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EURO-CARES

A PLAN FOR EUROPEAN CURATION OF RETURNED EXTRATERRESTRIAL MATERIALS

WORK PACKAGE 9

ANNUAL PROJECT REPORT

REPORT ON MONTHS 12-24 OF THE GRANT

(DELIVERABLE D9.3)

This deliverable is a summary of a report submitted to the European Commission as part of our reporting requirements for the EURO-CARES grant.

1 Explanation of the work carried out by the beneficiaries and Overview of Progress

We report on our activities over months 12-24 of the EURO-CARES project. During this period, the science workpackages WP2, 3, 4, 5, and 6 ran concurrently. In addition WP8 (Impact) supported all the WPs and also WP9 (Management); see figure 1.

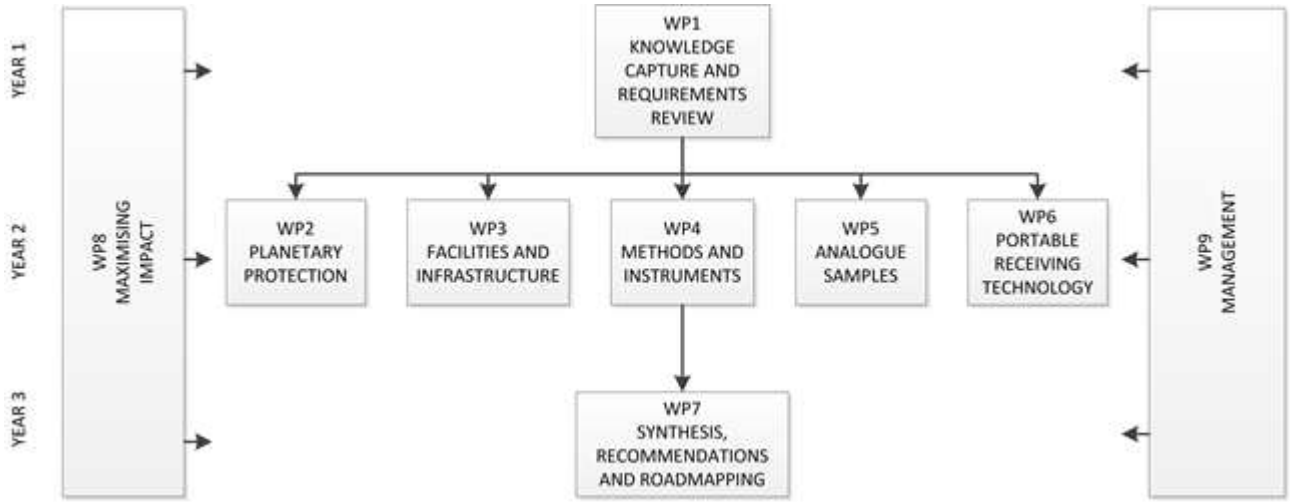

Figure 1. Structure of relationship of workpackages for EURO-CARES.

WP2, 3, 4, and 5 each held a **workshop** to which external stakeholders and industrial partners were invited:

Workpackage	**Meeting Dates**	**Meeting location**
WP2	14-16th June 2016	Firenze
WP3	13-16th April 2016	Vienna
WP4	13-14th October 2016	Paris
WP5	4-5th Feb and 1-3 June 2016	Orleans and Frankfurt

WP6 hosted a series of smaller meetings instead of one workshop.
The outcome of this work was a series of documents as follows:

1.1 Objectives

The objectives, as stated in Annex 1, are:
[1] Review the current state of the art in extraterrestrial sample curation, by examining the work being done in Europe and internationally and to write a technical report on current best practice;
[2] Devise a plan for terrestrial planetary protection that is effective, legally compliant and realistic, while minimising risk to current scientific study and optimising access to researchers for future studies;
[3] Review current knowledge and the essential requirements for such facilities, including building infrastructure and design, procedures and protocols, security, environmental conditions, documentation and databasing;
[4] Review the most suitable instrumentation for sample analysis, establish the optimum methods and instrumentation and identify those areas in which innovation and development will be required to enhance the curation and analytical capabilities of the ESCF;
[5] Make recommendations regarding the use of analogue samples as proxies for returned extraterrestrial materials. We will establish guidelines, deliver catalogues or potential analogues, and recommendations ready to be used in the event of a sample return mission. The analogue proxies are necessary in a curatorial facility for testing sample handling, storage and preparation techniques. This includes the testing of planetary protection measures as well as validating new analytical methods.
[6] Review suitable portable receiving facilities and determine the technology required in order to be able to transport samples (including those with a potential biohazard) following return to Earth most effectively.

