Ref. Ares(2019)2280717 - 09/03/2019

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

Project Acronym:	RAWFIE		
Contract Number:	645220		
Starting date:	Jan 1st 2015	Ending date:	March 31st, 2019

Deliverable Number and Title	D6.6: RAWFIE Platform Validation (c)		
Confidentiality	PU	Deliverable type[1]	R
Deliverable File	D6.6	Date	2019-03-30
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	2018-04-23	Initial version based on D6.4	all
0.2	2018-05-14	Collected first contributions; updated Validation by requirements	Section 3
0.3	2018-05-16	Questionnaire created	Annex A
0.4	2018-06-13	Updated requirement and scenarios	Section 3 and 4

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[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).

0.5	2019-01-07	Evaluated first responses from the questionnaire	Section 5, Annex C
0.6	2019-03-13	Collected further contribution for scenarios and requirements	Section 3 and 4
0.7	2019-03-19	Inserted executed user-defined scenarios	Section 4
0.8	2019-03-22	Evaluated further responses from the questionnaire	Section 5, Annex C
0.9	2019-03-26	Completing all sections	all
0.10	2019-03-29	Incorporate review comments	all
1.0	2019-03-3ß	Final version	all

Abstract:

The objective of this deliverable is to report the results of the third validation run of the RAWFIE platform. It describes the validation and evaluation procedures and their outcomes of the third implementation phase.
The document is released as a live document in three phases/cycles according to the roadmap (3 of 3).
This deliverable is based on the validation plan setup in D4.9, the requirements found in D3.3 and on the results of tasks T6.1 and T6.2.

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

Part II: Table of Contents

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Part III: Foreword

> **Important note**: During the 2nd review report a revision was requested for D6.2 and D6.4. But D6.6 superseded both deliverables. Therefore, the consortium decided all reviewer's comments related to D6.2 and D6.4 to be addressed in D6.6.

During the 2nd review report we got a request for revision for D6.2 and D6.4. These are shown below:

D6.2	RAWFIE Platform Validation (a)	REQUEST FOR REVISION	The report is good, however the weakness in it is the lack of real requirements defined for the component level. A stronger definition of components and subsystems requirements is needed
D6.4	RAWFIE Platform Validation (b)	REQUEST FOR REVISION	The observations are similar to the D6.2 comments. D3.2 is quite weak and this needs the validation plan to be improved based on better requirement defined in D3.2

The deliverables were rejected because of weak requirements in D3.1/D3.2. The requirements have been improved in the lasted version of D3.3, which superseded D3.1 and D3.2. The new requirements have been applied to the verification and validation scenarios in D4.9 and D6.6 is checking them.

Unfortunately, this deliverable had to be delayed until the end of the RAWFIE project, following a general project delay due to organisational, legal and insurance problems that delayed the experiments executions. A total of 17 experiments have been executed.

Part IV: Executive Summary

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

The first chapter gives a short introduction into this document. The next chapter introduces the used methodology, which is nearly the same as in D6.4.

The validation starts with a list stating which of the requirements from D3.3 are 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 D4.9). The scenarios that could be executed were successful with minor deviations.

Then, the new questionnaire elaborated for D6.6 is summarized in short. It was again reworked to get more metrics results for each of the validation scenarios. Unfortunately, mainly user-defined scenarios where executed by end-users. So most answers from these scenarios were received, less so for the predefined scenarios. The results of the questionnaire showed that most users have a good opinion about the RAWFIE platform, despite some stability problems.

The last chapter give a short conclusion and outlook.

Part V: Main Section

1 Introduction

1.1 Scope of D6.6

This deliverable presents the approach and the results of the third 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?") is determined from end-user feedback.

Six testbed were integrated in to the RAWFIE platform. On them, 17 experiments were executed in the course of six projects from the Open Calls. A list of experiments can be found in Appendix D. Several tests and validations were executed in the testbeds of Skaramagkas, RT-ART Zaragoza and DFKI Bremen. Some of the participating users and partners filled in a questionnaire and the results of the tests were used to fill in the test tables in the following sections.

This deliverable aims at:

- Describing the adopted methodology,
- Validating which requirements presented of D3.3 are met
- Perform an 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

1.2 Relation to other deliverables

The present D6.6 is the third and final version of the "RAWFIE Platform Validation". It is an update of D6.4. D6.6 uses the same methodology and updates the validation results of D6.4.

The updated validation scenarios were taken from D4.9. They check if the validation-related requirements defined in D3.3 are met.

2 Methodology

Methodology used for this deliverable is mostly the same as in D6.2/D6.4 and is not repeated. The main difference is that the questionnaire was completely reworked (to get detailed feedback for the metrics of the validation) and more experiments were executed.

3 Validation by requirements

Table 1 lists all requirements defined in the revised version of D3.3 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, almost all planed features are fulfilled.

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

No	ID	Component	Title	OK	Comment	Linked Scenario or Verification Test
1	PT-GEN-R-001	General	RAWFIE Platform shall adopt Sliced Federated Architecture (SFA)	Y	Addressed by the SAMANT ROC1 project	
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 shall include all basic entities that are used or/and exchanged by the various components of the RAWFIE Platform	Y	Verified by revision of the data model	
4	PT-GEN-R-004	General	RAWFIE platform shall provide appropriate data storage for information that needs to be persisted, or used after an experiment completion (e.g. analysed by the various tools and services).	Y	By Design: POSTGRES Database used for storage	All
5	PT-GEN-R-005	General	RAWFIE platform shall support secure data exchange based on certificates	Y	verified by audit (RAWFIE modules uses X.509 certificates)	
6	PT-GEN-R-006	General	Each experiment initiated from the RAWFIE platform shall be subject to approval by an ethics committee	Y	By Design	
7	PT-GEN-R-007	General	All data generated by an experiment shall be stored in an open public repository and be easily accessible via the platform UI	Y	By Design	
8	PT-GEN-R-008	General	Redundancy of RAWFIE physical and software services shall be provided	Y	By Design	SH-01
9	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	WP01, WP02, PA-01, PA-02, PA-04

10	PT-WEB-P-002	Web Portal Tool	Web portal usage shall be allowed only to authenticated users	Y		WP01, WP03
11	PT-WIK-T-001	Wiki Tool	A tutorial or similar type of documentation shall be provided to the users of the platform	Y		WT01
12	PT-WIK-T-002	Wiki Tool	The Wiki shall use the user credentials from the User & Rights repository	Y		WT01, WT02
13	PT-WIK-T-003	Wiki Tool	The wiki shall support different languages to provided manuals to customers from different regions.	Y		WT01
14	PT-WIK-T-004	Wiki Tool	The Wiki shall be easy to use and edit	Y		WT02
15	PT-BOO-T-001	Booking Tool	Booking Tool shall allow booking of resources at the experimenter level for a specified period and for selected resources	Y		BT01, BT02, BT03
16	PT-BOO-T-002	Booking Tool	Booking Tool functionality shall be compatible with the SFA architecture and the notion of slices reservations	Y		BT05
17	PT-BOO-T-003	Booking Tool	Booking Tool shall delegate all its actions related to Booking of a resource to the Booking Service	Y		BT01, BT02, BT03, BT04,TO-01
18	PT-BOO-T-004	Booking Tool	Booking Tool shall also interact with the Testbeds Directory Service in order to retrieve information on unallocated testbed resources	Y		BT03, TO-01
19	PT-BOO-T-005	Booking Tool	Booking Tool shall communicate with the underline services using JSON formatted messages (through an RPC or REST API)	Y		BT02, BT04, TO-01
20	PT-BOO-T-006	Booking Tool	Booking Tool shall provide appropriate functionality for viewing the reservations of a user/experimenter	Y		BT01, BT02, TO-01
21	PT-BOO-T-007	Booking Tool	Booking Tool shall allow editing of Reservations defined in a future time	Y		BT04
22	PT-BOO-T-008	Booking Tool	Booking Tool shall allow cancellation of present and future defined Reservations	Y		BT04, TO-01
23	PT-BOO-T-009	Booking Tool	Booking Tool shall allow creation of bookings through an intuitive UI interface	Y		BT03, TO-01
24	PT-BOO-T-010	Booking Tool	Appropriate notification mechanism shall be provided to the user in case status of reservation request is not directly available.	Y		BT01, BT03, BT04, TO-01
25	PT-BOO-T-011	Booking Tool	Booking Tool shall provide assistance of feedback to the potential experimenter during the booking process	Y		BT03, BT04

26	PT-BOO-T-014	Booking Tool	Booking Tool UI interface shall be protected with appropriate authorization and differentiate available actions and view based on user and its assigned role	Y	Authorization provided by web portal. Actions allowed depend on usr and role (see verification test BT04 for more details)	BT04
27	PT-BOO-T-015	Booking Tool	Booking Tool shall be integrated in the RAWFIE web portal.	Y	By design: Booking tool is integrated to the RAWFIE portal	BT01
28	PT-BOO-T-016	Booking Tool	Booking Tool shall limit reservation of resources during testbeds operational hours	Y		BT01, BT02
29	PT-BOO-T-017	Booking Tool	Booking Tool shall prohibit reservation of the same resource by different users at overlapping time periods	Y		BT03
30	PT-SYM-T-001	System Monitoring Tool	Listing and/or visualisation of current system health status shall be available	Y		SMT01, SMT03, SYMS02, PA-03
31	PT-SYM-T-002	System Monitoring Tool	The current system health status shall be grouped thematically.	Y		SMT01, PA-03
32	PT-SYM-T-003	System Monitoring Tool	Filtering of the accessible component health statuses by user roles/rights shall be possible.	Y		SMT02
33	PT-SYM-T-004	System Monitoring Tool	The health statuses webpage shall be updated automatically.	Y		SMT01, SMT03, PA-03
34	PT-SYM-T-005	System Monitoring Tool	The health status information shall include a severity indication and possibly textual information with additional details.	Y		SMT01, SMT03, PA-03
35	PT-SYM-T-006	System Monitoring Tool	The history of health status information shall be listed	Y		SMT03
36	PT-SYM-T-007	System Monitoring Tool	The status page view displaying information for various components shall update reasonably fast.	Y		PA-03
37	PT-REE-T-001	Resource Explorer Tool	The UI interface shall illustrate testbed and UxV information of the RAWFIE federation that the experimenters shall take advantage of	Y		RET01, TO-03
38	PT-REE-T-002	Resource Explorer Tool	Registration of testbeds and UxVs may be possible via the Web Portal	Y		TM02, TO-03, UM-01

39	PT-REE-T-003	Resource Explorer Tool	Resource Explorer tool shall allow for fine-grained resources' searches	Y		RET01,
40	PT-REE-T-004	Resource Explorer Tool	Link to the Booking Tool shall be provided	Y		RET01
41	PT-EXA-T-001	Experiment Authoring Tool	Experiment Description Language (EDL) shall be used as a language for the definition of experiment scenarios	Y		EAT01, EAT02, EAT03, EAT04, EAT05, EAT06, EAT07
42	PT-EXA-T-002	Experiment Authoring Tool	The EDL shall allow the definition of all necessary requirements for an experiment	Y		EAT01, EAT02, EAT03, EAT04, EAT05, EAT06, EAT07
43	PT-EXA-T-003	Experiment Authoring Tool	For each defined experiment specific metadata, i.e. name, version, date and description shall be defined.	Y		EAT01, EAT02, EAT03, EAT04, EAT05, EAT06, EAT07
44	PT-EXA-T-004	Experiment Authoring Tool	An experimenter shall be able to provide initial conditions and/or configuration parameters for an experiment	Y		EAT01, EAT02, EAT03, EAT04, EAT05, EAT06, EAT07 ES-01, ES-02
45	PT-EXA-T-005	Experiment Authoring Tool	An experimenter shall be able to manage/guide the available booked resources during experiment authoring	Y		EAT01, EAT02, EAT03, EAT04, EAT05, EAT06, EAT07 ES-05
46	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		EAT01
47	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	Y		EAT01, EAT02, EAT03, EAT04
48	PT-EXA-T-008	Experiment Authoring Tool	An experimenter shall be able to provide navigation or movement directives during experiment authoring	Y		EAT01, EAT02, EAT03, EAT04, EAT05, EAT06, EAT07, UxV01, UxV02, UxV15, ES-01, ES-02, ES-05

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49	PT-EXA-T-009	Experiment Authoring Tool	An experimenter shall be able to create groups of UxVs resources, for which specific directives will apply.	Y		EAT01, EAT02, EAT03, EAT04, EAT05, EAT06, EAT07
50	PT-EXA-T-010	Experiment Authoring Tool	A textual editor shall be provided for the authoring of RAWFIE experiments	Y		EAT01, EAT02, EAT03, EAT04, EAT05, EAT06, EAT07
51	PT-EXA-T-011	Experiment Authoring Tool	A visual/graphical editor shall be provided for the authoring of RAWFIE experiments	Y		EAT01, EAT02, EAT03, EAT04, EAT05, EAT06, EAT07
52	PT-EXA-T-012	Experiment Authoring Tool	Platform shall allow saving, editing and/or deletion of an experiment defined via EDL	Y		EAT01, EAT02, EAT03, EAT04, EAT05, EAT06, EAT07
53	PT-EXA-T-013	Experiment Authoring Tool	The visual editor shall allow the definition of movement and location waypoints from a map	Y		EAT01, EAT02, EAT03, EAT04, EAT05, EAT06, EAT07
54	PT-EXA-T-014	Experiment Authoring Tool	During authoring of an experiment selection of resources shall be limited only to the ones previously reserved from the user at the foreseen time of experiment	Y		EAT01, EAT02, EAT03, EAT04
55	PT-EXA-T-015	Experiment Authoring Tool	Validation of EDL script shall be possible prior to or during saving	Y		EAT01, EAT02, EAT03, EAT04, EAT05, EAT06, EAT07
56	PT-EXA-T-016	Experiment Authoring Tool	An experimenter shall have the means to define actions or tasks that shall run on a periodic or ad hoc basis during execution of an experiment	Y		EAT01, EAT02, EAT03, EAT04
57	PT-EXA-T-017	Experiment Authoring Tool	The Visual editor shall be synchronized with the Textual Editor	Y		EAT05
58	PT-EXM-T-001	Experiment Monitoring Tool	Experiment Monitoring Tool shall provide overview of experiments of a user	Y		EMT01, TO-02

59	PT-EXM-T-002	Experiment Monitoring Tool	Experiment Monitoring and Visualisation shall be integrated	N	A link was added to the Experiment Monitoring to start/open the Visualisation Tool with the experiment	EMT01, TO-02
60	PT-EXM-T-003	Experiment Monitoring Tool	Cancellation of running experiments shall be possible via Web Portal	Y		EMT02, TO-02
61	PT-NAV-T-001	UxV Navigation Tool	This component shall provide to the user the ability to remotely navigate a squad of UxVs through a user friendly interface.	N	Navigation tool not implemented	UxV01, UxV02, UxV15
62	PT-NAV-T-002	UxV Navigation Tool	The tool shall provide validation of user's instructions	N	Navigation tool not implemented	UxV01, UxV02, UxV15
63	PT-NAV-T-003	UxV Navigation Tool	UxV Navigation Tool shall be available for the navigation of all moving resources	N	Navigation tool not implemented	UxV01, UxV15, TO-02
64	PT-NAV-T-004	UxV Navigation Tool	UxV Navigation Tool shall be available to read from the database a detailed version of the map of the available areas	N	Navigation tool not implemented	UxV02, ES-05
65	PT-VIS-T-001	Visualisation Tool	The Visualisation Tool shall allow the visualisation of information about the running experiments, in tabular/graphical form	Y		VIS01, VIS02, VIS03, VIS04, VIS05, VIS06, UxV01, UxV02, UxV15, TO-02
66	PT-VIS-T-002	Visualisation Tool	A 3D visualization shall be available for the tracking of all moving resources	N	Option available, but will not be supported for now due to missing 3D maps	VIS01, VIS02, VIS03, VIS04, VIS05, VIS06
67	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	VIS01, VIS02, VIS03, VIS05, VIS06, UxV03
68	PT-VIS-T-004	Visualisation Tool	The Visualisation Tool shall provide access to information / features associated to each UxV device on the geographic map	Y		VIS01, VIS02, VIS03, VIS05, VIS06
69	PT-VIS-T-005	Visualisation Tool	The Visualisation Tool shall allow organization and manipulation of multiple geographic layers	Y		VIS01, VIS02, VIS03, VIS05, VIS06

70	PT-VIS-T-006	Visualisation Tool	Possibility of Adding/Removing/Updating graphical widgets shall be provided	Y		VIS01, VIS02, VIS03, VIS05, VIS06
71	PT-VIS-T-007	Visualisation Tool	Possibility to display both actual and expected UxVs' route and position shall be provided	Y		VIS01, VIS02, VIS03, VIS04, VIS05, VIS06
72	PT-VIS-T-008	Visualisation Tool	Logged in users shall be able to view information and visualize only their owned experiments	Y		VIS06
73	PT-DAA-T-001	Data Analysis Tool	Analysis tool shall provide an interface to data engine.	Y		DAT01
74	PT-DAA-T-002	Data Analysis Tool	Analysis tool shall provide access to past experiments	Y	Graphite is in place	DAT04
75	PT-DAA-T-003	Data Analysis Tool	Analysis tool shall provide ability to query message bus streams	Y		DAT01, DAT03
76	PT-DAA-T-004	Data Analysis Tool	Analysis tool shall provide interface to end running jobs	Y	Access to spark master is in place	DAT03, DAE02
77	PT-DAA-T-005	Data Analysis Tool	Analysis tool shall provide a simple metric selection interface, a view of the result stream & the job status tab	N	Job status tab rejected due to notebook structure (Zeppelin)	DAT01, DAT03, DAT04
78	PT-DAA-T-006	Data Analysis Tool	The Analysis Tool shall provide an interface for the end-user to write their own code.	Y		DAT01, DAT02, DAT03
79	PT-DAA-T-007	Data Analysis Tool	The Analysis Tool shall provide authenticated login	Y	Through the platform web portal	DAT01, DAT02, DAT03, DAT04
80	PT-DAA-T-008	Data Analysis Tool	The Data Analysis shall allow for online (streaming) and batch (offline) based experiments data processing	Y		DAT01, DAT02, DAT04
81	PT-DIR-S-001	Testbeds Directory Service	The Testbed Directory Service shall provide REST / Web Service API to access to information on all Testbeds registered in RAWFIE	Y		TD04
82	PT-DIR-S-002	Testbeds Directory Service	The Testbed Directory Service shall provide REST / Web Service API to access to information on all Testbeds registered in RAWFIE according to predefined filters	Y		TD04
83	PT-DIR-S-003	Testbeds Directory Service	The Testbed Directory Service shall provide REST / Web Service API to access to information about available resources (UxVs) belonging to the testbeds registered in RAWFIE	Y		TD01, TO-01
84	PT-DIR-S-004	Testbeds Directory Service	The Testbed Directory Service shall provide REST / Web Service API to access to information on available	Y		TD01, TO-01

			resources (UxVs) belonging to the testbeds registered in RAWFIE according to predefined filters			
85	PT-DIR-S-005	Testbeds Directory Service	The Testbed Directory Service shall provide the possibility to register new testbeds in the RAWFIE platform,as well as to unregister (delete) testbeds from the platform	Y		TD02, TO-03
86	PT-DIR-S-006	Testbeds Directory Service	Queries to look at resources based on the provided technological capabilities shall be provided	Y		TD01, TD04, TO-01
87	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		TD03, TM02
88	PT-CPV-001	EDL Compiler and Validator	A tool for translating EDL into user directives shall be provided	Y		ECV01, ECV02
89	PT-CPV-002	EDL Compiler and Validator	An experimenter shall have the opportunity to use a code generation engine	Y		ECV01, ECV02
90	PT-CPV-003	EDL Compiler and Validator	Experiments defined via EDL shall be validated after their authoring	Y		ECV01, ECV02
91	PT-CPV-004	EDL Compiler and Validator	The compiler and validator shall communicate with the authoring tool in order to transfer error indications and hints for solving them	Y		ECV01, ECV02
92	PT-EXV-S-001	Experiment Validation Service	RAWFIE shall provide a validator to constantly check experiment scenarios during runtime	Y		UxVNT01, ECV01, ECV02
93	PT-EXV-S-002	Experiment Validation Service	The validation service shall perform syntactic checking	Y		ECV01, ECV02 EAT01
94	PT-EXV-S-003	Experiment Validation Service	The validation service shall perform semantic checking	Y		ES-01, ES-02, ES-05
95	PT-USR-S-001	Users & Rights Service	User login credentials checking shall be provided	Y		USR01,
96	PT-USR-S-002	Users & Rights Service	RAWFIE platform shall support various roles with different privileges at every level of access.	Y		USR02, USR03, PA-02
97	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	Not needed	

