



ACTIVAGE PROJECT

ACTivating InnoVative IoT smart living environments for AGEing well

Support and training plan for deployment of AIoTES

Deliverable No.	D5.6	Due Date	31-Sep-2018
Type	Report	Dissemination Level	Public
Version	0.8	Status	Final
Description	Description of the consultative and interactive AIOTES support tools accessible to the AIOTES community. This deliverable is an update of deliverable D5.2.		
Work Package	WP5 – ACTIVAGE IoT Ecosystem Suite Integration		

Authors

Name	Partner	e-mail
Byron Ortiz S.	03 TELEVES	byrort@televes.com
Alejandro M. Medrano Gil	05 UPM	amedrano@lst.tfo.upm.es
Helmi Ben Hmida	06 FhG	helmi.ben.hmida@igd.fraunhofer.de
Mathieu Gallissot	07 CEA	mathieu.gallissot@cea.fr
Stéphane Bergeon	07 CEA	stephane.bergeon@cea.fr
Levent Gurgen	07 CEA	levent.gurgen@cea.fr
Stefanos Stavrotheodoros	08 CERTH	stavrotheodoros@iti.gr
Thanos Stavropoulos	08 CERTH	athstavr@iti.gr
Nikolaos Kaklanis	08 CERTH	nkak@iti.gr
Konstantinos Votis	08 CERTH	kvotis@iti.gr
Dimitrios Tzovaras	08 CERTH	Dimitrios.Tzovaras@iti.gr
Clara Valero	11 UPV	clavalpe@dcom.upv.es
Matilde Julián	11 UPV	majuse@dcom.upv.es
Regel G. Usach	11 UPV	regonus@teleco.upv.es
Pierre Barralon	15 TECNALIA	pierre.barralon@tecnalia.com

History

Date	Version	Change
10-Dec-2018	0.0	Structure of the document and task assignments
15-Dec-2019	0.1	Updates in the task assignments
10-Jan-2019	0.2	UPV contribution to section 4.1.3 and 4.2
15-Jan-2019	0.3	TELEVES, CERTH contributions to section 4.2
21-Jan-2019	0.4	ToC reorganisation
23-Jan-2019	0.5	UPV contribution to section 4 CERTH contribution to section 4.2 CEA contribution to section 4.2, 4.3, and 5.1 TEC finalisation of section 1 and section 6.
24-Jan-2019	0.6	UPV contribution to section 4.1 FhG contribution to section 4.2 UPM contribution to section 4.2 TEC finalisation of the abstract
31-Jan-2019	0.7	CEA contribution to section 4.2 and 5.1 Version ready for internal quality review
22-Feb-2019	0.8	Final version which includes revisions from reviewers: Isabelle Chartier (CEA), Helmi Ben Hmida (FhG)

Key data

Keywords	AIOTES, training, support
Lead Editor	Pierre Barralon, 15 TECNALIA
Internal Reviewer(s)	Isabelle Chartier, 07 CEA Helmi Ben Hmida, 06 Fh-IGD

Abstract

This document is the deliverable D5.6 “Support and Training Plan for Deployment of AIoTES” (an update of D5.2) which presents outcomes of task 5.2 “*Test and validation of ACTIVAGE IoT Ecosystem Suite*”, task 5.3 “*Test and Validation Framework for Deployment sites*” and prepares task 5.4 “*Support for deployment sites*” of the WP5 “*ACTIVAGE IoT Ecosystem Suite Integration*”. This document describes the tools that support the integration of AIoTES into deployment sites.

For this, the different needs of deployment sites have been synthesized. A summary description of the main stakeholders involved in the integration of AIoTES was made accompanied by different use cases illustrating the interaction between these stakeholders and AIoTES, for support, diagnosis, management of deployments or management of cybersecurity and privacy.

To operationally address the identified needs, we deployed consultative materials (online training tool and a wiki) on one hand and interactive tool (issue reporting and tracking and on-site test framework) on the other hands.

Training has been specified starting from these reference use cases, using a state of art methodology. Each stakeholder is associated with capabilities to learn to master the adoption of AIoTES in its specific role. Such capabilities include the general knowledge about AIoTES, the integration of AIoTES within a deployment site, the use of AIoTES for application development, management of a deployment site and device integration and finally the handling of security and privacy. This list of capabilities enabled to establish a list of courses that have been prepared (more courses will be available in the coming months) and are available onto a distance learning platform (**Poliformat**) as well as a **Wiki**.

The support tool (OTRS, ZohoDesk) enables issue reporting and tracking for AIoTES from the different stakeholders of the deployment site. Issues regarding AIoTES when reported have a specific lifecycle, from the assignment to the diagnosis up to the closure of the issue.

In association to this support tool, a **testing framework (Squash Test Suite)** is provided to perform tests in the runtime phase of AIoTES. This testing framework completes the AIoTES testing procedure during built-time which is conducted by task 5.2. The aim was to ensure that the various AIoTES instances in each deployment site were deployed in a nominal environment, preventing the risk of malfunctions or misunderstandings between conception and execution of services. Such dysfunction may happen for example in an IoT deployment when devices hasn't been deployed as expected and declared into the services, with mis location, misconfiguration or mis calibration of devices. This tool was developed in close relation to those developed in WP4 to provide an on-site test suite for both devices and AIoTES, thus having a strong confidence in the quality of the deployment.

Statement of originality

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

Table of contents

Table of contents	5
List of tables	7
List of figures	8
1 About This Document	9
1.1 Deliverable context	9
2 Requirements for validation, training and support	11
2.1 Challenges for on-site deployers	11
2.1.1 Support	11
2.1.2 Deployment tools	12
2.1.3 Maintainability.....	12
2.2 Stakeholders for the tools	13
2.3 Use cases	14
2.3.1 Support Use Cases	14
2.3.2 Troubleshooting Use Cases.....	16
2.3.3 DS management use case	18
2.3.4 Security and Privacy use cases.....	22
2.3.5 Summary of Use Cases.....	27
3 Definitions for training	28
3.1 Learning and Teaching strategies	28
3.2 Capabilities	30
3.2.1 General capabilities	30
3.2.2 Capabilities for DS integration	31
3.2.3 Capabilities for application development.....	32
3.2.4 Capabilities for management.....	33
3.2.5 Capabilities for device integration.....	35
3.2.6 Security & Privacy	35
3.3 Tables of capabilities per stakeholder	36
4 Consultative supporting materials	39
4.1 Assisted distance learning platform	39
4.1.1 Learning Management System (LMS)	39
4.1.2 Training platform: POLIFORMAT (Sakai based)	40
4.1.3 POLIFORMAT user manuals	42
4.2 List of courses	42
4.2.1 Structure of the courses and timelines.....	43
4.2.2 Courses content.....	47
4.3 Wiki	80
4.3.1 Infrastructure.....	80
4.3.2 Contents.....	81
5 Interactive supporting tools	86

5.1	Management toolkit specifications	86
5.1.1	AloTES support tool	86
5.1.2	Deployment validation tool	91
5.2	Zoho Desk	99
5.2.1	Infrastructure	99
5.2.2	Procedure	101
5.2.3	Zoho user manual	102
6	Conclusion and future work	103
	References.....	104
	Appendix A PoliformaT manuals.....	105
A.1	How to register to POLIFORMAT	105
A.1.1	Getting started with ACTIVAGE Training	105
A.1.2	ACTIVAGE Training user creation template	107
A.2	How to use POLIFORMAT	108
	Appendix B Zoho Desk user manual.....	116
B.1	Ticket fields.....	116
B.2	How to respond to tickets	118
B.2.1	ACTIVAGE How to manage tickets	118

List of tables

TABLE 1: SUMMARY OF STAKEHOLDERS IN SCOPE OF WP5	14
TABLE 2: USE CASE DESCRIPTION FOR GUIDANCE FOR DEVICES AND SERVICE FUNCTIONALITY UNDERSTANDING	14
TABLE 3: USE CASE DESCRIPTION FOR THE DOCUMENTATIONS FOR DS DEVICE INSTALLER	15
TABLE 4: USE CASE DESCRIPTION FOR THE DOCUMENTATION FOR DS ADMINISTRATORS.....	15
TABLE 5: USE CASE DESCRIPTION FOR DEVICE AND SENSOR TROUBLESHOOTING.....	16
TABLE 6: USE CASE DESCRIPTION FOR AGGREGATOR TROUBLESHOOTING	17
TABLE 7: USE CASE DESCRIPTION FOR AIOTES TROUBLESHOOTING.....	18
TABLE 8: USE CASE DESCRIPTION FOR CREATING AND EDITING A DEPLOYMENT SITE.....	18
TABLE 9: USE CASE DESCRIPTION FOR CONFIGURING COMPONENTS	19
TABLE 10: USE CASE DESCRIPTION FOR DEPLOYMENT SITE MAINTENANCE	20
TABLE 11: USE CASE DESCRIPTION FOR UPDATING COMPONENTS	20
TABLE 12: USE CASE DESCRIPTION FOR ON-SITE DEVICE MAINTENANCE	21
TABLE 13: USE CASE DESCRIPTION FOR ROUTINE SECURITY AUDIT TO DEPLOYMENT SITE MANAGER	22
TABLE 14: USE CASE DESCRIPTION FOR ROUTINE SECURITY AUDIT TO USERS	22
TABLE 15: USE CASE DESCRIPTION FOR SECURITY EVENTS TO DEPLOYMENT SITE MANAGER	23
TABLE 16: USE CASE DESCRIPTION FOR SECURITY EVENTS TO USER.....	23
TABLE 17: USE CASE DESCRIPTION FOR ROUTINE PRIVACY AUDIT TO DEPLOYMENT SITE MANAGER.....	24
TABLE 18: USE CASE DESCRIPTION FOR ROUTINE PRIVACY AUDIT TO USER	24
TABLE 19: USE CASE DESCRIPTION FOR PRIVACY-RELATED EVENT TO DEPLOYMENT SITE MANAGER	25
TABLE 20: USE CASE DESCRIPTION FOR PRIVACY-RELATED EVENT TO USER.....	25
TABLE 21: SUMMARY OF USE CASES BY INVOLVED STAKEHOLDERS	27
TABLE 22: CAPABILITIES PER STAKEHOLDER.....	36
TABLE 23: TRAINING AND SUPPORT TOOLS AND ACCESS LINK	38
TABLE 24: ACTIVAGE COURSES AND TIMELINES	43
TABLE 25: COURSES FOR SPECIFIC STAKEHOLDERS.....	44
TABLE 26: LIST OF KPI PRODUCES BY THE SUPPORT TOOL.....	89
TABLE 27: ZOHU DESK ASSOCIATED MAILBOXES	101
TABLE 28: AIOTES MAILBOX ASSIGNMENTS.....	101

List of figures

FIGURE 1: TRAINING USER DRIVEN APPROACH	29
FIGURE 2: NEURO-LINGUISTIC PROGRAMMING (NLP) APPLIED TO EDUCATION.....	29
FIGURE 3: ACTIVAGE WIKI TABLE OF CONTENT	81
FIGURE 4: ARCHITECTURE OF THE SUPPORT TOOLS (WIKI, POLIFORMAT, ZOHOS DESK, OTRS, SQUASH TEST SUITE). ..	86
FIGURE 5: ISSUE MANAGEMENT LIFECYCLE.....	88
FIGURE 6: GROUP FOR THE SUPPORT TOOL	90
FIGURE 7: LIST OF TARGETS IN THE SUPPORT TOOL	91
FIGURE 8: TEST AND VALIDATION INTERFACE FOR REQUIREMENTS.....	92
FIGURE 9: TEST AND VALIDATION INTERFACE FOR TEST CASES	93
FIGURE 10: USER CREATION EMAIL.....	106
FIGURE 11: USER CREATION EMAIL.....	108
FIGURE 12: POLIFORMAT LOG IN SCREEN.....	109
FIGURE 13: POLIFORMAT TYPE OF ACCESS	109
FIGURE 14: POLIFORMAT CREDENTIALS.....	110
FIGURE 15: POLIFORMAT NAVIGATION BAR	110
FIGURE 16: POLIFORMAT SITES	111
FIGURE 17: ACTIVAGE TRAINING MAIN SCREEN.....	111
FIGURE 18: ACTIVAGE TRAINING NAVIGATION BAR.....	112
FIGURE 19: POLIFORMAT ISSUES TAB.....	112
FIGURE 20: POLIFORMAT ISSUES SECTION	113
FIGURE 21: POLIFORMAT LANGUAGE SELECTION	113
FIGURE 22: POLIFORMAT OVERVIEW PAGE	114
FIGURE 23: POLIFORMAT PREFERENCES SECTION.....	114
FIGURE 24: POLIFORMAT LANGUAGE SELECTION	115
FIGURE 25: TICKET EXAMPLE	118
FIGURE 26: TICKET REPLY.....	118
FIGURE 27: TICKET HISTORY	119
FIGURE 28: SUBMIT A TICKET FOR APPROVAL	120
FIGURE 29: CLOSING A TASK	121

1 About This Document

The purpose of the work presented in this document is to facilitate the integration of AIoTES within the deployment sites and by the Open callers by providing at the beginning training materials. Then tools to support AIoTES deployment and finally a testing framework.

It serves as a link in the iterative phases of the project. Indeed, during phase 2 DEMONSTRATE, AIoTES was developed to be at the edge between integration and early adoption by the deployment sites. In the running phase, AIoTES should start to be deployed in the 9 Deployment Sites. To support this phase and fulfil these objectives of the project, two steps are mandatory:

- Facilitate the adoption of AIoTES for the deployment sites, at first to enable multilateral cooperation for milestone 3 - EXPAND and then enable external third parties to provide new use cases and technologies on top of AIoTES, as part of the milestone 4 – GROW.
- Maintain and evolve AIoTES to make it more reliable and relevant milestone after milestone

This deliverable took its main inputs from the first submission of this document (D5.2) which had inputs coming from the requirements of deployment sites expressed within deliverable 2.1. Technical inputs were gathered from WP3 and WP4 deliverables, in particular D4.1 concerning the development and deployment tools as well as the D5.1 concerning the architecture and components of AIoTES.

1.1 Deliverable context

Project item	Relationship
Objectives	This deliverable contributes mainly to the achievement of objective <u>Q1</u> "Delivering the ACTIVAGE IoT Ecosystem Suite" by setting up training courses and tools to facilitate the adoption of AIoTES by the integrators and various stakeholders of the deployment sites (5 IoT systems integrated to ACTIVAGE). The works presented in this document contribute in a minor way to the achievement of objectives <u>Q2</u> "Implementation, Demonstration and Replication of Use Cases" providing and <u>Q6</u> "Market growth and sustainability" by respectively providing training and support to third party joining ACTIVAGE during (thru open-calls) and beyond the project.
Exploitable results	D5.6 is a direct contribution to the perpetuation of AIoTES as the most important exploitable result from ACTIVAGE.
Work plan	D5.6 reports work progress in <u>T5.2</u> "Test and validation of ACTIVAGE IoT Ecosystem Suite" for the definition of test cases and <u>T5.3</u> "Test and Validation Framework for Deployment sites" for the deployment site validation tool. This deliverable also integrates the training and support specification from the starting <u>T5.4</u> "Support for deployment sites (also for future sites open calls).
Milestones	This deliverable contributes to the <u>MS2 – Demonstrate</u> with

	<p>regard to the adoption and support of AIoTES within the deployment sites as well as the consolidation of feedback on the first deployments in order to participate in the continuous improvement of AIoTES. The work will also be the foundation of <u>MS3 - Expand</u>, which makes it easier for external developers and open-callers to integrate the project with appropriate training and support.</p>
Deliverables	<p>D5.6 is the second of two-version defining the support and training plan for the ACTIVAGE IoT Ecosystem Suite. D5.6 is an update of D5.2.</p> <p>The following deliverables have provided major inputs for defining this support and training plan:</p> <ul style="list-style-type: none"> - D2.1 and D9.1 for requirements regarding support and training - D4.1 regarding specification for the development and deployment tools - D5.1 regarding the different technological components of the AIoTES framework from which people must be trained for. - D5.2 first version of this deliverable.
Risks	<p>D5.6 aims to mitigate the risk 9 “Difficulty in the DS concept Validation and adoption” with two actions:</p> <ul style="list-style-type: none"> - Providing training support for actual deployment site stakeholders and awardees of the open calls - Providing a testing framework for the deployment site in order facilitate the integration of AIoTES

2 Requirements for validation, training and support

In this section we will introduce the common definitions in the scope of this deliverable with first an insight for challenges regarding the deployment sites operation for which the training, test and support tools are specified. Then, we establish a list of roles and stakeholder regarding the deployment operation, list which will be used for the other sections. Finally, we present typical use cases for support.

2.1 Challenges for on-site deployers

According to the Smart Living Environment for Ageing Well requirements obtained in D2.1, there are several requirements in the field of maintainability and support to be met for the successful deployment to the different sites. Next, these requirements are grouped in three different categories.

2.1.1 Support

From the support point of view, a user manual will be provided describing in detail how to perform individual tasks. If necessary, participants (final users and healthcare professionals) will receive additional training on the hardware and software they will be using. It will therefore be ensured that participants have sufficient digital literacy and are aware of the implications for privacy.

Methods will therefore be developed through which participants can easily access support mechanisms, such as e-mail communication, the provision of a helpline, the existence of help forums, or direct interaction with other participants who have gained more experience with the use of the system.

On-site deployers will have an easy access to updated documentation about the system to deploy. They also will be provided with the most up-to-date training documentation that will be transferred to participants.

In summary, these are the considered challenges for the support items:

- Existence of a user manual for participants (final users and healthcare professionals).
- If needed, additional training for participants on hardware and software.
- Easy access to support infrastructure: e-mail, helpline, forums...
- Updated documentation for DS deployers.
- DS deployers must know where to find proper and up-to-date documentation.
- DS deployers must have the correct materials to train future participants of the DS infrastructure.
- Develop training plans and programs for end users' support in handling effectively the hardware and software
- Provide training courses for administrators to support them to test and manage IoT technologies in the DS
- Provide educational material for enriching knowledge about specific versions

2.1.2 Deployment tools

Regarding the deployment tools, on-site deployers will be able to obtain the proper software from a site where its content is always up to date and the latest version is always available. In addition, this software must guarantee that it is free of bugs and that no errors will occur during its execution.

So, in summary, the challenges are:

- DS deployers know where to find the proper and up-to-date deployments tools.
- Identification of the latest versions to avoid incompatibilities.
- Deployment tools must be free of bugs and ensure a correct execution.
- Emerging technologies such as sensors, medical devices present new challenges for secure update mechanisms
- Change and configuration must be aligned with AIoTES general support. Tools should provide useful features to ensure clear history tracking of errors and auditing
- Find techniques to use configuration management tools consistently

2.1.3 Maintainability

From the point of view of the deployment of new devices, the first concept refers to the ease of installation, removal and general maintenance of the sensors and interfaces to be used. These operations should not only be carried out by the entities involved in the deployment, but also by third parties without the need for special qualification.

Once the deployment is completed and the system is already in operation, it must provide information about its general condition, as well as the particular condition of each of the sensors, indicating both their physical operation and whether they are connected to the Internet. This information should be displayed in an intelligible, attractive and, whenever possible, self-explanatory graphical way. A log mechanism will also be set up to record any anomalies that may have occurred and thus facilitate subsequent analysis. There will be also a mechanism to alert users and maintainers in real time.

To facilitate the control of all the systems deployed in the different sites, the existence of a common management tool will be considered, allowing operations such as the individualized configuration of each system, the activation and deactivation of filters and rules, the modification of alarm mechanisms, the control of sensors and connected devices, the visualization of the general operating and connection states, etc.

In summary, the maintainability challenges to face are:

- Ease of maintenance of sensors and interfaces used in deployments.
- No special qualification needed when third parties are involved.
- Systems must provide information about their general performing condition.
- Systems must provide detailed information (status, operations, connection state, etc.) on each of their sensors, hardware components and interfaces.
- There must be a mechanism to show the operation information in an accessible, user-friendly way.
- Systems will record atomic operations in log files to facilitate later analysis.
- When a system component fails, it must be ensured that the warning information reaches the right person.
- There must be a central management tool to control all deployed systems, allowing remote operations like individual configurations, alarms control, sensor and devices management, etc.

- Deal with third parties' APIs and mainly with those that perform critical actions
- Update and upgrade systems components to face on -site troubleshooting
- Update and upgrade systems components according to the current progresses in the market

2.2 Stakeholders for the tools

A detailed list of stakeholders has been defined in the deliverable D2.1, from which we can extract and synthesize those having a role either in training or in support and maintenance. Different intervenient plays some major roles in the Smart services value chain, mainly:

Technical developers: Technical developers presents the first positively affected categories by the support tools, mainly to enable the usage and the exploitation of available APIs and functions from different platforms, to ease the quick development of solutions through the Visual programming tools. The technical team should be also later able to easily extend the system, combine it with others, and easily add to remove further devices...

- AIoTES Expert which typically integrates an existing IoT platform within AIoTES. This expert has a leading development role and the ability to specify roadmaps for further developments.
- AIoTES developers, which compared to the AIoTES expert doesn't have necessary the initial knowledge about the underlying platforms but can develop bridges for AIoTES.

Services providers: Usually, services providers, such as the Red Cross, use open standard APIs or web services to offer wider access to third parties and extensibility to their clients, this way furthering the exploitation of their services.

- Application developer which develops on top of AIoTES services which can be replicable over many deployment sites. This role is highly bound to AIoTES and its ability to develop efficient services.

Deployment sites managers, which are the technical referents of the deployment sites regarding the different uses cases and services deployed.

- DS Administrator who has authority onto the deployment sites, in particular regarding the user management (inclusion and removal of user), the management of platforms and devices, and must report on a regular basis strategic KPI to the ACTIVAGE board and potentially to local authorities.
- DS Device installer who happens to be in front row with the users (beneficiaries, caregivers, etc.) during the whole lifecycle of the devices as one of the contact points for those users to report issues or suggest improvements.

Users

- Caregivers and relatives, whether they are professional or non-professional with regular interactions to the final users. Given deployment sites and use-cases deployed, these users interact with the different services that are provided by AIoTES applications rather than the devices. They potentially have contacts with the DS Administrator and the application developers.
- End user which benefits from AHA services through IoT.

Newcomers

- Open call participant which can be one of the different roles but without prior knowledge to the project and AIoTES in particular.

- Other parties such as IoT or services suppliers willing to benchmark their tools and mechanisms using ACTIVAGE technology, test beds, and data sets, and to evaluate the adequacy of ACTIVAGE to their domains, and for developing extended and new use cases based on the ACTIVAGE platform.

Table 1: Summary of stakeholders in scope of WP5

Stakeholder	Description
Application developer	develops over AIoTES framework
AIoTES expert	deploys AIoTES, integrates platform in AIoTES
AIoTES developer	develops AIoTES bridges
DS administrator	manages the DS, including users, platforms, and devices
DS device installer	manages the devices of a DS
User	doctors, caregivers interested in the medical monitoring of patients
Final User	patients, aged person living in the smart home
open call participant	individuals, local authorities, service providers, associations, organizations and businesses. Invited third parties interested to get involved in specific tasks that will be carried out with the ultimate goal to expand ACTIVAGE use cases and apply experiments of new cities
other third parties involved in development	IoT or service suppliers interested in evaluating ACTIVAGE ecosystem (GROW and SUSTAIN phases)

2.3 Use cases

2.3.1 Support Use Cases

The different use cases of deployment sites that have been implemented within ACTIVAGE raised several challenges and concerns.

Concerning the final users' and healthcare professionals support, a user manual material has been considered as a valuable communication document. Moreover, the whole infrastructure of ACTIVAGE system is intended to be supported by diverse communication means as emails, a helpline and discussion forums.

Table 2: Use case description for Guidance for devices and service functionality understanding

Use Case Number	UC.SUP.01
Use Case Name	Guidance for devices and service functionality understanding
Brief Description	Final Users (elderly, formal and informal caregivers) use a practical and concise guide matched to the intended audience in order to understand technical information and be actively involved in system functioning. Healthcare professionals use the manual to retrieve experimental info and facilitate in practice their work assisted by manual information resources. Final users and healthcare professionals utilize the user manual as an interactive and experimental learning tool to figure out basic functions and

	technical details.
Assumptions & Pre-Conditions	Final users and healthcare professional are unfamiliar with the ACTIVAGE technologies.
Goal (Successful End Condition)	Support effectively final users and healthcare professionals in ACTIVAGE technologies and applications usage. Ensure further understanding and comprehension of ACTIVAGE technologies.
Involved Actors	Final Users and Healthcare professionals
Use Case Initiation	The use case is initiated when the user manual is handed out to final users.
Main Flow	<ol style="list-style-type: none"> 1. Final users/healthcare professionals are trying to use ACTIVAGE devices or services but they are unfamiliar with their functionalities. 2. Final users/healthcare professionals use the manual for more detailed technical information about the ACTIVAGE system and optimal interactions with the system.

Table 3: Use case description for the documentations for DS device installer

Use Case Number	UC.SUP.02
Use Case Name	Documentations for DS device installer
Brief Description	Having detailed information about the devices/services, requirements/guidelines and overall the technological environment, DS device installers are assisted in their work to set up new environments or maintain the existing ones. These communication tools facilitate applications' deployment, installation and configuration. Moreover detailed documentation speed up developers' work.
Assumptions & Pre-Conditions	DS device installer is unfamiliar with one of the ACTIVAGE technologies.
Goal (Successful End Condition)	Find the proper info about the deployment tools, their functionalities, installation, activation, deactivation and update.
Involved Actors	DS device installer
Use Case Initiation	The use case is initiated when a DS device installer wants to retrieve information related to one of the ACTIVAGE technologies.
Main Flow	<ol style="list-style-type: none"> 1. A DS developer does not know how to deploy, install or configure one of the ACTIVAGE technologies. 2. DS developer advices the manuals for more detailed information.

Table 4: Use case description for the documentation for DS Administrators

Use Case Number	UC.SUP.03
Use Case Name	Documentations for DS Administrators
Brief Description	For the deployment, installation and configuration of the applications, a DS Administrator needs to have an in-depth understanding of the ACTIVAGE architecture and of the technical details related to the used technologies. Therefore, a

	documentation kit has been created and is available for the better comprehension of the installed hardware and software. A DS Administrator can consult it for retrieving information related to the administration of the Deployment Site and software/hardware configuration.
Assumptions & Pre-Conditions	DS Administrators are unfamiliar with the ACTIVAGE technologies.
Goal (Successful End Condition)	The DS Administrators gets informed about the needed steps for deployment, installation or configuration of the ACTIVAGE technologies.
Involved Actors	DS Administrators
Use Case Initiation	The use case is initiated when the administrator tries to find detailed technical information related to the ACTIVAGE technologies.
Main Flow	<ol style="list-style-type: none"> 1. A DS Administrator tries to deploy, install or configure one of the ACTIVAGE applications but is unfamiliar with the technologies used 2. The DS Administrator accesses the related resources and documentation and gets informed about the needed steps

2.3.2 Troubleshooting Use Cases

Table 5: Use case description for device and sensor troubleshooting

Use Case Number	UC.TRB.01
Use Case Name	Device/Sensor troubleshooting
Brief Description	A DS administrator discovers a malfunction through an alarm notification by the Management Toolkit for one of the devices/sensors of the DS. By using the Management Toolkit, the administrator reports the bug along with any needed information (location, type and ID of device/sensor, type of malfunction etc.). The ACTIVAGE support centre processes the created ticket and informs the personnel responsible for this DS. An individual responsible for this type of issues goes to the indicated location and resolves the issue by fixing or replacing the device/sensor.
Assumptions & Pre-Conditions	<ul style="list-style-type: none"> – The DS administrator must be logged in to the DS Management System. – An Internet connection must be enabled. – One of the devices/sensors of the DS is malfunctioning. – For each device/sensor malfunction an alarm notification is created in the DS Management System.
Goal (Successful End Condition)	The malfunction related to the device/sensor is resolved.
Involved Actors	DS Administrator
Use Case Initiation	The use case is initiated when the DS administrator discovers a malfunction for one of the devices/sensor of the DS.
Main Flow	<ol style="list-style-type: none"> 1. The DS administrator opens the DS Management System web front-end.

	<ol style="list-style-type: none"> 2. The DS administrator logs in to the DS Management System. 3. An alarm notification is received that indicates malfunctioning for one of the devices/sensors of the DS. 4. The administrator reports the malfunctioning by using the Management Toolkit. 5. The ACTIVAGE support centre processes the report and informs the personnel responsible for this DS. 6. An individual responsible for this type of issues goes to the indicated location and resolves the issue by fixing or replacing the device/sensor.
--	--

Table 6: Use case description for aggregator troubleshooting

Use Case Number	UC.TRB.02
Use Case Name	Aggregator troubleshooting
Brief Description	A DS administrator uses the DS Management System and an alarm notification is received that indicates malfunctioning for one of the aggregators of the DS. By using the Management Toolkit, the DS administrator reports the malfunction along with any needed information (location, type of malfunction etc.). The ticket created is processed by the ACTIVAGE support centre that examines it and informs the responsible personnel for this DS. An individual responsible for this type of issues goes to the indicated location and resolves the issue by fixing or replacing the aggregator.
Assumptions & Pre-Conditions	<ul style="list-style-type: none"> – The administrator must be logged in to the DS Management System. – An Internet connection must be enabled. – One of the aggregators of the DS is malfunctioning. – Whenever an aggregator malfunctions an equivalent alarm notification is created and sent to the DS Management System.
Goal (Successful End Condition)	The malfunction related to the aggregator is resolved.
Involved Actors	DS Administrator
Use Case Initiation	The use case is initiated when a DS administrator receives an alarm notification that indicates malfunctioning for one of the aggregators of the DS through the DS Management System.
Main Flow	<ol style="list-style-type: none"> 1. The DS administrator opens the DS Management System web front-end. 2. The DS administrator logs in to the DS Management System. 3. An alarm notification is received that indicates malfunctioning for one of the aggregators of the DS. 4. The administrator reports the malfunctioning through the Management Toolkit. 5. The ACTIVAGE support centre processes the created ticket and informs the personnel responsible for this DS. 6. An individual responsible for this type of issues goes to the indicated location and resolves the issue by fixing or replacing the device/sensor.

