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ACTIVAGE PROJECT

ACTivating InnoVative IoT smart living environments for AGEing well

Support and training plan for deployment of AIoTES

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Abstract

This document is the deliverable D5.2 “Support and Training Plan for Deployment of AIoTES” 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*”. The purpose is to describe 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.

Training has been specified starting from these reference use cases, using a state of art methodology. Each stakeholder is associated with capabilities to learn in order 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 enables to establish a list of courses that will be prepared in future work and which will be made available onto a distance learning platform which will be deployed.

Training provides the necessary knowledge for the deployment site to apprehend the integration of AIoTES in first hand. To support this integration more operationally, two tools are specified: a support tool and an on-site test framework. The support tool 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 is provided in order 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 is to ensure that the various AIoTES instances in each deployment site are 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 mislocation, misconfiguration or miscalibration of devices. This tool is developed in close relation to those developed in WP4 in order 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.

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1 About This Document

The purpose of the work presented in this document is to facilitate the integration of AIoTES within the deployment sites by providing at first training, then support and finally a testing framework.

It serves as a link in the iterative phases of the project. Indeed, during phase 2 DEMONSTRATE, AIoTES is in the edge between integration and early adoption by the deployment sites. In order to fulfil all 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 as input the different requirements coming from the deployment sites and expressed within deliverable 2.1. The other inputs concern the technical deliverables resulting from the work carried out in WP3 and WP4, in particular the 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 O1 "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 O2 “Implementation, Demonstration and Replication of Use Cases” providing and O6 “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	D5.2 is a direct contribution to the perpetuation of AIoTES as the most important exploitable result from ACTIVAGE.
Work plan	D5.2 report work progress in T5.2 “Test and validation of ACTIVAGE IoT Ecosystem Suite” for the definition of test cases and T5.3 “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 T5.4 “Support for deployment sites (also for future sites open calls).
Milestones	This deliverable contributes to the MS2 – Demonstrate with 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 MS3 - Expand, which makes it easier for external developers and open-callers to integrate the project with appropriate training and support.
Deliverables	D5.2 is the first of two-version defining the support and training plan for the ACTIVAGE IoT Ecosystem Suite. The following deliverables have provided major inputs for defining this support and training plan : - 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 have to be trained for
Risks	D5.2 aims to mitigate the risk 9 “Difficulty in the DS concept Validation and adoption” with two actions: - 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 has to 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 or not 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.

In order 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 though 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 in order 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 have the ability to be replicable over many deployment sites. This role is highly bound to AIoTES and its successivity 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 have to 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 for evaluation by 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 a number of 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	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	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	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	– 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	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 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	– 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	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	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 Info

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	– 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	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	– 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	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	– 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	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	– 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	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	– DS administrator – IoT Installer – Service provider – Users – Final User
Use Case Initiation	The use case is initiated either by : – 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	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	– 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	– DS administrator – IoT Installer – Service provider
Use Case Initiation	The use case is initiated either by : – The DS manager, whenever he is willing to check; – The DS security manager component, automatically and periodically.
Main Flow	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	– 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	– DS manager – User – IoT Installer – Service provider
Use Case Initiation	The use case is initiated either by : – The DS manager, whenever he is willing to check; – The DS security manager component, automatically and periodically.
Main Flow	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	– 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	– 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	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	– 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	– 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	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, as well as the action to undertake in case of privacy breach.
Assumptions & Pre-Conditions	– 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 – DS device installer – Service provider
Use Case Initiation	The use case is initiated either by : – The DS manager, whenever he is willing to check; – The DS security manager component, automatically and periodically.
Main Flow	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	– 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 – DS device installer – Service provider
Use Case Initiation	The use case is initiated either by : – The DS manager, whenever he is willing to check; – The DS security manager component, automatically and periodically.

Main Flow	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	– 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 manager – DS device installer – Service provider
Use Case Initiation	The use case is initiated either by : – The DS privacy manager component, automatically on detected privacy breach or attack.
Main Flow	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	– 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	– User – DS manager – DS device installer – Service provider

Use Case Initiation	The use case is initiated either by : – The DS privacy manager component, automatically on detected privacy breach or attack.
Main Flow	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 AIoTES. For that purpose, a training program should be defined and provided to the various users of AIoTES.

