

Horizon 2020

Call: H2020-SC5-2015-one-stage

Topic: SC5-13e-2015

Type of action: CSA

Proposal number: 689648

Proposal acronym: MICA

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#### How to fill in the forms

The administrative forms must be filled in for each proposal using the templates available in the submission system. Some data fields in the administrative forms are pre-filled based on the previous steps in the submission wizard.

Proposal ID **689648**

Acronym **MICA**

## 1 - General information

Topic SC5-13e-2015

Type of action CSA

Call identifier H2020-SC5-2015-one-stage

Acronym

Proposal title\*

Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &

Duration in months

Fixed keyword 1

Fixed keyword 2

Fixed keyword 3

Fixed keyword 4

Fixed keyword 5

Free keywords

### Abstract

Primary and secondary raw materials are fundamental to Europe's economy and growth. They represent the most important link in the value chain of industrial goods production, which plays a prominent role as a source of prosperity in Europe. However, as stated in the call, there exists to-date no raw materials knowledge infrastructure at EU level. The Mineral Intelligence Capacity Analysis (MICA) project contributes to on-going efforts towards the establishment of such an infrastructure by projects such as ProMine, EURare, Minventory, EuroGeoSource, Minerals4EU, ProSum, I2Mine, INTRAW, MINATURA2020 and others.

The main objectives of MICA are:

- Identification and definition of stakeholder groups and their raw material intelligence (RMI) requirements,
- Consolidation of relevant data on primary and secondary raw materials,
- Determination of appropriate methods and tools to satisfy stakeholder RMI requirements,
- Investigation of (RMI-) options for European mineral policy development,
- Development of the EU-Raw Materials Intelligence Capacity Platform (EU-RMICP) integrating information on data and methods/tools with user interface capable of answering stakeholder questions,
- Linking the derived intelligence to the European Union Raw Materials Knowledge Base developed by the Minerals4EU project.

The MICA project brings together a multidisciplinary team of experts from natural and technical sciences, social sciences including political sciences, and information science and technology to ensure that raw material intelligence is collected, collated, stored and made accessible in the most useful way corresponding to stakeholder needs. Furthermore, the MICA project integrates a group of 15 European geological surveys that contribute to the work program as third parties. They have specific roles in the fulfilment of tasks and will provide feedback to the project from the diverse range of backgrounds that characterizes the European geoscience community.

Remaining characters

15



*Proposal ID* **689648**

*Acronym* **MICA**

Has this proposal (or a very similar one) been submitted in the past 2 years in response to a call for proposals under the 7th Framework Programme, Horizon 2020 or any other EU programme(s)? ☐ Yes ☒ No

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Acronym **MICA**

## Declarations

1) The coordinator declares to have the explicit consent of all applicants on their participation and on the content of this proposal.	<input checked="" type="checkbox"/>
2) The information contained in this proposal is correct and complete.	<input checked="" type="checkbox"/>
3) This proposal complies with ethical principles (including the highest standards of research integrity — as set out, for instance, in the <a href="#">European Code of Conduct for Research Integrity</a> — and including, in particular, avoiding fabrication, falsification, plagiarism or other research misconduct).	<input checked="" type="checkbox"/>
4) The coordinator confirms:	
- to have carried out the self-check of the financial capacity of the organisation on <a href="https://ec.europa.eu/research/participants/portal/desktop/en/organisations/lfv.html">https://ec.europa.eu/research/participants/portal/desktop/en/organisations/lfv.html</a> or to be covered by a financial viability check in an EU project for the last closed financial year. Where the result was “weak” or “insufficient”, the coordinator confirms being aware of the measures that may be imposed in accordance with the H2020 Grants Manual (Chapter on Financial capacity check); or	<input type="radio"/>
- is exempt from the financial capacity check being a public body including international organisations, higher or secondary education establishment or a legal entity, whose viability is guaranteed by a Member State or associated country, as defined in the H2020 Grants Manual (Chapter on Financial capacity check); or	<input checked="" type="radio"/>
- as sole participant in the proposal is exempt from the financial capacity check.	<input type="radio"/>
5) The coordinator hereby declares that each applicant has confirmed:	
- they are fully eligible in accordance with the criteria set out in the specific call for proposals; and	<input checked="" type="checkbox"/>
- they have the financial and operational capacity to carry out the proposed action.	<input checked="" type="checkbox"/>
The coordinator is only responsible for the correctness of the information relating to his/her own organisation. Each applicant remains responsible for the correctness of the information related to him and declared above. Where the proposal to be retained for EU funding, the coordinator and each beneficiary applicant will be required to present a formal declaration in this respect.	

According to Article 131 of the Financial Regulation of 25 October 2012 on the financial rules applicable to the general budget of the Union (Official Journal L 298 of 26.10.2012, p. 1) and Article 145 of its Rules of Application (Official Journal L 362, 31.12.2012, p.1) applicants found guilty of misrepresentation may be subject to administrative and financial penalties under certain conditions.

## Personal data protection

Your reply to the grant application will involve the recording and processing of personal data (such as your name, address and CV), which will be processed pursuant to Regulation (EC) No 45/2001 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data. Unless indicated otherwise, your replies to the questions in this form and any personal data requested are required to assess your grant application in accordance with the specifications of the call for proposals and will be processed solely for that purpose. Details concerning the processing of your personal data are available on the [privacy statement](#). Applicants may lodge a complaint about the processing of their personal data with the European Data Protection Supervisor at any time.

Your personal data may be registered in the Early Warning System (EWS) only or both in the EWS and Central Exclusion Database (CED) by the Accounting Officer of the Commission, should you be in one of the situations mentioned in:

- the Commission Decision 2008/969 of 16.12.2008 on the Early Warning System (for more information see the [Privacy Statement](#)), or
- the Commission Regulation 2008/1302 of 17.12.2008 on the Central Exclusion Database (for more information see the [Privacy Statement](#)).

Proposal ID **689648**

Acronym **MICA**

## List of participants

#	Participant Legal Name	Country
1	Geological Survey of Denmark and Greenland	Denmark
2	FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV	Germany
3	NATURAL ENVIRONMENT RESEARCH COUNCIL	United Kingdom
4	UNIVERSITEIT LEIDEN	Netherlands
5	GUENTER TIESS	Austria
6	BUREAU DE RECHERCHES GEOLOGIQUES ET MINIERES	France
7	EuroGeoSurveys - EGS	Belgium
8	BUNDESANSTALT FUER GEOWISSENSCHAFTEN UND ROHSTOFFE	Germany
9	GEOLOGIAN TUTKIMUSKESKUS	Finland
10	UNIVERSITE JOSEPH FOURIER GRENOBLE 1	France
11	LA PALMA RESEARCH CENTRE FOR FUTURE STUDIES SL	Spain
12	FEDERATION EUROPEENNE DES GEOLOGUES	France
13	NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU	Norway
14	UNIVERSITY COLLEGE LONDON	United Kingdom
15	GEOLOSKI ZAVOD SLOVENIJE	Slovenia
16	JRC -JOINT RESEARCH CENTRE- EUROPEAN COMMISSION	Belgium

Proposal ID **689648**

Acronym **MICA**

Short name **GEUS**

## 2 - Administrative data of participating organisations

### PIC

999459677

### Legal name

Geological Survey of Denmark and Greenland

Short name: **GEUS**

### Address of the organisation

Street OSTER VOLDGADE 10

Town KOBENHAVN K

Postcode 1350

Country Denmark

Webpage [www.geus.dk](http://www.geus.dk)

### Legal Status of your organisation

#### Research and Innovation legal statuses

Public body ..... yes

Legal person ..... yes

Non-profit ..... yes

International organisation ..... unknown

International organisation of European interest ..... unknown

Secondary or Higher education establishment ..... unknown

Research organisation ..... yes

#### Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

NACE code 721 -



Proposal ID **689648**

Acronym **MICA**

Short name **GEUS**

### Department(s) carrying out the proposed work

#### Department 1

Department name

Petrology and Economic Geology

☒ Same as organisation address

Street

OSTER VOLDGADE 10

Town

KOBENHAVN K

Postcode

1350

Country

Denmark

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--

Proposal ID **689648**

Acronym **MICA**

Short name **GEUS**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex



Male



Female

First name **Holger**

Last name **Paulick**

E-Mail **hpa@geus.dk**

Position in org.

Senior researcher

Department

Petrology and Economic Geology

☒ Same as organisation address

Street

OSTER VOLDGADE 10

Town

KOBENHAVN K

Post code

1350

Country

Denmark

Website

www.geus.dk

Phone

+4538142000

Phone 2

+4591333891

Fax

+4538142050

### Other contact persons

First Name	Last Name	E-mail	Phone
Mikael	Pedersen	mp@geus.dk	+4591333953
Karen	Hanghøj	kha@geus.dk	+4591333851
Kirsten	Bache	kba@geus.dk	+4591333467
Jørgen	Tulstrup	jtu@geus.dk	+4591333951
Per	Kalvig	pka@geus.dk	+4591333864
Anissa	Bedoui	anbe@geus.dk	





Proposal ID **689648**

Acronym **MICA**

Short name **FISI**

**PIC**

999984059

**Legal name**

FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV

*Short name: FISI*

*Address of the organisation*

Street HANSASTRASSE 27C

Town MUENCHEN

Postcode 80686

Country Germany

Webpage www.fraunhofer.de

*Legal Status of your organisation*

**Research and Innovation legal statuses**

Public body .....no

Legal person ..... yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

**Enterprise Data**

SME self-declared status.....2007 - no

SME self-assessment ..... unknown

SME validation sme.....2007 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

NACE code 721 -

Proposal ID **689648**

Acronym **MICA**

Short name **FISI**

### Department(s) carrying out the proposed work

#### Department 1

Department name

Fraunhofer ISI

☐ Same as organisation address

Street

Breslauerstrasse 48

Town

Karlsruhe

Postcode

76139

Country

Germany

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--

Proposal ID **689648**

Acronym **MICA**

Short name **FISI**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex



Male



Female

First name **Lorenz**

Last name **Erdmann**

E-Mail **lorenz.erdmann@isi.fraunhofer.de**

Position in org.

Head of Business Unit Future Alternatives and Society

Department

Foresight



Same as organisation address

Street

Breslauerstrasse 48

Town

Karlsruhe

Post code

76139

Country

Germany

Website

www.fraunhofer.isi.de

Phone

+497216809313

Phone 2

+xxx xxxxxxxxx

Fax

+xxx xxxxxxxxx

### Other contact persons

First Name	Last Name	E-mail	Phone
Philine	Warnke	philine.warnke@isi.fraunhofer.de	
Albena	Kyuchukova	albena.kyuchukova@isi.fraunhofer.de	



Proposal ID **689648**

Acronym **MICA**

Short name **NERC-BGS**

**PIC**

999989200

**Legal name**

NATURAL ENVIRONMENT RESEARCH COUNCIL

*Short name: NERC-BGS*

*Address of the organisation*

Street Polaris House, North Star Avenue

Town SWINDON WILTSHIRE

Postcode SN2 1EU

Country United Kingdom

Webpage <http://www.nerc.ac.uk>

*Legal Status of your organisation*

**Research and Innovation legal statuses**

Public body .....yes

Legal person ..... yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

**Enterprise Data**

SME self-declared status.....2009 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

NACE code 721 -



Proposal ID **689648**

Acronym **MICA**

Short name **NERC-BGS**

### Department(s) carrying out the proposed work

#### Department 1

Department name

Bristish Geological Survey

☐ Same as organisation address

Street

Keyworth

Town

Nottingham

Postcode

NG12 5GG

Country

United Kingdom

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--

Proposal ID **689648**

Acronym **MICA**

Short name **NERC-BGS**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex



Male



Female

First name **Evi**

Last name **Petavratzi**

E-Mail **evpeta@bgs.ac.uk**

Position in org.

Senior Mineral Commodity Geologist

Department

British Geological Survey, Minerals & Waste

☐ Same as organisation address

Street

Keyworth

Town

Nottingham

Post code

NG12 5GG

Country

United Kingdom

Website

www.bgs.ac.uk

Phone

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Phone 2

+441159363100

Fax

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### Other contact persons

First Name	Last Name	E-mail	Phone
Paul	Lusty	plusty@bgs.ac.uk	+4401159363291
Vicky	Hards	vlh@bgs.ac.uk	+4401159363336
Sheryl	White	swhite@bgs.ac.uk	
Susan	Stocks	sst@bgs.ac.uk	



Proposal ID **689648**

Acronym **MICA**

Short name **UL-CML**

**PIC**

999974553

**Legal name**

UNIVERSITEIT LEIDEN

*Short name: UL-CML*

*Address of the organisation*

Street RAPENBURG 70

Town LEIDEN

Postcode 2311 EZ

Country Netherlands

Webpage <http://www.leidenuniv.nl>

*Legal Status of your organisation*

**Research and Innovation legal statuses**

Public body .....yes

Legal person ..... yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

**Enterprise Data**

SME self-declared status.....2012 - no

SME self-assessment ..... unknown

SME validation sme.....2012 - no

**Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.**

NACE code 853 -



Proposal ID **689648**

Acronym **MICA**

Short name **UL-CML**

### Department(s) carrying out the proposed work

#### Department 1

Department name

Faculty of Science / Institute of Environmental Sciences (CML)

☐ Same as organisation address

Street

Einsteinweg 2

Town

Leiden

Postcode

2333 CC

Country

Netherlands

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--



Proposal ID **689648**

Acronym **MICA**

Short name **UL-CML**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex



Male



Female

First name **Ester**

Last name **van der Voet**

E-Mail **voet@cml.leidenuniv.nl**

Position in org.

Associate Professor

Department

Faculty of Science / Institute of Environmental Sciences (CML)

☐ Same as organisation address

Street

Einsteinweg 2

Town

Leiden

Post code

2333 CC

Country

Netherlands

Website

www.cml.leiden.edu

Phone

+31-71-5277488

Phone 2

+31-71-5277461

Fax

+31-71-5277434

### Other contact persons

First Name	Last Name	E-mail	Phone
René	Kleijn	kleijn@cml.leidenuniv.nl	+31-71-5271498
Esther	Philips	philips@cml.leidenuniv.nl	+31-71-5277477
Ton	Brouwer	t.brouwer@science.leidenuniv.nl	+31-71-5273149



Proposal ID **689648**

Acronym **MICA**

Short name **Minpol**

**PIC**

954558280

**Legal name**

GUENTER TIESS

*Short name: Minpol*

*Address of the organisation*

Street PIRQUETSTRASSE 3

Town STRASSHOF

Postcode 2231

Country Austria

Webpage www.minpol.com

*Legal Status of your organisation*

**Research and Innovation legal statuses**

Public body .....no

Legal person ..... yes

Non-profit .....no

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....no

**Enterprise Data**

SME self-declared status.....2012 - no

SME self-assessment ..... unknown

SME validation sme.....2012 - yes

**Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.**

NACE code 93 - Other service activities

Proposal ID **689648**

Acronym **MICA**

Short name **Minpol**

### Department(s) carrying out the proposed work

#### Department 1

Department name

Department of International Mineral Policy

☒ Same as organisation address

Street

PIRQUETSTRASSE 3

Town

STRASSHOF

Postcode

2231

Country

Austria

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--

Proposal ID **689648**

Acronym **MICA**

Short name **Minpol**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Sex ☒ Male ☐ Female

First name **Eberhard**

Last name **Falck**

E-Mail **eberhard.falck@minpol.com**

Position in org.

Department

☒ Same as organisation address

Street

Town

Post code

Country

Website

Phone

Phone 2

Fax

### Other contact persons

First Name	Last Name	E-mail	Phone
Dominic	Wittmer	dominic.wittmer@minpol.com	+4915118775784
Guenter	Tiess	gtiess@minpol.com	+436642135050
Irene	Leischner	office@minpol.com	+436503605117



Proposal ID **689648**

Acronym **MICA**

Short name **BRGM**

PIC	Legal name
999993662	BUREAU DE RECHERCHES GEOLOGIQUES ET MINIERES

*Short name: BRGM*

*Address of the organisation*

Street Quai Andre Citroen - Tour Mirabeau 39-43

Town PARIS

Postcode 75739

Country France

Webpage www.brgm.fr

*Legal Status of your organisation*

#### Research and Innovation legal statuses

Public body .....yes

Legal person ..... yes

Non-profit .....yes

International organisation ..... unknown

International organisation of European interest ..... unknown

Secondary or Higher education establishment ..... no

Research organisation ..... no

#### Enterprise Data

SME self-declared status.....2011 - no

SME self-assessment ..... unknown

SME validation sme.....2011 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

NACE code - Not applicable

Proposal ID **689648**

Acronym **MICA**

Short name **BRGM**

*Department(s) carrying out the proposed work*

**Department 1**

Department name	GeoResources Division
<input type="checkbox"/>	Same as organisation address
Street	3, avenue Claude Guillemin - BP 36009
Town	ORLEANS
Postcode	45060
Country	France

**Department 2**

Department name	Information Systems Division
<input type="checkbox"/>	Same as organisation address
Street	3, avenue Claude Guillemin - BP36009
Town	ORLEANS
Postcode	45060
Country	France

Proposal ID **689648**

Acronym **MICA**

Short name **BRGM**

### Department 3

Department name Water, Environment and Ecotechnologies Division

☐ Same as organisation address

Street 3, avenue Claude Guillemin - BP 36009

Town ORLEANS

Postcode 45060

Country France

### *Dependencies with other proposal participants*

<i>Character of dependence</i>	<i>Participant</i>	
--------------------------------	--------------------	--

Proposal ID **689648**

Acronym **MICA**

Short name **BRGM**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex



Male



Female

First name **Daniel**

Last name **Cassard**

E-Mail **d.cassard@brgm.fr**

Position in org.

Programme Scientific Coordinator

Department

GeoResources Division



Same as organisation address

Street

3, avenue Claude Guillemin - BP 36009

Town

ORLEANS

Post code

45060

Country

France

Website

http://www.brgm.fr/

Phone

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Phone 2

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Fax

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### Other contact persons

First Name	Last Name	E-mail	Phone
Francois	Tertre	f.tertre@brgm.fr	+33238643642





Proposal ID **689648**

Acronym **MICA**

Short name **EGS**

**PIC**

983544402

**Legal name**

EuroGeoSurveys - EGS

*Short name: EGS*

*Address of the organisation*

Street Rue Joseph II 36-38

Town Brussels

Postcode 1000

Country Belgium

Webpage www.eurogeosurveys.org

*Legal Status of your organisation*

**Research and Innovation legal statuses**

Public body .....no

Legal person ..... yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....no

**Enterprise Data**

SME self-declared status.....2010 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

**Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.**

NACE code - Not applicable



Proposal ID **689648**

Acronym **MICA**

Short name **EGS**

### Department(s) carrying out the proposed work

#### Department 1

Department name EuroGeoSurveys

☒ Same as organisation address

Street Rue Joseph II 36-38

Town Brussels

Postcode 1000

Country Belgium

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--

Proposal ID **689648**

Acronym **MICA**

Short name **EGS**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Ms

Sex



Male



Female

First name **Claudia**

Last name **Delfini**

E-Mail **claudia.delfini@eurogeosurveys.org**

Position in org.

Communication Manager

Department

Communication

☒ Same as organisation address

Street

Rue Joseph II 36-38

Town

Brussels

Post code

1000

Country

Belgium

Website

www.eurogeosurveys.org

Phone

+3228887553

Phone 2

+xxx xxxxxxxxx

Fax

+xxx xxxxxxxxx

### Other contact persons

First Name	Last Name	E-mail	Phone
Francesca	Siciliano	francesca.siciliano@eurogeosurveys.org	+3228887553
Céline	Andrien	celine.andrien@eurogeosurveys.org	+3228887553
Luca	Demicheli	luca.demicheli@eurogeosurveys.org	



Proposal ID **689648**

Acronym **MICA**

Short name **BGR**

**PIC**

999429413

**Legal name**

BUNDESANSTALT FUER GEOWISSENSCHAFTEN UND ROHSTOFFE

*Short name: BGR*

*Address of the organisation*

Street Stilleweg 2

Town HANNOVER

Postcode 30655

Country Germany

Webpage www.bgr.bund.de

*Legal Status of your organisation*

**Research and Innovation legal statuses**

Public body .....yes

Legal person ..... yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

**Enterprise Data**

SME self-declared status.....2012 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

NACE code - Not applicable



Proposal ID **689648**

Acronym **MICA**

Short name **BGR**

### Department(s) carrying out the proposed work

#### Department 1

Department name

B1.2, "Availability of Mineral Raw Materials"

☒ Same as organisation address

Street

Stilleweg 2

Town

HANNOVER

Postcode

30655

Country

Germany

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--

Proposal ID **689648**

Acronym **MICA**

Short name **BGR**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex

☐

Male

☒

Female

First name **Henrike**

Last name **Sievers**

E-Mail **henrike.sievers@bgr.de**

Position in org.

