This project has received funding from "HORIZON 2020" the European Union's Framework Programme for research, technological development and demonstration under grant agreement no 645220

Road-, Air- and Water-based Future Internet Experimentation

Project Acronym:	RAWFIE		
Contract Number:	645220		
Starting date:	Jan 1st 2015	Ending date:	Dec 31st, 2018

Deliverable Number and Title	D6.4: RAWFIE Platform Validation (b)		
Confidentiality	PU	Deliverable type[1]	R
Deliverable File	D6.4	Date	23.08.2017
Approval Status[2]	WP Leader	Version	1.0
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[1] Deliverable type: P(Prototype), R (Report), O (Other)
[2] Approval Status: WP leader, 1st Reviewer, 2nd Reviewer, Advisory Board

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DISTRIBUTION

Name / Role	Company	Level of confidentiality[3]	Type of deliverable
Consortium		PU	R

CHANGE HISTORY

Version	Date	Reason for Change	Pages/Sections Affected
0.1	2017-05-26	TOC / Initial version	all
0.2	2017-05-26	Adapted TOC	all
0.3	2017-06-27	First version of the new questionnaire	Section 5, A

[3] Deliverable Distribution: PU (Public, can be distributed to everyone), CO (Confidential, for use by consortium members only), RE (Restricted, available to a group specified by the Project Advisory Board).

0.4	2017-07-07	Handled comments on the questionnaire Final version of the questionnaire	Section 5, A
0.5	2017-07-10	Publishing of the online questionnaire (Google Forms)	Section A
0.6	2017-07-14	First validation scenarios executed (RAWFIE Platform Admin scenarios)	Section 4.2
0.7	2017-07-19	Further validation scenarios executed (Testbed operator scenarios)	Section 4.3
0.8	2017-07-21	Start of installation of MST devices in Skaramagkas testbed	Section D
0.9	2017-07-24	Table “Validation by Requirements” updated	Section 3
0.10	2017-08-08	Closing of questionnaire, including raw results	Section B, C
0.11	2017-08-14	Questionnaire evaluated	Section 5
0.12	2017-08-15	Remaining scenarios filled in with the results from the executed experiments	Section 4.1, 4.4, 4.5
0.13	2016-08-18	Document ready for review	all
0.14	2016-08-18	1st review	all
0.14	2016-08-21	2nd review	all
0.14	2016-08-22	Handling review comments	all
1.0	2016-08-23	Final version	all

Abstract:

The objective of this deliverable is to report the results of the second validation run of the RAWFIE platform. It describes the validation and evaluation procedures and their outcomes of the second implementation phase.
The document is released as a live document in three phases/cycles according to the roadmap (2 of 3).
This deliverable is based on the validation plan setup in D4.6, the requirements found in D3.2 and on the results of tasks T6.1 and T6.2.

Keywords: tests, validation, evaluation, methodology, requirements, questionnaires, interviews

Part II: Table of Contents

List of Tables

Part III: Executive Summary

The objective of this deliverable is a report on the second validation and evaluation of the RAWFIE platform.

The first chapter gives a short induration into this document. The next chapter introduces the used methodology, which is nearly the same as in D6.2.

The validation starts with a list stating which of the requirements from D3.2 are currently met. This gives a high-level overview of the state of the system.

The following chapter presents the results of the executed validation scenarios (defined in D4.6). The scenarios that could be executed were mainly successful.

Then, the new questionnaire is summarized in short. It was completely reworked to get feedback for the metrics of the validation scenarios and about the integration efforts of testbed owners and UxV providers. Unfortunately, no external experimenters were involved in the experiments and therefore we got only answers from testbed owners and UxV providers. The results of the questionnaire showed that the integration of UxVs is smoothly concluded, but the integration of testbed need to be simplified.

The last chapters give a short roadmap of the validation steps along with the conclusion and outlook.

Part IV: Main Section

1 Introduction

1.1 Scope of D6.2

This deliverable presents the approach and the results of the second evaluation and validation of the RAWFIE system. In addition to verification ("Are we building the product right?"), the validation ("Are we building the right product?") also benefits from end-user feedback.

Several real tests and validations were executed in the testbeds of Skaramagkas, RT-ART Zaragoza and DFKI Bremen. The participating users and partners filled in a questionnaire and the results of the test were used to fill in the test tables in the following sections.

The evaluation of the system performance was left out of this deliverable as new performance results were already presented in D6.3 section 2.7.

This deliverable aims at:

- Describing the adopted methodology,
- Validating which requirements presented in D3.2 are currently met,
- Preparing end-user validation and questionnaires,
- Evaluating the questionnaires that were filled out after running the experiments,
- Evaluating validation tests and fill in the validation tables,
- Defining a roadmap on how the validation will be realised in the last version of this deliverable.

1.2 Relation to other deliverables

The present D6.4 deliverable is an update of D6.2. D6.4 uses the same methodology and updates the validation results of D6.2

The updated validation scenarios were taken from D4.6. They check if the validation-related requirements defined in D3.1/D3.2 are met.

D6.6 will be the third and final version of the "RAWFIE Platform Validation". It will contain further end-user feedback, especially from the users of the first and second Open Calls. The validation scenarios and templates of D4.9 will be used to perform the validation tests, based on the final metrics and success criteria.

2 Methodology

Methodology used for this deliverable is mostly the same as in D6.2 and is not repeated. The main difference is that the questionnaire was completely reworked (to get feedback for the metrics of the validation scenarios and about the integration efforts of testbed owners and UxV providers) and more experiments were executed.

Regarding section “2.2 Observing the end-user while operating the system” of D6.2 the website analysis tool Piwik[4] was installed. It tracks the RAWFIE Web Portal and the Wiki application.

[4] https://piwik.org/ https://piwik.org/

3 Validation by requirements

The following Table 1 lists all requirements defined in D3.2 and states if they are currently met or not. The "OK" column contains a Y(yes) in the requirement is met and a N (no) if not.

Regarding the development plan the most planed features are fulfilled, except the accounting functionalities (which are missing completely until now).

Validations were done during separate integration test and during the real tests in the testbeds.

No	ID	Component	Title	OK	Comment	Linked Scenario
1	PT-GEN-R-001	General	RAWFIE Platform should adopt Sliced Federated Architecture (SFA)	Y/N	Implementation started and ongoing	
2	PT-GEN-R-002	General	RAWFIE platform shall support various roles with different privileges at every level of access.	Y		PA-01, PA-02, TO-01,
3	PT-GEN-R-003	General	The RAWFIE Data model should include all basic entities that are used or/and exchanged by the various components of the RAWFIE Platform	Y		
4	PT-GEN-R-004	General	RAWFIE platform shall provide appropriate data storage for information that needs to be persisted, exchanged, or analysed by the various tools and services.	Y	POSTGRES Database used for storage	All
5	PT-WEB-P-001	Web Portal Tool	A web portal interface shall be provided to the users of the platform to access almost all main functionalities.	Y	Main access to implemented services and tools is achieved via a web portal	All
6	PT-WEB-P-002	Web Portal Tool	Web portal usage shall be allowed only to authenticated users	Y		
7	PT-WEB-P-003	Web Portal Tool	A tutorial or similar type of documentation shall be provided to the users of the platform	Y		
8	PT-BOO-T-001	Booking Tool	Booking Tool should allow booking of resources at the experimenter level for a specified period and for selected resources	Y		
9	PT-BOO-T-002	Booking Tool	Booking Tool functionality shall be compatible with the SFA myslice architecture and the notion of slices reservations	Y	Planned for 3rd dev. iteration	

10	PT-BOO-T-003	Booking Tool	Booking Tool should delegate all its actions related to Booking of a resource to the Booking Service	Y		TO-01
11	PT-BOO-T-004	Booking Tool	Booking Tool may also interact with the Testbeds Directory Service in order to retrieve information on unallocated testbed resources	Y		TO-01
12	PT-BOO-T-005	Booking Tool	Booking Tool should communicate with the underline services using JSON formatted messages (through an RPC or REST API)	Y		TO-01
13	PT-BOO-T-006	Booking Tool	Booking Tool should provide appropriate functionality for viewing the reservations of a user/experimenter	Y		TO-01
14	PT-BOO-T-007	Booking Tool	Booking Tool should allow editing of existing Reservations	Y		
15	PT-BOO-T-008	Booking Tool	Booking Tool should allow cancellation of existing Reservations	Y		TO-01
16	PT-BOO-T-009	Booking Tool	Booking Tool should allow creation of bookings through an intuitive UI interface	Y		TO-01
17	PT-BOO-T-010	Booking Tool	Appropriate notification mechanism should be provided to the user in case status of reservation request is not directly available.	Y		TO-01
18	PT-BOO-T-011	Booking Tool	Booking Tool may provide assistance of feedback to the potential experimenter during the booking process	Y		
19	PT-BOO-T-012	Booking Tool	Booking functionality should provide means to ensure fairness in resource booking as well as protect for malevolent actions that a user may perform.	N	Should be moved to Booking Service	
20	PT-BOO-T-013	Booking Tool	RAWFIE platform should allow virtualization of available UxVs resources during reservation process	N	discarded as not feasible	
21	PT-SYM-T-001	System Monitoring Tool	Listing and/or visualisation of current system health status shall be available	Y		PA-03
22	PT-SYM-T-002	System Monitoring Tool	The current system health status should be grouped thematically.	Y		PA-03
23	PT-SYM-T-003	System Monitoring Tool	Filtering of the accessible component health statuses by user roles/rights should be possible.	N	No access rights defined	
24	PT-SYM-T-004	System Monitoring Tool	The health statuses webpage should be updated automatically.	Y		PA-03

25	PT-SYM-T-005	System Monitoring Tool	The health status information should include a severity indication and possibly textual information with additional details.	Y		PA-03
26	PT-REE-T-001	Resource Explorer Tool	The UI interface shall illustrate testbed and UxV information of the RAWFIE federation that the experimenters should take advantage of	Y		TO-03
27	PT-REE-T-002	Resource Explorer Tool	Registration of testbeds and UxVs may be possible via the Web Portal	Y		TO-03
28	PT-REE-T-003	Resource Explorer Tool	RAWFIE platform should provide a Resource Discovery tool for fine-grained resource searches	Y		TO-03
29	PT-REE-T-004	Resource Explorer Tool	Link to the Booking Tool should be provided	Y		
30	PT-EXA-T-001	Experiment Authoring Tool	Experiment Description Language (EDL) shall be used as a language for the definition of experiment scenarios	Y		
31	PT-EXA-T-002	Experiment Authoring Tool	The EDL should allow the definition of all necessary requirements for an experiment	Y		
32	PT-EXA-T-003	Experiment Authoring Tool	For each defined experiment specific metadata, i.e. name, version, date and description shall be defined.	Y		
33	PT-EXA-T-004	Experiment Authoring Tool	An experimenter shall be able to provide initial conditions and/or configuration parameters for an experiment	Y		
34	PT-EXA-T-005	Experiment Authoring Tool	An experimenter shall be able to manage/guide the available booked resources during experiment authoring	Y		
35	PT-EXA-T-006	Experiment Authoring Tool	An experimenter shall be able to define the type of information to be gathered and/or stored by UxV resource(s)	Y		
36	PT-EXA-T-007	Experiment Authoring Tool	An experimenter shall be able to define the type of metrics to be gathered and/or stored during an experiment and/or per UxV resource	N	Planned for the next iteration	
37	PT-EXA-T-008	Experiment Authoring Tool	An experimenter shall be able to provide navigation or movement directives during experiment authoring	Y		
38	PT-EXA-T-009	Experiment Authoring Tool	An experimenter should be able to provide formation information for a group of UxVs resources	Y		

39	PT-EXA-T-010	Experiment Authoring Tool	A textual editor shall be provided for the authoring of RAWFIE experiments	Y		
40	PT-EXA-T-011	Experiment Authoring Tool	A visual/graphical editor shall be provided for the authoring of RAWFIE experiments	Y		
41	PT-EXA-T-012	Experiment Authoring Tool	Platform shall allow saving, editing and/or deletion of an experiment defined via EDL	Y		
42	PT-EXA-T-013	Experiment Authoring Tool	The visual editor should allow the definition of movement and location waypoints in a map	Y		
43	PT-EXA-T-014	Experiment Authoring Tool	During authoring of an experiment selection of resources should be limited only to the ones previously reserved from the user at the foreseen time of experiment	Y		
44	PT-EXA-T-015	Experiment Authoring Tool	Validation of EDL script should be possible prior to or during saving	Y		
45	PT-EXA-T-016	Experiment Authoring Tool	An experimenter shall have the means to define actions or tasks that should run on a periodic or ad hoc basis during execution of an experiment	N	Planned for 3rd dev. iteration	
46	PT-EXM-T-001	Experiment Monitoring Tool	Experiment Monitoring Tool shall provide overview of experiments of a user	Y		
47	PT-EXM-T-002	Experiment Monitoring Tool	Experiment Monitoring and Visualisation should be integrated	N		
48	PT-EXM-T-003	Experiment Monitoring Tool	Cancellation of running experiments should be possible via Web Portal	Y		TO-02
49	PT-NAV-T-001	UxV Navigation Tool	This component will provide to the user the ability to remotely navigate a squad of UxVs through a user friendly interface.	N	Navigation tool not implemented	
50	PT-NAV-T-002	UxV Navigation Tool	The tool should provided some validation of user's instructions	N	Navigation tool not implemented	
51	PT-NAV-T-003	UxV Navigation Tool	UxV Navigation Tool should be available for the navigation of all moving resources	N	Navigation tool not implemented	