So as to be able to define the training program, the first step to follow is to identify different types of learning and teaching strategies in order to be able to choose the most suitable training methodology for our project.

Moreover, the main elements of the training should be identified. These are the users, who must perform the training, as well as the different capabilities that they need to learn. The ACTIVAGE tools stakeholders have already been defined in section 0. Therefore, this information is not included here again. Section 3.2 introduces the capabilities that the training program should provide their students whereas section 3.3 establishes the connection between users and the skills they need to 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 studies[1] 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" has to be done. Next, the tutor has to 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 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

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

[2] http:// www.4mat.eu

provided by the NLP models, it is then possible to enhance communication between tutors and trainees. As a consequence, 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.

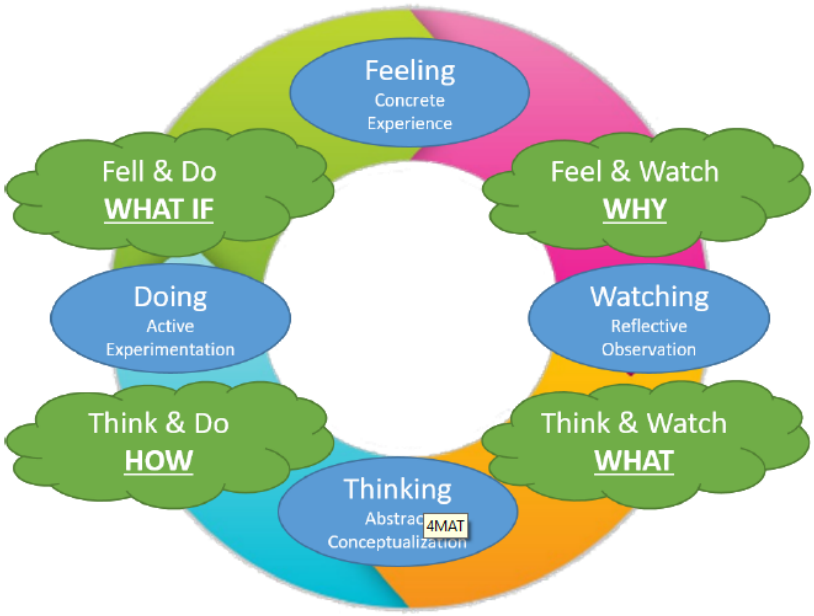

Figure 1: Training user driven approach

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.

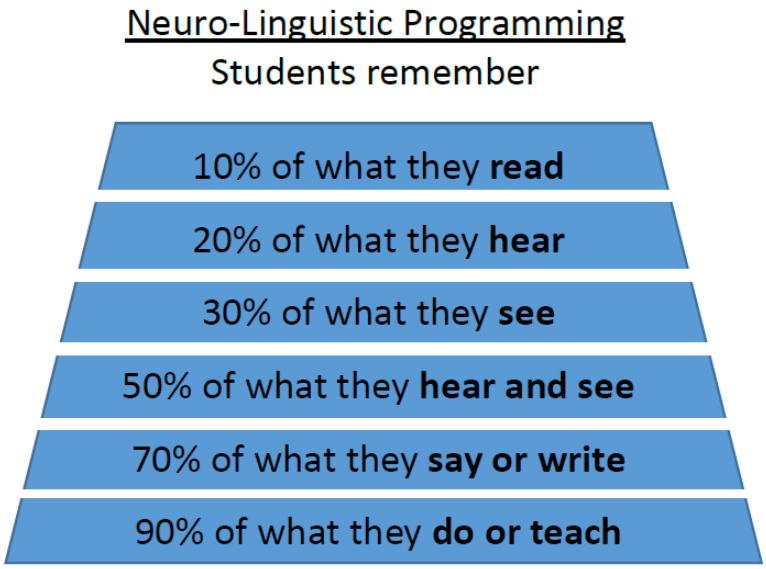

Figure 2: Neuro-Linguistic Programming (NLP) applied to education

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 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, in order 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, in order 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 in order 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 have to 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/marketplace

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, has to develop software components communicating with the AIOTES platform. This person has therefore a knowledge and some experience with AIOTES modules.