98	PT-BOO-S-001	Booking Service	Booking Service shall support reservations of resources at both user level and experiment level	Y		BS01,
99	PT-BOO-S-002	Booking Service	User level booking shall be triggered by the Booking Tool via a REST API.	Y	By design	BT02, BS01, BS02, BS03, BS04, BS05, BS06, BS07, BS08, TO-01
100	PT-BOO-S-003	Booking Service	Experiment level booking shall 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	
101	PT-BOO-S-004	Booking Service	Experiment level booking shall support both immediate booking as well as booking at a future time	Y		BT02, BS01
102	PT-BOO-S-005	Booking Service	Booking Service shall provide all the necessary methods to manage the bookings including addition, modification and cancellation/deletion operations	Y		BS01, BS02, BS03, BS04, BS05, TO-01
103	PT-BOO-S-006	Booking Service	Booking Service shall be able to compute and return feedback on conflicting bookings for a provided booking request	Y		BT03, BT04, BS07
104	PT-BOO-S-007	Booking Service	Reservation Data shall be persistent in order to survive service failures and be available by other services	Y		BS01, BS02, BS03, BS04, BS05, TO-01
105	PT-BOO-S-008	Booking Service	Historical data retrieval for Bookings/Reservations shall be available on demand	Y		BT01, BS06
106	PT-BOO-S-010	Booking Service	Booking functionality shall be able to correctly handle simultaneous Reservations requests by end users	Y		BS08
107	PT-BOO-S-012	Booking Service	Booking functionality shall provide means to ensure fairness in resource booking as well as protect for malevolent actions that a user may perform.	Y	By design: Approval of booking by testbed operator is needed	BS01, BS07
108	PT-BOO-S-013	Booking Service	All Booking Service incoming requests shall contain user initiating information and delegate/contact the User & Rights service in order to perform validation\authorization	Y		BS02, BS03, BS04
109	PT-LAU-S-001	Launching Service	Launching Service shall support short-term or manual launching of an experiment initiated directly by an experimenter	Y		LS01
110	PT-LAU-S-002	Launching Service	Launching Service shall support long-term or scheduled launching of an experiment initiated directly by an experimenter	Y		LS02

111	PT-LAU-S-003	Launching Service	Each executing experiment shall be uniquely identified within RAWFIE ecosystem	Y		LS01, LS02
112	PT-LAU-S-004	Launching Service	During launching it shall 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	LS01, LS02
113	PT-LAU-S-005	Launching Service	During launching it shall be ensured that the experiment to be started belongs to an authorized user of the RAWFIE platform	Y		LS01, LS02
114	PT-LAU-S-006	Launching Service	The Launching Service shall be able to address simultaneous requests for starting an experiment	Y		LS04
115	PT-LAU-S-007	Launching Service	The Launching Service shall send an appropriate message upon successful starting of an experiment	Y		LS01, LS02
116	PT-LAU-S-008	Launching Service	The Launching Service shall interact with other components or database services in order to retrieve information needed for deciding on launching an experiment	Y		LS01, LS02
117	PT-LAU-S-009	Launching Service	Interactions of the launching service with database services and/or other components shall respect the RAWFIE platform boundary	Y		LS01, LS02, LS03
118	PT-LAU-S-010	Launching Service	Launching service shall support requests for experiment cancellation	Y		EMT02, LS03, TO-02
119	PT-LAU-S-012	Launching Service	Launching service shall provide appropriate feedback to the requested entity regarding failures on fulfilling a request	Y		EMT02, LS01, LS02, LS03, TO-02
120	PT-LAU-S-013	Launching Service	Launching service shall not alter or modify any information related to the actual execution of an experiment	Y		LS01, LS02, LS03
121	PT-LAU-S-014	Launching Service	Notification mechanisms may be provided for experiments scheduled for execution in the future.	Y		LS02
122	PT-LAU-S-015	Launching Service	Only experiments approved by an ethics committee shall be allowed for launching	Y		LS01, LS02
123	PT-VIS-E-001	Visualisation Engine	The Visualization Engine shall retrieve from the message bus all runtime experiment information needed for visualizing the UxVs and/or any sensor measurments	Y		VIS01, VIS02, VIS03, VIS04, VIS05, VIS06, TO-02
124	PT-VIS-E-002	Visualisation Engine	The Visualization Engine shall provide a GIS server capable of handling geographical layers (overlays)	Y		VIS02

125	PT-VIS-E-003	Visualisation Engine	The Visualization Engine may allow cache of data for faster access to the available geographic layers	Y		VIS01, VIS02, VIS03, VIS04, VIS05, VIS06
126	PT-VIS-E-004	Visualisation Engine	The Visualization Engine shall provide the possibility to replay experiments using historical data	N	Requirement rejected, because currently not all data is stored from the Kafka topics permanently to be retrieved on user's request. Most of the other data is already in the DB, but the Kafka streams are missing. This was decided like that, because there was no practical need for now to replay experiments, so they are not stored and therefore the experiments cannot be replayed	VIS02
127	PT-VIS-E-005	Visualisation Engine	The Visualization Engine shall provide the possibility to visualize experiments for different users at the same time	Y		VIS01
128	PT-EXP-C-001	Experiment Controller	Cancellation of running experiments shall be possible	Y		EMT02, TO-02
129	PT-EXP-C-002	UxV Naviagation tool	RAWFIE platform shall allow experimenters to remotely navigate UxVs.	N	Navigation tool not implemented	
130	PT-EXP-C-003	Experiment Controller	The Experiment Controller shall support the execution of experiments that involve multiple testbeds	Y		VIS01, VIS02, VIS03, VIS04, EC03
131	PT-EXP-C-004	Experiment Controller	The Experiment Controller shall be able to support multiple experiments running the same time in parallel	Y		VIS01, VIS02, VIS03, VIS04, EC03
132	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		VIS01, VIS02, VIS03, VIS04, EC02, OS-08
133	PT-EXP-C-007	Experiment Controller	The Experiment Controller may be able to override the order of instructions described in the input script while the experiment is running	Y		EC02, TO-02

134	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		VIS01, VIS02, VIS03, VIS04, EC02, TO-02, OS-08
135	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	All the status updates/error messages are reported to the corresponding table inside RAWFIE DB	VIS01, VIS02, VIS03, VIS04, EC02, TO-02, OS-08
136	PT-DAA-S-001	Data Analysis Engine	The Data Analysis eEngine shall support accepting of analysis jobs	Y	Via distribution from Zeppelin or JAR submit	DAE01
137	PT-DAA-S-002	Data Analysis Engine	The Data Analysis Eengine shall support executing analysis jobs	Y	Via Apache Zeppelin	DAE01
138	PT-DAA-S-003	Data Analysis Engine	The Data Analysis Engine shall provide the ability to end running jobs	Y		DAE02
139	PT-DAA-S-004	Data Analysis Engine	The Data Analysis Engine shall be scalable.	Y	By design	DAE02
140	PT-DAA-S-006	Data Analysis Engine	The Data Analysis Engine shall support sending results to a results repository as well as retrieving data from a measurements repository	Y		
141	PT-SYM-S-001	System Monitoring Service	RAWFIE middle tier shall include a module to monitor the performance of the middle tier components.	Y		SYMS01, PA-03, SH-01
142	PT-SYM-S-002	System Monitoring Service	RAWFIE Testbeds and UxVs statuses shall be monitored	Y		SYMS01, SYMS02, MM01, MM02
143	PT-SYM-S-003	System Monitoring Service	RAWFIE system administrators shall be informed if critical, for the RAWFIE platfrom operation, services are down	Y		SYMS02, PA-03
144	PT-SYM-S-004	System Monitoring Service	User may register for notifications if certain components are down	Y		SYMS02
145	PT-SYM-S-005	System Monitoring Service	System Monitoring Service shall send notifications about planned downtimes	Y		SYMS03

146	PT-SYM-S-006	System Monitoring Service	System Monitoring Service shall support push and pull data collection	Y		SYMS01
147	PT-SYM-S-007	System Monitoring Service	System Monitoring Service shall provide different health statuses and human readable status messages for each component	Y		SMT01, SMT03, PA-03
148	PT-SYM-S-008	System Monitoring Service	System Monitoring Service shall check health status periodically	Y		SYMS02, PA-03
149	PT-SYM-S-009	System Monitoring Service	System Monitoring Service shall provide a history health status changes	Y		SMT03
150	PT-SYM-S-010	System Monitoring Service	System Monitoring Service shall support many health checks.	Y		PA-03
151	PT-SYM-S-011	System Monitoring Service	System Monitoring Service shall send the error notifications promptly.	Y		**SYMS02,** PA-03
152	PT-ACC-S-001	Accounting Service	The accounting service shall be capable to accept different cost models regarding RAWFIE usage on a per service basis	Y		ACCS01
153	PT-ACC-S-002	Accounting Service	The accounting service shall be capable to gather statistics regarding usage of the platform by experimenters.	Y		ACCS01
154	PT-ACC-S-003	Accounting Service	The RAWFIE platform shall record information related to time and type of access for a service by a user.	Y		ACCS01
155	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.	Y		ACCS01
156	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.)	Y		ACCS01
157	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	Y		ACCS01
158	PT-ACC-S-007	Accounting Service	The accounting service shall be able to handle the addition of new services that may be incorporated in the RAWFIE platform during time.	Y	Implementation specific for the given case. Not testable. Used third party software ("KillBill")	

				supported plugins for such cases.			
159	TB-GEN-R-002	General	Each Testbed shall provide the exact boundaries within which its UxVs can operate	Y			ES-01, ES-02
160	TB-GEN-R-003	General	Testbed areas shall at least be able to host/operate multiple UxVs of one or more types	Y			ES-01, ES-02
161	TB-GEN-R-004	General	Testbed areas environment shall be closely monitored	Y			TO-03
162	TB-GEN-R-005	General	Indoor spaces of a testbed shall provide a controlled indoor environment	Y			TO-03
163	TB-GEN-R-006	General	Testebed facility areas shall comprise storing spaces and be able to receive inspect and assemble and/or fix UxVs	Y			TO-03
164	TB-GEN-R-007	General	Testbed facilities shall provide emergency services in an extraordinary event	Y			TO-03
165	TB-GEN-R-008	General	Testbed areas shall provide proper facilities and equipment	Y			TO-03
166	TB-GEN-R-009	General	Testbed shall provide dedicated computational resources	Y	By design		TO-03
167	TB-GEN-R-010	General	Testbeds shall be supported by on-site personnel	Y	If supported by the testbed. Cannot be verified by testing		TO-03
168	TB-GEN-R-011	General	Testbeds shall conform to all legal regulations and restrictions and advertise them to the RAWFIE platform	Y			TO-03
169	TB-GEN-R-012	General	Testbeds shall provide information regarding the expected Coordination Reference System (CRS) their resources are expected to operate	Y	By design of data model		TO-03
170	TB-GEN-R-013	General	Testbeds shall provide information about their hours of operation	Y			TO-03
171	TB-GEN-R-014	General	Testbed messaging solution configuration shall ensure local and isolated flow of control commands and navigation sensors feedback	Y	A testbed configuration requirement. Cannot be tested in a scenario but only verified during a testbed audit		
172	TB-GEN-R-015	General	UxVs shall be accepted as operational devices to a testbed only if all testbed "acceptance procedure" items are fulfilled	Y	fulfilled by a procedure during the installation of a		

					UxV. It cannot be tested in a scenario	
173	TB-MOM-001	Monitoring Manager	The Monitoring Manager component shall be able to provide information about the capabilities of each resource node.	Y	Monitoring Manager is integrated within Testbed Manager	MM01, OS-06
174	TB-MOM-002	Monitoring Manager	The Monitoring Manager component shall collect and report current status of computing resources of the testbed facilities	Y		MM02
175	TB-MOM-003	Monitoring Manager	The Monitoring Manager component shall store periodically all testbed information	Y		MM01, MM02, UxV04, UxV05, UxV06, UxV07, UxV08, UxV09, UxV10, UxV11, UxV12
176	TB-MOM-004	Monitoring Manager	Testbed monitoring manager shall be able to transmit the current status to the System Monitoring Service.	Y		SYMS01, SMT01
177	TB-MOM-005	Monitoring Manager	Monitoring Manager shall be able to communicate and collect information from other services that provide important information related to the operation of testbed facility	Y		TM04
178	TB-NEC-001	Network Controller	The Network Controller shall list and monitor UxV connections	Y		NC01
179	TB-NEC-002	Network Controller	Network Controller shall keep track of all network communication resources	Y		NC01, NC02
180	TB-NEC-003	Network Controller	The Network Controller shall be able to decide/authorise connection switches	Y		NC02
181	TB-NEC-004	Network Controller	The Network Controller shall detect degraded and lost connections and notify other components accordingly.	Y		NC02, OS-03
182	TB-NEC-005	Network Controller	The Network Controller shall regularly check the connection time performance	Y		NC02
183	TB-NEC-006	Network Controller	The Network Controller shall provide a global network robustness indicator for the testbed.	Y		NC02
184	TB-REC-001	Resource Controller	Resource Controller shall control the navigation behaviour of UxVs based on experiment information received, providing corrections in trajectory if need be	Y		RC01, UxV01, UxV02, UxV15, OS-07
185	TB-REC-002	Resource Controller	Resource Controller shall be able to activate the an "Emergency Scenario" if conditions compromising	N		RC01, OS-01, OS-05, OS-07

			safety of a UxV are detected (including Mission Abort and Autonomy Revocation)			
186	TB-REC-003	Resource Controller	The Resource Controller shall receive location messages from the vehicles at regular intervals and use them to ensure that there is sufficient spatial separation between the devices involved in a certain experiment	Y		RC02, OS-07
187	TB-REC-004	Resource Controller	The Resource Controller shall transmit the next location for the current experiment to the vehicles	Y		RC02, UxV01, UxV02, UxV15
188	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		RC02
189	TB-REC-006	Resource Controller	For the experiment accomplishment the Resource Controller shall operate in close coordination with the Experiment Controller	Y		RC01, OS-08
190	TB-REC-007	Resource Controller	RC shall support conditional rerouting of UxVs subject to the conditions of the environment (e.g., temperature, number of neighbors) and their operational status (e.g., battery level, routing protocol status).	Y		RC01, RC02
191	TB-MAN-001	Testbed Manager	Testbed Manager shall support permanent storage of all testbed attributes and resources attributes that belong to testbed	Y		TM01, TO-03
192	TB-MAN-002	Testbed Manager	Testbed Manager shall provide information about the capabilities of each resource node	Y		TM02, TM03
193	TB-MAN-003	Testbed Manager	Testbed Manager shall check periodically the status of all other services running at testbed level	Y	services	OS-04, OS-05, TM04
194	TB-MAN-004	Testbed Manager	Testbed Manager shall contain a registration log for all the experiments executed in the testbed	Y		TM01, UxV03, UxV04, UxV08, UxV09, UxV11, UxV12, UxV13. UxV14
195	TB-MAN-005	Testbed Manager	Testbed Manager shall be periodically informed about the status of all running experiments in the testbed	Y		EMT02, TM01
196	TB-MAN-006	Testbed Manager	Testbed Manager shall store configuration parameters for the UxVs in the relevant testbed	Y		TM02

197	TB-MAN-007	Testbed Manager	Testbed Manager shall implement a user interface to support the interactions between testbed operators and machines	Y		TM01, TM02, TM03, TM04, TM05, TO-03, OS-05
198	TB-MAN-008	Testbed Manager	Testbed Manager shall be capable to handle temporary interruption of communication and store data locally in case of transmission failure	N	Not required since it is indirectly supported by appropriate message bus configuration	
199	TB-MAN-009	Testbed Manager	Testbed Manager may provide statistical data/information about testbed operation	Y		TM04, TM05
200	TB-MAN-010	Testbed Manager	Testbed Manager shall provide the ability to cancel an ongoing experiment in case of communication failure with the RAWFIE platform	Y		TM01, OS-04, OS-05
201	TB-AGG-001	SFA Aggregate Manager	SFA Aggregate Manager (SAM) shall provide an SFA Interface to comply with SFA based testbeds or testbed federations	Y	Addressed by the SAMANT ROC1 project	BT05, TM03
202	TB-AGG-002	SFA Aggregate Manager	SFA Aggregate Manager (SAM) shall provide a REST API to comply with RAWFIE testbeds.	Y	Addressed by the SAMANT ROC1 project	BT05, TM03
203	TB-AGG-003	SFA Aggregate Manager	SFA Aggregate Manager (SAM) shall advertise the resources of a testbed	Y	Addressed by the SAMANT ROC1 project	TM03
204	TB-AGG-004	SFA Aggregate Manager	SFA Aggregate Manager (SAM) reservation process shall comply with the resource reservation process of RAWFIE testbeds	Y	Addressed by the SAMANT ROC1 project	BT05, TM03
205	TB-AGG-005	SFA Aggregate Manager	SFA Aggregate Manager (SAM) shall provide an interface to testbed administrators for managing RAWFIE testbeds	N	An interface in the testbed manager is used for administering the resources of a Rawfie testbed.	BT05, TM03
206	UXV-GEN-001	UxV General	UxVs shall comply to RAWFIE specification and interfaces, that is, they must be able to communicate with the platform using common defined software interfaces and protocols, and data formats.	Y		UM-01
207	UXV-GEN-002	UxV General	UxV providers may provide for their supplied devices a simulator/emulator mimicking its real-world behavior and kinematics	Y	Not testable by a scenario, Certain UxV providers provide simulators,We are having UAV and a USV simulator	
208	UXV-NOD-001	UxV Node	Each UxV shall have a unique Identification code.	Y		MM01, RC02,

						UxV01, UxV02, UxV03, UxV04, UxV07, UxV15, UM-02
209	UXV-NOD-002	UxV Node	Each UxV node shall ensure a minimum autonomy of 15-30 minutes.	Y	Indirectly tested during experiment execution	**UxV15**
210	UXV-NOD-003	UxV Node	Each UxV node shall be able to carry additional payload equipment of at least 0.5 to 1 kg in weight.	Y	Indirectly tested during experiment execution	UxV15
211	UXV-NOD-004	UxV Node	Each UxV node may register the Coordination Reference System CRS it is expected to operate.	Y	Data model provides appropriate field in resource table	
212	UXV-NOD-005	UxV Node	A proper message communication protocol shall be defined for the communication between a UxV node and the tesbed ground components	Y	All the devices implement a RAWFIE adapter to translate the messages from their missions to kafka based messages	UxV15
213	UXV-NOD-006	UxV Node	All command messages received by the UxVs shall be ensured that they originate from an authorized testbed component or other UxV involved in an experiment before being processed	Y	A TPM module is designed to support an enahnced the security of the origin of messages	UM-01
214	UXV-INT-001	UxV Interface	All messages of the UxV Message API shall contain in their header basic information about the dispatching entity.	Y		UM-02
215	UXV-INT-002	UxV Interface	UxV shall support the Goto command	Y		UM-02
216	UXV-INT-003	UxV Interface	UxV shall support the KeepStation command	Y		OS-01
217	UXV-INT-004	UxV Interface	UxV shall support the Abort command	Y		OS-01, OS-08
218	UXV-INT-005	UxV Interface	UxVs shall be able to advertise themselves to the RAWFIE infrastructure	Y		UM-01
219	UXV-INT-006	UxV Interface	UxVs shall be able to advertise information about their sensors to the RAWFIE infrastructure	Y		
220	UXV-INT-007	UxV Interface	UxVs shall be able to inform testbed about their CPU usage	Y		UxV02
221	UXV-INT-008	UxV Interface	UxVs shall be able to inform testbed about their on-board storage	Y		UxV02
222	UXV-INT-009	UxV Interface	UxVs shall be able to inform testbed about their battery usage	Y		UxV02, OS-06

