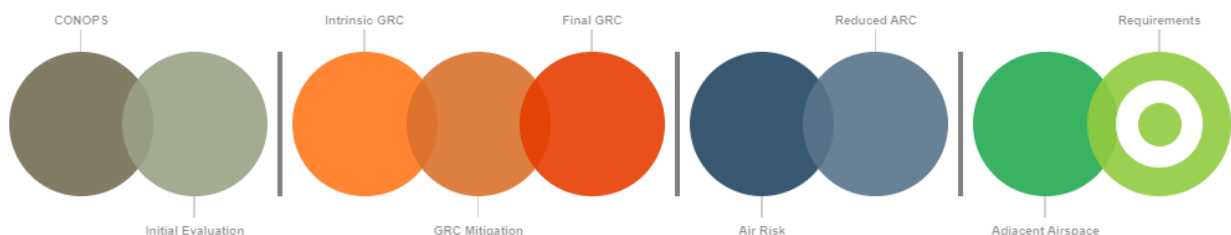


Figure 3 - SAMWISE logical sequence

Three main functionalities are shown on SAMWISE homepage:

- My Profile:** allows to manage the personal data, settings, subscriptions and invoices.
- My Documents:** allows to upload all the documents (as means of evidence) needed to support the SORA assessments.
- My Assessments:** allows to manage, create, edit, and delete the assessments.