ACTIVAGE AIOTES developer: IOTES 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, in order 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, in order 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 an order 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 taken into account for the effective DS management, is administrators' training targeted to optimize 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 in order 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 in order 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 in order 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 a number of key factors that cope with authentication practices and methods for a secure and trusted management of the IoT platforms and their connectivity. Specifically, administrators have to be trained in order 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 have to be supported accordingly in order 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 have to receive an appropriate knowledge level through courses in order 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 in order 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 in order 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), in order 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 be capable of using the Management Toolkit, in order 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 also 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 as long as 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- 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 aspects 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 aspects 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 aspects

	Privacy aspects
AIoTES developer	General knowledge about AIoTES Integration of IoT platforms in AIoTES AIOTES troubleshooting Security aspects 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 aspects Privacy aspects
DS device installer	General knowledge about AIoTES Use of AIoTES management tools Device troubleshooting Security aspects Privacy aspects
Open call participant	General knowledge about AIoTES Background and expertise in the AHA & IoT domains Security aspects Privacy aspects
Other third parties involved in development	General knowledge about AIoTES Background and expertise in the AHA & IoT domains AIoTES development tools Security aspects Privacy aspects

4 Training specification

4.1 Assisted distance learning platform

Due to the training needs in ACTIVAGE of users 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 Politecnica de Valencia, 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 in order 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 taken into account 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 POLIFORMAT[3] 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 (GDRP[5]). [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 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.

[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

Similar to Sakai, POLIFORMAT organizes the content and tools used in courses *site*s. 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 arrange
  - 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.

4.2 List of courses to be prepared

There will be 8 overall courses, one for each specific type of user or stakeholder. Each course will be composed by several simple courses, that correspond to a capability. In this way, each different user will receive training to acquire each of the capabilities required for his/her specific profile.

The list of stakeholder courses and their associated capability courses can be seen in the Table 23 below:

Table 23: Courses for specific stakeholders

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

	Application troubleshooting (view pending tickets, resolve bug, track ticket status, report ticket completion) Privacy and security aspects
Application deployer	General knowledge about AIoTES Use of AIOTES deployment tools Device installation and configuration Application deployment using IoT platform Device troubleshooting (create ticket, view ticket status) Privacy and security aspects
AIoTES expert	General knowledge about AIoTES AIoTES deployment Integration of IoT platforms in AIoTES (bridge development, alignments) Management of DSs (initiation of a new DS, etc.) User management (create users, assign roles, etc.) Privacy and security aspects
AIoTES developer	General knowledge about AIoTES Integration of IoT platforms in AIoTES (bridge development, alignments) AIoTES troubleshooting (view pending tickets, resolve bug, track ticket status, report ticket completion) Privacy and security 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 (create deployment unit, view installed devices/applications, view maintenance status, update components) DS troubleshooting (create ticket, view ticket status) Privacy and security aspects
DS device installer	General knowledge about AIoTES Use of AIoTES management tools Device troubleshooting (view pending tickets, replace malfunctioning device, track ticket status, report ticket completion) Privacy and security aspects
Open call participant	General knowledge about AIoTES Background and expertise in the AHA & IoT domains Privacy and security aspects
Other third parties involved in development	General knowledge about AIoTES Background and expertise in the AHA & IoT domains AIoTES development tools Privacy and security aspects

The list of simple courses, that correspond to specific capabilities, is the following:

– Background on IoT & AHA
– General knowledge about AIoTES

- Use of AIoTES deployment tools
- Integration of IoT platforms in AIoTES (bridge development, semantic alignments)
- Installation and configuration of devices in a private environment (final user / home place)
- Initialize / provision IoT devices security's functions
- Packaging services for deploying in another deployments/marketplace
- AIoTES API
- AIoTES development tools
- Application troubleshooting (view pending tickets, resolve bug, track ticket status, report ticket completion)
- Integration with other AHA services
- DS management
- User management (create users, assign roles, etc.)
- Maintaining IoT devices operational
- Device and application troubleshooting (create ticket, view ticket status)
- DS management (create deployment unit, IoT devices localization, view maintenance status, update components)
- Deploying an application (from Marketplace, or packaged); Batch deploying in many deployments (as well as update of services)
- Knowledge about the topology of the devices
- Knowledge about the devices that are going to be used (e.g how a device is paired, how a device can be reset etc.)
- Basic concepts regarding security
- Advanced concepts about security
- Basic concepts regarding privacy
- Advanced concepts about privacy