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223	UXV-INT-010	UxV Interface	UxVs shall be able to inform testbed about their orientation (attitude)	Y		UxV02
224	UXV-INT-011	UxV Interface	UxVs shall be able to inform testbed about their velocity and acceleration	Y		UxV02
225	UXV-INT-012	UxV Interface	UxVs shall periodically publish a digest of their scalar sensor readings	Y		UxV03
226	UXV-INT-013	UxV Interface	UxVs shall be able to inform testbed about key network performance indicators	Y	Proximity component is implemented to measure the network performances	NC02
227	UXV-INT-014	UxV Interface	UxVs with multiple network interfaces shall support commands for selecting/changing the network interface used for data/command exchange	Y	Command implemented by the Network Manager.	OS-03
228	UXV-PRX-001	UxV proximity	Embedded UxV proximity component shall be installed into the UxV	Y		UxP01, UxP02, UM-02, OS-08
229	UXV-PRX-002	UxV proximity	UxV proximity component shall provide information sharing	Y		UxP01, UM-02
230	UXV-PRX-003	UxV proximity	UxV proximity component shall provide presence detection of other compliant UxVs	Y		UxP02, OS-08
231	UXV-PRX-004	UxV proximity	UxV proximity shall offer data relay capabilities	Y		UxP01, UM-02
232	UXV-PRX-005	UxV proximity	UxV proximity component shall provide information helping in collision avoidance	Y	Implemented on ROBOTNIK UxV	OS-08
233	UXV-PRX-006	UxV proximity	UxV proximity component shall offer temporary storage			UxP01, UM-02
234	UXV-NET-001	UxV Network and Communication	At least one communication interface shall support the remote control of the UxV by an operator.	Y		OS-02
235	UXV-NET-002	UxV Network and Communication	UxVs shall share the same time reference	Y	By means of their synchronisation with the message bus	UM-02
236	UXV-NET-003	UxV Network and Communication	A UxV shall be capable to provide Access Point functionality on demand.	Y	Access point provided by vehicle manufacturer or experimenter depending on the experiment scenario and the actual testbed on which it is executed.	UM-02

237	UXV-NET-004	UxV Network and Communication	Each UxV node shall be equipped with redundant communication means.	Y	Support for several communications interfaces means provided by the platform. Whether several means are effectively installed on the UxV depends on the testbed owner.	UM-02, OS-03, OS-08
238	UXV-NET-005	UxV Network and Communication	Each UxV shall manage its communication means	Y		UM-02, OS-03, OS-08
239	UXV-NET-006	UxV Network and Communication	A UxV shall be interfaced with the RAWFIE Messaging Solution	Y		UxV03, UxV04, UxV05, UxV06, UxV07, UxV08, UxV09, UwV10, UxV11, UxV12, UxV13, UxV14, UM-02, OS-08
240	UXV-NET-008	UxV Network and Communication	The UxV communication system shall be able to detect the presence of other UxV within radio range.	Y	If proximity component is used	UM-02, UxP03
241	UXV-NET-009	UxV Network and Communication	Each UxV node shall be able to send navigation state feedback with at least 2 Hz frequency and maximum 1 sec latency within radio communication reach.	Y	If proximity component is used	UxV01, UxV02, UxV15, UM-02, OS-08
242	UXV-NET-010	UxV Network and Communication	At least one UxV communication interface shall support IPv4/IPv6 protocol stack.	Y		UM-01
243	UXV-NET-011	UxV Network and Communication	Each connection between a UxV and its testbed shall be secured.	Y	Security implemented by the use of VPN	UM-01
244	UXV-SEN-001	UxV Sensor and Localisation	Each UxV node shall tag timing capability to each sensor readings	Y		UxV03,
245	UXV-SEN-002	UxV Sensor and Localisation	Each UxV node shall be able to list the available sensors	Y		UxV03

246	UXV-SEN-003	UxV Sensor and Localisation	UxV location and sensor data shall be made available to the experimenter	Y		UxV01, UxV02, UxV03, UxV15, OS-07
247	UXV-SEN-004	UxV Sensor and Localisation	Location sensors shall be supported in each UxV unit and can be used remotely during testbed demonstrations.	Y		RC02, UxV01, UxV02, UxV03, UxV11, UxV12, UxV14, UxV15, OS-07
248	UXV-SEN-005	UxV Sensor and Localisation	UxVs shall send a notification to the Resource Controller when they reach the desired location	Y		UxV01, UxV02, UxV03 UxV15, OS-08
249	UXV-STO-001	UxV On-board storage	UxVs shall be able to store data on board.	Y		UxV03, UxV04, UxV08, UxV09, UxV11, UxV12, UxV13, UxV14
250	UXV-STO-002	UxV On-board storage	UxV's shall provide a management tool of the available storage.	Y		UxV03, UxV04, UxV08, UxV09, UxV11, UxV12, UxV13, UxV4
251	UXV-STO-003	UxV On-board storage	UxV's shall provide an authorized access to the data management tool.	Y		UxV03, UxV04, UxV08, UxV09, UxV11, UxV12, UxV13, UxV14
252	UXV-STO-004	UxV On-board storage	UxV's shall provide a data log.	Y	All data are published inside message bus	UxV03, UxV04, UxV05, UxV06, UxV07, UxV08, UxV09, UxV10, UxV11, UxV12, UxV13, UxV14
253	UXV-STO-005	UxV On-board storage	UxV's may provide an automated syncing of servers.	Y		UxV13
254	UXV-PRC-001	UxV On-board processing	Each UxV shall be able to operate autonomously.	Y		UxV01, UxV02, UxV15, UM-02
255	UXV-PRC-002	UxV On-board processing	The UxV shall provide collision avoidance mechanism.	Y	Partially for some devices, the rest are supported by RC	UM-02, OS-08

256	UXV-PRC-003	UxV On-board processing	Capability of task planning of the UxVs nodes during run-time.	Y		UxV01, UxV04, UxV07, UxV15, OS-08
257	UXV-PRC-004	UxV On-board processing	UxVs shall be able to cooperate during the execution of an experiment.	Y		UM-02
258	UXV-PRC-005	UxV On-board processing	Each UxV node shall be able to keep position while waiting for new instructions	Y		UxV01, UxV04, UxV07, UxV15
259	UXV-PRC-006	UxV On-board processing	UxVs shall be capable of processing sensor data in order to summarize large sensor data-sets.	Y	UxV depended	
260	UXV-MGT-001	UxV Management	UxVs shall offer on demand resources (Network, Sensor, Processing, and Controller).	Y	Some devices have adjustable payload that can be removed on demand	UxV03, UxV11, UxV12
261	UXV-MGT-002	UxV Management	UxV shall be capable to revert to a safe mode	Y		UxV01, UxV15, UM-02, OS-01, OS-04, OS-08
262	UXV-MGT-003	UxV Management	UxV shall be capable to restart its internal components independently	Y		UxV08
263	UXV-MGT-004	UxV Management	UxV shall be capable to monitor the health of its components and provide appropriate health status messages to the testbed	Y		UM-02, OS-04
264	UXV-MGT-005	UxV Management	UxV shall be capable to enable/disable certain internal components	Y		UM-02
265	UXV-MGT-006	UxV Management	UxV shall be capable to offer safe maintenance access for manufacturers	Y		UxV01, UxV03, UxV05, UxV06, UxV07, UxV08, UxV09, UxV11, UxV12, UxV13, UxV14, UxV15, UM-01

Table 1: Validation by requirements

4 Validation by validation scenarios

This section presents the validation scenario tables from D4.9.

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.	
5	Do something else	failed	
#			

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

The status of the metrics where evaluated where possible. While hard metrics (like values that could be easily measured) are always filled in, the soft metrics are only filled in if data from the end user questionnaire is available. However, as the end users mainly did user-defined scenarios, the most of the standard scenarios received no response.

4.1 User defined scenarios

The table below presents a short mapping between the user-defined scenarios (UDS) and the ROC2/ROC3 projects. Most of the experimenters needed to integrate their own network components and test different navigation schemes like UDS-4 or any other components like quality air sensors/cameras like UDS-8. UDS-2, UDS-3 and UDS-6 were not proposed or tested as a use case scenario.

User defined Scenarios	Total Num.	ROC2 and ROC3 project names

1 – Environmental Monitoring Water Canals (or Air)	1	Iapetus
2 – Border Surveillance or Perimeter protection of large area	0	
3 – On demand deployable Internet facilities	0	
4 – Exploration & Assessment of Network Technologies Robustness	5	PARROT, FCD4ITS, CELLDRONE, ATLAS, Unsurpassed
5 – Efficient Coordination for phenomena or mission coverage	3	GNFUV, MULTITETHER, UTMEXP
6 – Over the Air (OTA) UxV Re-programming	0	
7 – Gathering Information for Naval Search and Rescue (SAR) Operations (ops).	1	MARE
8 – Mobilize resources and gather sensor data	5	ORTUS, Io2EDGE, QOEST4CM, EXPRAS, EXPRAS
9 – (New) Reasoning and semantic experimentation	1	SCOR,

4.1.1 Environmental Monitoring Water Canals (or Air)

Scenario ID: UD-XX	Conducted by: Technological Educational Institution of Western Greece Greece		Date: March 2019
Title	Monitoring of Air Pollution		
Comments			
Main stakeholder	Experimenter – Project Name Iapetus – ROC3		
Secondary stakeholder			
Involved Sub-systems	Resource Explorer Tool Testbeds Directory Service Booking Tool Booking Service Experiment Authoring Tool EDL Compiler & Validator Experiment Validation Service Launching Service Experiment Monitoring Tool Visualization Tool Visualization Engine Data Analysis Tool Data Analysis Engine		
Validated requirement			

Step	Description	Status	Remarks
1	Experimenter logs in to the Web Portal	success	
2	Experimenter browses testbed and UxV resources, via the Resource Explorer Tool, looking for UxVs equipped with aerial quality sensors like and HAI testbed	success	
3	Experimenter navigates to the Booking Tool and books resources in a testbed for the desirable timeframe	success	Booking request should be created in pending state
4	Definition and validation of the experimentation scenario o The experimenter visits the authoring tool and creates an EDL script o He/She validates the experiment o He/She stores the experiment	success	
5	The experimenter launches the experiment right after the definition	success	
6	During the experiment execution the experimenter is able to: o See the movement of the resources o See sensor measurement o Perform outlier detection through the data analytics tools o Visualize sensor measurements	success	
7	From the Visualization Tool, the experimenter can access to "near to real time" visualization of the information coming from the experiment, as well as to the summary of the same information after the experiment stops. This includes: • current location (e.g., lat and lon values) of each resource • values of all measurements coming from the different aerial sensors, i.e. CO and CO_2	success	Experimenter observes the experiment (i.e. route, sensor reading) via the appropriate platform services (Experimenter monitoring Tool, Visualization Tool)
11	The experimenter evaluates the results/measurements through the appropriate platform services (experiment log, Data Analysis Tool, etc.)	success	

4.1.2 Exploration & Assessment of Network Technologies Robustness

Scenario ID: **UD-XX**	Conducted by: University of Luxembourg, Luxembourg	Date: **March 2019**
Title	Floating Car Data for Intelligent Transportation Systems	
Comments		
Main stakeholder	Experimenter – Project Name FCD4ITS – ROC3	
Secondary stakeholder		
Involved Sub-systems	Resource Explorer Tool Testbeds Directory Service Booking Tool Booking Service Experiment Authoring Tool EDL Compiler & Validator Experiment Validation Service Launching Service Experiment Monitoring Tool Visualization Tool Visualization Engine Data Analysis Tool Data Analysis Engine	
Validated requirement		

Step	Description	Status	Remarks
1	Experimenter logs in to the Web Portal	success	
2	Experimenter browses testbed and UxV resources, via the Resource Explorer Tool, looking for 5 UGVs at the HMOD testbed	success	HMOD testbed was selected as long as contains a large outdoor area in which the devices can lost the communication
3	Experimenter navigates to the Booking Tool and books resources in a testbed for the desirable timeframe	success	Booking request should be created in pending state
4	Definition and validation of the experimentation scenario o The experimenter visits the authoring tool and creates an EDL script o He/She validates the experiment o He/She stores the experiment	success	
5	The experimenter launches the experiment right after the definition	success	
	Experimenter sends the hardware devices that shall be integrated in the UGVs. Small single boards are prepared based on UGV dimensions. Everything is shipped to HMOD. These devices host the algorithms tested at RAWFIE devices	success	
6	During the experiment execution the experimenter is able to visualize the movement of the resources	success	
7	From the Visualization Tool, the experimenter can access to "near to real time" visualization of the information coming from the experiment, as well as to the summary of the same information after the experiment stops. This includes: • current location (e.g., lat and lon values) of each resource • values of all measurements coming from the different sensors	success	Experimenter observes the experiment (i.e. route, sensor reading) via the appropriate platform services (Experimenter monitoring Tool, Visualization Tool)
11	The experimenter evaluates the results/measurements through the appropriate platform services (experiment log, Data Analysis Tool, etc.)	success	

Scenario ID: **UD-XX**	Conducted by: ALLBESMART LDA, Portugal		Date: **March 2019**
Title	Experimental validation of autonomous UAV operation over cellular networks		
Comments			
Main stakeholder	Experimenter – Project Name CELLDRONE – ROC3		
Secondary stakeholder			
Involved Sub-systems	Resource Explorer Tool Testbeds Directory Service Booking Tool Booking Service Experiment Authoring Tool EDL Compiler & Validator Experiment Validation Service Launching Service Experiment Monitoring Tool Visualization Tool Visualization Engine Data Analysis Tool Data Analysis Engine		
Validated requirement			

Step	Description	Status	Remarks
1	Experimenter logs in to the Web Portal	success	
2	Experimenter browses testbed and UxV resources, via the Resource Explorer Tool, looking for UAV UGVs at BCN and CESA testbed	success	
3	Experimenter navigates to the Booking Tool and books resources in a testbed for the desirable timeframe	success	Booking request should be created in pending state
4	Define and validate an experimentation scenario o Authors an EDL script o Validate the experiment o Store the experiment for future launching	success	
5	Experiment launching o launch the experiment right after the definition o launch a stored experiment through the database	success	
	Experimenter sends the hardware devices that shall be integrated in the UAVs. Small single boards are prepared. Everything is shipped to testbeds	success	
6	During the experiment execution the experimenter is able to: o Visualize the resource waypoints	success	
7	From the Visualization Tool GUI, access to "near to real time" visualization of the information coming from the experiment, as well as to the summary of the same information after the experiment stops. This includes: • current location (e.g. lat and lon values) of each resource • values of all measurements coming from the different sensors available for the experiment	success	Experimenter observes the experiment (i.e. route, sensor reading) via the appropriate platform services (Experimenter monitoring Tool, Visualization Tool)
9	The experiment completes. Replay if it is needed	success	
10	Experimenter after the execution of experiments gather all data from QoE 4G/LTE network algorithms in order to be analysed by Data Analytics otool	success	
11	The experimenter evaluates the results/measurements through the appropriate platform services (experiment log, Data Analysis Tool, etc.)	success	

4.1.3 Efficient coordination for Phenomena or Mission Coverage

Scenario ID: **UD-XX**	Conducted by: University of Glasgow, United Kingdom		Date: **March 2019**
Title	Glasgow Network Functions for Unmanned Vehicles		
Comments			
Main stakeholder	Experimenter – Project Name GNFUV – ROC2		
Secondary stakeholder			
Involved Sub-systems	Resource Explorer Tool Testbeds Directory Service Booking Tool Booking Service Experiment Authoring Tool EDL Compiler & Validator Experiment Validation Service Launching Service Experiment Monitoring Tool Visualization Tool Visualization Engine Data Analysis Tool Data Analysis Engine		
Validated requirement			

Step	Description	Status	Remarks
1	Experimenter logs in to the Web Portal	success	
2	Experimenter browses testbed and UxV resources, via the Resource Explorer Tool, looking for USVs at HMOD testbed	success	
3	Experimenters navigates to the Booking Tool and books resources in a testbed for the desirable timeframe	success	Booking request should be created in pending state
	Experimenters create the communication bridge in order to consume USV messages. The real-time data are used as input to the distributed algorithm. The algorithms are registered in RAWFIE database.	success	
4	Definition and validation of the experimentation scenario o The experimenter visits the authoring tool and creates an EDL script o He/She validates the experiment o He/She stores the experiment	success	
5	The experimenter launches the experiment right after the definition	success	
	Experimenter sends the hardware devices that shall be integrated in the UAVs. Raspberry Pis were used to host the algorithms and the sensors. Everything is shipped to testbeds	success	
6	During the experiment execution the experimenter is able to: o See the movement of the resources	success	
7	From the Visualization Tool, the experimenter can access to "near to real time" visualization of the information coming from the experiment, as well as to the summary of the same information after the experiment stops. This includes: • current location (e.g., lat and lon values) of each resource • values of all measurements coming from the different sensors • values of any other kind of parameter relevant for the specific experiment purposes	success	Experimenter observes the experiment (i.e. route, sensor reading) via the appropriate platform services (Experimenter monitoring Tool, Visualization Tool)
11	The experimenter evaluates the results/measurements through the appropriate platform services (experiment log, Data Analysis Tool, etc.)	success	

Scenario ID: **UD-GEN**	Conducted by: Geonumerics, Spain		Date: **March 2019**
Title	Multiple ground-steered, virtually-tethered UAVs for corridor mapping		
Comments			
Main stakeholder	Experimenter – Project Name Multitether – ROC3		
Secondary stakeholder			
Involved Sub-systems	Resource Explorer Tool Testbeds Directory Service Booking Tool Booking Service Experiment Authoring Tool EDL Compiler & Validator Experiment Validation Service Launching Service Experiment Monitoring Tool Visualization Tool Visualization Engine Data Analysis Tool Data Analysis Engine		
Validated requirement			

Step	Description	Status	Remarks
1	Experimenter logs in to the Web Portal	success	
2	Experimenter browses testbed and UxV resources, via the Resource Explorer Tool, looking for 2 UAVs and 1 UGV at Catuav testbed	success	
3	Experimenter navigates to the Booking Tool and books resources in a testbed for the desirable timeframe	success	Booking request should be created in pending state
	The experiment defines events and the corresponding actions to be executed by the devices when specific conditions are fulfilled. These actions are related with the adoption of updated routes and the execution of specific algorithms.	success	
4	Definition and validation of the experimentation scenario o The experimenter visits the authoring tool and creates an EDL script o He/She validates the experiment o He/She stores the experiment	success	
5	The experimenter launches the experiment right after the definition	success	
	Experimenter sends the hardware devices that shall be integrated in the UGV. Raspberry Pis was used to host the algorithms and a GPS device. Everything is shipped to testbed	success	
6	During the experiment execution the experimenter is able to: o See the movement of the resources	success	
7	From the Visualization Tool, the experimenter can access to "near to real time" visualization of the information coming from the experiment, as well as to the summary of the same information after the experiment stops. This includes: • current location (e.g., lat and lon values) of each resource • values of all measurements coming from the different sensors • values of any other kind of parameter relevant for the specific experiment purposes	success	Experimenter observes the experiment (i.e. route, sensor reading) via the appropriate platform services (Experimenter monitoring Tool, Visualization Tool)
11	The experimenter evaluates the results/measurements through the appropriate platform services (experiment log, Data Analysis Tool, etc.)	success	