Table 7: Use case description for AIoTES troubleshooting

Use Case Number	UC.TRB.03
Use Case Name	AIoTES troubleshooting
Brief Description	While an application developer tries to set up an IoT infrastructure, a malfunction in the operations offered by the AIoTES itself arises (e.g. Semantic Interoperability Layer is not responding). The developer uses the Management Toolkit in order to create a ticket related to the issue/bug, specifying the exact component and service within the AIoTES. The ticket is processed by the ACTIVAGE support centre, which determines and informs the responsible developer for this AIoTES component, in order to have the malfunction resolved.
Assumptions & Pre-Conditions	A malfunction in the operations offered by the AIoTES itself arises.
Goal (Successful End Condition)	The malfunction of the AIoTES component is resolved.
Involved Actors	Application developer
Use Case Initiation	The use case is initiated when an application developer discovers a malfunction related to one of the AIoTES components.
Main Flow	<ol style="list-style-type: none"> 1. An application developer that tries to set up an IoT infrastructure discovers a malfunction related to one of the AIoTES components. 2. The application developer uses the Management Toolkit in order to create a ticket related to the issue/bug. 3. A ticket is created and processed by ACTIVAGE support centre that is responsible for the management of all issues related to AIoTES. 4. The ACTIVAGE support centre determines the responsible developer for this AIoTES component and informs him/her about the malfunction. 5. The malfunction is resolved.

2.3.3 DS management use case

General Information

The deployment management tools of deployment sites cover aspects of the actual deployment of devices or services, their configuration and general performing conditions, the easiness of maintenance of sensors, hardware components and interfaces and finally the update of the manager tool.

Table 8: Use case description for creating and editing a deployment site

Use Case Number	UC.MNG.01
Use Case Name	Create/edit DS
Brief Description	The DS administrator creates/edits a specific DS.
Assumptions & Pre-Conditions	<ul style="list-style-type: none"> – The DS administrator has to log into the ACTIVAGE system – An Internet connection has to be enabled.
Goal (Successful	The DS administrator is able to create a new deployment

End Condition)	installation by performing concrete actions as viewing/inserting/editing information related to the installation of devices/services in a Deployment Site.
Involved Actors	DS administrator
Use Case Initiation	The use case is initiated when the DS administrator decides to create/edit a DS.
Main Flow	<ol style="list-style-type: none"> 1. The DS administrator logs into the ACTIVAGE system. 2. The DS administrator selects the location of the new deployment installation. 3. The ACTIVAGE system displays all available resources (devices, services, etc.) for deployment. 4. The DS administrator selects the resources to be used in the new deployment installation.

Table 9: Use case description for configuring components

Use Case Number	UC.MNG.02
Use Case Name	Configuration of components (devices or services)
Brief Description	The DS administrator provides configuration parameters for one of the installed components (device or service).
Assumptions & Pre-Conditions	<ul style="list-style-type: none"> – The DS administrator must be logged in to the ACTIVAGE system. – An Internet connection must be enabled. – There must be at least one installation of devices and services in a deployment site. – The DS administrator has to insert appropriate parameters that reflect devices' operational performance.
Goal (Successful End Condition)	The selected components are configured according to the given parameters by the DS administrator.
Involved Actors	DS administrator
Use Case Initiation	The use case is initiated when a DS administrator opens the ACTIVAGE system and provides configuration parameters for a deployed component.
Main Flow	<ol style="list-style-type: none"> 1. The DS administrator opens the DS Management System web front-end. 2. The DS administrator logs in to the DS Management System. 3. The DS administrator selects a deployment site. 4. The DS administrator can browse all different IoT installations of the selected DS and select one of them. 5. The DS administrator selects one of the deployed components of the selected IoT installation for configuration. 6. The DS administrator provides the configuration parameters. 7. The DS administrator component is configured according to the given parameters.

Table 10: Use case description for deployment site maintenance

Use Case Number	UC.MNG.03
Use Case Name	DS maintenance
Brief Description	The DS administrator can access, through a graphical interface, the status of the installed devices and services in a deployment site. Particularly, the DS administrator can be informed about the actual operating status of all components as well as potential issues like malfunction of one of the components.
Assumptions & Pre-Conditions	<ul style="list-style-type: none"> – The DS administrator must be logged in to the ACTIVAGE system. – An Internet connection must be enabled. – There must be at least one installation of devices and services in a deployment site.
Goal (Successful End Condition)	The DS administrator is able to retrieve information related to the operating status of the installed components and identify possible malfunctions.
Involved Actors	DS administrator
Use Case Initiation	The use case is initiated when the DS administrator opens the ACTIVAGE system, in order to view the operating status of all installed devices and services.
Main Flow	<ol style="list-style-type: none"> 1. The DS administrator opens the DS Management System web front-end. 2. The DS administrator logs into the DS Management System. 3. The DS administrator selects a deployment site. 4. The DS administrator can browse all different IoT installations of the select DS. 5. By selecting an IoT installation the DS administrator can view its installed devices and their operating status. 6. When there is a notification alarm that indicates changes in components' status and operation, the DS administrator is instantly notified.

Table 11: Use case description for updating components

Use Case Number	UC.MNG.04
Use Case Name	Update of the installed components
Brief Description	The DS administrator can see if there are newer versions of installed software components and update them.
Assumptions & Pre-Conditions	<ul style="list-style-type: none"> – The DS administrator must be logged in to the ACTIVAGE system. – An Internet connection must be enabled. – There must be at least one installation of devices and services in a deployment site.
Goal (Successful End Condition)	Components are updated successfully in order to upgrade services.
Involved Actors	DS administrator
Use Case	The use case is initiated when a DS administrator tries to update

Initiation	one of installed components.
Main Flow	<ol style="list-style-type: none"> 1. The DS administrator opens the DS Management System web front-end. 2. The DS administrator logs into the DS Management System. 3. The DS administrator sees or receives notification that there are new versions available for specific components. 4. The DS administrator selects the components to be updated. 5. The DS administrator proceeds to the update of the component's software.

Table 12: Use case description for on-site device maintenance

Use Case Number	UC.MNG.05
Use Case Name	On-site device maintenance
Brief Description	Having an on-site maintenance in order to fix an issue, which was either planned / discover by the service provider, or reported by an user or the final user
Assumptions & Pre-Conditions	A documentation of the beneficiary installation must exist, with final user coordinates
Goal (Successful End Condition)	Issue is fixed
Involved Actors	<ul style="list-style-type: none"> – DS administrator – IoT Installer – Service provider – Users – Final User
Use Case Initiation	<p>The use case is initiated either by :</p> <ul style="list-style-type: none"> – The beneficiary which raises an issue thru the application or by reporting it to an user – An IoT device raising an maintenance event or AIoTES noticing an abnormal event
Main Flow	<ol style="list-style-type: none"> 1. The issue is dispatched by the DS Administrator to the appropriate actor 2. A fix to the issue is proposed to the DS Administrator 3. DS administrator mandates an installer to fix the issue, and provides the installer with the contact information of the beneficiary 4. Installer contacts the beneficiary to request a working time slot 5. Installer fixes the issue (device replacement, battery replacement, etc) 6. Beneficiary validates the operation

2.3.4 Security and Privacy use cases

Table 13: Use case description for routine security audit to deployment site manager

Use Case Number	UC.SEC.01
Use Case Name	Routine security audit to DS Manager
Brief Description	The DS manager is in charge of checking the activity of the routine security audit, as well as the action to undertake depending on its conclusion.
Assumptions & Pre-Conditions	<ul style="list-style-type: none"> – DS manager is aware of the routine security audit. – The routine security audit has been configured properly.
Goal (Successful End Condition)	On-site DS Security is guaranteed. The security measures and reporting procedures are in place and breakage, attacks and unauthenticated attempts are detected, rejected, logged and reported to the DS.
Involved Actors	<ul style="list-style-type: none"> – DS administrator – IoT Installer – Service provider
Use Case Initiation	The use case is initiated either by : <ul style="list-style-type: none"> – The DS manager, whenever he is willing to check; – The DS security manager component, automatically and periodically.
Main Flow	<ol style="list-style-type: none"> 1. The security audit is started. 2. The security audit results are logged. 3. The security audit results are notified to the DS Manager.

Table 14: Use case description for routine security audit to users

Use Case Number	UC.SEC.02
Use Case Name	Routine security audit to Users
Brief Description	The User is responsible for meeting the security rules and for taking the recommended measures, as well as the action to undertake (e.g. change password).
Assumptions & Pre-Conditions	<ul style="list-style-type: none"> – The User is aware of the security measures and corrective actions. – The routine security audit has been configured properly.
Goal (Successful End Condition)	On-site DS Security is guaranteed. The security measures and reporting procedures are in place and breakage, attacks and unauthenticated attempts are detected, rejected, logged and reported to the DS.
Involved Actors	<ul style="list-style-type: none"> – DS manager – User – IoT Installer – Service provider
Use Case	The use case is initiated either by :

Initiation	<ul style="list-style-type: none"> – The DS manager, whenever he is willing to check; – The DS security manager component, automatically and periodically.
Main Flow	<ol style="list-style-type: none"> 1. The security audit is started. 2. The security audit results are logged. 3. The security audit results are notified to the User.

Table 15: Use case description for security events to deployment site manager

Use Case Number	UC.SEC.03
Use Case Name	Security event to DS Manager
Brief Description	The DS manager is in charge of taking immediate measures and corrective actions in case of security event.
Assumptions & Pre-Conditions	<ul style="list-style-type: none"> – The DS manager is aware of the routine measures and corrective actions, or he has access to knowledgeable persons. – The security event is detectable and the security detection has been configured properly.
Goal (Successful End Condition)	On-site DS Security is guaranteed. The security measures and reporting procedures are in place and breakage, attacks and unauthenticated attempts are detected, rejected, logged and reported to the DS.
Involved Actors	<ul style="list-style-type: none"> – DS manager – DS device installer – Service provider
Use Case Initiation	The use case is initiated by the DS security manager component, automatically on detected security breach or attack.
Main Flow	<ol style="list-style-type: none"> 1. The security event is detected by the security component. 2. The security event is logged. 3. The security event is notified to the DS Manager.

Table 16: Use case description for security events to user

Use Case Number	UC.SEC.04
Use Case Name	Security event to User
Brief Description	The User is responsible for meeting the security rules and for taking the recommended measures, as well as the action to undertake (e.g. change password).
Assumptions & Pre-Conditions	<ul style="list-style-type: none"> – The DS manager is aware of the routine security audit. – The routine security audit has been configured properly.
Goal (Successful End Condition)	On-site DS Security is guaranteed. The security measures and reporting procedures are in place and breakage, attacks and unauthenticated attempts are detected, rejected, logged and reported to the DS.
Involved Actors	<ul style="list-style-type: none"> – User – DS manager – DS device installer

	– Service provider
Use Case Initiation	The use case is initiated by the DS security manager component, automatically on detected security breach or attack.
Main Flow	<ol style="list-style-type: none"> 1. The security event is detected by the security component. 2. The security event is logged. 3. The security event is notified to the User.

Table 17: Use case description for routine privacy audit to deployment site manager

Use Case Number	UC.PRI.01
Use Case Name	Routine privacy audit to DS Manager
Brief Description	The DS manager is responsible for the system meeting the privacy ethics and the GDPR rules and for taking the recommended measures, and the action to undertake in case of privacy breach.
Assumptions & Pre-Conditions	<ul style="list-style-type: none"> – The DS manager is aware of the routine privacy audit. – The routine privacy audit has been configured properly.
Goal (Successful End Condition)	On-site DS Privacy preservation is guaranteed. The privacy preservation measures and reporting procedures are in place and breach of the user consent and attacks are detected, rejected or corrected, logged and reported to the DS Manager.
Involved Actors	<ul style="list-style-type: none"> – DS administrator – DS device installer – Service provider
Use Case Initiation	The use case is initiated either by : <ul style="list-style-type: none"> – The DS manager, whenever he is willing to check; – The DS security manager component, automatically and periodically.
Main Flow	<ol style="list-style-type: none"> 1. The privacy preservation audit is started. 2. The privacy preservation audit results are logged. 3. The privacy preservation audit results are notified to the DS Manager.

Table 18: Use case description for routine privacy audit to user

Use Case Number	UC.PRI.02
Use Case Name	Routine privacy audit to User
Brief Description	The DS manager is responsible for the system meeting the privacy ethics and the GDPR rules and for taking the recommended measures, as well as the action to undertake in case of privacy breach.
Assumptions & Pre-Conditions	<ul style="list-style-type: none"> – The DS manager is aware of the routine privacy audit. – The routine privacy audit has been configured properly.
Goal (Successful End Condition)	On-site DS Privacy preservation is guaranteed. The privacy preservation measures and reporting procedures are in place and breach of the user consent and attacks are detected, rejected or corrected, logged and reported to the DS Manager.
Involved Actors	– DS administrator

	<ul style="list-style-type: none"> – DS device installer – Service provider
Use Case Initiation	<p>The use case is initiated either by :</p> <ul style="list-style-type: none"> – The DS manager, whenever he is willing to check; – The DS security manager component, automatically and periodically.
Main Flow	<ol style="list-style-type: none"> 1. The privacy preservation audit is started. 2. The privacy preservation audit results are logged. 3. The privacy preservation audit results are notified to the DS Manager.

Table 19: Use case description for privacy-related event to deployment site manager

Use Case Number	UC.PRI.03
Use Case Name	Privacy-related event to DS Manager
Brief Description	The DS manager is responsible for meeting the privacy ethics and the GDPR rules and for taking the recommended measures, as well as the action to undertake in case of privacy breach.
Assumptions & Pre-Conditions	<ul style="list-style-type: none"> – The DS manager is aware of the routine privacy audit. – The routine privacy audit has been configured properly.
Goal (Successful End Condition)	On-site DS Privacy preservation is guaranteed. The privacy preservation measures and reporting procedures are in place and breach of the user consent and attacks are detected, rejected or corrected, logged and reported to the DS Manager.
Involved Actors	<ul style="list-style-type: none"> – DS manager – DS device installer – Service provider
Use Case Initiation	<p>The use case is initiated either by :</p> <ul style="list-style-type: none"> – The DS privacy manager component, automatically on detected privacy breach or attack.
Main Flow	<ol style="list-style-type: none"> 1. The privacy preservation event is detected by the security component. 2. The privacy preservation event is logged. 3. The privacy preservation event is notified to the DS Manager.

Table 20: Use case description for privacy-related event to user

Use Case Number	UC.PRI.04
Use Case Name	Privacy-related event to User
Brief Description	The DS manager is responsible for the system meeting the privacy ethics and the GDPR rules and for taking the recommended measures, as well as the action to undertake in case of privacy breach.
Assumptions & Pre-Conditions	<ul style="list-style-type: none"> – The DS manager is aware of the routine privacy audit. – The routine privacy audit has been configured properly.
Goal (Successful	On-site DS Privacy preservation is guaranteed. The privacy

End Condition)	preservation measures and reporting procedures are in place and breach of the user consent and attacks are detected, rejected or corrected, logged and reported to the DS Manager.
Involved Actors	<ul style="list-style-type: none"> – User – DS manager – DS device installer – Service provider
Use Case Initiation	<p>The use case is initiated either by :</p> <ul style="list-style-type: none"> – The DS privacy manager component, automatically on detected privacy breach or attack.
Main Flow	<ol style="list-style-type: none"> 1. The privacy preservation event is detected by the security component. 2. The privacy preservation event is logged. 3. The privacy preservation event is notified to the User, within the legal delay.

2.3.5 Summary of Use Cases

Table 21: Summary of use cases by involved stakeholders

Use case number	Use case name	Involved stakeholders
UC.SUP.01	Guidance for devices and service functionality understanding	Users Final Users
UC.SUP.02	Documentations for DS device installer	DS device installer
UC.SUP.03	Documentations for DS Administrators	DS Administrator
UC.TRB.01	Device/Sensor troubleshooting	DS Administrator
UC.TRB.02	Aggregator troubleshooting	DS Administrator
UC.TRB.03	AIOTES troubleshooting	Application developer
UC.MNG.01	Create/edit DS	DS administrator
UC.MNG.02	Configuration of components (devices or services)	DS administrator
UC.MNG.03	DS maintenance	DS administrator
UC.MNG.04	Update of the installed components	DS administrator
UC.MNG.05	On-site device maintenance	DS administrator IoT Installer Service provider Users /Final User
UC.SEC.01	Routine security audit to DS Manager	DS administrator IoT Installer Service provider
UC.SEC.02	Routine security audit to Users	DS administrator User IoT Installer Service provider
UC.SEC.03	Security event to DS Manager	DS administrator DS device installer Service provider
UC.SEC.04	Security event to User	User DS administrator DS device installer Service provider
UC.PRI.01	Routine privacy audit to DS Manager	DS administrator DS device installer Service provider
UC.PRI.02	Routine privacy audit to User	DS administrator DS device installer Service provider
UC.PRI.03	Privacy-related event to DS Manager	DS administrator DS device installer Service provider
UC.PRI.04	Privacy-related event to User	User DS administrator DS device installer Service provider

3 Definitions for training

This section is directly related with the task “T5.4 Support for deployment sites” whose objective is to provide support to the DS on the use and operation of AloTES. For that purpose, a training program has been defined and provided to the various users of AloTES.

To define the training programs, the first step was to identify different types of learning and teaching strategies to and later select the most suitable training methodology for our project. This means that our choices were driven taking into account the users who will perform the training, as well as the different capabilities that they need to learn. The ACTIVAGE stakeholders have already been defined in section 2.2. Therefore, this information is not included here again. Section 3.2 introduces the capabilities that the training program provides to their students whereas section 3.3 establishes the connection between users, users’ needs and the skills/knowledge they will obtain.

3.1 Learning and Teaching strategies

Over the past few years, the way of teaching has changed significantly. Thanks to the new technological media the old-style seminar lessons have become obsolete and new techniques are emerging.

Recent studies¹ demonstrate that learning is a circular process. David A. Klob (1984) developed the modern theory of experiential learning, defining it as the process of learning through experience. The focus of this theory is the individual learning process. As he explains, the best learning is achieved when performing the displayed training repeatedly.

On the other hand, *4MAT*² is one of the most practical and time-tested teaching methods in the world with a 37-year history of performance. It defines four distinct phases of the learning cycle giving teachers and trainers a systematic way to train all learners to think and learn well.

The phases defined in *4MAT* are the following:

- Experiencing
- Conceptualising
- Applying
- Refining

Tutors or trainers should consider while applying the 4MAT model to follow a specific order, as shown in Figure 1.

In summary, to keep the attention of the “WHY student”, first the explanation of “WHY the topic at hand is important” must be done. Next, the tutor must focus / concentrate on the “WHAT” and “HOW students”, as they are more patient. It is also logical to first explain the theory (WHAT) and then the application process (HOW). Finally, the “WHAT IF students” are interested in obtaining more information and therefore need to be placed last.

Continuing with the topics of communication methods and learning mechanisms, it is important to include the Neuro-Linguistic Programming (NLP) models. Using the techniques provided by the NLP models, it is then possible to enhance communication between tutors

¹ https://en.wikipedia.org/wiki/Experiential_learning

² <http://www.4mat.eu>

and trainees. Therefore, training should implement not only the traditional communication channels such as auditory word elements but also visuals and practical ones. Taking into consideration all the above, the classic NLP model presents the following pyramid to subdivide the learning experience.



Figure 1: Training user driven approach

Figure 2 shows how to apply NLP to education. It should be highlighted that seeing (30%) or seeing and hearing (50%) are quite effective but doing or teaching (90%) is the best experience for students to learn and remember a specific topic. Therefore, when implementing the learning experience pyramid, the teaching procedure should be organized as follows: "First look at how something is done, then do it yourself, and finally teach it to others.

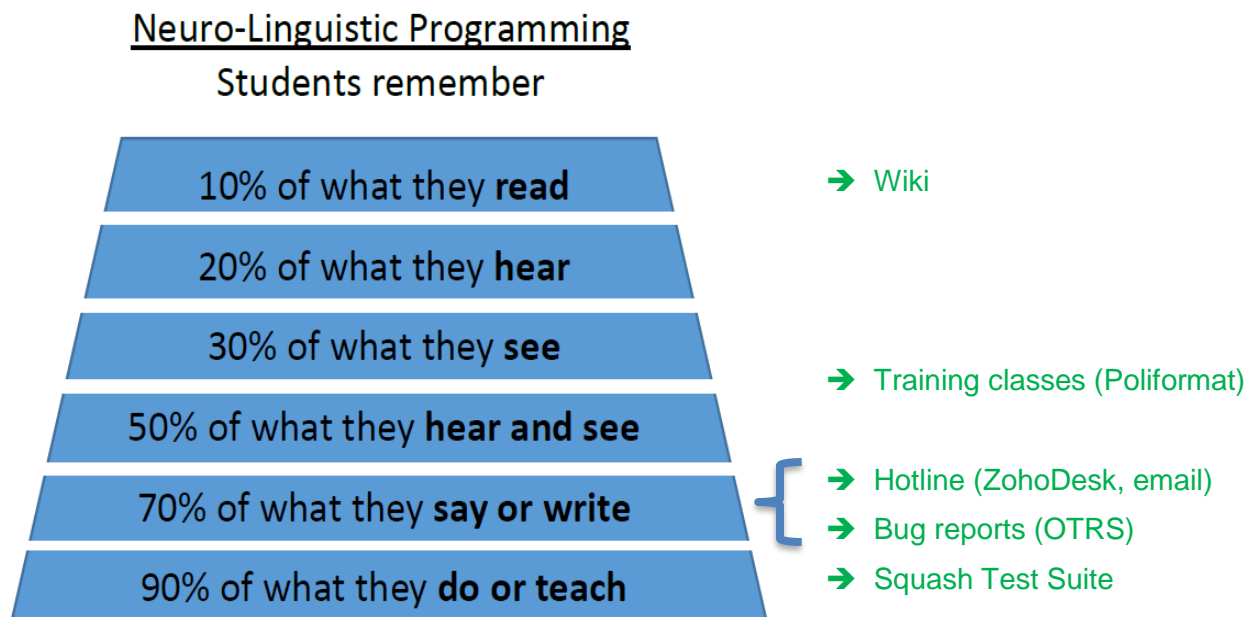


Figure 2: Neuro-Linguistic Programming (NLP) applied to education

From Figure 2, Activage partners are proposing different training and support modalities. We have also anticipated a similar training and support strategy for most of the stakeholders:

First of all, users may start to go through the consultative materials: reading the **wiki pages** (section 4.3) to get an overall view of AITES components, the supported 7 IoT platforms, the interoperability, security and safety functionalities. Such readings will probably be followed by the attendance of particular **training courses** centralised into the **Poliformat** web application (section 4.1.2).

When the needed knowledge will be acquired, users will start deploying AIOTES modules. This process will lead to problems/questions. These questions will be addressed either by emails to dedicated email addresses (Table 23) or through the **ZohoDesk** application (5.2).

In case specific bugs or errors are identified, users will be able to report them via the **OTRS** web application (5.1.1). Upgrades/improvements requests will also be managed at this location.

Finally and when AIOTES is deployed a **verification tool** (Squash Test Suite, section 5.1.2) will be used to ensure that some critical components or modules are properly functioning.

3.2 Capabilities

Capability is a term used to describe a future ability. In this deliverable this term is understood as the skills that the users/stakeholders require to for managing integrated deployment and troubleshooting to allow fast and reproducible deployment of the IoT solution in the DS.

The capabilities that are needed to deploy, install and operate in the DSs over AIoTES are detailed below. For simplicity, they have been grouped according to their areas of knowledge. Several capabilities can belong to more than one category at the same time. In such cases, it has been decided to include the capability in the category to which it is most directly related.

In the next subsections, the different capabilities that have been identified are described.

3.2.1 General capabilities

3.2.1.1 General knowledge about AIoTES

This skill refers to the general knowledge of the ACTIVAGE IoT Ecosystem Suite (AIOTES), the set of Techniques, Tools and Methodologies for interoperability at different layers between heterogeneous IoT Platforms and the ACTIVAGE Open Framework that provides Semantic Interoperability of IoT Platforms for AHA, addressing trustworthiness, privacy, data protection and security.

3.2.1.2 Background and expertise in the AHA & IoT domains

This capability refers to a general knowledge on two areas closely related with ACTIVAGE: Active and Healthy Ageing (AHA) and the Internet of Things (IoT). Moreover, also it refers to the expertise on some specific areas of the aforementioned domains for some types of users that require deeper knowledge of them.

3.2.2 Capabilities for DS integration

The usability of deployment tools refers to the fact that developers can discover both IoT services and applications registered by site administrators and application developers, to facilitate new IoT applications on deployment sites. Developers can make use of web-based means to register their applications and devices, as well as cloud tools which facilitate semantic discovery of already registered components. It provides the capability to record and discover sensors and actuators, infrastructure elements (such as servers or gateways), and software applications with information inputs sent from the aforementioned devices. Also, the capability to maintain and manage deployed tools will be acquired. This usability will be learnt from the perspective of different profiles: for Administrator User and for Developers.

3.2.2.1 Use of AIoTES deployment tools

The usability of deployment tools refers to the fact that developers can discover both IoT services and applications registered by site administrators and application developers, to facilitate new IoT applications on deployment sites. Developers can make use of web-based means to register their applications and devices, as well as cloud tools which facilitate semantic discovery of already registered components. It provides the capability to record and discover sensors and actuators, infrastructure elements (such as servers or gateways), and software applications with information inputs sent from the aforementioned devices. Also, the capability to maintain and manage deployed tools will be acquired. This usability will be learnt from the perspective of different profiles: for Administrator User and for Developers.

3.2.2.2 Integration of IoT platforms in AIoTES

The capability for the Integration of IoT platforms in AIoTES refers to the knowledge and ability for developing new bridges and alignments for the inclusion of a new platform in AIoTES. This integration has two parts to provide both syntactic and semantic interoperability. A first stage is the conversion of the platform data format to the ACTIVAGE data format (syntactic translation). And a second stage, the semantic translation among the new platform and ACTIVAGE, that may require the creation of semantic alignments.

3.2.2.3 Installation and configuration of devices in a private environment

Commissioning devices on-site requires installers to have skills in communication with the beneficiaries, and also a set of skills / good practice for the technical execution itself. The technical execution consists in preparing the appropriate tools given the devices to deploy, understanding the privacy data during the installation such as beneficiary identity and coordinates and respecting discretion of this information. Manipulation of deployment tools must be mastered.

3.2.2.4 Initialize / provision IoT devices security's functions

Provisioning a device with security information is a sensitive operation, one of the most delicate as secrets are being generated and manipulated. Deployers shall have the necessary knowledge related to this provisioning, in particular the channel used (in band / out of band) and the underlying security processes such as key generation, key storage, encryption algorithm used by the devices. Examples of attacks during this stage can alert the deployers to make them more vigilant while on-site.

3.2.2.5 Packaging services for deploying in other deployments/marketplaces

Once a service is developed, tested and validated, the next natural step is to extend its usage. For this it is essential to package the service in such a way that it is possible to easily deploy it in some other deployment site. This package not only includes all the technical requirements (such as specific needed software and hardware configurations), it includes, among many others, the actual installation (and removal) procedure, an administrative manual to help the management of the service, a user manual, the service software, the data flows and privacy information which the DPO needs to know. This package can then be distributed to other DSs (see section 3.2.4.5, for deploying packaged services), or published in the AIOTES Marketplace.

3.2.3 Capabilities for application development

3.2.3.1 AIoTES API

The capability associated to the AIoTES API refers to the knowledge of the functionality of this API and its use. AIOTES API is a common API which offers a homogeneous access to the ACTIVAGE features regardless of the configuration or particularities of the application scenario. It enables the interaction between the applications of the Marketplace and the different components to the AIoTES Framework through the APIs of the different components. The most remarkable benefit of the use of the AIoTES API is the potential reuse and exchange of heterogeneous services from the different IoT platforms. Thus, this capability allows application developers to produce new added value services from existing IoT services. Also, it allows third parties to develop new application and services compatible with the ACTIVAGE paradigm and contribute to the creation of the development ecosystem.

3.2.3.2 AIoTES development tools

The AIOTES development tools are offered to the community with the aim of facilitating the inclusion of new (AHA) services into the AIOTES ecosystem. The audience and contributors will have different technical backgrounds and experiences with the technologies embedded into AIOTES. We have identified the following developer profiles:

“Non-technical” developer: (e.g. “protégé” ontology designer) a person with no software development skills but with experience and expertise on applications and/or services (e.g. a set of primary preventive interventions) and curious to explore how such applications or services could be embedded (empowered) within AIOTES.