5 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 3. There are two main components:

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

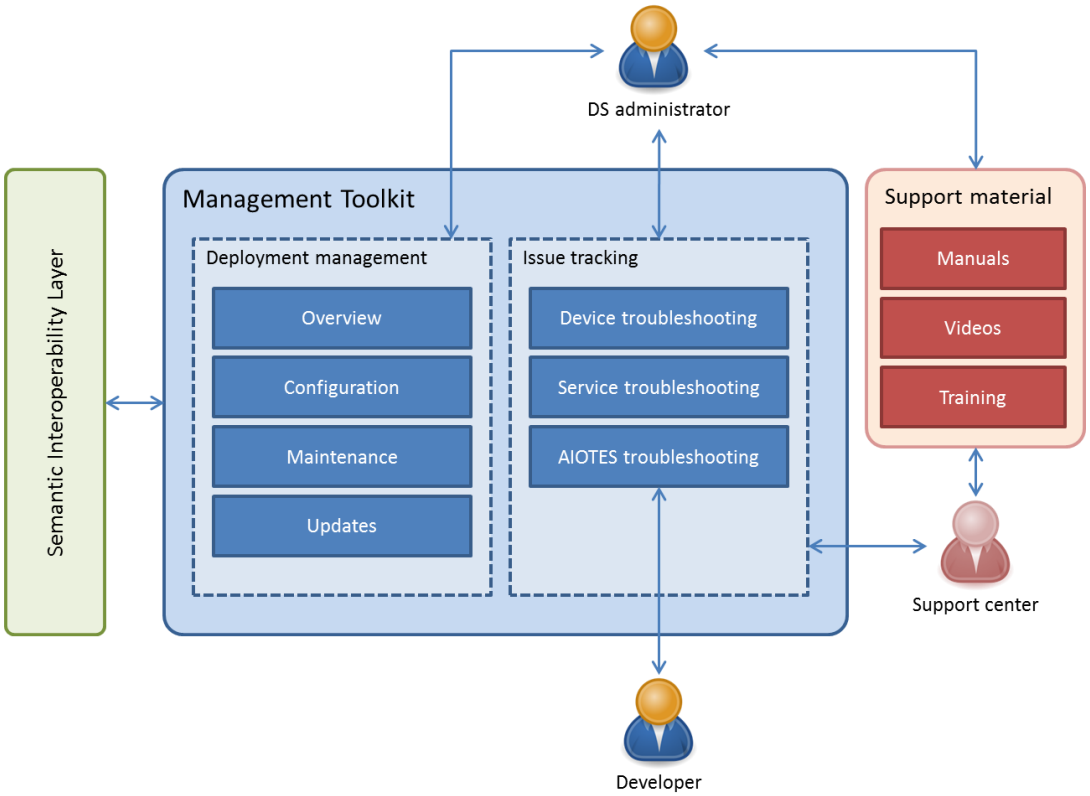

Figure 3: Architecture of the Management Toolkit.

5.1 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 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 all times, in order 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.

5.1.2 Support Process specifications

The AIoTES Support process is divided into six steps as illustrated in Figure 4, on which some may have several occurrences.

5.1.2.1 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 5.1.3)
- 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)

