

# AF3

## Advanced Forest Fire Fighting

### D5.3.2 – Training scenarios, material, tools and simulation specifications

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## ABBREVIATIONS AND ACRONYMS

ABBREVIATION ACRONYM	/ DESCRIPTION
ADL LMS VLE LRS SCORM	Assisted distance learning Learning Management System Virtual Learning Environment Learning Record Store Sharable Content Object Reference Model

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## 1. SCOPE

This document will describe the procedures for performing all activities related to task 5.3.2 at the first stage (month 12). The results of this task will be demonstrated in D5.3.4 which will be delivered in month 30.

The main activities described in this deliverable are the following:

- Training scenarios description: Three different AF3 scenarios for training the firefighting members in the use of AF3 new features and capabilities have been described in detail in this deliverable.
- Training material production procedures: This document will describe which types of training material will be produced for the firefighting members involved in the AF3 trials and how they will be able to access to them.
- Virtual training scenarios development process: Based on the scenarios described in section 2 of this document the virtual training scenarios will be designed and developed during tasks 5.3.2. Through this simulated environments, firefighting members will be able to train according to the training methodologies stated in D5.3.1.

In the following sections all above mentioned activities will be specified in their first stage (month 12) for starting the description of the T5.3.2 activities.

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## **2. AF3 TRAINING SCENARIOS DESCRIPTION**

The three main AF3 scenarios agreed by the consortium are described in detail below. These scenarios will be used as a base for the virtual training scenarios development.

### **Scenario 1. Forest and bush fires**

This first Scenario is set in a national park in the South of Europe.

#### **27<sup>th</sup> of July:**

20:30 - The emergency services receive a call informing of several small fires in the national park. A strong dry wind blows in the area.

20:50 - The local authorities establish a control room and send the first brigades on the field to start the fire extinguishing task.

21:00 - The first local emergency services arrive to the area. They make a first assessment of the situation: The wind blows strongly and the initial small foci are becoming large wild fires that could spread to the whole national park.

The area is composed of rich forest of adult pines, growing uphill on high slopes. The lack of defensive infrastructures on wide surface, drought and the elevated heat of the crown fire, allows the quick evolution of the fire.

No aerial means can intervene until the dawn.

#### **28<sup>th</sup> of July:**

05:00 - Situation is becoming critical. The fire brigades cannot stop the fire on the field during the night due to several factors such as the high slope, severe dryness, the strong wind and the lack of visibility. Two of the initial fire foci now form a large fire, which advances quickly in a southerly direction. The other two initial fire foci are already isolated but also form two other big fire fronts one kilometre in a westerly direction to the main fire front.

06:00 - The first aerial means take off for fighting the fire. Before take-off, the commander need to plan the fire attack using the C4I and provide the Aircraft pilot with GPS coordinates of the fire front to start the extinguishing line and angle of approach.

When they arrive to the area the situation that the commanders have to face is the following:

- The strong wind continues to blow.
- The fire affects almost half of the national park (very dense forest area with high slopes), but the main forestall area has not been affected yet. According to the first estimates the fire will reach this area in four or five hours if nothing is done.
- The main front is almost two kilometres and the other two some hundreds of metres each.
- The whole national park area is mountainous terrain with a dense forestall mass and the ground accesses are limited. The radio connectivity is also difficult for the same reason.

The main objective of the commanders is to prevent the fire from affecting the main forestall area of the park.

**Scenario 2.** Critical Infrastructure in forest: protection of transportation routes, power grids, pipelines etc.

**21<sup>st</sup> of August:**

09:30 - A large forest fire was declared 2 days ago burning over an irregular surface, with several drainage valleys. Pines and moderate load litter all around, e.g. piles of timber from cutting works. Now the fire is out of control due to dry weather and winds over 20 kilometres per hour that blows in the area.

10:30 - The fire is arriving to an overcrowded highway, where plenty of vehicles are traveling due to the summer holidays.

The authorities have decided to close the highway because the big flames and the smoke are crossing the road. There is also a road restaurant that must be evacuated.

11:00 - The fire has crossed the highway at several points and some vehicles have been trapped. The aerial means have detected a tanker truck also trapped, potentially loaded with gasoline.

The priority of the commanders is to evacuate the people trapped on the highway and to control the fire before it affects other roads.

**Scenario 3.** Wild land - urban interface fires: protection of populations and properties close to a forest.

**18<sup>th</sup> of July:**

16:00 - The emergency services, in a country in the south of Europe, receive a call concerning two small fire foci affecting a large residential area close to a youth campsite.

All the houses in the residential area are currently inhabited due to the holiday period. Last year it rained very little in the area and for this reason the forest and the scrub that surround the houses are very dry.

16:30 - The local authorities establish a control room and send the first brigades in the field to start the fire extinction task.

17:15 - Some aerial means (helicopters) arrive to the area and initiate water drops on the fire front.