52	PT-NAV-T-004	UxV Navigation Tool	UxV Navigation Tool should be available to read from the database a detailed version of the map of the available areas	N	Navigation tool not implemented	
53	PT-VIS-T-001	Visualisation Tool	The Visualisation Tool shall allow the visualisation of information about the running experiments, in tabular/graphical form	Y		TO-02
54	PT-VIS-T-002	Visualisation Tool	A 3D visualization should be available for the tracking of all moving resources	N	Option available, but will not be supported for now due to missing 3D maps	
55	PT-VIS-T-003	Visualisation Tool	The Visualisation Tool may allow visualisation of video streams coming from the experiment, and experiment's camera control	N	Rejected due to privacy issues. A separate stream will be available that is not going through the RAWFIE platform	
56	PT-VIS-T-004	Visualisation Tool	The Visualisation Tool shall provide access to information UxV device on the geographic map	Y		
57	PT-VIS-T-005	Visualisation Tool	The Visualisation Tool shall allow organization and manipulation of multiple geographic layers	Y		
58	PT-VIS-T-006	Visualisation Tool	Possibility of Adding/Removing/Updating graphical widgets should be provided	Y		
59	PT-VIS-T-007	Visualisation Tool	Possibility to display both actual and expected UxVs' route and position should be provided	Y		
60	PT-DAA-T-001	Data Analysis Tool	Analysis tool will provide interface to data engine.	Y		
61	PT-DAA-T-002	Data Analysis Tool	Analysis tool will provide access to past experiments	Y	Graphite is in place	
62	PT-DAA-T-003	Data Analysis Tool	Analysis tool will provide ability to query message bus streams	N	Planned for 3nd dev iteration	
63	PT-DAA-T-004	Data Analysis Tool	Analysis tool will provide interface to end running jobs	Y	Access to spark master is in place	
64	PT-DAA-T-005	Data Analysis Tool	Analysis tool will provide a simple metric selection interface, a view of the result stream & the job status tab	N	Planned for 3nd dev iteration	
65	PT-DIR-S-001	Testbeds Directory Service	The Testbed Directory Service shall provide access to information on all Testbeds registered in RAWFIE	Y		

66	PT-DIR-S-002	Testbeds Directory Service	The Testbed Directory Service should provide access to information on all Testbeds registered in RAWFIE according to predefined filters	Y		
67	PT-DIR-S-003	Testbeds Directory Service	The Testbed Directory Service shall provide access to information about available resources (UxVs) belonging to the testbeds registered in RAWFIE	Y		TO-01
68	PT-DIR-S-004	Testbeds Directory Service	The Testbed Directory Service should provide access to information on available resources (UxVs) belonging to the testbeds registered in RAWFIE, and according to predefined filters	Y		TO-01
69	PT-DIR-S-005	Testbeds Directory Service	The Testbed Directory Service should provide the possibility to register new testbeds in the RAWFIE platform, as well as to unregister (delete) testbeds from the platform	Y		
70	PT-DIR-S-006	Testbeds Directory Service	Some basic query capabilities should be provided	Y		TO-01
71	PT-DIR-S-007	Testbeds Directory Service	The Testbed Directory Service shall provide the possibility to register new resources belonging to a specific testbed in the RAWFIE platform, as well as to unregister (delete) resources	Y		
72	PT-CPV-001	EDL Compiler and Validator	A tool for translating EDL into user directives shall be provided	Y		
73	PT-CPV-002	EDL Compiler and Validator	An experimenter should have the opportunity to use a code generation engine	Y		
74	PT-CPV-003	EDL Compiler and Validator	Experiments defined via EDL shall be validated after their authoring	Y		
75	PT-CPV-004	EDL Compiler and Validator	The compiler and validator should communicate with the authoring tool in order to transfer error indications and hints for solving them	Y		
76	PT-EXV-S-001	Experiment Validation Service	RAWFIE shall provide a validator to constantly check experiment scenarios during runtime	Y		
77	PT-EXV-S-002	Experiment Validation Service	The validation service should perform syntactic checking	Y		

78	PT-EXV-S-003	Experiment Validation Service	The validation service should perform semantic checking	Y		
79	PT-USR-S-001	Users & Rights Service	User login credentials checking shall be provided	Y		TO-01
80	PT-USR-S-002	Users & Rights Service	RAWFIE platform shall support various roles with different privileges at every level of access.	Y		TO-01
81	PT-USR-S-003	Users & Rights Service	The Users & Rights Service may provide a proxy service for web application that do not check access rights.	N	To be checked if needed	
82	PT-BOO-S-001	Booking Service	Booking Service should support reservations of resources at both user level and experiment level	Y		TO-01
83	PT-BOO-S-002	Booking Service	User level booking should be triggered by the Booking Tool via a REST API.	Y		TO-01
84	PT-BOO-S-003	Booking Service	Experiment level booking should be triggered by the experimenter before issuing a manual or schedule launching of a validated experiment	Y	During experiment authoring selection of resources is available only from a user reservation	
85	PT-BOO-S-004	Booking Service	Experiment level booking should support both immediate booking as well as booking at a future time	Y		
86	PT-BOO-S-005	Booking Service	Booking Service should provide all the necessary methods to manage the bookings including addition, modification and cancellation/deletion operations	Y		TO-01
87	PT-BOO-S-006	Booking Service	Booking Service should be able to compute and return feedback on conflicting bookings for a provided booking request	Y		
88	PT-BOO-S-007	Booking Service	Reservation Data should be persisted in order to survive service failures and be available by other services	Y		TO-01
89	PT-BOO-S-008	Booking Service	Historical data retrieval for Bookings/Reservations should be available on demand	Y		
90	PT-BOO-S-009	Booking Service	Booking functionality shall support reservation of resources involving multiple testbeds	N	It will not be supported	
91	PT-BOO-S-010	Booking Service	Booking functionality should be able to correctly handle simultaneous Reservations requests by end users	Y		
92	PT-BOO-S-011	Booking Service	Notification mechanisms may be provided for experiments scheduled for execution in the future.	N	Moved to Launching Service	

93	PT-LAU-S-001	Launching Service	Launching Service should support short-term or manual launching of an experiment initiated directly by an experimenter	Y		
94	PT-LAU-S-002	Launching Service	Launching Service should support long-term or scheduled launching of an experiment initiated directly by an experimenter	Y		
95	PT-LAU-S-003	Launching Service	Each executing experiment should be uniquely identified within RAWFIE ecosystem	Y		
96	PT-LAU-S-004	Launching Service	During launching it must be ensured that the experiment to be started has been validated based on spatio-temporal constraints	Y	Certain validation checks apply. No spatial checks supported	
97	PT-LAU-S-005	Launching Service	During launching it must be ensured that the experiment to be started belongs to an authorized user of the RAWFIE platform	Y		
98	PT-LAU-S-006	Launching Service	The Launching Service should be able to address simultaneous requests for starting an experiment	Y		
99	PT-LAU-S-007	Launching Service	The Launching Service should send an appropriate message upon successful starting of an experiment	Y		
100	PT-LAU-S-008	Launching Service	The Launching Service may interact with other components or database services in order to retrieve information needed for deciding on launching an experiment	Y		
101	PT-LAU-S-009	Launching Service	Interactions of the launching service with database services and/or other components should respect the RAWFIE platform boundary	Y		
102	PT-LAU-S-010	Launching Service	Launching service should support requests for experiment cancellation	Y		
103	PT-LAU-S-011	Launching Service	RAWFIE platform shall provide means to ensure fairness in experiments execution	N	Discarded. Fairness is considered during reservation of resources	
104	PT-LAU-S-012	Launching Service	Launching service should provide appropriate feedback to the requested entity regarding failures on fulfilling a request	Y		
105	PT-LAU-S-013	Launching Service	Launching service should not alter or modify any information related to the actual execution of an experiment	Y		

106	PT-VIS-E-001	Visualisation Engine	The Visualization Engine shall handle the communication with the Message Bus, for the information that will be coming from the UxVs	Y		TO-02
107	PT-VIS-E-002	Visualisation Engine	The Visualization Engine shall provide a GIS server capable of handling geographical layers (overlays)	Y		
108	PT-VIS-E-003	Visualisation Engine	The Visualization Engine may allow cache of data for faster access to the available geographic layers	N	Not planned for now, we do not have in house maps for that	
109	PT-VIS-E-004	Visualisation Engine	The Visualization Engine shall provide the possibility to reply experiments using historical data	N	Planned for 3rd dev. Iteration, after having the database set up	
110	PT-EXP-C-001	Experiment Controller	Cancellation of running experiments should be possible	Y		
111	PT-EXP-C-002	UxV Naviagation tool	RAWFIE platform shall allow experimenters to remotely navigate UxVs.	N	Not yet implemented	
112	PT-EXP-C-003	Experiment Controller	The Experiment Controller shall support the execution of experiments that involve multiple testbeds	N	Multiple testbed experiments not supported	
113	PT-EXP-C-004	Experiment Controller	The Experiment Controller shall be able to support multiple experiments running	Y		
114	PT-EXP-C-005	Experiment Controller	The Experiment Controller shall be able to analyse the whole experiment script and dispatch the appropriate parts to each responsible testbed facility	Y		
115	PT-EXP-C-006	Experiment Controller	The Experiment Controller shall support receiving feedback at regular intervals from all testbed facilities about the progress of the experiment in this time interval	Y		
116	PT-EXP-C-007	Experiment Controller	The Experiment Controller shall be able to override the order of instructions described in the input script while the experiment is running	N	Not yet implemented	
117	PT-EXP-C-008	Experiment Controller	The Experiment Controller shall be able to continuously feed the front-end tier (Experiment Monitoring Tool) giving the experimenter a clear view of the experiment workflow as a whole	Y		
118	PT-EXP-C-009	Experiment Controller	The Experiment Controller shall send distinct error and warning messages in every case the experiment’s state diverges from the aimed target	Y	Basic warnings and errors, to be extended to next iteration	

119	PT-DAA-S - 001	Data Analysis Engine	Analysis engine will support accepting of analysis jobs	Y	Via distribution from Zeppelin or JAR submit	
120	PT-DAA-S - 002	Data Analysis Engine	Analysis engine will support compiling analysis jobs	Y	Via Apache Zeppelin	
121	PT-SYM-S-001	System Monitoring Service	RAWFIE middle tier shall include a module to monitor the performance of the middle tier components.	Y		
122	PT-SYM-S-002	System Monitoring Service	RAWFIE Testbeds and UxVs statuses should be monitored	N	UxVs statuses currently not sent by the Monitoring Manager of the testbed	
123	PT-SYM-S-003	System Monitoring Service	RAWFIE system administrators should be informed if critical components are down	N	Need to be configured in Icinga	PA-03
124	PT-SYM-S-004	System Monitoring Service	User may register for notifications if special components are down	N	Need to be configured in Icinga	
125	PT-SYM-S-005	System Monitoring Service	Notifications about planned downtimes	N	Need to be configured in Icinga	
126	PT-ACC-S-001	Accounting Service	The accounting service should be capable to accept different cost models regarding RAWFIE usage on a per service basis	N	Accounting Service not implemented	
127	PT-ACC-S-002	Accounting Service	The accounting service should be capable to gather statistics regarding usage of the platform by experimenters.	N	Accounting Service not implemented	
128	PT-ACC-S-003	Accounting Service	The RAWFIE platform should record information related to time and type of access for a service by a user.	N	Accounting Service not implemented	
129	PT-ACC-S-004	Accounting Service	The cost model used may take into consideration the overall time of experiments executed by a user of the platform.	N	Accounting Service not implemented	
130	PT-ACC-S-005	Accounting Service	The accounting service may support different types of charging based on the type of the experimenter (industrial, research, university etc.)	N	Accounting Service not implemented	
131	PT-ACC-S-006	Accounting Service	The accounting service may support predefined types of memberships regarding usage of the platform that may depend on various types of parameters	N	Accounting Service not implemented	

132	PT-ACC-S-007	Accounting Service	The accounting service should be able to handle the addition of new services that may be incorporated in the RAWFIE platform during time.	N	Accounting Service not implemented	
133	TB-GEN-R-001	General	Each UxV Testbed should provide a Slice Interface for federating their capabilities/resources to the experimenter.	N	Planned for 3rd iteration (supported by SAMANT open call project)	
134	TB-GEN-R-002	General	Each Testbed should provide the exact boundaries within which its UxVs can operate	Y		
135	TB-GEN-R-003	General	Testbed areas should at least be able to host/operate multiple UxVs of one or more types	Y		
136	TB-GEN-R-004	General	Testbed areas environment should be closely monitored	Y		
137	TB-GEN-R-005	General	Indoor spaces of a testbed should provide a shielded indoor environment	Y		
138	TB-GEN-R-006	General	Testbed facility areas should comprise storing spaces and be able to receive inspect and assemble and/or fix UxVs	Y		
139	TB-GEN-R-007	General	Testbed facilities should provide emergency services in an extraordinary event	Y		
140	TB-GEN-R-008	General	Testbed areas should provide proper facilities and equipment	Y		
141	TB-GEN-R-009	General	Testbed must provide dedicated computational resources	Y		
142	TB-GEN-R-010	General	Testbeds should be supported by on-site personnel	Y		
143	TB-GEN-R-011	General	Testbeds should conform to all legal restrictions	Y		
144	TB-MOM-001	Monitoring Manager	The Monitoring Manager component should be able to provide information about the capabilities of each resource node.	N	Monitoring manager not implemented. Will be integrated within Testbed Manager	
145	TB-MOM-002	Monitoring Manager	The Monitoring Manager component should collect and report current status of testbed facilities	N	Monitoring manager not implemented. Will be integrated within Testbed Manager	
146	TB-MOM-003	Monitoring Manager	The Monitoring Manager component should store periodically all testbed information	N	Monitoring manager not implemented. Will be integrated within Testbed Manager	

147	TB-MOM-004	Monitoring Manager	Testbed monitoring manager should be able to transmit the current status to the System Monitoring Service.	N	Monitoring manager not implemented. Will be integrated within Testbed Manager	
148	TB-NEC-001	Network Controller	The RAWFIE communication resources shall be managed to offer seamless connectivity in the normal operations of the system.	N	Network Controller not implemented	NC01, NC02
149	TB-NEC-002	Network Controller	Provision of network communication resource	N	Network Controller not implemented	NC02
150	TB-NEC-003	Network Controller	Alternative communication system	N	Network Controller not implemented	NC01, NC02
151	TB-NEC-004	Network Controller	Management of the communication system	N	Network Controller not implemented	NC01, NC02
152	TB-NEC-005	Network Controller	Time constraint verification and notification	N	Network Controller not implemented	NC03
153	TB-REC-001	Resource Controller	RAWFIE platform shall support a semi-autonomously way of navigation of the UxVs	Y		
154	TB-REC-002	Resource Controller	RAWFIE platform should be able to activate the “Emergency Scenario”	N		
155	TB-REC-003	Resource Controller	The Resource Controller shall receive location messages from the vehicles at regular intervals	Y		
156	TB-REC-004	Resource Controller	The Resource Controller shall transmit the next location for the current experiment to the vehicles	Y		
157	TB-REC-005	Resource Controller	The Resource Controller shall be able to plan the next location that will be transmitted in the vehicle taking into account the locations of all UxVs that are active in that testbed	Y		
158	TB-REC-006	Resource Controller	For the experiment accomplishment the Resource Controller shall operate in close coordination with the Experiment Controller	Y		
159	TB-PRO-001	Testbed Proxy	Testbed proxy should act as a reverse proxy	N	Removed from architecture	
160	TB-PRO-002	Testbed Proxy	Testbed proxy contains Inner and Outer Firewall	N	Removed from architecture	
161	TB-MAN-001	Testbed Manager	Testbed Manager shall support permanent storage of all testbed attributes and resources attributes that belong to testbed	Y		
162	TB-MAN-002	Testbed Manager	Testbed Manager shall provide information about the capabilities of each resource node	Y		