Senior Geologist

Department

B1.2, "Availability of Mineral Raw Materials"

☒ Same as organisation address

Street

Stilleweg 2

Town

HANNOVER

Post code

30655

Country

Germany

Website

www.bgr.bund.de

Phone

0049(0)5116433094

Phone 2

+xxx xxxxxxxxx

Fax

+xxx xxxxxxxxx



Proposal ID **689648**

Acronym **MICA**

Short name **GTK**

**PIC**

999432614

**Legal name**

GEOLOGIAN TUTKIMUSKESKUS

*Short name: GTK*

*Address of the organisation*

Street Betonimiehenkuja 4

Town ESPOO

Postcode 02151

Country Finland

Webpage www.gtk.fi

*Legal Status of your organisation*

**Research and Innovation legal statuses**

Public body .....yes

Legal person ..... yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

**Enterprise Data**

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

NACE code - Not applicable



Proposal ID **689648**

Acronym **MICA**

Short name **GTK**

### Department(s) carrying out the proposed work

#### Department 1

Department name

Geologian Tutkimuskeskus

☒ Same as organisation address

Street

Betonimiehenkuja 4

Town

ESPOO

Postcode

02151

Country

Finland

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--



Proposal ID **689648**

Acronym **MICA**

Short name **GTK**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex



Male



Female

First name **Jouni**

Last name **Vuollo**

E-Mail **jouni.vuollo@gtk.fi**

Position in org.

Chief geologist

Department

Geoinformation



Same as organisation address

Street

Lahteentie 2

Town

Rovaniemi

Post code

96400

Country

Finland

Website

www.gt.fi

Phone

+358205504206

Phone 2

+358407335870

Fax

+XXX XXXXXXXXX

### Other contact persons

First Name	Last Name	E-mail	Phone
Sanna	Matikainen	sanna.matikainen@gtk.fi	+358505763350
Niina	Ahtonen	niina.ahtonen@gtk.fi	+358400947118
Kalevi	Rasilainen	kalevi.rasilainen@gtk.fi	+358407229850
Taina	Eloranta	taina.eloranta@gtk.fi	+358503488775



Proposal ID **689648**

Acronym **MICA**

Short name **UJF**

**PIC**

999907429

**Legal name**

UNIVERSITE JOSEPH FOURIER GRENOBLE 1

*Short name: UJF*

*Address of the organisation*

Street Avenue Centrale, Domaine Universitaire 621

Town GRENOBLE

Postcode 38041

Country France

Webpage www.ujf-grenoble.fr

*Legal Status of your organisation*

**Research and Innovation legal statuses**

Public body .....yes

Legal person ..... yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....no

**Enterprise Data**

SME self-declared status.....2012 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

**Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.**

NACE code 853 -

Proposal ID **689648**

Acronym **MICA**

Short name **UJF**

### Department(s) carrying out the proposed work

#### Department 1

Department name	LIG (Laboratoire d'Informatique de Grenoble)
<input type="checkbox"/>	Same as organisation address
Street	BP 53
Town	Grenoble
Postcode	38041/9
Country	France

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--

Proposal ID **689648**

Acronym **MICA**

Short name **UJF**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Sex ☐ Male ☒ Female

First name **Danielle**

Last name **Ziebelin**

E-Mail **danielle.ziebelin@imag.fr**

Position in org.

Department

☐ Same as organisation address

Street

Town

Post code

Country

Website

Phone

Phone 2

Fax

### Other contact persons

First Name	Last Name	E-mail	Phone
Yann	Le Roux	europe@ujf-grenoble.fr	+33(0)476635979



Proposal ID **689648**

Acronym **MICA**

Short name **LPRC**

PIC	Legal name
954900496	LA PALMA RESEARCH CENTRE FOR FUTURE STUDIES SL

Short name: **LPRC**

Address of the organisation

Street CALLE EL CASTILLO - EL FRONTON 37

Town SANTA CRUZ DE LA PALMA

Postcode 38787

Country Spain

Webpage www.lapalmacentre.eu

Legal Status of your organisation

#### Research and Innovation legal statuses

Public body .....no

Legal person ..... yes

Non-profit .....no

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....no

#### Enterprise Data

SME self-declared status .....2012 - yes

SME self-assessment ..... unknown

SME validation sme.....2012 - yes

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

NACE code 93 - Other service activities

Proposal ID **689648**

Acronym **MICA**

Short name **LPRC**

### Department(s) carrying out the proposed work

#### Department 1

Department name	<input type="text" value="La Palma Research"/>
	<input checked="" type="checkbox"/> Same as organisation address
Street	<input type="text" value="CALLE EL CASTILLO - EL FRONTON 37"/>
Town	<input type="text" value="SANTA CRUZ DE LA PALMA"/>
Postcode	<input type="text" value="38787"/>
Country	<input type="text" value="Spain"/>

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--

Proposal ID **689648**

Acronym **MICA**

Short name **LPRC**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex



Male



Female

First name **Bodo**

Last name **Sandor Balazs**

E-Mail **research@lapalmacentre.eu**

Position in org.

Senior Advisor

Department

Technology Foresight



Same as organisation address

Street

CALLE EL CASTILLO - EL FRONTON 37

Town

SANTA CRUZ DE LA PALMA

Post code

38787

Country

Spain

Website

www.lapalmacentre.eu

Phone

+34 922493016

Phone 2

+34 922493016

Fax

+34 922493016

### Other contact persons

First Name	Last Name	E-mail	Phone
Adrienn	Cseko	director@lapalmacentre.eu	



Proposal ID **689648**

Acronym **MICA**

Short name **EFG**

**PIC**

983318392

**Legal name**

FEDERATION EUROPEENNE DES GEOLOGUES

*Short name: EFG*

*Address of the organisation*

Street RUE CLAUDE BERNARD 77

Town PARIS

Postcode 75005

Country France

Webpage www.eurogeologists.eu

*Legal Status of your organisation*

**Research and Innovation legal statuses**

Public body .....no

Legal person ..... yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....no

**Enterprise Data**

SME self-declared status.....2010 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

**Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.**

NACE code





Proposal ID **689648**

Acronym **MICA**

Short name **EFG**

### Department(s) carrying out the proposed work

#### Department 1

Department name	<input type="text" value="EFG Office"/>
<input type="checkbox"/> Same as organisation address	
Street	<input type="text" value="Rue Jenner 13"/>
Town	<input type="text" value="Brussels"/>
Postcode	<input type="text" value="1000"/>
Country	<input type="text" value="Belgium"/>

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--

Proposal ID **689648**

Acronym **MICA**

Short name **EFG**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex



Male



Female

First name **Vitor**

Last name **Correia**

E-Mail **vcorreia@apegeologos.pt**

Position in org.

President

Department

EFG Board



Same as organisation address

Street

Rue Jenner 13

Town

Brussels

Post code

1000

Country

Belgium

Website

www.eurogeologists.eu

Phone

+351964243953

Phone 2

+3227887637

Fax

+XXX XXXXXXXXX

### Other contact persons

First Name	Last Name	E-mail	Phone
Isabel	Fernandez	isabel.fernandez@eurogeologists.eu	+3227887636
Anita	Stein	anita.stein@eurogeologists.eu	+3227887631



Proposal ID **689648**

Acronym **MICA**

Short name **NTNU**

**PIC**

999977851

**Legal name**

NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU

*Short name: NTNU*

*Address of the organisation*

Street HOGSKOLERINGEN 1

Town TRONDHEIM

Postcode 7491

Country Norway

Webpage www.ntnu.no

*Legal Status of your organisation*

**Research and Innovation legal statuses**

Public body .....yes

Legal person ..... yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

**Enterprise Data**

SME self-declared status.....2011 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

**Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.**

NACE code 853 -

Proposal ID **689648**

Acronym **MICA**

Short name **NTNU**

### Department(s) carrying out the proposed work

#### Department 1

Department name	<input type="text" value="Department of Energy and Process Engineering"/>
<input type="checkbox"/> Same as organisation address	
Street	<input type="text" value="Sem Sælands vei 7"/>
Town	<input type="text" value="Trondheim"/>
Postcode	<input type="text" value="7491"/>
Country	<input type="text" value="Norway"/>

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--

Proposal ID **689648**

Acronym **MICA**

Short name **NTNU**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex



Male



Female

First name **Daniel Beat**

Last name **Mueller**

E-Mail **daniel.mueller@ntnu.no**

Position in org.

Professor

Department

Energy and Process Engineering

☐ Same as organisation address

Street

Sem Sælands vei 7

Town

Trondheim

Post code

7491

Country

Norway

Website

http://www.ntnu.no/ansatte/daniel.mueller

Phone

+4791897755

Phone 2

+XXX XXXXXXXXX

Fax

+XXX XXXXXXXXX

### Other contact persons

First Name	Last Name	E-mail	Phone
Hilde	Mogård Flaathe	hilde.m.flaathe@ntnu.no	+4773598056
Lars	Onsøyen	lars.e.onsoyen@ntnu.no	+4773597143



Proposal ID **689648**

Acronym **MICA**

Short name **UCL ISR**

**PIC**

999975620

**Legal name**

UNIVERSITY COLLEGE LONDON

*Short name: UCL ISR*

*Address of the organisation*

Street GOWER STREET

Town LONDON

Postcode WC1E 6BT

Country United Kingdom

Webpage <http://www.ucl.ac.uk>

*Legal Status of your organisation*

**Research and Innovation legal statuses**

Public body .....yes

Legal person ..... yes

Non-profit .....yes

International organisation ..... unknown

International organisation of European interest ..... unknown

Secondary or Higher education establishment ..... yes

Research organisation ..... yes

**Enterprise Data**

SME self-declared status .....2007 - no

SME self-assessment ..... unknown

SME validation sme.....2007 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

NACE code 853 -



Proposal ID **689648**

Acronym **MICA**

Short name **UCL ISR**

### Department(s) carrying out the proposed work

#### Department 1

Department name

Bartlett School of Environment, Energy and Resources

☐ Same as organisation address

Street

14 Upper Woburn Place

Town

London

Postcode

WC1H 0NN

Country

United Kingdom

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--

Proposal ID **689648**

Acronym **MICA**

Short name **UCL ISR**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex



Male



Female

First name **Raimund**

Last name **Bleischwitz**

E-Mail **r.bleischwitz@ucl.ac.uk**

Position in org.

Professor

Department

Bartlett School of Environment, Energy and Resources

☐ Same as organisation address

Street

14 Upper Woburn Place

Town

London

Post code

WC1H 0NN

Country

United Kingdom

Website

<http://www.bartlett.ucl.ac.uk/bseer>

Phone

++44 (0) 203 108 920

Phone 2

++44 (0) 7943 521084

Fax

+XXX XXXXXXXXX

### Other contact persons

First Name	Last Name	E-mail	Phone
Leonard	Williamson	leonard.williamson@ucl.ac.uk	++44(0)2031089207



Proposal ID **689648**

Acronym **MICA**

Short name **GeoZS**

**PIC**

999466370

**Legal name**

GEOLOSKI ZAVOD SLOVENIJE

*Short name: GeoZS*

*Address of the organisation*

Street DIMICEVA 14

Town LJUBLJANA

Postcode 1000

Country Slovenia

Webpage www.geo-zs.si

*Legal Status of your organisation*

**Research and Innovation legal statuses**

Public body .....no

Legal person ..... yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

**Enterprise Data**

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

**Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.**

NACE code 721 -



Proposal ID **689648**

Acronym **MICA**

Short name **GeoZS**

### Department(s) carrying out the proposed work

#### Department 1

Department name

Geological Information Centre

☒ Same as organisation address

Street

DIMICEVA 14

Town

LJUBLJANA

Postcode

1000

Country

Slovenia

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--

Proposal ID **689648**

Acronym **MICA**

Short name **GeoZS**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mrs

Sex



Male



Female

First name **Jasna**

Last name **Šinigoj**

E-Mail **jasna.sinigoj@geo-zs.si**

Position in org.

Head of Geological Information Centre

Department

Geological Information Centre

☒ Same as organisation address

Street

DIMICEVA 14

Town

LJUBLJANA

Post code

1000

Country

Slovenia

Website

www.geo-zs.si

Phone

38612809712

Phone 2

+xxx xxxxxxxxx

Fax

+38612809753

### Other contact persons

First Name	Last Name	E-mail	Phone
Duška	Rokavec	duska.rokavec@geo-zs.si	+38612809763
Barbara	Simić	barbara.simic@geo-zs.si	+38612809747



Proposal ID **689648**

Acronym **MICA**

Short name **JRC**

**PIC**

999992304

**Legal name**

JRC -JOINT RESEARCH CENTRE- EUROPEAN COMMISSION

*Short name: JRC*

*Address of the organisation*

Street Rue de la Loi 200

Town BRUSSELS

Postcode 1049

Country Belgium

Webpage <http://www.jrc.ec.europa.eu>

*Legal Status of your organisation*

**Research and Innovation legal statuses**

Public body .....yes

Legal person ..... yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

**Enterprise Data**

SME self-declared status.....2007 - no

SME self-assessment ..... unknown

SME validation sme.....2007 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

NACE code



Proposal ID **689648**

Acronym **MICA**

Short name **JRC**

### Department(s) carrying out the proposed work

#### Department 1

Department name

EC-JRC, IES, Digital Earth and Reference Data (H06-Unit)

☐ Same as organisation address

Street

E. Fermi 2749

Town

Ispira

Postcode

21027

Country

Italy

### Dependencies with other proposal participants

Character of dependence	Participant	
-------------------------	-------------	--

Proposal ID **689648**

Acronym **MICA**

Short name **JRC**

### Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex



Male



Female

First name **Robert**

Last name **Tomas**

E-Mail **robert.tomas@jrc.ec.europa.eu**

Position in org.

Scientific / Technical Project Officer

Department

EC-JRC - Digital Earth and Reference Data (H06- UNIT)

☐ Same as organisation address

Street

E. Fermi 2749

Town

Ispra

Post code

2749

Country

Italy

Website

Phone

+393490979071

Phone 2

+xxx xxxxxxxxx

Fax

+xxx xxxxxxxxx

### Other contact persons

First Name	Last Name	E-mail	Phone
Nicole	Ostlaender	nicole.ostlaender@jrc.ec.europa.eu	
Irene	Apolloner	irene.apolloner@ec.europa.eu	

Proposal ID **689648**

Acronym **MICA**

## 3 - Budget for the proposal

No	Participant short name	Country	(A) Direct personnel costs/€  ?	(B) Other direct costs/€  ?	(C) Direct costs of sub-contracting/€  ?	(D) Direct costs of providing financial support to third parties/€  ?	(E) Costs of in kind contributions not used on the beneficiary's premises/€  ?	(F) Indirect Costs / € (=0.25(A+B-E))  ?	(G) Special unit costs covering direct & indirect costs / €  ?	(H) Total estimated eligible costs / € (=A+B+C+D+F+G)  ?	(I) Reimbursement rate (%)  ?	(J) Max. grant / € (=H*I)  ?	(K) Requested grant / €  ?
1	Geus	DK	167 442	130 500	0	0	0	74485,50	0	372427,50	100	372427,50	372427,50
2	Fisi	DE	129 580	12 000	0	0	0	35395,00	0	176975,00	100	176975,00	176975,00
3	Nerc-bgs	UK	165 750	5 600	0	0	0	42837,50	0	214187,50	100	214187,50	214187,50
4	Ul-cml	NL	113 365	7 500	0	0	0	30216,25	0	151081,25	100	151081,25	151081,25
5	Minpol	AT	148 500	5 500	0	0	0	38500,00	0	192500,00	100	192500,00	192500,00
6	Brgm	FR	151 721	8 700	0	0	0	40105,25	0	200526,25	100	200526,25	200526,25
7	Egs	BE	63 483	50 000	10 000	0	0	28370,75	0	151853,75	100	151853,75	151853,75
8	Bgr	DE	5 800	4 000	0	0	0	2450,00	0	12250,00	100	12250,00	12250,00
9	Gtk	FI	44 150	4 000	0	0	0	12037,50	0	60187,50	100	60187,50	60187,50
10	Ujf	FR	66 000	4 000	0	0	0	17500,00	0	87500,00	100	87500,00	87500,00

Proposal ID **689648**

Acronym **MICA**

No	Participant short name	Country	(A) Direct personnel costs/€  ?	(B) Other direct costs/€  ?	(C) Direct costs of sub-contracting/€  ?	(D) Direct costs of providing financial support to third parties/€  ?	(E) Costs of inkind contributions not used on the beneficiary's premises/€  ?	(F) Indirect Costs / € (=0.25(A+B-E))  ?	(G) Special unit costs covering direct & indirect costs / €  ?	(H) Total estimated eligible costs / € (=A+B+C+D+F+G)  ?	(I) Reimbursement rate (%)  ?	(J) Max. grant / € (=H*I)  ?	(K) Requested grant / €  ?
11	Lprc	ES	69 660	5 000	0	0	0	18665,00	0	93325,00	100	93325,00	93325,00
12	Efg	FR	36 000	5 000	0	0	0	10250,00	0	51250,00	100	51250,00	51250,00
13	Ntnu	NO	51 863	5 500	0	0	0	14340,75	0	71703,75	100	71703,75	71703,75
14	Ucl Isr	UK	39 800	5 000	0	0	0	11200,00	0	56000,00	100	56000,00	56000,00
15	Geozs	SI	21 000	4 000	0	0	0	6250,00	0	31250,00	100	31250,00	31250,00
16	Jrc	BE	48 750	4 000	10 000	0	0	13187,50	0	75937,50	100	75937,50	75937,50
Total			1 322 864	260 300	20 000	0	0	395791,00	0	1998955,00		1998955,00	1998955,00



Proposal ID **689648**

Acronym **MICA**

## 4 - Ethics issues table

1. HUMAN EMBRYOS/FOETUSES		Page
Does your research involve <a href="#">Human Embryonic Stem Cells (hESCs)</a> ?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research involve the use of human embryos?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research involve the use of human foetal tissues / cells?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
2. HUMANS		Page
Does your research involve human participants?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research involve physical interventions on the study participants?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
3. HUMAN CELLS / TISSUES		Page
Does your research involve human cells or tissues (other than from Human Embryos/ Foetuses, i.e. section 1)?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
4. <a href="#">PERSONAL DATA</a> (ii)		Page
Does your research involve personal data collection and/or processing?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research involve further processing of previously collected personal data (secondary use)?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
5. <a href="#">ANIMALS</a> (iii)		Page
Does your research involve animals?	<input type="radio"/> Yes <input checked="" type="radio"/> No	

Proposal ID **689648**

Acronym **MICA**

<b>6. THIRD COUNTRIES</b>			Page
Does your research involve non-EU countries?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Do you plan to use local resources (e.g. animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna or flora samples, etc.)? (v)	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Do you plan to import any material from non-EU countries into the EU? <i>For data imports, please fill in also section 4.</i> <i>For imports concerning human cells or tissues, fill in also section 3.</i>	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Do you plan to export any material from the EU to non-EU countries? <i>For data exports, please fill in also section 4.</i> <i>For exports concerning human cells or tissues, fill in also section 3.</i>	<input type="radio"/> Yes <input checked="" type="radio"/> No		
If your research involves <a href="#">low and/or lower middle income countries</a> , are benefits-sharing measures foreseen? (vii)	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Could the situation in the country put the individuals taking part in the research at risk?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
<b>7. ENVIRONMENT &amp; HEALTH and SAFETY</b> See legal references at the end of the section. (vi)			Page
Does your research involve the use of elements that may cause harm to the environment, to animals or plants? <i>For research involving animal experiments, please fill in also section 5.</i>	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Does your research deal with endangered fauna and/or flora and/or protected areas?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Does your research involve the use of elements that may cause harm to humans, including research staff? <i>For research involving human participants, please fill in also section 2.</i>	<input type="radio"/> Yes <input checked="" type="radio"/> No		
<b>8. DUAL USE</b> (vii)			Page
Does your research have the potential for military applications?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
<b>9. MISUSE</b>			Page
Does your research have the potential for malevolent/criminal/terrorist abuse?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
<b>10. OTHER ETHICS ISSUES</b>			Page
Are there any other ethics issues that should be taken into consideration? Please specify	<input type="radio"/> Yes <input checked="" type="radio"/> No		



Proposal ID **689648**

Acronym **MICA**

I confirm that I have taken into account all ethics issues described above and that, if any ethics issues apply, I will complete the ethics self-assessment and attach the required documents.



[How to Complete your Ethics Self-Assessment](#)

Proposal ID **689648**

Acronym **MICA**

## 5 - Call specific questions

### *Open Research Data Pilot in Horizon 2020*

If selected, all applicants will participate in the [Pilot on Open Research Data in Horizon 2020](#)<sup>1</sup>, which aims to improve and maximise access to and re-use of research data generated by actions. Participating in the Pilot does not necessarily mean opening up all research data. Actions participating in the Pilot will be invited to formulate a Data Management Plan in which they will determine and explain which of the research data they generate will be made open.

