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**Title of document:**

# **Training report: Application & UAV operation**

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## **Work package 2 – WP2**

Piloting tools for wildfire prevention and mitigation

### **Activity 2.1 – A2.1**

Pilot activity setup and training

### **Deliverable 2.1.2 – D2.1.2**

Training report: Application & UAV operation

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<b>Project full title:</b>	Fire free MED
<b>Mission:</b>	Protecting, restoring and valorising the natural environment and heritage – Natural heritage
<b>Priority:</b>	Greener MED
<b>Specific objective:</b>	RSO 2.4 Promoting climate change adaptation and disaster risk prevention, resilience, taking into account eco-system-based approaches

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**Partner in charge:** FBML

**Partners involved:** FRSS, RCG, NPUNA, MU, CIMBAL. RGO

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## 1. Introduction

This document provides administrative and technical overview on the training done within the scope of Activity 2.1 by project partners RGO communications and Faculty of Maritime studies, attended by representatives of pilot partners: Fire and rescue service Sežana (FRSS), Rocca di Cerere UNESCO Global Geopark (RCG), The National Park Una (NPUNA), The Municipality of Ulcinj (MU), Public fire brigade of the Town of Mali Lošinj (FBML), Intermunicipal Community of Baixo Alentejo (CIMBAL). The training, that was held in separate training sessions, included both training on the use of the FRED application, as well as Unmanned Aircraft Systems (UAS) operation.

Comprehensive training materials were developed to support end users in effectively using the FRED Application and operating an UAS, as well as using both together for the purposes of fire prevention and mitigation. For the purposes of training users on the FRED application functionalities, a document *Annex 1: Training course material – FRED platform user manual* was distributed to training partners as well as across the FRED basecamp platform. For the purposes of UAS training, an extensive set of PowerPoint slides was created, grouped around 7 topics, also distributed to training participants, as well as made available on the FRED basecamp site. The two sets of training materials are in fact integral part of the deliverable D2.1.1 Training course material.

This report also provides an evaluation of a structured UAS training program delivered as an extension to the FRED 3rd Consortium Meeting, held in Sežana, Slovenia, from 20 to 22 May 2025. The training was organized for pilot project partners, who are obligated to implement pilot activities defined in Deliverable D1.1.2 and to operationalize the equipment procured through Activity A1.3 – Procurement of UAV and Auxiliary Equipment. Seeing that most of the pilot partners already have some experience with UAS technology, it was interesting evaluate their know-how before and after the training sessions. More information is provided in chapter 3 UAS Training assessment methodology.

## 2. Scope of training

The training on FRED application was held online over the course of two days, on 16th and 18th December 2025; whereas the UAS operation training was held in Sežana, Slovenia, from 20<sup>th</sup> to 22<sup>nd</sup> May 2025.

The FRED application training was organized in two identical sessions over the course of two days for the purpose of accommodating the fire-fighters/pilot partner schedules. The intention was to have as many operative staff as possible, and they are often limited by their work schedules. The presenter from the side of the developer, RGO Communications, demonstrated functionalities of the platform, taking questions and addressing individual comments by the pilot partner staff.

The agenda is made available as an Appendix 1: FRED application - Meeting Agenda to this document, as well as the attendance sheet, also made available as Appendix 2: FRED application - List of participants.