163	TB-MAN-003	Testbed Manager	Testbed Manager shall check periodically the status of all other services running at testbed level	N	Status checked only for Testbed Manager. Not possible for other services	
164	TB-MAN-004	Testbed Manager	Testbed Manager shall contain a registration log for all the experiments executed in the testbed	Y		
165	TB-MAN-005	Testbed Manager	Testbed Manager shall be periodically informed about the status of all running experiments in the testbed	Y		
166	TB-MAN-006	Testbed Manager	Testbed Manager shall store configuration parameters for the UxVs in the relevant testbed	Y		
167	TB-MAN-007	Testbed Manager	Testbed Manager shall implement a user interface to support the interactions between testbed operators and machines	Y		
168	TB-MAN-008	Testbed Manager	Testbed Manager shall be able to store data locally in case of transmission failure	N	Not required since it is indirectly supported by appropriate message bus configuration	
169	TB-MAN-009	Testbed Manager	Testbed Manager may provide statistical data/information about testbed operation	Y		
170	TB-UVG-001	General	Compliance of UxV to RAWFIE specification and interfaces	Y		
171	UXV-NOD-001	UxV Node	Each UxV shall have a unique Identification code.	Y		UxV01, UxV02, UxV03, UxV04,
172	UXV-NOD-002	UxV Node	Each UxV node should ensure a minimum autonomy of 15-30 minutes.	-	Not tested	(UxV02, UxV03, UxV5)
173	UXV-NOD-003	UxV Node	Each UxV node should ensure payload.	Y		UxV15
174	UXV-NET-001	UxV Network and Communication	Capability of taking the control of the UxVs from distance.	Y		UxV01, UxV02, UxV04, UxV05, UxV07, UxV08, UxV09
175	UXV-NET-002	UxV Network and Communication	UxVs should be able to Synchronize their Time-References between them.	N		UM-02
176	UXV-NET-003	UxV Network and Communication	The UxV should provide Access Point functionality.	N		UM-02
177	UXV-NET-004	UxV Network and	Each UxV node shall be equipped with primary and secondary communication means.	Y		UM-02

		Communication				
178	UXV-NET-005	UxV Network and Communication	UxV network interface management	N		UM-02
179	UXV-NET-006	UxV Network and Communication	UxV communication interoperability with RAWFIE (incoming)	Y		UxV03, UxV04, UxV05, UxV06, UxV07, UxV08, UxV09, UwV10, UxV11, UxV12, UxV13, UxV14, UM-02
180	UXV-NET-007	UxV Network and Communication	UxV communication interoperability with RAWFIE (outgoing)	Y		UxV03, UxV04, UxV05, UxV06, UxV07, UxV08, UxV09, UxV10, UxV11, UxV12, UxV13, UxV14, UM-02
181	UXV-NET-008	UxV Network and Communication	Neighbouring UxV monitoring	N	not tested in1st iteration	UM-02, UxP03
182	UXV-NET-009	UxV Network and Communication	Each UxV node should be able to send navigation state feedback with at least 2 Hz frequency and maximum 1 sec latency when within radio communication reach.	N	not tested in1st iteration	UxV01, UxV02, UxV15, UM-02
183	UXV-SEN-001	UxV Sensor and Localisation	Each UxV node should tag location and timing capability to each sensor readings	N	not tested in1st iteration	UxV01, UxV03, UxV04
184	UXV-SEN-002	UxV Sensor and Localisation	Each UxV node shall be able to list the available sensors	N	not tested in1st iteration	UxV03, UxV04
185	UXV-SEN-003	UxV Sensor and Localisation	UxV location and sensor data should be made available to the experimenter	Y		UxV02, UxV03, UxV04
186	UXV-SEN-004	UxV Sensor and Localisation	Location sensors should be supported in each UxV unit and can be used remotely during testbed demonstrations.	Y		UxV01, UxV02, UxV04, UxV11,

						UxV12, UxV14, UxV15, RC02
187	UXV-SEN-005	UxV Sensor and Localisation	UxVs should sent a notification to the Resource Controller when they reach the desired location	Y		UxV01, UxV02, UxV03 UxV04, UxV15
188	UXV-STO-001	UxV On-board storage	UxVs shall be able to store data on board.	N	not tested in1st iteration	UxV03, UxV04, UxV08, UxV09, UxV11, UxV12, UxV13, UxV14
189	UXV-STO-002	UxV On-board storage	UxV's shall provide a management tool of the available storage.	N	not tested in1st iteration	UxV03, UxV04, UxV08, UxV09, UxV11, UxV12, UxV13, UxV4
190	UXV-STO-003	UxV On-board storage	UxV's shall provide an authorized access to the data management tool.	N	not tested in1st iteration	UxV03, UxV04, UxV08, UxV09, UxV11, UxV12, UxV13, UxV14
191	UXV-STO-004	UxV On-board storage	UxV's shall provide a data log.	N	not tested in1st iteration	UxV03, UxV04, UxV05, UxV06, UxV07, UxV08, UxV09, UxV10, UxV11, UxV12, UxV13, UxV14
192	UXV-STO-005	UxV On-board storage	UxV's may provide an automated syncing of servers.	N	not tested in1st iteration	UxV13
193	UXV-PRC-001	UxV On-board processing	Each UxV shall be able to operate autonomously.	N	not tested in1st iteration	UxV13
194	UXV-PRC-002	UxV On-board processing	The UxV should provide collision avoidance mechanism.	N	not tested in1st iteration	
195	UXV-PRC-003	UxV On-board processing	Capability of task planning of the UxVs nodes during run-time.	N	not tested in1st iteration	
196	UXV-PRC-004	UxV On-board processing	UxVs should be able to cooperate during the execution of an experiment.	N	not tested in1st iteration	
197	UXV-PRC-005	UxV On-board processing	Each UxV node shall keep position while waiting for new instructions.	N	not tested in1st iteration	

198	UXV-MGT-001	UxV Management	UxVs shall offer on demand resources (Network, Sensor, Processing, and Controller).	N	not tested in1st iteration	UxV03, UxV11, UxV12
199	UXV-MGT-002	UxV Management	UxV shall be capable to revert to a safe mode	N	not tested in1st iteration	
200	UXV-MGT-003	UxV Management	UxV shall be capable to restart each component independently	N	not tested in1st iteration	
201	UXV-MGT-004	UxV Management	UxV shall be capable to monitor the health of the system	N	not tested in1st iteration	
202	UXV-MGT-005	UxV Management	UxV shall be capable to enable/disable each component	N	not tested in1st iteration	
203	UXV-MGT-006	UxV Management	UxV shall be capable to offer safe maintenance access for manufacturers	N	not tested in1st iteration	

Table 1: Validation by requirements

4 Validation by validation scenarios

This section presents the validation scenario tables from D4.6.

The status columns of the table can have five different states as shown in the table below

success	The step or metric was successfully executed or validated
p. success (partial success)	The step or metric was only partial successfully executed or validated. More details are given in the remarks.
failed	The step or metric could not be executed successfully (a failure occurred during execution) or could not be validated
not tested	The step or metric was not tested. Mainly due to missing implementations
n.a. (not applicable)	The step or metric has no quantifiable result in the RAWFIE context, e.g. some administrative or intermediate actions.

Scenario ID**: WP01**	Conducted by**: Fraunhofer**	Date**: Feb 2016**
Title	Title of the scenario	
Main stakeholder	The stakeholder that mainly acts in this scenario	
Secondary stakeholder	Additionally stakeholders that also act in this scenario	
Involved Subsystems	RAWFIE subsystems / components that are used during the scenario	
Validated requirement	Requirements that are validated with the scenario	

Step	**Description**	**Status**	**Remarks**
1	Do something	success	
2	Do something else	not tested	
3	Check something	p. success	
4	Do something else	n.a.	

#

Metric	**Success criteria**	**Status**	**Remarks**
Platform / 1 / stable system	100%	failed	

Some metrics were measured but not checked because the success criteria were not defined. This short coming will be resolved in D6.6 because the success criteria were added in D4.9 (which is the basis of D6.6).

4.1 User defined scenarios

Only “Monitoring of Water Canals” was executed partially. Other user defined scenarios were skipped.

4.1.1 Monitoring of Water Canals

Scenario ID: **UD-01**	Conducted by: **UoA**	Date: **July 2017**
Title	Monitoring of Water Canals	
Testbed performed	HMOD Testbed, in Skaramagas premises, Greece	
Number of UxVs	2-3	
UXV MANUFACTURER	MST, ALTUS	
Comment	UxVs that can collaborate for the purpose of environmental monitoring of water canals and gather of information that can be used for assessing quality of the water and structural integrity of canal walls *See also*: D3.1 section 3.3.1	
Validated requirement		

Technology	**Details**	**Status**	**Remarks**
Fixed wing UAV	inspect rapidly a large area.	Not tested	UAVs not delivered
Rotary wing UAV	inspect precisely the problematic area	Not tested	UAVs not delivered
USV or UUV	inspect precisely the underwater problem area	success	
UGV	inspect precisely bank areas	Not tested	Not available UGVs in a testbed with USVs
spectral imaging sensor and areal camera	image the area via USV	success	
bathymetric sensor (sound sensors)	acoustic maps of the underwater area via USV or UUV	success	

Measurements	**Details**	**Status**	**Remarks**
Spectral images		success	
Areal images		Not tested	
Acoustic maps		Not tested	

Environment	**Details**	**Status**	**Remarks**
Open air water channels	These channels should be able to be prepared to simulate a pollution	Not available	Testbed of Skaramagas is an area of open sea where a pollution event will be simulated

Algorithm	**Details**	**Status**	**Remarks**
Image analysation	Identify problems on spectral images, areal images and acoustic maps	Partial success	Spectral images were captured
Movement pattern	Evaluate patterns for inspecting rapidly of a large area via fixed wing UAV Evaluate patterns for inspect precisely of a small area via rotary wing UAV	Partial success	Movement patterns by USVs

Special script steps	**Details**	**Status**	**Remarks**
	Specific waypoints were simulate rectangles or more complicates schemas	success	
	Sensor data were published to RAWFIE platfrom	Success	

Metric	**Success criteria**	Success	**Remarks**
PLATFORM / PERF / 1 / STABLE SYSTEM	Downtime < 2%	4	
PLATFORM / PERF / 2 / ERRORS	Errors to experiments rate < 5 %	4	
PLATFORM / PERF / 5 / LATENCY/ RESULTS UPDATE TIME	Update time < 5 sec	4	

PLATFORM / PERF / 6 / LATENCY/ BOOKING TIME	Booking Time < 30 seconds		
PLATFORM / USE / 7 / NOTIFICATION	Questionnaire rates “notification” with an average > 3.5 (1 to 5)	Not measured	
PLATFORM / USE / 13 / GUIDANCE	Questionnaire rates “guidance” with an average > 3.5 (1 to 5)	N.a	
PLATFORM / USE / 14 / FILTERING	Questionnaire rates “filtering” with an average > 3.5 (1 to 5)	5	
PLATFORM / USE / 15 / EXPERIMENTS STATISTICS		5	
TESTBED / DATA / 1 / INFORMATION	Daily updates. Always available during testbed working hours.	5	
TESTBED / FUNC / 3 / AVAILABILITY	Downtime for maintenance, as well as other planned unavailability which may prevent the execution of the experiments should be communicated in advance, at least 2 days before.	Success	
TESTBED / USE / 4 / CONSISTENCY	Questionnaire rates “consistency” with an average > 3.5 (1 to 5)	Success	
UxV / FUNC / 1 / COHERENCE	Questionnaire rates “coherence” with an average > 3.5 (1 to 5)	Success	
UxV / FUNC/ 2 / MISSION ACHIEVEMENT	Questionnaire rates “mission achievement” with an average > 3.5 (1 to 5)	4	

4.2 RAWFIE Platform Admin scenarios

4.2.1 Administrator manages the user rights

Scenario ID**: PA-01**	Conducted by**: Fraunhofer**	Date**: July 2017**
Title	Administrator manages the user rights	
Comments		
Main stakeholder	RAWFIE Admin	
Secondary stakeholder	Experimenters	
Involved Sub-systems	Web Portal Users & Rights Service	
Validated requirement	PT-WEB-P-002	

Step	**Description**	**Status**	**Remarks**
1	Administrator opens the user management of the Web Portal	success	
2	Administrator searches for a given user	success	
3	Administrator changes the rights of the given user	success	

Metric	**Success criteria**	**Status**	**Remarks**

4.2.2 Administrators adds a new user

Scenario ID**: PA-02**	Conducted by**: Fraunhofer**	Date**: July 2017**
Title	Administrators adds a new user	
Comments		
Main stakeholder	RAWFIE Admin	
Secondary stakeholder	Experimenters	
Involved Sub-systems	Web Portal Users & Rights Service	
Validated requirement	PT-WEB-P-002	

Step	**Description**	**Status**	**Remarks**
1	Administrator opens the user management of the Web Portal	success	
2	Administrator clicks on “new user”	success	
3	Administrator inserts the user data and submits the data	success	
4	Users & Rights Service save the user	success	
5	Information is sent to the new user via email	not tested	No email service configured

Metric	**Success criteria**	**Status**	**Remarks**

4.2.3 System monitoring and error notifications

Scenario ID**: PA-03**	Conducted by**: Fraunhofer**	Date**: July 2017**
Title	System monitoring and error notifications	
Comments		
Main stakeholder	RAWFIE Admin	
Secondary stakeholder		
Involved Sub-systems	Web Portal System Monitoring Tool System Monitoring Service (Launching Service)	
Validated requirement	PT-SYM-T-001, PT-SYM-T-002, PT-SYM-T-004, PT-SYM-T-005	