20:45 - The fire reaches a road and is partially controlled by the fire brigades. During the night several brigades remain on the field trying to extinguish the fire.

**19<sup>th</sup> of July:**

05:45 - The wind has been blowing during the night and there are two re-ignitions compromising of a pine forest and a residential area on the other side of the main road. The fire has crossed the main road in a weakness point, running over forest and residential area.

07:00 – 1,300 houses must be evacuated and there are some smoke intoxication injures requiring treatment.

08:00 - The fire is out of control due to the strong winds and dry fuel. Some isolated houses have already been burned and the main residential area is in serious danger.



### 3. TRAINING MATERIAL SPECIFICATION

#### **3.1 AF3 ASSISTED DISTANCE LEARNING (ADL) PLATFORM**

The core distance learning tool that will be used by AF3 for the training of the fire fighter members will be a dedicated advanced Learning Management System (LMS) otherwise known as a Virtual Learning Environment (VLE). In addition to the core LMS that the AF3 distance learning system will provide, the training system shall integrate the latest in eLearning concepts through a technology and emerging standard known as TinCan API (also known as Experience API or xAPI). This approach will provide a complete Learning Record Store (LRS) solution as the basis for AF3 ADL.

Traditional LMS systems are based on the SCORM (Sharable Content Object Reference Model) compliant standard for course definition and distribution. However, the TinCan API is a brand new specification for learning technology that makes it possible to collect data about the wide range of experiences a person has (online and offline). This API captures data in a consistent format about a person or group's activities from many technologies. Mobile learning, simulations, virtual worlds, serious games, real-world activities, experiential learning, social learning, offline learning, and collaborative learning are just some of the things that can now be recognized and communicated well with the TinCan API.

A summary of the advantages of the TinCan API over the standard SCORM solution is available at <http://tincanapi.com/scorm-vs-the-tin-can-api/> From a complete review and through prototyping of the technology it has been determined that it fits well with the goals and requirements foreseen within the AF3 training scenarios and has been selected as the core for system implementation of the ADL platform.

The AF3 ADL tool shall be available through an internet accessible web site which is managed and run by the AF3 project partner, Skytek, for the duration of the fire fighter members training activity. This system will allow trainees to undertake distance learning and self-paced training activities either from within the training rooms of the AF3 Crisis Management Centre classroom based sessions or if they wish to perform additional preparatory training in advance of the AF3 trials.

The AF3 ADL system is deployed as a web application server, running on a **Red Hat Enterprise Linux 7 Server** which is deployed within the Skytek data centre located in Dublin Ireland. The data centre provision company has obtained the ISO 27001:2005 standard for their data centre.

The AF3 ADL Server Technical Specification is as follows:

Vendor	Cisco
Model	UCS C240 M3 High-Density Rack-Mount Server
Size	1U
Processor	2 x Xeon E5-2609 / 2.4 GHz
Memory	(2 x 32GB) + (2 x 16 GB) = Total of 96GB
Hard Disk	4 x 300GB = Total of 1.2GB

The AF3 ADL system shall be accessed via the following URL from a standard web browser:

**<http://adl.af3.skytek.com>**

On initial access to the system, the end user is presented with a login page maintaining access to the system only for accredited AF3 fire fighter trainees who have requested and being provided accounts. For custom accounts to the AF3 ADL system, requests can be made via email to [info@skytek.com](mailto:info@skytek.com) with the subject '**AF3: ADL Training system access**' The account request will be processed and an active account available to the user within 24 hours of receipt of email.