Applicants have the possibility to opt out of this Pilot and must indicate a reason for this choice.

Participation in this Pilot does not constitute part of the evaluation process. Proposals will not be evaluated favourably because they are part of the Pilot and will not be penalised for opting out of the Pilot.

We wish to opt out of the Pilot on Open Research Data in Horizon 2020.

☐ Yes

☒ No

<sup>1</sup> According to article 43.2 of Regulation (EU) No 1290/2013 of the European Parliament and of the Council, of 11 December 2013, laying down the rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" and repealing Regulation (EC) No 1906/2006.

### *Data management activities*

The use of a [Data Management Plan \(DMP\)](#) is required for projects participating in the [Open Research Data Pilot in Horizon 2020](#), in the form of a deliverable in the first 6 months of the project.

All other projects may deliver a DMP on a voluntary basis, if relevant for their research.

Are data management activities relevant for your proposed project?

☒ Yes

☐ No

A Data Management Plan will be delivered  
(Please note: Projects participating in the Open Research Data Pilot **must** include a Data Management Plan as a deliverable in the first 6 months of the project).



Data Management is part of a Work Package.



Data Management will be integrated in another way.



Please indicate how data management will be addressed in your project:

Data are compiled and generated in work packages 2, 3, 4, and 5 of the MICA project. Reporting according to the data management plan will be coordinated by WP1 (coordination).

Remaining characters

125



Horizon 2020 – SC5-13e-2015

Topic: Raw materials intelligence capacity

**MICA**  
(Mineral Intelligence Capacity Analysis)  
**Technical Annexes**  
**Sections 1-3**

*Coordination and support actions*



**MICA**  
Mineral Intelligence Capacity Analysis

**Title of Proposal**

MICA–Mineral Intelligence Capacity Analysis

## List of participants

Participant No.	Participant organisation name	Country
1 (Coord.)	<b>GEUS</b> – Geological Survey of Denmark and Greenland	Denmark
2	<b>F-ISI</b> - Fraunhofer Institute for Systems and Innovation Research	Germany
3	<b>NERC-BGS</b> – Natural Environment Research Council-British Geological Survey	United Kingdom
4	<b>UL-CML</b> -Universiteit Leiden, Centrum voor Milieuwetenschappen	Netherlands
5	<b>MinPol</b> - Minpol KG - Agency for International Minerals Policy	Austria
6	<b>BRGM</b> - Bureau de Recherches Géologiques et Minières (French Geological Survey)	France
7	<b>EGS</b> - EuroGeoSurveys	Belgium
8	<b>BGR</b> – Bundesanstalt für Geowissenschaften und Rohstoffe	Germany
9	<b>GTK</b> - Geologian tutkimuskeskus (Geological Survey of Finland)	Finland
10	<b>LIG</b> - Laboratoire d'informatique de Grenoble, Université Joseph Fourier	France
11	<b>LPRC</b> - La Palma Research Centre for Future Studies	Spain
12	<b>EFG</b> – European Federation of Geologists	France
13	<b>NTNU</b> - Norwegian University of Science and Technology	Norway
14	<b>UCL ISR</b> - University College London, Institute for Sustainable Resources	United Kingdom
15	<b>GeoZS</b> – Geological Survey of Slovenia	Slovenia
16	<b>JRC</b> – Joint Research Centre	Belgium

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## List of abbreviations and terms:

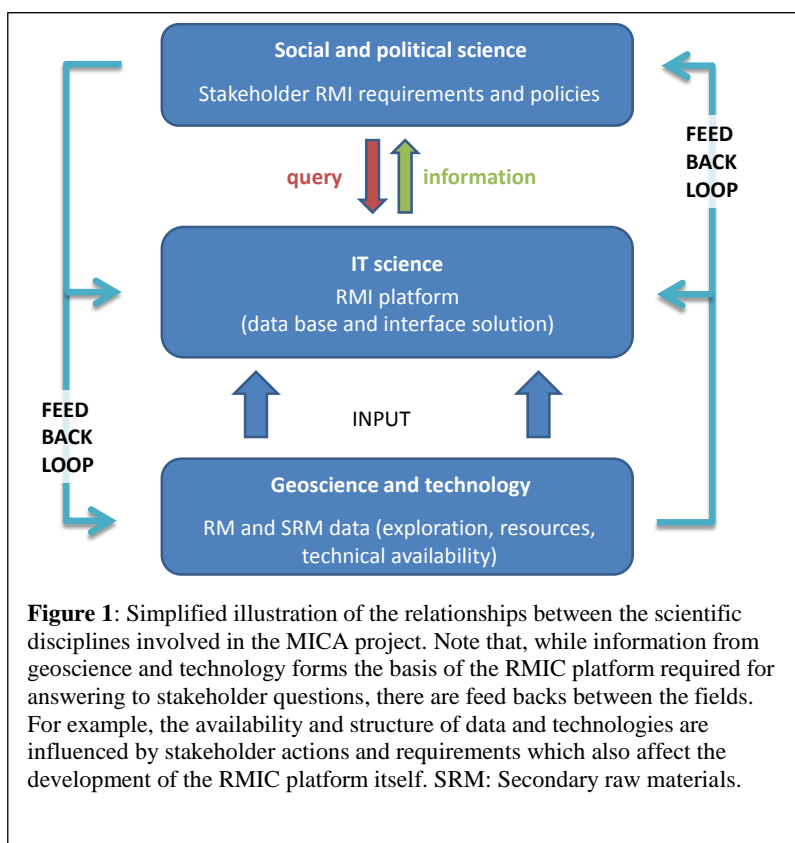
BAT:	Best Available Technique
CRM:	Critical Raw Material
CSR:	Corporate Societal Responsibility (ethical behaviour in relation to local communities and society as such)
DDG:	Dynamic Decision Graph
ETP SMR:	European Technology Platform for Sustainable Mineral Resources
EIP-RM:	European Innovation Partnership on Raw Materials
EU-RMICP :	European Raw Materials Intelligence Capacity Platform
EURMKB:	European Union Raw Materials Knowledge Base
EU-MKDP:	EU - Minerals Knowledge Data Platform (Minerals4EU project)
EU-UMKDP:	EU - Urban Mine Knowledge Data Platform (ProSUM project)
Fact sheet:	The detailed description of a method or a tool (text file).
Flow sheet:	Description of a workflow: all the data, methods and tools which are needed to answer to an end user's query or question and the recommended sequence of operations. Compares to recipe.
Foresight:	Future studies. Systematic attempts to look into the future, postulating possible, probable and preferable futures, deploying a range of scientific methods and tools.
Functionality:	The set of functions or capabilities associated with a method or a tool (e.g., a computer software).
ICMM:	International Council on Mining and Metals
IKMS:	Integrated Knowledge Management System (EURare project)
LCA:	Life-cycle assessment
Method:	= unitary method: A method used in the context of Mineral Resources / Raw Materials domain for producing specific studies like Life Cycle Analysis (LCA), Material Flow Analysis (MFA)...
MFA:	Material flow analysis
Mineral Raw Materials:	In this proposal we use the term "mineral raw materials" to include all non-energy and non-agricultural raw materials of primary or secondary origin.
Model:	A simplified description (especially a mathematical one), of a system or a process or a (thematic) domain, to assist calculations, predictions or representations.
Ontology:	An ontology is an explicit specification of a conceptualization. Ontology deals with questions concerning what entities exist or can be said to exist, and how such entities can be grouped, related within a hierarchy, and subdivided according to similarities and differences.
Prospectivity:	The term refers to the chance or likelihood that a mineral deposit of the type sought can be found within a formation or an area
RMI:	Raw materials intelligence. Refers to the ability to make sense of raw material data, of methods & tools, and of current and future developments in policy- and decision-making.
Reasoner:	A semantic reasoner, reasoning engine, rules engine, or simply a reasoner, is a piece of software able to infer logical consequences from a set of asserted facts or axioms.
SIP:	Strategic Implementation Plan
SLO:	Social License to Operate
SRM:	Secondary raw materials.
Software:	Any set of machine-readable instructions that directs a computer's processor to perform specific operations. An example could be the BRGM 3D GeoModeller which is used to build 3D models.
Tool:	This can be for example a software designed for a specific task.

# 1. Excellence

## Project rationale and background

Mineral raw materials are fundamental to Europe's economy and growth. The minerals economy provides an essential contribution to employment since primary and secondary raw materials are the most important link in the value chain of industrial goods production, which plays a prominent role as a source of prosperity in Europe. Consequently, the MICA project represents a continuation and further development of previous initiatives, which provide the background to this proposal.

While the importance of energy materials, such as oil and gas, has often been highlighted, the indispensable role of mineral raw materials (such as e.g., metal ores, industrial minerals and construction material) has historically not been properly acknowledged. This led to the launch of the European "Raw Materials Initiative" of 2008<sup>1</sup>. This "Raw Materials Initiative" is based on three pillars: (1) ensuring access to raw materials from global markets at undistorted conditions, (2) fostering sustainable supply of raw materials from European sources and (3) boosting resource efficiency and promoting recycling. Important reports and recommendations have been published<sup>2</sup> including the "Report on critical raw materials for the EU" (2011 and updated in 2014). Following the EC communication "Europe 2020 Flagship Initiative Innovation Union and growing raw materials challenges"



(2010), the Commission launched the European Innovation Partnership on Raw Materials (**EIP-RM**) in 2012. Its aim is to ensure the sustainable supply of raw materials for the European economy whilst increasing benefits for society as a whole, by promoting innovation across the entire materials value chain, i.e., by supporting technologies, improving the framework policy conditions for raw materials, and also by promoting international cooperation. Several projects related to mineral raw materials have been funded as a result of this increased awareness, notably ProMine, EuroGeoSource, EURare, Minventory, Minerals4EU, ProSUM, I<sup>2</sup>Mine, MINATURA2020 and others, and most recently the Knowledge and Innovation Community, EIT KIC Raw Materials.

The results of these initiatives form the basis for the MICA proposal which aims to synthesize the previous work into a

stakeholder tailored product termed the "European Raw Materials Intelligence Capacity Platform" (EU-RMICP). This user-centered database platform will require the development of ontology-based inter-relational structures with a firm grounding in the characterization of stakeholder requirements, data sources, raw material analysis methods and the minerals policy context. Therefore, the MICA project is truly interdisciplinary bringing together

<sup>1</sup> COM(2008) 699 final. The raw materials initiative — meeting our critical needs for growth and jobs in Europe

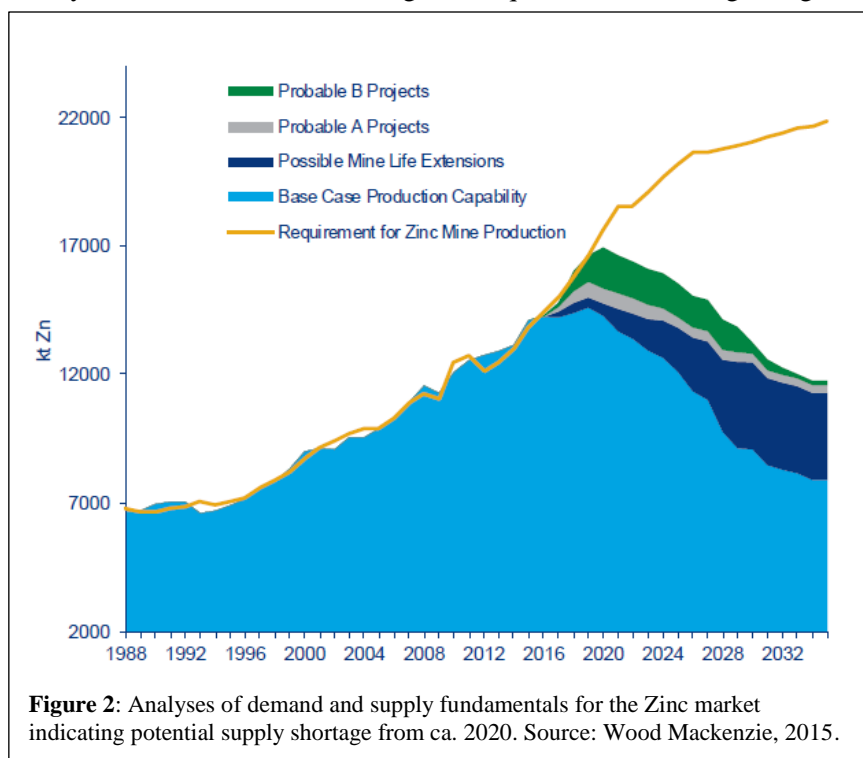
<sup>2</sup> COM(2011) 25 final. Tackling the challenges in commodity markets and on raw materials.; Christmann, P. et al. (2014): Recommendations on the framework conditions for the extraction of non-energy raw materials in the European Union – Report of the Ad Hoc Working Group on Exchange of best practices in minerals policy and legal framework, information framework, land-use planning and permitting. Brussels, 35 p



natural and technical sciences, social sciences including political sciences, and information science and technology (**Fig .1**).

On a broader background, the EU raw materials initiatives are formulated within the framework of **Sustainable Development** (Brundtland Commission, 1987), which links economic growth, environmental protection and social equity. This approach is also being developed further with tailored concepts for the mining industry on national and international levels<sup>3</sup>. For example, the International Council on Mining and Metals (ICMM) has been established with the aim to improve social and environmental performance in the mining and metals industry worldwide. In response to the increased demands from society new concepts have been developed including **Green Mining** (reduction of environmental impacts of extraction and processing of metals and minerals), **Corporate Societal Responsibility (CSR)** – ethical behaviour in relation to local communities and society as such) and the **Social License to Operate (SLO)** – acceptance of mining activities in local communities).

These concepts and initiatives aim to align the increasing requirements for environmental and social best practices in the mining industry on the one hand with the rising demand for mineral raw materials on the other. Even though there may be off-setting elements, such as the development of less resource intensive technologies, the anticipated rise in global population and living standards in developing countries is expected to drive continuously increasing levels of demand for a wide range of resources. Furthermore, requirements for a broad range of minor metals and minerals are increasing with modern technology, especially with the development of low carbon technologies such as electric cars, catalytic converters and photovoltaics. Industry forecasts for a number of raw materials suggest that there could be medium to long-term supply shortages in certain areas, including but not exclusively for critical raw materials such as rare earths. Clearly, the outlook for base metals (e.g., Zn, **Fig. 2**) indicates a significant need for identifying additional mineral resources in the medium and long-term in order to satisfy the expected increase in global demand. As a consequence there is an urgent need to satisfy the information and intelligence requirements of a large range of stakeholders in order to provide the best



possible basis for decision-making. This issue is at the heart of the MICA project.

All of the analyses, initiatives and commitments in the mineral raw material field rely on data made available by the public sector and by the private sector, which are used to develop metrics and indicators on which the performance of the sector is reported. Furthermore, realization of visions and concepts such as the “**Smart Mine**”, “**Deep Mining**”, “**Zero Waste**” and “**Circular Economy**” relies also on various tools and methods to process the data into a meaningful outcome. Examples of such methods and tools include **Life-cycle assessment (LCA)**, an internationally

standardised methodology (ISO 14040:2010) that aims to quantify the environmental pressures related to goods and services. Such analyses aim at the identification of environmental benefits, trade-offs and areas for achieving improvements taking the full life-cycle of a product into account<sup>4</sup>. In a similar fashion, **Material flow analysis**

<sup>3</sup> E.g. The Mining Association of Canada (2004). Towards Sustainable Mining (TSM).

<sup>4</sup> EC (2015). European platform on life cycle assessment.

(MFA) can be used in order to quantify stocks and flows of materials or substances in society. This type of information is particularly important for the characterization of potentials for urban mining that considers the production of secondary raw materials (SRM) out of material stocks in buildings, infrastructure, vehicles, durable products and so on.

With regard to the identification and delineation of resources in the geosphere there are statistical methods in place designed for use by mining companies to report the status of mineral resources and ore reserves to their shareholders and the stock market according to specific codes (e.g., JORC, NI 43-101; PERC etc.). Acquiring the data needed for these delineations typically involves substantial drilling programmes and, hence, investments to be recuperated by exploitation of the resource. In the domain of mineral exploration, aiming at the discovery of new mineral resources in the geosphere, there is a strong role for predictive geological mapping in order to characterize the relative prospectivity of certain rock formations for the potential occurrence of particular mineral deposits. Methods are evolving to carry out such exploration in 2D and 3D that aim to combine data from several geoscience disciplines (e.g., structural geology, stratigraphy, geochemistry, geophysics).

Investigating the demand side of the raw materials sector is equally important in order to identify changes of the society's needs. There are several tools available for this task including 'time series', 'end-use method', 'system dynamics modelling', and 'foresight'. Supply and demand of minerals are strongly interrelated with economics, technology, innovation, research and development, and with the changing political landscape at global, European and national levels. Furthermore, there are interconnections with several other policy areas (energy, resource-efficiency, customer behaviour, etc.), which makes the development of policy options for long-term „adequate access to raw materials” a difficult task. For this purpose strategic foresight activities need to be carried out that should be informed properly.

This short and non-exhaustive review of concepts, initiatives, methods and tools relevant to the mineral-based raw materials domain demonstrates the complexity of this action field. Knowledge on raw materials is dispersed and variable, and the complexity of material cycles (across all life cycle stages), policies, mineral market trends, technological trends, environmental issues, social impacts etc. requires many fields of expertise. Therefore, combining data and information to support decisions is ambitious, and this is demonstrated in the Strategic Implementation Plan of the EIP-RM. The current call (SC5-13e sub-call entitled “Raw materials intelligence capacity”) has identified these issues and requests coordinated actions to address them.

The aim and ambition of the MICA project is to contribute to the emerging raw materials knowledge infrastructure in Europe. To do so, the project team will conduct a careful analysis of stakeholder needs and undertake a review of existing data, methods and tools that provide intelligence on raw materials. The outcome of this analysis and review will be integrated into a powerful, user-friendly decision-support platform that provides different stakeholders (e.g. policy and decision makers, industry, investors, economic analysts, researchers and others) with answers to their raw materials-related questions and proposes options available for addressing associated problems.

## **1.1 Objectives**

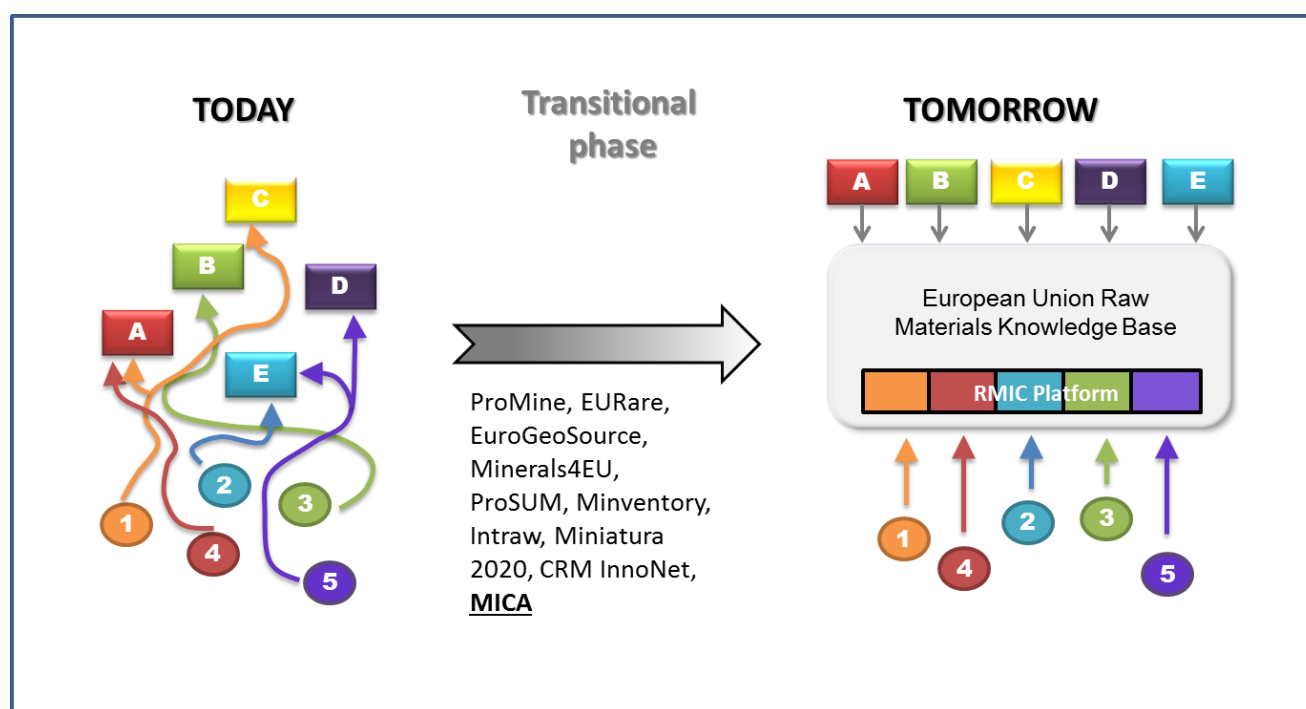
### *1.1.1 Overall concept and goal*

Raw materials intelligence (RMI) is developed in a complex context of sectoral policies (mineral, environmental, energy, fiscal, foreign, development, security, spatial planning, water resources, investment, etc.) and regulations at national and international (EU) levels. RMI, furthermore, covers several fields of knowledge including natural and technical sciences, social sciences, political sciences, legal studies, and information technologies. The challenge of this project is that stakeholder questions, how simple they may appear, will mostly require elements and expertise from these different fields to be properly answered.