Step	**Description**	**Status**	**Remarks**
1	Launching Service crashes	n.a.	Shutdown manually
2	System Monitoring Service checks system state and detects that Launching Service is not running	success	
3	System Monitoring Service sends a notification email to the administrator	not tested	No email service configured
4	Administrator opens the System Monitoring Tool	success	
5	Administrator checks system state	success	
6	Administrator restarts Launching Service via some SSH client	success	
7	Administrator checks system state (now Launching Service is running again)	success	

Metric	**Success criteria**	**Status**	**Remarks**
PLATFORM / PERF / 1 / STABLE SYSTEM			
PLATFORM / PERF / 2 / ERRORS			
PLATFORM / PERF / 4 / RECOVERY TIME			
PLATFORM / USE / 7 / NOTIFICATION			
PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY			
PLATFORM / USE / 12 / VISUALISATION / UTILITY			
PLATFORM / USE / 13 / GUIDANCE			
PLATFORM / USE / 14 / FILTERING			

4.3 Testbed operator scenarios

4.3.1 Schedule maintenance of resources

Scenario ID: **TO-01**	Conducted by: **HAI**	Date: **July 2017**
Title	Schedule maintenance	
Comment	The Testbed operator wants, for maintenance purposes, to temporary remove some resources (UxVs) already assigned to future experiments from a testbed	
Main stakeholder	Testbed Operator	
Secondary stakeholder	Experimenters	
Involved Sub-systems	Web Portal Booking Tool Booking Service Testbed Directory Service Users & Rights Service	
Validated requirement	PT-GEN-R-002, PT-BOO-T-003, PT-BOO-T-004, PT-BOO-T-005, PT-BOO-T-006, PT-BOO-T-008, PT-BOO-T-009, PT-BOO-T-010, PT-BOO-S-001, PT-BOO-S-002, PT-BOO-S-005, PT-BOO-S-007, PT-BOO-S-011, PT-DIR-S-003, PT-DIR-S-004, PT-DIR-S-006, PT-USR-S-001, PT-USR-S-002,	

Step	**Description**	**Status**	**Remarks**
1	Testbed operator wants to maintain certain UxVs because a problem has occured	success	
2	Via the Booking Tool he tries to find a period where the involved UxVs are free	success	Booking Tool supports filtering per UxV
3	He could not find one in the near future and decides to cancel some bookings	success	
4	The affected experimenters are notified via email that their bookings were cancelled	success	
5	The involved UxVs become unavailable for the period of the planned maintenance	failed	Web Portal Resource Explorer Tool does not support status change for each UxV to reflect maintenance or other reasons of unavailability
6	A new experimenter trying to make a Booking to the specified testbed should not be able to select the unavailable UxVs	failed	The current version of Booking Tool cannot support this step
7			

Metric	**Success criteria**	**Status**	**Remarks**
PLATFORM / USE / 7 / NOTIFICATION			
PLATFORM / USE / 8 / ROLES			
PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY			
PLATFORM / USE / 12 / VISUALISATION / UTILITY			
PLATFORM / USE / 13 / GUIDANCE			
PLATFORM / USE / 14 / FILTERING			
TESTBED / DATA / 1 / INFORMATION			

4.3.2 Cancel running experiment

Scenario ID**: TO-02**	Conducted by**: HAI**	Date**: July 2017**
Title	Cancel running experiment	
Comment	A testbed operator figures erroneous behaviour and wants to cancel a running experiment and ensure the resources return safely to their base	
Main stakeholder	Testbed Operator	
Secondary stakeholder	Experimenters (e.g. via the Experiment Monitoring tool and Experiment Controller)	
Involved Sub-systems	Web Portal Experiment Monitoring Tool Launching Service Experiment Controller Navigation Service Resource Controller Visualization Tool	
Validated requirement	PT-EXM-T-001, PT-EXM-T-002, PT-EXM-T-003, PT-NAV-T-003, PT-LAU-S-010, PT-LAU-S-012, PT-EXP-C-001, PT-EXP-C-007, PT-EXP-C-008, PT-EXP-C-009, TB-REC-002, TB-REC-003, TB-REC-006, PT-VIS-T-001, PT-VIS-E-001,	

Step	**Description**	**Status**	**Remarks**
1	the Testbed Operator notices that something goes wrong	success	
2	he opens the Experiment Monitoring Tool and browse to the experiment	success	
3	he initiate the cancelation of the experiment via the Experiment Monitoring Tool	success	
4	the Experiment Monitoring Tool instructs the Experiment Controller (via Launching Service)	success	Launching Service produces ExperimentCancelReq message at the Message Bus
5	the Experiment Controller issues the appropriate commands to send the UxVs back to the port	not tested	Responsibility of the Resource Controller
6	the Resource Controller receives the commands and guides the UxVs back (possible activation of emergency scenario).	success	
7	The Testbed Operator is able to view the route of UxV on a map and confirm that it returned to base	success	

Metric	**Success criteria**	**Status**	**Remarks**
PLATFORM / USE / 7 / NOTIFICATION			
PLATFORM / USE / 8 / ROLES			
PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY			
PLATFORM / USE / 12 / VISUALISATION / UTILITY			
PLATFORM / USE / 13 / GUIDANCE			
PLATFORM / USE / 14 / FILTERING			
TESTBED / DATA / 1 / INFORMATION			

4.3.3 Connect a new Testbed to the RAWFIE platform

Scenario ID**: TO-03**	Conducted by**: HAI**	Date**: July 2017**
Title	Connect a new testbed	
Comment		
Main stakeholder	Testbed Operator	
Secondary stakeholder	RAWFIE Admin	
Involved Sub-systems	Web Portal Experiment Monitoring Tool Experiment Controller Navigation Service	
Validated requirement		

Step	**Description**	**Status**	**Remarks**
1	The Testbed Operator agrees with the RAWFIE platform Admin to connect its Testbed	success	
2	Testbed Operator ensures the testbed fullfil the needed requirements to be connected to the RAWFIE platform (Networking facilities, and so on)	success	
3	Testbed Operator updates the Master Data Repository with new Testbed information via the Resource Explorer	not tested	This functionality is not supported from Resource Explorer Tool (moved to Testbed Manager). Registration of new testbeds will be initiated from Testbed Manager
4	Testbed Operator configures the Testbed components to be able to communicate with the rest of the RAWFIE platform	success	

Metric	**Success criteria**	**Status**	**Remarks**
PLATFORM / USE / 7 / NOTIFICATION			
PLATFORM / USE / 8 / ROLES			
PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY			
PLATFORM / USE / 12 / VISUALISATION / UTILITY			
PLATFORM / USE / 13 / GUIDANCE			
PLATFORM / USE / 14 / FILTERING			
TESTBED / DATA / 1 / INFORMATION			
PLATFORM / FUNC / 17 / EXTENSIBILITY			

4.4 UxV Manufacturers scenarios

Scenario “Autonomous coordination of multiple UxVs” was not executed

4.4.1 Install new UxVs in a testbed

Scenario ID**: UM-01**	Conducted by**: UoA**	Date**: July 2017**
Title	Install new UxVs in a testbed	
Comment		
Main stakeholder	UxV Manufacturers	
Secondary stakeholder	Testbed Operator	
Involved Sub-systems	Web Portal Resource Explorer	
Validated requirement	PT-P-003, TB-G-004	
Testbed performed	HMOD Testbed, in Skaramagas premises, Greece DFKI, Testbed in Bremen, Germany RT-ART, Testbed in Zaragoza, Spain	
Number of UxVs	1-7	
UXV MANUFACTURER	MST, ALTUS, University of Zagreb, Robotnik	

Step	**Description**	**Status**	**Remarks**
1	UxV Manufacturer ask the Testbed Operator if new UxVs could be installed in the testbed	Success	
2	Testbed Operator agrees		
3	UxV Manufacturer sends the new UxVs to the testbed site	success	
4	UxV Manufacturer give the information about the UxVs to the Testbed Operator	success	2 days of training is usually follows You can find the agenda of training days in the annex
5	Testbed Operator update the resource description for its testbed via the Resource Explorer	Not tested	
6	UxV Manufacturer ensures the UxV Node is able to send / receive information to from the RAWFIE components through the foreseen software interfaces	success	The testbed operator is using the platform for executing 2-3 experiments with one and afterwards more UxVs available
7	UxV Manufacturer and Testbed Operator configure the Testbed and RAWFIE platform components to control the new UxVs	suceess	

Metric	**Success criteria**	**Status**	**Remarks**
PLATFORM / FUNC / 17 / EXTENSIBILITY	Success	success	
PLATFORM / USE / 7 / NOTIFICATION	4	success	
PLATFORM / USE / 8 / ROLES	Not tested	n.a	
PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY	4	success	
PLATFORM / USE / 12 / VISUALISATION / UTILITY	4	success	
PLATFORM / USE / 13 / GUIDANCE	4	success	
PLATFORM / USE / 14 / FILTERING	4	success	

4.5 Early sub-system tests and validation

Matching pilot experimentation scenarios for validation to the use cases described in D3.1/D3.1 one-to-one postpones testing for validation to a very late stage of project development and requires a lot of resources. Even though RAWFIE focuses on large scale experimentation of real UxVs, it is envisaged to show some evidence that the RAWFIE platform works well in smaller scale experiments or with a reduced set of functions or components.

As a consequence of the above, at least two additional pilot experimentation scenarios have been introduced to allow for early tests and validation of sub-systems or reduced scale RAWFIE systems.

Both cases assume that all Front-end tier, middle tier and data tier components are fully functional and running. The end user can write and launch validated experiments which can be conducted using limited or no UxV resources.

In the future this section may be augmented with additional tests needed to validate the correctness of different UxVs subsystems integration to RAWFIE platform prior the phase of executing the end-user defined validation scenarios as described in the previous sections.

4.5.1 UxV Data Generator

Scenario ID**: EST-01**	Conducted by**: UoA**	Date**: July 2017**
Title	UxV Data Generator	
Comment	An "UxV Data Generator" component is implemented in the lower layer of Testbed and feeds the system with messages identical the ones generated from the UxV resources. A suitable log file also verifies that commands/responses from the RAWFIE platform arrive in testbed tier in the expected format. The "UxV Data Generator" component simulates to an extent the behaviour of an UxV device implementing incrementally from basic to more complex features. The scope of this validation scenario is to give to the experimenter the ability to write and run experiments in the RAWFIE platform in the absence of UxV resources and validate that the steps of the experiment are executed in the order and time specified in the scripts.	
Main stakeholder	Experimenter	
Secondary stakeholder	RAWFIE Platform Administrator / Testbed Operators /UxVs Manufacturers	
Involved Sub-systems	Web Portal Users & Rights Service Resource Explorer Tool Testbeds Directory Service Experiment Authoring Tool EDL Compiler & Validator Experiment Validation Service Booking Tool Booking Service Launching Service Experiment Controller Experiment Monitoring Tool	
Validated requirement	PT-GEN-001, PT-P-001, PT-P-003, PT-A-001, PT-A-003, PT-A-004, PT-A-005, PT-A-006, PT-A-008, PT-A-009, PT-A-013, PT-A-014, PT-A-016, PT-B-001, PT-L-002, PT-E-002, PT-E-003	
Testbed performed	HMOD Testbed, in Skaramagas premises, Greece DFKI, Testbed in Bremen, Germany RT-ART, Testbed in Zaragoza, Spain	
Number of UxVs	1-7	
UXV MANUFACTURER	MST, ALTUS, University of Zagreb, Robotnik	

Step	**Description**	**Status**	**Remarks**
1	Experimenter logins to the RAWFIE portal with the appropriate credentials	success	
2	Experimenter looks for the testbeds and UxV resources (simulated resources) available	success	
3	Experimenter uses the Experiment Authoring tool to write the experiment steps with EDL, e.g. o Ask UxV's current status and location (x1, y1) o Move to location x2, y2 o Monitor this location point o Return to the initial location	success	
4	Experimenter books the testbed and needed UxVs	success	
5	Experiment will be started at the given date/time	success	
6	EDL script is executed correctly using the UxV Generator component as end device that simulates UxVs behavior	success	
7	Measurements are sent to the database	success	
8	Experiment finishes	success	

9	Experimenter evaluates the results - View experiment log - Examine measurements	success	

Metric	Success criteria	Status	Remarks
UXV / FUNC/ 2 / MISSION ACHIEVEMENT	5	success	UXV / FUNC/ 2 / MISSION ACHIEVEMENT

4.5.2 UGV navigation and monitoring

Scenario ID**: EST-02**	Conducted by**: UoA**	Date**: July 2017**
Title	UGV navigation and monitoring	
Comment	A UGV (a ROBOTNIK Summit XL Robot) properly navigates to the coordinates described by end-user experiments and takes some action based on its sensing capabilities (e.g. take photos when predefined coordinates where reached). The scope of this validation scenario is to provide evidence that the UxV node interacts correctly with the RAWFIE platform using the appropriate testbed components and its network communication and navigation subcomponents behave as expected. Besides the Front-end tier, middle tier and data tier this validation test assumes that the Vehicular Testbed (VT) component in the testbed tier is fully functional and running.	
Main stakeholder	Experimenter	
Secondary stakeholder	RAWFIE Platform Administrator / Testbed Operators / Uxv Manufacturers	
Involved Sub-systems	Web Portal Users & Rights Service Resource Explorer Tool Testbeds Directory Service Experiment Authoring Tool EDL Compiler & Validator Experiment Validation Service Booking Tool Booking Service Launching Service Experiment Controller Experiment Monitoring Tool Vehicular Testbed Resource Controller UGV node(s)	
Validated requirement	PT-GEN-001, PT-P-001, PT-P-003, PT-A-001, PT-A-003, PT-A-004, PT-A-005, PT-A-006, PT-A-008, PT-A-009, PT-A-013, PT-A-014, PT-A-016, PT-B-001, PT-L-002, PT-E-002, PT-E-003	
Testbed performed	RT-ART, Testbed in Zaragoza, Spain	
Number of UxVs	3	
UXV MANUFACTURER	Robotnik	

Step	**Description**	**Status**	**Remarks**
1	Experimenter logins to the RAWFIE portal with the appropriate credentials	success	
2	Experimenter looks for the testbeds and UxV resources available	success	
3	Experimenter uses the Experiment Authoring tool to write the experiment steps with EDL, e.g. o Ask UGV's current status and location (x1, y1) o Move to different locations o Monitor these location points o Return to the initial location	success	
4	Experimenter books the testbed and needed UxVs	success	
5	Experiment will be started at the given date/time	Par. Success	Only manual launching was tested
6	EDL script is executed correctly and UGV behaves as expected	success	
7	Measurements are sent to the database	success	
8	Experiment finishes	success	

9	Experimenter evaluates the results - View experiment log - Examine measurements	success	

Metric	Success criteria	Status	Remarks
UXV / FUNC/ 2 / MISSION ACHIEVEMENT	5	success	

5 Questionnaire and execution of tests for end-user validation

The first version of the questionnaire was completely reworked to gather information regarding the soft metrics: mainly *PLATFORM / USE / ** for which separate questions are added for each metric for each component. The complete questionnaire can be found in annex A. Raw results are in annex B and C. The analysed results of the questionnaire are presented in section 5.2.