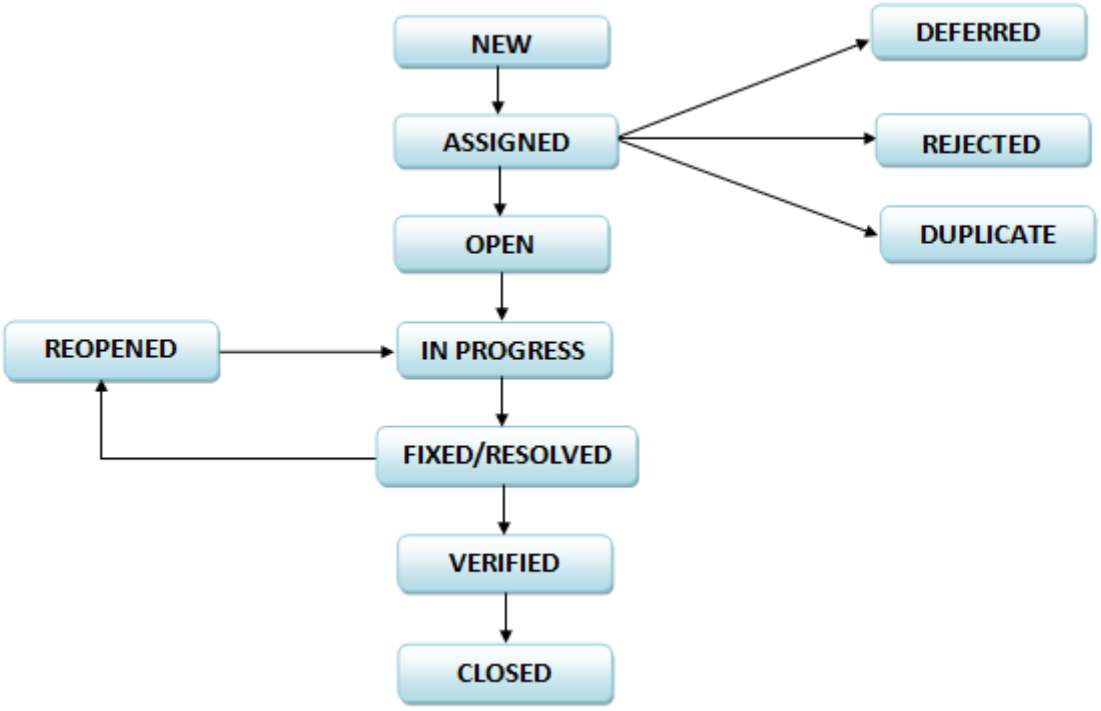

Figure 4: Issue management lifecycle

5.1.2.2 Assignment of a ticket

Once a ticket has been created by a user, it has to 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.

5.1.2.3 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 anytime of the support process, comments and technical data such as pictures or snapshots shall be added.

5.1.2.4 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.

5.1.2.5 Closing ticket

The ticket may be closed at anytime 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.

5.1.2.6 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 24: List of KPI produces by the support tool

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

5.1.3 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

AIoES 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.

5.2 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. 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.

5.2.1 Deployment management specifications

The **deployment management component** offers functionalities for managing the devices and services installed in a deployment site or in specific deployment units and installations. It is meant to offer the DS administrator with an overview of the DS structure in terms of devices and services used, as well as configuration and maintenance operations. It also assists the DS installer while performing and validating on-site operation and access to support if needed. Deployment management functionalities include the following:

– Deployment overview: An overview of all the components of a Deployment Site, such geographical areas it covers, deployment units (e.g. houses) in each area, devices installed in each unit, services/applications installed, etc.

– Device and service configuration: Configuration of devices and services for their installation in a specific deployment unit. Such configuration can include e.g. setting the number of devices used by an application, etc.

– Device and service validation: auditing of a deployment unit to make sure that all device and services are properly configured, according to quality requirements. Such auditing can include making sure that each device is at its correct location inside a house and it has been properly configured and secured.

– Maintenance: Overview of the operating status of the devices and services installed in a Deployment Site, e.g. any malfunctions of devices/applications, battery levels, etc.

– Update management: The ability to update software components (e.g. by downloading and installing the software's newest versions) and hardware components (e.g. by providing links to stores where the newest version can be purchased).

All information regarding the Deployment Site structure, the components installed in it and their status, is stored in the Semantic Interoperability Layer. The deployment management component of the Management Toolkit makes use of the AIOTES deployment tools presented in Deliverable D4.1 "Developers toolkit and deployment support".

5.2.2 Relationships with existing tools

As mentioned above, the DS management and support functionalities of the AIOTES Management Toolkit make use of the deployment tools presented in Deliverable D4.1. Table

25 shows which of the deployment tools of D4.1 are used for the functionalities covered by the deployment management component of the Management Toolkit. More information about the deployment tools can be found in D4.1 "Developers toolkit and deployment support".