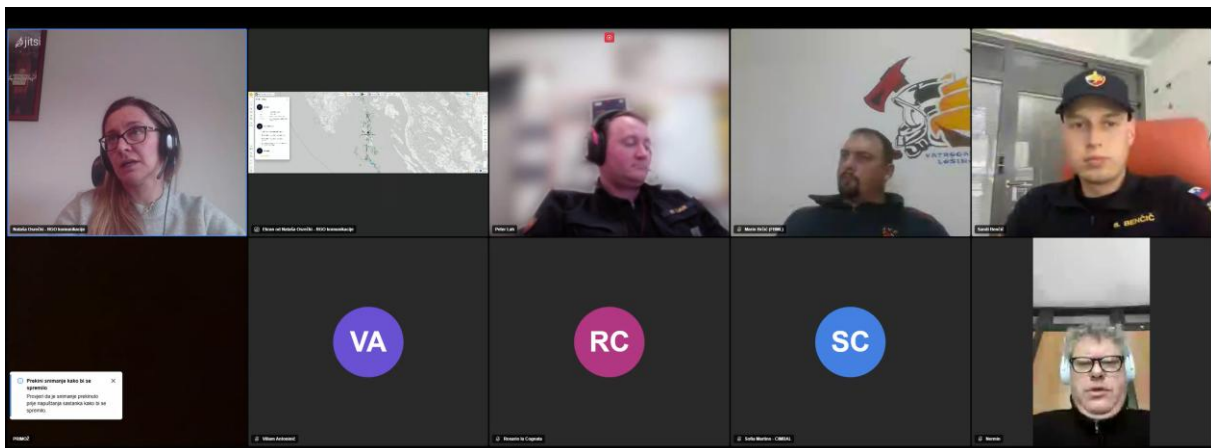


Figure 1: FRED application training held online, day 1.

The proposed UAS setup and methodology for pilot case implementation, as outlined in Deliverable D1.1.2, served as the foundation for designing this training. Participating pilot project partners included: FRSS, RCG, NPUNA, MU, FBML, and CIMBAL.

The training was structured over two days:

- The first day focused on a combined theoretical-practical session, covering core concepts, applicable regulations, and mission planning tools.
- The second day was conducted on-site, featuring live demonstrations and hands-on testing of UAS operations, including sensor deployment

(LiDAR and thermal imaging), mission execution, and data interpretation.



Figure 2: UAS Training – Day 1



Figure 3: UAS Training – Day 2

The primary objective of the training was to equip participants with both theoretical and practical knowledge required for the safe, compliant, and

effective use of UAS technologies in various operational contexts. This training directly supports the FRED project's goals and ensures that partners are adequately prepared to carry out their respective pilot activities.

The training covered the following key thematic areas:

- General knowledge of UAS operations and flight performance;
- Awareness of the applicable EU UAS regulatory framework (EU 2019/947 and EU 2019/945);
- Operational procedures, safety protocols, and privacy considerations;
- Familiarity with UAS mission planning tools and execution steps;
- Understanding of LiDAR sensor functionality and mission data interpretation;
- Overview of thermal imaging applications and result interpretation;
- Confidence building in participating in UAS operations, both in theoretical and practical terms.

Given that the proposed pilot activities require the use of advanced, enterprise-grade UAS solutions, all participants were expected to hold at least an A1/A3 certificate or an equivalent national qualification as a prerequisite for participating in the training and conducting UAS flight operations within the scope of the pilot projects.

The combined agenda items for both trainings was as follows:

Topic 01: General knowledge and introduction to UAS, including flight performance

Topic 02: Refreshment on regulations (EU Regulations 2019/947 & 2019/945)

Topic 03: Operational procedures and limitations (including privacy, data protection, and insurance policies)

Topic 04: "WhatsUP" – UAS market state of the art

Topic 05: General knowledge of LiDAR sensors, mission planning, and results interpretation

Topic 06: General knowledge of thermal imaging sensors and results overview

Topic 07: Login

Topic 08: User management

Topic 09: Map Management

Topic 10: Alerts

Topic 11: Weather data

Topic 12: UAS utilization

Topic 13: Export report

Topic 14: SITAC symbol management

Topic 15: Farsite simulation

Topic 16: FlamMap Simulation

Topic 17: Training mode

Topic 18: History mode

The participants were invited to take an active part in the training with hands on activities taking part.

### 3. UAS Training assessment methodology

To assess the effectiveness of the UAS training, two complementary evaluation methods were employed.

The first was the UAS Training – Feedback Survey (integral part of this document as Appendix 3: UAS training - Feedback survey), which collected participants' impressions of the training's organization, content, delivery, and overall usefulness. This qualitative feedback provided valuable insights into participants' satisfaction, as well as the perceived relevance and clarity of the training materials and sessions. The survey allowed participants to respond using a combination of Likert scale ratings, open-ended self-input, and predefined multiple-choice options. Questions included evaluations of training quality, instructor performance, balance between theory and practice, and relevance to professional needs, along with opportunities for open feedback and suggestions.

