

## STANDARD EXPERIMENT INFORMATION FORM

## SEIF

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[YYYY/MM/DD]

9 / 3

TRL/DRL (to be filled out by FP-coordinator)

Mission	<b>AMADEE-24</b> (to be filled out by FP-coordinator)	
<b>0.1. EXPERIMENT NAME AND BASIC INFORMATION</b>		
Acronym	<b>RAMSES</b>	
Long Name	Rover Aerial Mars Support and Exploration System	
Type of Experiment (technical, geological, biological, medical...)	technical, robotic	
Mini Description (1-2 lines)	RAMSES is a technology system for future UAVs using an AI-based network to autonomously detect landing sites in Mars-like environments. The state-of-the-art detector on RAMSES provides detailed information on scientific points of interest by utilizing a pixel-wise map, which is created by the landing site detector network.	
<b>0.2. PRINCIPAL INVESTIGATORS</b>		
	Primary Contact	Secondary Contact
Names of PIs	DI Martin Scheiber	Hüseyin Burak Ünal, B.S.c
Institution	University of Klagenfurt Institute of Smart System Technologies Universitaetstrasse 65-67, 9020 Klagenfurt, Austria	University of Klagenfurt Institute of Smart System Technologies Universitaetstrasse 65-67, 9020 Klagenfurt, Austria
E-mail	martin.scheiber@aau.at	hueseyin.uenal@aau.at
Phone (institution)	+43 463 2700 3573	
Phone (mobile)	+43 664 2336427	+43 678 7811681
Skype address		
Experiment team members in the field?	<input type="radio"/> YES <input type="radio"/> NO <input checked="" type="radio"/> TBD <i>To avoid breaking the simulation, PIs are only admitted to the field in special cases. However, even in those situations their stay is limited to the preparation phase of the mission. No external partners are permitted in the field during the isolation phase.</i>	
Availability of PIs during the mission: (e.g. MSC, remotely, ...)	Bridgehead phase: 1 member in MSC or 1 member remotely Main mission: 1 members in MSC or 1 member remotely  <i>Please provide here dates and locations, in case there is not enough space here, please provide an additional document and mention it in section 0.5 "Reference Documents".</i>	

0.3.FP-COORDINATOR (TO BE FILLED OUT BY FP-COORDINATOR)	
Name	Cillian Murphy
Availability during mission	First 2 weeks of mission
E-mail	cillian.murphy@oewf.org
Phone	+49 172 563 7191
Skype address	
0.4.RSS-COORDINATOR (TO BE FILLED OUT BY FP / RSS-COORDINATOR)	
Name	Julia Knie
Availability during mission	in the evenings & on most weekends; not yet sure if available during some days
E-mail	julia.knie@oewf.org
Phone	+43 676 4779700
Skype address	/
0.5. REFERENCE DOCUMENTS	
List of additional documents (Procedures etc.)	
<p><b>Make sure to refer to the most recent version valid of each reference document. Therefore, if you submit a new version of the experiment procedures, update this document as well!</b></p> <p><i>format: "file name – version number – short description"</i></p>	

# 1. Experiment Description

1.1. SCIENTIFIC RATIONALE	
<b>Brief Description</b> <i>(5-8 lines)</i>	<p>RAMSES is a technology system for future UAVs using an AI-based network to autonomously detect landing sites in Mars-like environments. By utilizing an AI-based network to generate a heat map RAMSES can detect safe landing sites for UAVs in the mission area. Additionally, the system contains generated pixel-wise maps and provides comprehensive and detailed depictions of scientific points of interest in Mars-like environments.</p> <p>RAMSES evaluates data gathered by other robotic vehicles to create the aforementioned heat map and points of interest. In turn this data can enhance the mission capabilities of other teams to further demonstrate collaboration between experiments.</p>
<b>Hypothesis</b>	<p>The system is able to find safe points for landing in Mars-like GNSS denied environments with minimal to no human intervention.</p>
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. Demonstrate autonomous landing site detector.</li> <li>2. Demonstrate a collaboration with other robotic vehicles by sharing data</li> <li>3. Demonstrate to provide pixel-wise map for scientific points of interest.</li> </ol>
<b>Successful Experiment Run</b>	<ol style="list-style-type: none"> <li>1. Autonomous landing site detection.</li> <li>2. Pixel-wise mapping.</li> <li>3. Map sharing for scientific points of interest.</li> </ol>