Table 25: Mapping between functionalities of the AIOTES Management Toolkit and the development and deployment tools of described in D4.1

Management toolkit functionality	Corresponding deployment tools (WP4)	Comments
Deployment overview	Deployment manager	The deployment manager tool (WP4) offers an overview of the devices and applications installed in a deployment unit or site.
Device and service configuration	Component configuration	The component configuration tool (WP4) allows the deployer to configure specific devices and applications with deployment unit-specific parameters.
Device and service validation	Benchmarking tool	The benchmarking tool (WP4) allows the deployer to determine whether an application or service is working properly.
Maintenance	Maintenance panel	The maintenance panel tool (WP4) allows the deployer to view the status of devices installed in a deployment unit, in order to spot any malfunctions.
Update management	Update manager	The update manager tool (WP4) allows the deployer to update services that have been installed in a deployment unit.

5.2.3 Deployment testing and validation module

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, using the same test templates which can be executed continuously in order to detect early failures. From this list of test case, each deployment site will have the duty to select those concerning their use case in order 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 suite[6], which is hosted by the Commissariat à l'Energie Atomique et aux Energies Alternatives, a member of the

[6] https://www.squashtest.org

ACTIVAGE consortium. It can be replicated onto other partners. This tool handle the basic test components and is compatible with testing automation engines such as Sahi and Selenium