Junior software developer: a person with basic development skills and a limited experience. This profile might not be familiar with all technologies used in AIOTES (e.g. web, mobile, desktop, backend, front, webservices) but has the background to learn them. He/she would be asked to implement AIOTES-based Proof-of-Concepts (POCs).

Senior software developer: understands that everything in his field involves trade-off and will look for what that is for design patterns, libraries, frameworks, and processes. He/she understands that his/her job is to provide solutions to problems, not writing code. Related to ACTIVAGE AIOTES platform, a senior developer will first evaluate the strengths and weaknesses of the ecosystem prior to intensive developments.

ACTIVAGE DS service developer: ACTIVAGE Deployment Site developer, in the course of the ACTIVAGE project, must develop software components communicating with the AIOTES platform. This person has therefore a knowledge and some experience with AIOTES modules.

ACTIVAGE AIoTES developer: AIoTES has emerged from seven European IoT platforms (FIWARE, IoTivity, OpenIoT, SENIORSOME, SensiNact, universAAL). An ACTIVAGE IoT developer is a person who contributed to the development of one of these seven IoT platforms and contributed to AIoTES development. It is, therefore, someone who knows in detail the architecture and functioning of AIoTES.

3.2.3.3 Application troubleshooting

AIoTES developers need to be able to use the AIoTES support tools, to resolve issues discovered by application developers using the AIoTES APIs, or end-users (DS administrators, deployers, etc.; see also section 3.2.4.4). Through training courses, the AIoTES developers need to become capable of using the Management Toolkit, to performing the following troubleshooting activities:

- View pending issues and tickets, submitted by application developers or end-users
- View information that is necessary for locating or reproducing the issue/bug
- Track and update the status of a ticket (e.g. unassigned, assigned, in progress, resolved)
- Report ticket completion, so that relevant users are notified

3.2.3.4 Integration with other AHA services

When adding, or developing new services, it is important that these services integrate with existing capabilities in the deployment. The easiest way to look at this is through the lens of resource optimization, when adding a new service, the resources this service consumes (like devices, data or processes) may already be available in the deployment, thus it is crucial to be able to recycle or share the resources amongst the different services (this has not only economic implications, it is also beneficial from a management, and user experience perspectives).

Advanced integration is also desirable, as having different services interact with one another not only optimize resources, it also offers high personalization capabilities. For example, when Health monitoring service is properly integrated with home sensor services, both can exchange knowledge like the activity of the user which might explain health measurements; at the end these kinds of integrations drastically improve the care the end user receives.

3.2.4 Capabilities for management

3.2.4.1 DS management

Among the key factors that have been considered for the effective DS management, one is the training of the administrators. The target being to optimization of the whole process of operations' performance.

Training has been considered as a systematic process dynamically adapted to AIoTES system training needs. Proper training programs are planned to be implemented to support effectively administrators in IoT platforms, devices and complex connectivity components' management.

In fact, training is comprised by a set of activities that are mainly targeted to support administrators' conceptual knowledge and skills for a sustainable development of the IoT technologies in the DS. Particularly, supportive tools as training courses and learning educational material will be provided to administrators to empower their expertise and foster their ability to:

- Test and manage effectively IoT technologies in the DS
- Conceptualize new technologies/ services through updated documentation
- Support the optimum delivery of services and information data exchange with minimised risks
- Improve consistency in implementation plans
- Manage control and monitoring issues of the DS activities
- Have a thorough overview of DS features and IoT platforms connectivity
- Support and upgrade data collection process

Moreover, in terms of the effective DS management, technical documentation and additional information will be also provided to administrators to support a strong sense of APIs interfaces and facilitate proper interpretation.

3.2.4.2 User management

The administrator has critical predefined roles and responsibilities in AIoTES system management and DS. Administrators are assigned to create, view, and manage user resources, passwords and reports. To make these tasks more efficient administrators need to be supported also in several key factors that cope with authentication practices and methods for a secure and trusted management of the IoT platforms and their connectivity. Specifically, administrators must be trained to extend their knowledge about:

- Administrative issues: User management that concern permissions, licenses and user authorization
- User management Interfaces: Manage potential external users and their profiles, profiles, interfaces
- User profiles' view and management: View and manage all users, enable additional functionalities
- Access rights' management: configure secure and strong settings in username and password logs

Hence administrators must be supported accordingly to acquire knowledge that will enhance core management capabilities about user and device authentication within the IoT, relevant protocols, authentication in API level for AIoTES management and orchestration.

IoT system administrators must receive an appropriate knowledge level through courses to conceptualize IoT architecture, communication protocols, troubleshooting and finally vulnerability issues that may arise in IoT devices.

3.2.4.3 Maintaining IoT devices operational

Maintaining devices operation requires to have a good understanding on why a device may fail, understanding its pitfall such as radio coverage and interference or early loss of batteries due to heavy data requests. From this knowledge one can improve the design of applications and services to optimize the different devices parameters to prevent faults. One can also develop tools and put in place procedures to supervise a set of many devices to react as soon as a loss is detected.

3.2.4.4 Device and application troubleshooting

Device installers, platform deployers, application installers and application developers need to be able to use the AIoTES support tools interface (Management Toolkit), to report discovered bugs and issues in the use of AIoTES components and interfaces. The reported issues can then be resolved by appropriate AIoTES developers (see section 3.2.3.3). Specifically, installers, deployers and application developers need to can use the Management Toolkit, to perform the following actions:

- Create a ticket related to a discovered issue or bug, and provide all relevant details
- View the current status of tickets created by them (unassigned, assigned, in progress, resolved)
- Know how to view the notifications transmitted to them by the Management Toolkit when a bug is resolved

3.2.4.5 Deploying an application and batch deploying in many deployments

Once a deployment site has selected an application to offer their users, whether it is offered through the marketplace or it is packaged; there is the process of deploying it in the technical infrastructure of the deployment site. Whether it is a software which runs in the cloud or it runs in gateways, it is essential that the deployment team has a clear plan for the deployment, particularly how it will affect multiple users. Deployers must understand the process, the available tools, the context like times when it is best to carry out the procedure, and have testing plans, as well as contingency plans in case something goes wrong, or some tests fail.

3.2.5 Capabilities for device integration

3.2.5.1 Knowledge about the topology of the devices

Depending of the needed to cover for each DS and scenario, we need the knowledge about:

- What kind of devices to use.
- The number of devices.
- Auxiliary devices needed to create the scenario (e.g. gateways)
- Capabilities of connection and interaction and how create the connectivity. (e. g. Protocols supported and allowed)
- Security rules of DS.

3.2.5.2 Knowledge about the devices that are going to be used

The capabilities for device integration in relation with the knowledge, refers to the information for each device of how it can be:

1. Installed in the DS: knowledge about how pair the device in a communication level and security level. Therefore, affect to the own device, intermediate devices like gateways and to the IoT platform.
2. Localization of device in relation with the requirements of coverage for optimal working.
3. Knowledge about how the device put in operation in case of malfunction, (e.g. reset)
4. Knowledge about how use the device in correct form (e.g. medical devices)

3.2.6 Security & Privacy

As discussed in the ACTIVAGE deliverable D5.1, the AIoTES framework consists of four main blocks, among which the Privacy block and the Security block. These blocks require a careful configuration.

Knowledge of the basic parameters of the Privacy block and the Security block is required.

Knowledge of the security management of the AIoTES framework is required.

3.2.6.1 Security aspects

Security is a complex matter. Only recognized professionals can assess its correct implementation and configuration. However, the security is effective if security rules are followed by the system managers and its users, including personnel, nurses, relatives, “patients” and all other stakeholders.

Knowledge of the security rules (e.g. password management, security audit, etc.) by all parties, respective to their role(s) is mandatory.

3.2.6.2 Privacy aspects

Privacy preservation is under the responsibility of the data site owner who stores private data (not only personal data) and provides access to it to third parties. The data collectors, processors and other roles as defined in the GDPR must obey and implement the GDPR rules and obligations. It is a matter of education of the respective managers. They must be capable of handling and meeting the GDPR rules and practices as recommended by the French CNIL (cf. CNIL website and reference documents).

Knowledge of the GDPR is required for the data collectors.

GDPR regulates the collection, usage and management of personal data, including the consent, its expiration, the right to modify the data and for the subject to be forgotten. Other ethical rules may apply depending on the application (medical files for example) and generally, the privacy of the various stakeholders must be preserved under the simple concern of preserving the respective and legitimate interests of all parties. It is in particular true for individuals, associations or business entities, who should usually take care of the security (see above section), the confidentiality of the information, during its collection, storage, processing, disclosure of the results, etc.

Knowledge of the rules for handling medical files and information is required.

3.3 Tables of capabilities per stakeholder

Once the stakeholders involved in the deployment of AIoTES have been defined in section 3.2 and after defining in section 4.2 the ACTIVAGE capabilities needed to use AIoTES, this section aims to provide a clear link between the users and the knowledge and skills that they need to acquire in the training.

As explained, there are capabilities that several users need to know and, therefore, are common. It should be pointed out that to use AIoTES, it is not necessary to understand all the elements and tools that make up the framework. Each user interacts with one or more tools and they are not all the same. Also, depending on the user's profile, he will need more or less knowledge about certain elements. Thereby, each user type will need to incorporate certain capabilities causing the need to create a different kind of training by asking for the type of user it is aimed at. In other words, the ACTIVAGE training program -detailed in section 5.1- must ensure that each stakeholder acquires the set of capabilities needed to perform the actions associated with their role.

Table 22: Capabilities per stakeholder

Stakeholder	Capabilities
Application developer	General knowledge about AIoTES Use of AIoTES API AIoTES development tools

	Application troubleshooting Security / Privacy aspects
Application deployer	General knowledge about AIoTES Use of AIoTES deployment tools Device installation and configuration Application deployment using IoT platform Device troubleshooting Security / Privacy aspects
AIoTES expert	General knowledge about AIoTES AIoTES deployment Integration of IoT platforms in AIoTES Management of DSs (initiation of a new DS, etc.) User management Security / Privacy aspects
AIoTES developer	General knowledge about AIoTES Integration of IoT platforms in AIoTES AIoTES troubleshooting Security / Privacy aspects
DS administrator	General knowledge about AIoTES Use of AIoTES management tools Knowledge about IoT devices localization, peering with the gateway, parameterization and personalization DS management DS troubleshooting Security / Privacy aspects
DS device installer	General knowledge about AIoTES Use of AIoTES management tools Device troubleshooting Security / Privacy aspects
Open call participant	General knowledge about AIoTES Background and expertise in the AHA & IoT domains Security / Privacy aspects
Other third parties involved in development	General knowledge about AIoTES Background and expertise in the AHA & IoT domains AIoTES development tools Security / Privacy aspects

The following chapters 4 and 5, will expose the different tools that are made available for the different stakeholders involved in the integration of AIOTES. These two chapters the purpose and contents of each tools, were and how to get access and the manual to use it.

General information about AIOTES specifications and integration is available through consultative materials: online courses and a wiki which are described in section 4.

Supporting tools during the integration of AIOTES are interactive tools which are described in section 5: a call center about AIOTES, an issue reporting tools and a test framework for on-site validation. The following table summarizes all the tools and access link and useful address to support the AIOTES implementation.

Table 23: Training and support tools and access link

Tools	What	Where link	Who	Need
POLIFORMAT	Training courses creation	https://poliformat.upv.es	ACTIVAGE WP3-4-5 partners “teachers”	ACQUIRING KNOWLEDGE
POLIFORMAT	Training courses attending	https://poliformat.upv.es/portal/directool/4136ab45-e867-4287-ac8e-d5eed63f8307/	Stakeholders involved in AIOTES implementation (DS and open callers)	ACQUIRING KNOWLEDGE
WIKI	General information about AIOTES	https://git.activageproject.eu .	Input given by ACTIVAGE partners WP3-4-5	ACQUIRING KNOWLEDGE
WIKI	General information about AIOTES	https://git.activageproject.eu/Development/Support-Wiki_content/wiki	Stakeholders involved in AIOTES implementation (DS and open callers)	ACQUIRING KNOWLEDGE
Hotline	Open Calls management	opencall@activageproject.eu	Open callers	ASSISTANCE / QUESTIONS
Hotline	PoliformaT user creation and use	training@activageproject.eu	Open callers	ASSISTANCE / QUESTIONS
Hotline	General AIOTES doubts	aiotes@activageproject.eu	Stakeholders involved in AIOTES implementation (DS and open callers)	ASSISTANCE / QUESTIONS
ZOHO Desk	Hotline management tools	https://desk.zoho.eu/support/activageproject/	Stakeholders involved in AIOTES implementation (DS and open callers)	ASSISTANCE / QUESTIONS
OTRS	Ticketing management	http://support.activageproject.eu/otrs/index.pl	AIOTES manager	BUG REPORTING / MODIFICATION REQUEST
OTRS	Ticket submission to notify bugs	http://support.activageproject.eu/otrs/index.pl	Stakeholders involved in AIOTES implementation (DS and open callers)	BUG REPORTING / MODIFICATION REQUEST
SQUASH	Test automation tools	http://test.activageproject.eu/squash	AIOTES WP3-4-5 partners	IOTES components VERIFICATION

4 Consultative supporting materials

Section 4 describes the information about the consultative supporting materials that are made available to the stakeholders involved in the deployment of AIoTES, through an **online training platform** proposing a list of courses (see Poliformat section 4.1.2) and an **online Wiki platform** for general information about AIoTES (see section 4.3).

4.1 Assisted distance learning platform

Due to the training needs in ACTIVAGE addressing many different stakeholders with different competencies has described in 3.3, and from very diverse places in Europe, all the training material will be hosted in an on-line learning platform (LMS). In this way, ACTIVAGE makes it easy for users to access and benefit from the training courses provided.

The LMS chosen is POLIFORMAT, which is hosted by the Universitat Politècnica de València, a member of the ACTIVAGE consortium.

4.1.1 Learning Management System (LMS)

LMS platforms are virtual learning spaces created to facilitate the distance training experience, both for educational institutions and companies. The system allows the creation of «virtual classrooms» where the interaction between tutors and students takes place. This LMS can also do evaluations, exchange files and participate in forums and chats, as well as many other additional tools.

Below are highlighted some of the benefits of LMS platforms

- **Study at any place and time:** This cancels the problem of geographic or temporal distances and offers great freedom in terms of time and pace of learning.
- **Cheap and flexible** way to expand the training.
- **User friendly application:** Great knowledge is not required for its use.
- **Constant updated** learning through the interaction between tutors and students.

The basic components or characteristics of any virtual learning environment, which must also be strongly linked and interconnected, in such a way that they influence each other and provide feedback can be synthesized in the following:

- **Centralization and automation** of learning management.
- **Flexibility:** The platform can be adapted to the study plans of the institution, as well as to the contents and pedagogical style of the organization. It also allows the trainer to organize courses with great ease and speed.
- **Interactivity:** The person becomes the protagonist of their own learning through self-service and self-guided services.
- **Standardization:** This feature allows to use courses made by third parties, personalizing the content and reusing the knowledge.
- **Scalability:** These resources can work with a variable number of users according to the needs of the organization.
- **Functionality:** Features and features that make each platform suitable (functional) according to the requirements and needs of users.
- **Usability:** Ease with which people can use the platform to achieve a specific goal.

- **Ubiquity:** Ability of a platform to generate peace of mind for the user and make him certain that everything he needs will be found in that virtual environment.
- **Integration:** LMS platforms must be able to integrate with other business applications used by human resources and accounting, which allows measuring the impact, efficiency, and above all, the cost of training activities.

Usually, the first argument to be considered when choosing a LMS platform is the cost. Depending on it, the LMS platforms are divided into two main types: LMS platforms under a license and Free GPL LMS platforms open for educational resource. Although the cost is important, there are many other factors involved, so selecting the platform that best suits the needs of the user is not an easy task.

LMS under license

Blackboard stands out among the proprietary systems. Among its main advantages are the possibility for students to learn according to their own style and rhythm and their great flexibility. Blackboard's work philosophy is very ambitious, and its team of developers has set itself the goal of working together with students and trainers to improve.

Open LMS

Sakai is an international community that collaborates to create technology that improves teaching, learning and research. The Management Committee of the Sakai Project is formed by a group of individuals belonging to various institutions (universities, schools, government, hospitals, etc.) that provide the necessary leadership for the good direction of the project.

Moodle is a project directed and coordinated by an Australian organization of 30 developers, which is supported financially by a worldwide network of about 60 companies. The learning platform is designed to provide educators, administrators and students with a unique, robust and secure integrated system to create personalized learning environments. Moodle can be downloaded on the web server itself, presenting the option to request assistance from a Moodle partners. The number of current users of Moodle worldwide, of more than 65 million users, which makes it the most used learning platform in the world.

4.1.2 Training platform: POLIFORMAT (Sakai based)

It has been decided to use the Sakai based POLIFORMAT³ platform for hosting the training courses of ACTIVAGE.

Note, that both the training material and the trainee personal data in this platform are sensitive and should be protected by copyright and personal data protection laws. The UPV and its LMS platform POLIFORMAT comply with the Spanish LOPD ("*Ley Oficial de Protección de Datos*"⁴: *Official Law on Data Protection*) which also complies with the European Legal Framework (GDRP⁵). [LOPD+GDRP]. Moreover, all the physical servers are protected inside a secure building of the university which require access control. At a logical level, the data is firewalled behind the university network security systems.

As explained, Sakai is a community source, educational software platform designed to support teaching, research and collaboration. More importantly the system is distributed

³ <https://poliformat.upv.es>

⁴ http://www.agpd.es/portalwebAGPD/canaldocumentacion/informes_juridicos/reglamento_lopd/index-ides-idphp.php

⁵ <https://gdpr-info.eu>

under the Educational Community License (a type of open source license, similar to GPL) so it can be freely implemented by any organization only by adjuring to their standards. Therefore, it can be modified to accommodate the requirements of each organization. This was the beginning of the POLIFORMAT platform.

Like Sakai, POLIFORMAT organizes the content and tools used in courses *sites*. Typically, a site corresponds to a course or a project. Each site has its own content, tools, users and access rights for users, search tool, usage statistics, etc. In principle, everything in Sakai is done per site. This is what allows Sakai to scale to hundreds of thousands of users.

The tutor has access to the following tools in POLIFORMAT that can be added to the platform dynamically and then be configured to suit the necessary needs:

- Home page (configurable)
- Announcements
- Calendar
- Qualifications
- Chat
- External Web Content
- Internal Web Mail
- Survey
- Shared Folders
- Statistics
- Examinations
- Forums
- Groups Management
- Lessons
- Course Syllabus
- Course Resources
- Course Assignments
- Video explanations
- Videoconference
- Wiki

Next, it is provided a list of recent additional features that POLIFORMAT offers:

- Improved interface and navigation
 - New interface.
 - Improved user experience on any device.
 - New item "Sites" to access your subjects or sites.
 - User profile information menu.
 - New site tools design.
- Site arranges
 - From "Sites" you can easily access all your sites (even the hidden ones), and mark and reorder your favourite sites.
 - The top bar of the main menu shows the sites marked as favourites (to mark a site as a favourite, just click the star next to the name of the site).

- From "My Workspace - Preferences" you can click on "Sites" and hide the ones that you don't want to see.
- Lessons
 - More accessible editing options, appearing now to the right of any element.
 - Now you can add elements anywhere on the page. A "+" button has been added which allows you to add an item directly above the selected one.
 - Back and forward buttons at the bottom of the page.
 - New "Checklists" feature.
 - Sections can be expanded and collapsed.
 - You can add a level of indentation and a custom CSS style in the linked elements (subpages, tasks, exams ...).
- Assignments
 - An email notification can be sent to announce the opening date of an assignment.
 - Peer assessments:
 - The student can add attachments when reviewing assignments from classmates.
 - The tutor has the average grade of the reviews made on an assignment.
- Messages
 - You can establish a specific configuration to grant different permissions in the sending of mails to recipients (permissions to send mails to a single group, to specific users ...).
- Resources
 - News buttons and styles.
 - Access to recycle bin through a button in the top menu.
- Tests & Quizzes
 - New question type: INTERACTIVE IMAGE. It allows interacting with an image by marking zones that are part of the solution.
 - Activity report: detailed information about the student exams and marks.
 - The tutor can attach files for the student when correcting a test.
 - Visual improvements when answering test type questions, shading the option when the mouse pass over.
 - New drop-down panel for the student where he can see the test progress.

4.1.3 POLIFORMAT user manuals

Appendix A includes the PoliformaT user manuals that are going to be delivered to the open callers and Deployment Sites with the objective of facilitating the use of the PoliformaT platform. These manuals will not be accessible online but shared with them by email.

4.2 List of courses

ACTIVAGE will provide a set of courses to provide DSs and open callers with the necessary knowledge to empower them in the use and operation of the ACTIVAGE Ecosystem. The courses will be available in PoliformaT (see section 4.1).

4.2.1 Structure of the courses and timelines

The ACTIVAGE courses are divided into six categories where each of them is composed by several simple courses, that correspond to a capability. The categories are the following:

1. AIoTES basic concepts: includes basic concepts about IoT platforms, AHA and an overall of AIoTES
2. AIoTES Framework: includes information of the components that make up AIoTES
3. DS integration: includes information to facilitate the integration of AIoTES in the DSs
4. Application development: includes information to facilitate the development over AIoTES.
5. Device Integration: includes information to facilitate the integration of specific DSs devices in other DSs.
6. Security & Privacy: includes guidelines on safety and privacy in IoT environments

In more detail, the complete list of courses is the following:

Table 24: ACTIVAGE courses and timelines

Main course	Sub-course	Delivery date
AIoTES basic concepts	Background on IoT & AHA domains	M25
	General knowledge about AIoTES	M25
AIoTES Framework	Semantic Interoperability Layer	M25
	DS Management	M27
	Marketplace	M25
	Development tools	alpha tools information -> M25 beta tools information -> M27 final tools information -> M30
	Deployment tools	alpha tools information -> M25 beta tools information -> M27 final tools information -> M30
	Analytics	M25
DS integration	SIL development	M25
	Installation and configuration of devices in a private environment	M30
	Initialize / provision IoT devices security's functions	M30
	Packaging services for deploying in another deployments/marketplace	M30
	AIoTES deployment and configuration	M25
Application development	AIoTES API	M30
	Application troubleshooting	M25
	Integration with other AHA services	M30
Device integration	Knowledge about the topology of the	M30

	devices	
	Knowledge about the devices that are going to be used	M30
Security & Privacy	Basic concepts regarding security	M30
	Advanced concepts about security	M30
	Basic concepts regarding privacy	M30
	Advanced concepts about privacy	M30

Not all courses will be available from the beginning. As the integration of AIoTES into SD progresses, certain information will be collected and analysed to create courses that, from this feedback, help integration into the ecosystem.

These courses provide students with the capabilities described in section 3.2.

As indicated in the introduction of the present section, the ACTIVAGE training has as target group both, DSs and open callers. However, this is a very general classification and a more exhaustive clarification of the end users is needed. It has been identified the following student profiles:

- Application developer
- Application deployer
- AIoTES expert
- AIoTES developer
- DS administrator
- DS device installer
- Open call participant
- Other third parties involved in development

It must be pointed out that the knowledge that must be acquired by each type of student is different. Consequently, the ACTIVAGE training it is adapted to the characteristics and necessities of each of these collectives. For this purpose, the lessons that each of the groups must attend differs. Hence, each user will receive training to acquire each of the capabilities required for their specific profile.

All students will have access to all lessons, leaving it up to the student to decide if he wants to broaden his knowledge in other areas.

The list of stakeholder courses and their associated capability courses can be seen in the Table 25 below:

Table 25: Courses for specific stakeholders

Stakeholder Course	Capabilities courses included
Application developer	1. AIoTES basic concepts 2. AIoTES Framework 4. Application development 6. Security & Privacy
Application deployer	1. AIoTES basic concepts 2.2.4. Device and application troubleshooting

	<ul style="list-style-type: none"> 3. DS integration 5. Device integration 6. Security & Privacy
AloTES expert	<ul style="list-style-type: none"> 1. AloTES basic concepts 2. AloTES Framework 3. DS integration 4. Application development 6. Security & Privacy
AloTES developer	<ul style="list-style-type: none"> 1. AloTES basic concepts 2. AloTES Framework 6. Security & Privacy
DS administrator	<ul style="list-style-type: none"> 1. AloTES basic concepts 2.2. Management 7. Security & Privacy
DS device installer	<ul style="list-style-type: none"> 1. AloTES basic concepts 2.2.4. Device and application troubleshooting 3. DS integration 5. Device integration 6. Security & Privacy
Open call participant	<ul style="list-style-type: none"> 1. AloTES basic concepts 2. AloTES Framework 3. DS integration 4. Application development 5. Device integration 6. Security & Privacy
Other third parties involved in development	<ul style="list-style-type: none"> 1. AloTES basic concepts 2. AloTES Framework 6. Security & Privacy

The list of courses is summarised below. For your convenience, in the table of content below, you can directly click on the course you are interested in to see its description.