The second method was a pre- and post-training self-assessment survey (integral part of this document as Appendix 4: UAS training - Pre-post evaluation survey), designed to quantitatively evaluate the change in participants' knowledge and confidence across key training topics. Participants rated their knowledge on a predefined set of thematic areas immediately before and after the training. This structured evaluation enabled the measurement of learning outcomes and helped identify topics that may require further reinforcement. The results of this assessment are presented in the following sections, which outline the evaluation methodology, survey structure, and detailed analysis of outcomes. In this survey, participants could respond exclusively using Likert scale ratings.

5-point Likert scale, defined as follows: 1 = No knowledge / Not confident at all / Strongly disagree; 2 = Basic awareness / Slightly confident / Disagree; 3 = Moderate knowledge / Some confidence / Neutral; 4 = Good knowledge / Confident / Agree; 5 = Advanced knowledge / Very confident / Strongly agree;

In line with the FRED project plan, each pilot project partner was expected to delegate three participants, resulting in a planned total of 18 participants representing all pilot project partners. This approach ensured that each organization had the necessary internal capacity to implement UAS-related pilot activities using the acquired UAS technologies.

All surveys were conducted anonymously to encourage honest and unbiased feedback from participants.

The following conditions were established to ensure the reliability and consistency of the assessment process:

- Participation in the survey was mandatory for all training participants.
- Surveys were distributed anonymously to encourage honest responses.
- Pre-training part of the survey were completed immediately before the start of the training session.
- Post-training part of the survey were completed immediately after the final training session.
- Feedback survey were completed immediately after the final training session.
- All participants were informed of the purpose of the survey and assured that the results would be used solely for UAS Training quality evaluation and improvement.
- The survey was conducted in written format.

After data collection, responses were compiled and analysed. The raw responses for both of the assessment surveys are presented in attached documents, Appendix 3 and Appendix 4 which are available on FRED basecamp site, as well as on project website.

For the UAS Training – Feedback Survey, average values and standard deviations were calculated for all Likert scale questions, providing a quantitative summary of participants' satisfaction across various dimensions of the training. Following this, responses to all other question types — including open-ended self-input and predefined multiple-choice options — were reviewed and analysed to extract generalized outputs and identify recurring themes, such as commonly highlighted strengths, suggested improvements, and perceived gaps in training content.

For the UAS Training – Pre- and Post-Evaluation Survey, average pre- and post-training scores were calculated for each training topic. These results provide insights into participants' knowledge levels on specific subject areas, enabling a targeted evaluation of training effectiveness for each module. In addition, the aggregated results across all topics serve as an indicator of each participant's overall knowledge and confidence related to UAS operations before and after the training.

For the UAS Training – Pre- and Post-Evaluation Survey, following result metrics were computed:

- Average score change per topic
- Percentage improvement
- Minimum and maximum score values
- Standard deviation to assess consistency across participants

Average score change (absolute) per covered topic reflects the improvement in perceived knowledge for each specific training module. This metric helps identify which topics had the greatest learning impact. Additionally, calculating the overall mean score change per participant across all topics makes it possible to assess both individual learning progress and the average knowledge gain at the group level.

Standard Deviation measures the variability of responses. A high standard deviation indicates diverse prior knowledge or confidence levels among participants, while a low value suggests consistent self-assessments across the group.

Percentage Improvement expresses the relative knowledge gain compared to pre-training scores, highlighting topics where participants began with a lower baseline but demonstrated substantial progress.

Minimum and Maximum Values (pre- and post-training) provide insight into the range of knowledge levels, identifying whether the group included participants with minimal or advanced understanding and how that distribution shifted after training.