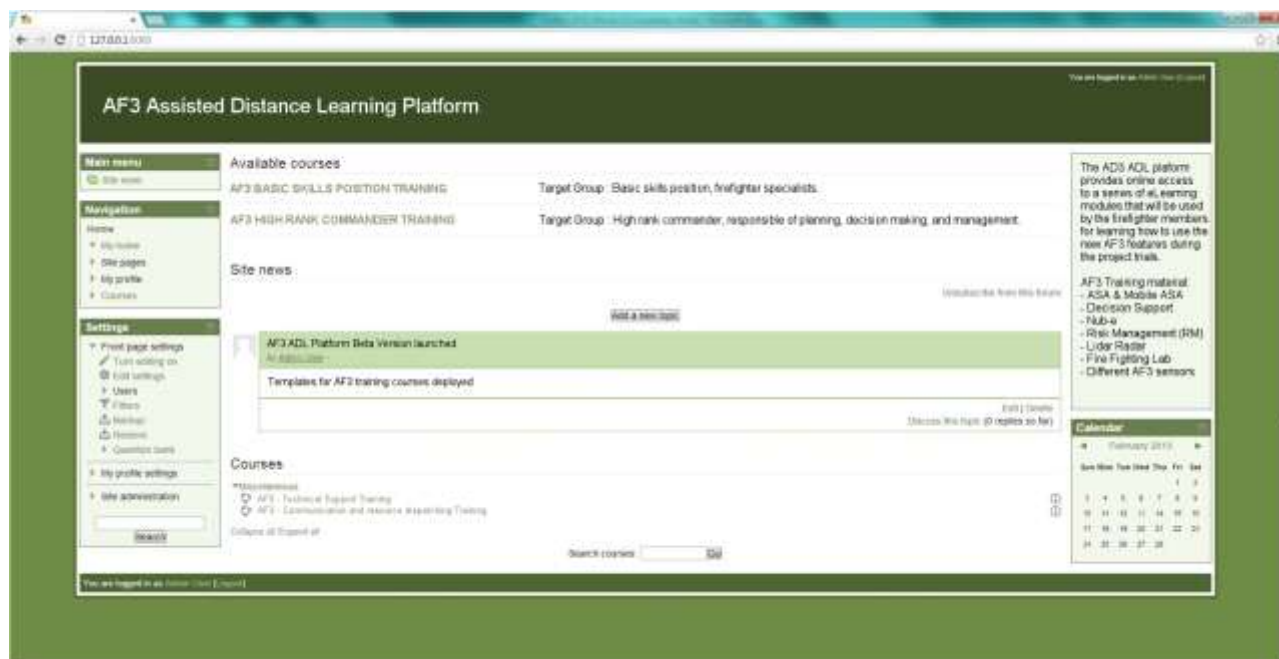


**Figure 1 Login page for AF3 ADL online LRS training system**

The main features of the ADL from the AF3 ADL trainer's point of view are as follows:

- Define the AF3 training course to be undertaken and upload content either through PowerPoint presentations, HTML, Wiki content or fully interactive courses.
- Support for courses developed using SCORM and TinCan API compliant authoring environments.
- Assignment of the course to selected trainee
- Monitoring of course progress of individual fire fighter trainees
- Assign course work to trainees
- Automatic gathering of interactive examination results from trainees
- Assignment of practical activities to trainees
- Management of different trainee groups and related courses
- Centralised and automated administration
- Provision of course both in the classroom and remotely through a web based interface
- Use of authoring tools for AF3 ADL course development
- Integration of social media tools for communication with AF3 fire fighter trainees
- Different question types in courses automatically graded i.e. multiple choice, true/false, fill in the blank etc.
- Awarding of certification to AF3 fire fighter trainee on completion of training course.

When a user successfully logs into the AF3 ADL system their home page provides access to the main services of the system along with the courses which they have been approved access to. The current beta version end user screenshot is shown in the following figure:

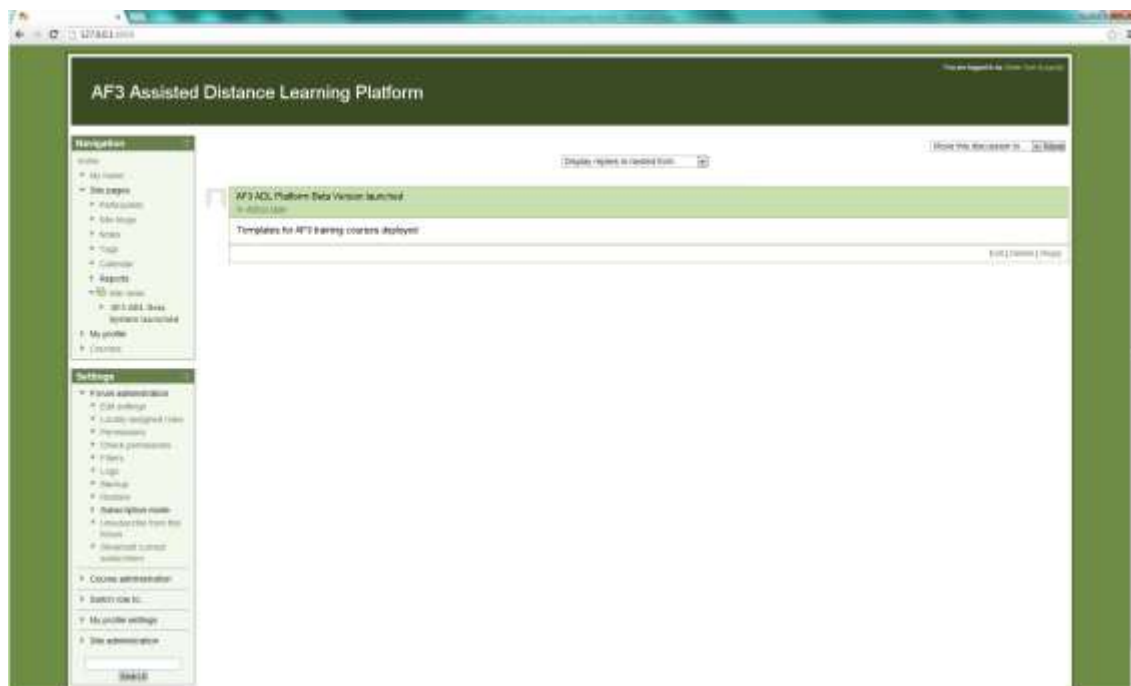


**Figure 2 Home page for end users with courses and support services**

The main features of the AF3 ADL system from a course fire fighter trainee point of view are:

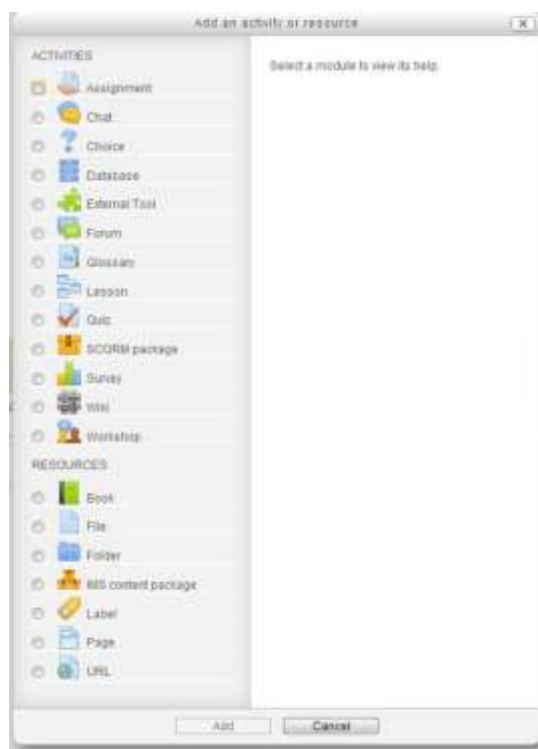
- Access to the training course material both at home and while at the AF3 Crisis Management Centre site.
- Use of standard web browser and PC for access to training material
- Automatic assignment of courses to be completed
- Review of completion state of different courses to be undertaken
- Individual training plan assigned from the trainer to a trainee
- Interactive training and simulation through courses
- Support tools to contact trainer
- Social media tools to discuss courses and content with other trainees.
- Online news
- Online quiz
- Wiki
- Instant messaging
- Secure access through username/password
- Integration of remote simulation environments to AF3 ADL courses

For example, a user has access to general news feeds on the site which provide details on when classroom AF3 ADL training sessions are being held.



**Figure 3 News sections of the AF3 ADL system**

The system provides a large variety of activities that can be accessed by the fire fighter trainee to provide powerful services for the fire fighter undergoing training. Examples of the range of activities provided by the AF3 ADL system are shown in the following screenshot.



**Figure 4 List of activities provided by AF3 ADL System**

### 3.2 AF3 TRAINING MATERIAL DESCRIPTION

In the following table the main training materials that will be used by the firefighting members for learning how to use the new AF3 features during in the AF3 Trials is described:

AF3 component/capability	Partner responsible	Training material description
ASA	UPVLC	ASA guide for being downloaded or consulted through AF3 ADL platform
Mobile ASA	UPVLC	Mobile ASA guide for being downloaded or consulted through AF3 ADL platform
SIMTAC (ASA training tool)	UPVLC	Virtual scenario for training
C4I system	ELBIT	User guide (downloadable) for C4I system
C4I system	ELBIT	Help option (menu) provided as part of C4I system
C4I system	ELBIT	Training mode for system operator
ERVIN	TRAGSA	Virtual simulator for the training of fire responders
Utilities for mobile devices (DS and responders monitoring)	TRAGSA	User guide (downloadable) for apps
Decision Support (DS)	SES	DS guide for being downloaded or consulted through AF3 ADL platform
Nub-e	PYRO	Nub-e system guide for being downloaded or consulted through AF3 ADL platform
Risk management (RM)	FHG	RM guide for being downloaded or consulted through AF3 ADL platform
Lidar Radar	ARIA	Lidar guide for being downloaded or consulted through AF3 ADL platform
Fire Fighting Lab (FFL)	SES	FFL guide for being downloaded or consulted through AF3 ADL platform
Other sensors (including EO)	Provided by different partners	Guides for being downloaded or consulted through AF3 ADL platform

**Table 1 Training Material description.**

## 4. TRAINING CURRICULA DESCRIPTION

According to the tentative training profiles of end users identified in D5.3.1, during this task the AF3 consortium is going to describe and develop several training curricula for the main firefighting services members who will participate in the different AF3 trials.

The description of the training curricula above mentioned is the following:

### **4.1 AF3 BASIC SKILLS POSITION TRAINING**

#### Target group 1

Basic skills positions → firefighter specialists such as: Helitack specialist, Brigade specialist, Engine operator, Heavy Machinery operator and UME troop member

CATEGORY ROLE	TARGET GROUP	SKILLS
Type 1 Basic skills Crewmember/firefighter positions	Helitack specialist Brigade specialist Engine operator Heavy Machinery operator UME troop member	Fire suppression methods Fire behaviour assessment Team working Firefighting tools use and care Proceedings and protocols

#### Objectives

The training objectives are described for subsequent stages in the emergency.