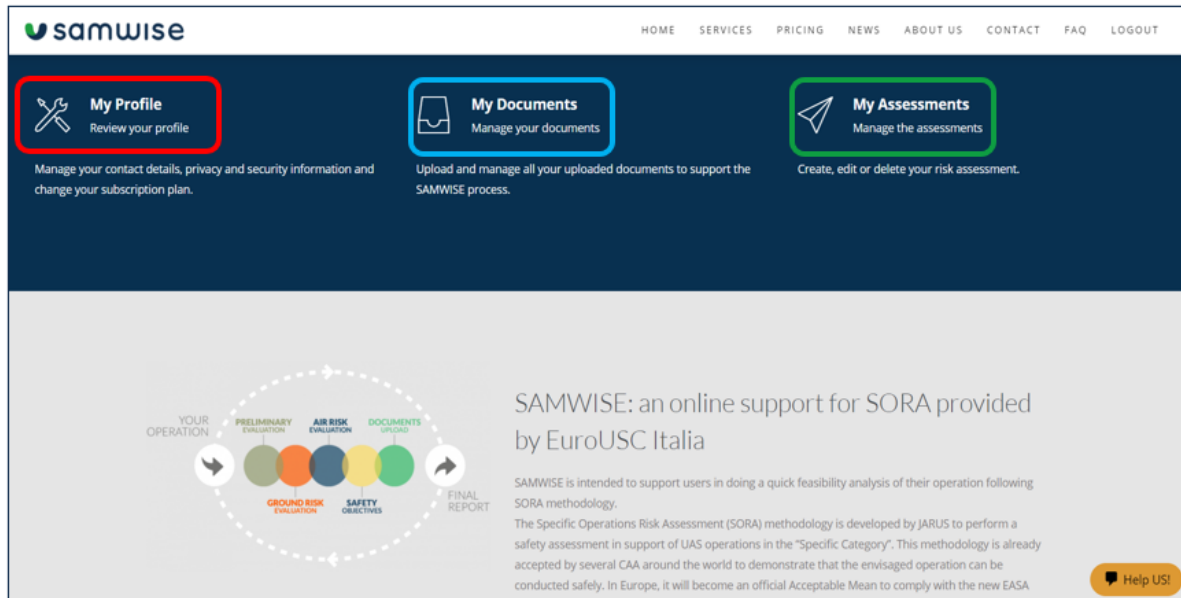


Figure 4 - SAMWISE main functionalities

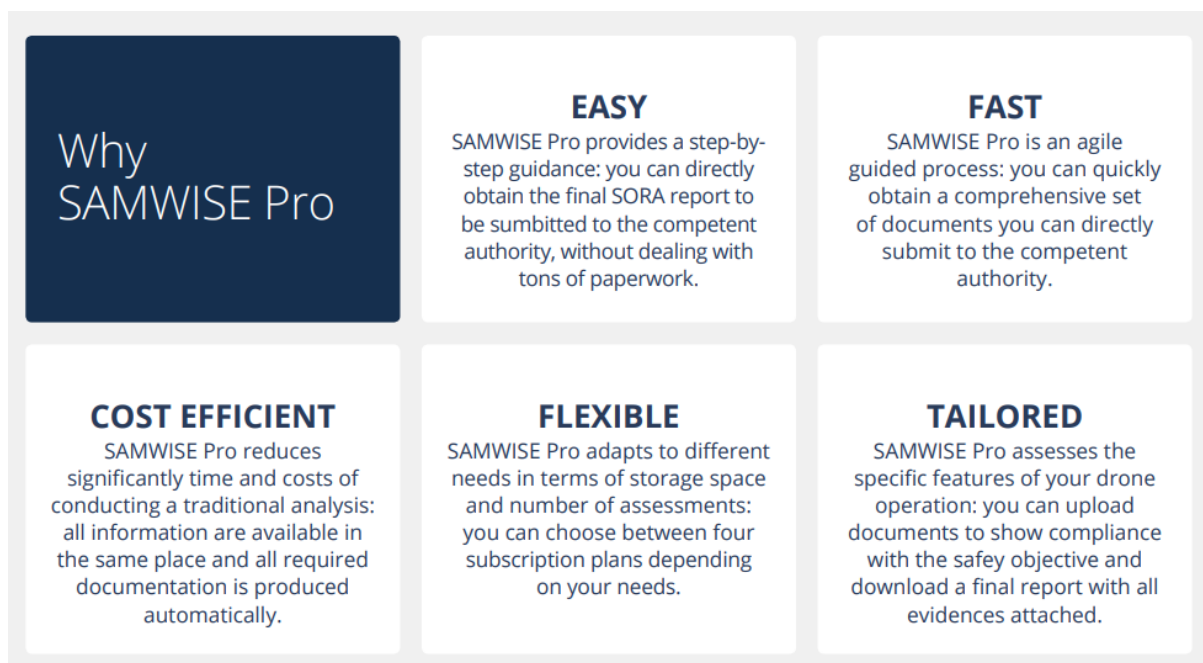


Figure 5 - SAMWISE Pro

SAMWISE tool consists of five main steps:

- 1) Access your personal area;
- 2) Enter your drone operation data;
- 3) Run the SORA analysis and identify applicable requirements;
- 4) Upload your proofs of compliance;
- 5) Download the full SORA report.