1.2. EXPERIMENT READINESS AND COLLABORATIONS			
Technology Readiness Level (TRL; 1-10)		5	- to be filled out by FP-coordinator; see FP Handbook for detailed definitions
Documentation Readiness Level (DRL; 0-6)		2	
Collaboration with other experiments?		<input checked="" type="radio"/> YES	<input type="radio"/> NO <input type="radio"/> TBD
	If Y, which? - to be filled out by FP-coordinator		
	If Y, how? - to be filled out by FP-coordinator		
1.3. NUMBER OF RUNS/SAMPLES			
In order to meet objectives...	How many runs? <i>run...a closed, repeatable part of the experiment, can be divided into specific parts (sections)</i>	How many samples? <i>sample...collected during an experiment; e.g. a geological sample could be a rock</i>	
Minimal required	TBD	NA	
Optimal	TBD	NA	
Comments on runs/samples  (2-3 sentences)	The SAMPLE team is set to conduct a series of aerial vehicle runs during the bridge-head phase, with ongoing discussions currently taking place with the RAMSES team.		
1.4. PACKING INFORMATION – EXPERIMENT SIZE AND WEIGHT			
	Pre-mission	Post-mission	
Number of packing cases/ boxes	NA	NA	
<i>If you have more than one packing case/box, please provide the following properties for each of them.</i>			
<i>In case your hardware contains dangerous goods (e.g. batteries), please make sure that they are properly packed for sea freight!</i>			
Size [cm*cm*cm]			
Weight [kg]			
Fragile (Y/N)			
Comments			

## 2. Experiment Requirements

### 2.1. TIME AND PERSONNEL REQUIREMENTS

Number of people required for experiment execution and the time they are needed for:

Please fill out the following table in the format "location: number of people x duration" (e.g. "H: 2 persons x 10 min"). "Location" refers to whether the activity is to be conducted in the habitat (H) or out in the field (F) on EVA.

If one of the fields below is not needed, please enter 0 or n/a

**The times given here need to be compatible with the experiment procedures! Make sure to update this table in particular each time the procedures are altered! Otherwise your experiment cannot be accommodated appropriately in the Activity Plan.**

	1-time preparation <sup>3</sup>	Experiment preparation (to be done prior to each run <sup>4</sup> )	Sole experiment time per run <sup>4,5</sup>	Experiment breakdown (to be done after each run <sup>4</sup> )	1-time breakdown <sup>6</sup>
Analog Astronaut(s) in the suit <sup>1</sup>	0	0	0	0	0
Unsuited Analog Astronaut(s) <sup>2</sup>	0	0	0	0	0
Unsuited field crew member(s) <sup>2</sup>	0	0	0	0	0
Total number of people required	0	0	0	0	0

<sup>1</sup> Currently in total two functional suits are available; please be aware of possible short-notice changes (operational constraints).

<sup>2</sup> If possible, during an experiment run outside the habitat these options should be avoided as they cause a discontinuity in the simulation. Only certified analog astronauts are allowed to wear the OeWF analog suits. Not every member of the field crew is an analog astronaut. For "Unsuited field crew member(s)" it is irrelevant if the person doing the task is a trained analog astronaut or not.

<sup>3</sup> This refers to any preparatory activities to be conducted only once per mission, typically in the beginning.

<sup>4</sup> See definition of run in section 1 "Experiment Description".

<sup>5</sup> The time and personnel needed to conduct the "pure science part" of the experiment.

<sup>6</sup> This refers to any breakdown activities to be conducted only once per mission, typically in the end.

2.1 TIME AND PERSONNEL REQUIREMENTS (CONTINUED)		
Break time between two runs?		<input type="radio"/> Break required <input checked="" type="radio"/> Does not matter <input type="radio"/> No break allowed <input type="radio"/> TBD
	If required, how long?	
	If not allowed, why?  If required, why? Are there specific tasks that need to be performed during the break (e.g. recharging batteries)?	The SAMPLE team is set to conduct a series of aerial vehicle runs, with ongoing discussions currently taking place with the RAMSES team.
Can the experimenter do other experiments/tasks in parallel or are they needed exclusively?		<input type="radio"/> Exclusive <input type="radio"/> Not exclusive <input checked="" type="radio"/> TBD
	Explanation / comments to statement above <i>- to be filled out by FP-coordinator</i>	<i>- to be filled out by FP-coordinator</i>
Comments on this section (2.1)		

## 2.2. TERRAIN REQUIREMENTS

*What types of slopes and terrain are required for the experiment, and which locations may be dangerous to the experiment (information to include: sizes of stones, maximum slope, slope stability, moisture content; sand/rocks/cliffs/snow/ice/water...). If possible, please provide examples of specific locations (coordinates) in the proximity of the field camp.*