The scenarios in section “4.2 RAWFIE Platform Admin scenarios” and “4.3 Testbed operator scenarios” were executed by some internal tests. The other (“4.1 User defined scenarios”, “4.4 UxV Manufacturers scenarios”, “4.5 Early sub-system tests and validation”) were executed during test in RT-ART testbed at Zaragoza with devices (UGVs) provided by Robotnik. A larger event for tests was the installation of MST devices (USVs) in the Skaramagkas testbed (Agenda is in Annex D)

5.1 Structure

The questionnaire currently has six main sections. The purpose of the questions is described in the following:

- About you
  - Simple questions to get an overview of the person that answers the questionnaire.
- Experimenters
  - Questions to evaluate the user experiences of the experiments. For the following components where evaluate:
    - Resource Explorer
    - System Monitoring
    - Booking
    - Visualisation
    - Experiment Monitoring
    - Data Analysis
    - EDL editor
- Testbed owner
  - Questions to evaluate the integration effort of testbed owners to integrate their testbed into RAWFIE
- New UxV provider

    - Questions to evaluate the integration effort of UxV manufactures to integrate their UxVs into RAWFIE
- Final comments
    - General comment on the RAWFIE system..

5.2 Results of questionnaire

A summary of the questionnaire and a table with all answers can be found in Annex B and C.

The following sub-sections summarise the results and derive some requirements out of them.

5.2.1 Conclusions

We have got eight(8) responses from the following types of stakeholders

- Roles
    - UxV manufactures or UxV service providers (industrial): six (6)
        - One (1) provides also a testbeds to RAWFIE
        - Two (2) of them may also provide testbeds to RAWFIE later.
        - Four (4) of them may also act as experiments later
    - Testbed owners: Two (2)
- Type of organisation/company
    - Small and medium-sized enterprise (SME): Four (4)
    - Research/university/higher education: Four (4)

5.2.1.1 Experimenters

Unfortunately, we have not got external experiments that have executed experiments on their own with RAWFIE system. One main effort on the next period will be, to include external end-used on the system tests and evaluation.

5.2.1.2 Testbed owners

Two(2) testbed owners have integrated their testbeds into RAWFIE and filled in the questionnaire.

Both evaluated it as difficult to integrate/install RAWFIE into/on their testbeds. The general management of RAWFIE was evaluated as neutral.

One of them did also integrate its testbed into another federation. He evaluated the integration of RAWFIE more difficult than the integration into other federation. Another critic point was that there are long waiting periods of task assignment and technical specifications.

5.2.1.3 UxV provider

Five(5) UxV providers have integrated their UxVs into RAWFIE and filled in the questionnaire

The majority evaluated the integration and installation efforts as neutral or easy.

One of them did also integrate its UxVs into another federation. He evaluated the integration of RAWFIE easier than the integration into other federations

5.2.1.4 General comments

The general comments only complained about the long feedback times of the RAWFIE team.

5.2.2 New requirements

In the next period, the RAWFIE team needs to do the following to address the expressed critic points:

- Ease the integration of new testbeds, e.g.
  - Deliver ready to use software packages
  - Comprehensive installation guide
  - Specify technical requirements
- Reduce feedback time for potential testbed owner and UxV providers
  - Improve internal handling of external request.

6 Roadmap for the Platform Validation

The following roadmap is planned to perform the validation of the system until M40

Year	**2017**					**2018**			
Month	A	S	O	N	D	J	F	M	A
Project Month	32	33	34	35	36	37	38	39	40
Development and implementation of RAWFIE components (3rd iteration)									
Extend questionnaires									
Platform ready for end-user test									
Perform validation scenarios (observation of participants, recording of validation metrics)									
Do questionnaires or interviews with the users									
Evaluate questionnaires and interviews									
Perform evaluation of quantitative metrics against success criteria									
Prepare D6.6									

7 Conclusion and Outlook

Since D6.2 the RAWFIE project got a big step forward:

- The most components reached a functional state,
- 3 real testbeds got integrated into RAWFIE
- real experiments could be executed with the platform on the integrated testbeds.

Also many work still needs to be done to reach the aim of a 100% successfully validated system: pending implementation and setups need to be realized, external end-users need to use the platform to run their experiments and integration of new testbeds needs to be simplified.

For the next version of the “RAWFIE Platform Validation” (D6.6), the platform will be ready for real end-user tests, where also the validation scenarios from D4.9 will be executed and metrics will be evaluated.

Annex

A End-user questionnaire

The following pages contain the questionnaire form:

RAWFIE user feedback

This survey is intended to collect some feedback from (potential) users, testbed operators and UxV providers of RAWFIE

*Required

About you

1. **How old are you?**
   Mark only one oval.
   - younger than 20
   - 20 to 29
   - 30 to 39
   - 40 to 49
   - 50 to 59
   - 60 and older

2. **Which kind of organisation/company are you from?** *
   Mark only one oval.
   - public body
   - university
   - research institute
   - interest group
   - one man company
   - small and medium-sized enterprise (SME)
   - large enterprise
   - Other: _____

3. **What is the name of your organisation/company (optional)?**

   _____

4. **What is your professional role?** *
   Tick all that apply.
   - CEO (Chief Executive Officer)
   - general managerial staff
   - CTO (Chief Technology Officer)
   - technical managerial staff
   - education
   - developer / researcher
   - technician
   - marketing
   - customer support
   - Other: _____

5. **What are your activities/responsibilities at your organisation/company ?**

6. **Which roles could be played by your organisation/company (if any)?** *
   Tick all that apply.

   - [ ] Experimenter
   - [ ] Tesbed owner
   - [ ] UxV manufacturer
   - [ ] Regulation body

About you

7. **Have you ever been member to another FIRE federation?** *
   Mark only one oval.

   - ( ) Yes
   - ( ) No *Skip to question 9.*

About you

8. **Please enter name(s) of the other federation(s) that you have been member of?**

Hint

In the following several question are presented where a score between 1 and 5 should be given. Where 1 means “low”, “slow”, “hard” or “bad” and 5 means “high”, “fast”, “easy” or “good”.

Experimenters

9. **Did you execute one or more experiments with RAWFIE?** *
   Mark only one oval.

   - ( ) Yes
   - ( ) No *Skip to question 77.*

Experimenters

10. **Did the experiment complete? (If no, please enter the reason for the interruption in the other field)**
    Mark only one oval.

    - ( ) Yes
    - ( ) Other:

Usability – Web Portal

11. **Do you like the integration concept of the RAWFIE Web Portal?**
    Mark only one oval.

    - ( ) Yes, it’s good to have all application accessible throw one page
    - ( ) No, I would prefer more specialized separate web applications
    - ( ) Other:

12. **Are the response times of the Web Portal in general sufficient?**
    Mark only one oval.

	1	2	3	4	5	
slow	( )	( )	( )	( )	( )	fast

13. **Is the user interface design consistent (similar actions lead to similar results and the elements in the GUI (fonts, patterns, tables) are similar to all pages)?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

14. **How would you rate the login and access control to the RAWFIE features?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

15. **Anything that should be improved/changed?**

Resource Explorer
The Resource Explorer tool in the web portal

16. **Did you use the Resource Explorer tool?** *
Mark only one oval.

- ◯ Yes
- ◯ No *Skip to question 24.*

Resource Explorer
The Resource Explorer tool in the web portal

17. **Are the response times of the tool sufficient?**
Mark only one oval.

	1	2	3	4	5	
slow	◯	◯	◯	◯	◯	fast

18. **Are the information presented in a clear way?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

19. **Is the tool easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard	◯	◯	◯	◯	◯	easy

20. **How would you evaluate the usefulness of the features provided by this tool?**
Mark only one oval.

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

21. **Does the tool provide helpful error messages or hints in order to guide you to the right option?**
1 (bad) to 5 (good)
Mark only one oval.

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ I did not need guidance

22. **Did you find the appropriate resources using the search/filtering functionality?**
1 (bad) to 5 (good)
Mark only one oval.

- 1
- 2
- 3
- 4
- 5
- I did not use it

23. **Anything that should be improved/changed?**

System Monitoring
The System Monitoring tool in the web portal

24. **Did you use the System Monitoring tool?** *
Mark only one oval.

- Yes
- No *Skip to question 31.*

System Monitoring
The System Monitoring tool in the web portal

25. **Are the response times of the tool sufficient?**
Mark only one oval.

	1	2	3	4	5	
slow						fast

26. **Are the information presented in a clear way?**
Mark only one oval.

	1	2	3	4	5	
bad						good

27. **Is the tool easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard						easy

28. **How would you evaluate the usefulness of the features provided by this tool?**
Mark only one oval.

	1	2	3	4	5	
low						high

29. **Does the tool provide helpful error messages or hints in order to guide you to the right option?**
1 (bad) to 5 (good)
Mark only one oval.

- 1
- 2
- 3
- 4
- 5
- I did not need guidance

30. **Anything that should be improved/changed?**

Booking

The Booking tool in the web portal

31. **Did you use the Booking tool?** *
Mark only one oval.

- Yes
- No *Skip to question 39.*

Booking

The Booking tool in the web portal

32. **Are the response times of the tool sufficient?**
Mark only one oval.

	1	2	3	4	5	
slow						fast

33. **Are the information presented in a clear way?**
Mark only one oval.

	1	2	3	4	5	
bad						good

34. **Is the tool easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard						easy

35. **How would you evaluate the usefulness of the features provided by this tool?**
Mark only one oval.

	1	2	3	4	5	
low						high

36. **Does the tool provide helpful error messages or hints in order to guide you to the right option?**
1 (bad) to 5 (good)
Mark only one oval.

- 1
- 2
- 3
- 4
- 5
- I did not need guidance

37. **Did you like the way how the booking is done?**
Mark only one oval.

	1	2	3	4	5	
good						bad

38. **Anything that should be improved/changed?**

Visualisation

The Visualisation tool in the web portal

39. **Did you use the Visualisation tool?** *

Mark only one oval.

- ◯ Yes
- ◯ No *Skip to question 48.*

Visualisation

The Visualisation tool in the web portal

40. **Are the response times of the tool sufficient?**

Mark only one oval.

	1	2	3	4	5	
slow	◯	◯	◯	◯	◯	fast

41. **Are the information presented in a clear way?**

Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

42. **How would you rate the display information / features associated to each UxV device on the geographic map?**

Mark only one oval.

	1	2	3	4	5	
good	◯	◯	◯	◯	◯	bad

43. **Is the tool easy to understand and to operate?**

Mark only one oval.

	1	2	3	4	5	
hard	◯	◯	◯	◯	◯	easy

44. **How would you evaluate the usefulness of the features provided by this tool?**

Mark only one oval.

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

45. **Does the tool provide helpful error messages or hints in order to guide you to the right option?**

1 (bad) to 5 (good)
Mark only one oval.

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ I did not need guidance

46. **Did the visualisation present all necessary information?**

Mark only one oval.

	1	2	3	4	5	
good	◯	◯	◯	◯	◯	bad

47. **Anything that should be improved/changed?**

Experiment Monitoring

The Experiment Monitoring tool in the web portal

48. **Did you use the Experiment Monitoring tool?** *
    Mark only one oval.

    - ◯ Yes
    - ◯ No *Skip to question 57.*

Experiment Monitoring

The Experiment Monitoring tool in the web portal

49. **Are the response times of the tool sufficient?**
    Mark only one oval.

	1	2	3	4	5	
slow	◯	◯	◯	◯	◯	fast

50. **Are the information presented in a clear way?**
    Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

51. **How would you rate the display information / features associated to each UxV device on the geographic map?**
    Mark only one oval.

	1	2	3	4	5	
good	◯	◯	◯	◯	◯	bad

52. **Is the tool easy to understand and to operate?**
    Mark only one oval.

	1	2	3	4	5	
hard	◯	◯	◯	◯	◯	easy

53. **How would you evaluate the usefulness of the features provided by this tool?**
    Mark only one oval.

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

54. **Does the tool provide helpful error messages or hints in order to guide you to the right option?**
    1 (bad) to 5 (good)
    Mark only one oval.

    - ◯ 1
    - ◯ 2
    - ◯ 3
    - ◯ 4
    - ◯ 5
    - ◯ I did not need guidance

55. **Did the monitoring present all necessary information?**
    Mark only one oval.

	1	2	3	4	5	
good	◯	◯	◯	◯	◯	bad

56. **Anything that should be improved/changed?**

Data Analysis

The Data analysis tool in the web portal

57. **Did you use the Data Analysis tool?** *

Mark only one oval.

- Yes
- No *Skip to question 66.*

Data Analysis

The Data analysis tool in the web portal

58. **Are the response times of the tool sufficient?**

Mark only one oval.

	1	2	3	4	5	
slow						fast

59. **Are the information presented in a clear way?**

Mark only one oval.

	1	2	3	4	5	
bad						good

60. **How would you rate the display information / features associated to each UxV device on the geographic map?**

Mark only one oval.

	1	2	3	4	5	
good						bad

61. **Is the tool easy to understand and to operate?**

Mark only one oval.

	1	2	3	4	5	
hard						easy

62. **How easy is it to select data metric(s) and a data analytics procedure, coupled with source and destination points?**

Mark only one oval.