4.2.2.1	AIoTES basic concepts	47
4.2.2.1.1	General knowledge about AIoTES (available: February 2019)	47
4.2.2.1.2	Background and expertise in the AHA & IoT domains (available: April 2019)	48
4.2.2.2	AIoTES Framework	49
4.2.2.2.1	Semantic Interoperability Layer (available: January 2019)	49
4.2.2.2.2	AIoTES Management tool (available: March 2019)	50
4.2.2.2.3	Marketplace (available: January 2019)	51
4.2.2.2.4	Development tools	52
4.2.2.2.4.1	AIoTES SIL Tool (available: January 2019)	52
4.2.2.2.4.1.1	AIoTES IDE (available: January 2019)	53
4.2.2.2.4.1.2	Seservice composer (available: January 2019)	54
4.2.2.2.4.2	ACTIVAGE Ontology Explorer (available: January 2019)	55
4.2.2.2.4.3	Device Semantics Editor (available: January 2019)	55
4.2.2.2.4.4	Service Semantics Editor (available: January 2019)	56
4.2.2.2.4.5	Data Analyser (available: January 2019)	57
4.2.2.2.4.6	Query Translator (available: April 2019)	58
4.2.2.2.4.7	Data Manipulator (available: April 2019)	59
4.2.2.2.4.8	Feature / result viewer (available: July 2019)	60
4.2.2.2.4.9	sensiNact development tools (available: July 2019)	61
4.2.2.2.4.10	Code Generator (available: February 2019)	62
4.2.2.2.4.11	ClickDigital (available: April 2019)	64
4.2.2.2.5	Deployment tools	65
4.2.2.2.5.1	AIoTES Private Docker registry (available: January 2019)	65
4.2.2.2.5.2	AIoTES Docker (available: January 2019)	65
4.2.2.2.5.3	Device Manager (available: April 2019)	66
4.2.2.2.5.4	Semantic auto-discovery platform (available: July 2019)	67
4.2.2.2.5.5	Service Manager (available: July 2019)	68
4.2.2.2.6	Analytics	69
4.2.2.2.6.1	Data Analytics (available: February 2019)	69
4.2.2.2.6.2	Data Lake (available: February 2019)	70
4.2.2.2.6.3	Visual Analytics (available: February 2019)	71
4.2.2.3	DS integration	72
4.2.2.3.1	SIL development (available: January 2019)	72
4.2.2.3.2	AIoTES deployment and configuration (available: January 2019)	73
4.2.2.4	Application development	74
4.2.2.4.1	AIoTES API (available: July 2019)	74
4.2.2.4.2	Application troubleshooting (available: March 2019)	75
4.2.2.4.3	Integration with other AHA services (available: March 2019)	76
4.2.2.5	Device Integration (available: March 2019)	77
4.2.2.6	Security & Privacy	79
4.2.2.6.1	IoT security's functions (available: March 2019)	79

4.2.2 Courses content

4.2.2.1 AIoTES basic concepts

4.2.2.1.1 General knowledge about AIoTES (available: February 2019)

TITLE		General knowledge about AIoTES
AIM OF THE COURSE	To provide a general view of AIoTES and to introduce its basic concepts	
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/	
PREREQUISITE COURSES	N/A	
ASSOCIATED COURSES	<ul style="list-style-type: none"> – Semantic Interoperability Layer – AIoTES Management – DS management – Marketplace – Development tools – Deployment tools – Analytics – Security & Privacy 	
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction 2. AIoTES architecture 3. Interoperability use cases 4. AIoTES implementation 5. Technical details AIoTES architecture 6. Interoperability use cases 7. AIoTES implementation 8. Technical details 	
DESCRIPTION OF THE COURSE	This course provides basic information about the AIoTES framework.	
MATERIALS PROVIDED	Videos, tests	
SKILLS ACQUIRED	Basic knowledge about AIoTES	
POTENTIAL USERS	All users	
DURATION OF THE COURSE	15 min	

4.2.2.1.2 Background and expertise in the AHA & IoT domains (available: April 2019)

TITLE		Background and expertise in the AHA & IoT domains
AIM OF THE COURSE	This course aims to highlight the AHA and IoT technologies from an added value and market viability perspectives, it aims also to open new horizons for IoT and AHA usecases, technologies and trends.	
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/	
PREREQUISITE COURSES	Basic knowledge in relation with AHA, smart home or IoT technologies.	
ASSOCIATED COURSES	The IoT lectures for the Technical university in Darmstadt-Germany	
STRUCTURE OF THE COURSE	Introduction - AHA usecases and technologies - IoT usecases and related technologies – Design thinking: co-creation, problem based, added value & impact oriented IoT technologies – Trends and potentials	
DESCRIPTION OF THE COURSE	AHA and IoT technologies have been always individually seen and treated from a technical level. This course aims to open new scope for the technologies provides, through introducing new aspects to be taken in consideration, mainly user centric, co-creation and market viability.	
MATERIALS PROVIDED	PDF slides and Pitches.	
SKILLS ACQUIRED	User centric thinking and added value thinking strategy	
POTENTIAL USERS	IoT technology provides,	
DURATION OF THE COURSE	2 hours	

4.2.2.2 AIoTES Framework

4.2.2.2.1 Semantic Interoperability Layer (available: January 2019)

TITLE		Semantic Interoperability Layer
AIM OF THE COURSE	To have an overall understanding on how the Semantic Interoperability Layer works.	
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/	
PREREQUISITE COURSES	<p>Mandatory: Background on IoT & AHA (skills that can be acquired through the course 'Background and expertise in the AHA & IoT domains')</p> <p>Recommended: General knowledge about AIoTES (course)</p>	
ASSOCIATED COURSES	<ul style="list-style-type: none"> – AIoTES framework – SIL development 	
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction to the Semantic Interoperability Layer 2. Semantic Interoperability Layer description 3. Role in ACTIVAGE 4. Components of the Semantic Interoperability Layer <ol style="list-style-type: none"> 4.1. Interoperability Layer 4.2. SIL API 5. SIL messages <p>Final Examination</p>	
DESCRIPTION OF THE COURSE	<p>This course introduces the AIoTES component Semantic Interoperability Layer, which is responsible of providing interoperability within ACTIVAGE (across AIoTES and the Deployment Sites, and allowing to build platform-independent applications on top of AIoTES). Along the course the complex concepts of syntactic and semantic interoperability and the interoperability needs in ACTIVAGE are explained. Also, the way on which those needs are solved by means of the use of the SIL, how the SIL internally works, its internal components, the API methods that expose and the type of messaging that employs. Finally, a final test is provided for self-assessment on the acquired skills, and a guide for the deployment of a SIL instance.</p>	
MATERIALS PROVIDED	<ul style="list-style-type: none"> – Introductory Video – Explicative documents – Tests – SIL deployment guide 	

SKILLS ACQUIRED	Understanding of concepts of interoperability, differences between semantic and syntactic interoperability, needs of interoperability among the DS IoT platforms and ACTIVAGE, basic knowledge on this AIoTES component, role and function, basic knowledge on deployments, extensions for different platforms, and use of the SIL API
POTENTIAL USERS	All ACTIVAGE users require this course in their training
DURATION OF THE COURSE	5 hours

4.2.2.2.2 AIoTES Management tool (available: March 2019)

TITLE		AIoTES Management tool
AIM OF THE COURSE	The course aims to learn how to use the AIoTES management tool and all of its features: monitoring of resources, technical KPI real time and historical values; as well as the management of users and IoT platform.	
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/	
PREREQUISITE COURSES	Mandatory: None, Recommended: General knowledge about AIoTES	
ASSOCIATED COURSES	None	
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. General presentation of the AIoTES management tool 2. Simple user features 3. Administrator features 	
DESCRIPTION OF THE COURSE	<p>The AIoTES management component provides a unique and common access to technical key performance indicators. The aim of this single-entry point for KPI is to make it possible to gather all KPI from the nine ACTIVAGE deployment sites in order to compute global European ACTIVAGE KPI current value and history. By giving access to a dedicated public API to ACTIVAGE KPI history and current value, it is possible to display current performance status of the ACTIVAGE project and also show the evolution of this performance during the project time</p> <p>The course is mainly a tutorial to learn how to use the AIoTES management tool.</p>	

MATERIALS PROVIDED	Documentation and tutorial
SKILLS ACQUIRED	For simple users: How to use the online IAOTES management tool to monitor technical KPIs coming for registered IoT platforms. For AIOTES management tool administrators: How to register users and IoT platforms
POTENTIAL USERS	AIOTES users, application deployers, stakeholders in deployment sites, AIOTES developers, platform developers, European commission, public
DURATION OF THE COURSE	2h

4.2.2.3 Marketplace (available: January 2019)

TITLE	Marketplace
AIM OF THE COURSE	To allow Marketplace users understand the platform's concepts and its use, enabling them to search, discover, buy, download and provide feedback. Also, to allow AIOTES developers provide, monetize, maintain and receive feedback over the Marketplace.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	Mandatory: None, Recommended: Development Tools, Deployment Tools
ASSOCIATED COURSES	None
STRUCTURE OF THE COURSE	1. About the ACTIVAGE Marketplace 2. ACTIVAGE Marketplace Tutorials
DESCRIPTION OF THE COURSE	The ACTIVAGE Marketplace is a one-stop-shop for providing, discovering and deploying applications built on AIOTES. As such, it is a high-level deployment tool, very close to end-users. Specifically, it is intended for applications users and developers alike. The added value of the ACTIVAGE Marketplace is to provide a uniform portal for all platforms, those that already offer one and those who do not, with all functionality needed to fully exploit applications. Crossing the boundaries of the platforms, developers and users can take advantage of cross-site application deployment reaching new

	<p>audiences and solving problems with existing solutions.</p> <p>This course provides the necessary material for users and developers to benefit from all capabilities offered by the ACTIVAGE Marketplace platform.</p>
MATERIALS PROVIDED	Documentation and Tutorials
SKILLS ACQUIRED	Using the online Marketplace platform to search, discover, download, buy, sell, provide and receive feedback for AIoTES applications.
POTENTIAL USERS	AIoTES users, application deployers, stakeholders in deployment sites, AIoTES developers, platform developers.
DURATION OF THE COURSE	5 hours

4.2.2.2.4 Development tools

4.2.2.2.4.1 AIoTES SIL Tool (available: January 2019)

TITLE	AIoTES SIL Tool
AIM OF THE COURSE	To present the SIL tool and how to use it.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	General knowledge about AIoTES Semantic Interoperability Layer
ASSOCIATED COURSES	None
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Presentation of the tool 2. Objective and functionality of the tool 3. Guided mode 1. Advanced mode
DESCRIPTION OF THE COURSE	This course shows which is the functionality and advantages that can be obtained through the use of the AIoTES SIL tool, a development tool that provides support and guidance to open callers, DSs and application developers in the first steps on the use of the SIL. In particular, SIL tool provides support in the creation of subscriptions to

	SIL data. Along the course, the 2 modes of use of this tool (guided and advanced) are explained.
MATERIALS PROVIDED	<ul style="list-style-type: none"> • Slide deck
SKILLS ACQUIRED	Learn to use the SIL
POTENTIAL USERS	Application developer, ALoTES expert, ALoTES developer and open call participant
DURATION OF THE COURSE	30 minutes / 1 hour

4.2.2.2.4.1.1 ALoTES IDE (available: January 2019)

AIOTES IDE	
TITLE	AIOTES IDE
AIM OF THE COURSE	To present the ALoTES IDE and how to use it.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	General knowledge about ALoTES ALoTES Framework
ASSOCIATED COURSES	Development tools
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Presentation of the tool 2. ALoTES Integrated Development Environment 3. Service Composer IDE – Wizard 4. ClickDigital IDE – Wizard 5. Code Generator Tool Wizard 2. 6. Code Templates Wizard
DESCRIPTION OF THE COURSE	This course explains how to use and take advantage of the ALoTES IDE-Wizard tool, which represents an Integrated Development Environment for ALoTES that encompasses 4 independent ALoTES development tools (ClickDigital, Service Composer, Code Generator and Code Templates) and at the same time provides a wizard that guides developers with the use of such tools.

MATERIALS PROVIDED	<ul style="list-style-type: none"> Slide deck
SKILLS ACQUIRED	Learn to use the AIoTES IDE as well as the deployment tools
POTENTIAL USERS	Application developer, AIoTES expert, AIoTES developer and open call participant
DURATION OF THE COURSE	30 minutes

4.2.2.2.4.1.2 *Seservice composer (available: January 2019)*

TITLE	Service composer
AIM OF THE COURSE	To present the Service composer and how to use it.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	General knowledge about AIoTES AIoTES Framework
ASSOCIATED COURSES	AIOTES IDE
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> Description <ol style="list-style-type: none"> 1.1 Description and functionalities 1.2 Node-RED 1.3 Service Composition Use <ol style="list-style-type: none"> 2.1 Service Composer
DESCRIPTION OF THE COURSE	The course explains what is the Service Composition and how to use it.
MATERIALS PROVIDED	<ul style="list-style-type: none"> Slide deck
SKILLS ACQUIRED	Learn to use the Service Composer.
POTENTIAL USERS	Application developer, AIoTES expert, AIoTES developer and open

	call participant
DURATION OF THE COURSE	1h

4.2.2.2.4.2 *ACTIVAGE Ontology Explorer (available: January 2019)*

TITLE	ACTIVAGE Ontology
AIM OF THE COURSE	By the end of the course, the user will be able to use the application and navigate through the Activage SIL Ontologies.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	Due to the fact that the Activage Ontology Explorer is an application for visualizing the SIL Activage Ontologies, a prerequisite is the knowledge of Ontologies.
ASSOCIATED COURSES	
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 3. Introduction 4. Activage Ontology Explorer video 5. Slides
DESCRIPTION OF THE COURSE	This course presents the Activage Ontology Explorer tool, its purpose, its supported functionalities and a guide of how to properly use it
MATERIALS PROVIDED	<ul style="list-style-type: none"> • A video that demonstrates how to use the application. • Slides that explain the purpose of the tool and list the supported functionalities of the application.
SKILLS ACQUIRED	Knowledge of how to use the application
POTENTIAL USERS	Application developers, other third parties involved in development
DURATION OF THE COURSE	10-15 minutes

4.2.2.2.4.3 *Device Semantics Editor (available: January 2019)*

TITLE	Device Semantics Editor
AIM OF THE	By the end of the course, the user will be able to use the application

COURSE	and easily manage the semantics related to the ACTIVAGE devices.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	The Device Semantics Editor is an application for editing/specifying the semantics associated with the devices of the SIL Ontology, thus it is essential the users to have a basic understanding of Ontologies in general. Moreover, a good understanding of the Activage SIL Ontology is needed.
ASSOCIATED COURSES	Activage Ontology Explorer
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction 2. Device Semantics Editor video 3. Slides
DESCRIPTION OF THE COURSE	This course presents the Device Semantics Editor, its purpose, its supported functionalities and a guide of how to properly use it.
MATERIALS PROVIDED	<ul style="list-style-type: none"> • A video that demonstrates how to use the application. • Slides that explain the purpose of the tool, list the supported functionalities of the application and provide a step-by-step guidance of using these functionalities.
SKILLS ACQUIRED	Knowledge of how to use the application
POTENTIAL USERS	Application developers, other third parties involved in development
DURATION OF THE COURSE	10-12 minutes

4.2.2.2.4.4 *Service Semantics Editor (available: January 2019)*

TITLE	Service Semantics Editor
AIM OF THE COURSE	By the end of the course, the user will be able to use the application and easily manage the semantics related to the ACTIVAGE services.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE	The Service Semantics Editor is an application for editing/specifying

COURSES	the semantics associated with the operation of a specific service or application, thus it is essential the users to have a basic understanding of Ontologies. Moreover, a good understanding of the Activage SIL Ontology is needed.
ASSOCIATED COURSES	Activage Ontology Explorer
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction 2. Service Semantics Editor video 3. Slides
DESCRIPTION OF THE COURSE	This course presents the Service Semantics Editor, its purpose, its supported functionalities and a guide of how to properly use it.
MATERIALS PROVIDED	<ul style="list-style-type: none"> • A video that demonstrates how to use the application. • Slides that explain the purpose of the tool, list the supported functionalities of the application and provide a step-by-step guidance of using these functionalities.
SKILLS ACQUIRED	Knowledge of how to use the application
POTENTIAL USERS	Application developers, other third parties involved in development
DURATION OF THE COURSE	10-12 minutes

4.2.2.2.4.5 Data Analyser (available: January 2019)

TITLE	Data Analyser
AIM OF THE COURSE	By the end of the course, the user will be able to use the application to perform common data analysis tasks.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	<p>The Data analyser tool is used to analyze data using the AIOTES data analytics services. Knowledge of the AIOTES data analytics methods is a prerequisite, as well as a knowledge of the Data Lake.</p> <p>Prerequisite courses:</p> <ul style="list-style-type: none"> • AIoTES Framework/Analytics/Data Analytics

	<ul style="list-style-type: none"> • AloTES Framework/Analytics/Data Lake.
ASSOCIATED COURSES	<ul style="list-style-type: none"> • AloTES Framework/Analytics/Data Analytics • AloTES Framework/Analytics/Data Lake
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction 2. Slides 3. Usage example videos <ol style="list-style-type: none"> 3.1. Local Outlier Factor anomaly detection 3.2. Histogram feature extraction 3.3. Summary statistics
DESCRIPTION OF THE COURSE	This course presents the Data analyser tool, its purpose, its supported functionalities and a guide of how to properly use it.
MATERIALS PROVIDED	<ul style="list-style-type: none"> • Slides that explain the purpose of the tool and list the supported functionalities of the application. • Video examples that demonstrate how to perform some of the most basic data analysis tasks supported by the application
SKILLS ACQUIRED	Knowledge of how to use the application.
POTENTIAL USERS	Application developers, DS administrators, open call participants, other third parties involved in development
DURATION OF THE COURSE	20 minutes

4.2.2.2.4.6 Query Translator (available: April 2019)

TITLE	Query Translator
AIM OF THE COURSE	By the end of the course, the user will be able to use the application and perform example query translations.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	<p>The Query translator tool is used to translate queries written towards the ACTIVAGE data model into the corresponding API calls directed to the IoT platforms. It depends on the SIL to perform the translation, so a knowledge of the SIL is a prerequisite.</p> <p>Prerequisite courses:</p>

	AIoTES Framework/Semantic Interoperability Layer
ASSOCIATED COURSES	AIoTES Framework/Semantic Interoperability Layer
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction 2. Query translator video 3. Slides
DESCRIPTION OF THE COURSE	This course presents the Query translator tool, its purpose, its supported functionalities and a guide of how to properly use it.
MATERIALS PROVIDED	<ul style="list-style-type: none"> • A video that demonstrates how to use the application. • Slides that explain the purpose of the tool and list the supported functionalities of the application.
SKILLS ACQUIRED	Knowledge of how to use the application.
POTENTIAL USERS	Application developers, other third parties involved in development
DURATION OF THE COURSE	15 minutes

4.2.2.2.4.7 Data Manipulator (available: April 2019)

TITLE	Data Manipulator
AIM OF THE COURSE	By the end of the course, the user will be able to use the application to perform basic data manipulation and preprocessing.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	<p>The Data manipulator tool is used to preprocess data (such as cleaning, computation of composite attributes, etc.) before performing a data analytics or visualization method. It supports queries towards the Data Lake, so a high-level knowledge of the AIoTES Data Lake is a prerequisite.</p> <p>Prerequisite courses:</p> <p>AIoTES Framework/Analytics/Data Lake</p>
ASSOCIATED COURSES	<ul style="list-style-type: none"> • AIoTES Framework/Analytics/Data Lake • AIoTES Framework/Analytics/Data Analytics

STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction 2. Data manipulator video 3. Slides
DESCRIPTION OF THE COURSE	This course presents the Data manipulator tool, its purpose, its supported functionalities and a guide of how to properly use it.
MATERIALS PROVIDED	<ul style="list-style-type: none"> • A video that demonstrates how to use the application. • Slides that explain the purpose of the tool and list the supported functionalities of the application. Sample data for manipulation.
SKILLS ACQUIRED	Knowledge of how to use the application.
POTENTIAL USERS	Application developers, DS administrators, open call participants, other third parties involved in development
DURATION OF THE COURSE	15 minutes

4.2.2.2.4.8 Feature / result viewer (available: July 2019)

TITLE	Feature / result viewer
AIM OF THE COURSE	By the end of the course, the user will be able to use the application to visually display analysis results.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	<p>The Feature/result viewer tool is used to visually display the results of an analysis using common data visualization methods. A knowledge of the AIoTES data analytics methods and of the data analyzer tool is a prerequisite.</p> <p>Prerequisite courses:</p> <ul style="list-style-type: none"> • AIoTES Framework/Analytics/Data Analytics • AIoTES Framework/Development tools/Data Analyser
ASSOCIATED COURSES	<ul style="list-style-type: none"> • AIoTES Framework/Analytics/Data Analytics • AIoTES Framework/Development tools/Data Analyser <p>AIoTES Framework/Analytics/Visual Analytics</p>

STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction 2. Feature/result viewer video 3. Slides
DESCRIPTION OF THE COURSE	This course presents the Feature/result viewer tool, its purpose, its supported functionalities and a guide of how to properly use it.
MATERIALS PROVIDED	<ul style="list-style-type: none"> • A video that demonstrates how to use the application. • Slides that explain the purpose of the tool and list the supported functionalities of the application. Sample analysis results for visualization.
SKILLS ACQUIRED	Knowledge of how to use the application.
POTENTIAL USERS	Application developers, DS administrators, open call participants, other third parties involved in development
DURATION OF THE COURSE	15 minutes

4.2.2.2.4.9 *sensiNact development tools (available: July 2019)*

TITLE	sensiNact development tools
AIM OF THE COURSE	The course aims to discover and to learn how to use all sensiNact development tools available in general (out of the ACTIVAGE project) and those that are dedicated to the ACTIVAGE project.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	<p>Mandatory: knowledge about java code</p> <p>Recommended: General knowledge about AIoTES</p>
ASSOCIATED COURSES	None
STRUCTURE OF THE COURSE	<p>Introduction / general presentation of sensiNact</p> <p>The sensiNact generic development tools</p> <ul style="list-style-type: none"> - sensiNact documentation and wiki - sensiNact API doc and swagger - sensiNact source code public access

	<ul style="list-style-type: none"> - sensiNact tutorial and sample source code - sensiNact studio <p>The sensiNact ACTIVAGE dedicated development tools</p> <ul style="list-style-type: none"> - sensiNact ACTIVAGE documentation - sensiNact ACTIVAGE (AHA) API doc and swagger <p>sensiNact ACTIVAGE sample source code</p>				
DESCRIPTION OF THE COURSE	<p>Eclipse sensiNact is a IoT platform that aims at creating a common environment in which heterogeneous devices can exchange information and interact among each other in the IoT world.</p> <p>Eclipse sensiNact is composed of two tools, sensiNact Gateway aiming at integrating devices and aggregating data from various sources and sensiNact Studio aiming at interacting with the sensiNact Gateway to visualize the devices and the data.</p> <p>As a generic IoT platform, Eclipse sensiNact provides general documentation and tutorial. The first part of the course describes these sensiNact generic development tools.</p> <p>As ACTIVAGE IoT platform, sensiNact is deployed in a DS (DS6). The second part of the course describes the developments tools that have been created for the ACTIVAGE project needs.</p>				
MATERIALS PROVIDED	Wiki, documentation and tutorials				
SKILLS ACQUIRED	<p>The acquired skills are:</p> <ul style="list-style-type: none"> - knowledge about the sensiNact IoT platform - ready to use the generic and ACTIVAGE sensiNact API - ready to implement sensiNact southbound bridges - ready to use the sensiNact studio 				
POTENTIAL USERS	<table border="1"> <tr> <td>Application developer</td> <td>develops over AIoTES framework</td> </tr> <tr> <td>AIoTES developer</td> <td>develops AIoTES bridges</td> </tr> </table>	Application developer	develops over AIoTES framework	AIoTES developer	develops AIoTES bridges
Application developer	develops over AIoTES framework				
AIoTES developer	develops AIoTES bridges				
DURATION OF THE COURSE	2h				

4.2.2.2.4.10 Code Generator (available: February 2019)

TITLE	Code Generator
AIM OF THE	Learn how to use the Code generator tool, in its different forms, and

COURSE	how to extend the tool with custom template systems.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	<ul style="list-style-type: none"> [External] Semantics, ontologies, RDF, OWL.
ASSOCIATED COURSES	None
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> The Code Generation Introduction The Protege plugin <ol style="list-style-type: none"> Instalation Usage The Maven Plugin <ol style="list-style-type: none"> Goal & configuration Usage & embedding in the development workflow The REST Service <ol style="list-style-type: none"> Installation Usage Developing Template systems <ol style="list-style-type: none"> The XML Coordinator The Velocity Template Language OWLAPI Variables, and other tricks.
DESCRIPTION OF THE COURSE	<p>The course will showcase the use of the code generator tool, how to effectively use it, and how to extend it.</p> <p>The code generation tool enables the generation of code using a template system dictating how to generate code from the given ontologies. The output, depending on the template system, can be SQL code, API descriptors, full operational code in any language, or code stubs to be completed.</p>
MATERIALS PROVIDED	<ul style="list-style-type: none"> Videos, wikis.
SKILLS ACQUIRED	Usage of code generation tool, identifying when it is effective to use ontological models to generate any other text-based collection of files,

	VTL programming language, OWLAPI java OWL library.
POTENTIAL USERS	Service developers, tool developers, integrators, IoT Developers, Knowledge engineers.
DURATION OF THE COURSE	3 hours

4.2.2.4.11 ClickDigital (available: April 2019)

TITLE	ClickDigital
AIM OF THE COURSE	This course aims to introduce ClickDigital IDE from a practice level. It aims to familiarize the audience about the added value and the usage of ClickDigital
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	AIOTES
ASSOCIATED COURSES	AIOTES
STRUCTURE OF THE COURSE	ClickDigital definition - Demostration – Usage guidelines
DESCRIPTION OF THE COURSE	ClickDigital aims to ease and enable a visual based programming of IoT solution. This course will demonstrate the best way for exploiting clickDigital to visually develop smart IoT application and offer them for their client.
MATERIALS PROVIDED	PDF-Videos
SKILLS ACQUIRED	IT Skills.
POTENTIAL USERS	IoT Technology provides
DURATION OF THE COURSE	2 hours

4.2.2.2.5 Deployment tools

4.2.2.2.5.1 AIoTES Private Docker registry (available: January 2019)

TITLE		AIoTES Private Docker registry
AIM OF THE COURSE	Explain what is the ACTIVAGE Docker registry and how to use it to deploy AIoTES.	
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/	
PREREQUISITE COURSES	General knowledge about AIoTES AIoTES Framework	
ASSOCIATED COURSES	AIoTES Docker <ul style="list-style-type: none"> • AIoTES deployment and configuration 	
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. ACTIVAGE Docker registry 2. Use <ol style="list-style-type: none"> 2.1 Login 2.2 Pushing a Docker image 2.3 Pulling a published image 	
DESCRIPTION OF THE COURSE	The course explain what is the ACTIVAGE Docker registry and how to use it to be able to deploy AIoTES.	
MATERIALS PROVIDED	Slide deck	
SKILLS ACQUIRED	To be able to deploy and run AIoTES.	
POTENTIAL USERS	AIoTES expert, AIoTES developer and open call participant	
DURATION OF THE COURSE	1h	

4.2.2.2.5.2 AIoTES Docker (available: January 2019)

TITLE		AIoTES Docker
AIM OF THE COURSE	Explain how to run AIoTES on Docker.	

POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	General knowledge about AIoTES AIoTES Framework
ASSOCIATED COURSES	AIOTES Private Docker registry <ul style="list-style-type: none"> • AIoTES deployment and configuration
STRUCTURE OF THE COURSE	1. Docker 2. AIoTES Docker 3. AIoTES Docker deployment
DESCRIPTION OF THE COURSE	This course explains what Docker is, what the AIoTES Docker is and how to deploy it.
MATERIALS PROVIDED	Slide deck
SKILLS ACQUIRED	To be able to deploy and run AIoTES.
POTENTIAL USERS	AIoTES expert, AIoTES developer and open call participant
DURATION OF THE COURSE	1h

4.2.2.2.5.3 Device Manager (available: April 2019)

TITLE	Device Manager
AIM OF THE COURSE	By the end of the course, the user will be able to use the application and manage existing or registering new IoT devices into the AIOTES.
POLIFORMAT	
PREREQUISITE COURSES	Due to the fact that the Device Manager is an application for managing existing or registering new IoT devices into the AIOTES, it is essential the users to have an understanding of the semantics related to the Activage devices.
ASSOCIATED COURSES	<ul style="list-style-type: none"> • Activage Ontology Explorer • Device Semantics Editor

STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction 2. Device Manager video 3. Slides
DESCRIPTION OF THE COURSE	This course presents the Device Manager tool, its purpose, its supported functionalities and a guide of how to properly use it.
MATERIALS PROVIDED	A video that demonstrates how to use the application. Slides that explain the purpose of the tool, list the supported functionalities of the application and provide a step-by-step guidance of using these functionalities.
SKILLS ACQUIRED	Knowledge of how to use the application
POTENTIAL USERS	Application deployers
DURATION OF THE COURSE	15 minutes

4.2.2.2.5.4 *Semantic auto-discovery platform (available: July 2019)*

TITLE	Semantic auto-discovery platform
AIM OF THE COURSE	By the end of the course, the user will be able to use the application and formulate semantic queries in order to discover devices or services with desired functionalities and characteristics.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	The Semantic auto-discovery platform is an application for discovering AIoTES components (devices and services) that meet certain semantically-specified criteria. That means that it is essential the users to have a basic understanding of Ontologies and of the semantics related to the Activage services and devices.
ASSOCIATED COURSES	<ul style="list-style-type: none"> • Activage Ontology Explorer • Device Manager • Service Manager
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction 2. Semantic auto-discovery platform video

	3. Slides
DESCRIPTION OF THE COURSE	This course presents the Semantic auto-discovery platform, its purpose, its supported functionalities and a guide of how to properly use it.
MATERIALS PROVIDED	<ul style="list-style-type: none"> • A video that demonstrates how to use the application. • Slides that explain the purpose of the tool, list the supported functionalities of the application and provide a step-by-step guidance of using these functionalities.
SKILLS ACQUIRED	Knowledge of how to use the application and search for devices/services semantically.
POTENTIAL USERS	Application deployers
DURATION OF THE COURSE	15 minutes

4.2.2.2.5.5 Service Manager (available: July 2019)

TITLE	Service Manager
AIM OF THE COURSE	By the end of the course, the user will be able to use the application and manage existing or registering new services into the AIoTES.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	Due to the fact that the Service Manager is an application for managing existing or registering new services into the AIoTES, it is essential the users to have an understanding of the semantics related to the Activage services.
ASSOCIATED COURSES	<ul style="list-style-type: none"> • Activage Ontology Explorer • Service Semantics Editor
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction 2. Service Manager video 3. Slides
DESCRIPTION OF THE COURSE	This course presents the Service Manager tool, its purpose, its supported functionalities and a guide of how to properly use it.
MATERIALS	A video that demonstrates how to use the application. Slides that

PROVIDED	explain the purpose of the tool, list the supported functionalities of the application and provide a step-by-step guidance of using these functionalities.
SKILLS ACQUIRED	Knowledge of how to use the application
POTENTIAL USERS	Application deployers
DURATION OF THE COURSE	15 minutes

4.2.2.2.6 Analytics

4.2.2.2.6.1 Data Analytics (available: February 2019)

TITLE	Data Analytics
AIM OF THE COURSE	By the end of the course, the user will have an overview of the data analytics methods supported in AIOTES and will be able to use the data analytics API to perform common data analytics operations.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	<p>The AIOTES data analytics services offer means to analyze the collected raw data and extract meaningful insights from them. They cover aspects such as feature extraction, classification, clustering and time-series prediction. The data analytics methods are quite generic in nature, so the course can be followed even without previous knowledge of the AIOTES architecture. However, some methods make use of the Data Lake's Metadata Storage, so a high-level knowledge of the Data Lake is a prerequisite for them.</p> <p>Prerequisite courses:</p> <p>AIoTES Framework/Analytics/Data Lake</p>
ASSOCIATED COURSES	<ul style="list-style-type: none"> • AIoTES Framework/Analytics/Data Lake • AIoTES Framework/Analytics/Visual Analytics
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction 2. Data analytics methods and API slides
DESCRIPTION OF THE COURSE	This course presents the AIOTES Data Analytics services and API.
MATERIALS PROVIDED	Slides that explain the supported data analytics methods and the

	AIoTES API.
SKILLS ACQUIRED	Knowledge about the data analytics methods and of how to use the data analytics API.
POTENTIAL USERS	Application developers, DS administrators, open call participants, other third parties involved in development
DURATION OF THE COURSE	1 hour

4.2.2.2.6.2 Data Lake (available: February 2019)

TITLE	Data Lake
AIM OF THE COURSE	By the end of the course, the user will have gained knowledge about the AIoTES Data Lake and its functionalities and will be able to use the Data Lake API to perform basic operations.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	<p>The Data Lake is one of the core components of the AIoTES, architecturally lying above the Semantic Interoperability Layer. The Data Lake provides three basic functionalities: (a) The Data Integration Engine, for submitting queries to the ACTIVAGE data model and retrieving integrated results from the IoT platforms, through the SIL, (b) The Analytics Metadata Storage, which stores models and metadata computed through training analytics methods, and (c) Raw data storage for IoT platforms not having their own. Prerequisites for the course include a high-level knowledge of the SIL and the overall AIoTES architecture.</p> <p>Prerequisite courses:</p> <ul style="list-style-type: none"> • AIoTES basic concepts/General knowledge about AIoTES • AIoTES Framework/Semantic Interoperability Layer).
ASSOCIATED COURSES	<ul style="list-style-type: none"> • AIoTES basic concepts/General knowledge about AIoTES • AIoTES Framework/Semantic Interoperability Layer • AIoTES Framework/Analytics/Data Analytics
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction 2. Data Lake components and API slides
DESCRIPTION	This course presents the AIoTES Data Lake platform, its components

OF THE COURSE	and its supported functionalities and API.
MATERIALS PROVIDED	Slides that explain the components and functionalities of the Data Lake and API.
SKILLS ACQUIRED	Knowledge about the Data Lake functionalities and of how to use its API.
POTENTIAL USERS	Application developers, DS administrators, open call participants, other third parties involved in development
DURATION OF THE COURSE	30 minutes

4.2.2.2.6.3 Visual Analytics (available: February 2019)

TITLE	Visual Analytics
AIM OF THE COURSE	By the end of the course, the user will have an overview of the visual analytics methods included in AIOTES and will be able to use the visual analytics API.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	The AIOTES visual analytics services and components offer means to visualize the collected raw data or the results of analyses, in order to visually explore the available data and extract useful insights. Visual analytics make use of common types of charts, such as line charts, bar charts and scatterplots, as well as more sophisticated types of charts, such as graph-based ones. The visual analytics methods are quite generic in nature, so the course can be followed even without previous knowledge of the AIOTES architecture.
ASSOCIATED COURSES	<ul style="list-style-type: none"> • AIoTES Framework/Analytics/Data Lake • AIoTES Framework/Analytics/Data Analytics
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction 2. Visual analytics methods and API slides
DESCRIPTION OF THE COURSE	This course presents the AIOTES Visual Analytics components and associated API.
MATERIALS PROVIDED	Slides that explain the supported visual analytics components and the Visual Analytics API.
SKILLS ACQUIRED	Knowledge about the AIOTES visual analytics components and of

	how to use the visual analytics API.
POTENTIAL USERS	Application developers, DS administrators, open call participants, other third parties involved in development
DURATION OF THE COURSE	1 hour

4.2.2.3 DS integration

4.2.2.3.1 SIL development (available: January 2019)

TITLE	SIL development
AIM OF THE COURSE	To provide the necessary knowledge to be able to connect new platforms to the SIL.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	General knowledge about AIoTES Semantic Interoperability Layer
ASSOCIATED COURSES	AIoTES API
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. SIL development (introduction of new IoT platforms) <ol style="list-style-type: none"> 1.1. Bridge development 1.2. Alignment development 2. Testing <ol style="list-style-type: none"> 2.1. Unitary tests 2.2. Integration tests <p>Full testing environment</p>
DESCRIPTION OF THE COURSE	This course provides the necessary information to connect new IoT platforms to the SIL. This includes basic knowledge about syntactic and semantic interoperability and how this is achieved in the SIL, how to develop new bridges and alignments and the different types of tests that can be performed to verify their functionality.
MATERIALS PROVIDED	Video, slides, text, tests
SKILLS ACQUIRED	Knowledge about the functions and structure of the bridges, basic knowledge about syntactic and semantic translation, basic knowledge about bridge and alignment testing.