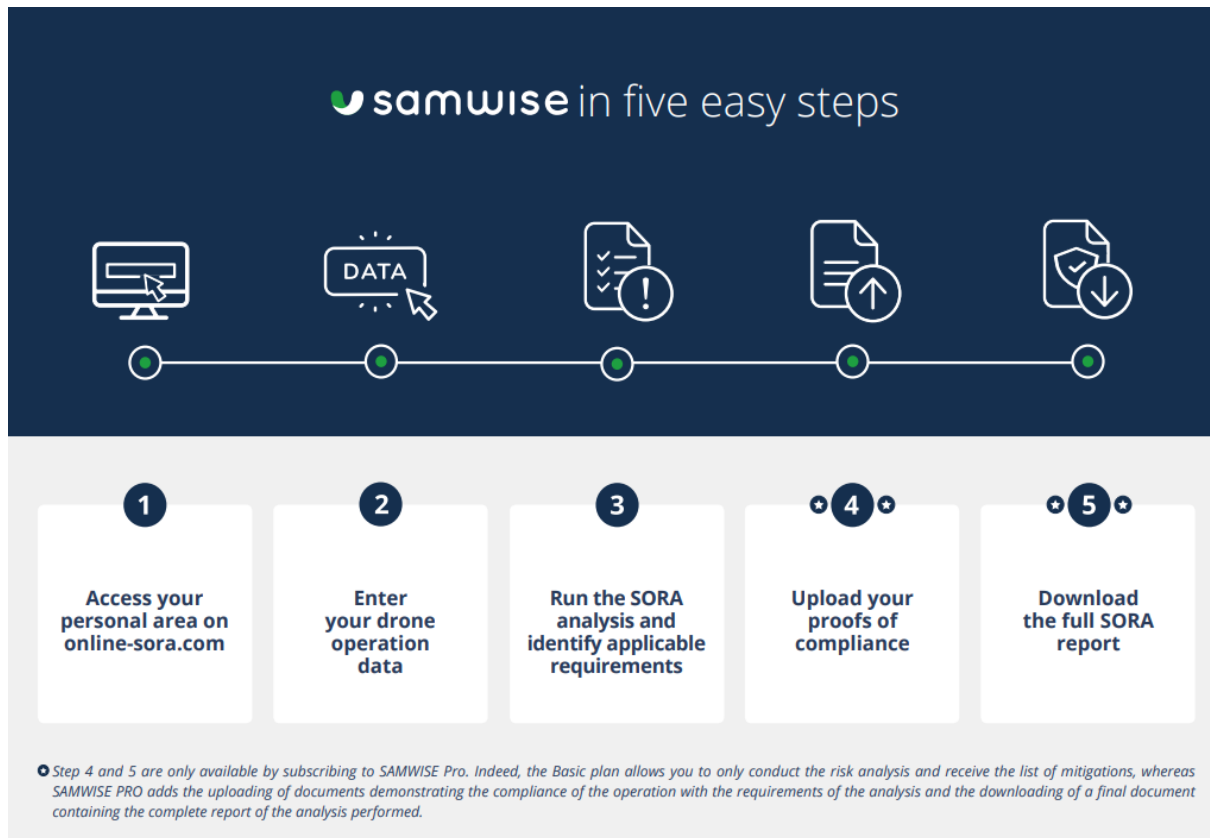


Figure 6 - SAMWISE in five easy steps

### Step 1: Access your personal area

Register at [www.online-sora.com](http://www.online-sora.com). Fill in the registration form with your personal data and choose a subscription plan. After receiving the email confirmation, log in to your personal area with your password and email.