## 4. Results of the UAS Training Assessment Survey

### a) UAS training feedback survey

Results of the UAS training – Feedback survey indicate a high overall level of participant satisfaction, with average ratings for all key evaluation areas exceeding 4.5/5, except for one. The highest-rated aspect of the training was “The instructor was knowledgeable and engaging,” which received a perfect score of 5.0, with no variation among responses. Similarly, participants rated the structure and organization of the training and the likelihood of recommending it to colleagues very positively, both averaging 4.94. The lowest-rated item, although still favourable, was “The duration of the training was appropriate” (average: 4.53, SD: 0.70), suggesting that some participants would have preferred more time, particularly for hands-on activities. A slightly higher variability was observed in the statement “The balance between theory and practice was appropriate” (SD: 0.75, range: 2–5), indicating that a few participants desired a stronger emphasis on practical exercises.

When asked what they found most useful, participants most frequently highlighted the practical components of the training, especially hands-on work with UAS, thermal camera and LiDAR demonstrations, and field exercises involving control commands. In terms of content depth, some participants wished for more detailed coverage of remote controller commands, post-project data usage, and LiDAR applications, along with additional practice time. The most common suggestion for improvement was to include more practical exercises, although several respondents noted that the training was already well-organized and comprehensive.

Additional comments were generally minimal, with most participants responding “No” or leaving the field blank. However, a few added short positive remarks such as “All OK” or “Good work.” In terms of overall quality, the majority rated the training as “Excellent,” with only a few selecting “Good.” Nearly all participants confirmed that the training was relevant to their current or future professional responsibilities, and most reported that it completely or mostly met their expectations. Finally, all respondents expressed interest in being contacted for future training opportunities or collaborative activities, indicating a high level of engagement and perceived value.

### b) UAS training Pre-post evaluation survey

Results of a UAS training – Pre-post evaluation survey show a significant improvement in overall perceived knowledge: The mean pre-training score across all participants was 2.13 (basic knowledge), indicating a relatively low initial familiarity with the training topics. After the training, the mean post-training score rise to 3.98, reflecting a marked increase in participants' self-reported understanding and readiness.

The mean score change was calculated at +1.85 points, representing a total percentage improvement of 86.6%. This clearly indicates the training was highly effective in enhancing the participants' overall UAS-related competencies. In addition to measuring knowledge gain, standard deviation was analysed to evaluate the consistency of responses within the group: The pre-training standard deviation was 0.96, suggesting that participants entered the training with a wide range of prior knowledge and confidence levels. The post-training standard deviation decreased to 0.66, implying that the training contributed to more uniform knowledge across all participants. This reduction in variability confirms that the training was not only effective in improving average knowledge but also successful in aligning participants to a more consistent baseline of understanding, which is particularly important given that all trainees are expected to carry out standardized pilot activities in line with the FRED project objectives.

Overall, the aggregated metrics at the group level validate the training as a successful intervention that substantially improved both individual and collective preparedness for UAS operations.

A detailed evaluation was conducted for each of the seven key topics included in the UAS training program. The analysis is based on a comparison of pre- and post-training self-assessment scores and incorporates the previously introduced indicators. An overview of the results for each topic is provided in the following section.

#### General Knowledge of UAS Operation and Performance

Participants began with a moderate level of understanding (average score: 2.59), which increased significantly after training to 4.12. This represents a mean score change of +1.53 points and a 59.1% improvement, confirming that the training successfully enhanced foundational knowledge related to UAS performance.

#### Awareness of UAS Regulations (EU 2019/947 & 2019/945)

This topic showed one of the most substantial improvements. The pre-training average was low (2.24), increasing to 4.00 post-training. With a mean increase of 1.77 points and a 78.97% improvement, this reflects

the effectiveness of the regulatory component in bridging knowledge gaps.

#### Understanding of Operational Procedures, Privacy, and Safety

The training effectively improved participants' understanding of operational procedures, with scores rising from 2.41 to 4.18, a mean gain of 1.76 points (73.13% improvement). This is critical, as these procedures are central to safe and compliant UAS usage.

#### Familiarity with UAS Mission Planning Tools and Execution Steps

This topic had one of the lowest pre-training scores (1.71), indicating limited initial knowledge. Post-training, the score increased to 3.94, resulting in a mean score change of +2.24 points and a 131% improvement, highlighting a strong impact of the practical mission planning components.