Best terrain	The more contrast the terrain has, the better. Contrast can be provided by e.g., dark rocks on the brighter ground and shadows. The texture should be coarse and not self-similar. It would also be beneficial to have both slopes and flat areas.
Possible terrain	Fine-grained structures are possible given enough contrast, but self-similarity will cause issues in this scenario.
Not useful terrain	Complete uniform terrain or low-contrast terrains such as sand dunes or large rock surface are unsuited for the experiment as well as take-off locations which are not leveled.
Dangerous terrain	
Specific coordinates available?	<input type="radio"/> YES <input checked="" type="radio"/> NO <input type="radio"/> TBD
If Y – Coordinates	<div></div> <p><i>coordinate format: WGS 84 (EPSG:4326, "GPS coordinates"), decimal degrees</i>  <i>If you specify multiple locations, please provide a ranking which of those are most ... least important.</i></p>
	<i>In case of more detailed information (multiple locations, etc.), please provide them in an additional document and mention it in section 0.5 "Reference Documents".</i>

2.3. WEATHER REQUIREMENTS				
Preferable weather conditions <i>(conditions outside those ranges are unsuitable for the experiment)</i>				
Unsuitable weather situations <i>(e.g. rain, thunderstorm, snow...)</i>				
Temperature	Lower limit [°C]		Upper limit [°C]	
Humidity	Lower limit [%]		Upper limit [%]	
Max. wind speed	Steady [km/h]			
	Gusts [km/h]			
Required ground conditions <i>(e.g. dry, wet, frozen, rime, snow cover...)</i>				
Required lighting conditions				
Hazardous weather conditions <i>(conditions outside those ranges are <b>dangerous</b> for the experiment and/or the persons operating it)</i>				
Dangerous weather situations <i>(e.g. rain, thunderstorm, snow...)</i>				
Temperature	Lower limit [°C]		Upper limit [°C]	
Humidity	Lower limit [%]		Upper limit [%]	
Max. steady wind speed	Steady [km/h]			
	Gusts [km/h]			
Required ground conditions <i>(e.g. dry, wet, frozen, rime, snow cover...)</i>				
Light requirements				
Additional Information				
Additional weather requirements (not mentioned above)				
In case of unstable weather, what is the time necessary to break up the experiment? [min]				

2.4. POWER REQUIREMENTS				
Power [W]				
Is AC required?		<input type="radio"/> YES	<input checked="" type="radio"/> NO	<input type="radio"/> TBD
If Y, is the equipment compatible with a 230V/50Hz power grid?		<input type="radio"/> YES	<input checked="" type="radio"/> NO	<input type="radio"/> TBD
<i>If N to question above:</i>				
Voltage [V]			Frequency [Hz]	
Are plugs compatible with German Schuko (CEE 7/3 socket & CEE 7/4 plug; Type F)?		<input type="radio"/> YES	<input checked="" type="radio"/> NO	<input type="radio"/> TBD
<i>If N, please provide the necessary converters!</i>				
Is DC required?		<input type="radio"/> YES	<input checked="" type="radio"/> NO	<input type="radio"/> TBD
If Y, is the DC provided by batteries?		<input type="radio"/> YES	<input checked="" type="radio"/> NO	<input type="radio"/> TBD
<i>If Y to question above:</i>				
Type of batteries				
Number of batteries				
Capacity per battery [Wh]				
Net weight per battery [kg]				
Serial numbers of batteries				
<i>Please make sure that batteries are properly packed for sea freight!</i>				
Maximum battery run time [min]				
Are the batteries rechargeable?		<input type="radio"/> YES	<input checked="" type="radio"/> NO	<input type="radio"/> TBD
<i>If Y to question above:</i>				
Max. battery charge time [min]				
Avg. # of runs conductible with fully charged battery				
Avg. charge time after 1 run [min]				
<i>Please, mind the questions about AC power supply above concerning the chargers!</i>				