POTENTIAL USERS	AIoTES developer, AIoTES expert
DURATION OF THE COURSE	5 hours

4.2.2.3.2 AIoTES deployment and configuration (available: January 2019)

TITLE		AIoTES deployment and configuration
AIM OF THE COURSE	Explain how to deploy and configure AIoTES	
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/	
PREREQUISITE COURSES	General knowledge about AIoTES AIoTES Framework	
ASSOCIATED COURSES	AIoTES Private Docker registry AIoTES Docker	
STRUCTURE OF THE COURSE	<ol style="list-style-type: none"> 1. Introduction <ol style="list-style-type: none"> 1.1 Docker 1.2 Docker Compose 2 AIoTES deployment tools 3. AIoTES Docker deployment 	
DESCRIPTION OF THE COURSE	The courses explain the difference between Docker and Docker Compose and how to use it along with the AIoTES deployment tool to deploy AIoTES.	
MATERIALS PROVIDED	Slide deck. Documentation.	
SKILLS ACQUIRED	Be able to deploy and run AIoTES.	
POTENTIAL USERS	Application developer AIoTES expert, AIoTES developer and open call participant	
DURATION OF THE COURSE	2h	

4.2.2.4 Application development

4.2.2.4.1 AIoTES API (available: July 2019)

TITLE		AIoTES API
AIM OF THE COURSE		To provide a general reference for the use of the AIoTES API
POLIFORMAT		https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES		General knowledge about AIoTES Semantic Interoperability Layer AIoTES Management Marketplace Development tools Deployment tools Analytics Security & Privacy
AIM OF THE COURSE		Device and gateway securization module using secure element STM (ST SAFE)
POLIFORMAT		Physical workshop (not possible in poliformat ?)
PREREQUISITE COURSES		Knowledge about embedded devices: electronic architecture, firmware programming , bootloader and embedded Linux. NDA signed with STMicroelectronics
ASSOCIATED COURSES		None
STRUCTURE OF THE COURSE		Introduction to security context (common attack template, risk management) ST SAFE TMP architecture TMP implementation on using Raspberry Pi as example (Bootloader and LINUX) TPM usage for system developer

DESCRIPTION OF THE COURSE	The goal of this course is to present a way to secure a embedded device using a secure element. At first common, knowledge will be presented about the risk and attacks for which the secure element is a counter measure. Then, the basic functions and architecture of the ST SAFE TPM will be presented followed by a sample implementation on a Raspberry PI performing measured boot with U-Boot and integrity measurements with the Linux Kernel. In conclusion, application level usage will be presented with functions such as storing sensitive information or using PKCS11 interfaces along integrity validation.
MATERIALS PROVIDED	Raspberry PI with ST SAFE TPM enabled
SKILLS ACQUIRED	Using TPM functions at different levels of an integrated system (bootloader, OS, application)
POTENTIAL USERS	System integrators
DURATION OF THE COURSE	3 hours

4.2.2.4.2 Application troubleshooting (available: March 2019)

TITLE	Application troubleshooting
AIM OF THE COURSE	Presenting the ticketing tool used to report issues regarding AIOTES
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	General knowledge about AIOTES
ASSOCIATED COURSES	
STRUCTURE OF THE COURSE	General presentation about the OTRS platform
DESCRIPTION OF THE COURSE	Presentation of the OTRS tool with issue tracking, issue management and issue reporting
MATERIALS PROVIDED	Access to the platform OTRS tutorial

SKILLS ACQUIRED	
POTENTIAL USERS	All AIOTES users
DURATION OF THE COURSE	1h

4.2.2.4.3 Integration with other AHA services (available: March 2019)

TITLE	Application troubleshooting
AIM OF THE COURSE	The students will be able to complete their knowledge of use cases where AIOTES can be useful to integrate full AHA services, understand full Deployment, take the most advantage of advanced AIoTES features and learn other exotic integration strategies.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	AIOTES Basics, AIOTES Framework, AIOTES API, AIoTES Data analytics
ASSOCIATED COURSES	AIOTES API Application Troubleshooting
STRUCTURE OF THE COURSE	Classification of AHA services Integration Strategies in AIOTES Mapping Integration Strategies to AHA services Using IoT together with AHA services, Extracting knowledge, Using Semantical features, Using Services, Dataflows and workflows.
DESCRIPTION OF THE COURSE	This course will help students to identify other AHA services that are not covered in other AIOTES Courses, as well as discover other possibilities for integration and how to apply them to these AHA services.
MATERIALS PROVIDED	Theoretical Text and slides, Video lessons, self-evaluated exercises.

SKILLS ACQUIRED	Proficiency in AIoTES integration strategies
POTENTIAL USERS	Application Developers
DURATION OF THE COURSE	5 hours

4.2.2.5 Device Integration (available: March 2019)

TITLE	Device Integration
AIM OF THE COURSE	The goals of the course are bringing knowledge about the topology of the devices and the devices that are going to be used. The course allows install and use devices in AIoTES LEVEL and therefore in the selected Deployment Sites (DS) oriented to share information.
POLIFORMAT	https://poliformat.upv.es/portal/directtool/4136ab45-e867-4287-ac8e-d5eed63f8307/
PREREQUISITE COURSES	To make the correct integration of devices in AIoTES is necessary to obtain knowledge about the basic concepts of AIoTES including AIoTES Framework and the integration of the DS to use. Therefore, the courses that you must carry out are: <ul style="list-style-type: none"> • AIoTES basic concepts • AIoTES Framework • DS integration, selecting the DS where you will work.
ASSOCIATED COURSES	N/A
STRUCTURE OF THE COURSE	The structure of the course is divided in two main parts, one related with the related to install and use every device in each DS and another part related with AIoTES but for device level. In the first part every DS will include all information needed in relation with the install and use of every device and also the rules of security needed, therefore the main structure for each DS will be the next: <ul style="list-style-type: none"> o Physical installation, including rules of security and privacy of the specific DS. o Logical installation, including rules of security and privacy of the specific DS. o Steps to do in case of malfunction.

	<ul style="list-style-type: none"> o Correct use of device (specially in medical devices). o Specific requirements of each platform. <p>The second part related with AIoTES but a device level, and in this case the structure of that part is related whit all information about the operations for use the device in AIoTES level and also the application of the security needed, taking in to account all tools that can help in this task, therefore the main structure for that part will be the next:</p> <ul style="list-style-type: none"> o Logical installation in AIoTES. o Security to include at AIoTES. <p>Tools which facilitate the installation and use of devices.</p>
<p>MATERIALS PROVIDED</p>	<p>The material provided consists in some operation manual and if necessary additional videos can be created.</p>
<p>SKILLS ACQUIRED</p>	<p>The skills acquired after the completion the course are the capabilities to understand the topology for each DS for device level but including the necessary elements (like gateways, platforms specifications, etc.) to understand the topology.</p> <p>Also, the capabilities related to install and use every device in each DS will be acquired. These capabilities include:</p> <ul style="list-style-type: none"> o Operations of physical installation, preparing in appropriate manner the deploy, like localization of device in relation with the requirements of coverage for optimal working. o Operations of logical installation. o Knowledge about how the device put in operation in case of malfunction, (e.g. reset) o Knowledge about how use the device in correct form. o Security to include in the device, gateway and platform to ensure the correct operation of the device (security rules in DS level), understanding the privacy data during the installation and execution and provisioning a device ready to send/ receive sensitive information. o Specific requirements of each platform like use the tokens for example. <p>Naturally, the capabilities related with AIoTES but for device level will be acquired, these are:</p>

	<ul style="list-style-type: none"> o Operation of logical installation in AIoTES. o Security to include at AIoTES level to allow the use of the device. Namely the acknowledge about the rules of security in AIoTES related to devices. o Tools which facilitate semantic discovery of already registered devices, that provides the capability to record and discover sensors and actuators, as part of the infrastructure elements (such as servers or gateways). 												
POTENTIAL USERS	<p>The potential users of the courses of device integration are showed in the next table:</p> <table border="1"> <tr> <td>Application developer</td> <td>develops over AIoTES framework</td> </tr> <tr> <td>AIoTES developer</td> <td>develops AIoTES bridges</td> </tr> <tr> <td>DS administrator</td> <td>manages the DS, including users, platforms, and devices</td> </tr> <tr> <td>DS device installer</td> <td>manages the devices of a DS</td> </tr> <tr> <td>open call participant</td> <td>individuals, local authorities, service providers, associations, organizations and businesses. Invited third parties interested to get involved in specific tasks that will be carried out with the ultimate goal to expand ACTIVAGE use cases and apply experiments of new cities</td> </tr> <tr> <td>other third parties involved in development</td> <td>IoT or service suppliers interested in evaluating ACTIVAGE ecosystem (GROW and SUSTAIN phases)</td> </tr> </table>	Application developer	develops over AIoTES framework	AIoTES developer	develops AIoTES bridges	DS administrator	manages the DS, including users, platforms, and devices	DS device installer	manages the devices of a DS	open call participant	individuals, local authorities, service providers, associations, organizations and businesses. Invited third parties interested to get involved in specific tasks that will be carried out with the ultimate goal to expand ACTIVAGE use cases and apply experiments of new cities	other third parties involved in development	IoT or service suppliers interested in evaluating ACTIVAGE ecosystem (GROW and SUSTAIN phases)
Application developer	develops over AIoTES framework												
AIoTES developer	develops AIoTES bridges												
DS administrator	manages the DS, including users, platforms, and devices												
DS device installer	manages the devices of a DS												
open call participant	individuals, local authorities, service providers, associations, organizations and businesses. Invited third parties interested to get involved in specific tasks that will be carried out with the ultimate goal to expand ACTIVAGE use cases and apply experiments of new cities												
other third parties involved in development	IoT or service suppliers interested in evaluating ACTIVAGE ecosystem (GROW and SUSTAIN phases)												
DURATION OF THE COURSE	Taking in to account that the associated courses have been made, the estimation is about two days in the AIoTES part and one day for the part related with each DS.												

4.2.2.6 Security & Privacy

4.2.2.6.1 IoT security's functions (available: March 2019)

IoT security's functions	
AIM OF THE COURSE	Device and gateway securization module using secure element STM (ST SAFE)
POLIFORMAT	Physical workshop (not possible in poliformat ?)
PREREQUISITE COURSES	Knowledge about embedded devices: electronic architecture, firmware programing, bootloader and embedded Linux.

	NDA signed with STMicroelectronics
ASSOCIATED COURSES	None
STRUCTURE OF THE COURSE	<p>Introduction to security context (common attack template, risk management)</p> <p>ST SAFE TPM architecture</p> <p>TPM implementation on using Raspberry Pi as example (Bootloader and LINUX)</p> <p>TPM usage for system developer</p>
DESCRIPTION OF THE COURSE	<p>The goal of this course is to present a way to secure a embedded device using a secure element. At first common, knowledge will be presented about the risk and attacks for which the secure element is a counter measure. Then, the basic functions and architecture of the ST SAFE TPM will be presented followed by a sample implementation on a Raspberry PI performing measured boot with U-Boot and integrity measurements with the Linux Kernel. In conclusion, application level usage will be presented with functions such as storing sensitive information or using PKCS11 interfaces along integrity validation.</p>
MATERIALS PROVIDED	Raspberry PI with ST SAFE TPM enabled
SKILLS ACQUIRED	Using TPM functions at different levels of an integrated system (bootloader, OS, application)
POTENTIAL USERS	System integrators
DURATION OF THE COURSE	3 hours

4.3 Wiki

The ACTIVAGE wiki is the collection of collaborative contributions made by the ACTIVAGE partners in order to provide technical documentation about the ACTIVAGE project, the ACTIVAGE IoT Ecosystem Suite (AIOTES) and the ACTIVAGE deployment sites.

4.3.1 Infrastructure

The ACTIVAGE wiki is today located in the GIT Gogs installed in the UPV cloud at <https://git.activageproject.eu>.

A direct public access to the ACTIVAGE wiki is available using this link: https://git.activageproject.eu/Development/Support-Wiki_content/wiki

4.3.2 Contents

A table of content is provided in the wiki. See Figure 3: ACTIVAGE wiki table of content below:

ACTIVAGE at a glance

Table of contents

- 1. [ACTIVAGE at a glance](#)
 - i. [What is AIOTES](#)
 - i. [Architecture](#)
 - ii. [IoT platforms](#)
 - iii. [Use Cases and Examples](#)
 - iv. [How to integrate your solution with AIOTES?](#)
 - i. [Data Model](#)
 - ii. [Semantic Interoperability Layer](#)
 - iii. [Tools](#)
 - iv. [Security and Privacy](#)
 - v. [Information package and software components available](#)
 - ii. [Deployment sites at a glance](#)
- 2. [ACTIVAGE full documentation](#)

What is AIOTES?

Architecture

ACTIVAGE has defined a reference architecture for IoT Platforms Interoperability. This face the interoperability in a universal way with the objective of serving as common fra solutions that can be deployed, extended and replicated at Deployment Sites across E

Figure 3: ACTIVAGE wiki table of content

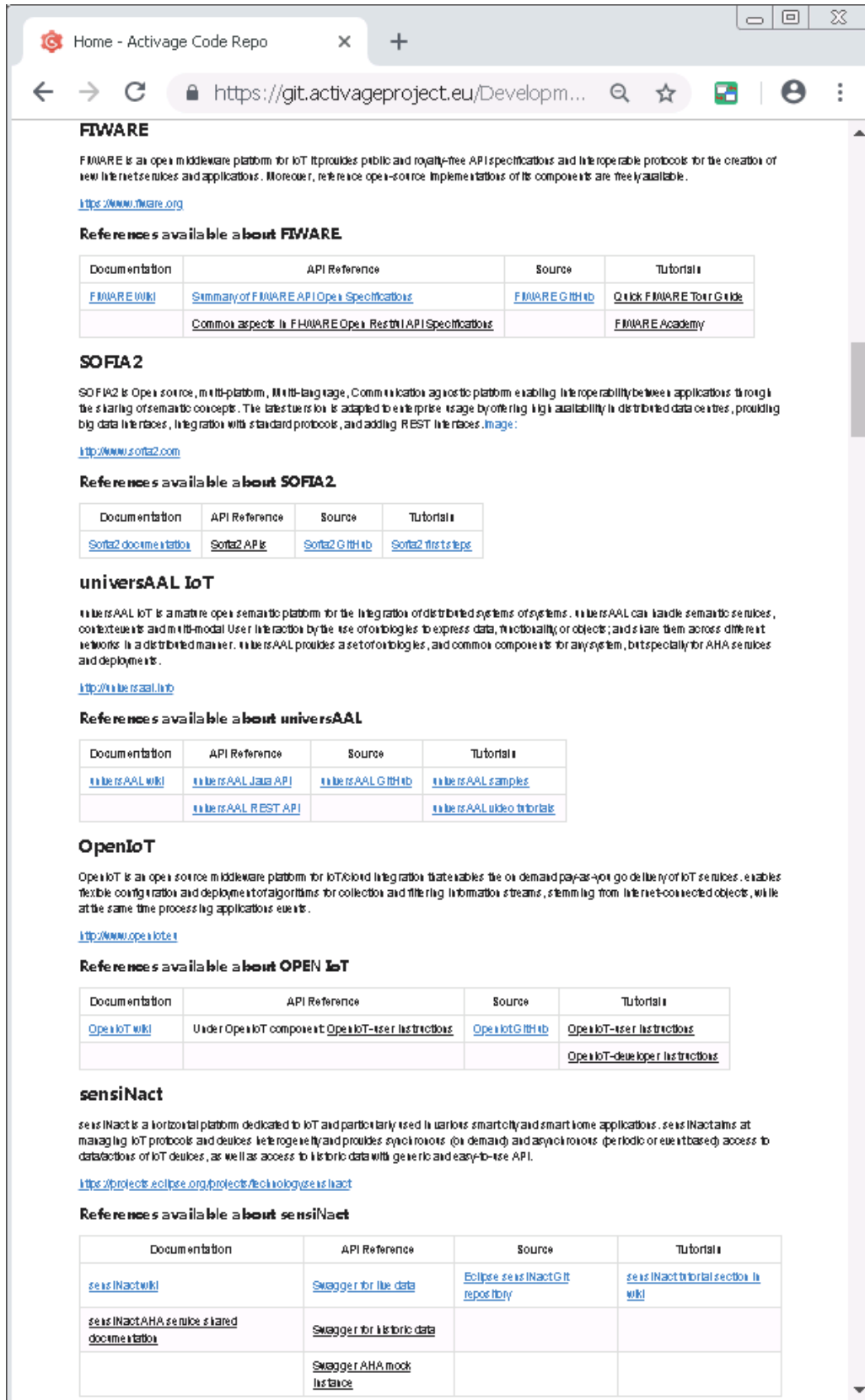
The content of the ACTIVAGE wiki is dedicated to users searching for technical documentation in order to contribute to the ACTIVAGE project.

The first step of a contribution to ACTIVAGE project is always done in a specific Deployment Site. For this first technical step, the wiki introduces the seven ACTIVAGE IoT platforms and where they are deployed among the 9 ACTIVAGE Deployment Sites.

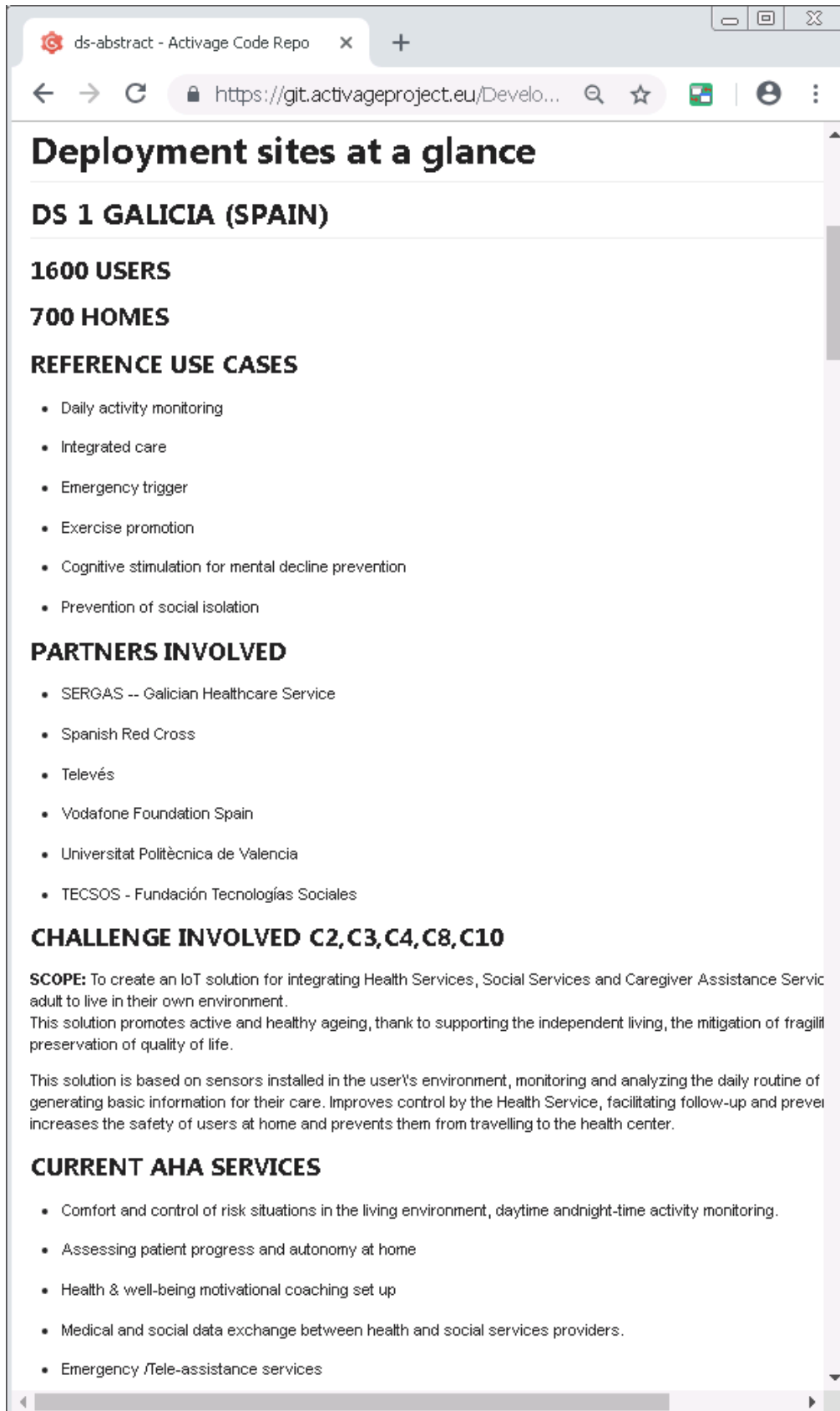
DS	universAAL	SOFIA2	OPENIOT	FIWARE	sensiNact	SENIORSOME	IoTivity
DS1 GAL		deployed					
DS2 VLC	deployed			deployed			

DS	universAAL	SOFIA2	OPENIOT	FIWARE	sensiNact	SENIORSOME	IoTivity
DS3 MAD	deployed						
DS4 RER				deployed			
DS5 GRC	deployed			deployed			
DS6 GNB					deployed		
DS7 WOQ	deployed						
DS8 UK							deployed
DS9 FIN						deployed	

The wiki provides links to the IoT platforms specific documentation and dedicated wiki pages.



The wiki introduces also some information about the Deployment Sites.



The screenshot shows a web browser window with the following content:

Deployment sites at a glance

DS 1 GALICIA (SPAIN)

1600 USERS

700 HOMES

REFERENCE USE CASES

- Daily activity monitoring
- Integrated care
- Emergency trigger
- Exercise promotion
- Cognitive stimulation for mental decline prevention
- Prevention of social isolation

PARTNERS INVOLVED

- SERGAS -- Galician Healthcare Service
- Spanish Red Cross
- Televés
- Vodafone Foundation Spain
- Universitat Politècnica de Valencia
- TECSOS - Fundación Tecnologías Sociales

CHALLENGE INVOLVED C2, C3, C4, C8, C10

SCOPE: To create an IoT solution for integrating Health Services, Social Services and Caregiver Assistance Service adult to live in their own environment.

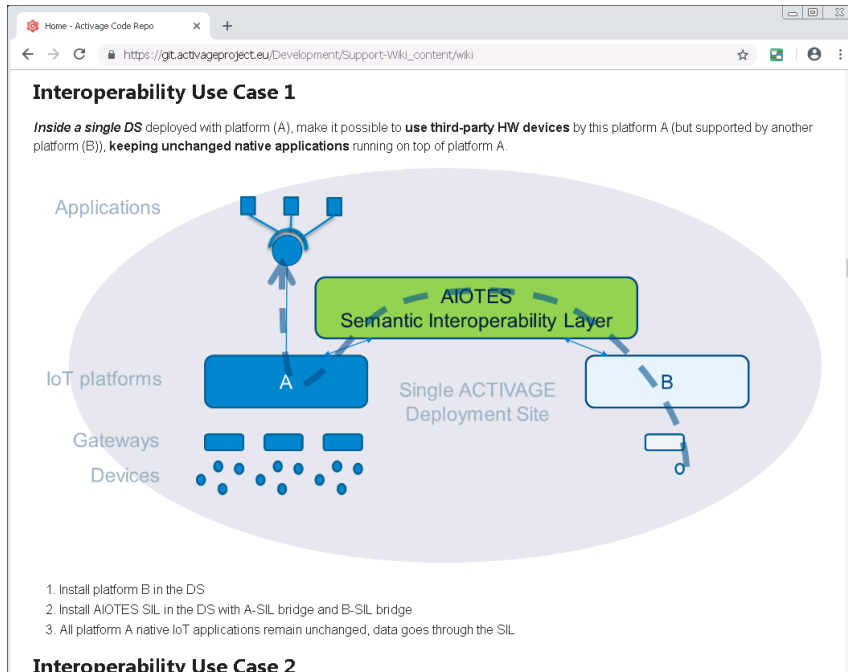
This solution promotes active and healthy ageing, thank to supporting the independent living, the mitigation of fragility preservation of quality of life.

This solution is based on sensors installed in the user's environment, monitoring and analyzing the daily routine of generating basic information for their care. Improves control by the Health Service, facilitating follow-up and prevent increases the safety of users at home and prevents them from travelling to the health center.

CURRENT AHA SERVICES

- Comfort and control of risk situations in the living environment, daytime and night-time activity monitoring.
- Assessing patient progress and autonomy at home
- Health & well-being motivational coaching set up
- Medical and social data exchange between health and social services providers.
- Emergency /Tele-assistance services

The second step is to use AIOTES to make the contribution interoperable in any other ACTIVAGE Deployment Sites. The wiki explains what interoperability use cases are supported through AIOTES, and how to integrate a solution with AIOTES to make it interoperable.



The wiki is the entry point to all tools provided by AIOTES to help users in development tasks (development tools) and in deployment actions (deployment tools)

Summary of ACTIVAGE tools to be offered

Category	Sub-category	Tool name	Technical details
ACTIVAGE Developer tools	Semantic Interoperability Layer tools	AIOTES SIL tool	JAVA application, its deployment depends on the AIOTES Docker tool
		ACTIVAGE ontology explorer	Web application, no need to install anything locally
		Device semantics editor	Web application, no need to install anything locally
		Service semantics editor	Web application, no need to install anything locally
	Data Lake tools	ACTIVAGE data model workbench	Web application, no need to install anything locally
		Metadata storage explorer	Web application, no need to install anything locally
		Data / visual analytics tools	Data analyser
	Integrated Development Environment (IDE)	AIOTES IDE	an installable software package for multiplatform workstations.
		Code generator	Will be provided as plugin for the IDE, as well as Protégé, and Maven
		Service composer	Will be provided as plugin for the IDE, and as a web service
ClickDigital IDE		Will be provided as plugin for the IDE	
ACTIVAGE Deployment tools	Support	Wiki pages	
	AIOTES docker	Will be provided as a script extending the docker system	
	Component configuration	Web and REST application, no need to install anything locally	

Furthermore, the wiki gives describes the general architecture of AIOTES, and give details on security and privacy services included inside AIOTES.