##### Pre-emergency

###### Fire prevention

- To understand the performance, and capabilities of AF3 innovative countermeasures during the Fire prevention stage: Nub-e system, etc...
- To acquire the required skills to operate with AF3 counter-measures, including Nub-e system, in the construction of preventive layers according to fuel characteristics (load, height, etc.), and to pre-defined objectives. Placement of capsules (position, height, density, etc.)

##### Emergency

###### Preventive intervention

- To acquire the required knowledge on the proceedings and protocols of the new fire extinction systems with Nub-e systems. Construction of defence lines with Nub-e. Methods for placement, performance of tasks capsule deployment.

##### Monitoring and Crisis Management and Simulation

- To acquire the required knowledge about the functionalities (objectives, features, cautions, etc.) of person-borne sensors and devices attached to Personal Protection Equipment (PPE).
- To acquire the required knowledge about the use and handing of person-borne sensors and devices attached to PPE (i.e. health monitoring sensors, cameras, localiser devices, etc.): placement, maintenance, etc.

- Safety and health regards related to the wear and use person-borne sensors and devices attached to PPE.

**Fire Fighting and Rescue operations**

- To understand the performance and capabilities of AF3 innovative countermeasures during the Fire Fighting and Rescue operations stage: Nub-e system, Advanced Aerial Fire Fighting (AAFF) system, monitoring technologies, etc.
- To understand the proceedings and protocols of the new fire extinction systems with AAFF. Performance, mop-up requirements, safe distances, safety areas, safety position for drops of pellets.
- Safety rules and risk situations related to AAFF, Nub-e extinction systems, UAVs and UGVs.

**Post-emergency.**

**Debriefing and Feedback**

- Debriefing and lessons learnt. Apply knowledge acquire with simulations and practices.

**Course programme draft**

<b>CONTENT</b>	<b>Training environment (On-field, Mixed-reality, Virtual)</b>
New countermeasures´ effects on fire. (AAFF and Nub-e)	Theory (e-learning/face-to-face)
New attack methods with AAFF. Direct and indirect attacks and mop-up.	Theory(e-learning/face-to-face) Virtual
Construction of defence lines with Nub-e and AAFF indirect attack. Types, setup configuration and placement.	Theory(e-learning/face-to-face) On-field and Virtual
Portable sensors and monitoring devices	Theory and On-field
Safety rules and Risk situations (AAFF, Nub-e, UAVs, UGVs)	Theory(e-learning/face-to-face) On-field
Debriefing, simulations and practices assessment (pictures, videos, etc.)	Theory(e-learning/face-to-face) On-field

***Table 2 Target 1 category curricula potential content***

## 4.2 AF3 LOW RANK COMMANDER TRAINING

### Target group 2

Low rank commander → personnel organizing, controlling, and supervising firefighting tasks: Brigade Foreman, Helitack foreman, Helitack pilot, Aircraft pilot, Helicopter pilot, Engine foreman.

CATEGORY ROLE	TARGET GROUP	SKILLS
Type 2. Basic command-chain positions Senior firefighter/Squad boss/ Leader/ Low rank/ Leading role	Brigade foreman Helitack foreman Helitack pilot Aircraft pilot Helicopter pilot Engine foreman	Fire suppression methods Fire behaviour assessment Firefighting task planning and assessment Firefighting resources coordination Proceedings and protocols Team management Tools and equipment maintenance and control Mapping and guidance Safety management Information interpretation

### Objectives

#### Pre-emergency (Fire prevention and Readiness)

##### Fire prevention

- To understand the performance, and capabilities of AF3 innovative countermeasures during the Fire prevention stage: Nub-e system
- Be able to organise and evaluate the construction of preventive layers with Nub-e system. Tasks assignment, performance of deployment tasks, placement requirements, maintenance and handling requirements (transport, storage, etc.).

#### Emergency

##### Preventive intervention

- Be able to organise and evaluate the construction of preventive layers with Nub-e system. Tasks assignment, performance of deployment tasks, placement requirements, maintenance and handling requirements (transport, storage, etc.).

##### Monitoring and Crisis Management and Simulation

- To acquire the required knowledge about the functionalities (objectives, features, cautions, etc.) of person-borne sensors and devices attached to Personal Protection Equipment (PPE).
- To acquire the required knowledge about the use and handing of person-borne sensors and devices attached to PPE (i.e. health monitoring sensors, cameras, localiser devices, etc.): placement, maintenance, etc.
- Safety and health regards related to the wear and use person-borne sensors and devices attached to PPE.
- To acquire the required knowledge for using mobile ASA. Capabilities and functionalities.