The MICA project brings together experts from a wide range of disciplines in order to ensure that RMI is collected, collated, stored and made accessible in the most useful way in order to correspond to stakeholder needs. Hence, the goal for MICA is to provide stakeholders with the best possible information, in a seamless and

flexible way using an ontology-based platform European Union Raw Materials Intelligence Capacity Platform (EU-RMICP). To accomplish this goal, MICA will assess sources of relevant data and information and conduct analyses of appropriate methods and tools in order to provide guidelines and recommendations. Stakeholder identification and consultation is a critical component of the project.

Overall, the MICA project will build upon the concepts of “fact sheets” and “flow sheets”. Fact sheets are domain-specific descriptions of data sources, methods, tools and models, whereas “flow sheets” can be considered “recipes” that describe what fact sheets should be used as well as how they should be combined and in what sequence to obtain answers to specific question. These fact sheets and flow sheets will be integrated into the European Union Raw Materials Intelligence Capacity Platform (EU-RMICP) which is intended to be a stand-alone product that can be incorporated into a European Union Raw Materials Knowledge Base (EURMKB) within a future permanent structure of a EU raw materials intelligence service (**Fig. 3**). In this regard, the MICA project has strong links to the efforts of the current Minerals4EU project where an EU Minerals Knowledge Data Platform (EU-MKDP) is being developed.



**Figure 3.** Illustration of the MICA project as a part of the transitional phase in building a European Union Raw Materials Knowledge Base. The MICA project will build the RMIC platform that will be able to provide information regarding specific RMI requirements of stakeholders. Today stakeholders (circles) need to identify particular RMI providers (squares) in order to meet their requirements (colour coded). Some stakeholders (e.g., 1 and 5) have to consult more than one RMI provider to fulfil their needs. The RMIC platform takes these requirements into account and provides the relevant intelligence directly.

### 1.1.2 Specific objectives

The **main objectives** of MICA can be summarised as follows:

- Identification and definition of stakeholder groups and their RMI requirements (WP2);
- Consolidation of relevant data on primary and secondary raw materials (WP3);
- Determination of appropriate methods and tools to satisfy stakeholder RMI requirements (WP4);
- Investigation of (RMI-) options for European mineral policy development (WP5);
- Development of an EU-Raw Materials Intelligence Capacity Platform (EU-RMICP) integrating information on data and methods/tools with user interface capable of answering stakeholder questions (WP6); and

- Linking the derived intelligence (results and stakeholders) to the European Union Raw Materials Knowledge Base developed by the Minerals4EU project.

## 1.2 Relation to the work programme

This project is a direct response to the work programme topic “Raw materials intelligence capacity” (H2020-SC5-13e-2015). The MICA consortium acknowledges the issues and requirements identified in this coordination and support action. The MICA responses to the call specifications are outlined below.

Call/topic statement	Project response
Mineral policies are sometimes not clear, too dispersed in their implementation or insufficiently linked to other related policies (e.g. land-use planning) to be fully effective.	WP5 will analyse the EU policy framework regarding mineral and related policies including inter-dependencies, and will provide a basis for a coherent policy development.
A common understanding of which mineral deposits are of public importance is lacking.	MICA will address this topic, which will be described in the RMICP by a Fact Sheet, and used in several scenarios (Flow sheets). Through stakeholder engagement, MICA will shortlist criteria that define mineral deposits of public importance. Also, cooperation with the MINATURA2020 project via the partner MinPol will be important.
Permitting procedures can be lengthy and sometimes conflict with other public authorities' requirements.	This aspect is addressed as part of the stakeholder analysis which will include mining companies. Fact or Flow sheets) related to this topic will be established, covering different themes (policies, land-use, permitting...).
Knowledge of raw materials reserves and resources is dispersed...	MICA will provide a link between initiatives such as Minerals4EU, EURare, ProSUM, MINVENTORY, INTRAW and MINATURA2020. All platforms currently developed are INSPIRE compliant, ensuring interoperability of data. Moreover the RMICP developed in MICA will be connected to the EU-MKDP.
... terminology is often heterogeneous...	WP3 will assess the level of harmonization within and across dispersed datasets and data sources.
... reporting standards vary throughout the Member States.	MICA will adopt reporting standards developed by the Minerals4EU project and is represented through EuroGeoSurveys in the Expert Group of the United Nations Economic Commission for Europe Expert Group on Resources Classification (UNECE EGRC)
There is no raw materials knowledge infrastructure at EU level	MICA will ensure that products developed by the Minerals4EU project are further improved and expanded. In particular, MICA will provide a single-point-of-discovery to European data sources building on Minerals4EU, EURare, MINATURA2020, and ProSUM, and extend the EURMKB capacities.
Research and development in the area of raw materials is scattered between different players. Further coordination is required between industrial players, researchers in the EU and across the whole value chain and EU and Member State funding	WP2 will gather a wide range of stakeholders involved and affected by R&D (EC, member-state level, local authorities, industry, research, civil society, etc.) thereby identifying R&D coordination needs and fields for joint action. MICA's scope

authorities	covers the entire value chain of raw materials from cradle to grave.
There is a need to better exploit synergies in R&D with the best world players in raw materials technology and scientific developments...	Some MICA partners (BRGM, GTK, GEUS) are involved in the INSPIRE Mineral Resources (MR) specifications. This is at an international level with participation in the International Union of Geological Sciences (IUGS), Commission for the Management and Application of Geoscience Information (CGI) and the Geoscience Terminology Working Group (GTWG).
... as well as to learn from the experience of raw materials-producing countries.	Some MICA partners (Minpol and GeoZS) were part of SNAP-SEE (South East Europe) project addressing these issues. Several partners are actively collaborating on raw materials related projects with research institutions and industry in other producing countries (Sweden, Finland, Ireland, Norway).
developing a methodology for reviewing and selecting all relevant methods and tools necessary for providing high quality expertise for different stakeholders, including advisors and decision makers at EU, Member State and industry level as well as the expert community and general public, taking into account methods and tools such as: statistics, life cycle assessment, materials flows analysis, 2-4D modelling, forecasting global supply and demand, and other trends.	This is one of the main aims of MICA: to bring high quality answers to questions raised by different stakeholders. This flexibility is reached using a Dynamic Decision Graph (DDG), based on a multidimensional ontology of the Domain of Questions, and pre-established scenarios (Flow sheets) initially indexed for the various sub-domains and re-indexed following the choices of the user when he/she navigates the graph and makes selections. To develop the DDG efficiently, all WPs will coordinate closely.
When appropriate, mentoring, dissemination of best practices, analysis on related policy, regulations, trade and other relevant issues, involving the international community, should be incorporated.	WP5 will provide a comprehensive and integrated analysis of mineral related policies and relevant legislation/regulations bearing on raw materials. WP7 will interact with the international community about these topics.
...international cooperation is encouraged.	EuroGeoSurveys operates in this field through formal agreements with Geological Surveys worldwide and WP7 will ensure that the progress of MICA is reported internationally. Moreover, MICA partners all have extensive international cooperation and some are members of the UNEPs International Resource Panel and will communicate results and get input from the IRP Working group on Global Metal Flows.

### 1.3 Concept and approach, quality of the coordination and support measures

#### 1.3.1 Overall concept and main ideas, models or assumptions involved

The main subject areas of MICA and their relationship to the individual work packages are illustrated in the table below.

Main objective short name	Work package contributions	
Needs	Identification and classification of stakeholders (D2.1)	
	Identification and mapping of stakeholders' intelligence requirements (D2.2)	
Data	Review of data availability. Assessment of data use and respective audience. Assessment of data quality (D3.1)	
	Mapping data to tools and methods (D3.2)	
	Transforming data into information and knowledge (D3.3)	
	Developing a data strategy (D3.4)	
Methods	Reporting on methods (D4.1)	
	Conducting case studies (D4.2, D4.3)	
	Providing recommendations (D4.4)	
Policies	Assessment of important elements of RMI and their relevance for mineral policy development (D5.1, D5.2)	
	Development of strategic raw materials intelligence approaches (D5.3, D5.4, D5.5)	
	Testing of a (future) RMI capacity in Europe and its wider context (D5.6)	
EU-RMICP	Synthesis of stakeholders requirements and analysis of methods functionalities	(D6.1)
	Development of ontologies	
	Development of the Dynamic Decision Graph (DDG) for visualization, navigation & selection	
	Search and ranking modules development	
	Development of the Central database of the EU-RMICP	(D6.2)
	Delivery of the full EU-RMICP system, fully integrated to the EURMKB	
Communication / Dissemination / Exploitation	Development of the Communication Strategy	(D7.1 to D7.13)
	Engagement with Geosciences data providers	
	Engagement with Professionals	
	Public outreach	

The seven work packages of MICA have been set up to reflect the general logic in the approach, namely from requirement (WP2) to analyses (WP3, 4 & 5) to implementation (WP6) and ultimately to dissemination (WP7). The rationale of the individual work packages in the overall picture is given below.

## WP2: Need assessment: stakeholder identification, appraisal and mapping of stakeholder requirements

WP2 aims at providing a synopsis of more general stakeholder needs with regard to RMI and of specific requirements to the RMI capacity platform. There is a threefold rationale for stakeholder identification in the MICA project. (1) capture of potential providers and users of data (WP3), of methods (WP4) and of the platform itself (WP6), (2) to map stakeholder initiatives (cf. WP5) and (3) to explore additional potential stakeholders within the wider society in the EU.

A broad understanding of stakeholders is a prerequisite for informed decision-making and good raw material governance. In addition to the stakeholder groups already *involved* in RMI policy- and decision-making, WP 2 identifies and elicits the requirements of *affected* and of *dormant* stakeholders<sup>5</sup>. Starting with stakeholders mentioned in the call and previous projects (Minerals4EU, ProSUM, etc.),<sup>6</sup> the list will be expanded and differentiated by elicitation of stakeholder positions and by critical systems thinking.<sup>7</sup>

<sup>5</sup> cf. Mitchell, R.K.; Agle, B.R.; Wood, D.J. (1997): Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. In: Academy of Management Review, 22 (4), p. 853-886.

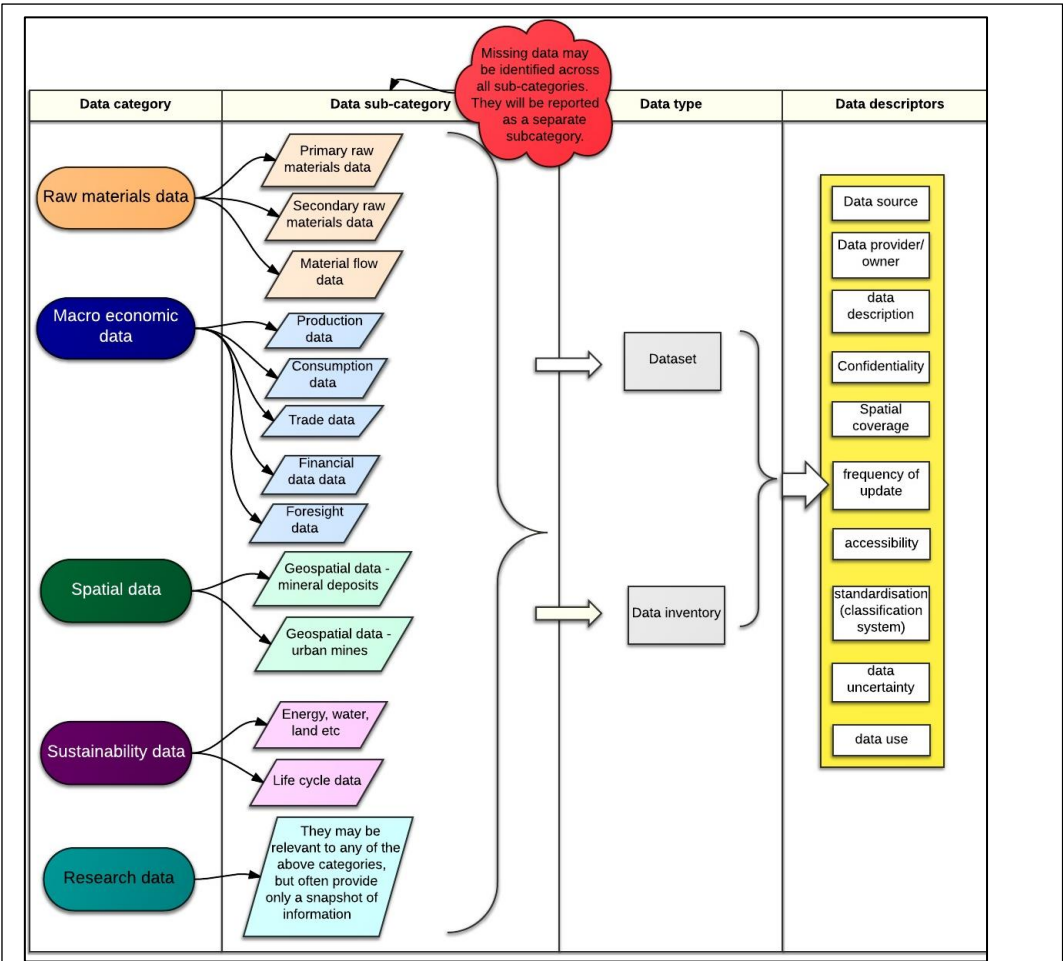
<sup>6</sup> The call mentions advisors and decision makers at EU, member state and industry level, the expert community as well as the general public.

<sup>7</sup> cf. Achterkamp, M.C.; Vos, J.F.J. (2007): Critically identifying stakeholders – evaluating boundary critique as a vehicle for stakeholder identification. In: Systems Research and Behavioral Science, 24, p. 3-14.

The identified stakeholders will be involved in WP2 through broad surveys, in-depth meetings and interviews, and a large stakeholder workshop which identifies non-apparent needs and requirements as well as partial and joint interests of a broad range of stakeholders. The outcome of WP2 is a synopsis of needs and requirements assigned to stakeholder groups that the MICA project will take into consideration.

### WP3: Data for raw materials intelligence capacity

Raw materials intelligence is underpinned by good quality, high resolution, regularly updated and accessible data. Accordingly, there is a requirement to develop improved strategies for utilising, extracting, combining or even producing relevant data in more efficient ways. Raw material cycles often extend to global level and data sources are dispersed across the globe, with no central point of collation. The inclusion of the international community (scientific, industry, public authorities) is therefore very important. Past and current projects related to raw materials in EU have already provided significant contributions on different aspects of data. A bridging action combining these efforts and utilising the data produced is needed to deliver answers to key questions posed by stakeholders and experts. Furthermore, developing a data strategy for filling gaps and providing recommendation on the most appropriate datasets is critical for enhancing the raw materials knowledge infrastructure at EU level. Knowledge of data availability underpins the development of methodologies or tools for data analysis and subsequent decision making related to raw materials. Therefore, an important stage in the MICA project is an assessment of data sources, utilisation and reliability covering primary and secondary raw materials and building a comprehensive inventory (Fig. 4). Datasets will be mapped according to different tools and methods and the “fit-for –purpose” status of data categories (or individual datasets) will be examined. In a joint effort it will be identified what information and knowledge can be extracted from the data inventory and how stakeholder needs, data availability and data uncertainty link. This will lead to recommendations regarding a future EU raw materials data strategy.



**Figure 4:** Model structure of raw materials data forming the inventory of the MICA project.

#### **WP4: Methods and tools for mineral intelligence**

Work Package 4 aims at providing an overview of methods and tools for raw materials intelligence, and to assess the relevance and usefulness of these tools in providing information to stakeholders needs as identified in Work Package 2. Methods and tools are needed to process data on raw materials and to enable drawing relevant conclusions from them. Many different methods and tools exist, each with their own purpose and therefore with their own scope and methodological strengths and weaknesses. In WP4, it will be identified where methodological gaps exist, and where different methods aim at answering similar questions but with different scopes. The methodologies will be classified according to a number of characteristics, such as scope, level of detail, type of model used, input data required, indicators delivered, ability to forecast, ability to include uncertainty analyses etc. To achieve meaningful results, powerful methods/tools are needed, but also adequate data. We expect especially to be short on data and methods in the area of urban mining.

Furthermore, the questions and intelligence requirements identified in WP2 are categorized and analysed in view of the different methods in order to identify (i) data requirements, (ii) advantages and disadvantages of different tools, and (iii) potential synergies in terms of data and tools.

We will distinguish four types of methodologies:

##### *1. Methods to identify and assess geological and anthropogenic (urban) stocks*

The aim of these methods is to make estimates of deposits of both primary and secondary mineral resources, together with an estimate on their extractability/treatability. This is a very important part of minerals intelligence: knowing where the potential sources of materials for society reside. For geological stocks, methods for assessing resources and reserves are defined in international standards (PERC, 2013; JORC, 2012; NI 43-101). There is at present no equivalent in the case of societal (urban) stocks. As part of WP4, proposals will be made in order to address this issue.

##### *2. Methods to assess society's metabolism*

The aim of these methods is to specify the flows of resources: how much is mobilized by society, in which applications is it used, what are the characteristics in terms of life span and recyclability, what are the energy and environmental implications, is there a risk of supply problems? These methods mostly come from the industrial ecology field and include Material Flow Analysis (MFA), Life Cycle Assessment (LCA), environmentally extended Input Output Analysis (EE-IOA), (Environmental) Risk Assessment ((E)RA), various types of footprint analysis, system dynamics models, and various methods for criticality assessment.

##### *3. Methods to assess the economic aspects of the use of resources*

Resource prices and the cost of extraction and processing are essential drivers and barriers for mineral production. These can be assessed at different levels with methods that broadly belong to Cost-Benefit-Analysis. Broadly speaking these methods can deliver insights into the costs from investments into mineral production, the barriers to investments, and the net benefits derived from those investments. To bridge the gap to macro-economic analysis, usually two types of models are applied, Computable General Equilibrium (CGE) models and dynamic input-output models. However, only few economic models can yet incorporate minerals and metals adequately.

##### *4. Methods to forecast or estimate future use of resources*

A specific group of questions relates to future developments and these types of questions can be assessed with scenario analysis including models on driving forces behind resource flow (e.g., social change, population and economic growth, electrification of vehicle fleets, emerging tensions), policy targets (e.g. transition towards more renewable energy sources), dynamic MFA, and system dynamics models.

The question of uncertainty propagation through the methods and tools that are also considered during the MICA project, drawing from classical probability theory but also from more recent information theories designed to address knowledge gaps and imprecise information (e.g. imprecise probability theory, belief functions, fuzzy-set theory, etc.).



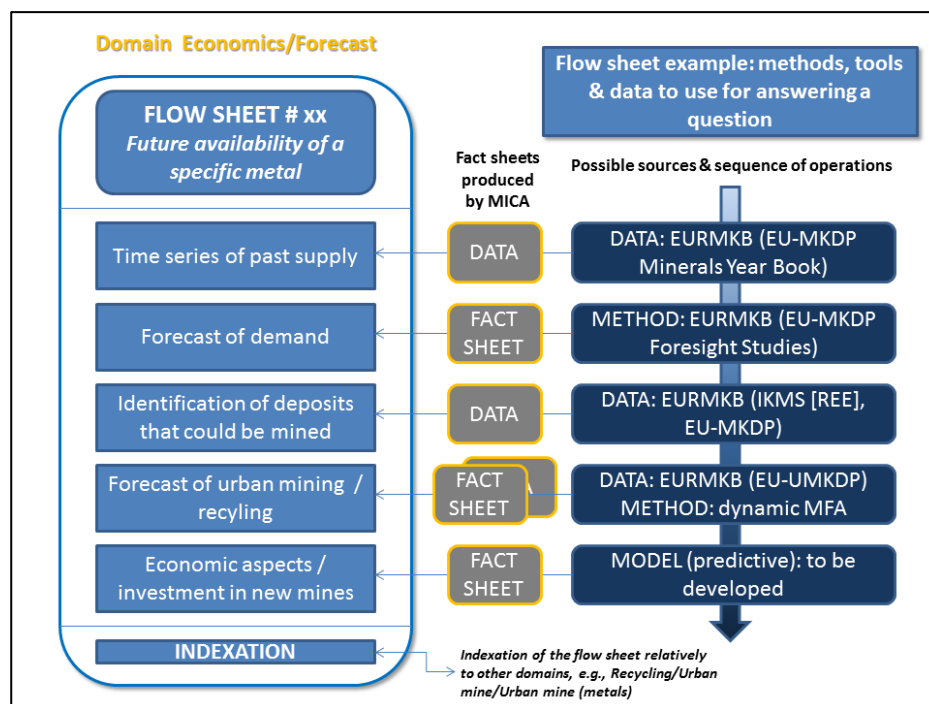
## WP5: Minerals policy context

The objective of this WP is to turn Raw Materials Intelligence (RMI) into a tool that facilitates foresight processes and future perspectives for Europe. In order to do this WP5 will first undertake a stocktaking exercise on existing relevant scenarios and international planning documents. WP5 will map those scenarios against the data and tools that will have been analysed in WP3 and WP4 in order to arrive at benchmarks for future foresight and planning processes. As Europe will need to become more resilient and robust, this WP will in particular assess future capacities needed at different levels – for industry, member states, regions, the EU and the role of the EU in international relations – and it will test those recommended capacities towards the end of the project with stakeholders. Accordingly, WP5 will go beyond what was/is attempted in the projects MINVENTORY, INTRAW, and MINATURA2020 and get European policy makers and stakeholders prepared for the global long-term challenges. The outputs of WP5 will inform WP2, WP 3, WP4, and WP6.