5 Interactive supporting tools

In addition to the consultative tools presented in section 0, ACTIVAGE partners also provides **Interactive support** through a **bug/issue reporting/fixing tool** (section 5.1) as well as general “**call center**” (section 5.2).

5.1 Management toolkit specifications

The Management Toolkit offers deployment management and troubleshooting functionalities to the administrators of DSs and the developers of applications within the AIOTES ecosystem.

The architecture of the Management toolkit is depicted in Figure 4. There are two main components:

- the deployment management component, and
- the issue tracking component.

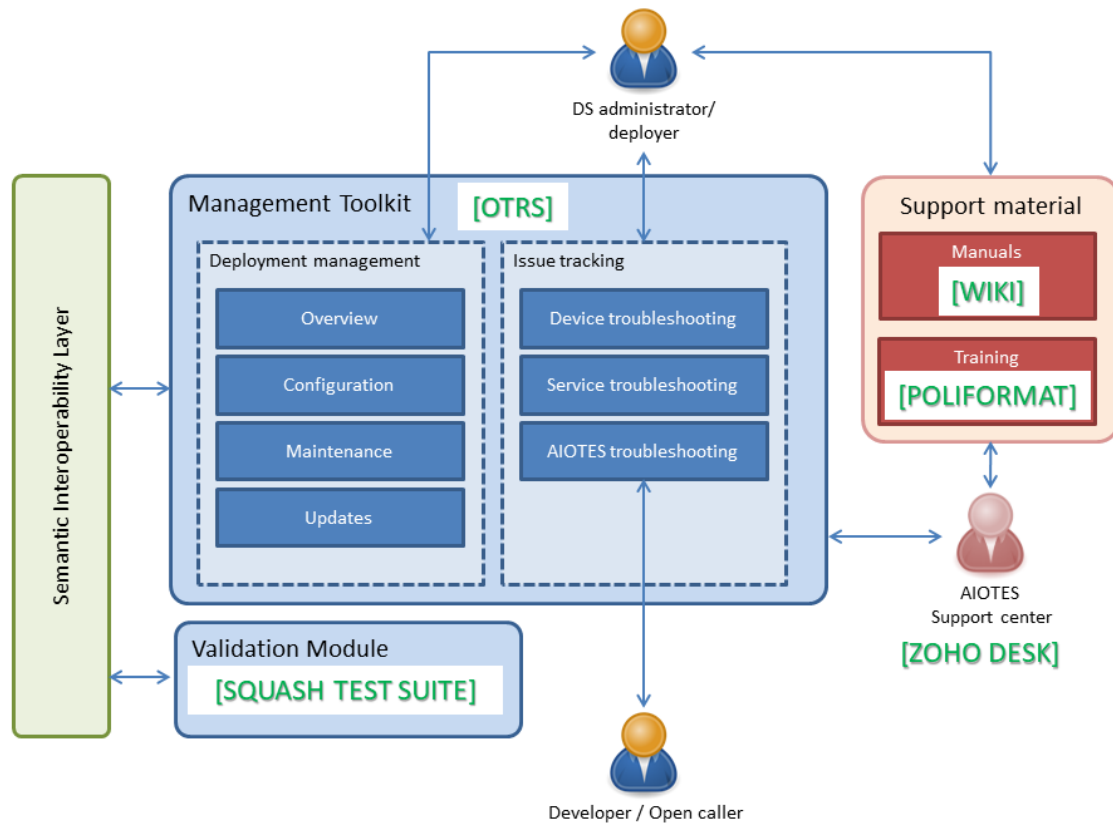


Figure 4: Architecture of the Support tools (wiki, poliformat, Zoho Desk, OTRS, Squash Test Suite).

5.1.1 AIoTES support tool

The AIoTES support tool is meant to provide a way for AIoTES users and maintainers to report feedback about not only issues but also possible improvements. These expected stakeholders are, regarding to the Table 1 :

- Application developer: to report issues or to suggest improvements

- AIoTES expert: to supervise support and issues management
- AIoTES developer: to troubleshoot and provide solutions for reported issues
- open call participant: to report issues or to suggest improvements

5.1.1.1 Issue tracking

The **issue tracking component** offers functionalities for troubleshooting hardware and software components of a DS. The Management Toolkit offers an issue tracking system, through which the users of the system (DS administrators, deployers, application developers) can report issues and bugs discovered, in order for them to be resolved by the responsible parties. Troubleshooting involves the following categories:

- **Device troubleshooting:** When an administrator or deployer discovers a malfunction in the operation of a device (e.g. the device stops sending data), they can report the malfunction, specifying the exact device and location within the DS.
- **Service troubleshooting:** When an administrator or deployer discovers a malfunction in the operation of an application installed in a DS (e.g. a software crash), they can report the malfunction, specifying the exact service and its installation location within the DS.
- **AIoTES troubleshooting:** When an application developer, discovers a malfunction in the operations offered by the AIoTES itself (e.g. the Semantic Interoperability Layer is not responding, the Data Lake returns empty data, or a data analytics service returns unexpected results), he/she can report the malfunction, specifying the exact component and service within the AIoTES.

Whenever a malfunction is reported, whether it is a device, application or AIoTES malfunction, a new ticket is created in the issue tracking system, which is then processed by the ACTIVAGE support centre. The support centre is responsible for handling the malfunction and contacting the responsible parties (municipality officers, installers, application developers, AIoTES developers) for its resolution.

The Management Toolkit is accompanied by support material, which can be consulted by the end-users at any time, to facilitate training and provide troubleshooting for common problems. The support material consists of user manuals, wikis, video tutorials, as well as training courses and programs defined in section 3 and 4 of this document.

5.1.1.2 Support Process specifications

The AIoTES Support process is divided into six steps as illustrated in Figure 5, on which some may have several occurrences.

5.1.1.2.1 Creation of a ticket

For every issue suspicion, a user can create a ticket onto the support platform. All user as described in Table 1 shall have this possibility as long as they are authenticated onto the platform.

For its creating, each ticket shall have the mandatory following attributes:

- Date of observation of the issue
- Module concerned (detailed in section 5.1.1.3)
- Version of the module
- Environment in which the issue happened

- Comment regarding on how to reproduce the issue
- Category of the ticket (incident / problem / question / feature request)

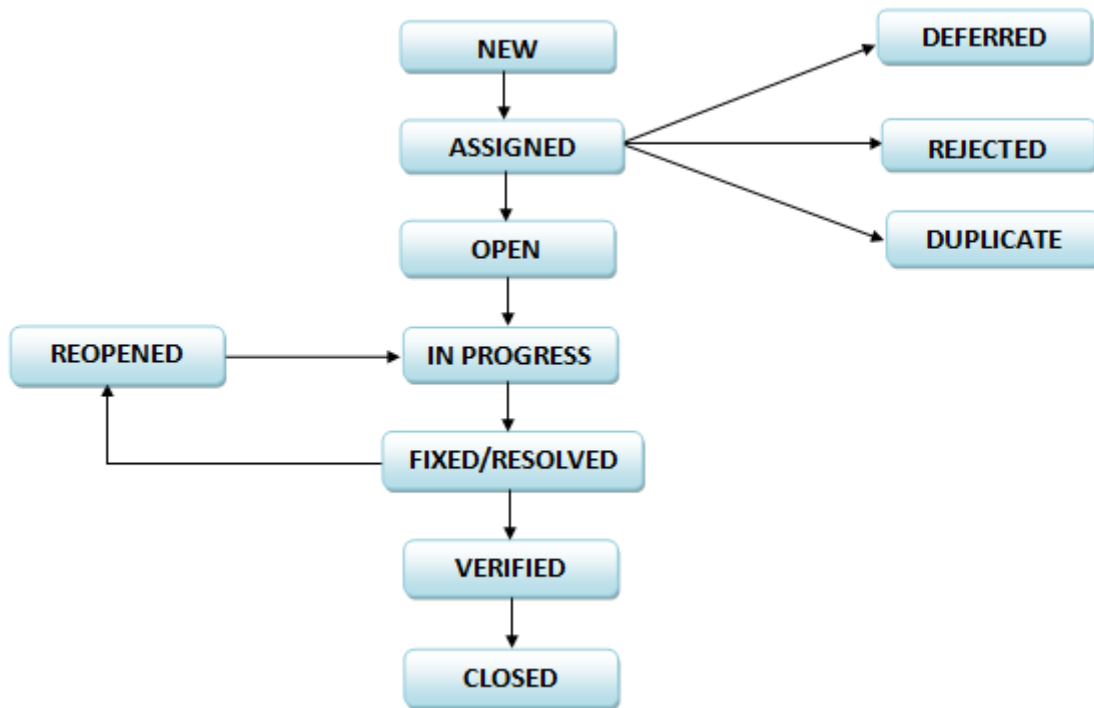


Figure 5: Issue management lifecycle

5.1.1.2.2 Assignment of a ticket

Once a ticket has been created by a user, it must be assigned. It can be done manually by the author of the ticket in a predefined list or it can be made automatically given the concerned module.

A ticket shall have the ability to be reassigned anytime depending on how the ticket is evolving thru diagnosis and troubleshooting. At every reassignment, a justification shall be provided to inform the original author of the ticket.

5.1.1.2.3 Evolution of a ticket

Troubleshooting an issue is an iterative process, especially in complex architecture such as IoT topologies. Use cases described in subsection 2.3.1 shows the necessity of numerous interaction on the path to solving an issue.

At any time of the support process, comments and technical data such as pictures or snapshots shall be added.

5.1.1.2.4 Rejection of a ticket

An assignee of the ticket can, after investigation, rejecting the ticket. Doing so, he **MUST** provide justification to inform the author of the ticket.

Indeed, even thou the ticket may not be legitimate as an issue from AIoTES, the fact that it has been created is a sign which shall not be ignored and reported. It may be a precursor to a misunderstanding of a function or a misunderstanding of the scope of operation of a component that is not clear enough.

5.1.1.2.5 Closing ticket

The ticket may be closed at any time by either the author or the assignee. A justification shall be provided at the closure. Such justification be the solving of the issue or it can result onto a suggestion for improvement in following versions of the components. The author can refuse the closure of a ticket with comments.

5.1.1.2.6 Reporting

This part of the process is out of the ticket lifecycle. It regards the reporting of the support statistics as part of KPI productions. Given WP6 ongoing work, KPI to report are about support effectiveness and can be gathered onto the three following categories:

Table 26: List of KPI produces by the support tool

KPI	Criteria	Target
Resolution rate	Ratio of solved issues per total issues	90%
Responsiveness	Ratio of assigned issues	100%
	Average time of first response	1 hour during business hours
Accessibility	To be defined with WP6	To be defined with WP6

5.1.1.3 Components covered by support

The first components to be covered by the support platform are those developed within the ACTIVAGE project, described in D5.1.

AIoTES components, with AIoTES Experts and developers stakeholder mainly involved:

- Interoperability layer
- IPSM (Inter Platform Semantic mediator)
- Data lake
- Data analytics
- Visual analytics
- AIoTES management
- Security
- Privacy

AIoTES interfaces, for services providers and other technical stakeholders

- AIoTES API
- Core API
- Data analytics API
- Visual analytics GUI
- Data lake API
- Management API

Further components may be added in future versions.

5.1.1.4 Support platform implementation

The platform for the AIoTES support tool is OTRS. It has been chosen upon the following criteria:

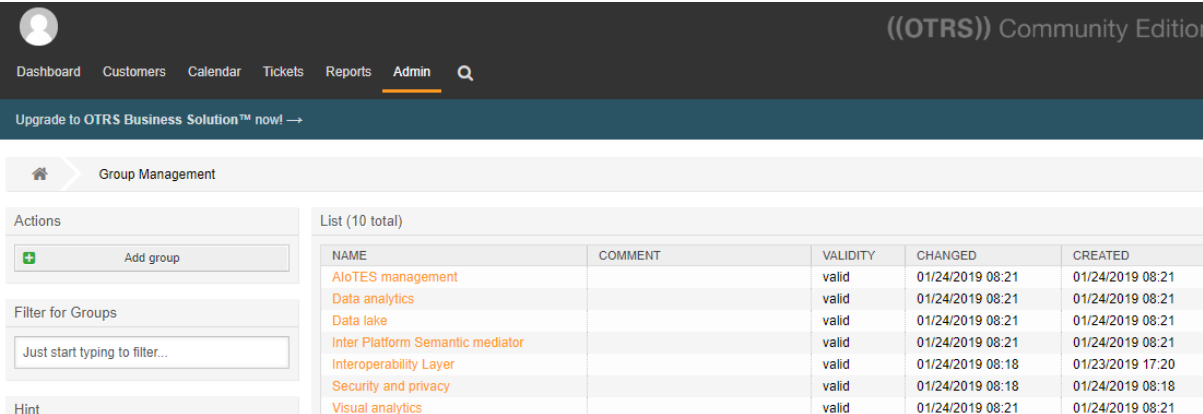
- Open-source with professional support if needed
- Scalability by the number of projects
- Multilanguage support
- Ability to be clustered with several partners
- Ability to connect to an accounting system such as LDAP
- Reporting ability (required for the KPI extraction)
- Availability of APIs to enable deeper integration in AIoTES

A first instance is deployed in DS6 facilities, hosted by CEA. This instance is accessible through the following URL: <http://support.activageproject.eu/otrs/index.pl>. At this URL, registered users can both report issues and manage those issues.

Three main categories have been configured in the tool:

- Agents: they are people which will provide support
- Groups: a group is composed of agents, and each issue will be assigned to a group. Each group can have an owner which can add or remove agents. In our case, groups correspond to AIoTES modules
- Customers: is a set of users which can report issues. In this case it corresponds to deployment sites and open-callers.

Groups have been declared corresponding to each AIoTES module



Upgrade to OTRS Business Solution™ now! →

Group Management

Actions

+ Add group

Filter for Groups

Just start typing to filter...

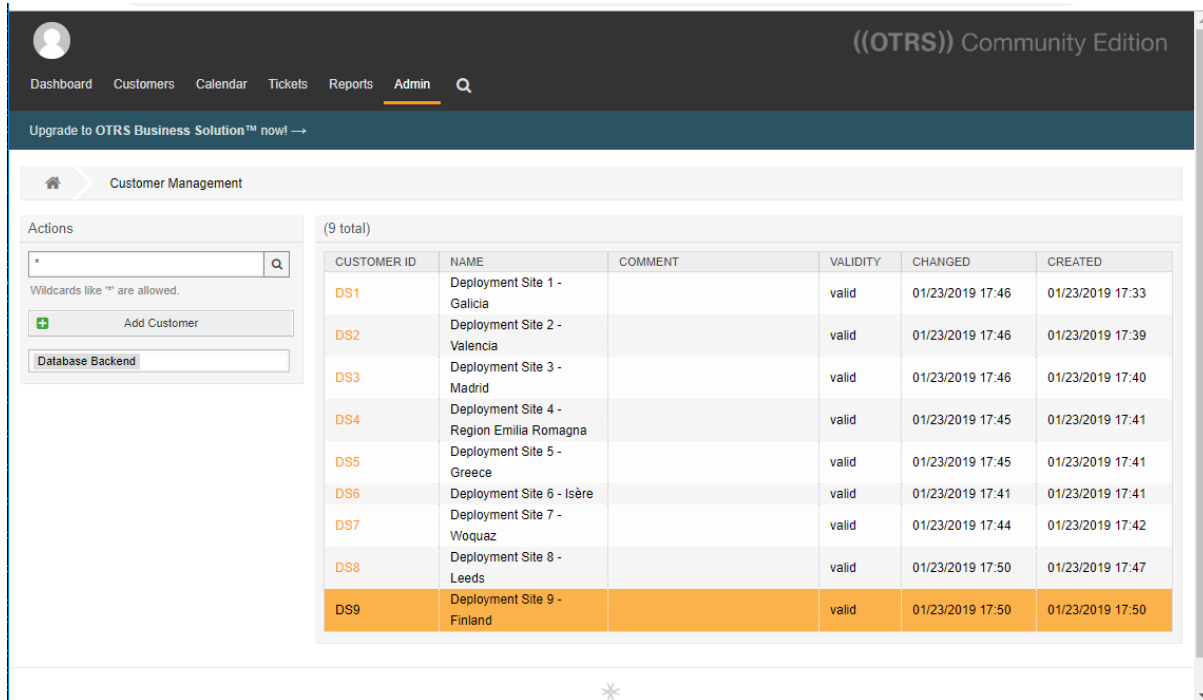
Hint

List (10 total)

NAME	COMMENT	VALIDITY	CHANGED	CREATED
AIoTES management		valid	01/24/2019 08:21	01/24/2019 08:21
Data analytics		valid	01/24/2019 08:21	01/24/2019 08:21
Data lake		valid	01/24/2019 08:21	01/24/2019 08:21
Inter Platform Semantic mediator		valid	01/24/2019 08:21	01/24/2019 08:21
Interoperability Layer		valid	01/24/2019 08:18	01/23/2019 17:20
Security and privacy		valid	01/24/2019 08:18	01/24/2019 08:18
Visual analytics		valid	01/24/2019 08:21	01/24/2019 08:21

Figure 6: Group for the support tool

- Customers, which in this case are the deployment sites and that can be later on extended with other parties. The tool enable each 'Customer' to have customized support process and also have delegated authentication. This kind of delegation is tested with DS6 using an LDAP server⁶. In such configuration, a central LDAP server can serve as a main entry point which can delegate to specific sub-instances authentication if any Deployment Sites and open callers have already an internal authentication system.



CUSTOMER ID	NAME	COMMENT	VALIDITY	CHANGED	CREATED
DS1	Deployment Site 1 - Galicia		valid	01/23/2019 17:46	01/23/2019 17:33
DS2	Deployment Site 2 - Valencia		valid	01/23/2019 17:46	01/23/2019 17:39
DS3	Deployment Site 3 - Madrid		valid	01/23/2019 17:46	01/23/2019 17:40
DS4	Deployment Site 4 - Region Emilia Romagna		valid	01/23/2019 17:45	01/23/2019 17:41
DS5	Deployment Site 5 - Greece		valid	01/23/2019 17:45	01/23/2019 17:41
DS6	Deployment Site 6 - Isère		valid	01/23/2019 17:41	01/23/2019 17:41
DS7	Deployment Site 7 - Woquaz		valid	01/23/2019 17:44	01/23/2019 17:42
DS8	Deployment Site 8 - Leeds		valid	01/23/2019 17:50	01/23/2019 17:47
DS9	Deployment Site 9 - Finland		valid	01/23/2019 17:50	01/23/2019 17:50

*
Figure 7: List of targets in the support tool

5.1.2 Deployment validation tool

5.1.2.1 Objective of the deployment validation tool

For the ACTIVAGE project, the question of successful deployments of IoT is crucial. To achieve these deployments, several developments are conducted such as the AIoTES interoperability layer and some associated tools. Such tools related to development and deployment are already described in D4.1. They are often related to an IoT platform or a deployment site.

The objective of the work described here is to join these deployment tools and to associate a test and validation module. In the short term this module aims to ensure that all deployment units within a deployment site meets the desired quality standards. This module also aims to reinforce the DS device installer in its work and the DS administrator in the management of the human factor.

On a long-term basis, this module could be used to have some label delivered within the deployment sites to ensure that these deployments comply with a stricter quality framework.

Using this tutorial ⁶ <https://doc.otrs.com/doc/manual/admin/6.0/en/html/external-backends.html#multiple-customer-backends>

Such module is necessary in the perspective of the SUSTAIN phase of the project, with potential DS device installers acting with sub-contracting of even franchise model.

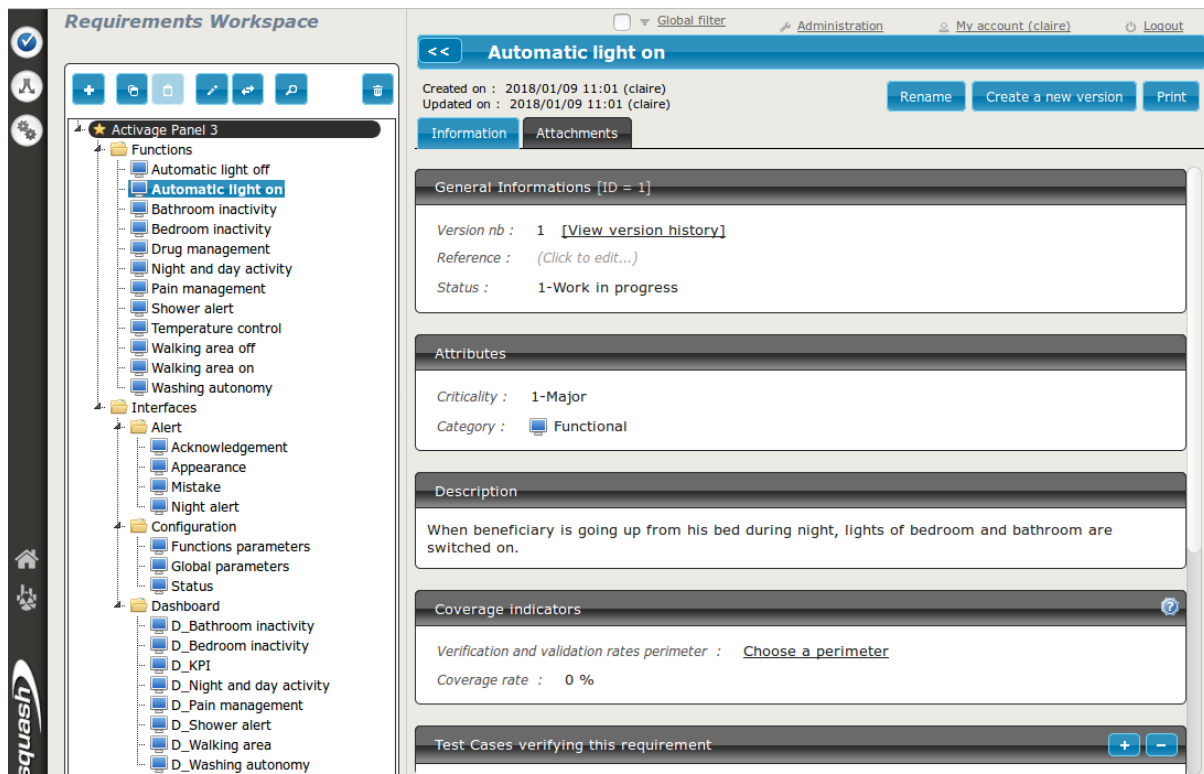
5.1.2.2 Description of the validation module (Squash Test Suite)

The modules proposed in addition to the deployment tools is an automated functional testing tool. This tool aims to ensure that the deployment site and each of its units and in a consistent operating state. Unlike a manual test module, automated tests can run almost continuously and thus contribute to the responsiveness of detection and correction of incidents.

This test phase will be carried out in continuity with the tests described in document D5.1 and D53, using the same test templates which can be executed continuously to detect early failures. From this list of test case, each deployment site will have the duty to select those concerning their use case to produce test campaign which are well fitted for each deployment units.

Report will be stored to be accessible upon request while failure will be immediately reported to the DS Administrator.

The Test Automation tool chosen is the open Squash test suite⁷, which is hosted by the CEA, a member of the ACTIVAGE consortium (<http://test.activageproject.eu/squash>). It can be replicated onto other partners. This tool handles the basic test components and is compatible with testing automation engines such as Sahi and Selenium.



The screenshot displays the Squash Test Suite interface. On the left, a 'Requirements Workspace' sidebar shows a tree structure under 'Activage Panel 3', including 'Functions' (with 'Automatic light on' selected) and 'Interfaces'. The main area shows the details for the 'Automatic light on' requirement:

- Header:** 'Automatic light on' with navigation arrows, 'Administration', 'My account (claire)', and 'Logout' links.
- Metadata:** Created on: 2018/01/09 11:01 (claire); Updated on: 2018/01/09 11:01 (claire). Buttons for 'Rename', 'Create a new version', and 'Print' are present.
- General Informations [ID = 1]:** Version nb: 1 (with a 'View version history' link); Reference: (Click to edit...); Status: 1-Work in progress.
- Attributes:** Criticality: 1-Major; Category: Functional.
- Description:** When beneficiary is going up from his bed during night, lights of bedroom and bathroom are switched on.
- Coverage indicators:** Verification and validation rates perimeter: Choose a perimeter; Coverage rate: 0%.
- Test Cases verifying this requirement:** A section with '+' and '-' buttons.

Figure 8: test and validation interface for requirements

⁷ <https://www.squashtest.org>

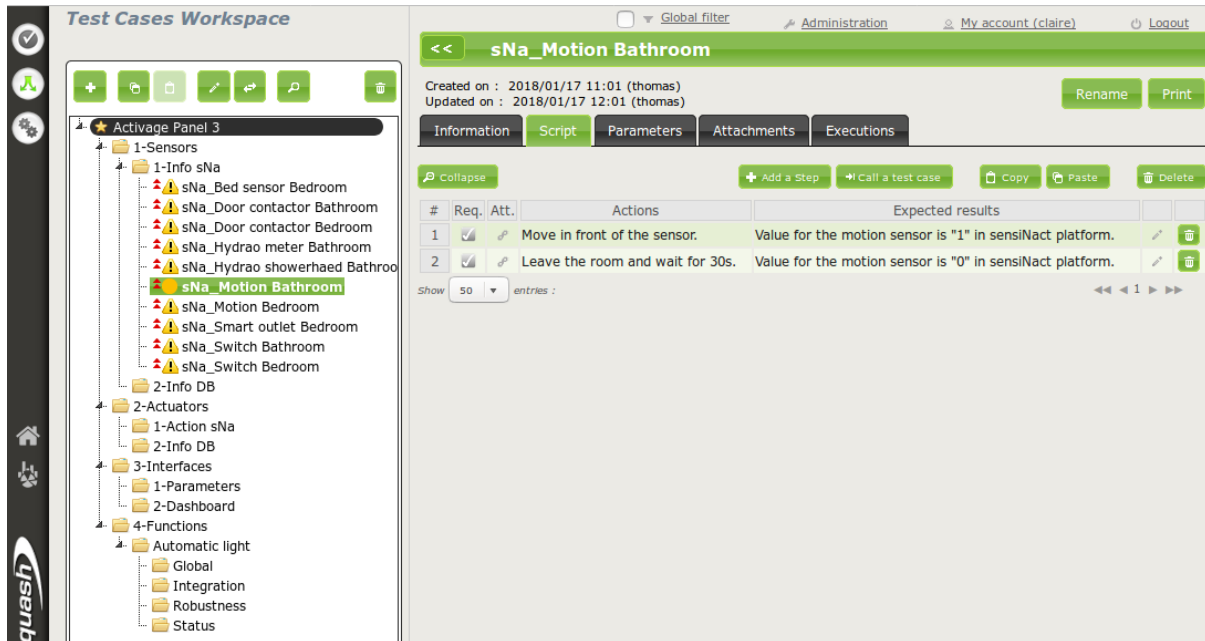


Figure 9: test and validation interface for test cases

5.1.2.3 AIoTES validation components

More details about the verification tests can be found in the deliverable “5.3 Intermediate Validation Results”

5.1.2.3.1 SIL

5.1.2.3.1.1 Bridge unit tests

The first step in the development and testing of a new IoT platform bridge consists of the creation of JUnit test classes for bridge standalone testing. These unit tests make use of a real or simulated platform and the necessary classes from the SIL. The tests can be defined specifically for each bridge and allow testing different functionalities separately (communication with the IoT platform, syntactic translation, etc).

Since each platform has specific requirements, the tests to be performed when testing the bridges can vary greatly and should be defined by the bridge developer. However, the unit tests must at least ensure the correct functioning of the following common operations:

- registerPlatform: Registers the platform in the SIL and creates a bridge instance for this platform.
- unregisterPlatform: Unregisters the platform.
- subscribe: Subscribes client to observations provided by the platform. Creates a listener for sensor data and sends the received observations upstream in the common JSON-LD format.
- unsubscribe: Cancels specified subscription created by the Subscribe.
- platformCreateDevices: An instruction for the platform to create new virtual devices.
- platformDeleteDevices: An instruction for a platform to remove a virtual device.
- observe: Pushes a given observation message from SIL to platform (bridge acting as a publisher for platform)

5.1.2.3.1.2 *Semantic Unit Test (Messages, Semantic translation & Alignments)*

The objective of the semantic unit tests is to check that the semantic translations are performed correctly. Semantic translations are performed after the syntactic translation process of the bridges. Messages are sent to the IPSM component, and semantic conversion is performed following the rules for translation set on the alignment files.

These tests verify the definition of the semantic alignments and need data in the JSON-LD format of the SIL as an input. These messages are provided by the bridge. The semantic unit tests cover the different types of translations that will be performed (from platform ontology to central ontology and vice versa) and the different messages that will be translated (observations, device definitions, etc). In order to test that messages are well-formed, the semantic alignments for performing semantic translations are correct and so the results of the translation, it has been created a webtool for testing the ACTIVAGE semantic translation. This webtool is connected to a real instance of IPSM running in one server. By these means, through the webtool interface it is possible to configure an ontology translation, selecting the alignments and preparing a channel for this task. Then, it is possible to perform in an easy and direct way semantic translations of messages executing it through this interface and check the existence of potential errors. Therefore, this tester makes it possible to test alignments, the quality of the semantic translation and/or messages format.