**Fire Fighting and Rescue operations**

- To understand the performance and capabilities of AF3 innovative countermeasures during the Fire Fighting and Rescue operations stage: Nub-e system, AAFF system, monitoring technologies, etc.
- To understand the proceedings and protocols of the new fire extinction systems with AAFF. Performance, mop-up requirements, safe distances, safety areas, safety position for drops of pellets and task organisation.
- Safety rules and risk situations related to AAFF, Nub-e extinction systems, UAVs and UGVs. Risk prevention, health and safety at work

**Post-emergency.**

**Debriefing and Feedback**

- Debriefing and lessons learnt. Apply knowledge acquire with simulations and practices.

**Course programme draft**

<b>CONTENT</b>	<b>Training environment (On-field, Mixed-reality, Virtual)</b>
New countermeasures' effect on fire. (AAFF and Nub-e)	Theory (e-learning/face-to-face)
New attack methods with AAFF. Direct and indirect attack.	Theory(e-learning/face-to-face) Virtual
Organization, construction and evaluation of defence lines with Nub-e and AAFF. Proceedings and protocols of the new fire extinction systems with Nub-e and AAFF.	Theory(e-learning/face-to-face) On-field and Virtual
Portable sensors and monitoring devices.	Theory(e-learning/face-to-face) and On-field
Safety rules and Risk situations (AAFF, Nub-e, UAVs, UGVs). Risk prevention, health and safety at work.	Theory(e-learning/face-to-face), On-field
Use of mobile ASA. Capabilities and functionalities.	Mixed-reality, On-field, and Virtual
Debriefing, simulations and practices assessment (pictures, videos, etc.)	Theory(e-learning/face-to-face) and On-field

***Table 3 Target 2 category curricula potential content***

### 4.3 AF3 MIDDLE RANK COMMANDER TRAINING

#### Target group 3

Middle rank commander → team managers and supervisors: Helitack chief, Brigade chief, UME official, Chief of firemen brigade.

CATEGORY ROLE	TARGET GROUP	SKILLS
Type 3 Chief/Captain/ Middle rank	Helitack chief Brigade chief UME official Chief of firemen brigade	Fire suppression methods Fire behaviour assessment Firefighting task planning and assessment Firefighting resources coordination support Information generation and interpretation Team(s) management Radio Safety management

#### Objectives

##### Pre-emergency

###### Fire prevention

- To understand the performance, and capabilities of AF3 innovative countermeasures during the Fire prevention stage: Nub-e system
- Be able to plan, organise and evaluate the construction of preventive layers with Nub-e system. Tasks assignment, performance of deployment tasks, placement requirements, maintenance and handling requirements (transport, storage, etc.).
- To acquire the required knowledge about the performance of UAVs and UGVs for fire prevention and monitoring tasks. Identification and safety considerations.

##### Emergency

###### Preventive intervention

- Be able to plan, organise and evaluate the construction of preventive layers with Nub-e system. Tasks assignment, performance of deployment tasks, placement requirements, maintenance and handling requirements (transport, storage, etc.).

###### Fire Detection

- Fire detection with AF3 detection tools: Sensors, UAVs and UGVs.

###### Monitoring and Crisis Management and Simulation

- To acquire the required knowledge about the functionalities (objectives, features, cautions, etc.) of person-borne sensors and devices attached to Personal Protection Equipment.
- To acquire the required knowledge about the use and handing of person-borne sensors and devices attached to PPE (i.e. health monitoring sensors, cameras, localiser devices, etc.): placement, maintenance, etc.
- Safety and health regards related to the wear and use person-borne sensors and devices attached to PPE.
- To acquire the required knowledge for using mobile ASA. Capabilities and functionalities.

- To know types and capabilities of ground sensors, UGVs, UAVs. Know types and capabilities of sensors. Know proceeding and protocols for working at monitored areas: sensor networks, UAVs, UGVs, etc.

Fire Fighting and Rescue operations

- Understand the performance and capabilities of AF3 innovative countermeasures during the Fire Fighting and Rescue operations stage: Nub-e system, AAFF system, monitoring technologies, etc.
- Comprehend the proceedings, protocols and organisation of the new fire extinction systems with AAFF. Performance, mop-up requirements, safe distances, safety areas, safety position for drops of pellets, organisation and planning.
- Safety rules and risk situations related to AAFF, Nub-e extinction systems, UAVs and UGVs. Risk prevention, health and safety at work.

Post-emergency.

Debriefing and Feedback

- Debriefing and lessons learnt. Apply knowledge acquire with simulations and practices.