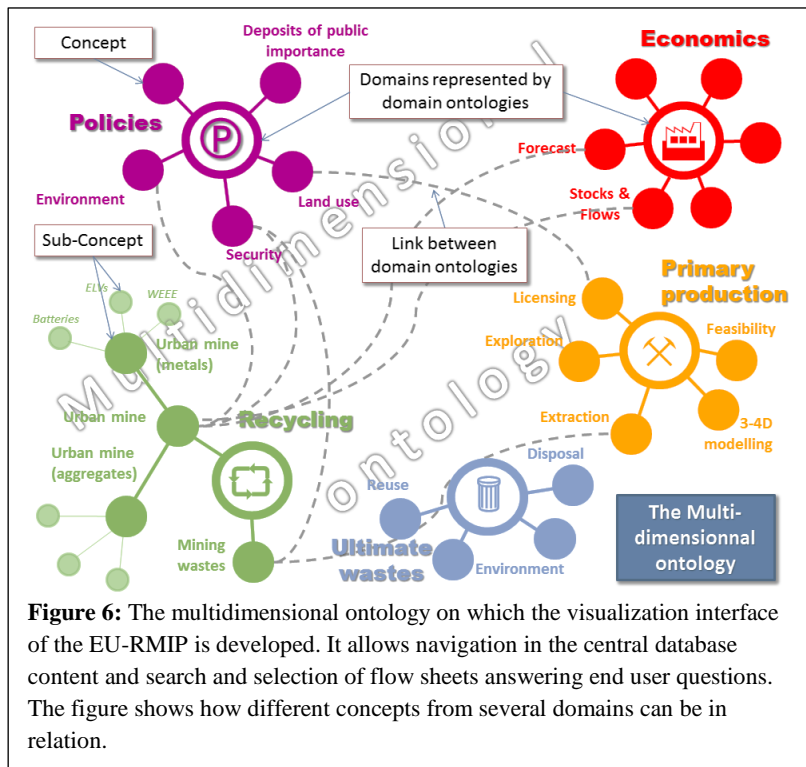
## WP6: The European Raw Materials Intelligence Capacity Platform (EU-RMICP)

The objective of this work package is to develop a methodology and associated tools to allow the end user to select in a seamless way the best available set of information for answering questions regarding raw materials. To reach this objective WP6 will create a database with an ontology-based interface on top to visualize database content. For this purpose, work packages 3, 4 and 5 will deliver detailed descriptions of methods and tools, which here are named “**FACT SHEETS**”. From each fact sheet, WP6 will generate an inventory of the “functionalities” (e.g., name of the method, requested data at the input, scale of implementation [local, regional, country- or continental scale], accuracy, range of application, results at the output...), which will be annotated within the ontologies, and which can be used for basic searches through text-based search, filters and ontology navigation. These fact sheets will be stored in the Central Database of Descriptions.

Based on a careful analysis and synthesis of stakeholders’ needs/expectations made in WP2, and with the assistance of domain experts from WP3, WP4 and WP5, a series of pre-established scenarios called here “**FLOW SHEETS**” will be set-up to describe the sequences of operations (data, methods and tools needed) to answer complex queries (**Fig. 5**). Flow sheets metadata will be stored in the central database. Metadata related to data –



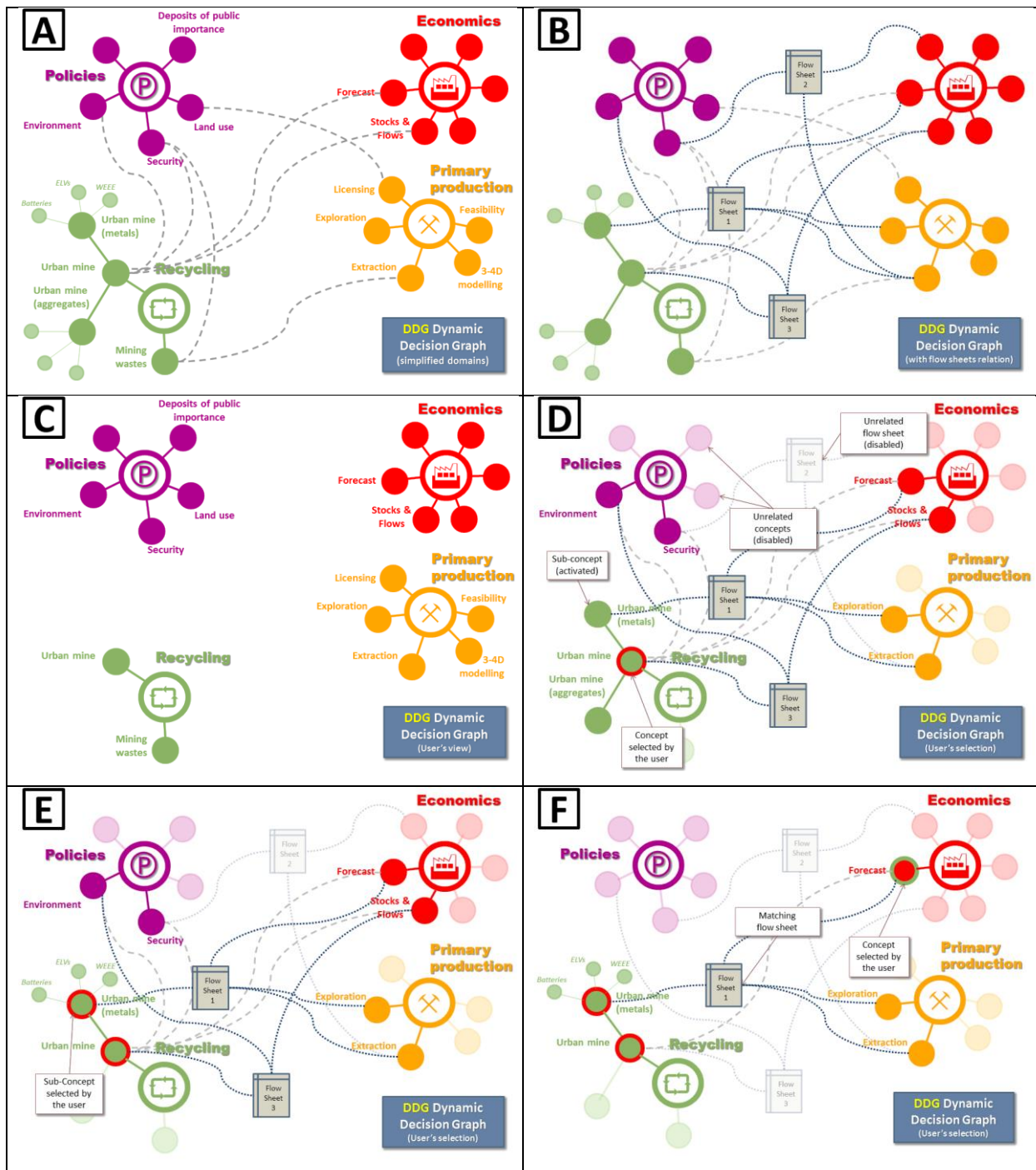
**Figure 5:** Example of a flow sheet, i.e. a scenario showing the linking of several tasks (data input, methods and tools described in fact sheets). Boxes on the right side indicate already existing possible sources for data. Acronyms: EURMKB (European Union Raw Materials Knowledge Base), IKMS (Integrated Knowledge Management System - EURARE project), EU-MKDP (EU - Minerals Knowledge Data Platform – Minerals4EU project), EU-UMKDP (EU - Urban Mine Knowledge Data Platform – ProSUM project).



surveys made in WP2, e.g., geological knowledge, mining activity, primary production, recycling, ultimate wastes, economics, policies (**Figs. 6 and 7**). The flow sheets developed in collaboration with WP3, WP4 and WP5, which combine data, methods and tools, will be annotated within the concepts from the domain ontologies. This graphical approach to the interaction with end-users is advantageous, compared to constraining the query to using scroll lists which leads to standardized questions that cannot fully reflect the end user's needs. Another alternative could be the analysis of a query presented in natural language. However, the syntax analysis essential to fully understand the query represents a full project in itself and is beyond the scope of the MICA project.

Importantly, the fully functional EU-RMICP will become a key component of the EURMKB (**Fig. 3**), as it will provide stakeholders with the best available techniques for using data and knowledge from the IKMS, the EU-MKDP and the EU-UMKDP, as its development will follow the same rules as those adopted for these modules.

- The EU-RMICP will notably be a **self-contained system** which can easily be moved to other installations / platforms such as a cloud (see for example the InGeoCloudS EU-FP7 project) or a server hosted by the European Commission, depending on the choices that will be made at the end of the project.
- The **maintenance** issue of fact sheets and flow sheets and of their metadata will be addressed by network building and a dedicated governance structure. The Minerals4EU network and permanent body (currently under construction) and the future European Geological Data Infrastructure (EGDI) represent efficient solutions as they are supported by the entire EuroGeoSurveys Community.
- MICA partners are in teams currently developing the IKMS, the EU-MKDP and the EU-UMKDP, and this ensures a **final EU-RMICP product fully integrated** with other components of the EURMKB.



**Figure 7:** A use case scenario illustrating the advantage of using the Dynamic Decision Graph approach to stakeholder queries.

A) A simplified view (limited number of domains) with all the ontological links between super concepts activated (not visible inside the graph interface).

B) Same view showing all the flows sheets indexed with the concepts of the domain ontologies, and activated (not visible inside the graph interface).

C) The Dynamic Decision Graph as it appears to the end user at the inception.

D) Selection of a concept: unrelated flow sheets disabled .

E) Specifies the question and selects a sub-concept. Certain sub-concepts stay highlighted (activated) because the selected sub-concept inherits the properties of the super concept ( or 'father' concept) located above.

F) Specifies the question and selects another sub-concept. Unrelated concepts and flow sheets are disabled. Only one flow sheet matches with the end user request

### 1.3.2 Links to international research and innovation activities, related or affiliated projects and initiatives

Partners of the MICA consortium are actively participating in the following projects:

**EGDI-Bridge:** A follow-up of the recently finalized FP7 project EGDI-Scope (<http://www.egdi-scope.eu>) aims to deliver an implementation plan for the realisation of a sustainable European Geological Data Infrastructure (EGDI). EGDI is considered one of three strategic pillars by the EuroGeoSurveys (EGS) community (32 European Geological Surveys), and its long term importance is best demonstrated by the willingness of the 32 EGS members to provide in-kind contributions to the basic maintenance of the core components. Recently, a proposal for an implementation project was submitted under the acronym GNEISS. EGDI will be the long-term sustainable structure where results from e.g. Minerals4EU will be hosted. *GEUS, BRGM, BGS, and GeoZS* are involved in the project.

**EURARE** (<http://www.eurare.eu/>): Investigating the basis for developing a European Rare Earth Element (REE) industry. BRGM, BGS and GEUS are partners in EURare which will provide data to the EU-RMIP (Flow sheets).

**Minerals4EU** (<http://www.minerals4eu.eu/> and <http://minerals4eu.brgm-rec.fr/>): Develops a permanent EU Mineral intelligence network structure. Delivers a web portal, a European Minerals Yearbook and foresight studies to meet the recommendations of the Raw Materials Initiative. *GTK, BRGM, BGS, BGR, GEUS, and GeoZS* are partners in Minerals4EU. This platform will provide data to the EU-RMIP Flow sheets.

**Minventory** (<http://www.minventory.eu/>): This project has determined the availability and accessibility of resources and reserves in Europe held in Member States and 13 neighbouring countries. Data availability was investigated for primary and secondary raw materials and ‘in-use stocks’. The project involved an analysis of barriers to harmonising data and interoperability development, and remedial actions. These were combined into a roadmap with proposed actions to be achieved by 2020 or beyond. The results of the review of data availability are available through a Commission portal and will provide the EU-RMIP with useful metadata related to reserves and resources and also to classification systems used. *BGS* was coordinating Minventory

**ProSUM:** By establishing a EU Information Network, the project will coordinate efforts to collect secondary CRM data and collate maps of stocks and flows for materials and products of the “urban mine”. Via a user-friendly, open-access Urban Mine Knowledge Data Platform (EU-UMKDP), it will communicate the results online and combine them with primary raw materials data from the on-going Minerals4EU project. The EU-UMKDP jointly developed by *BRGM, GEUS and GeoZS* is thus an extension of the EU-MKDP and will provide data to the EU-RMIP (Flow sheets).

The **IRP Working Group on Global Metal Flows** produces a series of reports on the metals challenge from a global perspective. These reports so far have addressed stocks in society, recycling rates, opportunities and barriers to improve recycling rates, and environmental impacts. Presently a large project is underway on demand and supply scenarios for metals. This project includes environmental impacts, and also includes nexus issues: the specification of resource requirements to enable metals production.

**MINATURA2020:** Diverse land use requires consideration of exclusiveness, reversibility, and consequences. The overall objective of MINATURA2020 is to develop a concept and methodology (i.e. a harmonised European regulatory/guidance/policy framework) for the definition and subsequent protection of “mineral deposits of public importance” to ensure ‘best use’ in the future. Providing a policy planning framework that comprises the ‘sustainability principle’ for mining is the driving force behind MINATURA2020. Partners from MINATURA2020 in MICA are *MinPol* (coordinator), *EFG, LPR, UCL* and *GeoZS*.



The MICA project is largely building on national contributions, and this in several ways. In addition to the Geological Surveys who are partners in MICA (BGR, BGS-NERC, BRGM, GEUS, GeoZS, and GTK, the EGS (EuroGeoSurveys) is a full partner and WP leader. Furthermore, 15 Geological Surveys are third party partners involved in several tasks of the project, bringing their expertise and knowledge to MICA and ensuring that the analyses performed in the project consider "regional" specificities, and ensuring commitment to data supply and maintenance.

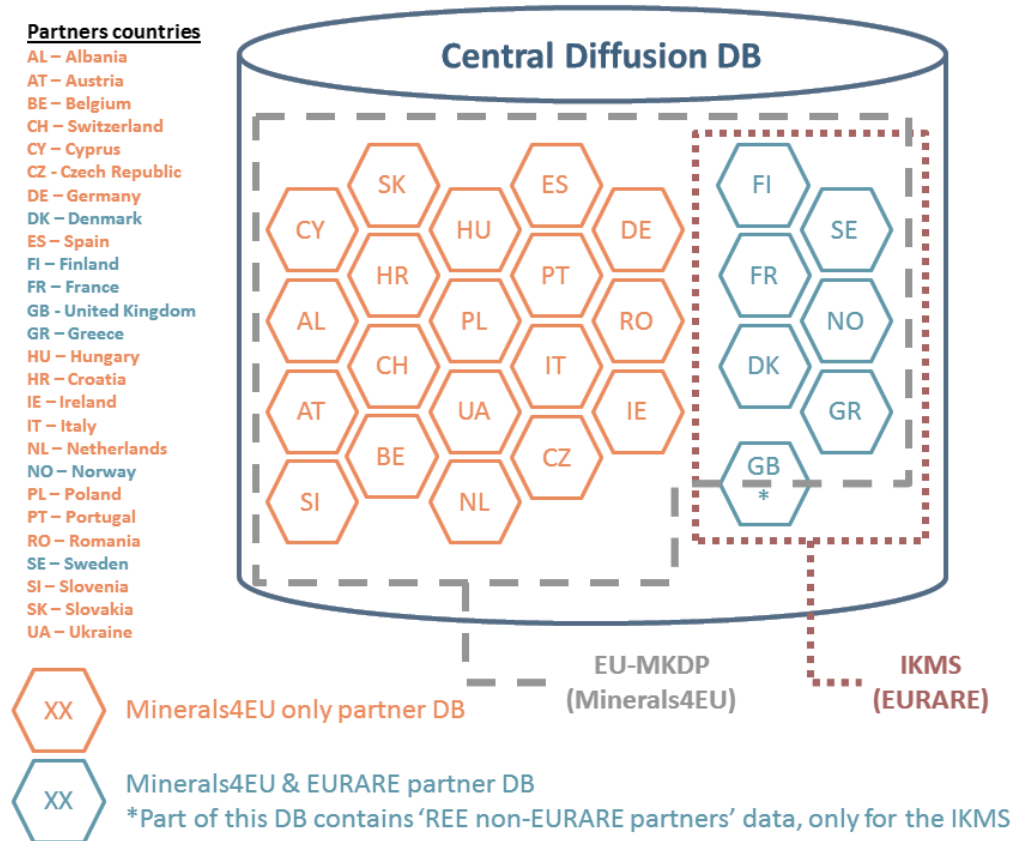
Also, MICA will use data provided by the IKMS and the EU-MKDP for building flow sheets. These platforms are based on a distributed architecture, which means that they are connected, via Web Feature Services (WFS), to national provider databases. The national contributions to these platforms are summarized in **Figure 8**.

For the EU-UMKDP, data related to the urban mine will be served by project databases developed by the ProSUM partners after compilation and homogenization of data coming from several sources (EUROSTAT, WEEE Forum, Empa, Universities, Eucobat, RECHARGE AISBL and others).

Furthermore, there are additional mineral resources databases such as the former EU-FP7 ProMine and

EuroGeoSource projects (<http://promine.gtk.fi/>; <http://ptrarc.gtk.fi/ProMine/default.aspx>;

<http://www.eurogeosource.eu/eurogeosource-portal/>; <http://www.eurogeosource.eu/>) which can be connected to the EU-RMICP.



**Figure 8:** The Central Diffusion Database shared by the IKMS (EURare) and the EU-MKDP (Minerals4EU), showing the involvement of all European countries for providing data related to primary and secondary mineral resources. Note the selection of data for each of the platforms is made by filters operating on commodities and name spaces, on top of the diffusion database.

### 1.3.3 Coordination and support measures

In order to realise its objectives, MICA will focus on two clearly defined coordination and support measures:

1. Coordination: Engaging with a broad range of diverse stakeholder groups that voice interest in RMI, particularly within the research and innovation realms of the Horizon 2020 societal challenges; Collecting requirements for defining the perimeter of the multidimensional ontology on which the Dynamic Decision Graph will be built; Collating and hierarchizing these requirements for identifying the

methods and tools and data necessary for developing key scenarios which will be the release vectors of knowledge, bringing high-quality expertise;

2. Support: Designing, realizing and evaluating a Dynamic Decision Graph for the MICA platform that meets requirements, allows by-passing the formalism of a question in natural language, allows specifying the query in the course of the process, optimizes the chance to identify the best possible answer to a query even complex, and maximises the opportunities to take advantage of the latest European research and innovation developments, including semantic web and data visualisation.

#### 1.3.4 Gender analysis

A gender analysis of the project participants shows a well-balanced composition. In total, there are 26 male and 20 female scientists involved from the 16 consortium members. In terms of work package leadership there are 4 work packages with female leaders (WP1, WP3, WP4, WP7) and 3 work packages with male leaders (WP2, WP5, WP6).

## 2. Impact

### 2.1 Expected impacts

In 2012, the European Commission launched the European Innovation Partnership on Raw Materials (EIP-RM). Its aim is to ensure the sustainable supply of raw materials to the European economy whilst increasing benefits for society as a whole, by promoting innovation across the entire raw materials value chain. The EIP-RM has published a Strategic Implementation Plan (SIP) setting out a number of actions which need to be undertaken to achieve these objectives. The SIP calls specifically for the creation of a European Raw Materials Knowledge Base (EURMKB) and the MICA project will make a substantial contribution through the development of the EU-Raw Materials Intelligence Capacity Platform (EU-RMICP).