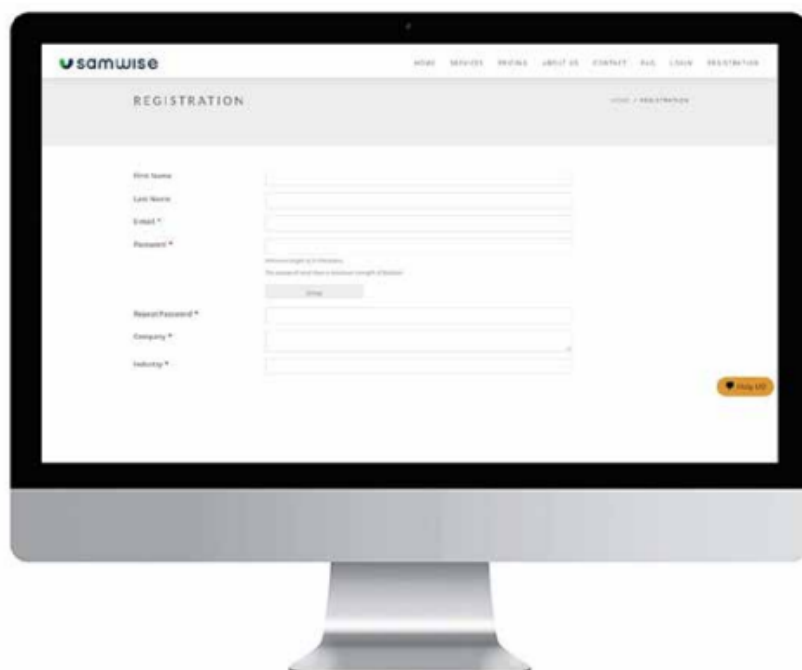
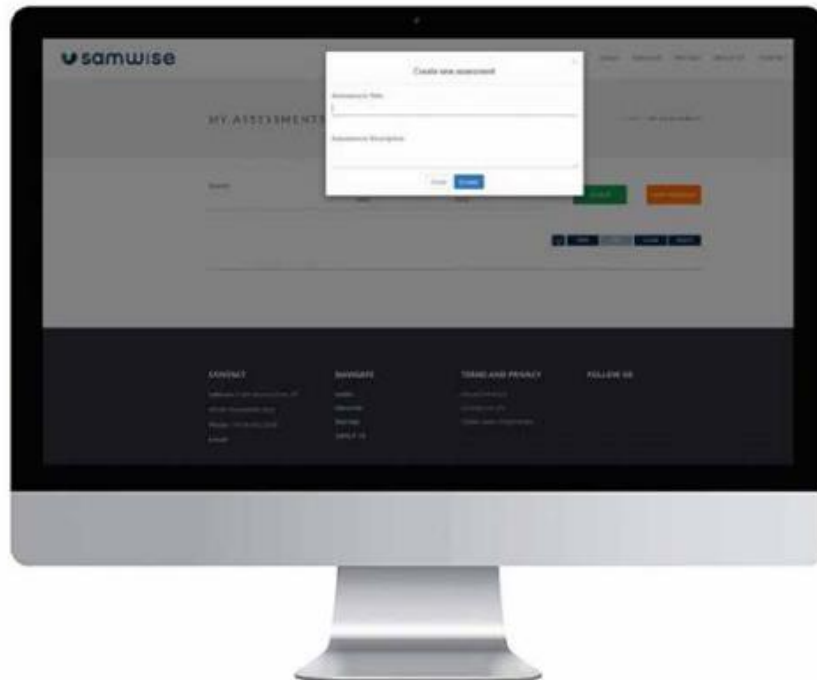


Figure 7 - SAMWISE in five easy steps: Access your personal area

### **Step 2: Enter your drone operation data**

Click on My Assessment and enter the initial technical and operational details of your drone operation (flight conditions, max operational height, max take-off mass, max dimension, max velocity, etc.).



*Figure 8 - SAMWISE in five easy steps: Enter your drone operation data*

### **Step 3: Run the SORA analysis and identify applicable requirements**

Start your assessment. Evaluate the initial risks for third parties on the ground and in the air, apply the safety mitigations and, after computing a “final level of risk” (SAIL), identify a set of Operational Safety Objectives to be compliant with.



*Figure 9 - SAMWISE in five easy steps: Run the SORA analysis and identify applicable requirements*

#### **Step 4: Upload your proofs of compliance**

Upload your means of evidence with just one click to demonstrate compliance with the applicable Operational Safety Objectives and mitigations.



*Figure 10 - SAMWISE in five easy steps: Upload your proofs of compliance*

#### **Step 5: Download the full SORA report**

Download your final report. After the necessary checks, you will be able to deliver the report to the competent Civil Aviation Authority in order to obtain the authorization to fly, as required by the new EU Regulation.