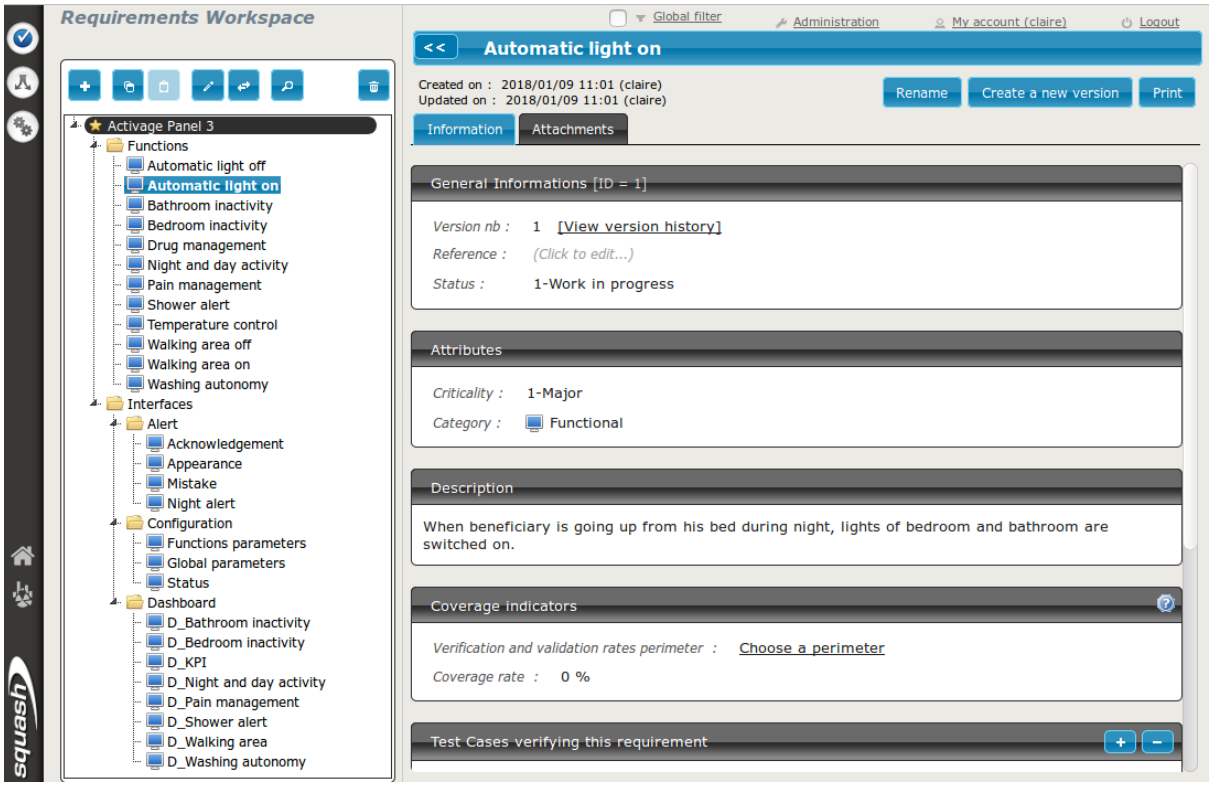

Figure 5: test and validation interface for requirements

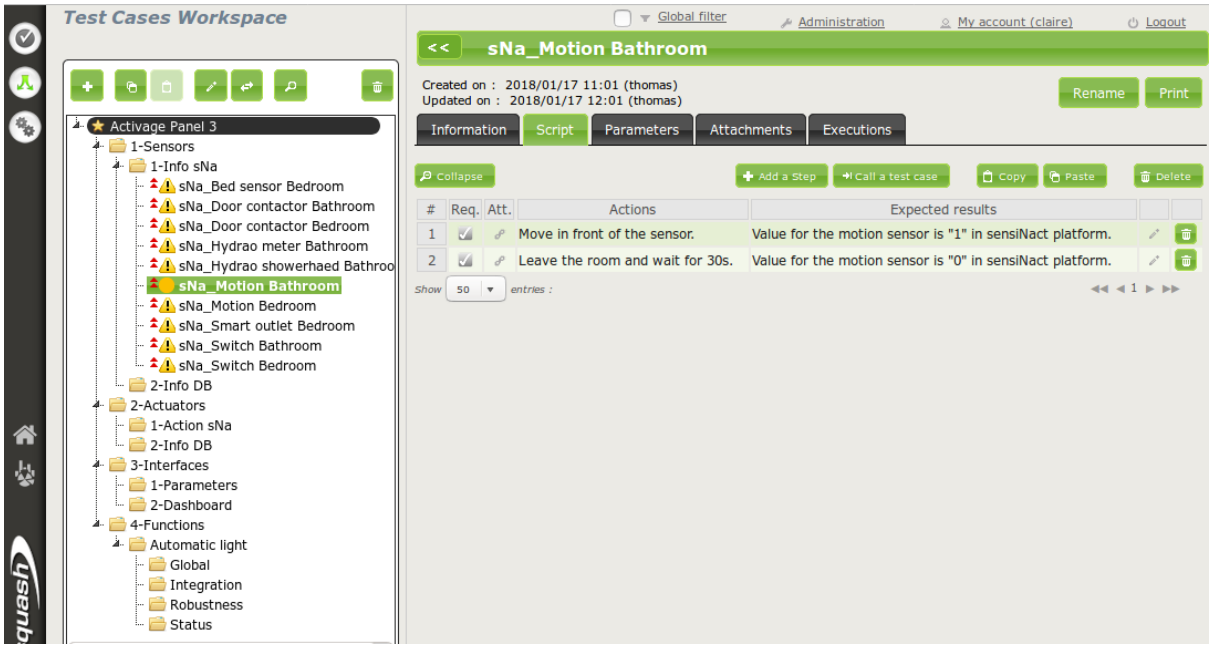

Figure 6: test and validation interface for test cases

6 Conclusion and Future Work

In this deliverable we have presented the training and tools which eases adoption of AIoTES by the deployment sites and open-callers and also enable qualitative deployments.

At first, the training program is to be defined, with the definition of the different stakeholders involved in the development and support phases and their capabilities to be acquired for a proper usage of AIoTES. Once those definition done, a list of course and training platform has been specified. These courses will be prepared in the next future, to have them aligned on time with open calls and first cross-pilots in the deployment sites. The courses will be made by the technical responsible and will be made available using an online training platform.

In addition to training, this deliverable has also presented specifications for support, with two main tools related to AIoTES.

First, there is a support tool for AIoTES, which tracks issues. We presented the life cycle of the tickets that can be created by the different users within the scope of AIoTES. The future work will consist, along with the other WP5 tasks, of choosing this platform and integrating the described process. One of the advantages of this support is to be able to generate performance indicators that can be used on the one hand for the project reporting as well as the other KPIs, also friends for the continued improvement of AIoTES.

Secondly, there is a validation and testing suite that, combined with existing deployment tools under development, help ensure that deployments are functional, consistent with what is expected. This tool also has the ability to collect and produce performance scorers for project monitoring and consolidate feedback from experimentation.

A second version of this deliverable will report the integration of these different training tools and support modules.

References

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