These objectives correspond to the project work packages 1-6. WP1, Knowledge Capture and Review, was undertaken in Months 1-9. The aim of this WP is to consolidate the information already available in the literature and from experts from other countries (i.e. Japan and USA, which both have a history of returned space mission curation). A highlight of WP1 was a workshop held in Greenwich, UK in August 2015. This workshop brought together EURO-CARES team members and invited experts from science and industry from Europe and beyond. A report has been written summarising the main points from the meeting (D1.8). This is available on our website.

Work packages 2-6, which correspond to objectives 2-6 above, started in Month 10 and make up the bulk of the work undertaken in months 12-24.

1.2 Work carried out per workpackage WP2 Planetary Protection

1.2.2 Work Package 2

Objectives

- To ascertain and review planetary protection policies at a national and international level;
- To define methods, protocols and techniques for planetary protection issues and recommend protocols and methods for implementation.

Team Members

John Brucato	INAF	IT	Lead
Petra Rettberg	DLR	DE	Deputy
John Bridges	LEI	UK	Mars Sample Return
Allan Bennett	PHE	UK	Biosafety and Biosecurity
Alessandra Rotundi	INAF	IT	Sample analysis expert
Andrea Tozzi	INAF	IT	Optic technology designer
Luca Carbonaro	INAF	IT	Technician
Ralf Moeller	DLR	DE	Biologist
John Holt	LEI	UK	Biohazard Technology
Andrea Meneghin	INAF	IT	Engineer

Remarks on Personnel Involved

Two months/person Post-doc position to Dr. Andrea Meneghin: His contract ("Assegno di ricerca") has been awarded through a public competition and the scope is to work on all the work packages of the project and in particular on WP 1,2,7. Please, note that according to the "List of issues applicable to particular countries", published with the Annotated Model Grant Agreement dated 30th October 2015, the cost of "Assegno di ricerca" which was originally planned as personnel cost is now declared as subcontract. Please, note that the contract started on 20th July 2015 and will end on 19 July 2017 (24 months)

Deliverables in months 12-24

D2.1	**Biohazard Assessment**	**2**	**INAF**	**R**	**PU**	**12**
D2.2	**Biohazard & Biosecurity**	**2**	**PHE**	**R**	**PU**	**18**
D2.3	**Sterilisation**	**2**	**DLR**	**R**	**PU**	**24**
D2.4	**Sample Transfer**	**2**	**INAF**	**R**	**PU**	**24**
D2.5	**Facility Requirements**	**2**	**PHE**	**R**	**PU**	**24**

WP2 is proceeding as per plan and on time.

WP3 Facilities and Infrastructure

Team members

Ludovic Ferrière	NHMV	AT	Lead
Aurore Hutzler	NHMV	AT	EURO-CARES Postdoc
Allan Bennett	PHE	UK	Deputy
Thomas Pottage	PHE	UK	
John Brucato	INAF	IT	
Ernesto Palomba	INAF	IT	
Luigi Folco	PISA	IT	
Vinciane Debaille	ULB	BE	
Caroline Smith	NHM	UK	

Objectives

The objective of this work package is to define the state of the art facilities required to receive, contain, and curate extra-terrestrial samples from sample return missions. All aspects, from the building design to the storage of the samples to the curation, are covered by this work package.
WP3 have delivered a architectural design booklet, based on work they undertook with students.

Deliverables

D3.1	Conceptual Design	3	NHMW	R	PU	16
D3.2	Workshop Report	3	NHMW	R	PU	18
D3.3	Advanced Design and Technology Identification	3	NHMW	R	PU	24

WP3 is proceeding as per plan and on time.