5.1.2.3.1.3 *Integration tests*

The next step are the integration tests, which have been designed to check if the bridge can be integrated in the SIL. These tests are defined as JUnit classes that use the Interoperability Layer Java API to execute a standard scenario and check if the operations (register platform, create devices, subscribe to specific devices, etc.) have been executed correctly. The integration tests must ensure the correct operation of all the functions of the bridge when they are called by the SIL and check that the bridge generates the proper messages in each case.

These tests make use of a real or simulated platform together with the following components of the SIL:

- RabbitMQ
- Parliament triple store
- Inter-Platform Semantic Mediator (IPSM)

The IPSM should be configured to use the defined semantic alignments in order to check the operation of the bridge together with the semantic translation.

5.1.2.3.2 Data lake

The Data Lake is responsible for providing access to raw data and analytics metadata that are needed for high-level applications, such as data/visual analytics services and development/deployment tools.

Functional testing has the following steps:

- Identify functions that the software has to perform.
- Create input data based on the function's specifications.
- Determine the output based on the function's specifications.
- Execute the test
- Compare the actual and expected outputs.

All 5 operations in the ACTIVAGE InfluxDB REST API are tested, as they are identified as the functions that the REST API must perform:

- /createDB: creates a new database
- /select: select the set of registries that match the conditions specified in the instruction
- /insert: inserts a registry
- /update: updates a current registry
- /delete: deletes a current registry

5.1.2.3.3 Data analytics

The analytics metadata storage is a database used to store models created and used by the AIoTES data analytics methods. Specific analysis types, such as anomaly detection or prediction, require that appropriate models are trained using historical data and used to assess new data.

The analytics metadata storage is implemented as a MongoDB⁸ database accompanied by a Node.js⁹ server offering a RESTful interface. The main functionalities offered by this interface are the following:

- Create a new model
- Retrieve an existing model
- Edit/delete an existing model

A model is essentially a MongoDB document, i.e. a JSON object, containing a unique ID and a set of parameters that may be different depending on the model.

Testing for the analytics metadata storage is performed by testing the RESTful API offered by the implemented Node.js server, and specifically by testing whether the provided input produces expected output.

Due to the fact that MongoDB documents acquire a unique MongoDB identifier that is not deterministic, in cases where the expected output is a MongoDB result, the comparison of the produced output to the expected output is performed in terms of whether the produced output contains the properties and values of the expected output, rather than comparing the two outputs in an absolute manner.

The Mocha¹⁰ testing environment is used for testing, with the Chai¹¹ JavaScript library used for the composition of the assert statements in a format closer to natural language.

5.1.2.3.4 Security

The security module validation is required to ensure that the deployment of AIoTES reaches a minimum level of trust. The overall concept is to validate a certain level of security integration, which provides Privacy. This deployments test does not replace in any way

⁸ <https://www.mongodb.com/>

⁹ <https://nodejs.org/en/>

¹⁰ <https://mochajs.org/>

¹¹ <https://www.chaijs.com/>

formal certification delivered by entitled specialized organizations. Security objectives for AIoTES have been defined in task 3.2 and organized in four levels:

- IoT device level
- Gateway level
- Cloud level
- Application level

We will describe in this section minimal test in order to test common security features as defined in the risk analysis performed and shares in D3.3. The methodology to define this test is to select the requirements and to find a test condition that can verify, partially or totally, the requirement. Test cases can be done automatically with a probe or manually by an operator. In this last case, the test result will be more valuable if the operator is external to the system, for example performing cross-deployment-site validation.

IoT device mandatory requirements to be tested	
Class 0	Data timeliness
Class 1	Secure boot process Authentication of code source Secured root of trust Code/Firmware signing & verification Access Control (privileges) to modify sensitive information Access control to read sensitive information Encrypted or secured storage of cryptographic material Defense against repeated login/connection attempts Access Control Policy and its enforcement Authorized code source Appropriate security level in default configuration
Class 2	Authenticated connections Data validation Entity authentication Data authentication (message auth. Codes) Data encryption

Gateway mandatory requirements to be tested	
Class 1	Read and write operation shall require authentication Write and Read permission shall be tuned in the file system Removable storage devices shall be proscribed User authentication Enable physical protection of the hardware Use trusted and authenticated updates repository Monitors the different resources (cpu, memory, bandwidth, latency, etc.) All privileged operations require authentication Headers and data verification encryption of data with a strong scheme (unique keys, min 128 bits length) The communication is firewalled

Class 2	File system shall be adapted to the technology (read/write cycles) Data shall be backed up Authenticated code to execute Authenticate the cloud process with unique and strong credentials verified by a PKI
Class 3	Use of a strong encrypted channel (IPsec, SSH tunnel), at the lowest OSI layer possible

Cloud mandatory requirements to be tested	
Class 0	Data timeliness Data-integrity protection to be provided as part of protocol security. Using the best cryptographic schemes.
Class 1	Prevention of impersonation techniques through proper use of authentication/authorization procedures (enforced by the respective Authentication and Authorization Functional Components (no weak passwords, no default credentials) Authentication of code source Secured root of trust Code/Firmware signing & verification Robust Access Control (privileges) to modify sensitive information Robust Access Control to read sensitive information Encrypted or secured storage of cryptographic material DoS detection/reaction scheme, defense against repeated login/connection attempts Access Control Policy and its enforcement Authorized code source Appropriate security level in default configuration Secured discovery/resolution/lookup system Security management of infrastructure to prevent global disclosure of access policies from the decision point to an unauthorized external attacker.
Class 2	Authenticated connections Data validation Trustworthy discovery/resolution/lookup system. Trustworthiness of the entire system to be enabled through its security Functional Components. Strong authorization control against new service installation End-to-end integrity protection of service-access signaling (data integrity protection is provided as part of protocol security) End-to-end confidentiality protection of exchanged data, offered through protocol security, use data encryption schemes Strong security for server-to-server communications that leverages individual's credentials (e.g. certificates) instead of group keys, and allows for revocation (security by design, adequate management policies) Integrity protection obtained from authentication enforcement. End-to-end integrity protection of service-access signaling. Secure storage of personal data with dedicated protection architecture (e.g. firewall) and access control rules - this is part of security management.

Class 3	Use of strong Denial-of-service prevention schemes (e.g. anti-jamming, enforced MAC, etc.). Techniques at physical layer (spread spectrum, frequency hopping, UWB) Secure data backups
---------	---

Application mandatory requirements to be tested	
Class 1	Signed and trusted executables (or services), restricted execution platforms Use of Digital Signatures, and secured credentials (D)DoS reduction systems, platform limits Using correcting communication protocols
Class 2	Secured communications Code correction storage, backups Digital signatures Binary checksum, and/or signature checking (D)DoS reduction systems, Stress testing Load Balancing, Stress testing
Class 3	Strong authentication, and encryption protocols Usage and respect of authorization mechanisms Service authentication (specially for remote DS) Secured communications, and storage devices Strong Authentication Mechanisms (including MFA) Ensuring the user credentials are secure and trusted to a single user Usage of secure and trusted communication channels Usage and respect of authorization mechanisms

To perform these tests, the following solution may be used:

- Manually, reporting existing results or certification from suppliers, in particular for the device and gateway domain
- Using a dedicated vulnerability probing tool such as OpenVAS¹² or similar
- Using specific auditing tools, such as <https://www.ssllabs.com/ssltest/> to test public portals security
- Using scripts to automate checks

¹² <http://openvas.org/>

5.2 Zoho Desk

5.2.1 Infrastructure

5.2.1.1 What is a Help Desk Software?

Help Desk is a department in an organization that handles customers' interactions on a product or service. Customers contact the help desk when they have a question or a problem and a product expert addresses the question to the customer's satisfaction.

In a typical scenario, a help desk is a space manned by product experts from the customer support department when customers require assistance. Most companies give out an email address or a toll-free number for the customers to request help from the experts. Customers can reach the company through these channels when they need help.

A help desk software automates most of the steps in this process as possible. A help desk software consists of at least 3 parts: Ticket Management, Automation Suite, Reporting and Optimization. Here's how:

- Ticket Management: The software pulls customer emails from an email address and lists them in a single place. It allows a help desk executive to answer calls from customers and log them easily. It enables customer support executives to listen and respond to customer feedback on social media, such as Facebook and Twitter.
- Automation Suite: The Automation Suite allows a help desk coordinator to ensure that questions from customers are redirected to employees who can answer them satisfactorily. It enables the coordinator to monitor when a support executive hasn't responded to a ticket, or when a ticket is taking too long to get resolved, or one of the several other possible cases.
- Reporting and Optimization: This is the most important function of customer service. It pulls pertinent information about the critical aspects of the help desk. Managers can understand parameters such as load on the help desk team, turnaround time, and resolution rate of each executive etc. Metrics like these give managers a quick perspective of how things are faring and let them make amends for the better.

5.2.1.2 Zoho Desk solution

After successfully helping to manage the answer to the doubts of the entities interested in participating in the first ACTIVAGE Open Call (in the context of the task T7.2 “Coordination & Evaluation of Open Call Activities”) this help desk tool has been selected again to support the second ACTIVAGE Open Call as well as to support the use and operation of AIoTES for Deployment Sites and open callers, T5.4 “Support for deployment sites”.

Zoho Desk¹³ is web-based help desk software that allows to manage customer support activities efficiently. Zoho Desk allows to assign, track and set up alerts on help desk tickets easily.

The ACTIVAGE instance is accessible through this link:

<https://desk.zoho.eu/support/activageproject/>

¹³ <https://help.zoho.com/portal/kb/zoho-desk>

The Key Zoho Desk Features are the following:

- **Prioritize, Manage and Close Customer Support Tickets:** supports the creation and manage of tickets submitted via phone, email, or web form. It can be set priority to an incoming ticket and then close the tickets in the preferred order.
- **Create a Help Desk Solution for Your Support Team:** To help the task to provide appropriate solutions for customer tickets effectively it is available a Knowledge Base of customer support articles
- **Provide a Help Center:** Zoho Desk can help customers proactively before they contact your support team. With the Help Center, it can be created a Knowledge Base for customers that is available to them 24/7. This feature also allows customers to create a ticket and track it online, eliminating the need to contact the support center.
- **Manage Contracts and Service Level Agreements:** When a customer ticket is created, Zoho Desk will consider an appropriate resolution time based on your business hours. If those parameters are missed, the ticket will be escalated automatically.
- **Create Standard and Customized Reports:** Zoho Desk permits to determine get detailed reports including all the important facts about the support center's performance. Some examples of this statistics are the average resolution time, the number of tickets closed per agent per day or the number of tickets opened per product.
- **Customize the Help Desk:** Zoho Desk allows to customize features such as working tabs, staff roles and profiles, departments, workflow rules, email templates, web forms, business hours and parameters, help folders, catalogue, accounts, contacts, and more.

By default, Zoho Desk provides some standard fields in each of the help desk modules. These standard fields can be displayed or hidden as per the organization's requirement. The mandatory fields cannot be edited or deleted. Some of these fields are common to all modules and are displayed within each module settings.

The standard modules that are available in Zoho Desk are the following:

- Tickets
- Accounts
- Contacts
- Products
- Tasks
- Contracts
- Time Entry

Tickets are support requests that are sent by customers. They contain support conversations, as well as other properties, such as priority, category, and status. Requests are submitted by customers through a set of communication options (collectively called channels in Zoho Desk) which are converted into tickets. Depending on the business requirements channels can be added or removed.

Below is a list of manners in which your customers can connect to Zoho Desk:

- Send an email to the help desk-monitored support mailbox
- Submit a ticket from a customer-facing web interface
- Fill out a support contact form from a website

- Call to the customer service telephone number
- Ping through a live chat widget
- Post on a community forum
- Send a tweet
- Post on a Facebook page

5.2.2 Procedure

First of all, it should be pointed out that, as commented in section 5.2.1.2, Zoho Desk tool is going to be used in task T5.4 “Support for deployment sites” and task T7.2 “Coordination & Evaluation of Open Call Activities”.

In the context of the task T7.2 “Coordination & Evaluation of Open Call Activities”, during the first ACTIVAGE Open Call it was used to collect all requests for assistance from entities interested in the open call and manage them in one place. This support tool will also be used in the ACTIVAGE second Open Call.

Currently, in the context of task T7.2 it has been created a mailbox to answer the questions of the ACTIVAGE open calls (opencall@activageproject.eu). Regarding the task T5.4, which is the task on which this deliverable focus, a mailbox is going to be created and managed with Zoho Desk with the aim to support the **general** doubts that can arise regarding the use and operation of AIoTES. **Technical** questions should be addressed to the AIoTES Support Tool (section 5.1.1.1). Furthermore, a mailbox to manage the PoliformaT user creation and to solve doubts regarding PoliformaT is going to be created.

Thus, by using the Zoho Desk tool, these three mailboxes are going to be managed cross work package by several groups of the project. The following table summarizes the mailboxes than are going to be managed by Zoho Desk.

Table 27: Zoho Desk associated mailboxes

Mailbox	Doubts about	Task context
opencall@activageproject.eu	ACTIVAGE Open Calls	T7.2
training@activageproject.eu	PoliformaT user creation and use	T5.4
aiotes@activageproject.eu	General AIoTES doubts	T5.4

Regarding the mailboxes associated to the task T5.4, UPV will be the group in charge of answering the petitions that reach the training mailbox. Regarding the AIoTES mailbox, below is summarized the groups that will be in charge of answering the AIoTES general doubts. The task of resolving these doubts will be divided among different groups (as outlined in the table) where each will have to answer the questions arising from each of the components that make it up.

Table 28: AIoTES mailbox assignments

AIoTES module	Group
Semantic Interoperability Layer	UPV
Analytics	CERTH

Deployment tools	HOPU
Development tools	CEA
Marketplace	CERTH
AIoTES Management	CEA
Security and Privacy	UPM/CEA

5.2.3 Zoho user manual

Appendix B contains the needed information to start managing Zoho Desk. It includes information about the structure and content of the tickets and how to respond and manage them. This information has been extracted from the Zoho Desk website, section “Zoho Desk Knowledge Base¹⁴”.

¹⁴ <https://help.zoho.com/portal/kb/zoho-desk>

6 Conclusion and future work

In this deliverable we have presented the consultative and interactive supporting tools which ease the adoption of AIoTES by the deployment sites as well as open-callers while enabling qualitative deployments.

First of all, users may start to go through the consultative materials: reading the **wiki pages** (section 4.3) to get an overall view of AITES components, the supported 7 IoT platforms, the interoperability, security and safety functionalities. Such readings will probably be followed by the attendance of particular **training courses** centralised into the **Poliformat** web application (section 4.1.2).

When the needed knowledge will be acquired, users will start deploying AIOTES modules. This process will lead to problems/questions. These questions will be addressed either by emails to dedicated email addresses (Table 23) or through the **ZohoDesk** application (5.2).

In case specific bugs or errors are identified, users will be able to report them via the **OTRS** web application (5.1.1). Upgrades/improvements requests will also be managed at this location.

Finally, and when AIOTES is deployed a **verification tool** (Squash Test Suite, section 5.1.2) will be used to ensure that some critical components or modules are properly functioning.

As it can be seen in section 4.2, the content of some courses is not detailed. Indeed, such courses will be available after the submission of this document. It is important to remember that the access to Poliformat will always remain the same. Therefore, connecting to this online tool will always present to the user the most updated content of the courses.

To ensure the maximal use/re-use of AIOTES in the future, the consortium is currently identifying the strategy for maintaining the consultative and interactive support tools after the project ends. We are sharing the current approach (but not definitive) for each tools:

- Poliformat: can be maintained by UPV, 2 years after project ends (Moodle¹⁵ could be a long-term alternative)
- Wiki, OTRS, Squash Test Suite, hosted by CEA won't be maintained after the end of project. However, these tools are on a virtual machine and can therefore be taken and managed by any other partner or moved to the cloud.
- Hotline: ZohoDesk is paid by Fraunhofer. Medtronics provides DNS names, emails. Maintenance options have not yet been discussed.

¹⁵ <https://moodle.org>

References

David A Kolb. Experiential learning: Experience as the source of learning and development. FT press 2014.

Appendix A PoliformaT manuals

A.1 How to register to POLIFORMAT

To be able to register in the private platform PoliformaT, users will be provided with the manual “Getting started with ACTIVAGE Training” as well as the template “ACTIVAGE Training user creation” with which they will be able to register on the platform.

A.1.1 Getting started with ACTIVAGE Training

The ACTIVAGE Training is hosted in the e-learning learning platform PoliformaT which is an adaptation of the Open Source Sakai platform, used worldwide by more than 100 universities.

How to obtain a PoliformaT account?

To be able to create a new user in the **PoliformaT** assisted distance learning platform it is necessary to fill in the attached form “ACTIVAGE Training user creation template”.

The following are some clarifications to fill in the form satisfactorily:

It is required to indicate your PASSPORT/DNI/NIE accreditation since your accreditation number will be your user identification.

- PASSPORT: Official document containing personal information and usually a photograph that allows a person to travel to foreign countries and to prove who they are.
- DNI: This is the ID number for Spanish citizens.
- NIE: This is the identification number in Spain for foreigners residing in Spain.

To correctly complete the field *Document* follow these guidelines:

- If you choose PASSPORT as *Type of document*, the *Document* must necessarily begin with a P and then may have letters or numbers.
- If you choose DNI as *Type of document*, *Document* must be a number to which you need to eliminate the possible zeros on the left.
- If you choose NIE as *Type of document*, *Document* has to start with X or Y and then a number, it is necessary to eliminate the possible zeros of the left of that number.

Example 1:

Name	Manuel
Last name	Vázquez López
Email	xxx@gmail.com
Type of document	PASSPORT
Document	P12345678

Example 2:

Name	Manuel
Last name	Vázquez López
Email	xxx@gmail.com
Type of document	DNI
Document	12345678

It will take a few days to process your registration to Poliformat once you send the form to the email address above. Once the registration is complete, you will receive an email like the one below. In this email you will be informed of your username and password.



Figure 10: User creation email

Change the password

If you do not remember the PoliformaT password or you wish to specify another one, you can do so from the link <https://poliformat.upv.es/portal/site/UTILS>, specifying the email account with which you were registered (XXXXXXXXXX), and you will receive an email with a link, click on it and a window will open with your default browser and it will allow you to establish a new password.

We remind you that to access the course in PoliformaT you must do so by identifying yourself through the PoliformaT main page <https://poliformat.upv.es> (Click on IDENTIFY in the upper right part of the screen, and identify yourself as a POLIFORMAT USER).

AloTES doubts

If you have any general questions related to the use and management of AloTES, you can direct them to the mail aiotes@activageproject.eu. For technical questions or to notify a

possible bug, use the AloTES ticketing system:
<http://support.activageproject.eu/otrs/customer.pl>

A.1.2 ACTIVAGE Training user creation template

Please take a moment to fill out the following form. Once completed, send it to address training@activageproject.eu with the subject *PoliformaT user creation*.

For each user it is necessary to fill in and send a separate form.

ORGANIZATION INFORMATION

Organization	[Name of the organization]
Contact person name	[Name, email, phone number]

Indicate if your organization belongs to the **ACTIVAGE Open Call** or is associated to one of the **ACTIVAGE Deployment Sites** and if so, which one.

- Open Call
- Deployment Site
 - DS1 - Galicia
 - DS2 - Valencia
 - DS3 - Madrid
 - DS4 - Regione Emilia-Romagna
 - DS5 - Greece
 - DS6 - Grenoble region
 - DS7 - WOQUAZ
 - DS8 - Leeds
 - DS9 - Finland

i *[Explanation]*

Note: To replace the text of any suggestion (like this one) with your own, simply click on it and start typing. If you do not want to add any text, simply click on the suggestion and press the space bar to delete it.

USER INFORMATION

Name	[Name]
Last name	[Last name]
Email	[Email]
Type of document	[PASSPORT/NIE/NIF]

Document

[Document]



Note: To correctly complete the user information, please, follow the instructions available in the document "Getting started with ACTIVAGE Training".

A.2 How to use POLIFORMAT

PoliformaT is the online platform of the Universitat Politècnica de València, where you can find the materials that ACTIVAGE Project put into the ACTIVAGE subjects/courses.

Previous steps

To access PoliformaT you must have been previously registered. To do so, follow the instruction available in document "Getting started with ACTIVAGE Training".

Once the registration is complete, you will receive an email like the one below. In this email you will be informed of your username and password.



Aviso desde PoliformaT / Avis des de PoliformaT

Ud ha sido dado de alta en la plataforma PoliformaT de la UPV.
Su usuario es: xxxxxxxxx
Su password es: xxxxxxxxx

Para acceder a la plataforma debe acceder a <http://poliformat.upv.es> seleccionar Identificarse y luego usuario PoliformaT como opcion de identificacion.
Un saludo del Equipo PoliformaT

Universidad Politécnica de Valencia
poliformat@upv.es

Para garantizar su integridad y autenticidad, este correo se ha firmado digitalmente y puede comprobarse su envío, si usted es miembro de la UPV, desde la Intranet.
Per a garantir la integritat i l'autenticitat d'aquest correu, s'ha signat digitalment i se'n pot comprovar l'enviament, si vostè és membre de la UPV, des de la Intranet.

Figure 11: User creation email

Access and use of PoliformaT

To access the course in PoliformaT go to <http://poliformat.upv.es> and click on the top right, under "Identify", to identify yourself as a PoliformaT User.

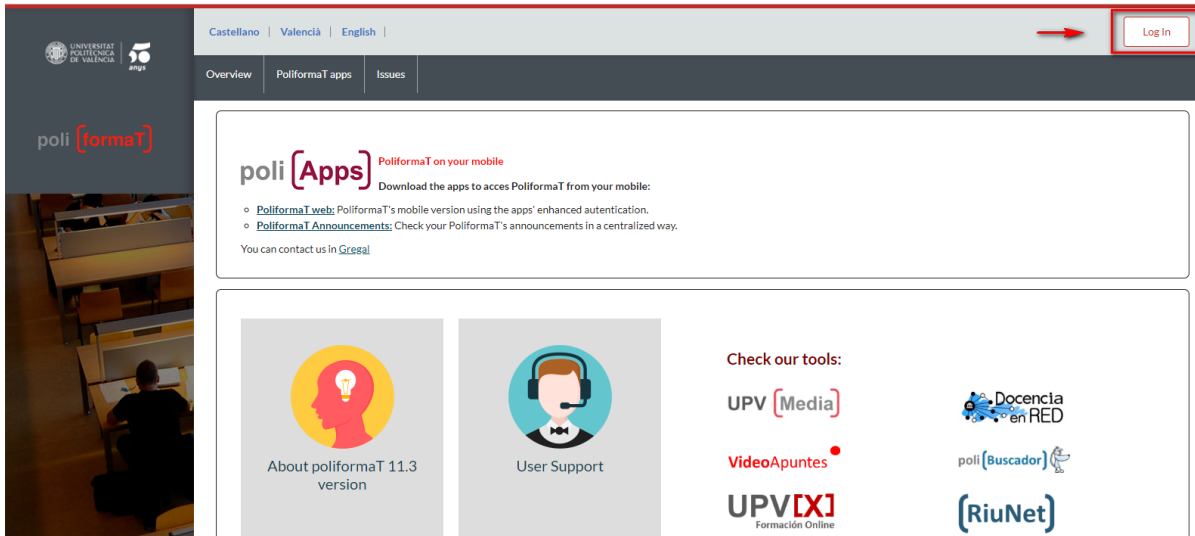


Figure 12: PoliformaT Log In screen

We will identify ourselves with our passwords with the "PoliformaT User" option:

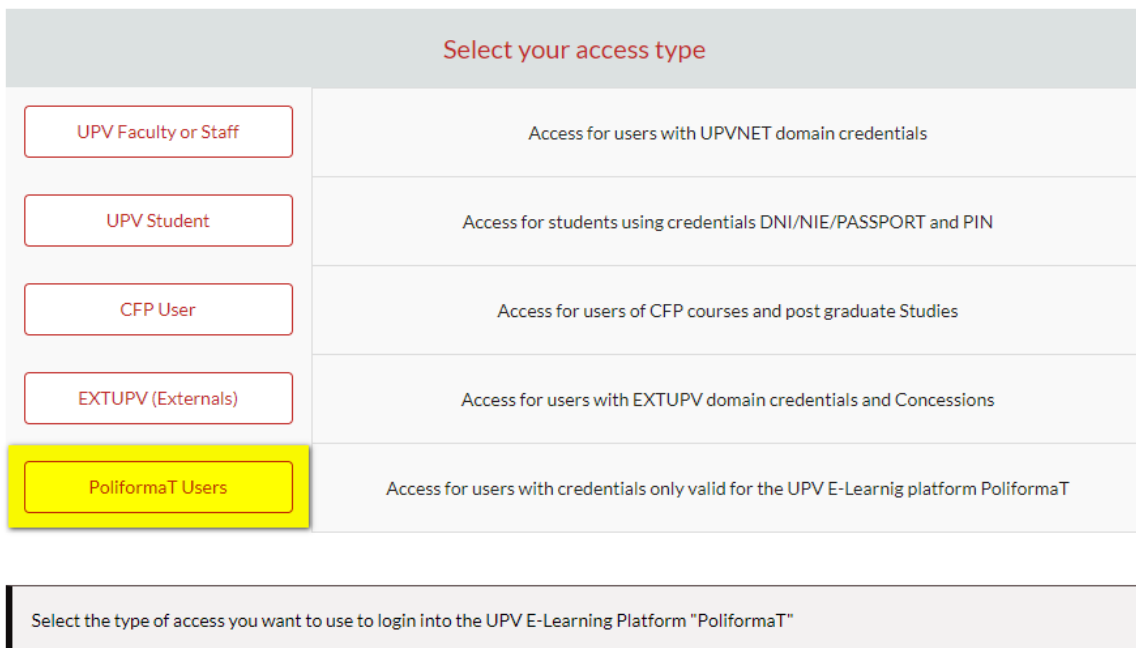
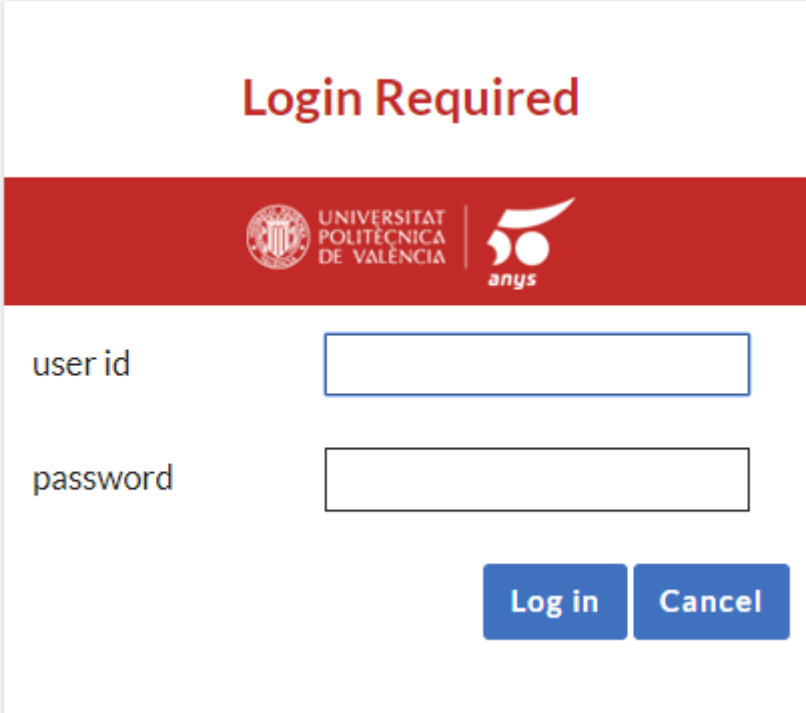


Figure 13: PoliformaT type of access



The image shows a login dialog box titled "Login Required" in red text. Below the title is a red horizontal bar containing the logos for "UNIVERSITAT POLITÈCNICA DE VALÈNCIA" and "anys". Underneath the bar are two input fields: "user id" and "password". At the bottom right of the dialog are two blue buttons: "Log in" and "Cancel".

Figure 14: PoliformaT credentials

Once we access PoliformaT we get some tabs. In red and by default we get the tab "My PoliformaT", which is a personal space for our user.

Next to it, it shows us the places (subjects or courses) where we can access. If we have more sites, appears on the right side of the grey bar a dropdown "Sites", where we can select the subject or course where we want to access.

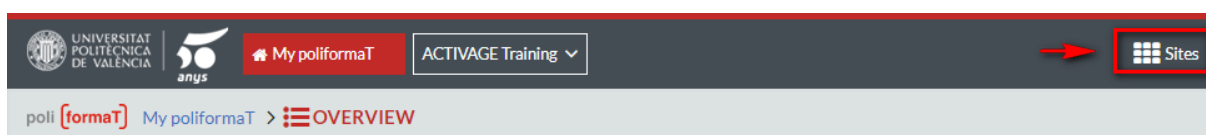


Figure 15: PoliformaT navigation bar

We must click on the NAME OF THE COURSE where we want to access (located in the top gray bar, or in the drop-down "Sites", if we do not find our course in the gray bar). When we click on "Sites" a drop-down appears with all the courses that we have active.