Course programme draft

CONTENT	Training environment (On-field, Mixed-reality, Virtual)
New countermeasures´ effect on fire. (AAFF and Nub-e)	Theory (e-learning/face-to-face)
New attack methods with AAFF. Direct and indirect attack.	Theory(e-learning/face-to-face) Virtual
Organization and evaluation of defence lines with Nub-e and AAFF. Proceedings and protocols of the new fire extinction systems with Nub-e and AAFF.	Theory(e-learning/face-to-face) On-field and Virtual
Portable sensors and monitoring devices.	Theory(e-learning/face-to-face) and On-field
Safety rules. Risk situations (AAFF, Nub-e, UAVs, UGVs). Risk prevention, health and safety at work.	Theory(e-learning/face-to-face), On-field and Virtual
Monitoring with UAVs and UGVs. Proceeding and protocols for the use of UAVs and UGVs.	Theory(e-learning/face-to-face)
Use of mobile ASA. Capabilities and functionalities.	Mixed-reality, On-field, and Virtual
Capabilities and functionalities of the environmental monitoring Lidar	Theory (e-learning/face-to-face)
Debriefing, simulations and practices assessment (pictures, videos, etc.)	Theory(e-learning/face-to-face) and On-field

**Table 4 Target 3 category curricula potential content**

## 4.4 AF3 HIGH RANK COMMANDER TRAINING

### Target group 4

High rank commander → high qualified personnel responsible of planning, decision making, and management of teams and resources: Director of Operations, DOS Assistant, Air coordinator.

CATEGORY ROLE	TARGET	SKILLS
Type 4 Commander / Decision maker/ High range	Director of Operations DOS Assistant Air coordinator	Fire behaviour assessment Decision making Inter-teams management Operations planning Firefighting resources coordination Data & information generation and processing Radio Safety management

### Objectives

#### Pre-emergency

##### Fire prevention

- To understand the performance, and capabilities of AF3 innovative countermeasures during the Fire prevention stage: Nub-e system
- Be able to plan the construction of preventive layers with Nub-e system.
- Fire prevention and monitoring with UAVs and UGVs. Proceeding and protocols for the use of UAVs and UGVs.

#### Emergency

##### Preventive intervention

- Be able to plan the construction of preventive layers with Nub-e system.

##### Fire Detection

- Fire detection with UAVs. Proceeding and protocols for the use of UAVs.

##### Monitoring and Crisis Management and Simulation

- To acquire the required knowledge about the functionalities (objectives, features, cautions, etc.) of person-borne sensors and devices attached to Personal Protection Equipment.
- To acquire the required knowledge about the use and handing of person-borne sensors and devices attached to PPE (i.e. health monitoring sensors, cameras, localiser devices, etc.): placement, maintenance, etc.
- Safety and health regards related to the wear and use person-borne sensors and devices attached to PPE.
- To acquire the required knowledge for using DS tools. Capabilities and functionalities.
- To acquire the required knowledge for using ASA. Capabilities and functionalities.

- Planning monitoring with UAVs and UGVs. Know types and capabilities of UAVs and UGVs. Know types and capabilities of sensors. Know proceeding and protocols for UAVs and UGVs deployment.
- To acquire the required knowledge about FFL functionalities and capabilities.
- To acquire the required knowledge about C4I functionalities, capabilities.
- To acquire the required knowledge about Lidar capabilities, functionalities.

**Fire Fighting and Rescue operations**

- To understand the performance and capabilities of AF3 innovative countermeasures during the Fire Fighting and Rescue operations stage: Nub-e system, AAFF, monitoring technologies, etc.
- To understand the proceedings, protocols and organisation of the new fire extinction systems with AAFF. Performance, mop-up requirements, safe distances, safety areas, safety position for drops of pellets, organisation and planning.
- Safety rules and risk situations related to AAFF, Nub-e extinction systems, UAVs and UGVs. Risk prevention, health and safety at work.

**Post-emergency.**

**Debriefing and Feedback**

- Debriefing and lessons learnt. Apply knowledge acquire with simulations and practices.

**Course programme draft**

<b>CONTENT</b>	<b>Training environment (On-field, Mixed-reality, Virtual)</b>
New countermeasures´ effect on fire. (AAFF and Nub-e)	Theory (e-learning/face-to-face)
New attack methods with AAFF. Direct and indirect attack.	Theory(e-learning/face-to-face) Virtual
Planning and organisation of defence lines with Nub-e and AAFF. Proceedings and protocols of the new fire extinction systems with Nub-e and AAFF.	Theory(e-learning/face-to-face) On-field and Virtual
Portable sensors and monitoring devices.	Theory(e-learning/face-to-face) and On-field
Safety rules. Risk situations (AAFF, Nub-e, UAVs, UGVs). Risk prevention, health and safety at work.	Theory(e-learning/face-to-face), On-field
Monitoring with UAVs and UGVs. Proceeding and protocols for the use of UAVs and UGVs.	Theory(e-learning/face-to-face)
Use of DS tools Capabilities and functionalities.	Mixed-reality, On-field, and Virtual
Use of ASA. Capabilities and functionalities.	Mixed-reality, On-field, and Virtual

CONTENT	Training environment (On-field, Mixed-reality, Virtual)
Use of FFL. Capabilities and functionalities.	Mixed-reality, On-field, and Virtual
Use of C4I. Capabilities and functionalities.	Mixed-reality, On-field, and Virtual
Debriefing, simulations and practices assessment (pictures, videos, etc.)	Theory(e-learning/face-to-face) and On-field