Scenario ID: **UD-GEN**	Conducted by: **Wyenor Ltd.**, United Kingdom	Date: **March 2019**
Title	UAS Traffic Management Experiments	
Comments		
Main stakeholder	Experimenter – Project Name UTMEXP – ROC2	
Secondary stakeholder		
Involved Sub-systems	Resource Explorer Tool Testbeds Directory Service Booking Tool Booking Service Experiment Authoring Tool EDL Compiler & Validator Experiment Validation Service Launching Service Experiment Monitoring Tool Visualization Tool Visualization Engine Data Analysis Tool Data Analysis Engine	
Validated requirement		

Step	Description	Status	Remarks
1	Experimenter logs in to the Web Portal	success	
2	Experimenter browses testbed and UxV resources, via the Resource Explorer Tool, looking for UAVs at HMOD testbed	success	
3	Experimenter navigates to the Booking Tool and books resources in a testbed for the desirable timeframe	success	Booking request should be created in pending state
	The experiment defines events and the corresponding actions to be executed by the devices when specific conditions are fulfilled. These actions are related with the adoption of updated routes and the execution of specific algorithms.	success	
4	Define and validate an experimentation scenario o Authors an EDL script o Define the algorithm o Validate the experiment o Store the experiment for future launching	success	
5	Experiment launching o launch the experiment right after the definition o launch a stored experiment through the database	success	
	Experimenter sends the hardware devices that shall be integrated in the UAVs. Snapdragons were used to host the algorithms and the camera. Everything is shipped to testbeds	success	
6	During the experiment execution the experimenter is able to: o Visualize the resource waypoints	success	
7	From the Visualization Tool GUI, access to "near to real time" visualization of the information coming from the experiment, as well as to the summary of the same information after the experiment stops. This includes: • current location (e.g. lat and lon values) of each resource • values of all measurements coming from the different sensors available for the experiment • values of any other kind of parameter relevant for the specific experiment purposes • tasks are executed to different USVs	success	Experimenter observes the experiment (i.e. route, sensor reading) via the appropriate platform services (Experimenter monitoring Tool, Visualization Tool)
9	The experiment completes. Replay if it is needed	success	
10	Experimenter after the execution of experiments gather all data from algorithms in order to be analysed by Data Analytics.	success	

11	The experimenter evaluates the results/measurements through the appropriate platform services (experiment log, Data Analysis Tool, etc.)	success	

4.1.4 Gathering Information for Naval Search and Rescue

Scenario ID: **UD-GEN**	West Sea Project, Greece		Date: **March 2019**
Title	MARitime SafEty		
Comments			
Main stakeholder	Experimenter – Project Name MARE – ROC3		
Secondary stakeholder			
Involved Sub-systems	Resource Explorer Tool Testbeds Directory Service Booking Tool Booking Service Experiment Authoring Tool EDL Compiler & Validator Experiment Validation Service Launching Service Experiment Monitoring Tool Visualization Tool Visualization Engine Data Analysis Tool Data Analysis Engine Dynamic Relocator		
Validated requirement			

Step	Description	Status	Remarks
1	Experimenter logs in to the Web Portal	success	
2	Experimenter browses testbed and UxV resources, via the Resource Explorer Tool, looking for USVs at HMOD testbed	success	
3	Experimenter navigates to the Booking Tool and books resources in a testbed for the desirable timeframe	success	Booking request should be created in pending state
4	The experiment defines events and the corresponding actions to be executed by the devices when specific conditions are fulfilled. These actions are related with the adoption of updated routes and the execution of specific algorithms. Detection algorithm sends an alert message in RAWFIE Platform and automatically produces new waypoints to follow the unknown project.	success	
6	Definition and validation of the experimentation scenario o The experimenter visits the authoring tool and creates an EDL script o He/She validates the experiment o He/She stores the experiment	success	
7	The experimenter launches the experiment right after the definition	success	
8	During the experiment execution the experimenter is able to: o See the movement of the resources	success	
9	From the Visualization Tool, the experimenter can access to "near to real time" visualization of the information coming from the experiment, as well as to the summary of the same information after the experiment stops. This includes: • current location (e.g., lat and lon values) of each resource • values of all measurements coming from the different sensors • values of any other kind of parameter relevant for the specific experiment purposes	success	Experimenter observes the experiment (i.e. route, sensor reading) via the appropriate platform services (Experimenter monitoring Tool, Visualization Tool)
12	The experimenter evaluates the results/measurements through the appropriate platform services (experiment log, Data Analysis Tool, etc.)	success	

4.1.5 Mobilize resources and gather sensor data

Scenario ID: **UD-GEN**	ITTI, Poland	Date: **March 2019**
Title	QoE SupporT for improved Crisis Management	
Comments		
Main stakeholder	Experimenter – Project Name QoEST4CM – ROC2	
Secondary stakeholder		
Involved Sub-systems	Resource Explorer Tool Testbeds Directory Service Booking Tool Booking Service Experiment Authoring Tool EDL Compiler & Validator Experiment Validation Service Launching Service Experiment Monitoring Tool Visualization Tool Visualization Engine Data Analysis Tool Data Analysis Engine	
Validated requirement		

Step	Description	Status	Remarks
1	Experimenter logs in to the Web Portal	success	
2	Experimenter browses testbed and UxV resources, via the Resource Explorer Tool, looking for UAV at HMOD testbed	success	
3	Experimenters navigates to the Booking Tool and books resources in a testbed for the desirable timeframe	success	Booking request should be created in pending state
4	Experimenters create the communication bridge in order to communicate with RAWFIE. Experimenters integrate a raspberry pi and a camers that runs an adaptive video stream processing algorithm.	success	
5	Define and validate an experimentation scenario o Authors an EDL script o Define the algorithm o Validate the experiment o Store the experiment for future launching	success	
6	Experiment launching o launch the experiment right after the definition o launch a stored experiment through the database	success	
7	During the experiment execution the experimenter is able to: o Visualize the resource waypoints	success	
8	From the Visualization Tool GUI, access to "near to real time" visualization of the information coming from the experiment, as well as to the summary of the same information after the experiment stops. This includes: • current location (e.g. lat and lon values) of each resource • values of all measurements coming from the different sensors available for the experiment • values of any other kind of parameter relevant for the specific experiment purposes	success	Experimenter observes the experiment (i.e. route, sensor reading) via the appropriate platform services (Experimenter monitoring Tool, Visualization Tool)
9	Experiment completes and UAV measures network quality. The network grid that is calculated is uploaded then to raspberry pi and the experiment rums again. The video streaming is adaptive to network grid.	success	
10	The experimenter evaluates the results/measurements through the appropriate platform services (experiment log, Data Analysis Tool, etc.)	success	

Scenario ID: **UD-GEN**	WPWEB SRL, Italy		Date: **March 2019**
Title	Experimenting Autonomous Remote Sensing		
Comments			
Main stakeholder	Experimenter – Project Name EXP-A.R.S. – ROC2		
Secondary stakeholder			
Involved Sub-systems	Resource Explorer Tool Testbeds Directory Service Booking Tool Booking Service Experiment Authoring Tool EDL Compiler & Validator Experiment Validation Service Launching Service Experiment Monitoring Tool Visualization Tool Visualization Engine Data Analysis Tool Data Analysis Engine		
Validated requirement			

Step	Description	Status	Remarks
1	Experimenter logs in to the Web Portal	success	
2	Experimenter browses testbed and UxV resources, via the Resource Explorer Tool, looking for UAV at Catuav testbed	success	
3	Experimenters navigates to the Booking Tool and books resources in a testbed for the desirable timeframe	success	Booking request should be created in pending state
4	Experimenters try SLAM algorithms based on the HD input of UAVs	success	
5	Define and validate an experimentation scenario o Authors an EDL script o Validate the experiment o Store the experiment for future launching	success	
6	Experiment launching o launch the experiment right after the definition o launch a stored experiment through the database	success	
7	During the experiment execution the experimenter is able to: o Visualize the resource waypoints	success	
8	From the Visualization Tool GUI, access to "near to real time" visualization of the information coming from the experiment, as well as to the summary of the same information after the experiment stops. This includes: • current location (e.g. lat and lon values) of each resource • values of all measurements coming from the different sensors available for the experiment • values of any other kind of parameter relevant for the specific experiment purposes	success	Experimenter observes the experiment (i.e. route, sensor reading) via the appropriate platform services (Experimenter monitoring Tool, Visualization Tool)
9	The different moving patterns and videos produced are evaluated. The experiment replay.	success	
10	The experimenter evaluates the results/measurements through the appropriate platform services (experiment log, Data Analysis Tool, etc.)	success	

Scenario ID: **UD-GEN**	W.P. FORMAT SRL, Italy		Date: **March 2019**
Title	Object Recognition Through UAV Sensing		
Comments			
Main stakeholder	Experimenter – Project Name O.R.T.U.S – ROC3		
Secondary stakeholder			
Involved Sub-systems	Resource Explorer Tool Testbeds Directory Service Booking Tool Booking Service Experiment Authoring Tool EDL Compiler & Validator Experiment Validation Service Launching Service Experiment Monitoring Tool Visualization Tool Visualization Engine Data Analysis Tool Data Analysis Engine		
Validated requirement			

Step	Description	Status	Remarks
1	Experimenter logs in to the Web Portal	success	
2	Experimenter browses testbed and UxV resources, via the Resource Explorer Tool, looking for one UAV and three UGVs at HMOD testbed	success	
3	Experimenters navigates to the Booking Tool and books resources in a testbed for the desirable timeframe	success	Booking request should be created in pending state
4	Define and validate an experimentation scenario o Authors an EDL script o Validate the experiment o Store the experiment for future launching	success	
5	Experiment launching o launch the experiment right after the definition o launch a stored experiment through the database	success	
6	During the experiment execution the experimenter is able to: o Visualize the resource waypoints o Capture the video from UAV	success	
7	From the Visualization Tool GUI, access to "near to real time" visualization of the information coming from the experiment, as well as to the summary of the same information after the experiment stops. This includes: • current location (e.g. lat and lon values) of each resource • values of all measurements coming from the different sensors available for the experiment • values of any other kind of parameter relevant for the specific experiment purposes	success	Experimenter observes the experiment (i.e. route, sensor reading) via the appropriate platform services (Experimenter monitoring Tool, Visualization Tool)
8	Video created by UAV is analysed based on a machine learning algorithm. After the analysis the experimenter replays in order to automatically detect the three moving UGVs	success	
9	The experimenter evaluates the results/measurements through the appropriate platform services (experiment log, Data Analysis Tool, etc.)	success	

4.1.6 Metrics

This section evaluates the metrics for all user defines scenarios, summarizing the results of the single questionnaires.

Metric	Success criteria	Status	Remarks
PLATFORM / PERF / 1 / STABLE SYSTEM	Downtime < 2%	Failed	11 * yes 3 * no 5 * I don't know
PLATFORM / PERF / 2 / ERRORS	Errors to experiments rate < 5 %	Failed	9 of 23 experimenters encountered errors
PLATFORM / PERF / 5 / LATENCY/ RESULTS UPDATE TIME	Update time < 5 sec	Success	16 * yes 1 * no 6 * I don't know
PLATFORM / PERF / 6 / LATENCY/ BOOKING TIME	Booking Time < 30 seconds	Success	19 * yes 1 * no 3 * I don't know
PLATFORM / USE / 7 / NOTIFICATION	Questionnaire rates "notification" with an average > 3.5 (1 to 5)	Success	Ø 4.3
PLATFORM / USE / 8 / ROLES	Questionnaire rates "roles" with an average > 3.5 (1 to 5)	Success	Ø 4.5
PLATFORM / USE / 9 / VISUALISATION / BALANCE	Questionnaire rates "balance" with an average > 3.5 (1 to 5)	Success	Ø 4.2
PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY	Questionnaire rates "simplicity" with an average > 3.5 (1 to 5)	Success	Ø 4.1
PLATFORM / USE / 12 / VISUALISATION / UTILITY	Questionnaire rates "utility" with an average > 3.5 (1 to 5)	Success	Ø 4.5
PLATFORM / USE / 13 / GUIDANCE	Questionnaire rates "guidance" with an average > 3.5 (1 to 5)	Success	Ø 3.9
PLATFORM / USE / 14 / FILTERING	Questionnaire rates "filtering" with an average > 3.5 (1 to 5)	Success	Ø 4.3
PLATFORM / USE / 15 / EXPERIMENTS STATISTICS	Questionnaire rates "experiment statistics" with an average > 3.5 (1 to 5)	Success	Ø 4.2
TESTBED / DATA / 1 / INFORMATION	Daily updates. Always available during testbed working hours.	Success	12 * yes 3* no 5 * partly 3 * N/A
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	15 * yes 3 * no 2 * There was no downtime 3 * N/A
TESTBED / USE / 4 / CONSISTENCY	Questionnaire rates "consistency" with an average > 3.5 (1 to 5)	Success	Ø 3.9
UxV / FUNC / 1 / COHERENCE	Questionnaire rates "coherence" with an average > 3.5 (1 to 5)	Success	Ø 4.0
UxV / FUNC/ 2 / MISSION ACHIEVEMENT	Questionnaire rates "mission achievement" with an average > 3.5 (1 to 5)	Success	Ø 4,4
UXV / FUNC / 9 / ROUTE TIMING	Actual route time does not differ from planned route time by more than 10%	Partial success	9 * yes 3 * no 10 * I don't know 1 * N/A
UXV / FUNC / 10 / DATA ACQUISITION COVERAGE	100 % of the sensor data required from the UxV is given to the experimenter after the experiment (directly or after downloading from the storage)	Success	15 * yes 2 * no 1 * partly 5 * N/A

4.2 RAWFIE Platform Admin scenarios

4.2.1 Administrator manages the user rights

Scenario ID: **PA-01**	Conducted by: **Fraunhofer**		Date: **May 2018**
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-GEN-R-002, PT-WEB-P-001, PT-WIK-002		

Step	Description	Status	Remarks
1	User tries to edit the Wiki, which fails due to missing rights.	success	
2	Administrator opens the user management of the Web Portal	success	
3	Administrator searches for a given user	success	
4	Administrator changes the rights of the given user	success	
5	User tries to edit the Wiki again and succeeds.	success	

Metric	Success criteria	Status	Remarks
PLATFORM / USE / 9 / VISUALISATION / BALANCE	Questionnaire rates "balance" with an average > 3.5 (1 to 5)		No separate administrators that could answer the question (administrated by developers)
PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY	Questionnaire rates "simplicity" with an average > 3.5 (1 to 5)		dito
PLATFORM / USE / 12 / VISUALISATION / UTILITY	Questionnaire rates "utility" with an average > 3.5 (1 to 5)		dito
PLATFORM / USE / 13 / GUIDANCE	Questionnaire rates "guidance" with an average > 3.5 (1 to 5)		dito
PLATFORM / USE / 14 / FILTERING	Questionnaire rates "filtering" with an average > 3.5 (1 to 5)		dito

4.2.2 Administrators adds a new user

Scenario ID: **PA-02**	Conducted by: **Fraunhofer**	Date: **May 2018**
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-GEN-R-002, PT-WEB-P-001, PT-USR-S-001, PT-USR-S-002	

Step	Description	Status	Remarks
1	New user tries to login (which fails as the account does not exist)	success	
2	Administrator opens the user management of the Web Portal	success	
3	Administrator clicks on "new user"	success	
4	Administrator inserts the user data and submits the data	success	
5	Users & Rights Service save the user	success	
6	Information is sent to the new user via email	failed	No email notification implemented
7	New user logs-in into the Web Portal	success	

Metric	Success criteria	Status	Remarks
PLATFORM / USE / 7 / NOTIFICATION	Questionnaire rates "notification" with an average > 3.5 (1 to 5)		No separate administrators that could answer the question (administrated by developers)
PLATFORM / USE / 9 / VISUALISATION / BALANCE	Questionnaire rates "balance" with an average > 3.5 (1 to 5)		dito
PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY	Questionnaire rates "simplicity" with an average > 3.5 (1 to 5)		dito
PLATFORM / USE / 12 / VISUALISATION / UTILITY	Questionnaire rates "utility" with an average > 3.5 (1 to 5)		dito
PLATFORM / USE / 13 / GUIDANCE	Questionnaire rates "guidance" with an average > 3.5 (1 to 5)		dito
PLATFORM / USE / 14 / FILTERING	Questionnaire rates "filtering" with an average > 3.5 (1 to 5)		dito

4.2.3 System monitoring and error notifications

Scenario ID: **PA-03**	Conducted by**: Fraunhofer**		Date**: May 2018**
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, PT-SYM-T-007 PT-SYM-S-001, PT-SYM-S-003, PT-SYM-S-007, PT-SYM-S-008, PT-SYM-S-010, PT-SYM-S-011		

Step	Description	Status	Remarks
1	Launching Service crashes (e.g. stopped manually)	n.a.	
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	success	
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 / USE / 7 / NOTIFICATION	Questionnaire rates "notification" with an average > 3.5 (1 to 5)		No separate administrators that could answer the question (administrated by developers)
PLATFORM / USE / 9 / VISUALISATION / BALANCE	Questionnaire rates "balance" with an average > 3.5 (1 to 5)		dito
PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY	Questionnaire rates "simplicity" with an average > 3.5 (1 to 5)		dito
PLATFORM / USE / 12 / VISUALISATION / UTILITY	Questionnaire rates "utility" with an average > 3.5 (1 to 5)		dito
PLATFORM / USE / 13 / GUIDANCE	Questionnaire rates "guidance" with an average > 3.5 (1 to 5)		dito
PLATFORM / USE / 14 / FILTERING	Questionnaire rates "filtering" with an average > 3.5 (1 to 5)		dito
PLATFORM / PERF / 5 / LATENCY/ RESULTS UPDATE TIME	The health status listing page should loaded and updated in less than 5 seconds.	success	
PLATFORM / PERF / 5 / LATENCY/ RESULTS UPDATE TIME	Error notification (e.g. Email) sent in about 30 seconds after the error was detected. The error detection should not exceed the 30 seconds + check interval + max response time.	success	max_check_attempts = 5 check_interval = 60s retry_interval = 15s Total = 165
PLATFORM / PERF / 3 / SCALABILITY	System load of the server where the System Monitoring Service is running, should not exceed 20%	success	

4.2.4 System stability

Scenario ID: **PA-04**	Conducted by: **Fraunhofer**	Date: **May 2018**
Title	System stability	
Comments		
Main stakeholder	RAWFIE Admin	
Secondary stakeholder		
Involved Sub-systems	System Monitoring Tool (all monitored components / services)	
Validated requirement	PT-WEB-P-001	

Step	Description	Status	Remarks
1	RAWFIE system runs several weeks with several executed experiments	n.a.	
2	System Monitoring Service collects status information all the time	n.a.	
3	Administrator opens the System Monitoring Tool	success	
4	Administrator checks statistics about uptime and error counts	success	

Metric	Success criteria	Status	Remarks
PLATFORM / PERF / 1 / STABLE SYSTEM	Downtime < 2%	success	
PLATFORM / PERF / 2 / ERRORS	Errors to experiments rate < 5 %	success	
PLATFORM / PERF / 4 / RECOVERY TIME	Recovery in 1 hour after error occurs (during business time)		Not needed
PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY	Questionnaire rates "simplicity" with an average > 3.5 (1 to 5)		No separate administrators that could answer the question (administrated by developers)
PLATFORM / USE / 12 / VISUALISATION / UTILITY	Questionnaire rates "utility" with an average > 3.5 (1 to 5)		dito
PLATFORM / USE / 13 / GUIDANCE	Questionnaire rates "guidance" with an average > 3.5 (1 to 5)		dito
PLATFORM / USE / 14 / FILTERING	Questionnaire rates "filtering" with an average > 3.5 (1 to 5)		dito

4.3 Testbed operator scenarios

4.3.1 Schedule maintenance of resources

Scenario ID: **TO-01**	Conducted by: **HAI**		Date: **May 2018**
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	
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	success	
6	A new experimenter trying to make a Booking to the specified testbed should not be able to select the unavailable UxVs	success	

Metric	Success criteria	Status	Remarks
PLATFORM / USE / 7 / NOTIFICATION	Questionnaire rates "notification" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 8 / ROLES	Questionnaire rates "roles" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY	Questionnaire rates "simplicity" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 12 / VISUALISATION / UTILITY	Questionnaire rates "utility" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 13 / GUIDANCE	Questionnaire rates "guidance" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 14 / FILTERING	Questionnaire rates "filtering" with an average > 3.5 (1 to 5)		
TESTBED / DATA / 1 / INFORMATION	The information managed by the testbed components is available	success	UxVs became unavailable from Booking Tool after their status change in all circumstances

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4.3.2 Cancel running experiment

Scenario ID: **TO-02**	Conducted by: **HAI**		Date: **May 2018**
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	
5	the Experiment Controller issues the appropriate commands to send the UxVs back to the port	success	
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	Questionnaire rates "notification" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 8 / ROLES	Questionnaire rates "roles" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY	Questionnaire rates "simplicity" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 12 / VISUALISATION / UTILITY	Questionnaire rates "utility" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 13 / GUIDANCE	Questionnaire rates "guidance" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 14 / FILTERING	Questionnaire rates "filtering" with an average > 3.5 (1 to 5)		
TESTBED / DATA / 1 / INFORMATION	The information managed by the testbed components is available	success	

4.3.3 Connect a new Testbed to the RAWFIE platform

Scenario ID**: TO-03**	Conducted by**: HAI**		Date**: May 2018**
Title	Connect a new testbed		
Comment			
Main stakeholder	Testbed Operator		
Secondary stakeholder	RAWFIE Admin		
Involved Sub-systems	Web Portal Testbed Manager Testbed Directory Service Resource Explorer Tool		
Validated requirement	PT-DIR-S-005, PT-REE-T-001, PT-REE-T-002, TB-GEN-R002, TB-GEN-R-003, TB-GEN-R-004, TB-GEN-R-005, TB-GEN-R-006, TB-GEN-R-007, TB-GEN-R-008, TB-GEN-R-009, TB-GEN-R-010, TB-GEN-R-011, TB-GEN-R012, TB-GEN-R013, TB-MAN-001, TB-MAN-007		

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 fulfill the needed requirements to be connected to the RAWFIE platform (Networking facilities, and so on)	success	
3	Testbed Operator fills the new Testbed information via Testbed Manager and inserts the testbed in the Master Data Repository using Testbed Directory Service	success	
4	Testbed Operator explores all testbeds and their details from Resource Explorer Tool	success	
5	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	Questionnaire rates "notification" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 8 / ROLES	Questionnaire rates "roles" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY	Questionnaire rates "simplicity" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 12 / VISUALISATION / UTILITY	Questionnaire rates "utility" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 13 / GUIDANCE	Questionnaire rates "guidance" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 14 / FILTERING	Questionnaire rates "filtering" with an average > 3.5 (1 to 5)		
TESTBED / DATA / 1 / INFORMATION	The information managed by the testbed components is available	success	
PLATFORM / FUNC / 17 / EXTENSIBILITY	Connection of the new testbed did require the input of new data related only to the new testbed and its resources.	success	

4.4 UxV Manufacturers scenarios

4.4.1 Install new UxVs in a testbed

Hint: Some modification were applied to the scenario description since 4.9.