WP4 Instruments and Methods

Objectives

"*The objective of this work package is to understand what are the best analyses to be performed within the ESCF whilst ensuring minimal contamination, minimal damage to the sample and rapid distribution of samples to the scientific community*. "

Team members

Jérôme Aléon	MNHN	FR	Lead
Ian Franchi	OU	UK	Deputy
Matthieu Gounelle	MNHN	FR	Former lead
John Brucato	INAF	IT	
Bernard Marty	CNRS	FR	
Yves Marrochi	CNRS	FR	
Ernesto Palomba	INAF	IT	
Vinciane Debaille	ULB	BE	
Sara Russell	NHM	UK	

Evolution of team members.

Vinciane Debaille (already in WP3 and WP5) joined the WP4 during the fall 2015. Jérôme Aléon moved to the cosmochemistry group at MNHN (lead Matthieu Gounelle) in 2015 and joined the Euro-Cares consortium to work closely with Matthieu Gounelle, former lead of WP4. He replaced Matthieu Gounelle as the WP4 leader in october 2015 (month 10). This move does not change the structure of WP4 as MNHN remains the leading institution for this WP. J. Aléon defended his PhD in 2001. He is a research scientist involved in meteorite, micrometeorite and interplanetary dust research for more than 15 years. As a former lead of the curation facility WG for the Marco Polo -R ESA mission proposal, he also has experience of investigating sample analysis in a large scale ESCF.

Deliverables

D4.1	Space agency visits	4	MNHN	R	PU	12
D4.2	Report on Instrumentation	4	OU	R	PU	12
D4.3	Workshop WP4 report	4	MNHN	R	PU	18
D4.4	Industry visit	4	MNHN	R	PU	24 (overdue)

WP4 is slightly delayed due to the later scheduling of the workshop (this was to avoid clash and workshop fatigue with other WP workshops). We expect to be back on track to complete this WP by month 30.

WP 5. Analogues
Team Members:

Frances Westall	Orleans	FR	Lead
Jutta Zipfel	Senck	DR	Deputy
Caroline Smith	NHM	UK	
Vincianne Debaille	ULB	BE	
Luigi Folco	PISA	IT	
John Bridges	LEI	UK	
Frederic Foucher	Orleans	FR	

Objectives
The objective of WP 5 is to create a list of different types of samples that would be required for such a facility (analogues and standards), and to create a preliminary list of analogue materials already available. These lists will be completed over the course of this project in response to the requirements established by the other work packages, and might include recommendations for the fabrication of new artificial analogues.

Deliverables

D5.1	Interim Report – Required Analogue Characteristics	5	SENCK	R	PU	12
D5.2	Interim Report – Appropriate Analogues	5	CNRS	R	PU	18
D5.3	Interim Conclusions	5	CNRS			18-24

WP5 is proceeding as per plan and on time. They have produced recommendations for analogue samples for the facility.

WP 6. Portable Receiving Technologies

Team members

Lucy Berthoud	TAS	UK	Lead
John Vrublevskis	TAS	UK	
Allan Bennett	PHE	UK	Deputy
Thomas Pottage	PHE	UK	
John Bridges	LEI	UK	
John Holt	LEI	UK	
Ernesto Palomba	INAF	IT	
Fabrizio Dirri	INAF	IT	

Objectives

The objective of this work package is to propose methods for the recovery and transport of Mars, Lunar and asteroid samples from the landing site to the permanent curatorial facility and from the curatorial facility to other laboratories. They have completed all their deliverables on time, as listed below.

Deliverables

D6.1	Report on Recovery Preparation	6	SEA	R	PU	18
D6.2	Report on Initial Inspection	6	SEA	R	PU	20
D6.3	Report on Transport	6	SEA	R	PU	22
D6.4	Report on Planetary Protection	6	SEA	R	PU	24

WP6 is proceeding as per plan and on time.

1.3 Impact

We have maximised the impact of the project with the following activities and events:

Workshops
The five workshops that we have held throughout the year have enabled us to communicate with stakeholders in academia and industry. We have established strong relationships with curatorial experts at NASA and JAXA, and representatives from these organisations attended our workshops. In addition we established links with architects (explored during the WP3 workshop) and with industry partners involved in the manufactures of suitable instruments and equipment (at the WP4 workshop).