*Figure 11 - SAMWISE in five easy steps: Download the full SORA report*

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# SORA-based analysis

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line with the requirements of the specific category.  
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Figure 12 – SORA report



## 5. Conclusion

Drone applications are increasing in the coming years. Several UAS operations are going to be in “Specific” category for which a safety assessment is required. SAMWISE is a tool specifically designed to automatize the risk-assessment process in the UAS domain in a timely and cost-effective manner by leveraging the SORA methodology, and that can be also exploited by CAAs to accelerate the evaluation process of operators’ applications to perform drone operations in the “Specific” category. SAMWISE allows to conduct the risk assessment compliant with the new EU regulation. It also contributes to drone operations safety by harmonizing the risk assessment process. Users and clients are both drone operators, who are required to complete risk assessments to fly their drones, CAAs, that need to efficiently evaluate the huge number of applications they receive, and U-Space service providers who might want to add value to their solutions.

SAMWISE is a web tool adopted by FF2020 Living Labs for developing the risk assessments required for obtaining operational authorisations from local CAA. It provides the FF2020 project with one of the UTM (Unmanned Aircraft System Traffic Management) services listed by ISO 23629-12: Risk Analysis Assistance (RAA).

Thanks to SAMWISE, building your operational risk assessment in the Specific UAS category has never been so easy.

## 6. Useful link

- ✓ SAMWISE tool: <https://www.online-sora.com/>
- ✓ Video Teaser:  
[https://www.youtube.com/watch?v=E9QWW1cLwTg&ab\\_channel=EuroUSCItalia](https://www.youtube.com/watch?v=E9QWW1cLwTg&ab_channel=EuroUSCItalia)
- ✓ SAMWISE Demo: [https://www.youtube.com/watch?v=93fjnAZS\\_6I&t=403s](https://www.youtube.com/watch?v=93fjnAZS_6I&t=403s)
- ✓ Video Lessons “How to use SAMWISE”:  
[https://www.youtube.com/watch?v=taKySrlqZls&list=PLezwGTZ2vfPMpchP7cuSO4F52NQVvHPOJ&ab\\_channel=EuroUSCItalia](https://www.youtube.com/watch?v=taKySrlqZls&list=PLezwGTZ2vfPMpchP7cuSO4F52NQVvHPOJ&ab_channel=EuroUSCItalia)

## 7. Acronyms & Abbreviations

Acronym	Title
AMC	Acceptable Means of Compliance
CAA	Civil Aviation Authority
ConOps	Concept of Operations
EASA	European Union Aviation Safety Agency
EU	European Union
FF2020	Flying Forward 2020
GM	Guidance Material
ISO	International Organization for Standardization
JARUS	Joint Authorities for Rulemaking on Unmanned Systems
LL	Living Lab
NOTAM	NOtice To AirMen
OSO	Operational Safety Objective
PDRA	Pre-Defined Risk Assessment
RAA	Risk Analysis Assistance
SAIL	Specific Assurance and Integrity Level
SORA	Specific Operations Risk Assessment
STS	Standard Scenario
UAM	Urban Air Mobility
UAS	Unmanned Aircraft System



UTM

Unmanned Aircraft System Traffic Management

## 8. References

- [1] SESAR, “Drone Outlook Study”, 2016,  
[http://www.sesarju.eu/sites/default/files/documents/reports/European Drones Outlook Study 2016.pdf](http://www.sesarju.eu/sites/default/files/documents/reports/European_Drones_Outlook_Study_2016.pdf)
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# FF2020



Flying Forward 2020 (FF2020) is a collaborative three-year research and innovation project funded by the European Union under the Horizon 2020 programme. Our project is developing an entire state-of-the-art Urban Air Mobility (UAM) infrastructure by incorporating this new form of mobility within the geospatial digital infrastructure of cities. It includes a governance model and framework, a regulatory framework, a geospatial digital infrastructure, a Digital Toolbox, an Identity of Things (IDoT) scheme, and interoperability frameworks. The solutions developed during the project will be tested in five living labs across Europe: Eindhoven, Milan, Zaragoza, Tartu and Oulu – enabling an open dialogue with stakeholders, end-users and citizens to improve processes and results. Ultimately, our goal is to have a positive and lasting impact on the quality of life of European citizens and to create sustainable partnerships and cities.

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