Scenario ID: **UM-01**	Conducted by: **UoA**		Date: **Mai 2018**
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, UXV-MGT-006, UXV-GEN-001, UXV-NOD-006, UXV-INT-005, UXV-NET-010, UXV-NET-011, PT-REE-T-002		

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	success	
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 like manuals and device requirements	success	
5.	2 Days Training is arranged. First day is handled as a training session based on the main functionalities of the devices and the maintenance needs. The second day is dedicated to manual experiments and RAWFIE Experiments.	success	
6	Testbed Operator update the resource description for its testbed via the Resource Explorer	success	
7	The connection between the new UxV and the testbed is mutually authenticated via VPN	success	
8	The connection of UxV and the Ground Control Station is tested	success	In case of UAVs, Modes about ARM, RTL and other commands are pre-configured
9	Fail safe modes are enabled based on the geofencing of testbed area	success	Option for UAVs
10	UxV Manufacturer ensures the UxV Node is able to send / receive information to/from the RAWFIE components through the foreseen software interfaces	success	
11	UxV runs a mission under RAWFIE interface	success	

12	An abort mission for security mission is tested	success	

Metric	Success criteria	Status	Remarks
PLATFORM / USE / 7 / NOTIFICATION	Questionnaire rates "notification" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 8 / ROLES	Questionnaire rates "roles" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY	Questionnaire rates "simplicity" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 12 / VISUALISATION / UTILITY	Questionnaire rates "utility" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 13 / GUIDANCE	Questionnaire rates "guidance" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 14 / FILTERING	Questionnaire rates "filtering" with an average > 3.5 (1 to 5)		
PLATFORM / FUNC / 17 / EXTENSIBILITY	Connection of the new UxV did require the input of new data related only to the new UxV.	success	

4.4.2 Autonomous coordination of multiple UxVs

Scenario ID: UM-02	Conducted by: CSEM / ROBOTNIK / UoA		Date: several times in 2018-2019
Title	Autonomous coordination of multiple UxVs		
Comment	This scenario deals with the autonomous coordination of multiple UxVs for providing the RAWFIE experiment with some robustness with respect to the loss of communication or performance issue in the connection between the UxV swarms and the RAWFIE system. This is particularly relevant for ensuring the UxV coordination when they are operating in large remote areas or over the sea.		
Main stakeholder	Testbed Manager, Experimenters		
Secondary stakeholder	UxV Manufacturers,		
Involved Sub-systems	Local RAWFIE entities Proximity component		
Validated requirement	TB-UVG-001, UXV-MGT-002, UXV-NET-002, UXV-NET-003, UXV-NET-004, UXV-NET-005, UXV-NET-006, UXV-NET-008, UXV-NET-009, UXV-PRC-001, UXV-PRC-002, UXV-PRC-004, UXV-MGT-002, UXV-MGT-004, UXV-MGT-005, UXV-NOD-001, UXV-PRX-001, UXV-PRX-002, UXV-PRX-004, UXV-PRX-006, UXV-INT-001, UXV-INT-002,		

Step	Description	Status	Remarks
1	The UxV manufacturer(s) deploys several UxVs that will operate in swarm in the experiment. The experiment consists in collecting and analysing the data exchanges that occurred during the experiment on the Proximity component network interface, for the sake of the coordination of the UxV motion.	success	
2	UxV Manufacturer sends the new UxVs to the testbed site. UxV Manufacturer gives the information about the UxVs to the Testbed Operator.	success	
3	Testbed Operator update the resource description for its testbed via the Resource Explorer, while the route followed by the UxV and relative UxV locations are specified in the experiment EDL script. UxV Manufacturer and Testbed Operator configure the testbed to control the new UxVs.	success	
4	The experiment is started and the experimental conditions, the exchanged data and the behavior of the UxV are logged with a time information.	success	
5	The UxV manufacturer collects the logged data and evaluates the relationship between the experimental conditions, the exchanged data and the behaviour of the UxV • View experiment log • Examine measurements • Percentage of the covered area • Nodes lifetime • Nodes energy consumption • Final positions	success	
6	The experimenter details the deviations of the UxV route and their relative trajectories from the expected behaviour.	success	
7			

Metric	Success criteria	Status	Remarks
PLATFORM / USE / 12 / VISUALISATION / UTILITY	Questionnaire rates "utility" with an average > 3.5 (1 to 5)	success	Ø 4

PLATFORM / USE / 13 / GUIDANCE	Questionnaire rates "guidance" with an average > 3.5 (1 to 5)	partly success	Ø 3.3
PLATFORM / USE / 14 / FILTERING	Questionnaire rates "filtering" with an average > 3.5 (1 to 5)	success	Ø 4
PLATFORM / USE / 15 / EXPERIMENTS STATISTICS	Questionnaire rates "experiments statistics" with an average > 3.5 (1 to 5)	success	Ø 4
UxV / FUNC / 1 / COHERENCE	Questionnaire rates "coherence" with an average > 3.5 (1 to 5)	success	Ø 5
UxV / FUNC/ 2 / MISSION ACHIEVEMENT	Questionnaire rates "missing achievments" with an average > 3.5 (1 to 5)	success	Ø 4.3
INTERCONNECTIVITY / PERF/ 1 / AGGREGATED THROUGHPUT	95% of messages processed within 100 ms	success	Average delay 7.5 ms Maximal delay 8.0 ms

4.5   Middleware Services Health monitoring scenario

4.5.1   One or multiple available instances of a service or database are down

Scenario ID: **SH-01**	Conducted by: **Fraunhofer**	Date: **January 2019**
Title	One or multiple available instances of a service or database are down	
Comment		
Main stakeholder	RAWFIE Admin	
Secondary stakeholder		
Involved Sub-systems	System Monitoring Tool, System Monitoring Service, All middleware services	
Validated requirement	PT-SYM-001 to PT-SYM-007, PT-SYM-S-001,003,004,007,008,009,010,011, PT-GEN-R-008	

Step	Description	Status	Remarks
1	The user is logged into the RAWFIE web portal, with the System Monitoring Tool UI dashboard open	success	
2	The System Monitoring Service is running, continuously checking the status of all middleware services	success	
3	One of the middleware is intentionally stopped in order to simulate a specific server / service failure	success	
3.1	The master instance of the Master Data Repository database is stopped, and the database is configured with a live replica in a master / slave configuration fashion	success	
3.2	Then, one of the servers of the Cluster running Apache Kafka, is also intentionally stopped	success	
4	The user is promptly notified about the servers and services failure, with clear information about the status and the affected services and servers	success	
5	The user verifies that the database is not reachable anymore with the current configuration, since a manual intervention is needed to setup the slave as the new master.\n\nIn the same way, the user can verify that the Apache Kafka Cluster itself is still properly running (e.g. from the indicated status in the dashboard), even if one of the server is down	success	
6	The user starts the recovery activities based on the established recovery procedures for both services	success	

Metric	Success criteria	Status	Remarks
PLATFORM / USE / 7 / NOTIFICATION	Questionnaire rates "notification" with an average > 3.5 (1 to 5)		No separate administrators that could answer the question (administrated by developers)
PLATFORM / USE / 13 / GUIDANCE	Questionnaire rates "guidance" with an average > 3.5 (1 to 5)		dito
PLATFORM / PERF / 5 / LATENCY/ RESULTS UPDATE TIME	The health status listing page should loaded and updated in less than 5 seconds.		dito

PLATFORM / PERF / 5 / LATENCY/ RESULTS UPDATE TIME	Error notification (e.g. Email) sent in about 30 seconds after the error was detected. The error detection should not exceed the 30 seconds + check interval + max response time.	success	

4.6 Operational Safety Scenarios

4.6.1 Experiment validation with respect to safety

4.6.1.1 Attempt to set a waypoint out of the authorized area

Scenario ID: **ES-01**	Conducted by: **UoA**		Date: **Mai 2018**
Title	Attempt to set a waypoint out of the authorized area		
Comment			
Main stakeholder	Experimenter		
Secondary stakeholder	RAWFIE Admin		
Involved Sub-systems	Experiment Authoring Tool		
Validated requirement	TB-GEN-R-002, PT-EXA-T-004, PT-EXA-T-008, PT-EXV-S-003		

Step	Description	Status	Remarks
1	A user logs-in to the RAWFIE web portal and starts writing a new experiment in the authoring tool	success	
2	The user sets a waypoint out of the authorized area of the given testbed.	success	
3	This error is detected by the authoring tool which displays an error	success	
4	The experimenter choses an alternative waypoint and continues the definition of its experiment	success	

Metric	Success criteria	Status	Remarks
PLATFORM / USE / 7 / NOTIFICATION	Questionnaire rates "notifications" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 13 / GUIDANCE	Questionnaire rates "guidance to correct the error" with an average > 3.5 (1 to 5)		
PLATFORM / PERF / 5 / LATENCY/ RESULTS UPDATE TIME	Experimenters should be notified within 5 seconds about the error	success	

4.6.1.2 Attempt to set two waypoints for which their direct path involves crossing an unauthorized area

Scenario ID: **ES-02**	Conducted by: **UoA**		Date: **Mai 2018**
Title	Attempt to set two waypoints for which their direct path involves crossing an unauthorized area		
Comment			
Main stakeholder	Experimenter		
Secondary stakeholder	RAWFIE Admin		
Involved Sub-systems	Experiment Authoring Tool		
Validated requirement	TB-GEN-R-002, PT-EXA-T-004, PT-EXA-T-008, PT-EXV-S-003		

Step	Description	Status	Remarks
1	A user logs-in to the RAWFIE web portal and starts writing a new experiment in the authoring tool	success	
2	The user sets two consecutive waypoints within the testbed boundaries but their connection involves an area outside the testbed.	success	
3	The authoring tool detects the potential breach of testbed boundaries, and displays an error message asking the user to add extra waypoints so that the UxV stays within the testbed boundaries.	success	
4	The experimenter choses an alternative waypoint and continues to define its experiment	success	

Metric	Success criteria	Status	Remarks
PLATFORM / USE / 7 / NOTIFICATION	Questionnaire rates "notifications" with an average > 3.5 (1 to 5)		
PLATFORM / USE / 13 / GUIDANCE	Questionnaire rates "guidance to correct the error" with an average > 3.5 (1 to 5)		
PLATFORM / PERF / 5 / LATENCY/ RESULTS UPDATE TIME	Experimenters should be notified within 5 seconds about the error	success	

4.6.2 Validation of the platform safety during experiments execution

4.6.2.1 Abort and manual takeover

4.6.2.1.1 Abort

Scenario ID**: OS-01**	Conducted by**: HAI**		Date**: May 2018**
Title	Abort		
Comment	Fixed-wing UAVs from RAWFIE-OC2 DOGMA and multicopters from RAWFIE-OC1 VENAC projects used for the execution of this safety scenario		
Main stakeholder	Testbed Operator		
Secondary stakeholder	RAWFIE Admin, Experimenter		
Involved Sub-systems	Testbed Resource Controller UxV		
Validated requirement	TB-REC-002, UXV-INT-003, UXV-INT-004, UXV-MGT-002		

Step	Description	Status	Remarks
1	An experiment runs: a single UxV is asked to follow a predefined path (set of waypoints)	success	
2	During its run, the experiment is aborted from the Testbed Manager UI and notified to the UxV	success	ExperimentCancelRequest
3	The UxV implements the abort operation: either stop and remain on spot (UGV, USV) or go back to base (UAV).	success	All components that receive the ExperimentCancelRequest implement the experiment abort
4	The UxV sends a message to Message Bus to confirm the experiment abort.	success	

Metric	Success criteria	Status	Remarks
UXV / FUNC / 5 / ABORT	100% abort success rate	success	Successful UxVs landing in all experiments

4.6.2.1.2 Remote pilot takeover

Scenario ID: **OS-02**	Conducted by: **HAI**		Date: **May 2018**
Title	Remote pilot takeover		
Comment	Fixed-wing UAVs from RAWFIE-OC2 DOGMA and multicopters from RAWFIE-OC1 VENAC projects used for the execution of this safety scenario		
Main stakeholder	Testbed Operator		
Secondary stakeholder	RAWFIE Admin		
Involved Sub-systems	UxV		
Validated requirement	UXV-NET-001, D3.3 Annex A		

Step	Description	Status	Remarks
1	An experiment runs: a single UxV is asked to follow a predefined path (set of waypoints)	success	
2	At some point during the experiment run, a remote pilot acts on the remote control to take over control of the UxV.	success	Both UAVs are supported from remote controllers that can switch to GPS-assisted manual remote piloting and Return to Launch modes
3	The UxV is totally under the control of the remote pilot.	success	
4	The UxV sends a message to the Message Bus to inform interested components of the remote pilot takeover.	success	

Metric	Success criteria	Status	Remarks
UXV / FUNC / 6 / REMOTE TAKEOVER	100% takeover success rate	success	Successful UxVs landing in all experiments

4.6.2.2 *Communications failure*

4.6.2.2.1 Communication link failure, secondary interface takeover

Scenario ID**: OS-03**	Conducted by**: HAI**		Date**: May 2018**	
Title	Communication link failure, secondary interface takeover			
Comment	Fixed-wing UAVs from RAWFIE-OC2 DOGMA and multicopters from RAWFIE-OC1 VENAC projects used for the execution of this safety scenario			
Main stakeholder	Testbed Operator			
Secondary stakeholder	RAWFIE Admin			
Involved Sub-systems	UxV, Resource Controller, Network Controller			
Validated requirement	UXV-NET-004, UXV-NET-005, UXV-INT-014, TB-NEC-004, TB-NF-G-003			

Step	Description	Status	Remarks
1	A UxV is equipped with primary and secondary communication interfaces	success	4G/Wifi combination
2	A simple experiment is run: the UxV is asked to follow a predefined path (set of waypoints) to return back to base.	success	
3	At some point on the Testbed, the operators disables the primary communication interface	success	E.g. unplug the Wifi access point(s)
4	The UxV detects the failure of the primary communication link and switches to its secondary interface. Regular messages sent to the Network Controller reflect the interface change.	success	The interface change appears in messages sent to the *NetwPerfUxv* topic as explained in D4.8, section 5.3.3.2
5	On the Testbed side, the network controller detects the primary interface failure from the *NetwPerfUxv* messages (or lack thereof), and checks that the UxV has switched to the secondary one. Notification is sent over the Message Bus on the global network performance topic *GlobalNetwPerf*	success	

Metric	Success criteria	Status	Remarks
UXV / FUNC / 7 / CONNECTIVITY	< 10s UxV unreachable	success	Measured using Message Bus and Network Controller logs (debug mode) timestamps.

4.6.2.2.2 Total communication link failure

Scenario ID: **OS-04**	Conducted by: **HAI**		Date: **May 2018**
Title	Total communication link failure		
Comment	Fixed-wing UAVs from RAWFIE-OC2 DOGMA and multicopters from RAWFIE-OC1 VENAC projects used for the execution of this safety scenario		
Main stakeholder	Testbed Operator		
Secondary stakeholder	RAWFIE Admin		
Involved Sub-systems	UxV, Resource Controller, Network Controller		
Validated requirement	TB-MAN-003, TB-MAN-010, TB-NF-G-002, UXV-MGT-002, UXV-MGT-004		

Step	Description	Status	Remarks
1	A UxV is equipped with primary and secondary communication interfaces	success	4G/Wifi combination
2	A simple experiment is run: the UxV is asked to follow a predefined path (set of waypoints)	success	
3	At some point on the Testbed, the operators disables both communication means. Depending on the kind of communication means, one of the interfaces may be disabled on board the UxV before the experiment starts (e.g. cellular interface)	success	
4	The UxV detects the loss of link from internal OS error and aborts the experiment as explained in scenario **OS-01**	success	Automatic switch to Return To Launch mode for UxVs
5	On the Testbed side, the network controller detects the total loss of link by lack of NetwPerfUxv messages. Then it sends a notification over the message bus on the *GlobalNetwPerf* topic. The notification is intercepted by the concerned components Testbed Manager which issues an ExperimentCancelRequest and sounds and displays an alarm for an immediate remote takeover	success	The Resource Controller and Testbed Manager detect value zero (= no link) on the indicator parameter of the *GlobalNetwPerf* topic for the concerned UxV.

Metric	Success criteria	Status	Remarks
TESTBED / FUNC / 4 / FAILURE DETECTION	< 10s communication failure detection	success	Measured using Message Bus, Network Controller and Testbed Manager timestamps.