	1	2	3	4	5	
hard						easy

63. **How would you evaluate the usefulness of the features provided by this tool?**

Mark only one oval.

	1	2	3	4	5	
low						high

64. **Does the tool provide helpful error messages or hints in order to guide you to the right option?**

1 (bad) to 5 (good)

Mark only one oval.

- 1
- 2
- 3
- 4
- 5
- I did not need guidance

65. **Anything that should be improved/changed?**

EDL editor

The EDL editor tool in the web portal

66. **Did you use the EDL Editor tool?** *
    Mark only one oval.

    - ◯ Yes
    - ◯ No *Skip to question 77.*

EDL editor

The EDL editor tool in the web portal

67. **Are the response times of the tool sufficient?**
    Mark only one oval.

	1	2	3	4	5	
slow	◯	◯	◯	◯	◯	fast

68. **Are the information presented in a clear way?**
    Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

69. **Is the tool easy to understand and to operate?**
    Mark only one oval.

	1	2	3	4	5	
hard	◯	◯	◯	◯	◯	easy

70. **Does the EDL editor provide an appropriate environment to create EDL scripts?**
    Mark only one oval.

	1	2	3	4	5	
good	◯	◯	◯	◯	◯	bad

71. **Are the scripting possibilities powerful enough to describe you experiment?**
    Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

72. **How easy is the definition of movement and location waypoints from a map?**
    1 (hard) to 5 (easy)
    Mark only one oval.

    - ◯ 1
    - ◯ 2
    - ◯ 3
    - ◯ 4
    - ◯ 5
    - ◯ I did not used it

73. **Are the compiler error messages helpful to resolve the error?**
    Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

74. **Which development tools are missing**

75. **Which scripting possibilities are missing?**

76. **Anything that should be improved/changed?**

Testbed owner

77. **Did you integrate RAWFIE in your testbed?** *
Mark only one oval.

- Yes
- No *Skip to question 87.*

Testbed owner

78. **How complicated was it, to adapt the testbed software and hardware for RAWFIE (e.g. networking stuff, installation of needed software packages?**
Mark only one oval.

	1	2	3	4	5	
hard						easy

79. **How complicated was it, to adapt the software components delivered by RAWFIE to be used in your testbed?**
1 (hard) to 5 (easy)
Mark only one oval.

- 1
- 2
- 3
- 4
- 5
- Not used (implemented everything on our own)

80. **How difficult is the management of the RAWFIE elements in your tesbed?**
Mark only one oval.

	1	2	3	4	5	
hard						easy

81. **How much time needed to be part of RAWFIE?**
Mark only one oval.

- <3 months
- <6 months
- <1 year
- More than a year

82. **Have you integrated your testbed to another federation?** *
Mark only one oval.

- Yes
- No *Skip to question 86.*

Testbed owner (other federations)

83. **Please enter name(s) of the other federation(s) that you have been member of?**

84. **Were the integration procedures of RAWFIE easier than the ones of the other federation?**
Mark only one oval.

	1	2	3	4	5	
1 (more hard)	◯	◯	◯	◯	◯	5 (more easy)

85. **If the procedures of RAWFIE are more difficult, please name the sectors that in your opinion should be improved**

Testbed owner (final)

86. **Anything else that should be improved/changed?**

New UxV provider

87. **Did you integrate your UxVs into RAWFIE?** *
Mark only one oval.

- ◯ Yes
- ◯ No *Skip to question 95.*

New UxV provider

88. **How complicated was it to adapt the UxVs software and hardware for RAWFIE (e.g. networking stuff, installation of needed software packages?**
1 (hard) to 5 (easy)
Mark only one oval.

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ Not used (implemented everything on our own)

89. **How much time was needed to integrate your devices in RAWFIE?**
Mark only one oval.

- ◯ <3 months
- ◯ <6 months
- ◯ <1 year
- ◯ More than a year

90. **Have you ever provided devices to another federation?** *
Mark only one oval.

- ◯ Yes
- ◯ No *Skip to question 94.*

New UxV provider (other federations)

91. **Please enter name(s) of the other federation(s) that you have been member of?**

92. **Were the integration procedures of RAWFIE easier than the ones of the other federation?**
Mark only one oval.

	1	2	3	4	5	
more hard	◯	◯	◯	◯	◯	more easy

93. **If the procedure in RAWFIE are more difficult, please name the sectors that in your opinion should be improved**

New UxV provider (final)

94. **Anything else that should be improved/changed?**

Final comments

95. **Any additional comments that you have about the RAWFIE system?**

B Questionnaire summary

The following pages contain the automatic generated summary.

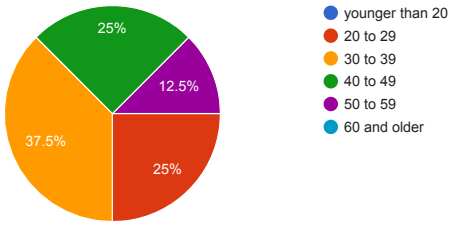
RAWFIE user feedback

8 responses

About you

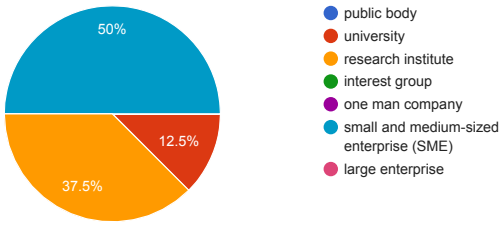
How old are you?

8 responses



Which kind of organisation/company are you from?

8 responses



What is the name of your organisation/company (optional)?

7 responses

Robotnik
Automation

CESA-Drones

INESC
TEC

University
of Zagreb

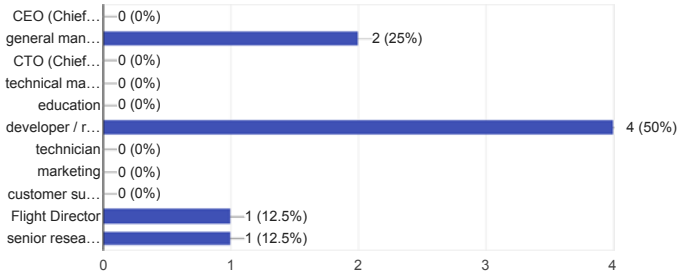
CATUAV

DFKI

ALTUS LSA

What is your professional role?

8 responses



What are your activities/responsibilities at your organisation/company ?

8 responses

R&D
engineer

In
charge of site management, flight management, security and regulation compliance.

Fellow
researcher

Researcher/project
manager

Research,
project coordination, fund raising

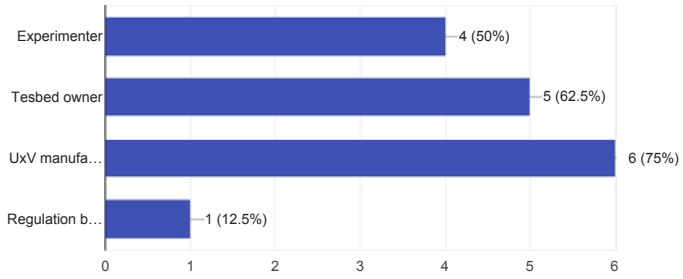
Manager
of European Projects

research,
development, programing, project leader, testbed supervisor

R&D
DIRECTOR

Which roles could be played by your organisation/company (if any)?

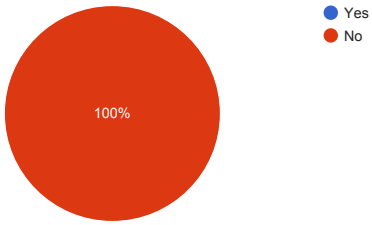
8 responses



About you

Have you ever been member to another FIRE federation?

8 responses



About you

Please enter name(s) of the other federation(s) that you have been member of?

0 responses

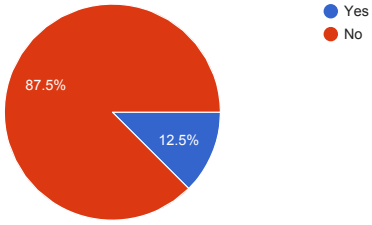
No responses yet for this question.

Hint

Experimenters

Did you execute one or more experiments with RAWFIE?

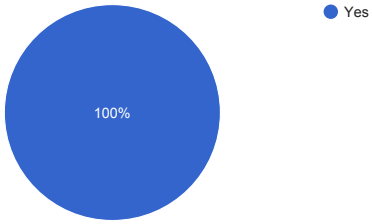
8 responses



Experimenters

Did the experiment complete? (If no, please enter the reason for the interruption in the other field)

1 response



Usability – Web Portal

Do you like the integration concept of the RAWFIE Web Portal?

0 responses

No responses yet for this question.

Are the response times of the Web Portal in general sufficient?

0 responses

No responses yet for this question.

Is the user interface design consistent (similar actions lead to similar results and the elements in

0 responses

No responses yet for this question.

How would you rate the login and access control to the RAWFIE features?

0 responses

No responses yet for this question.

Anything that should be improved/changed?

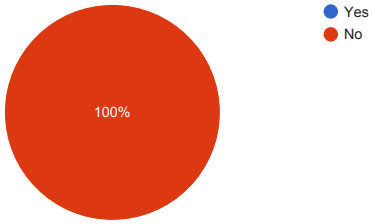
0 responses

No responses yet for this question.

Resource Explorer

Did you use the Resource Explorer tool?

1 response



Resource Explorer

Are the response times of the tool sufficient?

0 responses

No responses yet for this question.

Are the information presented in a clear way?

0 responses

No responses yet for this question.

Is the tool easy to understand and to operate?

0 responses

No responses yet for this question.

How would you evaluate the usefulness of the features provided by this tool?

0 responses

No responses yet for this question.

Does the tool provide helpful error messages or hints in order to guide you to the right option?

0 responses

No responses yet for this question.

Did you find the appropriate resources using the search/filtering functionality?

0 responses

No responses yet for this question.

Anything that should be improved/changed?

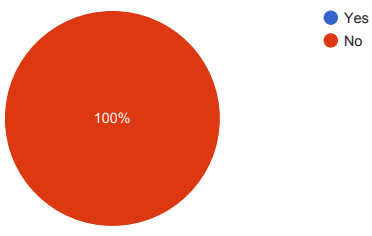
0 responses

No responses yet for this question.

System Monitoring

Did you use the System Monitoring tool?

1 response



System Monitoring

Are the response times of the tool sufficient?

0 responses

No responses yet for this question.

Are the information presented in a clear way?

0 responses

No responses yet for this question.

Is the tool easy to understand and to operate?

0 responses

No responses yet for this question.

How would you evaluate the usefulness of the features provided by this tool?

0 responses

No responses yet for this question.

Does the tool provide helpful error messages or hints in order to guide you to the right option?

0 responses

No responses yet for this question.

Anything that should be improved/changed?

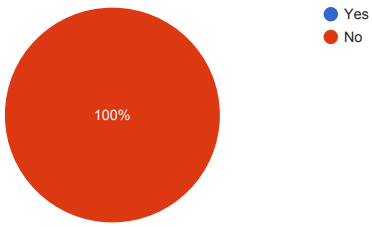
0 responses

No responses yet for this question.

Booking

Did you use the Booking tool?

1 response



Booking

Are the response times of the tool sufficient?

0 responses

No responses yet for this question.

Are the information presented in a clear way?

0 responses

No responses yet for this question.

Is the tool easy to understand and to operate?

0 responses

No responses yet for this question.

How would you evaluate the usefulness of the features provided by this tool?

0 responses

No responses yet for this question.

Does the tool provide helpful error messages or hints in order to guide you to the right option?

0 responses

No responses yet for this question.

Did you like the way how the booking is done?

0 responses

No responses yet for this question.

Anything that should be improved/changed?

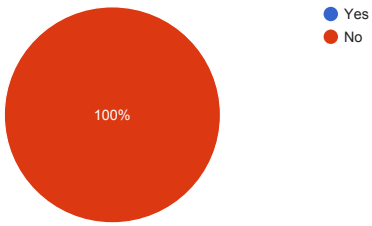
0 responses

No responses yet for this question.

Visualisation

Did you use the Visualisation tool?

1 response



Visualisation

Are the response times of the tool sufficient?

0 responses

No responses yet for this question.

Are the information presented in a clear way?

0 responses

No responses yet for this question.

How would you rate the display information / features associated to each UxV device on the geog

0 responses

No responses yet for this question.

Is the tool easy to understand and to operate? 0 responses

No responses yet for this question.

How would you evaluate the usefulness of the features provided by this tool?

0 responses

No responses yet for this question.

Does the tool provide helpful error messages or hints in order to guide you to the right option?

0 responses

No responses yet for this question.

Did the visualisation present all necessary information?

0 responses

No responses yet for this question.

Anything that should be improved/changed?

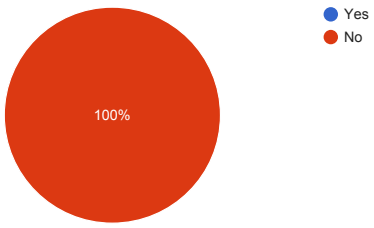
0 responses

No responses yet for this question.

Experiment Monitoring

Did you use the Experiment Monitoring tool?

1 response



Experiment Monitoring

Are the response times of the tool sufficient?

0 responses

No responses yet for this question.

Are the information presented in a clear way?

0 responses

No responses yet for this question.

How would you rate the display information / features associated to each UxV device on the geog

0 responses

No responses yet for this question.

Is the tool easy to understand and to operate?

0 responses

No responses yet for this question.

How would you evaluate the usefulness of the features provided by this tool?

0 responses

No responses yet for this question.

Does the tool provide helpful error messages or hints in order to guide you to the right option?

0 responses

No responses yet for this question.

Did the monitoring present all necessary information?

0 responses

No responses yet for this question.

Anything that should be improved/changed?

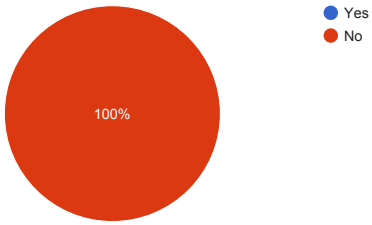
0 responses

No responses yet for this question.

Data Analysis

Did you use the Data Analysis tool?

1 response



Data Analysis

Are the response times of the tool sufficient?