#### Understanding of LiDAR Sensors and Mission Data Interpretation

Participants' prior knowledge of LiDAR applications was minimal (average 1.35), but the post-training score rose to 3.47, yielding a +2.12 point change and an impressive 156.5% improvement. This demonstrates that the training effectively introduced a complex topic in an accessible and understandable way.

#### Knowledge of Thermal Imaging Applications and Results Overview

Initial knowledge of thermal imaging was also relatively low (2.00), but increased to 3.82 post-training, marking a +1.82 point improvement and a 91.2% relative increase. This indicates good comprehension of practical sensor applications.

#### Confidence in Participating in UAS Operations (Theory + Practice)

The training succeeded in building practical confidence among participants. Average scores increased from 2.24 to 4.06, yielding a +1.82 point gain and an 81.6% improvement. This suggests that the combination of theoretical and hands-on sessions was particularly effective in preparing participants for field operations.

To better understand the knowledge profile of participants, both before and after the training, a comparison was made across all seven thematic areas based on average self-assessment scores.

#### Pre-Training Knowledge Levels

Before the training, participants demonstrated the least familiarity with the following topics:

1. Understanding of LiDAR sensors and mission data interpretation (average score: 1.35)
2. Familiarity with UAS mission planning tools and execution steps (average score: 1.71)
3. Awareness of UAS regulations (EU 2019/947 & 2019/945) (average score: 2.24)

These low scores suggest that participants had limited prior exposure to advanced UAS functionalities, regulatory frameworks, and technical planning tools—likely reflecting their real-world training needs and justifying the training design.

In contrast, the topics with the highest initial knowledge were:

1. General knowledge of UAS operation and performance (average score: 2.59)
2. Understanding of operational procedures, privacy, and safety (average score: 2.41)

This indicates that while participants had some awareness of basic drone operation and safety considerations, their understanding was still well below expert level and left room for meaningful improvement.

### Post-Training Knowledge Levels

After the training, the topics with the highest self-assessed knowledge and confidence were:

1. General knowledge of UAS operation and performance (average score: 4.12)
2. Understanding of operational procedures, privacy, and safety (average score: 4.18)
3. Confidence in participating in UAS operations (average score: 4.06)

These results confirm that the training effectively strengthened the foundational and operational competencies that are essential for safely conducting field missions.

Meanwhile, the lowest post-training scores (though still significantly improved) were observed in:

1. Understanding of LiDAR sensors and mission data interpretation (average score: 3.47)

## 2. Familiarity with UAS mission planning tools and execution steps (average score: 3.94)

Although these areas showed some of the highest percentage improvements, the lower post-training scores suggest these are still complex topics where participants may benefit from additional in-depth training or on-site mentoring.

## 5. Conclusion

The FRED application training was used to introduce the pilot partners with the different segments of the application functionalities, from account management to the utilization of different fire behaviour simulation tools available in the platform. It was well received by the participants, who were also supported by the *FRED platform user manual*, as an initial point of user support, before contacting the developer for clarifications.

The UAS training delivered as part of the FRED 3rd Consortium Meeting successfully met its objectives of enhancing participants' theoretical understanding and practical competencies in the use of Unmanned Aircraft Systems. The combination of structured content, hands-on demonstrations, and a focus on operational readiness resulted in a measurable increase in perceived knowledge across all key training topics.

Both the feedback and assessment surveys confirmed high levels of satisfaction and significant learning gains among participants. Notably, the training was especially effective in strengthening foundational knowledge and building confidence for field deployment, while also identifying areas—such as LiDAR and thermal imaging results interpretation and mission planning—that may benefit from further targeted support.

Overall, the training has laid a strong foundation for the successful implementation of UAS-based pilot activities within the FRED project, ensuring that partners are better equipped to apply advanced UAS technologies in real-world scenarios.

Appendices, which are an integral part of this document are as follows:

**Appendix 1: FRED application - Meeting Agenda**

**Appendix 2: FRED application - List of participants**

**Appendix 3: UAS training - Feedback survey**

**Appendix 4: UAS training - Pre-post evaluation survey**

**Appendix 5: UAS training - List of participants**