#### 2.1.1 Contribution to the expected impacts set out in the work programme

Call/topic statement	Project response
In the medium to longer term enhanced impact of research and innovation activities through better identification of R&I priorities, improved co-ordination of EU and Member States' research and innovation programmes and funded activities, and synergies with international research and innovation programmes.	WP2, WP3, WP4 and WP5 will identify and assess R&I needs, and suggest possible development tracks at EU- and international level. The comprehensive policy analyses of WP5 and the needs analyses of WP2 will provide the framework for the recommendation of R&I priorities.
Greater EU influence in multilateral processes and better support to implementation of international commitments.	Having all information related to mineral intelligence methods, tools and data organised, quality controlled and available in a single place will significantly help decision makers at EU level to better navigate the Mineral Raw Materials Domain.
Contribution to evidence-based policy and appropriate, cost-effective management, planning and adaptation decisions by the public sector, businesses, industry and society addressing global challenges in the EU and beyond through the provision and effective communication of trustworthy science-based information.	WP5 will analyse existing regulations and sectorial policies, which will help to identify current gaps and will facilitate efficient and appropriate management, planning and adaptation decisions. WP2 provides a stakeholder classification that will enable effectively targeted communication (through WP7).
Establishing and maintaining strong and sustainable relationships with the countries concerned.	The EURMKB components are based on distributed data-architectures involving data contributions and commitments from all European countries through their National Geological Surveys and other

	institutions. This ensures anchorage and sustainable links within the European Union.
Improved conditions for sustainable access and supply of raw materials in the EU.	This is included in the MICA domain ontology, which covers land use, deposits of public importance, mining laws and permitting as well as data related to availability of primary and secondary resources.
Facilitated decision-making at EU, national, regional and local levels and in the minerals industry.	Through the EU-RMCP, all information related to data, tools, and methods are provided by MICA, helping stakeholders to identify the best possible decisions. WP2 also provides a classification of stakeholders as a basis for sound stakeholder management in decision-making.
Safeguarding of mineral wealth for future generations by defining mineral deposits of public importance.	This topic will be described thoroughly by MICA and will be the basis of a Fact Sheet, used in several scenarios (Flow Sheets). This will promote the concept and show its importance with regard to e.g., sustainability of raw materials. Furthermore, MICA is strongly linked to the project MINATURA2020 (coordinated by WP5 leader MinPol), that also addresses the question of deposits of public importance.
Stable and competitive supply of raw materials from EU sources.	This will be an important concept in the MICA domain ontology, with associated Fact sheets and Flow Sheets. This will help identify tools and data currently available to handle this major concern, and also their limitations.
Promotion of good governance and facilitation of public acceptance in the EU.	Public acceptance relies on developing multi-stakeholder dialogue, and promoting an "EU Responsible Mining Charter". Tools for assessing sustainable performance, and promoting suggestions for possible additional or improved indicators, will be presented in the MICA platform through dedicated Fact Sheets.
Increased competitiveness of the EU industry and minerals supply from EU sources.	MICA will deliver strengthening of the knowledge about which data are available (WP3), of the methods and tools to exploit these data, and the results they can produce (WP4) and of the regulatory framework (WP5). This is combined with the data related to primary and secondary resources delivered by the EU-MKDP (and other platforms) and will lead to a comprehensive and accurate representation of the EU raw material endowment.
Increased transparency of EU raw materials policies and legislation.	The policy analyses provided by WP5 will clarify the interdependencies of various policy arenas impacting raw materials, and will help to identify the drivers behind policy making in the EU. Such analyses can be included in Fact/Flow Sheets, or be a domain concept (see <b>Fig. 6</b> ), if identified as a priority during the analysis of stakeholders' needs.
Increased EU raw materials knowledge for different stakeholders, increased transparency of EU raw materials information through completion of an inventory of raw materials.	Such inventories are currently being compiled in EURare (REEs), Mineral4EU (primary resources and mining wastes) and ProSUM (urban mining waste), all these projects providing not only structured data (databases), but also all the pertinent knowledge. The knowledge data platforms developed in these projects are seen as components ("bricks") of the EURMKB. MICA brings together the tools, the

	methods and the "recipes" on how to use these data efficiently, and so they can be tailored to specific stakeholder requirements.
Better understanding of longer term raw materials research and innovation needs and initiatives by the wider society in the EU.	Raw materials issues in the wider society in the EU will be elicited through stakeholder consultations in WP2. In essence, MICA provides a holistic view of all data and methods relevant for the field of raw materials, and as such MICA will enable stakeholders and decision-makers to better understand the complexity of the field. This will help identify areas of priority in research and innovation in the future. The analysis of stakeholders' needs (WP2), will identify issues that are perceived as current and future challenges. WP7 will cooperate closely with WP2 to direct the communication at the wider society.
Facilitated translation of the industrial needs into governmental planning, policy and decision making and vice versa resulting in an improved environment for the industry in the EU.	WP2 provides a broad empirical appraisal of industry needs and of policy needs with regard to RMI, thus contributing to a better mutual understanding of joint interests and of coordination needs.
Contribution to achieving the objectives of the EIP on Raw Materials.	Several of the objectives/concepts of the EIP-RM will be explained and promoted in MICA. As a whole, the main contribution will bear on the development of the EURMKB. Here, MICA brings a new component to this major objective.

### 2.1.2 Societal impacts

Our modern developed society and its life-style strongly depends on a sustained supply of raw materials. While the majority of these materials are derived from primary mining, many members of society have become deeply suspicious of mining and often reject proposals for new mines or even the extension of existing ones. This rejection of mining in principle, and in specific cases, is often the result of poor environmental practices and an indifference towards societal impacts from the mining companies in the past. Thus, poor governance has led to a lack of trust between the different stakeholders concerned, namely the mine operators, regulatory and licensing authorities, and the general public (as individuals or organised in e.g. NGOs). This lack of trust among stakeholders has a negative impact on 'domestic' mining project developments and, thus, increased the reliance of Europe on imported raw materials, often from less developed countries with only basic environmental regulations.

Many European policy makers are faced with the difficult situation to have to ensure a sustained and sustainable supply of raw materials on one side and public opposition to mining on the other. The MICA project will add to trust-building processes by providing all stakeholders with Raw Materials Intelligence that not only describes the occurrence of such materials in their geological context, but also assesses their accessibility from a societal perspective. Raw Materials Intelligence thus will help to make the various social processes around mining more transparent and thus contributes to a better informed stakeholder dialogue. In the long term, this is expected to have a positive impact on the possibility to use our EU domestic sources of raw materials.

In addition to ensuring the supply of EU societies as a whole with the raw materials that are needed to maintain their standard of living, mining generates added value in a way that typically every job in a mine generates three or even more additional jobs in the surrounding societies.

### 2.1.3 Barriers, obstacles, and framework conditions

- The Answers provided by EU-RMICP may be unsuited for end users because scenarios will be described mostly by technical experts at Geological Surveys.



Solution: Ensure that the results of the stakeholder analyses are effectively incorporated into the ontology. Cooperation between WP2 and WP6 will ensure that non-technical aspects and stakeholders will be accounted for.

- The reliability of underlying data may be questionable

Solution: A detail assessment of data reliability and testing of which data types / data sets combine best with which methodology in order to comply with stakeholder RMI requirements is an integral part of the work plan. An investigation of data uncertainties is a prime objective of WP3 (data). Metadata associated with data bring information about dataset quality and accuracy into the data base.

- The MICA user interface is too difficult to use

Solution: The MICA interface will be specifically designed for non-skilled end users. It will allow the end user to specify his query during the process of navigation and discovery in the DDG.

- Lack of educational support

Solution: The WP7 is taking care of communicating the development of the MICA project to stakeholders. Dissemination activities include an on-line training course.

- Cultural differences across domains

Solution: Geographically, the 15 partners of the consortium cover a large part of Europe and will be able to take into consideration and manage cultural differences that may lead to different approaches towards the same problem. Furthermore, 15 surveys that are members of EGS will contribute as third party partners, additionally strengthening diversity of the expertise.

- Un-even use of standards across domains (e.g. resource classification standards etc.)

Solution: This problem goes beyond the MICA objectives. However, MICA can contribute through Fact sheets and Flow Sheets to make the society aware of these problems and to promote the use of certain international standards. Also, this work may identify critical areas that require further efforts towards European harmonization of regulations.

## **2.2 Measures to maximise impact**

### *2.2.1 Plan for dissemination and exploitation (PDE)*

Dissemination activities implemented during and after the project are aimed at maximizing the impact and use of the raw materials intelligence platform built by MICA. These activities will include first of all, general actions, aimed at the potential stakeholders and subsequently, actions specifically targeting the different types of audience on the basis on their specific needs defined during WP2. This includes research, policy making, commercial and investment, environmental and social impacts, setting standards, and skills and educational training (WP7). Exploitation of the results will be optimised by the involvement of the EuroGeoSurveys (EGS) network, which brings together the Geological Surveys from 36 European countries and the European Federation of Geologists (EFG) representing 50.000 professional geoscientists from 24 European countries.

The EGS Secretary General, who is regularly invited to give keynote speeches to major international conferences, will be directly involved in WP7 activities. EGS coordinates the dissemination activities of the Minerals4EU project that will develop the EU Mineral intelligence network structure delivering a web portal, a European Minerals Yearbook and foresight studies. EGS also runs the Secretariat of the European Technology Platform on Sustainable Mineral Resources, which brings together several of the main European stakeholders, mainly from the industry sectors. Finally, EGS is represented in the High Level Group of the European Innovation Partnership on Raw Materials, in the GEO High Level Group, and in several other high level boards. Participation of EGS

will thus ensure the maximum possible impact of the project findings. The outreach activities will be enhanced by a continuous updating of each WP progress and communication with WP1 (Management) and WP2 (Stakeholder identification, identification and mapping of stakeholder requirements).

The exploitation activities of MICA mainly refer to activities of mainstreaming (successful transfer of project results to appropriate stakeholders and decision-makers) and multiplication (convincing other end-users to adopt or apply the outputs of the project) using social media, training courses, conferences, etc. The main MICA tools and channels of dissemination that will be established during the project implementation will be used for the purpose of exploiting the project's results. The exploitation activities will be built on i) the direct involvement of end-user representatives in the project consortium ii) on the partners' well established networks in the participating countries and beyond, as well as iii) on a set of communication and technical materials that will be produced for this purpose. The MICA network itself will be structured on an enlargement and sustainability strategy, to ensure a strong impact during and after the funding period.

WP7 will ensure that all relevant and interested stakeholders are regularly informed and updated. Therefore, simplicity and consistency are essential to ensure that the target audiences understand and retain the information. This will also ensure transparency in the implementation of the project.

For this, it is fundamental to develop and implement a dedicated **Communication Strategy**, which will encompass outreach and exploitation, allowing the maintenance of linkages with relevant past, on-going and in preparation initiatives, as well as the dissemination of information in a reliable, comprehensive, objective and professional way. Most of MICA exploitation, communication and dissemination efforts will be naturally targeted to linking to the European Minerals Intelligence Network set up by the Minerals4EU project and that will probably be established as part of a permanent body in 2015. It will also link to the International Observatory for Raw Materials that will have been established by January 2018 by the on-going EU funded project INTRAW, headed by the EFG. Starting with the Minerals Intelligence Network created by the Minerals4EU, WP2 and WP7 will contribute to expand the network further by identifying additional target audiences, considering MICA's outcomes and all communities implicated on mineral raw materials supply in the EU and beyond, from public authorities to industry users or consumers.

The exploitation activities aim at achieving stable frameworks of cooperation throughout the life-cycle of the project as well as the continuing use and maintenance of MICA outcomes after the official project termination, by transferring the acquired knowledge into the permanent Minerals Intelligence Network developed under the Minerals4EU project.

### *2.2.2 Communication activities*

The Communication Strategy will take into account actions targeted at the national, European and international level with the aim to improve the understanding of the potential added value of MICA products and outcomes in terms of further research activities: by the consortium members; by research communities; by policy makers; by public administration staff; and by industry. Communication actions during the project will include stakeholders workshops (WP7-WP2), training sessions and materials (WP7), and communication activities such as consultation and awareness seminars, conference papers and presentations, press releases, the website, attending national and international conferences (WP7). They are aimed at raising awareness and visibility of the project towards wider audiences and at exploiting the results of MICA; at creating a network of stakeholders; at transferring the results to appropriate decision-makers to achieve their sustainable promotion and support; at harmonizing the exploitation activities of the partners for a more efficient and effective communication.

Progress towards dissemination targets and impact of dissemination activities will be measured through monitoring: (1) the amount of information available through communication tools, (2), number of communication tools available, (3) number of participants involved in seminars/workshops, (4) number of participants involved in the training courses (5) number of internet search results and media publications referring to MICA.

Actions in order to maximize the impact and use of the raw materials intelligence platform will include:

- Ensuring the projects results are ingested into the European Minerals Intelligence Platform developed by the Minerals4EU project
- Participating in international conferences

- Informing and getting the acceptance of the EuroGeoSurveys General Meeting (the EU most influential geoscientific decision-making body)
- Including the projects updates into the agenda of the ETP SMR meeting and events
- Participating in and debriefing the High Level Group of the European Innovation Partnership on Raw Materials, in the GEO High Level Group
- Developing dissemination materials to support and promote the project
- Linking the project to partners' websites including the Minerals4EU web portal
- Maintaining linkages with relevant past, on-going and in preparation initiatives

### *2.2.3 Project Sustainability*

MICA will produce an Intelligence Capacity Platform, which will require maintenance and updates. It is expected that the overall project maintenance and development costs after the initial set up within the EC funded project will be relatively low. This is because the key components – the many datasets – reside with highly reputable and authoritative organisations – e.g. the national Geological Surveys, or are directly managed by the European Commission (EC) Services. It is, expected that the sustainability of the EU Raw Materials Knowledge Base (EURMKB) will be guaranteed by the EC. The mineral resources component of the EURMKB is the Minerals Resources Knowledge Base (MRKB). EuroGeoSurveys and the Minerals4EU project partners have committed to establishing a Permanent European Minerals Intelligence Network running the MRKB for the EU. MICA, as defined by the scope of this call, will improve the capacity of Minerals4EU to contribute to the EURMKB.

The close coordination with the Minerals4EU permanent structure and other raw materials projects will ensure the sustainability of EURMKB and maximise impacts and benefit from the use of public funds. The MRKB will also be integrated into the European Geological Data Infrastructure (EGDI), which will ensure further sustainability.

Moreover, the Stakeholders Network developed by MICA will also link to the European Minerals Intelligence Network developed and maintained by Minerals4EU, to improve the EU intelligence capacity.

### *2.2.4 Data generation and management*

The term "data" covers at least two types of objects: **structured data** which are coming from databases, and **semi- or non-structured data** which can refer respectively to Excel spreadsheets for example and to any type of document, ranging from reports, graph charts, time-series, publications, maps, images, etc. in any format (.docx, .PDF, .jpeg, .TIFF...).

**MICA will not actually provide any structured data**, these are instead delivered through the various platforms MICA intends to coordinate (EU-UMKDP, IKMS, EU-MKDP from Minerals4EU, EURare and ProSUM). Rather MICA will design tools and methods for integrating data through Fact and Flow Sheets described above. A Dynamic Decision Graph (DDG) will dynamically inject **information about the structured data** - needed to provide the best possible answer to an end user query. This information will be provided by WP3 and include essential labels related to location of datasets, their availability (downloadable or not), their status (public or not) and the conditions for their use (if any). If an end-user wants to download the suggested datasets, he or she will have to "connect" to the above-mentioned platforms directly through an INSPIRE/OGC compliant WFS, web portals or dedicated download facilities.

The non-structured data provided by MICA in the form of Fact sheets and Flow sheets will be generated by the different WPs. These data are stored in the Central database of the EU-RMICP (accompanied by their metadata), which will be specially designed for these particular data. The Central database can be seen as a Database of Descriptions (descriptions of methods, models, tools, data, and scenarios). These descriptions will be provided to an end user after the phase of navigation and selection made in the DDG. These non-structured data are thus public data.

The metadata mentioned above will be developed using the DUBLIN CORE profile (<http://dublincore.org/>), extended when necessary for the needs of the project. This is also this profile, which is used in the IKMS and sister platforms. It should be noticed here that the DUBLIN CORE profile allows a perfect management of the rights attached to a document and its accessibility. Thus, a copyrighted document mentioned in a Flow sheet because it is of prime importance may not be downloadable by end users if they do not have the right to do so. The MICA system favours each time this is possible, the entry of a (perennial) link to a document and not the upload of the document itself onto the system.

All the non-structured data generated by the project will thus be accessible through the Dynamic Decision Graph (DDG) developed using open source software in order to be self-contained and transferable into the future European Geological Data Infrastructure. Meanwhile, the maintenance of the system and of the data it contains could be managed by the Minerals4EU network and permanent body currently under construction.

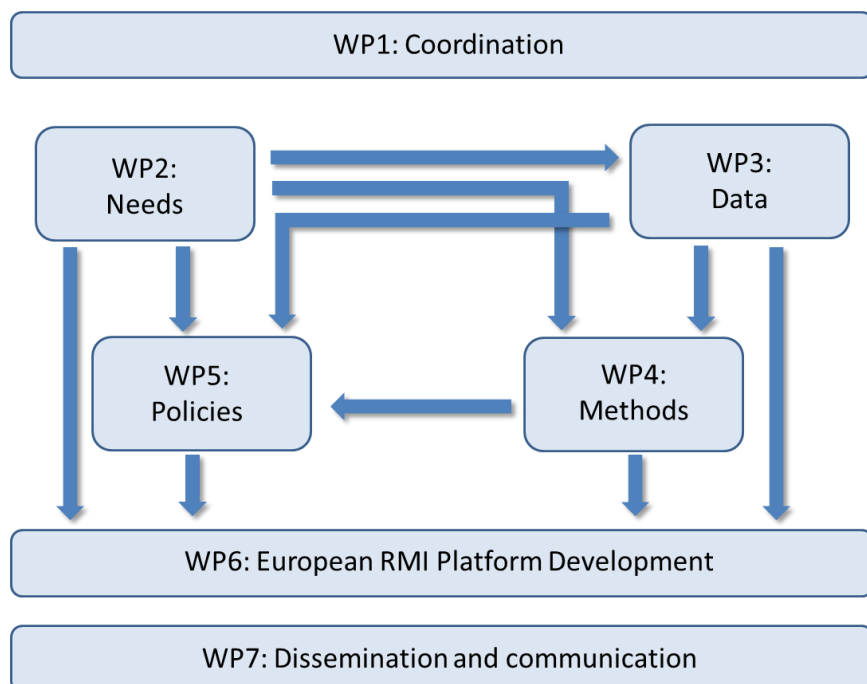
### 3. Implementation

#### 3.1 Work plan – Work packages, deliverables and milestones

The MICA project is carried out in seven interconnected work packages during a time frame of 24 months. The ultimate aim is to develop a Raw Materials Intelligence Capacity Platform that can provide answers to raw material questions by various stakeholders. MICA is a truly interdisciplinary endeavour that brings together social and political scientists (analyses of stakeholder RMI requirements and raw material policies), geoscientists and technical experts (data and methods) and IT developers organized in seven work packages.

##### 3.1.1. General work plan and Milestones

The overall project plan is structured into four phases that are associated with specific milestones. The interrelationship of work packages and the sequencing of deliverables are described below and illustrated in a PERT diagram (**Fig. 9**) and a GANTT chart (**Fig. 10**).



**Figure 9:** PERT chart illustrating the relationship between individual work packages. Note that WP1 and WP7 are covering aspects of relevance for all other work packages, which is not illustrated however.

- **Start-up (M0-2):**

The success of the MICA project relies heavily on a timely definition of stakeholder groups and their raw material intelligence requirements. This is an important input from WP2 to other work packages aiming at matching information (WP3 and 4) with policy options (WP5). Also, the construction of the RMIC platform (WP6) must be firmly grounded on the results of the stakeholder analysis. In order to kick-start this process, an inception paper will be prepared by WP2 based on a preliminary stakeholder analysis using information compiled during previous projects. Furthermore, an internal project workshop during the first full consortium meeting will be refining this starting point. In a similar fashion, existing material will be compiled for the work in WP3 (data) and WP4 (methods). The end of the start-up phase is marked by Milestone MS1 (Table 3.2a).