4.6.2.2.3 Resource Controller failure

Scenario ID: **OS-05**	Conducted by: **HAI**		Date: **May 2018**
Title	Resource Controller failure		
Comment	Fixed-wing UAVs from RAWFIE-OC2 DOGMA and multicopters from RAWFIE-OC1 VENAC projects used for the execution of this safety scenario		
Main stakeholder	Testbed Operator		
Secondary stakeholder	RAWFIE Admin		
Involved Sub-systems	UxV, Resource Controller, Testbed Manager		
Validated requirement	TB-REC-002, TB-MAN-003, TB-MAN-007, TB-MAN-010		

Step	Description	Status	Remarks
1	A simple experiment is run: the UxV is asked to follow a predefined path (set of waypoints)	success	
2	The Resource Controller is artificially stopped	success	
3	The condition is detected on board the UxV at the latest when it reaches is next waypoint (no new way point received)	success	
4	Testbed Manager detects Resource Controller failure from the absence of its health status messages and presents visual and sound indications for starting manual control takeover from the remote pilot as in **OS-02**. An ExperimentCancelRequest is also issued.	success	RAWFIE experiment cancelled and UxV successfully landed using the remote controller
5	A notification is sent from Testbed Manager to System Monitoring tool to inform the platform about Resource Controller failure	success	

Metric	Success criteria	Status	Remarks
TESTBED / FUNC / 4 / FAILURE DETECTION	< 10s communication failure detection	success	Measured using Message Bus, Resource Controller and Testbed Manager timestamps.

4.6.2.3 Low resource risks

4.6.2.3.1 Low battery/fuel

Scenario ID: **OS-06**	Conducted by: **HAI**		Date: **May 2018**
Title	Low battery/fuel		
Comment	Fixed-wing UAVs from RAWFIE-OC2 DOGMA and multicopters from RAWFIE-OC1 VENAC projects used for the execution of this safety scenario		
Main stakeholder	Testbed Operator		
Secondary stakeholder	RAWFIE Admin		
Involved Sub-systems	UxV, Resource Controller, Testbed Manager		
Validated requirement	TB-MOM-001, TB-NF-G-002, UXV-INT-009		

Step	Description	Status	Remarks
1	A UxV is prepared with low battery / fuel (or the low fuel limit is artificially increased for the test benefit)	success	
2	A simple experiment is run: the UxV is asked to follow a predefined path (set of waypoints) to return back to base	success	
3	During the experiment, it is ensured that fuel/current consumption will make the device cross the low fuel/battery limit. If necessary extra consumption sources (dependent on UxV type) are added	success	Low fuel level is adjustable. A value 15% battery level was set for this execution of this scenario
4	As fuel level is constantly reported by the UxV and monitored by the Testbed Manager. Its UI displays and sounds an alarm upon detection of low fuel level and sends automatically a command to the Resource Controller to cancel the experiment	success	Experiment cancel is required through an ExperimentCancelRequest message
5	The Resource Controller notifies the experiment abort to the UxV which follows the procedure described in scenario **OS-01**	success	
6	Once the experiment is aborted, remaining fuel/battery charge is measured on the UXV to check that it corresponds to the alert level set for the experiment.	success	The goal is to ensure that fuel/battery level is monitored properly to avoid missed and false alarms.

Metric	Success criteria	Status	Remarks
UXV / FUNC / 8 / FUEL BATTERY LEVEL MEASUREMENT	< 10% of total fuel/battery capacity error between alarm threshold and actual remaining fuel/battery after experiment abort	success	Correct measurement of battery charge / fuel ensures that low-level thresholds are correctly detected (no missed alarm, no false alarm).

4.6.2.4 *UxV operations safety*

4.6.2.4.1 Excursion outside the authorized area

Scenario ID**: OS-07**	Conducted by**: HAI**		Date**: May 2018**
Title	Excursion outside the authorized area		
Comment	Fixed-wing UAVs from RAWFIE-OC2 DOGMA and multicopters from RAWFIE-OC1 VENAC projects used for the execution of this safety scenario		
Main stakeholder	Experimenter		
Secondary stakeholder	RAWFIE Admin		
Involved Sub-systems	Resource Controller, Testbed Manager, UxV		
Validated requirement	TB-REC-001, TB-REC-002, TB-REC-003, UXV-SEN-003, UXV-SEN-004		

Step	Description	Status	Remarks
1	Set artificial testbed boundaries so that the UxV is still in authorized space if it crosses them	success	The Resource Controller receives testbed boundaries from the Testbed Manager
2	A simple experiment is run: the UxV is asked to follow a predefined path (set of waypoints) to return back to base. The path is chosen so that it is near the boundary of the testbed.	success	For the execution of this scenario Geofencing inside the autopilot of UxVs is disabled
3	When the UxV is close to the testbed boundary, its course is artificially altered to make it cross into unauthorized areas.	success	
4	The illegal crossing is detected by the Resource Controller	success	
5	The experiment is aborted as in **OS-01**and manual takeover is ordered by the Testbed Manager as in **OS-02**	success	ExperimentCancelRequest

Metric	Success criteria	Status	Remarks
TESTBED / FUNC / 6 / BOUNDARY BREACH DETECTION	100% of boundary crossings detected	**success**	A boundary crossing is detected correctly if detection is announced within 5 seconds of the actual crossing

4.6.2.4.2 Waypoint cannot be reached

Scenario ID: **OS-08**	Conducted by: **HAI**		Date: **May 2018**
Title	Waypoint cannot be reached		
Comment	Fixed-wing UAVs from RAWFIE-OC2 DOGMA and multicopters from RAWFIE-OC1 VENAC projects used for the execution of this safety scenario		
Main stakeholder	Experimenter		
Secondary stakeholder	RAWFIE Admin		
Involved Sub-systems	Resource Controller, Experiment Controller, UxV		
Validated requirement	PT-EXP-C-006, PT-EXP-C-008, PT-EXP-C-009, TB-REC-006, UXV-SEN-005		

Step	Description	Status	Remarks
1	A simple experiment is run: the UxV is asked to follow a predefined path (set of waypoints) to return back to base	success	
2	At some point we assume that the UxV cannot reach the requested waypoint.	success	
3	The UxV informs Resource Controller about this incident.	success	
4	Resource Controller identifies the problem and aborts the whole experiment.	success	ExperimentCancelRequest
5	Status update message regarding this issue is dispatched to the Kafka message bus.	success	
6	Experiment Controller consumes the status message and annotates this experiment as "FAILED".	success	

Metric	Success criteria	Status	Remarks
TESTBED / FUNC / 5 / DEADLOCK DETECTION	100% of deadlocked experiments identified	success	Deadlock correctly detected if not later than 20 seconds after planned waypoint reaching time

4.6.2.4.3 Collision risk detection and avoidance

Scenario ID: **OS-09**	Conducted by: **CSEM**		Date: **February 2019**
Title	Collision risk detection and avoidance		
Comment			
Main stakeholder	Experimenter		
Secondary stakeholder	RAWFIE Admin		
Involved Sub-systems	Resource Controller, Testbed Manager, UxV		
Validated requirement	UXV-NET-004, UXV-NET-005, UXV-NET-006, UXV-NET-008, UXV-NET-009, UXV-PRC-002, UXV-PRC-003, UXV-INT-004, UXV-MGT-002, UXV-PRX-001 UXV-PRX-003, UXV-PRX-005		

Step	Description	Status	Remarks
1	Two UxVs are required for this scenario. The UxV and/or the testbed are equipped with anti-collision features.	success	Proximity Component, ROBOTNIK UGV, ROS
2	The experiment scenario sets both vehicles on a collision or near-collision course (depending on the risks involved). Alternatively, the UxVs are handled manually.	success	Paths with collision potential sent from ground station
3	Observe that the collision risk is detected on UxVs and on the testbed and that the corrective actions (experiment abort or change of direction) are taken	success	Video taken and paths logged
4	If the collision risk is detected on the UxVs, the testbed is informed.	success	

Metric	Success criteria	Status	Remarks
UXV / FUNC / 11 / COLLISIONS RISK DETECTION	100% of collision risk detected.	100% measured	Tested on UGV

5 Questionnaire and execution of tests for end-user validation

5.1 Structure

The third version of the questionnaire had the aim to collect the metrics for the validation scenarios. For each metric of a scenario, a question was added. That is why the questionnaire is rather large (250 questions), but a user gets only the questions presented of the scenarios that he has executed.

The questionnaire can be found in Annex A. A mapping between the defined (soft) metrics and the corresponding questions in the questionnaire is in Annex B. A set of tables with all answers can be found in Annex C.

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

5.2 Overview of the results

We have collected 23 responses from the following types of stakeholders

- Roles (multiple selections were possible)
  - developer / researcher: 15
  - education: 6
  - technical managerial staff: 3
  - CTO (Chief Technology Officer): 1
  - CEO (Chief Executive Officer): 3
- Type of organisation/company
  - Small and medium-sized enterprise (SME): 10
  - University/higher education: 12
  - research institute: 1

The end-users executed mainly their own user defined scenarios. Only one predefined scenario was execute by an end-user.

Users give mostly positive answers and many comments highlighted the usefulness of the RAWFIE system. Some problems with the system stability were notified.

5.3 Needed improvements

Based on the answers and critical comments the following improvements are needed/requested

- Overall system
  - Stability: There were again problems with the stability of the system: uptime and disconnections during experiments.
  - Ease the data management for the data acquired during the experiment
- Booking Tool
  - Better support for time zones to improve scheduling of experiments, because setting the time of experiments is ambiguous as there are problems to clearly identify the time zone used by the RAWFIE platform
- UxVs
  - Faster reconfiguration of UxV hardware needed for custom experiments
- Testbed
  - Better WiFi availability would be good (to be provided by the testbed owner)

6 Conclusion and Outlook

The validation process and the executed scenarios show that the RAWFIE project has evolved to a working system:

- All components reached a functional state and were validated
- 6 testbeds got integrated into RAWFIE
- Many (17) experiments could be executed with the platform

Some stability problems have occurred, but the RAWFIE team is continuously working to solve them. In the current state, there is no significant technical obstacles that may prevent to run RAWFIE in production.

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

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?** *
   Check 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 ?**

   _____
   _____
   _____
   _____

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".

If you are not able to answer a question (e.g. you did not used a feature) just skip the question.

Experiments

6. **Which scenario did you execute?** *
Mark only one oval.

- PA-01 - Administrator manages the user rights   *Skip to question 7.*
- PA-02- Administrators adds a new user   *Skip to question 13.*
- PA-03 - System monitoring and error notifications   *Skip to question 20.*
- PA-04 - System stability   *Skip to question 30.*
- TO-01 - Schedule maintenance   *Skip to question 38.*
- TO-02 - Cancel running experiment   *Skip to question 46.*
- TO-03 - Connect a new testbed   *Skip to question 54.*
- UM-01 - Install new UxVs in a testbed   *Skip to question 63.*
- UM-02 - Autonomous coordination of multiple UxVs   *Skip to question 71.*
- SH-01 - One or multiple available instances of a service or database are down   *Skip to question 79.*
- ES-01 - Attempt to set a waypoint out of the authorized area   *Skip to question 83.*
- ES-02 - Attempt to set two waypoints for which their direct path involves crossing an unauthorized area   *Skip to question 86.*
- UD-01 (HMOD)- Monitoring of Water Canals   *Skip to question 89.*
- UD-02 (HMOD) - Border Surveillance or Perimeter protection of large areas   *Skip to question 109.*
- UD-02 (rtart) - Border Surveillance or Perimeter protection of large areas   *Skip to question 129.*
- UD-04 (HMOD) - Exploration & Assessment of Network Technologies Robustness   *Skip to question 149.*
- UD-05 (HMOD) - Efficient Coordination for phenomena or mission   *Skip to question 169.*
- UD-05 (rtart) - Efficient Coordination for phenomena or mission   *Skip to question 189.*
- UD-09 (HMOD) - The geofencing service   *Skip to question 209.*
- UD-12 (HMOD) - Sensor reading   *Skip to question 229.*

PA-01- Administrator manages the user rights

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

	1	2	3	4	5	
bad	○	○	○	○	○	good

8. **Are the tools easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard	○	○	○	○	○	easy

9. **How would you evaluate the usefulness of the provided features?**
Mark only one oval.

	1	2	3	4	5	
low	○	○	○	○	○	high

10. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

	1	2	3	4	5	
bad	○	○	○	○	○	good

11. **Did you find the appropriate items using the search/filtering functionality?**
Mark only one oval.

	1	2	3	4	5	
bad	○	○	○	○	○	good

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

_____

_____

_____

PA-02 - Administrators adds a new user

13. **Were the displayed notifications and messages useful?**
Mark only one oval.

	1	2	3	4	5	
not useful	○	○	○	○	○	very useful

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

	1	2	3	4	5	
bad	○	○	○	○	○	good

15. **Are the tools easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard	○	○	○	○	○	easy

16. **How would you evaluate the usefulness of the provided features?**
Mark only one oval.

	1	2	3	4	5	
low						high

17. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

	1	2	3	4	5	
bad						good

18. **Did you find the appropriate items using the search/filtering functionality?**
Mark only one oval.

	1	2	3	4	5	
bad						good

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

_____

_____

PA-03 - System monitoring and error notifications

20. **Were the displayed notifications and messages useful?**
Mark only one oval.

	1	2	3	4	5	
not useful						very useful

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

	1	2	3	4	5	
bad						good

22. **Are the tools easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard						easy

23. **How would you evaluate the usefulness of the provided features?**
Mark only one oval.

	1	2	3	4	5	
low						high

24. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

	1	2	3	4	5	
bad						good

25. **Did you find the appropriate items using the search/filtering functionality?**
Mark only one oval.

	1	2	3	4	5	
bad						good

26. **Does the health status listing page loaded and updated in less than 5 seconds**
Mark only one oval.

Yes
No
Don't know

27. **Was the error notification (e.g. Email) sent within 165 seconds**
Mark only one oval.

Yes
No
Don't know

28. **Does the system load of the server, where the System Monitoring Service is running, not exceed 20%**
Mark only one oval.

Yes
No
Don't know

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

_____

_____

PA-04 - System stability

30. Was the system available at least 98% of the time during all the tests?
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

31. Was the rate failed vs. successful experiments below 5%?
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

32. Did the system recover within 1 hour after an error occurs (during business time)
Mark only one oval.

◯ Yes
◯ No
◯ There was no error

33. Are the tools easy to understand and to operate?
Mark only one oval.

	1	2	3	4	5	
hard	◯	◯	◯	◯	◯	easy

34. How would you evaluate the usefulness of the provided features?
Mark only one oval.

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

35. Do the tools provide helpful error messages or hints in order to guide you to the right option?
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

36. Did you find the appropriate items using the search/filtering functionality?
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

37. Anything that should be improved/changed?

_____

_____

_____

Skip to question 249.

TO-01 - Schedule maintenance

38. Were the displayed notifications and messages useful?
Mark only one oval.

	1	2	3	4	5	
not useful	◯	◯	◯	◯	◯	very useful

39. Where the access rights / restrictions as you expected?
Mark only one oval.

	1	2	3	4	5	
inappropriate	◯	◯	◯	◯	◯	appropriate

40. Are the tools easy to understand and to operate?
Mark only one oval.

	1	2	3	4	5	
hard	◯	◯	◯	◯	◯	easy

41. How would you evaluate the usefulness of the provided features?
Mark only one oval.

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

42. Do the tools provide helpful error messages or hints in order to guide you to the right option?
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

43. Did you find the appropriate items using the search/filtering functionality?
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

44. **The information managed by the testbed components is available and valid?**
Mark only one oval.

- Yes
- No
- Don't know

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

_____

_____

_____

Skip to question 249.

TO-02 - Cancel running experiment

46. **Were the displayed notifications and messages useful?**
Mark only one oval.

	1	2	3	4	5	
not useful	◯	◯	◯	◯	◯	very useful

47. **Where the access rights / restrictions as you expected?**
Mark only one oval.

	1	2	3	4	5	
inappropriate	◯	◯	◯	◯	◯	appropriate

48. **Are the tools easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard	◯	◯	◯	◯	◯	easy

49. **How would you evaluate the usefulness of the provided features?**
Mark only one oval.

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

50. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

51. **Did you find the appropriate items using the search/filtering functionality?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

52. **The information managed by the testbed components is available and valid?**
Mark only one oval.

- Yes
- No
- Don't know

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

_____

_____

_____

Skip to question 249.

TO-03 - Connect a new testbed

54. **Were the displayed notifications and messages useful?**
Mark only one oval.

	1	2	3	4	5	
not useful	◯	◯	◯	◯	◯	very useful

55. **Where the access rights / restrictions as you expected?**
Mark only one oval.

	1	2	3	4	5	
inappropriate	◯	◯	◯	◯	◯	appropriate

56. **Are the tools easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard	◯	◯	◯	◯	◯	easy

57. **How would you evaluate the usefulness of the provided features?**
Mark only one oval.

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

58. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

59. **Did you find the appropriate items using the search/filtering functionality?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

60. **The information managed by the testbed components is available and valid?**
Mark only one oval.

◯ Yes
◯ No
◯ Don't know

61. **Did the connection of the new testbed only require the input of new data related to the new testbed and its resources?**
Mark only one oval.

◯ Yes
◯ No
◯ Don't know

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

_____
_____
_____

UM-01 - Install new UxVs in a testbed

63. **Were the displayed notifications and messages useful?**
Mark only one oval.

	1	2	3	4	5	
Not useful	◯	◯	◯	◯	◯	Very useful

64. **Where the access rights / restrictions as you expected?**
Mark only one oval.

	1	2	3	4	5	
inappropriate	◯	◯	◯	◯	◯	appropriate

65. **Are the tools easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard	◯	◯	◯	◯	◯	easy

66. **How would you evaluate the usefulness of the provided features?**
Mark only one oval.

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

67. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

68. **Did you find the appropriate items using the search/filtering functionality?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

69. **Did the connection of the new UxV only require the input of new data related to the new UxV.**
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

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

_____
_____
_____

UM-02- Autonomous coordination of multiple UxVs

71. **How would you evaluate the usefulness of the provided features?**
Mark only one oval.

1 2 3 4 5
low ⬭⬭⬭⬭⬭ high

72. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

1 2 3 4 5
bad ⬭⬭⬭⬭⬭ good

73. **Did you find the appropriate items using the search/filtering functionality?**
Mark only one oval.

1 2 3 4 5
bad ⬭⬭⬭⬭⬭ good

74. **Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past**
Mark only one oval.

1 2 3 4 5
always ⬭⬭⬭⬭⬭ never

75. **Did the maximum / average deviation from the planned route exceed the expected threshold?**
Mark only one oval.

1 2 3 4 5
alway ⬭⬭⬭⬭⬭ never

76. **Was the rate of achieved vs. assigned objectives acceptable?**
Mark only one oval.

1 2 3 4 5
unacceptable ⬭⬭⬭⬭⬭ acceptable

77. **Was aggregated data throughput for the whole RAWFIE platform above [TODO: define threshold]**
Mark only one oval.

⬭ Yes
⬭ No
⬭ Don't know

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

_____

_____

_____

Skip to question 249.

SH-1 - One or multiple available instances of a service or database are down

79. **Were the displayed notifications and messages useful?**
Mark only one oval.

1 2 3 4 5
Not useful ⬭⬭⬭⬭⬭ Very useful

80. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

1 2 3 4 5
Bad ⬭⬭⬭⬭⬭ Good

81. **Does the health status listing page loaded and updated in less than 5 seconds**
Mark only one oval.

⬭ Yes
⬭ No
⬭ I don't know

82. **Was the error notification (e.g. Email) sent within 165 seconds?**
Mark only one oval.

⬭ Yes
⬭ No
⬭ I don't know

Skip to question 249.

ES-01 - Attempt to set a waypoint out of the authorized area

83. **Were the displayed notifications and messages useful?**
Mark only one oval.

1 2 3 4 5
Not useful ⬭⬭⬭⬭⬭ Very useful

84. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

Bad 1 2 3 4 5 Good

85. **Where you notified within 5 seconds about the error?**
Mark only one oval.

Yes
No
I don't know

Skip to question 249.

ES-02 - Attempt to set two waypoints for which their direct path involves crossing an unauthorized area

86. **Were the displayed notifications and messages useful?**
Mark only one oval.

Not useful 1 2 3 4 5 Very useful

87. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

Bad 1 2 3 4 5 Good

88. **Where you notified within 5 seconds about the error?**
Mark only one oval.

Yes
No
I don't know

Skip to question 249.

UD-01 (HMOD) - Monitoring of Water Canals

89. **Was the system up and running at lest 98% of the time**
Mark only one oval.