0 responses

No responses yet for this question.

Are the information presented in a clear way?

0 responses

No responses yet for this question.

How would you rate the display information / features associated to each UxV device on the geog

0 responses

No responses yet for this question.

Is the tool easy to understand and to operate?

0 responses

No responses yet for this question.

How easy is it to select data metric(s) and a data analytics procedure, coupled with source and de

No responses yet for this question.

How would you evaluate the usefulness of the features provided by this tool?

0 responses

No responses yet for this question.

Does the tool provide helpful error messages or hints in order to guide you to the right option?

0 responses

No responses yet for this question.

Anything that should be improved/changed?

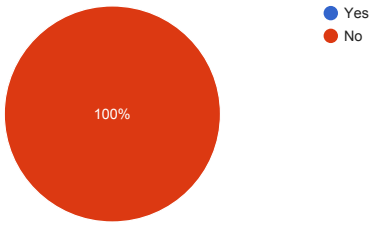
0 responses

No responses yet for this question.

EDL editor

Did you use the EDL Editor tool?

1 response



EDL editor

Are the response times of the tool sufficient?

0 responses

No responses yet for this question.

Are the information presented in a clear way?

0 responses

No responses yet for this question.

Is the tool easy to understand and to operate?

0 responses

No responses yet for this question.

Does the EDL editor provide an appropriate environment to create EDL scripts?

0 responses

No responses yet for this question.

Are the scripting possibilities powerful enough to describe you experiment?

0 responses

No responses yet for this question.

How easy is the definition of movement and location waypoints from a map?

0 responses

No responses yet for this question.

Are the compiler error messages helpful to resolve the error?

0 responses

No responses yet for this question.

Which development tools are missing

0 responses

No responses yet for this question.

Which scripting possibilities are missing?

0 responses

No responses yet for this question.

Anything that should be improved/changed?

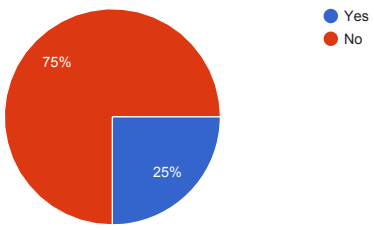
0 responses

No responses yet for this question.

Testbed owner

Did you integrate RAWFIE in your testbed?

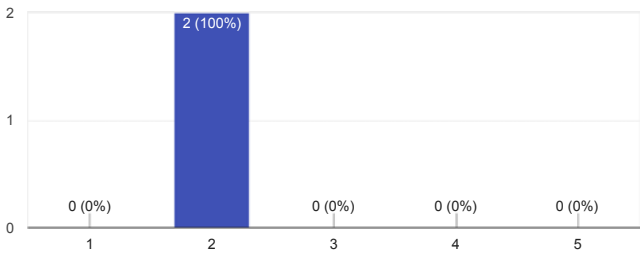
8 responses



Testbed owner

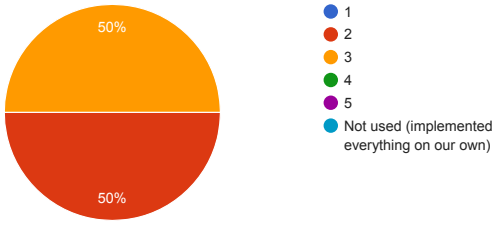
How complicated was it, to adapt the testbed software and hardware for RAWFIE (e.g. networking

2 responses



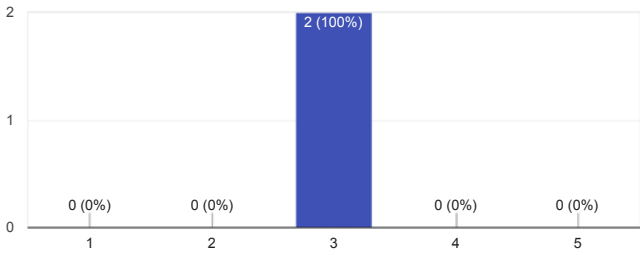
How complicated was it, to adapt the software components delivered by RAWFIE to be used in yo

2 responses



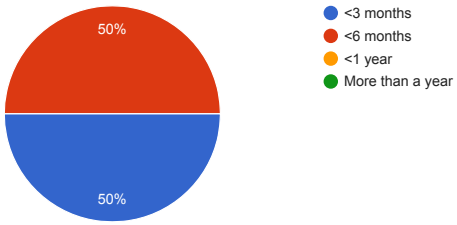
How difficult is the management of the RAWFIE elements in your tesbed?

2 responses



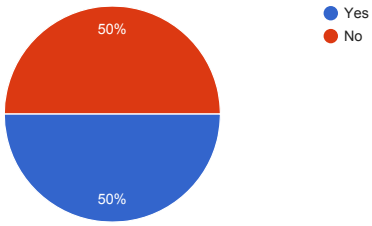
How much time needed to be part of RAWFIE?

2 responses



Have you integrated your testbed to another federation?

2 responses



Testbed owner (other federations)

Please enter name(s) of the other federation(s) that you have been member of?

1 response

Aerospace
Valley - FPDC (Professional Federation of Civilian Drone)

Were the integration procedures of RAWFIE easier than the ones of the other federation?

1 response

If the procedures of RAWFIE are more difficult, please name the sectors that in your opinion shoul

1 response

1-) More
complicated project; 2-) We are awaiting a confirmation from RAWFIE concerning the modification of the tasks assigned to CESA drones 3-) We are awaiting technical specifications from drones used in RAWFIE experimentations in order to France regulation compliance.

Testbed owner (final)

Anything else that should be improved/changed?

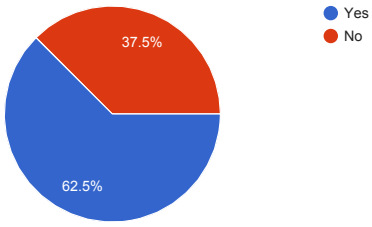
1 response

We are aware
that the scope of the project brings complexity in the first deployments of experiments.

New UxV provider

Did you integrate your UxVs into RAWFIE?

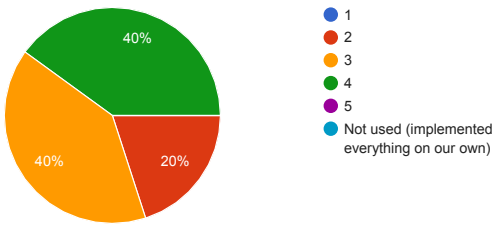
8 responses



New UxV provider

How complicated was it to adapt the UxVs software and hardware for RAWFIE (e.g. networking st

5 responses

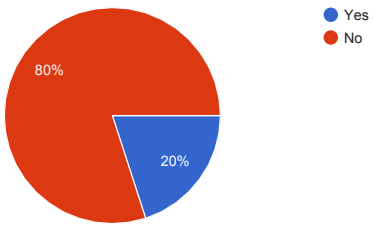


How much time was needed to integrate your devices in RAWFIE?

5 responses

Have you ever provided devices to another federation?

5 responses



New UxV provider (other federations)

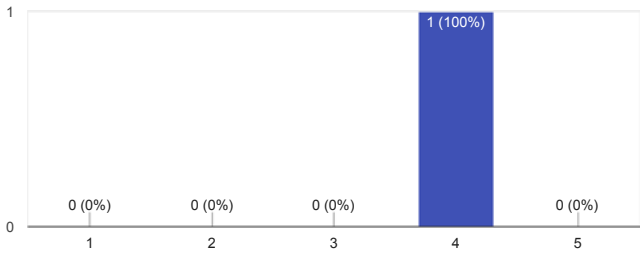
Please enter name(s) of the other federation(s) that you have been member of?

0 responses

No responses yet for this question.

Were the integration procedures of RAWFIE easier than the ones of the other federation?

1 response



If the procedure in RAWFIE are more difficult, please name the sectors that in your opinion should

0 responses

No responses yet for this question.

New UxV provider (final)

Anything else that should be improved/changed?

2 responses

Performances
of consumers/producers examples

NO

Final comments

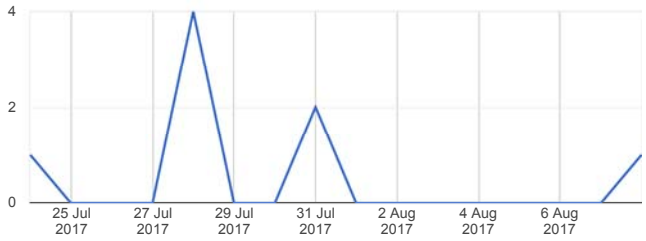
Any additional comments that you have about the RAWFIE system?

3 responses

We would
like to know how to reduce reaction times during exchanges with RAWFIE

We have
not integrated RAWFIE software components yet. We have the computer resources
ready but we are waiting for notices about it

NO



C Questionnaire single results

In the following pages the raw answers of the questionnaire are listed as table.

Timestamp	7.24.2017 9:21:05	7.28.2017 10:15:59	7.28.2017 11:47:30	7.28.2017 13:14:26	7.28.2017 14:04:37	7.31.2017 9:23:27	7.31.2017 14:57:17	8.8.2017 13:04:19
How old are you?	20 to 29	30 to 39	20 to 29	30 to 39	40 to 49	50 to 59	30 to 39	40 to 49
Which kind of organisation/company are you from?	small and medium-sized enterprise (SME)	small and medium-sized enterprise (SME)	research institute	research institute	university	small and medium-sized enterprise (SME)	research institute	small and medium-sized enterprise (SME)
What is the name of your organisation/company (optional)?	Robotnik Automation	CESA-Drones		INESC TEC	University of Zagreb	CATUAV	DFKI	ALTUS LSA
What is your professional role?	developer / researcher	Flight Director	developer / researcher	developer / researcher	senior researcher	general managerial staff	developer / researcher	general managerial staff
What are your activities/responsibilities at your organisation/company ?	R&D engineer	In charge of site management, flight management, security and regulation compliance.	Fellow researcher	Researcher/project manager	Research, project coordination, fund raising	Manager of European Projects	research, development, programing, project leader, testbed supervisor	R&D DIRECTOR
Which roles could be played by your organisation/company (if any)?	Experimenter, Tesbed owner, UxV manufacturer	Tesbed owner	Experimenter, UxV manufacturer	Experimenter, Tesbed owner, UxV manufacturer, Regulation body	UxV manufacturer	Experimenter, Tesbed owner, UxV manufacturer	Tesbed owner	UxV manufacturer
Have you ever been member to another FIRE federation?	No	No	No	No	No	No	No	No
Please enter name(s) of the other federation(s) that you have been member of?								
Did you execute one or more experiments with RAWFIE?	No	No	Yes	No	No	No	No	No
Did the experiment complete? (If no, please enter the reason for the interruption in the other field)			Yes					
Do you like the integration concept of the RAWFIE Web Portal?								
Are the response times of the Web Portal in general sufficient?								
Is the user interface design consistent (similar actions lead to similar results and the elements in the GUI (fonts, patterns, tables) are similar to all pages)?								
How would you rate the login and access control to the RAWFIE features?								

Anything that should be improved/changed?								
Did you use the Resource Explorer tool?			No					
Are the response times of the tool sufficient?								
Are the information presented in a clear way?								
Is the tool easy to understand and to operate?								
How would you evaluate the usefulness of the features provided by this tool?								
Does the tool provide helpful error messages or hints in order to guide you to the right option?								
Did you find the appropriate resources using the search/filtering functionality?								
Anything that should be improved/changed?								
Did you use the System Monitoring tool?			No					
Are the response times of the tool sufficient?								
Are the information presented in a clear way?								
Is the tool easy to understand and to operate?								
How would you evaluate the usefulness of the features provided by this tool?								
Does the tool provide helpful error messages or hints in order to guide you to the right option?								
Anything that should be improved/changed?								
Did you use the Booking tool?			No					
Are the response times of the tool sufficient?								
Are the information presented in a clear way?								
Is the tool easy to understand and to operate?								

How would you evaluate the usefulness of the features provided by this tool?								
Does the tool provide helpful error messages or hints in order to guide you to the right option?								
Did you like the way how the booking is done?								
Anything that should be improved/changed?								
Did you use the Visualisation tool?			No					
Are the response times of the tool sufficient?								
Are the information presented in a clear way?								
How would you rate the display information / features associated to each UxV device on the geographic map?								
Is the tool easy to understand and to operate?								
How would you evaluate the usefulness of the features provided by this tool?								
Does the tool provide helpful error messages or hints in order to guide you to the right option?								
Did the visualisation present all necessary information?								
Anything that should be improved/changed?								
Did you use the Experiment Monitoring tool?			No					
Are the response times of the tool sufficient?								
Are the information presented in a clear way?								
How would you rate the display information / features associated to each UxV device on the geographic map?								
Is the tool easy to understand and to operate?								

How would you evaluate the usefulness of the features provided by this tool?								
Does the tool provide helpful error messages or hints in order to guide you to the right option?								
Did the monitoring present all necessary information?								
Anything that should be improved/changed?								
Did you use the Data Analysis tool?			No					
Are the response times of the tool sufficient?								
Are the information presented in a clear way?								
How would you rate the display information / features associated to each UxV device on the geographic map?								
Is the tool easy to understand and to operate?								
How easy is it to select data metric(s) and a data analytics procedure, coupled with source and destination points?								
How would you evaluate the usefulness of the features provided by this tool?								
Does the tool provide helpful error messages or hints in order to guide you to the right option?								
Anything that should be improved/changed?								
Did you use the EDL Editor tool?			No					
Are the response times of the tool sufficient?								
Are the information presented in a clear way?								
Is the tool easy to understand and to operate?								