- **Phase 1 (M3-12)**

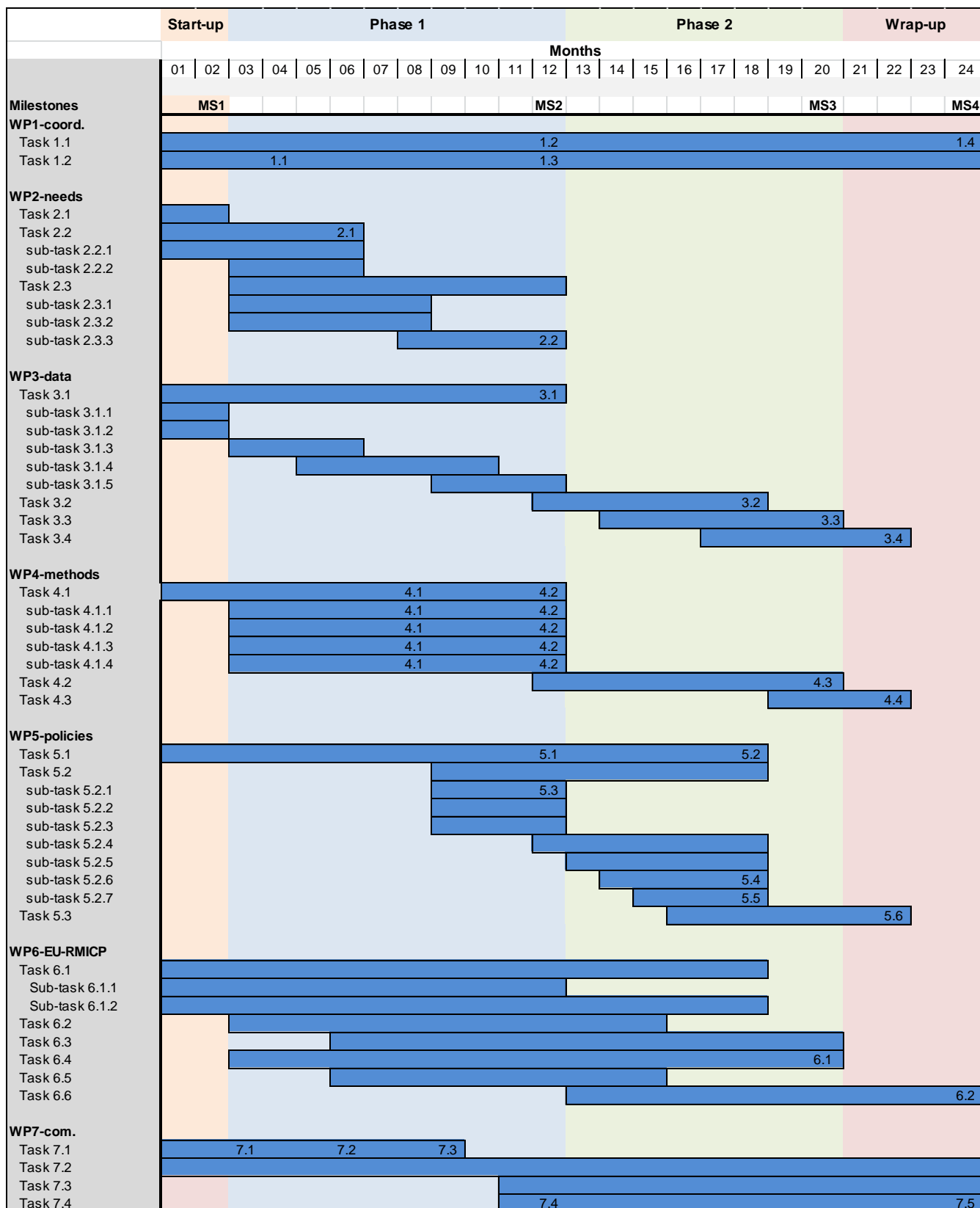
Based on the inception paper, the stakeholder RMI requirements will be investigated in detail by WP2 during this phase with results continuously flowing into the activities of WPs 3, 4, 5, and 6. Activities in WP3 are focussed on assessments of data use and data uncertainty and WP4 will conduct a comprehensive review of methods and tools. This will be complemented by work in WP5 on raw material intelligence approaches and the development of a raw material intelligence matrix. In WP6, the development work will focus on a synthesis of stakeholder requirements, methods functionality analysis, translation of end users' queries in a graph of domain/sub-domain concepts and development of the select and rank modules. Also, during Phase 1 there will be deliveries from WP7 ensuring the communication with stakeholders and the engagement of geoscience data providers and potential users of the RMIC platform. The end of Phase 1 is marked by Milestone MS2 (Table 3.2a).

- **Phase 2 (M13-20)**

During Phase 2 there will be a strong emphasis on integration of the results. Consortium members will work together on tasks such as "Mapping data to tools and methods" (Task 3.3) and "Transforming data into information and knowledge" (Task 3.4). Policy options are examined in WP5 leading to reports on raw materials foresight and the RMI matrix. The dissemination of these findings will be one of the focus activities of WP7 during this phase. In WP6, the construction of the RMI platform is coming to its conclusion and all the work performed in Tasks 6.1, 6.2, 6.3 and 6.4 will be integrated. Continued communication and dissemination activities in WP7 will ensure stakeholder involvement and engagement of data providers and professionals. The end of phase 2 is marked by Milestone MS3 (Table 3.2a).

- **Wrap-up (M21-24)**

During the final phase of the MICA project the focus will be on the preparation of recommendations regarding the continued development and maintenance of a European raw materials knowledge system. These reports will summarise the findings of WP3, WP4 and WP5. Importantly, the full EU-RMICP system will be delivered and integrated to the EURMKB. This final phase will also concentrate on dissemination of the project results to secure support for the EU-RMICP after the completion of the project. The end of the wrap-up phase is marked by Milestone MS4 (Table 3.2a).



**Figure 10:** GANTT diagram showing the time lines of all tasks in the MICA project. Numbers indicate defined deliveries.

**Table 3.1a:**

Work package number	1	Start Date or Starting Event					M1
Work package title	Management and Coordination (short: Coordination)						
Participant number	1	2	3	4	5	6	7
Short name of participant	GEUS	F-ISI	BGS	UL-CML	MinPol	BRGM	EGS
Person/months per participant:	10	0.5	0.5	0.5	0.5	0.5	0.5

**Objectives**

This work package is concerned with the overall financial, administrative and operational management of the project as well as coordinating activities across work packages.

The specific objectives are to

- perform daily management of the project (monitoring of progress; communication with partners and with the EC; financial management; reporting; decision making; conflict management)
- organise meetings and produce minutes of meetings

Manage the Advisory Board and ensure proper engagement with its members

**Description of work****Task 1.1 Project Management**

(lead: GEUS, participants: WP leaders from Fraunhofer-ISI, BGS, U Leiden, MinPol, BRGM, EGS)

This task covers

- daily management of the project and consortium including financial, administrative and operational management
- monitoring of progress
- coordination of dependencies across work packages
- arrangement of regular web- or teleconference with the consortium
- collecting and quality assurance of deliverables
- interim and final reporting to the EC

**Task 1.2 Management of Advisory Board (lead: GEUS)**

This task covers the general interaction with members of the Advisory Board including

- Communication about project progress
- Arrangement of Advisory Board meetings

Compilation and dissemination of feed-back from the Advisory Board to the rest of the consortium

**Deliverables****Task 1.1**

**D1.2:** First year progress report (M12)

**D1.4:** Final project report (M24)

**Task 1.2**

**D1.1:** List of Advisory Board Members (M4)

**D1.3:** Summary of mid-way recommendation from Advisory Board (M12)

Work package number	2		Start Date or Starting Event						M1
Work package title	Stakeholder identification, appraisal and mapping of stakeholder requirements (short: Needs)								
Participant number	2	1	3	4	5	6	7	12	13
Short name of participant	F-ISI	GEUS	NERC-BGS	UL-CML	MinPol	BRGM	EGS	EFG	NTNU
Person/months per participant:	10	1	1	2	1,5	1	2	3	1

### Objectives

The objective of WP2 is to provide a synopsis of stakeholder needs in Raw Material Intelligence (RMI) and – more concretely – of requirements to the envisaged RMI capacity. It aims at

- a comprehensive and differentiated inventory of relevant stakeholders, and
- an exploration of stakes (interests/questions) in RMI and how these are met at the moment.

The main purpose of WP2 is to inform WP3-WP7 about stakeholder requirements.

### Description of work

Task 2.1 maps the pre-existing knowledge of the WP2 participants about the stakeholder landscape and stakeholder requirements to achieve a shared understanding of key RMI issues at an early stage of the MICA project. Task 2.2 identifies and classifies stakeholders systematically, to provide a sound basis for the broader and deeper appraisal of stakeholder needs and requirements in task 2.3.

#### Task 2.1: Inception of stakeholder landscape & hypothesis on requirements [M1-M2]

*Lead: F-ISI, Contributors: all other participants*

The inception workshop will be informed by an inventory of stakeholders in RMI compiled from past projects (e.g. Minerals4EU, ProSUM) and by WP leader briefs on supposed stakeholder requirements. These two strands will be mapped, discussed and matched to one another in a half-day internal workshop after the Kick-Off. An inception paper will be prepared that depicts shared key requirements to the RMI capacity and refined directions for the systematic search.

#### Task 2.2: Systematic identification & classification of stakeholders [M1-M6]

*Lead: ISI, Contributors: all other participants*

**T2.2.1: Stakeholder list.** Starting with the stakeholders mentioned in the call, we will expand the list, identify sub-groups, and concrete organisations and persons representing these sub-groups:

- EC level: analyse past tenders to find out who issued and who answered the tenders, thereby identification of the advisors and questions; trace the stakeholders of EU mineral policy, e.g. within consultations, thereby identification of the decision makers and initiative aims;
- EU member-state level: classify member states to select representative countries; start with the respective economics and environmental ministries to analyse past tenders and trace stakeholders in national policies analogue to above;
- Industry: approach industry associations and chambers, focus on raw-material dependent sectors such as mining and waste management;
- Expert communities and other interest groups: analyse – based on literature and web search routines – scientific conferences and positioning papers respectively (last 2 to 3 years).

An open call to raise stakes via the project's online media is provided by WP7.

**T2.2.2: Stakeholder analysis.** The initial stakeholder list will be elaborated into a fully-fledged stakeholder analysis covering in particular involved, affected and dormant stakeholders.<sup>8</sup> Stakeholder identification and analysis go hand in hand by elicitation of stakeholder positions towards key RMI issues, such as primary or

<sup>8</sup> cf. Mitchell, R.K.; Agle, B.R.; Wood, D.J. (1997): Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. In: Academy of Management Review, 22 (4), p. 853-886.



secondary raw material supply extension. WP2 participants will hold brainstorming sessions to identify actors affected by the strategic choices under discussion through critical systems thinking.<sup>9</sup> Foresight studies will be analysed to identify in particular dormant stakeholders which might gain future relevance.

### **Task 2.3: Identification and mapping of stakeholders' RMI needs & requirements [M3-M12]**

*Lead: F-ISI, Contributors: all other participants*

**Task 2.3.1: Preparation of the appraisal.** The scope of the needs and requirements appraisal will account for the data (WP3), method (WP4) and RMI platform (WP6) capabilities. An appraisal template will be designed and agreed upon. The empirical appraisal concept will be tailored to the principal stakeholder groups identified in Task 2.2.

**Task 2.3.2: Appraisal of stakeholders' RMI needs & requirements.** Three empirical methods are envisaged:

- i. 2-3 surveys to capture distributed stakeholders' positions (e.g. member-state geosurveys, professional geologists);
- ii. 4-6 small group meetings/interviews to elicit key stakeholders' positions in depth (e.g. EC members, recycling industry); and
- iii. 1 large multi-stakeholder workshop to identify non-apparent stakeholders' needs and requirements and to identify joint interests of a broad range of representative stakeholders (e.g. EC members, international organizations, cities & regions, mining industry, finance)

This interactive stakeholder workshop with ~ 30 external participants will be held in Brussels along with the second Consortium meeting.

**Task 2.3.3: Data analysis and validation.** The outcomes of the need & requirement appraisal will be analysed, classified and mapped. The findings will then be consolidated by the project team in a virtual meeting, and documented in a report.

### **Deliverables**

D2.1: Stakeholder Report - documenting task 2.2 (Month 6)

D2.2: Map of Stakeholders' RMI needs and requirements - documenting task 2.3 (Month 12)

Work package number	3			Start Date or Starting Event					M1
Work package title	Data for raw materials intelligence capacity (short: Data)								
Participant number	3	6	2	9	1	5	13	4	8
Short name of participant	BGS	BRGM	F-ISI	GTK	GEUS	Minpol	NTNU	UL-CML	BGR
Person/months per participant:	18	2	2	1	1	1	2	2	1

### **Objectives**

WP3 aims to review and assess datasets relevant to raw materials intelligence that currently or in the future may be used to provide the evidence and knowledge required to support the needs of a range of stakeholders, including decision and policy makers, industry, the research community and the general public.

### **Description of work**

WP3 consists of the following four tasks:

**Task 3.1: Review of data availability, use and uncertainty.** – *BGS lead, contributors: Contributors: all other participants.* This task will review data availability and assess data usage, potential applications and uncertainty, with the aim of developing an inventory of data relevant to raw materials intelligence. Datasets for primary and secondary raw materials (non-energy non-agricultural mineral-based raw materials) will be

<sup>9</sup> cf. Achterkamp, M.C.; Vos, J.F.J. (2007): Critically identifying stakeholders – evaluating boundary critique as a vehicle for stakeholder identification. In: Systems Research and Behavioral Science, 24, p. 3-14.

investigated. The review will not be restricted to EU data sources but consider all potentially relevant datasets available globally.

Task 3.1 contains seven subtasks:

*T3.1.1. Developing the preliminary structure of a raw materials data inventory:* The structure of the raw materials inventory will be developed prior to the data review process. An illustration of the possible structure of this inventory is presented in **Figure 4**.

*T3.1.2. Review of existing raw materials data inventories:* Data arising from past and current projects undertaken in the EU (e.g. Minventory, Minerals4EU, Eurogeosource, Promine, EGDI, Prosum, RMSA etc), which have made significant contributions to data availability and our understanding of raw materials will be investigated. These existing data inventories will be added to our current inventory structure.

*T3.1.3. Review of other relevant datasets:* Additional datasets that are not part of the inventories reviewed in T3.1.2 will be examined and added to the data inventory. These may comprise datasets from public and private sources and other relevant research. For all identified data/inventories (T3.1.2 and T3.1.3) metadata on the use of the data by end user groups will be added to the inventory descriptors (this will be facilitated by the stakeholder engagement undertaken in WP2).

*T3.1.4. Quality assurance of the raw materials data inventory:* This considers data uncertainty for the datasets identified, develop a qualitative indicator (based on expert knowledge) of data uncertainty, which will be added to the inventory descriptions. Furthermore, redundancies and constraints associated with complimentary datasets are identified and previous assessments of data uncertainty associated with the datasets are examined.

*T3.1.5. Case studies on data uncertainty:* Building on T3.1.4, up to 3 case studies will be produced in order to develop our quantitative understanding of data uncertainty. These will assess ambiguity and vagueness in the data by: identifying epistemic or conceptual uncertainties and identifying sources of uncertainty in the quantitative data. Uncertainty will be addressed using different methods, such as expert elicitation and fuzzy set theory. The outputs of T3.1.5 will feed into population of the data inventory.

The output from Task 3.1 will be a preliminary raw materials data inventory and a workshop report. The raw materials inventory can be transformed into fact sheets to be included into the European Raw Materials Intelligence Capacity Platform (EU-RMIPC).

**Task 3.2: Mapping data to tools and methods.** – *UL-CML lead/ Contributors: BGS, NTNU.* In collaboration with WP4, WP3 will map datasets to appropriate tools and methods. Where multiple datasets from different sources are available to address the same parameter or issue, then prioritisation of datasets that best fit the purpose and objectives of the method/ tool/calculation will be undertaken. The expert knowledge of partners involved in the WP3 will be used to develop an indicator that scores how fit-for-purpose datasets and data categories are for specific tools and methods and this metadata will be added to the data inventory. Data gaps identified during the mapping exercise will be reported. A final raw materials data inventory will be produced at the end of this task.

**Task 3.3: Transforming data into information and knowledge.** – *BGS/BRGM lead/ Contributors: F-ISI.* To determine how datasets are used and what information and/or knowledge they convey two approaches are proposed: i) a *proactive approach* (WP3 lead) and ii) a *reactive approach* (WP2 lead).

*Proactive approach:*

*T3.3.1: Consortium expert knowledge – lead BGS:* the knowledge of experts forming this consortium will be used to define the topics and emerging issues that require answers from the data, tools and methods. These will be defined at an early stage in the project and datasets will be mapped against the identified topics and questions as the inventory evolves. Furthermore, data gaps will be identified and reported. A short survey and discussion will be undertaken to define these in the first consortium meeting (Kick-off).

*T3.3.2 Workshop on data on mineral intelligence – lead BRGM:* The workshop will examine the relationships between stakeholder questions and topics, datasets and data uncertainty. The workshop will focus on specific topics deemed highest priority by stakeholder and the Commission, for example forecasting supply and demand, commodity prices and impacts of new technologies. These topics

comprise components of decision trees used by stakeholder groups. For example, a mining company may be interested in data/methods for forecasting demand for a specific commodity to aid future investment decisions. However, steel manufacturer may require information on forecast demand to assess whether diversification of existing supply chains, or substitution should be considered. Whilst both stakeholder groups are interested in the same topic, the decisions to be made using similar data are different and therefore the uncertainty associated with the use of the underlying data and ultimately the decisions arising will be different.

The outputs of these sub-tasks will be discussed in a report and will feed into the EU RMICP platform of WP6.

**Task 3.4: Developing a future raw materials data strategy for Europe. – lead BGS/ Contributors:**

*Minpol, UL-CML.* Any future data strategy should consider emerging issues on raw materials and attempt to address them by providing relevant links to data. Task 3.1 to 3.3 will assist in developing suitable recommendations, which will feed into the knowledge platform developed by WP6. Data acquisition, harmonisation, accessibility and addressing issues and gaps in data and knowledge will represent some of the key elements of the proposed future raw materials data strategy. Key recommendations from WP4 and WP5 will feed into the future data strategy. The strategy will be presented in Deliverable D 3.5.

**Deliverables**

D 3.1 – Draft inventory of metadata on raw materials– Month 12

D 3.2 – Final inventory-Month 18

D 3.3 – Report on the transformation of data into information and knowledge – Month 20

D 3.4 – Draft report on raw materials data inventory presenting methodology, data availability and assessment of data uncertainty. Future raw materials data strategy – Month 22

Work package number	4	Start Date or Starting Event					M1
Work package title	Methods and tools for mineral intelligence (short: Methods)						
Participant number	4	3	6	2	14	13	
Short name of participant	UL-CML	NERC-BGS	BRGM	F-ISI	UCL-ISR	NTNU	
Person/months per participant:	14	4	2	4	4	4	

**Objectives**

Inventory and assessment of tools and methods for providing expertise to stakeholders on mineral intelligence.

**Description of work**

Work Package 4 aims at providing an overview of methods and tools for raw materials intelligence, and to assess the relevance and usefulness of these tools for providing stakeholder and policy information needs as identified within Work Package 2.

Methods and tools are needed to process the data on raw materials and enable drawing relevant conclusions from them. Many different methods and tools exist, each with their own purpose and therefore with their own scope and methodological strengths and weaknesses.

Identifying the different stages of the life cycle of raw materials, it will be possible to assign the methods to each stage. It is also important to identify methods that integrate over the entire life cycle, as this has additional value from a materials management point of view. The questions and intelligence requirements identified in WP2 are categorized and analysed in view of the different methods in order to identify (i) data requirements, (ii) advantages and disadvantages of different tools, and (iii) potential synergies in terms of data and tools. Here it is important that the total scope of the questions is adequately covered by the methodologies. The methodologies will be classified according to a number of characteristics, such as scope,

level of detail, type of model used, input data required, indicators delivered, ability to forecast, ability to include uncertainty analyses etc. etc.

Method development in the area of raw materials occurs at the global level. It is therefore important to include the global community of both method developers and stakeholders. Including the global scientific and government community will be initiated via the network around the International Resource Panel of the UNEP, where experts in this area from all over the world come together with a steering committee of government representatives. Including the stakeholder community will be done via the ICM, the umbrella organization of companies and branch organisations of mineral producers.

We will distinguish four types of methodologies:

1. Methods to identify and assess geogenic and anthropogenic (urban) stocks
2. Methods to assess society's metabolism
3. Methods to assess the economic aspects of the use of resources
4. Methods to forecast or estimate future use of resources

It should be recognized that the various tools and methods assessed in WP4 rely on data (the topic of WP3) and that data are typically fraught with uncertainty. Data uncertainty analysis and representation is treated in WP3 as part of the process of data collection and synthesis. In WP4 arises the question of uncertainty propagation through the methods and tools that are considered. We will adopt an open view regarding propagation methodologies, drawing from classical probability theory but also from more recent information theories designed to address knowledge gaps and imprecise information (e.g. imprecise probability theory, belief functions, fuzzy-set theory, ...).

The work will be divided into task as follows.