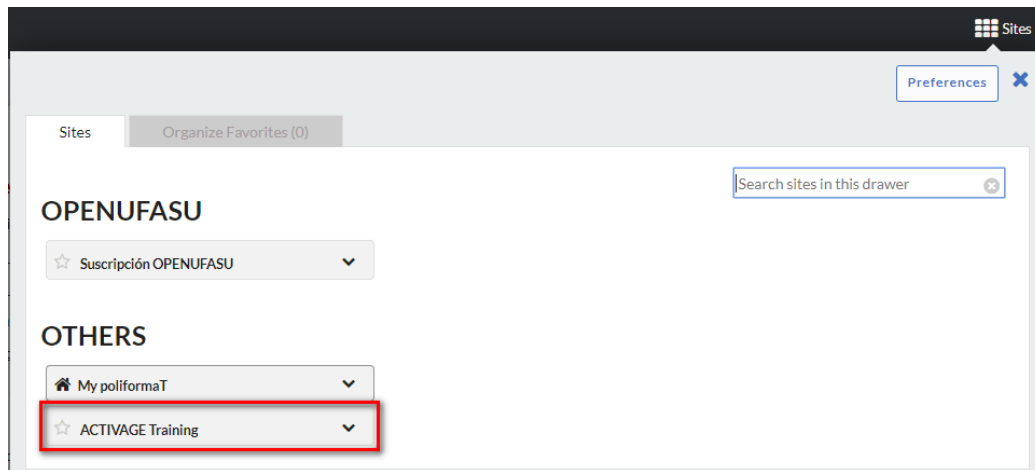


Figure 16: PoliformaT sites

In the course, we found a side menu, with tools on which we can click to see its content:



Figure 17: ACTIVAGE Training main screen



Figure 18: ACTIVAGE Training navigation bar

Submit Computer Problem and Receive Assistance

Any time we have a computer problem, we can contact the University's Customer Service Centre. For this we have two options:

- Before identifying us, in the PoliformaT page we have the option "Issues" in the horizontal menu, which gives us the possibility of sending our incidence by filling in a simple form where we can explain our problem:

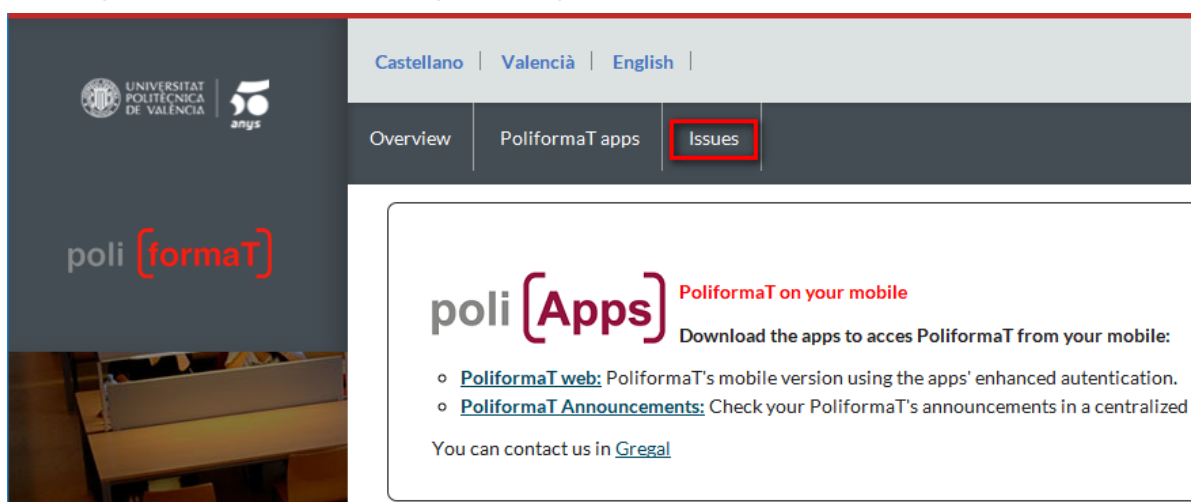


Figure 19: PoliformaT issues tab

- Once identified, from "My PoliformaT" - Home, we can click on the "Send Incident" logo to access the same questionnaire in an identified way:

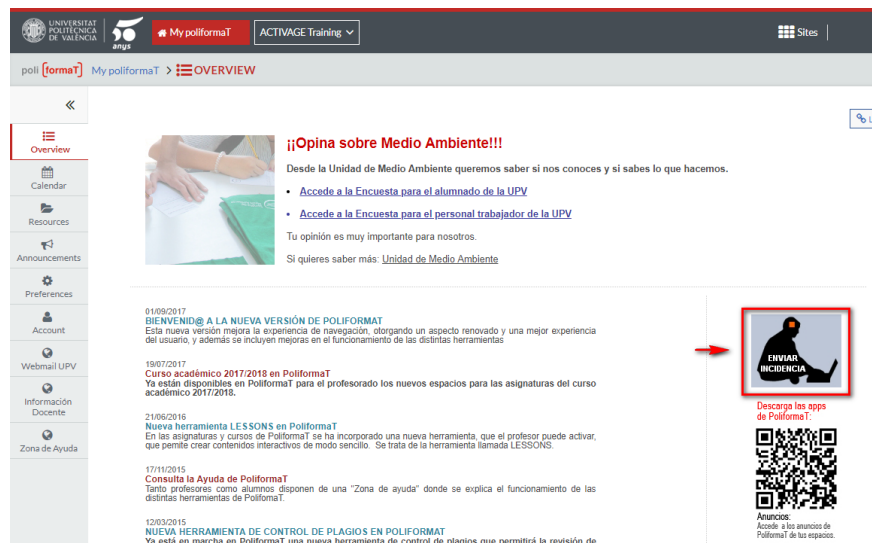


Figure 20: PoliformaT issues section

Change the language

If you want to change the language, you can do it in two different ways:

1. In the top navigation bar of the main poliformaT web site you can change the language in which the web page will be displayed.



Figure 21: PoliformaT language selection

2. Once identified, from "My PoliformaT" – Preferences, click on the Language button located at the top of the screen.

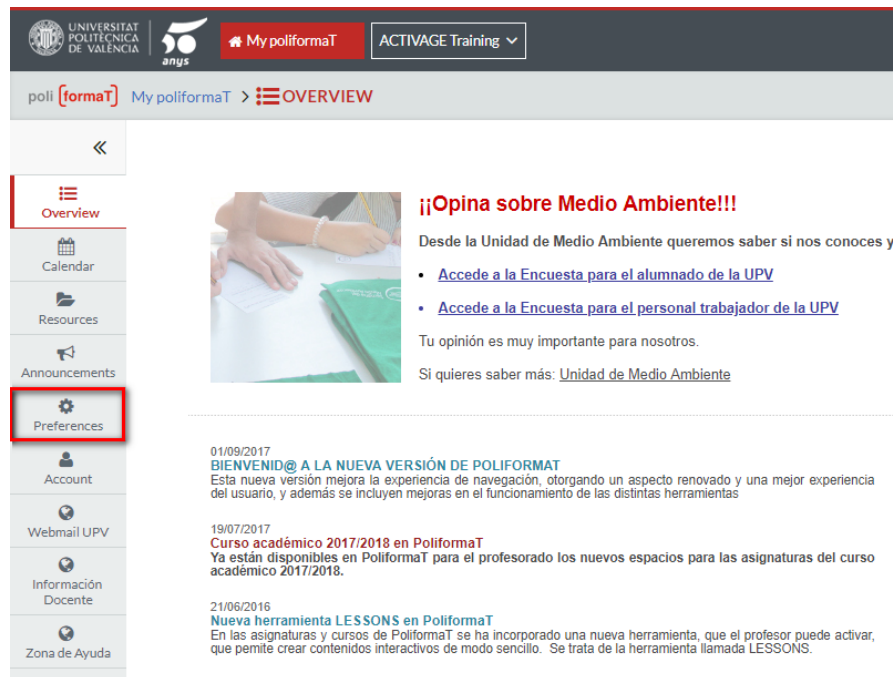


Figure 22: PoliformaT overview page

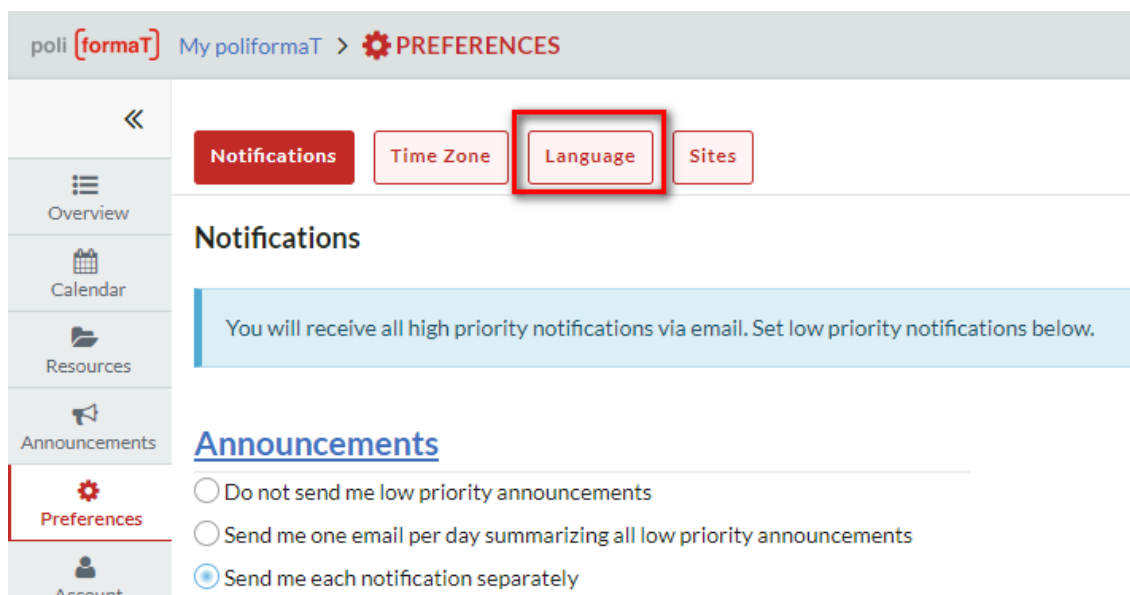


Figure 23: PoliformaT preferences section

A new window will appear where you can choose the language you want from a list of options.

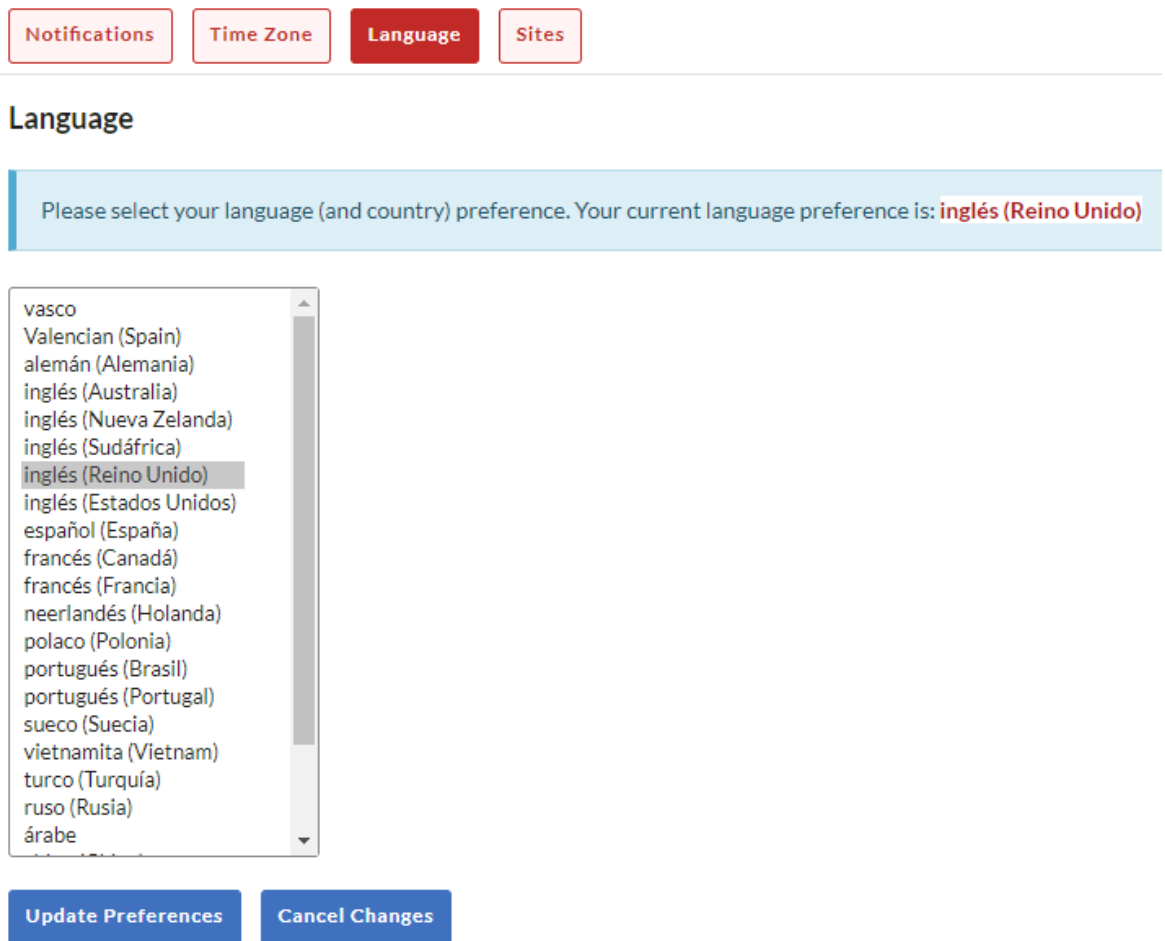


Figure 24: PoliformaT language selection

Appendix B Zoho Desk user manual

B.1 Ticket fields

Most often a ticket will contain the customer's name, email, subject and a description of the request. Apart from these, there are also a bunch of standard fields which your customers can choose to fill when they submit a ticket. For example, they can enter a product version, set priority, and specify a category. There are other fields which can only be filled by agents or a through an automation rule. For example, fields like ticket owner, due date, status, etc.

Here are the standard fields that are available in Zoho Desk:


1. **Department:** This field is used to differentiate a ticket based on its relevance to a business unit or a division. While you can have multiple departments, the field will be listed only when you have more than one department. Both your end-users and agents can specify a department. You can also route a ticket to its department using business rules like workflows and macros.
2. **Contact Name:** This is the name of the end-user (or requestor) who had raised a support request. This is a mandatory field, and hence, every ticket received in your helpdesk will have this pre-filled. For a ticket that is received through email, the display name associated with the customer's email will be its Contact Name. Also, agents can manually fill the contact name when they log a new ticket.
3. **Account Name:** Accounts are the companies or departments within a company with which you have business dealings. Single or multiple contacts can be associated with an account. When you specify an account name while adding a ticket, the contact and the account will be mapped subsequently. End users have the convenience of viewing tickets that were raised by their colleagues in the Help Center.
4. **Email:** The email address for communicating with your end users. This field will auto-fill for tickets that are received through email and that of your Help Center (for logged-in customers).
5. **Phone:** The contact's phone number will come in handy when your agent is required to address a high priority ticket. While speaking with a customer, you can open the ticket and fill this field.
6. **Subject:** The subject of a ticket should be a summary of its content. For a ticket that is received through email, the subject of the email will typically be the subject of the ticket. A well-constructed subject line will help you set up intelligent automation using Workflows and Assignment Rules.
7. **Description:** Description is the detailed information about a ticket. For a ticket that is received through email, the body of the email will be the ticket's description.
8. **Status:** The status will signify the life cycle of a ticket from open to close. Zoho Desk offers you four different statuses: Open, On Hold, Escalated, Closed. The status can be defined manually by an agent or through the different automation options. Let's get through each of these statuses in detail.
 - **Open** refers to the ticket that has just been received and indicates that someone is working on it when assigned to an agent. An open ticket can either be assigned to an agent or stay unassigned. All the new tickets that are created in your helpdesk will default to Open.

- **On Hold** refers to the ticket that an agent has ceased to work on, but awaiting input or solution from a third party. Typically tickets that are On Hold will be considered and visible to your customers as Open.
- **Escalated** refers to the ticket that wasn't closed within a pre-defined due period. Usually, a ticket will be escalated when it violates an SLA and triggers its related events. By default, escalated tickets will be considered as Open.
- **Closed** refers to the ticket that was solved. A ticket can be manually closed by an agent or after a certain number of days using a time-based rule. A closed ticket will be re-opened when there is a new response from the customer.

In addition to these, you can create custom statuses and map them to Open or Closed state as demanded by your support process.

9. **Product Name:** You can list the company-wide products that are sold to your customers. An agent can specify the product name or chosen by your customers while they submit a ticket in the Help Center. The product information is ideal when you assign tickets based on products or simply to add more context to your agents.
10. **Ticket Owner:** Ticket Owner is the agent who is designated to solve the support requests. A new ticket received in your helpdesk will stay Unassigned. You can choose to assign ownership manually or by using one of the intelligent automation systems. A ticket's owner can be changed any number of times.
11. **Due Date:** Ticket due date will help you to maintain service commitments with your customers. It is often set by one of the default SLAs built into the system or by a custom SLA associated with an account. An agent can as well set the due date using the date and time picker widget.
12. **Priority:** When you must handle hundreds of tickets every day, it is impossible to decide which ticket you should pick first. And, therefore tickets are assigned with priorities. Four kinds of priorities can be assigned to a ticket: High, Medium, Low, None. Priorities can be manually set by agents or by using one of the automation systems. Additionally, you can set the priority using the default priority-based SLAs.
13. **Channel:** These are the means through which you receive the tickets in your helpdesk. There are seven channels: Phone, Email, Web, Chat, Forums, Twitter, Facebook. The channel will be set to Phone when an agent logs a new ticket, and it will be auto-filled for most other occasions. It will be quite useful when you have set up business rules around the origin of tickets.
14. **Category and Sub Category:** These are additional fields that will help you in the process of assigning the right tickets to the right agent at the right time. You can add custom values to the Category field and have it mapped to Sub Category in a parent-child relationship. For example, when an end user selects 'Defect' under Category, you can display associated Sub Category values like Under Warranty, Out-of-Warranty, Extended Warranty, etc., This can be used to deflect a ticket to the best agent, department or a user group.
15. **Attachment:** Add files that are relevant to a ticket. Your customers can send in emails with attachments, which will be added to the tickets that are created in Zoho Desk. Files can also be uploaded while submitting a ticket in the Help Center.

B.2 How to respond to tickets

The person who has sent the ticket initiates the conversation. Just above the conversation is the *Reply All* link which can be used when there are multiple recipients for the ticket and you want to respond to all of them. Click the Reply All icon () to open the editor window.

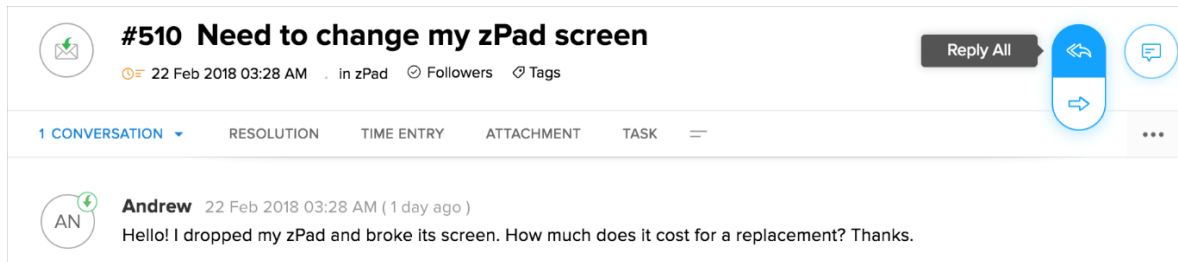


Figure 25: Ticket example

If there are multiple recipients involved and you want to reply to just the person who has sent the ticket, click Reply (from inside the editor).

Within the editor, compose your response for the ticket. When you're done composing, click the Send button at the top of your editor window. This will complete your action of responding to a ticket. You can also click Send & Close to send a reply and close the ticket simultaneously.

Your recent response will now be listed just below the title of the ticket. You can view the date and the time at which you sent the reply.

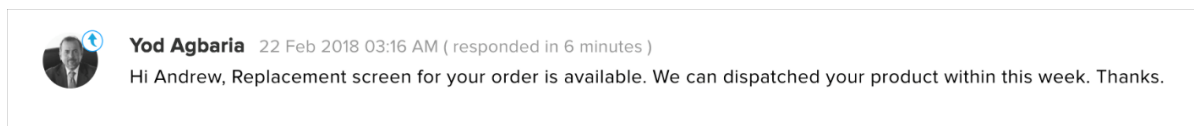


Figure 26: Ticket reply

B.2.1 ACTIVAGE How to manage tickets

Ticket tabs allow you to link tickets to the other standard modules in your help desk. These tabs provide contextual information about a ticket such as ticket activity, pending tasks, supportive files, resolutions and the like. Let's look at the different types of tabs in more detail.

History

The ticket history (or the audit trail), shows the support team the full sequence of activities associated with each ticket. The history allows you to review all actions that have been taken both by your support agents and through system automation, giving you a comprehensive picture of the support process from start to finish.

Here is how a ticket's first event is recorded in its history:

#449 I need to order Zpad and Zwatch
09 Feb 2018 02:53 AM Followers Tags

9 CONVERSATION RESOLUTION TIME ENTRY ATTACHMENT **HISTORY**

Ticket History - All

02:53 AM
Andrew submitted a new ticket via email

Contact Name Andrew
Email andrew@mailinator.com
Subject I need to order Zpad and Zwatch
Status Open
To Address orders@zylker.zohosupport.com
Channel Email

Figure 27: Ticket history

The following are registered in a ticket's history:

- Agent activities, including sending a reply, editing ticket properties, changing ownership, applying a macro, etc.
- Customer activities, including responding to their ticket, receiving an email notification, updating ticket properties, etc.
- Automated actions, such as a workflow trigger, applying an assignment rule, SLA alerts, etc.

To view ticket's history:

1. Open a ticket to view its details.
2. Open the History tab at the top of the page.

Approval

Often, agents do not have the authority to make decisions on all customer requests. For example, some businesses do not offer returns. However, a customer might have just purchased a product with a manufacturing defect and is now requesting to replace it. For this type of exceptional circumstance, the support agent may not have the authority to decide by themselves but will have to get approval from someone in a supervisory role. The approval feature in Zoho Desk allows you handle this with ease.

To submit a ticket for approval:

1. Open the ticket to view its details.
2. Open the Approval tab at the top of the page.
3. Click Send of Approval or click the Add icon (+).
4. Enter the To Address (supervisor), Subject and Description for the request.
5. Click Submit for Approval.

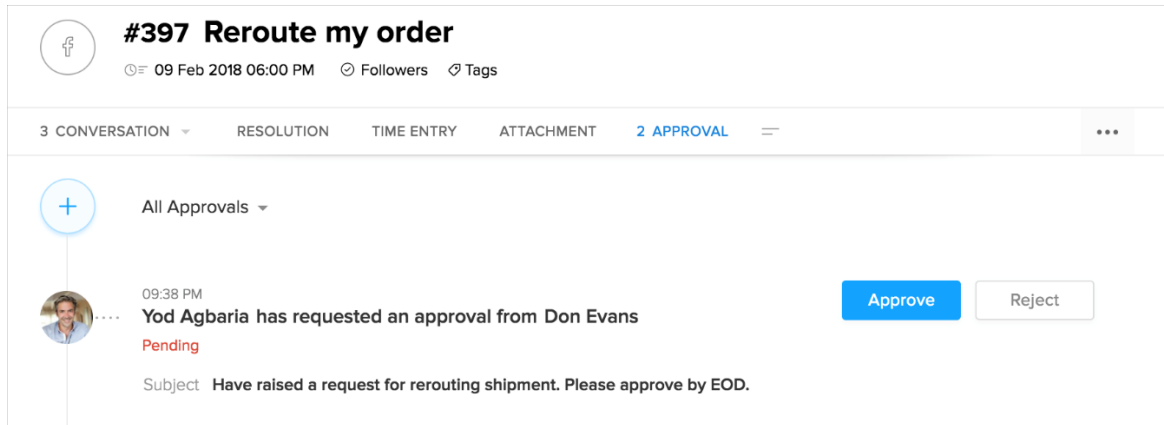


Figure 28: Submit a ticket for approval

When the request is submitted, an email containing a link to the ticket will be sent to the agent's supervisor, who will be able to approve or reject the request from within the ticket's detail view. Until it is approved or rejected, the request is displayed as 'Pending.'

Resolution

After an agent has closed a ticket, they can enter details on how the request was resolved in the Resolution tab. This documentation can help other agents who might encounter similar requests in future. When they submit a resolution, your agents can also choose to post it as an article in the KBase.

To enter a resolution:

1. Open the ticket to view its details.
2. Open the Resolution tab at the top of the page.
3. Enter the resolution details for the ticket.
4. Click Save or Save and Add Solution.

When you click Save and Add Solution, you will be taken to the Add Article page.

After adding a resolution, you can click the More icon (...) to edit or delete your description. A resolution can also be shared with a customer right away. Instead of drafting an email reply, your agents can fill out the resolution field and enable the Notify Contact checkbox. Please note that you cannot add more than one resolution for a ticket.

Tasks

You can use tasks to assign specific segments of work to agents and set specific time frames for them as well. Tasks are listed in the Tasks module and in the ticket's detail page. You can add tasks to a ticket or create a stand-alone task.

To add a task to a ticket:

1. Open the ticket to view its details.
2. Open the Task tab at the top of the page.
3. Click Add a Task link or the Add icon (+).

4. In the Add Task page, enter the task details.
5. Click Submit to create a new task.

Agents will be notified by email when a task is assigned to them.

Note:

- The person who creates a task will be set as the task owner by default. You can use either the drop-down menu or the search bar to assign tasks to agents.
- Create reminders for tasks to get a notification at the time you want. You can choose to be notified by email, SMS or a browser pop-up. The reminder date and time should be less than the due date of the task. You can only set a reminder if you have specified a due date.

Closing Tasks

Tasks are closed only when their status is updated as Completed.

To close a task:

1. Open the ticket to view its details.
2. Open the Task tab at the top of the page.
3. From the Task List view, hover your mouse over a task and click the Check-Box icon (☑) to the right.

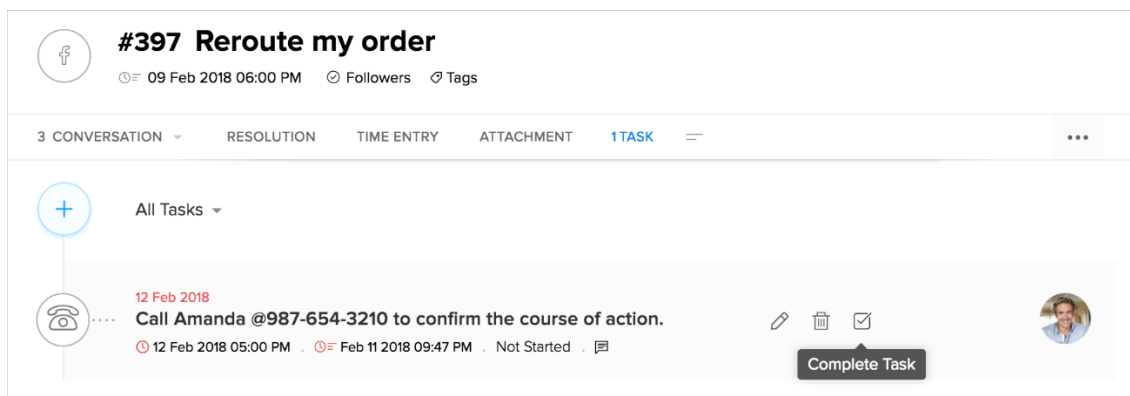


Figure 29: Closing a Task

Time Entry

The Time Entry module allows your agents to log the time they spend working on each ticket. Support managers can later generate a report to review and analyze the time spent during specific periods.

Time entries will come in handy for analyzing certain key help desk metrics including:

- The time spent on each ticket created in your help desk.
- The total billable hours of an agent during specific periods, e.g. in a week or a month.
- The total support cost per agent or of a customer account.

To add a Time Entry:

1. Open the ticket to view its details.
2. Click the Time Entry tab at the top of the page.
3. Click Add a Time Entry link or the Add icon (+).
4. In the Add Time Entry page, specify the time spent and the associated costs.
5. Click Submit to add the entry.

To edit a Time Entry:

1. Open the ticket to view its details.
2. Click the Time Entry tab at the top of the page.
3. Hover your mouse over an entry and click the Edit icon (✎).
4. Make the necessary changes to the Time Entry and click Save.

To delete a Time Entry:

1. Open the ticket to view its details.
2. Click the Time Entry tab at the top of the page.
3. Hover your mouse over an entry and click the Delete icon (🗑).
4. Click OK to delete.

Attachments

File attachments may include customer support collateral, support quotes/invoices, SLAs, as well as other support documentation. The attachments can be associated with tickets and viewed by your customers in the Help Center.

To upload an attachment:

1. Open the ticket to view its details.
2. Click the Attachment tab at the top of the page.
3. Click the Add an Attachment link or the Add icon (+).
4. Select the file you wish to upload.

When a file is attached, it will be set as 'Public' and can be viewed by your end users. You can click the More icon (...) to set the attachment as 'Private.'

To delete an attachment:

1. Open the ticket to view its details.
2. Click the Attachment tab at the top of the page.
3. Click the More icon (...) next to the attachment and then click Delete from the drop menu.

You can upload either a single file or multiple files for each ticket. The size of each file cannot exceed 20MB.