Does the EDL editor provide an appropriate environment to create EDL scripts?								
Are the scripting possibilities powerful enough to describe you experiment?								
How easy is the definition of movement and location waypoints from a map?								
Are the compiler error messages helpful to resolve the error?								
Which development tools are missing								
Which scripting possibilities are missing?								
Anything that should be improved/changed?								
Did you integrate RAWFIE in your testbed?	Yes	Yes	No	No	No	No	No	No
How complicated was it, to adapt the testbed software and hardware for RAWFIE (e.g. networking stuff, installation of needed software packages?	2	2						
How complicated was it, to adapt the software components delivered by RAWFIE to be used in your testbed?	3	2						
How difficult is the management of the RAWFIE elements in your tesbed?	3	3						
How much time needed to be part of RAWFIE?	<3 months	<6 months						
Have you integrated your testbed to another federation?	No	Yes						
Please enter name(s) of the other federation(s) that you have been member of?		Aerospace Valley - FPDC (Professional Federation of Civilian Drone)						
Were the integration procedures of RAWFIE easier than the ones of the other federation?		2						

If the procedures of RAWFIE are more difficult, please name the sectors that in your opinion should be improved		1-) More complicated project; 2-) We are awaiting a confirmation from RAWFIE concerning the modification of the tasks assigned to CESA drones 3-) We are awaiting technical specifications from drones used in RAWFIE experimentations in order to France regulation compliance.						
Anything else that should be improved/changed?		We are aware that the scope of the project brings complexity in the first deployments of experiments.						
Did you integrate your UxVs into RAWFIE?	Yes	No	Yes	Yes	Yes	No	No	Yes
How complicated was it to adapt the UxVs software and hardware for RAWFIE (e.g. networking stuff, installation of needed software packages?	2		3	4	4			3
How much time was needed to integrate your devices in RAWFIE?	<6 months		<6 months	<6 months	<3 months			<3 months
Have you ever provided devices to another federation?	No		No	Yes	No			No
Please enter name(s) of the other federation(s) that you have been member of?								
Were the integration procedures of RAWFIE easier than the ones of the other federation?				4				
If the procedure in RAWFIE are more difficult, please name the sectors that in your opinion should be improved								

Anything else that should be improved/changed?				Performances of consumers/producers examples				NO
Any additional comments that you have about the RAWFIE system?		We would like to know how to reduce reaction times during exchanges with RAWFIE				We have not integrated RAWFIE software components yet. We have the computer resources ready but we are waiting for notices about it		NO

D Training Agenda

- Day
  - 09:00 - Hands-on Instructions on How to Assemble the MST ASVs
  - 10:30 - Pre and Post Deployment Maintenance
  - 11:00 - Integration of the MST ASVs in the RAWFIE WiFi Infrastructure
    - (Requirement for field training but not part of the training plan)
  - 12:00 - Lunch
  - 13:00 - Introduction to the Command & Control Software
  - 14:00 - Overview of available maneuvers and basic mission planning
  - 15:00 - Tutored deployment of the ASVs
  - 15:30 - Deployment and showcase of maneuvers with missions planned by MST
  - 16:30 - Recovery of ASVs and post deployment maintenance (cleaning and charging)
- Day 2
  - 09:00 - Brief review of concepts
  - 09:30 - Pre deployment maintenance
  - 10:00 - Deployment of ASVs and execution of HMOD trainees missions
  - 11:30 - Recovery of ASVs
  - 12:00 - Lunch
  - 13:00 - Deployment of ASVs and execution of HMOD trainees missions
  - 15:00 - Analysis of mission execution data
  - 16:30 - Recovery of ASVs and post deployment maintenance (cleaning and charging)
- Day 3
  - 09:00 - Brief review of concepts
  - 09:30 - Deployment of ASVs and execution of RAWFIE experiments missions
  - 13:30 - Recovery of ASVs and post deployment maintenance (cleaning and charging)

E Abbreviations

Table 2 gives the abbreviations used across the RAWFIE projects in the documents and deliverables.

Abbreviation	Meaning
3D	three-dimensional space
ACL	Access Control List
AGL	Above Ground Level
AHRS	Attitude and Heading Reference System
AJAX	Asynchronous JavaScript and XML
AM	Aggregate Manager (of SFA)
AP	Access Point
API	Application Programming Interface
API	Application programming interface
AT	Aerial Testbed

AUV	Autonomous underwater vehicle
B-VLOS	Beyond Visual Line Of Sight
CA	Certification Authority
CAA	Civil Aviation Authority
CAO	Cognitive Adaptive Optimization
CBNR	Chemical Biological Nuclear Radiological
CEP	Circular Error Probability
CPU	Central Processing Unit
CSR	Certificate Signing Request
DETEC	Department of the Environment, Transport, Energy and Communication
DGCA	Directorate General of Civil Aviation
DoA	Description of Actions
EASA	European Aviation Safety Agency
EC	Experiment Controller
ECC	Error Correction Code
ECV	EDL Compiler & Validator
EDL	Experiment Description Language
EDL	Experiment Description Language
EER	Experiment and EDL Repository
EU	European Union
E-VLOS	Extended Visual Line Of Sight
EVS	Experiment Validation Service
FIRE	Future Internet Research & Experimentation
FOCA	Federal Office of Civil Aviation
FPS	Frames Per Second
FPV	First Person View
GAA	German Aviation Act
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
GPIO	General Purpose Input/Output
GPS	Global Positioning System
GUI	Graphical user interface
HD	High Definition
HTTP	Hypertext Transfer Protocol
HW	Hardware
IAA	Irish Aviation Authority
IaaS	Infrastructure as a Service
IDE	Integrated Development Environment
IDE	integrated development environment
IFR	Instrument Flight Rules
IP	Internet Protocol
ISO	International Standards Organization
JDBC	Java Database Connectivity
JSON	JavaScript Object Notation
KPI	Key Performance Indicator
KPI	Key Performance Indicator
LBL	Long Baseline
LDAP	Lightweight Directory Access Protocol
LS	Launching Service

MEMS	MicroElectroMechanical System
MM	Monitoring Manager
MSO	Multi Swarm Optimization
MT	Maritime Testbed
MOM	Message Oriented Middleware
MVC	Model View Controller
NAT	Network Address Translation
NC	Network Controller
NF	Non Functional
ODBC	Open Database Connectivity
OEDL	OMF EDL
OMF	cOntrol and Management Framework
OMF	Orbit Management Framework
OML	ORBIT Measurement Library
OS	Operating System
OTA	Over The Air
P2P	Point to Point
PSO	Particle Swarm Optimization
PTZ	Pan Tilt Zoom
RC	Resource Controller
RC	Resource Controller
RE	Requirement Engineering
REST	Representational state transfer
RIA	Research and Innovation Action
ROS	Robot Operating System
ROV	Remotely Operated Vehicle
RPA	Remotely Piloted Aircraft
RPAS	Remotely Piloted Aircraft System
RPS	Remotely Piloted Station
RSpec	SFA Resource Specification
SaaS	Software as a Service
SAML	Security Assertion Markup Language
SFA	Slice-based Federation Architecture
SOA	Service Oriented Architecture
SOAP	Simple Object Access Protocol
SQL	Simple Query Language
SSO	Single-Sign-On
SVN	Apache Subversion
TM	Testbed Manager
TMS	Testbed Manager Suite
TP	Testbed Proxy
UAV	Unmanned Aerial Vehicle
UGV	Unmanned Ground Vehicle
UI	User Interface
UML	Unified Modelling Language
USV	Unmanned Surface Vehicle
UUV	Unmanned Underwater Vehicle
UxV	Unmanned aerial/ground/surface/underwater Vehicle
VE	Visualization Engine

VT	Vehicular Testbed
VT	Visualization Tool
WCS	Web Coverage Service
WFS	Web Feature Service
WMS	Web Map Service
WPS	Web Processing Service
WSDL	Web Services Description Language
XMPP	Extensible Messaging and Presence Protocol

Table 2: Common abbreviations

Table 3 gives the notations used in the RAWFIE documents and deliverables.

Notation	Description
D*X.Y*	Deliverable *X.Y* from the DoW
MS*X*	Milestone *X* from the DoW
WP*X*	Work package *X* from the DoW
OC*X*	Open Call *X*
A*X.Y*	Activity number *Y* in Phase *X*
DL*X.Y*	Deadline number *Y* in Phase *X*
M*X*	Project month number *X*

Table 3: Notation

F Glossary

The RAWFIE glossary consists of generic terms, contributed by all partners.

A

Accounting Service

RAWFIE component. Component that keeps track of resources usage by individual users.

Aggregate Manager

Slice Federation Architecture (SFA) term. The Aggregate Manager API is the interface by which experimenters discover, reserve and control resources at resource providers.

Avro

Apache Avro: a remote procedure call and data serialization framework

B

Booking Service

RAWFIE component. The Booking Service manages bookings of resources by registering data to appropriate database tables.

Booking Tool

RAWFIE component. The Booking tool will provide the appropriate Web UI interface for the experimenter to discover available resources and reserve them for a specified period.

C

Common Testbed Interface

RAWFIE component. The set of software and hardware functionalities each Testbed provider should ensure, for the communication with Middle Tier software components of RAWFIE, therefore for the integration with the RAWFIE platform

Component

A reusable entity that provides a set of functionalities (or data) semantically related. A component may encapsulate one or more modules (see definition) and should provide a well defined API for interaction

D

Data Analysis Engine

RAWFIE component. The Data Analysis Engine enables the execution of data processing jobs by sending requests to a processing engine which will perform the computations specified when the analytical task was defined through the Data Analysis Tool to be transmitted to the processing engine for execution.

Data Analysis Tool

RAWFIE component. The Data Analysis Tool enables the user to browse available data sources for subject to analytical treatment as well as previous analysis tasks' outcomes.

E

EDL Compiler & Validator

RAWFIE component. The EDL validator will be responsible for performing syntactic and semantic analysis on the provided EDL scripts.

Experiment Authoring Tool

RAWFIE component. This component is actually a collection of tools for defining experiments and authoring EDL scripts through RAWFIE web portal. It will provide features to handle resource requirements/configuration, location/topology information, task description etc.

Experiment Controller

RAWFIE component. The Experiment Controller is a service placed in the Middle tier and is responsible to monitor the smooth execution of each experiment. The main task of the experiment controller is the monitoring of the experiment execution while acting as 'broker' between the experimenter and the resources.

Experiment Monitoring Tool

RAWFIE component. Shows the status of experiments and of the resources used by experiments.

Experiment Validation Service

RAWFIE component. The Experiment Validation Service will be responsible to validate every experiment as far as execution issues concern.

M

Master Data Repository

RAWFIE component. Repository that stores all main entities that are needed in the RAWFIE platforms. Is an SQL-database

Measurements Repository

RAWFIE component. Stores the raw measurements from the experiments

Message Bus

Also known as Message Oriented Middleware. A message bus is supports sending and receiving messages between distributed systems. It is used in RAWFIE across all tiers to enable asynchronous, event-based messaging between heterogeneous components. Implements the Publish/Subscribe paradigm.

Module

A set of code packages within one software product that provides a special functionality

Monitoring Manager

RAWFIE component. Monitors the status of the testbed and the UxVs belonging to it, at functional level, e.g. the 'health of the devices' and current activity.

N

Network Controller

Manages the network connections and the switching between different technologies in the testbed in order to offer seamless connectivity in the operations of the system.

L

Launching Service

RAWFIE component. The Launching Service is responsible for handling requests for starting or cancellation of experiments.

R

Resource Controller

RAWFIE component. The Resource Controller can be considered as a cloud robot and automation system and ensures the safe and accurate guidance of the UxVs.

Resource Explorer Tool

RAWFIE component. The experimenter can discover and select available testbeds as well as resources/UxVs inside a testbed with this tool. Administrators can manage the data.

Results Repository

RAWFIE component. Stores the results of data analyses.

Resource Specification (RSpec)

SFA term. This is the means that the SFA uses for describing resources, resource requests, and reservations (declaring which resources a user wants on each Aggregate).

S

Schema Registry

A schema registry is a central service where data schemas are uploaded to. As an added benefit each schema has versions with it can convert allowable formats to other ones (e.g.: float to double) It maintains schemas for the data transferred and keeps revisions to be able to upgrade the definitions as with the simple field conversion. Used in RAWFIE for messages on the message bus.

Service

A component that is running in the system, providing specific functionalities and accessible via a well known interface.

Slice Federation Architecture (SFA)

SFA is the de facto standard for testbed federation and is a secure, distributed and scalable narrow waist of functionality for federating heterogeneous testbeds.

Subsystem

A collection of components providing a subset of the system functionalities.

System

A collection of subsystems and/or individual components representing the provided software solution as a whole.

System Monitoring Service

RAWFIE component. Checks readiness of main components and ensure that all critical software modules will perform at optimum levels. Predefined notification are triggered whenever the corresponding conditions are met, or whenever thresholds are reached

System Monitoring Tool

RAWFIE component. Shows the status and the readiness of the various RAWFIE services and testbed

T

Testbed

A testbed is a platform for conducting rigorous, transparent, and replicable testing of scientific theories, computational tools, and new technologies.

In the context of RAWFIE, a testbed or testbed facility is a physical building or area where UxVs can move around to execute some experiments. In addition, the UxVs are stored in or near the testbed.

Testbeds Directory Service

RAWFIE component. Represents a registry service of the middleware tier where all the integrated testbeds and resources accessible from the federated facilities are listed, belonging to the RAWFIE federation.

Testbed Manager

RAWFIE component. Contains accumulated information about the UxVs resources and the experiments of each one of the federation testbeds.

Tool

A GUI implementation to do a special thing, e.g. the “Resource Explorer tool” to search for a resource

U

Users & Rights Repository

RAWFIE component. Management of users and their roles. Is a directory services (LDAP).

Users & Rights Service

RAWFIE component. Manages all the users, roles and rights in the system.

UxV

The generic term for unmanned vehicle. In RAWFIE, it can be either:

USV - Unmanned Surface vehicle.

UAV - Unmanned Aerial vehicle.

UGV - Unmanned Ground vehicle.

UUV - Unmanned Underwater vehicle.

UxV Navigation Tool

RAWFIE component. This component will provide to the user the ability to (near) real-time remotely navigate a squad of UxVs.

UxV node

RAWFIE component. A single UxV node. The UxV is a complete mobile system that interacts with the other Testbed entities. It can be remotely controlled or able to act and move autonomously.

V

Visualisation Engine

RAWFIE component. Used for providing the necessary information to the Visualisation tool, to communicate with the other components, to handle geospatial data, to retrieve data for experiments from the database, to load and store user settings and to forward them to the visualisation tool.

Visualisation Tool

RAWFIE component. Visualisation of an ongoing experiment as well as visualisation of experiments that are already finished

W

Web Portal

RAWFIE component. The central user interface that provides access to most of the RAWFIE tools/services and available documentation.

Wiki Tool

RAWFIE component. Provides documentation and tutorials to the users of the platform.