Yes
No
I don't know

90. **Where there any system errors during the experiment?**
Please insert the number of errors. 0 for none.
Optionally add a short comment about the error

91. **Did the user interface update at least every 5 seconds?**
Mark only one oval.

Yes
No
I don't know

92. **Did the booking request succeed within 30 seconds?**
Mark only one oval.

Yes
No
I don't know

93. **Were the displayed notifications and messages useful?**
Mark only one oval.

Not useful 1 2 3 4 5 Very useful

94. **Where the access rights / restrictions as you expected?**
Mark only one oval.

inappropriate 1 2 3 4 5 appropriate

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

bad 1 2 3 4 5 good

96. **Are the tools easy to understand and to operate?**
Mark only one oval.

hard 1 2 3 4 5 easy

97. **How would you evaluate the usefulness of the provided features?**
Mark only one oval.

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

98. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

99. **Did you find the appropriate items using the search/filtering functionality?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

100. **Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past?**
Mark only one oval.

	1	2	3	4	5	
always	◯	◯	◯	◯	◯	never

101. **Did the testbed provide daily updated information about weather conditions, UxV availability, UxV capabilities, sensors or whole testbed availability**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Partly

102. **Downtimes for maintenance, as well as other planned unavailability which may prevent the execution of the experiments where communicated in advance, at least 2 days before?**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ There was no downtime

103. **Did the experiment execute as expected (e.g. the experiment was exactly what you asked for)?**
Mark only one oval.

	1	2	3	4	5	
no match	◯	◯	◯	◯	◯	exact match

104. **Did the maximum / average deviation from the planned route exceed the expected threshold?**
Mark only one oval.

	1	2	3	4	5	
always	◯	◯	◯	◯	◯	never

105. **Was the rate of achieved vs. assigned objectives acceptable?**
Mark only one oval.

	1	2	3	4	5	
unacceptable	◯	◯	◯	◯	◯	acceptable

106. **Did the actual route time not differ from planned route time by more than 10%**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

107. **Could you access all the sensor data from the UxV after the experiment (directly or after downloading from the storage)**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Partly

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

_____

_____

_____

Skip to question 249.

UD-02 (HMOD) - Border Surveillance or Perimeter protection of large areas

109. **Was the system up and running at lest 98% of the time**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

110. Where there any system errors during the experiment?

Please insert the number of errors. 0 for none.
Optionally add a short comment about the error

_____

111. Did the user interface update at least every 5 seconds?

Mark only one oval.

- Yes
- No
- I don't know

112. Did the booking request succeed within 30 seconds?

Mark only one oval.

- Yes
- No
- I don't know

113. Were the displayed notifications and messages useful?

Mark only one oval.

	1	2	3	4	5	
Not useful	◯	◯	◯	◯	◯	Very useful

114. Where the access rights / restrictions as you expected?

Mark only one oval.

	1	2	3	4	5	
inappropriate	◯	◯	◯	◯	◯	appropriate

115. Are the information presented in a clear way?

Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

116. Are the tools easy to understand and to operate?

Mark only one oval.

	1	2	3	4	5	
hard	◯	◯	◯	◯	◯	easy

117. How would you evaluate the usefulness of the provided features?

Mark only one oval.

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

118. Do the tools provide helpful error messages or hints in order to guide you to the right option?

Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

119. Did you find the appropriate items using the search/filtering functionality?

Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

120. Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past?

Mark only one oval.

	1	2	3	4	5	
always	◯	◯	◯	◯	◯	never

121. Did the testbed provide daily updated information about weather conditions, UxV availability, UxV capabilities, sensors or whole testbed availability

Mark only one oval.

- Yes
- No
- Partly

122. Downtimes for maintenance, as well as other planned unavailability which may prevent the execution of the experiments where communicated in advance, at least 2 days before?

Mark only one oval.

- Yes
- No
- There was no downtime

123. Did the experiment execute as expected (e.g. the experiment was exactly what you asked for)?

Mark only one oval.

	1	2	3	4	5	
no match	◯	◯	◯	◯	◯	exact match

124. **Did the maximum / average deviation from the planned route exceed the expected threshold?**
Mark only one oval.

	1	2	3	4	5	
always	◯	◯	◯	◯	◯	never

125. **Was the rate of achieved vs. assigned objectives acceptable?**
Mark only one oval.

	1	2	3	4	5	
unacceptable	◯	◯	◯	◯	◯	acceptable

126. **Did the actual route time not differ from planned route time by more than 10%**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

127. **Could you access all the sensor data from the UxV after the experiment (directly or after downloading from the storage)**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Partly

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

_____

_____

_____

_____

UD-02 (rtart) - Border Surveillance or Perimeter protection of large areas

129. **Was the system up and running at lest 98% of the time**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

130. **Where there any system errors during the experiment?**
Please insert the number of errors. 0 for none.
Optionally add a short comment about the error

_____

131. **Did the user interface update at least every 5 seconds?**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

132. **Did the booking request succeed within 30 seconds?**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

133. **Were the displayed notifications and messages useful?**
Mark only one oval.

	1	2	3	4	5	
Not useful	◯	◯	◯	◯	◯	Very useful

134. **Where the access rights / restrictions as you expected?**
Mark only one oval.

	1	2	3	4	5	
inappropriate	◯	◯	◯	◯	◯	appropriate

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

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

136. **Are the tools easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard	◯	◯	◯	◯	◯	easy

137. **How would you evaluate the usefulness of the provided features?**
Mark only one oval.

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

138. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

139. **Did you find the appropriate items using the search/filtering functionality?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

140. **Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past?**
Mark only one oval.

	1	2	3	4	5	
always	◯	◯	◯	◯	◯	never

141. **Did the testbed provide daily updated information about weather conditions, UxV availability, UxV capabilities, sensors or whole testbed availability**
Mark only one oval.

◯ Yes
◯ No
◯ Partly

142. **Downtimes for maintenance, as well as other planned unavailability which may prevent the execution of the experiments where communicated in advance, at least 2 days before?**
Mark only one oval.

◯ Yes
◯ No
◯ There was no downtime

143. **Did the experiment execute as expected (e.g. the experiment was exactly what you asked for)?**
Mark only one oval.

	1	2	3	4	5	
no match	◯	◯	◯	◯	◯	exact match

144. **Did the maximum / average deviation from the planned route exceed the expected threshold?**
Mark only one oval.

	1	2	3	4	5	
always	◯	◯	◯	◯	◯	never

145. **Was the rate of achieved vs. assigned objectives acceptable?**
Mark only one oval.

	1	2	3	4	5	
unacceptable	◯	◯	◯	◯	◯	acceptable

146. **Did the actual route time not differ from planned route time by more than 10%**
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

147. **Could you access all the sensor data from the UxV after the experiment (directly or after downloading from the storage)**
Mark only one oval.

◯ Yes
◯ No
◯ Partly

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

_____

_____

_____

Skip to question 249.

UD-04 (HMOD) - Exploration & Assessment of Network Technologies Robustness

149. **Was the system up and running at lest 98% of the time**
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

150. **Where there any system errors during the experiment?**
Please insert the number of errors. 0 for none.
Optionally add a short comment about the error

_____

151. **Did the user interface update at least every 5 seconds?**
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

152. **Did the booking request succeed within 30 seconds?**
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

153. **Were the displayed notifications and messages useful?**
Mark only one oval.

	1	2	3	4	5	
Not useful	◯	◯	◯	◯	◯	Very useful

154. **Where the access rights / restrictions as you expected?**
Mark only one oval.

	1	2	3	4	5	
inappropriate	◯	◯	◯	◯	◯	appropriate

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

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

156. **Are the tools easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard	◯	◯	◯	◯	◯	easy

157. **How would you evaluate the usefulness of the provided features?**
Mark only one oval.

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

158. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

159. **Did you find the appropriate items using the search/filtering functionality?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

160. **Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past?**
Mark only one oval.

	1	2	3	4	5	
always	◯	◯	◯	◯	◯	never

161. **Did the testbed provide daily updated information about weather conditions, UxV availability, UxV capabilities, sensors or whole testbed availability**
Mark only one oval.

◯ Yes
◯ No
◯ Partly

162. **Downtimes for maintenance, as well as other planned unavailability which may prevent the execution of the experiments where communicated in advance, at least 2 days before?**
Mark only one oval.

◯ Yes
◯ No
◯ There was no downtime

163. **Did the experiment execute as expected (e.g. the experiment was exactly what you asked for)?**
Mark only one oval.

	1	2	3	4	5	
no match	◯	◯	◯	◯	◯	exact match

164. **Did the maximum / average deviation from the planned route exceed the expected threshold?**
Mark only one oval.

	1	2	3	4	5	
always	◯	◯	◯	◯	◯	never

165. **Was the rate of achieved vs. assigned objectives acceptable?**
Mark only one oval.

	1	2	3	4	5	
unacceptable	◯	◯	◯	◯	◯	acceptable

166. **Did the actual route time not differ from planned route time by more than 10%**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

167. **Could you access all the sensor data from the UxV after the experiment (directly or after downloading from the storage)**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Partly

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

_____
_____
_____

UD-05 (HMOD) - Efficient Coordination for phenomena or mission

169. **Was the system up and running at lest 98% of the time**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

170. **Where there any system errors during the experiment?**
Please insert the number of errors. 0 for none.
Optionally add a short comment about the error

_____

171. **Did the user interface update at least every 5 seconds?**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

172. **Did the booking request succeed within 30 seconds?**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

173. **Were the displayed notifications and messages useful!**
Mark only one oval.

	1	2	3	4	5	
Not useful	◯	◯	◯	◯	◯	Very useful

174. **Where the access rights / restrictions as you expected?**
Mark only one oval.

	1	2	3	4	5	
inappropriate	◯	◯	◯	◯	◯	appropriate

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

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

176. **Are the tools easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard	◯	◯	◯	◯	◯	easy

177. **How would you evaluate the usefulness of the provided features?**
Mark only one oval.

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

178. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

179. **Did you find the appropriate items using the search/filtering functionality?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

180. **Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past?**
Mark only one oval.

	1	2	3	4	5	
always	◯	◯	◯	◯	◯	never

181. **Did the testbed provide daily updated information about weather conditions, UxV availability, UxV capabilities, sensors or whole testbed availability**
Mark only one oval.

◯ Yes
◯ No
◯ Partly

182. **Downtimes for maintenance, as well as other planned unavailability which may prevent the execution of the experiments where communicated in advance, at least 2 days before?**
Mark only one oval.

◯ Yes
◯ No
◯ There was no downtime

183. **Did the experiment execute as expected (e.g. the experiment was exactly what you asked for)?**
Mark only one oval.

	1	2	3	4	5	
no match	◯	◯	◯	◯	◯	exact match

184. **Did the maximum / average deviation from the planned route exceed the expected threshold?**
Mark only one oval.

	1	2	3	4	5	
always	◯	◯	◯	◯	◯	never

185. **Was the rate of achieved vs. assigned objectives acceptable?**
Mark only one oval.

	1	2	3	4	5	
unacceptable	◯	◯	◯	◯	◯	acceptable

186. **Did the actual route time not differ from planned route time by more than 10%**
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

187. **Could you access all the sensor data from the UxV after the experiment (directly or after downloading from the storage)**
Mark only one oval.

◯ Yes
◯ No
◯ Partly

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

_____

_____

_____

_____

Skip to question 249.

UD-05 (rtart) - Efficient Coordination for phenomena or mission

189. **Was the system up and running at lest 98% of the time**
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

190. **Where there any system errors during the experiment?**
Please insert the number of errors. 0 for none.
Optionally add a short comment about the error

_____

191. **Did the user interface update at least every 5 seconds?**
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

192. **Did the booking request succeed within 30 seconds?**
Mark only one oval.

- Yes
- No
- I don't know

193. **Were the displayed notifications and messages useful?**
Mark only one oval.

	1	2	3	4	5	
Not useful						Very useful

194. **Where the access rights / restrictions as you expected?**
Mark only one oval.

	1	2	3	4	5	
inappropriate						appropriate

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

	1	2	3	4	5	
bad						good

196. **Are the tools easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard						easy

197. **How would you evaluate the usefulness of the provided features?**
Mark only one oval.

	1	2	3	4	5	
low						high

198. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

	1	2	3	4	5	
bad						good

199. **Did you find the appropriate items using the search/filtering functionality?**
Mark only one oval.

	1	2	3	4	5	
bad						good

200. **Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past?**
Mark only one oval.

	1	2	3	4	5	
always						never

201. **Did the testbed provide daily updated information about weather conditions, UxV availability, UxV capabilities, sensors or whole testbed availability**
Mark only one oval.

- Yes
- No
- Partly

202. **Downtimes for maintenance, as well as other planned unavailability which may prevent the execution of the experiments where communicated in advance, at least 2 days before?**
Mark only one oval.

- Yes
- No
- There was no downtime

203. **Did the experiment execute as expected (e.g. the experiment was exactly what you asked for)?**
Mark only one oval.

	1	2	3	4	5	
no match						exact match

204. **Did the maximum / average deviation from the planned route exceed the expected threshold?**
Mark only one oval.

	1	2	3	4	5	
always						never

205. **Was the rate of achieved vs. assigned objectives acceptable?**
Mark only one oval.

	1	2	3	4	5	
unacceptable						acceptable

206. **Did the actual route time not differ from planned route time by more than 10%**
Mark only one oval.

Yes

No

I don't know

207. **Could you access all the sensor data from the UxV after the experiment (directly or after downloading from the storage)**
Mark only one oval.

Yes

No

Partly

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

_____

_____

_____

Skip to question 249.

UD-09 (HMOD) - The geofencing service

209. **Was the system up and running at lest 98% of the time**
Mark only one oval.

Yes

No

I don't know

210. **Where there any system errors during the experiment?**
Please insert the number of errors. 0 for none.
Optionally add a short comment about the error

_____

211. **Did the user interface update at least every 5 seconds?**
Mark only one oval.

Yes

No

I don't know

212. **Did the booking request succeed within 30 seconds?**
Mark only one oval.

Yes

No

I don't know

213. **Were the displayed notifications and messages useful?**
Mark only one oval.

	1	2	3	4	5	
Not useful						Very useful

214. **Where the access rights / restrictions as you expected?**
Mark only one oval.

	1	2	3	4	5	
inappropriate						appropriate

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

	1	2	3	4	5	
bad						good

216. **Are the tools easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard						easy

217. **How would you evaluate the usefulness of the provided features?**
Mark only one oval.

	1	2	3	4	5	
low						high

218. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

	1	2	3	4	5	
bad						good

219. **Did you find the appropriate items using the search/filtering functionality?**
Mark only one oval.

	1	2	3	4	5	
bad						good

220. **Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past?**
Mark only one oval.

	1	2	3	4	5	
always	◯	◯	◯	◯	◯	never

221. **Did the testbed provide daily updated information about weather conditions, UxV availability, UxV capabilities, sensors or whole testbed availability**
Mark only one oval.

◯ Yes
◯ No
◯ Partly

222. **Downtimes for maintenance, as well as other planned unavailability which may prevent the execution of the experiments where communicated in advance, at least 2 days before?**
Mark only one oval.

◯ Yes
◯ No
◯ There was no downtime

223. **Did the experiment execute as expected (e.g. the experiment was exactly what you asked for)?**
Mark only one oval.

	1	2	3	4	5	
no match	◯	◯	◯	◯	◯	exact match

224. **Did the maximum / average deviation from the planned route exceed the expected threshold?**
Mark only one oval.

	1	2	3	4	5	
always	◯	◯	◯	◯	◯	never

225. **Was the rate of achieved vs. assigned objectives acceptable?**
Mark only one oval.

	1	2	3	4	5	
unacceptable	◯	◯	◯	◯	◯	acceptable

226. **Did the actual route time not differ from planned route time by more than 10%**
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

227. **Could you access all the sensor data from the UxV after the experiment (directly or after downloading from the storage)**
Mark only one oval.

◯ Yes
◯ No
◯ Partly

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

_____

_____

_____

Skip to question 249.

UD-12 (HMOD) - Sensor reading

229. **Was the system up and running at lest 98% of the time**
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

230. **Where there any system errors during the experiment?**
Please insert the number of errors. 0 for none.
Optionally add a short comment about the error
Mark only one oval.

231. **Did the user interface update at least every 5 seconds?**
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

232. **Did the booking request succeed within 30 seconds?**
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

233. **Were the displayed notifications and messages useful?**
Mark only one oval.

	1	2	3	4	5	
Not useful	◯	◯	◯	◯	◯	Very useful

234. **Where the access rights / restrictions as you expected?**
Mark only one oval.

	1	2	3	4	5	
inappropriate	◯	◯	◯	◯	◯	appropriate

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

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

236. **Are the tools easy to understand and to operate?**
Mark only one oval.

	1	2	3	4	5	
hard	◯	◯	◯	◯	◯	easy

237. **How would you evaluate the usefulness of the provided features?**
Mark only one oval.

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

238. **Do the tools provide helpful error messages or hints in order to guide you to the right option?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

239. **Did you find the appropriate items using the search/filtering functionality?**
Mark only one oval.

	1	2	3	4	5	
bad	◯	◯	◯	◯	◯	good

240. **Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past?**
Mark only one oval.

	1	2	3	4	5	
always	◯	◯	◯	◯	◯	never

241. **Did the testbed provide daily updated information about weather conditions, UxV availability, UxV capabilities, sensors or whole testbed availability**
Mark only one oval.

◯ Yes
◯ No
◯ Partly

242. **Downtimes for maintenance, as well as other planned unavailability which may prevent the execution of the experiments where communicated in advance, at least 2 days before?**
Mark only one oval.

◯ Yes
◯ No
◯ There was no downtime

243. **Did the experiment execute as expected (e.g. the experiment was exactly what you asked for)?**
Mark only one oval.

	1	2	3	4	5	
no match	◯	◯	◯	◯	◯	exact match

244. **Did the maximum / average deviation from the planned route exceed the expected threshold?**
Mark only one oval.

	1	2	3	4	5	
always	◯	◯	◯	◯	◯	never

245. **Was the rate of achieved vs. assigned objectives acceptable?**
Mark only one oval.

	1	2	3	4	5	
unacceptable	◯	◯	◯	◯	◯	acceptable

246. **Did the actual route time not differ from planned route time by more than 10%**
Mark only one oval.

◯ Yes
◯ No
◯ I don't know

247. **Could you access all the sensor data from the UxV after the experiment (directly or after downloading from the storage)**
Mark only one oval.

◯ Yes
◯ No
◯ Partly

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

_____

_____

_____

Skip to question 249.

Another experiment...
The Resource Explorer tool in the web portal

249. **Did you execute another experiment?**
Mark only one oval.