Website
Our website is at euro-cares.eu. Here there are details of our project, information about our workshops, and all the deliverables are posted here.

Reports
We have created reports summarising our activity in our active workpackages; these are our deliverables as listed above.

In the Press

1. **12/2016** Ludovic Ferrière is quoted in an article by der Standard.at: "Europäische Forscher planen Einrichtung für außerirdisches Material".
2. **12/2016** Ludovic Ferrière is quoted in an article in the Salzburger Nachrichten: "Forscher tüfteln an Einrichtung für Gesteinsproben aus dem Weltall".
3. **12/2016** Ludovic Ferrière is quoted in an article on APA.ots: "Internationales Forscher-Team arbeitet unter NHM Wien-Beteiligung an Einrichtung zur Behandlung von extraterrestrischen Gesteinsproben".
4. **12/2016** Ludovic Ferrière is quoted in an article on APA-Science: "Forscher tüfteln an Einrichtung für extraterrestrische Gesteinsproben".
5. **12/2016** Ludovic Ferrière is quoted in an article on Studium.at: "Forscher tüfteln an Einrichtung für extraterrestrische Gesteinsproben".
6. **12/2016** The EURO-CARES project was mentionned on the facebook page of the Natural History Museum of Vienna
7. **10/2016** Frédéric Foucher and Frances Westall from CBM Orléans discuss Eurocares in an article in Microscoop pages 10-11 (in French)
8. **09/2016** Sara Russell is quoted in a Horizon 2020 magazine article: "Talks underway for world's first alien life form facility in Europe"
9. **05/2016** Report of a meeting of cleanroom experts where EURO-CARES was discussed; Published in the journal Chemiereport - Das Branchenmagazin page 33 (in German)
   Link to full publication here
10. **01/2016** Jutta Zipfel gave an interview to Euranet (in German)

Educational Materials

We have compiled suitable educational materials for schools and universities and also prepared an outreach package for distribution. These are described in our submitted deliverables: D8.6, D8.7, D8.9.

MOOC

We have written a MOOC (Massive Open Online Course). More details about this can be found in submitted deliverable D8.8.

Impact related Deliverables (WP8)

D8.6	Educational Material - Schools	8	OU	R	PU	12
D8.7	Educational Materials - Universities	8	OU	R	PU	12
D8.8	MOOC	8	OU	DEC	PU	18
D8.9	Outreach package	8	OU	R	PU	20
D8.10	Brochure	8	OU	R	PU	24 (overdue)

We are behind on our deliverables for WP8, namely the press release and production of a brochure. The press release we decided to wait until we have something that will be of interest to the press. Our final workshop, WP7, at around month 30 will be a good opportunity for this.
The brochure is in the planning stages and will be ready by month 34 at the latest.

2 Update of the plan for exploitation and dissemination of result (if applicable)

Following analysis of the national curricula and education guidelines of several nations, we decided that it was more appropriate to include educational materials for students aged over 16 in the 'Universities' deliverable (D8.7) rather than the 'Schools' deliverable (D8.6). The change has been reflected in a change to the titles of the deliverables, from ‘Schools’ to ‘Pre 16 years of Age’ and ‘Universities’ to ‘Post 16 years of Age’.
The OU seem unwilling to host the prepared MOOC “Space on Earth” using their futurelearn platform. EdExis very flexible, easy to prepare material for, and possibly more widespread internationally than FutureLearn. We will therefore investigate this mechanism for disseminating this deliverable.
The content for the Brochure is completed, but the format is still being debated.

3 Update of the data management plan (if applicable)

Not required.

4 Deviations from Annex 1 (if applicable)

Personnel changes:
Our desk officer has given permission to allow Vincianne Debaille (Brussels) to spend some of her time on WP4 so we can benefit from her expertise in this area.

Finances
Our finances are on track. As of the time of the review meeting, we had spent approximately €1.1 M (55% of the budget). Personnel costs are on track, and other costs are slightly underspent.

Looking Ahead

We will move into WP7 (Synthesis) soon. A final workshop will be held in Firenze on 10-12th July 2017.