***Table 5 Target 4 category curricula potential content***

## 4.5 AF3 TECHNICAL SUPPORT AND COMMUNICATION AND RESOURCE DISPATCHMENT TRAINING

### Target group 5

Personnel specialist in detection, monitoring and forecast → Lookout observer

Members of mobile units for communication and weather observation, Operational centre officer, other

CATEGORY ROLE	TARGET	SKILLS
Type 5 Communications and resources dispatchment, meteo, technical support	Lookout observer Members of mobile units for communication and weather observation Operational centre officer	Radio Data & information generation and processing Firefighting coordination support

### Objectives

#### Pre-emergency (Fire prevention and Readiness)

##### Fire prevention

- To understand the performance, and capabilities of AF3 innovative countermeasures during the Fire prevention stage.

#### Emergency

##### Monitoring and Crisis Management and Simulation

- To acquire the required knowledge for using DS and ASA tools. Capabilities and functionalities.
- Planning monitoring with UAVs and UGVs. Know types and capabilities of UAVs and UGVs. Know types and capabilities of sensors. Know proceeding and protocols for UAVs and UGVs deployment.
- To acquire the required knowledge about FFL functionalities and capabilities.
- To acquire the required knowledge about C4I functionalities, capabilities.
- To acquire the required knowledge about Lidar capabilities, functionalities. Proceeding and protocols for Lidar deployment.

#### Fire Fighting and Rescue operations

- To understand the performance and capabilities of AF3 innovative countermeasures during the Fire Fighting and Rescue operations stage: Nub-e system, AAFF, monitoring technologies, etc.
- To understand the proceedings and protocols of the new fire extinction systems with AAFF.

- Safety rules and risk situations related to AAFF, Nub-e extinction systems, UAVs and UGVs. Risk prevention, health and safety at work

Post-emergency.

Debriefing and Feedback

- Debriefing and lessons learnt. Apply knowledge acquire with simulations and practices.

**Course programme**

CONTENT	Training environment (On-field, Mixed-reality, Virtual)
New countermeasures' effect on fire. (AAFF and Nub-e)	Theory (e-learning/face-to-face)
New attack methods with AAFF. Direct and indirect attack.	Theory(e-learning/face-to-face) Virtual
Safety rules. Risk situations (AAFF, Nub-e, UAVs, UGVs). Risk prevention, health and safety at work.	Theory(e-learning/face-to-face), On-field and Virtual
Monitoring with UAVs and UGVs. Proceeding and protocols for the use of UAVs and UGVs.	Theory(e-learning/face-to-face)
Use of DS and ASA tools Capabilities and functionalities.	Mixed-reality, On-field, and Virtual
Use of FFL. Capabilities and functionalities.	Mixed-reality, On-field, and Virtual
Use of C4I. Capabilities and functionalities.	Mixed-reality, On-field, and Virtual
Proceeding, protocols, capabilities and functionalities of the environmental monitoring Lidar	Theory (e-learning/face-to-face)
Debriefing, simulations and practices assessment (pictures, videos, etc.)	Theory(e-learning/face-to-face) and On-field

***Table 6 Target 5 category curricula potential content***



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## **5. VIRTUAL SCENARIOS DEVELOPMENT DESCRIPTION**

This section is going to describe the virtual scenarios development for virtually training the firefighting members who will participate in the AF3 trials.

According to the AF3 scenarios description performed in section 2 of this document there are 3 different kind of scenarios for using AF3 system:

- Forest and bush wild fires
- Critical Infrastructure in forest: protection of transportations routes, power grids, pipelines, highways, etc.
- Wild land - urban interface fires: protection of populations and properties close to a forest.

Taking into account these scenarios, the consortium will develop a unique virtual scenario that will be able to cover whatever circumstance included in the above described scenarios.

The virtual scenario will have extensive forest areas in which a large wild fire could be represented and extinguished taking into account several parameters such as; fuel type, wind speed and so on. On the other hand this virtual scenario will be able to include borders with urban areas and also some kind of critical infrastructure that could be affected by the fire.

This way the firefighting members who will participate in the AF3 trials will be able to solve virtual situations making use of some of the AF3 innovative features and procedures. The AF3 end users and the technical partners in charge of performing the simulation will work closely in order to obtain a useful virtual training environment for AF3 system.

The development of this virtual training environment will start in month 12 and will be available in a beta version in month 22.

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## **6. CONCLUSIONS**

At this stage (month 12) Task 5.3.2 is ongoing, but its results will not be able to be shown until the end of the task (month 30).

For this reason D5.3.2 describes all the activities which will be performed during this task including some which have already been done such as the AF3 scenarios description and the training curricula description.

The final results of T5.3.2 will be stated in D5.3.4. This is a new deliverable which will be produced that was not originally envisioned.

The new deliverable was considered necessary by the consortium since the D5.3.2 delivery date was month 12 and no other deliverable was scheduled for showing the final results of T5.3.2 at month 30.