2.4 POWER REQUIREMENTS (CONTINUED)			
Comments			
2.5. COMMUNICATION REQUIREMENTS			
Do you intend to connect to the network infrastructure?		<input type="radio"/> YES	<input checked="" type="radio"/> NO
		<input type="radio"/> TBD	
If Y, do you intend to use wireless OeWF network infrastructure? <i>(currently 5GHz 802.11a/n WLAN)</i>		<input type="radio"/> YES	<input checked="" type="radio"/> NO
		<input type="radio"/> TBD	
If Y, required bandwidth on the wireless connection [kbit/s] <i>(if approx. constant, otherwise see below)</i>			
If not approx. constant, what are the peak and average values?		Peak [kbit/s]	
		Average [kbit/s]	
Static IP addresses required?		<input type="radio"/> YES	<input checked="" type="radio"/> NO
		<input type="radio"/> TBD	
If Y:			
Number in field			
Number in MSC			
Is an independently managed subnet preferred?		<input type="radio"/> YES	<input checked="" type="radio"/> NO
		<input type="radio"/> TBD	
If Y, minimum size			
Remote network access to devices in field/MSK required? <i>(i.e. VPN access required)</i> <i>(i.e. PI neither at field nor MSC, but needs to access some devices)</i>		<input type="radio"/> YES	<input checked="" type="radio"/> NO
		<input type="radio"/> TBD	

2.5 COMMUNICATION REQUIREMENTS (CONTINUED)	
Does the experiment include radio equipment? <i>(except equipment for interfacing with the ÖWF network)</i>	<input type="radio"/> YES <input checked="" type="radio"/> NO <input type="radio"/> TBD
<i>If Y:</i>	
Frequency range(s)	
Corresponding effective transmission power	
If the experiment includes <u>any</u> telecommunication equipment: serial numbers of respective devices.	
Comments	
2.6. DATA REQUIREMENTS	
Total storage required for data stored on OEWF equipment (file servers)	TBD
Data acquisition rate <i>(How much data per unit time is generated when the experiment is running?)</i>	TBD
Does this data need to be transferred during the mission? <i>('no' implying that it is returned to MSC with the field crew at the end of the mission)</i>	<input type="radio"/> YES <input type="radio"/> NO <input checked="" type="radio"/> TBD
If Y, does it need to be transferred as soon as available? <i>(else it will be send in the evening)</i>	<input type="radio"/> YES <input type="radio"/> NO <input checked="" type="radio"/> TBD

## 2.7. HARDWARE SPECIFICS

– contents of cases/boxes specified in section 1.4 “Packing Information – Experiment Size and Weight”

No. <sup>1</sup>	Tool/Consumable/Hardware part	Weight [kg]	Size [cm*cm*cm]	Quantity	Consumption Rate <sup>2</sup> (per experiment or run)	Serial number (where available) (esp. for batteries and telecommunication devices)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

<sup>1</sup> If you require more lines to specify all of your experiment's tools/consumables/hardware parts, please provide a separate document with a similar table as this one. In case you need to do so, please, do not forget to mention this in section 0.5 “Reference Documents”.

<sup>2</sup> In case your experiment consumes some amount of some substance (e.g. alcohol for sterilizing tools) per run (or in some interval of time), please give here an estimate of the average amount consumed. This will tell the Flightplanning team how often your experiment can be scheduled before the consumables run out.

2.8. STORAGE REQUIREMENTS		
Hardware Storage		
Can the hardware be stored in an assembled state?	<input type="radio"/> YES	<input checked="" type="radio"/> NO <input type="radio"/> TBD
<i>If N, please remember to provide detailed packing instructions.</i>		
Does any part of the hardware or any consumable require a specific temperature?	<input type="radio"/> YES	<input checked="" type="radio"/> NO <input type="radio"/> TBD
If Y, which parts/consumables and which temperatures [°C]?		
Does any part of the hardware or any consumable need to be protected from rain/frost/etc.?	<input type="radio"/> YES	<input checked="" type="radio"/> NO <input type="radio"/> TBD
If Y, which parts/consumables and from which environmental conditions?		
Are there any other special hardware/consumable storage requirements?	<input type="radio"/> YES	<input checked="" type="radio"/> NO <input type="radio"/> TBD
If Y, of which kind are they?		

Sample Storage		
Are there samples that have to be stored?		<input type="radio"/> YES <input checked="" type="radio"/> NO <input type="radio"/> TBD
	If Y, how many and of which kind?	
Do the/some samples require a specific temperature?		<input type="radio"/> YES <input checked="" type="radio"/> NO <input type="radio"/> TBD
	If Y, which samples at which temperatures [°C]?	
Are there any other special sample storage conditions required (Light, humidity, etc.)?		<input type="radio"/> YES <input checked="" type="radio"/> NO <input type="radio"/> TBD
	If Y, which?	
Sample Shipment		
<p><i>Please note that in general the experiment's PI is responsible to cover transportation costs and organize transportation logistics. Details (e.g. the location the shipment has to be organized from) vary on a mission basis, and will be communicated in time. In case of questions, please contact your responsible FP coordinator.</i></p>		
If samples are taken, where should they be shipped after the mission (recipient/point of contact incl. phone number/e-mail if not given in section 0.2 "Principal Investigators" + postal address)		
Do the samples have to be shipped under any specific conditions (temperature, etc.)?		<input type="radio"/> YES <input checked="" type="radio"/> NO <input type="radio"/> TBD
	If Y, which?	