◯ Yes   *Skip to question 6.*

◯ No   *Skip to question 250.*

Final comments

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

_____

_____

_____

_____

B   Metric-Questions mapping

Metric	Question

PLATFORM / PERF / 1 / STABLE SYSTEM	• Was the system up and running at least 98% of the time
	   o yes
	   o no
	   o I don't know

PLATFORM / PERF / 2 / ERRORS	• Where there any system errors during the experiment? o Free text

PLATFORM / PERF / 5 / LATENCY/ RESULTS UPDATE TIME	• Did the user interface update at least every 5 seconds?
	   o yes
	   o no
	   o I don't know

PLATFORM / PERF / 6 / LATENCY/ BOOKING TIME	• Did the booking request succeed within 30 seconds?
	   o yes
	   o no
	   o I don't know

PLATFORM / USE / 7 / NOTIFICATION	• Were the displayed notifications and messages useful?
	   o 1: Not useful
	   o 5: Very useful

PLATFORM / USE / 8 / ROLES	• Where the access rights / restrictions as you expected?
	   o 1: inappropriate
	   o 5: appropriate

PLATFORM / USE / 9 / VISUALISATION / BALANCE	• Are the information presented in a clear way?
	   o 1: bad
	   o 5: good

PLATFORM / USE / 10 / VISUALISATION / SIMPLICITY	• Are the tools easy to understand and to operate?
	   o 1: hard
	   o 5: easy

PLATFORM / USE / 12 / VISUALISATION / UTILITY	• How would you evaluate the usefulness of the provided features?
	   o 1: Low
	   o 5: high

PLATFORM / USE / 13 / GUIDANCE	• Do the tools provide helpful error messages or hints in order to guide you to the right option?
	   o 1: Bad
	   o 2: Good

PLATFORM / USE / 14 / FILTERING	• Did you find the appropriate items using the search/filtering functionality?
	   o 1: Bad
	   o 5: Good

C.1 About you

No.	Timestamp	How old are you?	Which kind of organisation/company are you from?	What is the name of your organisation/company (optional)?	What is your professional role?	What are your activities/responsibilities at your organisation/ company?
1	2018-10-07	40 to 49	university	Athens University of Economics and Business	education, developer / researcher	Teaching and Research
2	2018-10-30	20 to 29	small and medium-sized enterprise (SME)	ITTI	developer / researcher	engineer involved in R&D projects
3	2018-11-27	20 to 29	university		developer / researcher	Student, Research
4	2018-11-30	50 to 59	small and medium-sized enterprise (SME)	ITTI	technical managerial staff	Managing and technically contributing to projects
5	2019-01-23	30 to 39	university		developer / researcher	
6	2019-01-23	50 to 59	university	Faculty of Electronic Engineering, University of Nis	technical managerial staff, education, developer / researcher	Full Professor
7	2019-01-23	40 to 49	university	University of Nis, Faculty of Electronic Engineering	education, developer / researcher	assistant professor
8	2019-01-23	20 to 29	university	University of Nis, Faculty of Electronic Engineering	education, developer / researcher	Teaching assistant and researcher
9	2019-01-23	40 to 49	small and medium-sized enterprise (SME)		CEO (Chief Executive Officer)	
10	2019-01-23	40 to 49	university	Athens University of Economics and Business	education	teaching and research
11	2019-01-24	40 to 49	university	TECHNOLOGICAL EDUCATION INSTITUTION OF WESTERN GREECE	developer / researcher	
12	2019-01-24	40 to 49	small and medium-sized enterprise (SME)	WPWEB	CEO (Chief Executive Officer)	General management
13	2019-01-25	30 to 39	university		developer / researcher	IoT development
14	2019-01-25	30 to 39	small and medium-sized enterprise (SME)	Feron Technologies PC	technical managerial staff	R&D Director
15	2019-01-25		research institute		developer / researcher	
16	2019-01-25	40 to 49	university	University of Nis	education	Teaching students and doing research
17	2019-02-17	60 and older	small and medium-sized enterprise (SME)	Wyenor Ltd	developer / researcher	Technical specification design implementation and testing
18	2019-03-13	30 to 39	small and medium-sized enterprise (SME)	West Sea Project	developer / researcher	Image processing
19	2019-03-13	30 to 39	university		developer / researcher	
20	2019-03-13	30 to 39	small and medium-sized enterprise (SME)		CTO (Chief Technology Officer)	Advanced applications
21	2019-03-13	40 to 49	small and medium-sized enterprise (SME)		developer / researcher	

| 22 | 2019-03-18 | 40 to 49 | small and medium-sized enterprise (SME) | | CEO (Chief Executive Officer) | Design of robotics and sensor networks |
| 23 | 2019-03-22 | 40 to 49 | university | | developer / researcher | Software development |

C.2   PA-01- Administrator manages the user rights

No answers

C.3   PA-01- Administrator manages the user rights

No answers

C.4   PA-02 - Administrators adds a new user

No answers

C.5   PA-03 - System monitoring and error notifications

No answers

C.6   PA-04 - System stability

No answers

C.7   TO-01 - Schedule maintenance

No answers

C.8   TO-02 - Cancel running experiment

No answers

C.9   TO-03 - Connect a new testbed

No answers

C.10   UM-01 - Install new UxVs in a testbed

No answers

C.11   UM-02- Autonomous coordination of multiple UxVs

No.	How would you evaluate the usefulness of the provided features?	Do the tools provide helpful error messages or hints in order to guide you to the right option?	Did you find the appropriate items using the search/filtering functionality?	Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past	Did the maximum / average deviation from the planned route exceed the expected threshold?	Was the rate of achieved vs. assigned objectives acceptable?	Was aggregated data throughput for the whole RAWFIE platform sufficient	Anything that should be improved / changed?
7	5	4	5	5	5	5	Yes	
8	5	4	5	5	5	5	Yes	
20	2	2	2	2		3		

C.12   SH-1 - One or multiple available instances of a service or database are down

No answers

C.13   ES-01 - Attempt to set a waypoint out of the authorized area

No answers

C.14   ES-02 - Attempt to set two waypoints for which their direct path involves crossing an unauthorized area

No answers

C.15   UD-01 (HMOD) - Monitoring of Water Canals

No.	Was the system up and	Where there any system	Did the user interface	Did the booking request	Were the displayed notification	Where the access rights /	Are the information presented	Are the tools easy to	How would you evaluate	Do the tools provide	Did you find the appropriate

	running at lest 98% of the time	errors during the experiment?	update at least every 5 seconds?	succeed within 30 seconds?	s and messages useful?	restrictions as you expected?	in a clear way?	understand and to operate?	the usefulness of the provided features?	helpful error messages or hints in order to guide you to the right option?	items using the search/filtering functionality?
18	No	There were eerors in the simulation test beds	Yes	No	3	4	4	4	5	3	4

No.	Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past?	Did the testbed provide daily updated information about weather conditions, UxV availability, UxV capabilities, sensors or whole testbed availability	Downtimes for maintenance, as well as other planned unavailability which may prevent the execution of the experiments where communicated in advance, at least 2 days before?	Did the experiment execute as expected (e.g. the experiment was exactly what you asked for)?	Did the maximum / average deviation from the planned route exceed the expected threshold?	Was the rate of achieved vs. assigned objectives acceptable?	Did the actual route time not differ from planned route time by more than 10%	Could you access all the sensor data from the UxV after the experiment (directly or after downloading from the storage)	Anything that should be improved / changed?
18	5	Partly	Yes	4	5	5	I don't know	Partly	

C.16 UD-02 (HMOD) - Border Surveillance or Perimeter protection of large areas

No.	Was the system up and running at lest 98% of the time	Where there any system errors during the experiment?	Did the user interface update at least every 5 seconds?	Did the booking request succeed within 30 seconds?	Were the displayed notifications and messages useful?	Where the access rights / restrictions as you expected?	Are the information presented in a clear way?	Are the tools easy to understand and to operate?	How would you evaluate the usefulness of the provided features?	Do the tools provide helpful error messages or hints in order to guide you to the right option?	Did you find the appropriate items using the search/filtering functionality?
9	Yes		Yes	Yes							

| 21 | I don't know | | I don't know | | 3 | 4 | 3 | 2 | 3 | 3 | 4 |
| 22 | No | | Yes | Yes | 4 | 5 | 4 | 4 | 5 | 4 | 5 |

No.	Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past?	Did the testbed provide daily updated information about weather conditions, UxV availability, UxV capabilities, sensors or whole testbed availability	Downtimes for maintenance, as well as other planned unavailability which may prevent the execution of the experiments where communicated in advance, at least 2 days before?	Did the experiment execute as expected (e.g. the experiment was exactly what you asked for)?	Did the maximum / average deviation from the planned route exceed the expected threshold?	Was the rate of achieved vs. assigned objectives acceptable?	Did the actual route time not differ from planned route time by more than 10%	Could you access all the sensor data from the UxV after the experiment (directly or after downloading from the storage)	Anything that should be improved / changed?
9									
21	3	Yes	Yes	2	4	4	Yes		
22	3	Yes	Yes	5	4	5	No	Yes	

C.17   UD-02 (rtart) - Border Surveillance or Perimeter protection of large areas

No answers

C.18   UD-04 (HMOD) - Exploration & Assessment of Network Technologies Robustness

No.	Was the system up and running at lest 98% of the time	Where there any system errors during the experiment?	Did the user interface update at least every 5 seconds?	Did the booking request succeed within 30 seconds?	Were the displayed notifications and messages useful?	Where the access rights / restrictions as you expected?	Are the information presented in a clear way?	Are the tools easy to understand and to operate?	How would you evaluate the usefulness of the provided features?	Do the tools provide helpful error messages or hints in order to guide you to the right option?	Did you find the appropriate items using the search/filtering functionality?

No.											
1	Yes	there were disconnections that affected experiments, we have sent detailed comments and logs	Yes	Yes	5	5	5	5	5	5	5
2	Yes	There were difficulties with adding new experiment (when many experiments were already scheduled)	Yes	Yes	4	5	4	5	5	4	
4	Yes		Yes	Yes	4	5	5	4	4	4	
10	Yes	a few	Yes	Yes	5	5	5	5	5	4	4
14	No	0	Yes	Yes	4	3	4	4	4	2	5
15	I don't know		I don't know	Yes	4	5	3	3	4	3	3
17	Yes	Rejection of messages - size limit exceeded	I don't know	I don't know	3	4	4	4	5	3	4
19	No		I don't know	I don't know		3	3	3	3		

No.	Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past?	Did the testbed provide daily updated information about weather conditions, UxV availability, UxV capabilities, sensors or whole testbed availability	Downtimes for maintenance, as well as other planned unavailability which may prevent the execution of the experiments where communicated in advance, at least 2 days before?	Did the experiment execute as expected (e.g. the experiment was exactly what you asked for)?	Did the maximum / average deviation from the planned route exceed the expected threshold?	Was the rate of achieved vs. assigned objectives acceptable?	Did the actual route time not differ from planned route time by more than 10%	Could you access all the sensor data from the UxV after the experiment (directly or after downloading from the storage)	Anything that should be improved / changed?
1	5	Yes	Yes	4	4	5	No	Yes	All personnel was great. the project is very ambitious and there were some hiccups because of this.

No.									
2	4	Partly		4		4	I don't know		Better support for time zones to improve scheduling of experiments
4	4	Partly		4		4	I don't know		Setting the time of experiments is ambiguous as there are problems to clearly identify the time zone used by the RAWFIE platform
10	4	Yes	Yes	4	4	5	Yes	Yes	fewer downtims, if possible
14	5	No	No	4			I don't know	Yes	Need for fast reconfiguration of UxV hardware for custom experiments
15	3	Yes	Yes	4	4	4	I don't know	Yes	It would be useful to provide facilities for enabling more elaborate route forms.
17	4	No	There was no downtime	4	3	5	I don't know	Yes	
19		Partly	No	2		2	I don't know		The WiFi connectivity on the testbed; The flexibility of the people from the naval base supporting the experiments;

C.19 UD-05 (HMOD) - Efficient Coordination for phenomena or mission

No.	Was the system up and running at lest 98% of the time	Where there any system errors during the experiment?	Did the user interface update at least every 5 seconds?	Did the booking request succeed within 30 seconds?	Were the displayed notifications and messages useful?	Where the access rights / restrictions as you expected?	Are the information presented in a clear way?	Are the tools easy to understand and to operate?	How would you evaluate the usefulness of the provided features?	Do the tools provide helpful error messages or hints in order to guide you to the right option?	Did you find the appropriate items using the search/filtering functionality?
1	Yes	see previous answer	Yes	Yes	5	5	5	5	5	5	5
10	Yes	a few	Yes	Yes	5		5	4	5	4	5
23	I don't know		Yes	Yes	4	5	4	5	4	5	3

No.	Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past?	Did the testbed provide daily updated information about weather conditions, UxV availability, UxV capabilities, sensors or whole testbed availability	Downtimes for maintenance, as well as other planned unavailability which may prevent the execution of the experiments where communicated in advance, at least 2 days before?	Did the experiment execute as expected (e.g. the experiment was exactly what you asked for)?	Did the maximum / average deviation from the planned route exceed the expected threshold?	Was the rate of achieved vs. assigned objectives acceptable?	Did the actual route time not differ from planned route time by more than 10%	Could you access all the sensor data from the UxV after the experiment (directly or after downloading from the storage)	Anything that should be improved / changed?
1	5	Yes	Yes	4	4	4	Yes	Yes	see previous comment
10	4	Yes	Yes	4	5	5	Yes	Yes	fewer downtimes. make it never rain!:)
23	3	Yes	No	5	4	4	No	Yes	

C.20 UD-05 (rtart) - Efficient Coordination for phenomena or mission

No.	Was the system up and running at lest 98% of the time	Where there any system errors during the experiment?	Did the user interface update at least every 5 seconds?	Did the booking request succeed within 30 seconds?	Were the displayed notifications and messages useful?	Where the access rights / restrictions as you expected?	Are the information presented in a clear way?	Are the tools easy to understand and to operate?	How would you evaluate the usefulness of the provided features?	Do the tools provide helpful error messages or hints in order to guide you to the right option?	Did you find the appropriate items using the search/filtering functionality?
6	Yes	We have problems in collecting data at the beginning. But, after first successful experiment, all succeding experiments were successfully finished.	Yes	Yes	5	5	5	5	5	5	

8	I don't know	0	Yes	Yes	5	5	5	5	5	4	5
16	Yes	0	Yes	Yes	5	5	5	5	5	5	

No.	Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past?	Did the testbed provide daily updated information about weather conditions, UxV availability, UxV capabilities, sensors or whole testbed availability	Downtimes for maintenance, as well as other planned unavailability which may prevent the execution of the experiments where communicated in advance, at least 2 days before?	Did the experiment execute as expected (e.g. the experiment was exactly what you asked for)?	Did the maximum / average deviation from the planned route exceed the expected threshold?	Was the rate of achieved vs. assigned objectives acceptable?	Did the actual route time not differ from planned route time by more than 10%	Could you access all the sensor data from the UxV after the experiment (directly or after downloading from the storage)	Anything that should be improved / changed?
6	5		Yes	5	5	5	I don't know	No	
8	4	Partly	Yes	4	5	5	Yes	Yes	Ease the data management for the data acquired during the experiment
16	5		Yes	4	5	5	Yes	Yes	

C.21 UD-09 (HMOD) - The geofencing service

No answers

C.22 UD-12 (HMOD) - Sensor reading

No.	Was the system up and running at lest 98% of the time	Where there any system errors during the experiment?	Did the user interface update at least every 5 seconds?	Did the booking request succeed within 30 seconds?	Were the displayed notifications and messages useful?	Where the access rights / restrictions as you expected?	Are the information presented in a clear way?	Are the tools easy to understand and to operate?	How would you evaluate the usefulness of the provided features?	Do the tools provide helpful error messages or hints in order to guide you	Did you find the appropriate items using the search/filtering functionality?

									to the right option?	
3	No	2	No	Yes	2	3	3	2	3	3	3
7	I don't know	0	I don't know	Yes	5	5	5	5	5	5	5
11	Yes		Yes	Yes	4	5	4	4	5	4	
12	Yes	0	I don't know	Yes	5	5	4	4	5	3	5
13	Yes	of course but they were fixed	Yes	Yes	5	5	5	5	5	5	5

No.	Did the same or similar experiment configuration (parameters) lead to problems (UxV collisions, crashes, system failures, etc.) in the past?	Did the testbed provide daily updated information about weather conditions, UxV availability, UxV capabilities, sensors or whole testbed availability	Downtimes for maintenance, as well as other planned unavailability which may prevent the execution of the experiments where communicated in advance, at least 2 days before?	Did the experiment execute as expected (e.g. the experiment was exactly what you asked for)?	Did the maximum / average deviation from the planned route exceed the expected threshold?	Was the rate of achieved vs. assigned objectives acceptable?	Did the actual route time not differ from planned route time by more than 10%	Could you access all the sensor data from the UxV after the experiment (directly or after downloading from the storage)	Anything that should be improved / changed?
3	5	Yes	Yes	2	3	3	I don't know	No	
7	4	Yes	There was no downtime	5	1	5	Yes	Yes	
11	5	Yes	Yes	4	4	5	Yes	Yes	
12	5	No	Yes	4		5	I don't know	Yes	
13	5	Yes	Yes	5	5	5	Yes	Yes	

C.23 Final comments

No.	Was the system up and running at lest 98% of the time
1	The system is very good, but it is very ambitious so there are some hiccups. Personnel we interacted with is very professional and accomodating.
2	RAWFIE system is powerful and allows performing variety of distinct experiments. It is especially useful the posiibility to remotely perform series of experiments after having single integration of hardware. Some improvements could be done to eliminate few flaws.

4	We evaluate RAWFIE as an attractive tool for future experiments and projects.
10	RAWFIE system extremely useful to the community.
14	Nice tool but limited unavailability for on-site experiments
15	Powerful system with great potential for further development, extension and exploitation.
17	It would have been very beneficial for our extending our results if we could have done more experiments. Our objectives were however mostly achieved. Some monitoring capability for network traffic would have been useful.
22	Excellent support by NKUA's team

D List of Experiments

Project Name	Short Description	Testbed	Number of Devices	Dates
UNSURPASSED	The aim of the project is the intrgration and testing of 1) ad hoc routing, 2) delay-tolerant routing, 3) information-centric networking 4) security mechanisms. Experimenters designed to conduct experiments, in the Skaramagas USV testbed, of escalating complexity, their scope stretching from the radio channel up to networking functionality and above.	HMOD	7 flexus	21/03/18 17/05/18 24/05/18 31/05/18 12/07/18 19/7/18 20/09/18 18/10/18
ATLAS	The ATLAS project aims (1)to integrate the appropriate mechanisms for equipping the RAWFIE infrastructure with up to date opportunistic networking capabilities based on the MAD protocol and (2)to engage the enhanced infrastructure in experiments, towards assessing the performance of MAD in a variety of real-world conditions and towards evaluating the potential of ATLAS-enhanced USV-based opportunistic networks in connection with the relevant use-case of providing connectivity to remote maritime areas.	HMOD	6 flexus	13/7/18 11/12/18
UTMEXP	The experimentation done by the UTMEXP project will test the principles underlying the proposed Unmanned Airborne System (UAS) Traffic Management (UTM) concept. To do the experiments it is necessary to fly a "flock" of Unmanned Airborne Vehicles (UAVs) that are able to communicate with each other and with a management system to exchange command and control (C2) messages, management data, payload and other information. The experiments will also demonstrate the capabilities of the RAWFIE platform for execution of a complex mobile IoT application.	HMOD	2 UAVs - Colibris	18/7/18 1/11/18

| GNFUV | The design of the architecture was introducing Raspberry Pis which are placed on the vehicles to form a network that is able to react based on sensor readings.

Our platform is able to use edge analytics to identify outliers and perform analytics at the sensing device (UxV). The GNFUV Team further conducted the first experiment in Athens test-bed at Skaramangkas (March and July 2018) which the purpose to explore the RAWFIE platform with the extension of our platform and the ability of using edge computing on the UxVs | HMOD | 3 USVs- Pladypos | 29/03/18-30/03/18 20/7/18 |
|---|---|---|---|---|
| Qoest4cm | The QoE4STCM experiment is focused on real time video streaming issues. The main purpose of the project is to deliver streaming system, integrated with the unmanned aerial vehicle, enabling for adaptive change of video parameters depending on cellular network conditions. The proposed solution assumes using of network coverage maps during streaming. The maps will be used by the video adaptation algorithm in the automated way. Additionally, the maps can be used during drone trajectory planning by the operator in order to provide the best possible network conditions. The methodology of creating those maps is also part of the project. The project takes into account also the possibilities of automatic quality evaluation of video and the possibilities of automatic selection of most valuable video parts for relevant users (first responders or commanders in field). | HMOD | 1 UAV Colibri | 25-27/09/18 |
| EXP-A.R.S | A focus point of this project is the experimentation of a reliable SLAM system (Simultaneous Localization and mapping) based on VINS (Vision-aided Inertial Navigation Systems). | BCN | 1 Blackbird | 15/12/18 |

	The RAWFIE infrastructure helped to experiment "as a service" different SLAM's extensively.			

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

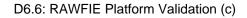| FPV	First Person View
GAA	German Aviation Act
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
GPIO	General Purpose Input/Output
GPS	Global Positioning System
GUI	Graphical user interface
HD	High Definition
HTTP	Hypertext Transfer Protocol
HW	Hardware
IAA	Irish Aviation Authority
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.