## 2.9. EXPERIMENT SPECIFIC REQUIREMENTS

*If necessary, please provide in this section any other requirements your experiment might have, that were not covered in the previous sections.*

The proposed experiment will be carried out in close collaboration with the SAMPLE rover. The aim of this experiment is to evaluate the output of the landing site detector using the dataset collected by the SAMPLE team. The experiment will be performed offline, and the network will generate a pixel-wise map to identify the landing sites and scientific points of interest. The generated map will aid in the identification of suitable landing sites and scientific areas of interest, contributing towards the successful execution of the mission objectives.

The team SAMPLE has the ability to adjust the weather requirements for data gathering during the mission based on the operational capabilities of their aerial vehicle. The "data requirements" section is currently a topic of discussion between OEWf, team RAMSES and team SAMPLE.

### 3. Risk Assessment

Please fill in the lines with the point of view of the Analogue Astronaut operating your experiment in mind. Hazards are sources for potential accidents, endangering the Analogue Astronaut and/or the suit or other adjacent equipment. Please provide sketches and/or photographs if necessary and mention them in section 0.5 “Reference Documents”.

A hazard is applicable, when the Analogue Astronaut is exposed it during a mission, but it might also be applicable if this is not the case: e.g. a sharp part, which is normally hidden from access during operations is not applicable. A pressure vessel for some pressurized gas present during the mission always forms an applicable hazard.

If an hazard is applicable to your experiment, please offer a brief description below the following table (incl. the number of the hazard the description is referring to), or, if there is not enough space there, provide it in an additional document (referred to in section 0.5 “Reference Documents”). Also explain a hazard mitigation procedure in the experiment's procedures document (referred to in section 0.5 “Reference Documents”).

No.	Hazard	Applicable to the experiment?  - check box if YES	If Y, reference to procedure  (e.g. section, step no.)
1	Unprotected moving Parts	<input type="checkbox"/> YES	
2	Parts with sharp or abrasive surfaces	<input type="checkbox"/> YES	
3	Trip hazard, falling, twisting	<input type="checkbox"/> YES	
4	Electrical discharge / arc discharge / high voltage	<input type="checkbox"/> YES	
5	Electrostatic discharge	<input type="checkbox"/> YES	
6	Dangerous substances	<input type="checkbox"/> YES	
7	Incorporation of health hazardous substances	<input type="checkbox"/> YES	
8	Exposure to bio-hazardous substances	<input type="checkbox"/> YES	
9	Combustible substances	<input type="checkbox"/> YES	
10	Pyrotechnical Devices	<input type="checkbox"/> YES	
11	Hot/Cold Surfaces	<input type="checkbox"/> YES	
12	Excessive Noise	<input type="checkbox"/> YES	
13	Ultrasound / Infrasound	<input type="checkbox"/> YES	
14	Excessive Vibration	<input type="checkbox"/> YES	
15	Non-Ionizing radiation (Laser, UV, IR sources)	<input type="checkbox"/> YES	

No.	Hazard	Applicable to the experiment? <i>- check box if YES</i>	If Y, reference to procedure <i>(e.g. section, step no.)</i>
16	Ionizing Radiation	<input type="checkbox"/> YES	
17	Electromagnetic Interference (EMI)	<input type="checkbox"/> YES	
18	Pressure Vessels	<input type="checkbox"/> YES	
19	Low/High external pressure	<input type="checkbox"/> YES	
20	Inadequate Lighting / Glare	<input type="checkbox"/> YES	
21	Oxygen deprivation / Excessive Oxygen Release	<input type="checkbox"/> YES	
22	Increased work load – Human-Machine interface	<input type="checkbox"/> YES	
23	Increased work load – Excessive Information	<input type="checkbox"/> YES	
24	Heavy physical work / exhaustion	<input type="checkbox"/> YES	
25	Interface malfunction to other mission items	<input type="checkbox"/> YES	

  

Description of applicable hazards