**Task 4.1: Reporting on methods** (task leader: CML).

1. Inventory of methodologies and tools and scoping the methodologies on a number of characteristics  
After a brief scoping, we will decide on a precise list of methodologies to be included. This task would rely on past inventories, that have been done within the framework of previous projects. The team contains experts on many of these methodologies. The result of this task will be a report describing and characterizing the methodologies in fact sheets. These fact sheets will serve within WP6 for the development of the raw materials intelligence capacity platform. As part of WP6, an inventory of method functionalities will be generated in the form of fact sheet metadata. The metadata will then be assigned to the various ontologies.

2. Confronting the methodologies with the stakeholder questions from WP2

This part of the work can start after the stakeholder questions are identified in WP2. Stakeholder questions will be translated into requirements from data and methodology. Here we envisage also a feedback with WP3, to ensure certain essential data are indeed available, or if not, establish whether these data are collectable. For example, a question with regard to the future availability of a specific metal will be translated into (1) time series of past supply (2) forecasts of demand (3) identification of deposits that could be mined (4) forecasts of urban mining / recycling and (5) economic aspects such as investments in new mines. For all of these, data, methods, assumptions and models are required. These will be identified, leading to a map of what can and can't be done in the present situation. With regard to data, a feedback with WP3 is envisaged, in the organisation of a joint workshop. The result will be published in a brief report or a paper for a scientific journal.

Task 4.1 is divided into subtasks based on the different types of methodologies as distinguished above:

Subtask 4.1.1 reporting on methods to identify and assess geological and urban stocks (subtask leader: BGS)

Subtask 4.1.2 reporting on industrial ecology methods (subtask leader: CML)

Subtask 4.1.3: Reporting on economic methods (subtask leader: UCL-ISR)

Subtask 4.1.4: Reporting on methods to assess methodological uncertainties (subtask leader BRGM).

**Task 4.2: Conducting case studies** (task leader: NTNU. Contributors: CML, F-ISI, BRGM)).

The aim of this task is to conduct case studies based on past applications of the methodologies, with a view on how they would support the stakeholder questions from WP2. In this task, different partners will

cooperate to provide the input from various angles. The outcomes of Task 4.1 will be used to illustrate the practical application of these methods. The most important result is an interpretation of the outcomes of the methods and models in terms of the question asked. Each case study will result in a brief report or paper for a scientific journal.

The case studies will cover a broad field of stakeholder questions and illustrate the potential of the various methodologies included in Task 4.1. Topics could include 1) Future demand and supply of a (number of) specific resource(s); 2) Environmental impacts of the use of a specific resource, or minerals in general; 3) Potential of circular economy for specific resources; 4) Impacts of energy transition on resource demand and supply and other issues.

**Task 4.3: Providing recommendations.** (task leader: BRGM; contributors: all WP4 partners)

This task aims at providing recommendations on the use of these methodologies in a raw materials knowledge system. For each of the questions identified in WP2, we will recommend the possible and most appropriate methods and models to use, and we will identify the main difficulties in arriving at an answer. This may lead to a number of recommendations, aimed at statistical offices and geological survey institutes for the collection of data, at scientists developing methods and models, and at stakeholders relevant to the use of the different methods. These will be put down in a report and will be communicated at the various dissemination platforms of the project

**Deliverables**

- D4.1 Fact sheets of methods – Month 8
- D4.2 Report or paper on the use of methodologies for stakeholder questions – Month 12
- D4.3 Four case study reports – Month 20
- D4.4 Recommendations document – Month 22

Work package number	5	Start Date or Starting Event					M1-M24
Work package title	Minerals policy context (short: ‘Policies’)						
Participant number	5	11	3	2	13	14	
Short name of participant	MinPol	LPRC	BGS	F-ISI	NTNU	UCL ISR	
Person-months per participant:	10	9	1	1	1	1	

**Objectives**

Anticipatory raw materials intelligence (RMI) is developed in a complex context of sectoral policies (mineral, environmental, energy, fiscal, foreign, development, security, spatial planning, water resources, investment, etc.) and regulations at national and international (EU) level, stakeholder needs, and practical data availability constraints. In WP5, a stocktaking exercise on existing relevant scenarios and international planning documents will be undertaken. These scenarios will be mapped against the data and tools that are analysed in WP3 and WP4 in order to arrive at benchmarks for future foresight and planning processes. As Europe will need to become more resilient and robust with regard to raw material requirements, WP5 will in particular assess future capacities needed at different levels – for industry, member states, regions, the EU and the role of the EU in international relations. Furthermore, and it will test those recommended capacities towards the end of the project with stakeholders. Accordingly, WP5 will go beyond what was/is attempted in the projects **MINVENTORY**, **INTRAW**, and **MINATURA2020** and get European policy makers and stakeholders prepared for the global long-term challenges.

**Task 5.1: Stocktaking, mapping and key functions of RMI (MinPol, BGS, UCL-ISR)**

The scope and content of RMI will be a function of stakeholder needs (c.f. WP2) of existing long-term scenarios with relevance to RMI. It will assess relevant the implications for raw materials from low carbon

scenarios (e.g. IPCC, EU steel technology platform), resource efficiency scenarios (e.g. POLFREE project), and international development documents (e.g. the new Chinese five years plan, African Mining Vision).

The minimum set of tools/methods needed to develop a coherent and comprehensive mineral policy-making framework providing a fast response will be investigated. A RMI-MATRIX will be developed, that allows the identification of best, medium and worst cases for RMI development. Compromising factors could be the lack concrete mineral policy scenarios, the absence of reliable production statistics, import and export, or the absence of reliable (historical/future) mineral consumption analyses (cf. Task 4.2).

The assessment will differentiate between operative tools (e.g. descriptive statistics, life cycle assessment (LCA), materials flows analysis (MFA, c.f. WP4)) and strategic, long-term planning tools (e.g. back-casting, scenario development and analysis). Task 5.1 will investigate the key functions of RMI in minerals policies and which methods and tools can be used (by which stakeholders). Key aspects of mineral policies include: (a) clear definition of scope (primary, secondary, etc. minerals); (b) commitment to provide an appropriate materials regulatory and knowledge framework; (c) harmonisation between sectoral policies bearing on sustainable resource management; (d) appropriate supply and demand scenarios, including the feedback from corresponding (mineral) policies (cf. WP4); (e) SWOT analyses of policy and regulatory options and their critical paths; (f) monitoring the effectiveness and impact of regulations and policies; (g) monitoring the status of mineral deposits of public importance;

#### **Task 5.2: Strategic raw materials intelligence approaches (LPRC, F-ISI, MinPol, BGS, UCL-ISR)**

The aim is to develop recommendations for European raw materials foresight approaches, complementary to the operative forecast tools (WP4), where the focus is on near-future planning. The purposes and the methods to be reviewed will be largely qualitative, with the underlying assumption that the experts involved are aware of the data and facts, and thus will be able to formulate opinions needed for strategic RMI. The outcomes of this Task will enable stakeholders to conduct foresight exercises in order to: 1) increase Europe's capacities for a timely response to anticipated scenarios that concern future raw material challenges (2030/2050 horizon); 2) identify major trends, uncertainties, key decision points, driving forces, needs for future research, etc. against different timeframes; 3) formulate ideas for possible future actions (actively bringing forward a 'preferred future') and increasing efficiency and effectiveness of the EU activities related raw materials policy planning. Outputs will provide tools (c.f. WP6) to support RMI for longer-term policy making. The following subtasks are envisaged (correlation with WP2 and WP4):

**5.2.1 - Logframe definition** Finalising the objectives and targets of Task 5.2. The Logframe will provide a concise summary of the implementation of this task according to the objectives hierarchy.

**5.2.2 - Understanding the different purposes of a RMI foresight..** A classification system according to the various purposes and goals will be developed that considers the stakeholder objectives and different futures (possible, probable, preferable, aspirational). It will be investigated: 1) what is the most suitable foresight method to support a specific purpose, and 2) what are the actual tools and steps (or combination of tools) that can be applied during foresight?

**5.2.3 - Benchmarks & best practices.** International case studies and literature will be reviewed to understand how other EU and non-EU countries have used foresight in raw materials in general and RMI in particular. Key personnel involved in conducting these exercises will be contacted for their subjective evaluation of the success of the foresight.

**5.2.4 - Methodology Catalogue.** A matrix will be developed, where i) possible purposes of the raw materials foresight and ii) generic foresight methods provide the frame that will allow a quick overview of the different methods and their suitability for the different purposes foreseen. The catalogue will provide an overview of the entire spectrum of foresight methods, including anticipatory thinking protocols (Delphi method, Causal Layered Analysis, Horizon Scanning, Scenario planning, etc.), Back-casting methods (cross-impact analysis, back-view mirror, etc.), visioning, futures workshops, serious games, etc.

**5.2.5 – Detailed methodology assessment.** Based on the matrix and end-user requirements from WP2 the most suitable methods for any given RMI purpose will be discussed in greater detail. The objective is to provide not only clear guidance to the methods themselves, but also guidance as to the practical implementation of the exercise itself.

**5.2.6 – Pilot workshop.** The objective is to provide guidance and support to WP5 policy making. The workshop will i) emphasise a strong scenario analysis with back-casting elements, ii) involve experts from within the raw materials community, and iii) involve a back-casting exercise starting from a preferable future vision with strong focus on the evolution of policies and envisioning the raw materials policy contexts of existing scenarios. A second objective will be methodology oriented, evaluating the methods and tools in real time and thus refine the final approaches for WP6.

**5.2.7 – Recommendation.** They will focus on user needs, both actual (c.f. WP2) and anticipated. A Guide on conducting raw materials foresight for RMI will be developed, elaborating on i) different possible objectives for RMI foresight, ii) methods corresponding to the objectives listed before, iii) detailed guide to conducting the exercise, iv) guidance to the evaluation of the foresight; v) SWOT analyses of the foresight.

**Task 5.3: Testing of RMI in Europe and its wider context (MinPol, LPRC, BGS, UCL-ISR)**

The RMI *status quo* in Europe and how it influences the mineral policy development will be analysed. The RMI-MATRIX for EU-countries will be screened for the capacities, methods and tools employed (c.f. WP4). Methods for correlating and transposing information from country reports will be developed for each EU member state.

European minerals policies and supporting RMI operate in a context of multi-national players and their governance paradigms, such as the World Trade Organisation (WTO), the World Bank (WB), the World Mining Ministries Forum (WMMF), and internationally operating mining companies. National governance paradigms influence how RMI can be established, namely a) which functions (foresight, regulatory, supervisory, research, etc.) are assigned to which authority, b) how the interactions between the different authorities are played out, and c) whether these interactions result in synergistic or antagonistic effects. Task 5.3 will map out the respective influences to understand how RMI and mineral policies can be implemented effectively in member states. Task 5.3 will analyse the feedback of this contextualisation.

Social licensing and the related governance paradigms and provisions (e.g. national planning regulations, UN conventions, EU directives) will have a major impact on the implementation of mineral (and related) policies. Task 5.3 will analyse the impact the stakeholder may have on mineral policy development referring to WP2.

**Summary of Deliverables**

D5.1: Report on the RMI tools and methods (M12)

D5.2: Report on the development and application of the RMI-MATRIX (M12)

D5.3 Report on Foresight Logframe (M12)

D5.4 Report on Pilot Foresight (M18)

D5.5 Raw materials Foresight Guide (18)

D5.6 Report on RMI implementation status quo and needs in EU-28 (M18)

Work package number	6	Start Date or Starting Event				M1	
Work package title	European Raw Materials Intelligence Capacity Platform Development (short: EU-RMICP)						
Participant number	1	2	3	4	6	9	10
Short name of participant	GEUS	F-ISI	BGS	UL-CML	BRGM	GTK	UJF-LIG
Person/months per participant:	8	1	1	2	15	4	12
Participant number	15	16					
Short name of participant	GeoZS	JRC					
Person/months per participant:	6	6					

## Objectives

Putting data and information on mineral resources at the disposal of various stakeholders is an important task and is currently done in several EU-FP7 and H2020 projects (such as EURARE, Minerals4EU and ProSUM).

Clearly, specialists have the necessary knowledge on how to efficiently use these data to perform various studies. However, this is difficult for most of the stakeholders because this typically requires

- (i) a clear and global vision of all the methods and tools that can be used
- (ii) knowledge on how to implement these methods and tools including their limits of use (requisite characteristics of the initial dataset, scale, accuracy...)
- (iii) a selection of the best available technique to obtain the result(s) necessary for the investigation and/or,
- (iv) knowledge on how to combine or link together several of these techniques.

The MICA project aims to develop a methodology and associated tools in order to fill this gap in the chain of use of data and to help the end user to select in a seamless way the best available set of technologies for answering his/her question(s)/problem(s).

To reach this objective, WP6 will create a database of methodologies and tools descriptions with an ontology-based interface to visualize the database content and the relationships between the different techniques, and to search for the most appropriate method(s) and tool(s).

Work packages 3, 4 and 5 will deliver detailed descriptions of several methods and tools which are named here “**Fact Sheets**”. However, such descriptions and associated metadata, even extremely detailed, may not help the end user on how to proceed. It is easily conceivable that some complex queries will necessitate to link/combine two or more methods (plus data), moreover, possibly in a logical, pre-defined sequence. Based on a careful analysis and synthesis of stakeholders’ needs/expectations made in WP2, and with the assistance of domain experts from WP3, WP4 and WP5, WP6 will set up a series of pre-established scenarios called here “**Flow Sheets**” which will describe the sequences of operations (data, methods and tools needed) to answer complex queries and will be stored in the central database..

A Search Interface for the EU-RMICP will be developed as a Dynamic Decision Graph (DDG) allowing (i) to visualize and navigate in the database content, (ii) to refine the initial end user query, and (iii) to identify the most appropriate Flow Sheet(s). The graph will be based on a multidimensional ontology composed of domain and sub-domain ontologies, representing the 'field of questions' of the end users. The Flow Sheets will be annotated during the navigation/selection process within the concepts from the domain ontologies, allowing end users to refine their initial question and find the most appropriate answers.

***This "intelligent" layer located on top of the central database and its visualization system are thus essential pieces of the system for achieving the ultimate goal, which is to provide all the stakeholders with the highest quality of expertise. It should be noted that the DDG with its intuitive interface is particularly adapted to non-skilled users and may help them to formulate/refine their initial question.***

## Description of work

- **T6.1:** based on the needs expressed by the stakeholders, this task will be in charge of elaborating a synthesis of the requirements, to rank them in a logical way allowing setting up a selection strategy. This task will also be in charge of the functionality analysis of each method and tool and to create the associated metadata sets (Fact sheets metadata) and to develop the necessary flow sheets and their metadata. [Leader GTK, with the support of GeoZS]
  - o **T6.1.1:** synthesis of stakeholders' requirements. Evaluation of the granularity associated with their expectations. [Leader GTK, with the support of F-ISI & WP2].
  - o **T6.1.2:** methods functionality analysis and creation of the Fact Sheets metadata, the Flow Sheets and their metadata. [Leader GTK, with the support of F-ISI, BGS, UL-CML, and in collaboration with WP3, WP4 & WP5].
- **T6.2:** translation of end users’ queries into a graph of domain/sub-domains concepts that represents the 'domain of questions', and set up of the multidimensional ontology and related domain ontologies [Leader UJF-LIG, with the support of BRGM, GEUS, GTK].
- **T6.3:** development of the Dynamic Decision Graph (DDG) for visualization, navigation and



selection. The visualization solution will be based on existing open source libraries [Leader JRC, with the support of BRGM, UJF-LIG, GEUS, GTK].

- **T6.4:** development of the select and rank modules, allowing respectively the selection of the most adapted methods/tools organized by scenario (Flow Sheets) and the refining of the selection [Leader UJF-LIG, with the support of BRGM].
- **T6.5:** development of the central base of the EU-RMICP [Leader GEUS with the support of JRC, GeoZS, BRGM, UJF-LIG, GTK].
- **T6.6:** integration to the EURMKB<sup>10</sup> and set up of the connections with the IKMS<sup>11</sup>, the EU-MKDP<sup>12</sup> and the EU-UMKDP<sup>13</sup> (i.e., connection with the knowledge bases and map viewers, predefined layers, the Minerals4EU MICKA metadata catalogue for structured data, connection to other catalogues [One Geology-Europe, INSPIRE...] and external layers [OGC WMS]). [Leader BRGM with the support of GEUS, GTK].

### Deliverables

- D6.1: Description of the whole methodology developed for providing the end used with the best possible answer to his query. Will integrate all the work performed in tasks T6.1 to T6.4. Month 20.
- D6.2: Delivery of the EU-RMICP system, fully integrated to the EURMKB. Month 23.

Work package number	7	Start Date or Starting Event					M1
Work package title	Communication, outreach and linkages (short: “outreach”)						
Participant number	7	1	2	5	12	16	
Short name of participant	EGS	GEUS	F-ISI	Min Pol	EFG	JRC	
Person/months per participant:	8	1	0.5	0.5	3	0.5	

### Objectives

The purpose of WP7 is to ensure a **maximum impact of the project during its life-span and beyond**. WP7 will communicate the project's benefits to its stakeholders, especially the EU minerals intelligence community, and the derived advantages for the EU related policies and needs. For this purpose a dedicated Communication Strategy will be developed and implemented, linking with relevant past, on-going and in preparation initiatives. MICA will especially **link to the Minerals Intelligence Network set up by the Minerals4EU project** and that will have been established as part of a permanent body legally registered at EuroGeoSurveys by October 2015, **and with the International Observatory for Raw Materials** that will have been established by January 2018 by the ongoing EU funded project INTRAW, headed by the European Federation of Geologists.

WP7 will ensure that all relevant and interested stakeholders are involved and/or reached, and properly, correctly and regularly informed and kept updated. In this regard, WP7 will:

- i. Build up on the Minerals Intelligence Network created by the Minerals4EU project and expand it further by identifying additional target audiences, considering MICA's outcomes and all communities implicated on mineral raw materials supply in the EU and beyond, from public authorities to industry users or consumers;
- ii. Increase EU's raw materials knowledge for the benefit of different stakeholders and widely disseminate information on the project and its progress by using the most suitable communication channels and by developing tailored messages for each target group;
- iii. Maintain contacts and support the EU bodies for facilitating decision making at EU level;

<sup>10</sup> EURMKB: European Union Raw Materials Knowledge Base (see EIP-RM SIP document)

<sup>11</sup> IKMS: Integrated Knowledge Management System (EU-FP7 project EURARE)

<sup>12</sup> EU-MKDP: EU Minerals Knowledge Data Platform (EU-FP7 project Minerals4EU)

<sup>13</sup> EU-UMKDP: EU Urban Mining Knowledge Data Platform (H2020 project ProSUM)

### Description of work

WP7 will design and implement of a tailored communication strategy serving as guideline to identify target audiences, messages, and communication channels, ensuring a close link with previous, on-going and in preparation EU-funded projects and other relevant initiatives concerning minerals intelligence, such as Minerals4EU ([www.minerals4eu.eu](http://www.minerals4eu.eu)) or MINATURA2020 ([www.minatura.eu](http://www.minatura.eu)) and INTRAW ([www.intraw.eu](http://www.intraw.eu)). The synergies with those projects will be also exploited, as well as synergies with technologically advanced countries concerning raw materials in the areas of research, education, industry and trade. Relevant international organizations playing a role in the field, such as UNECE, GEOSS, IUGS, EGU, ASGMI, CCOP or OAGS will also be targeted.

To secure the success of the activities, WP7 will develop specific tasks addressed to three main target groups: users, providers and public at large.

#### WP 7.1 Development of the Communication Strategy (EGS, EFG)

The primary aim of this Task is the development of the Communication Strategy and Dissemination Plans, detailing the most suitable actions to reach the objectives of WP7.

The Communication Strategy will consider the EU need of securing the supply of raw materials, as well as past and ongoing initiatives and EU funded projects, thus preventing overlaps and leveraging synergies. The link with those projects, especially Minerals4EU, will be used as starting point to enlarge the stakeholders' community. Attention will also be paid to international cooperation in research and innovation, exploiting synergies with the best world players in the field of raw materials. This will be fostered through EFG, who is leading the H2020 funded project INTRAW, aiming the creation of the EU International Raw Materials Observatory. This way **WP7 will contribute to a deeper knowledge of raw materials issues among different stakeholders** (EU institutions, regulators, policy makers, industrial consumers, environmental bodies, EU citizens and other stakeholders) and to a wider dissemination of MICA outcomes.

This task will also be responsible to ensure a proper and smooth transferring of MICA outputs and the expanded Minerals Intelligence Network into the Minerals4EU Permanent Body at the end of the project.

A fundamental objective of WP7 consists in publishing and communicating MICA's progress and the results achieved, setting up and using adequate communication tools such as a dedicated dynamic website, social networks, workshops, conferences and published articles. EGS and EFG will collect information from all partners to be disseminated and will develop the content of communication vehicles and materials (brochure, leaflet, newsletter, magazine, poster, etc.). MICA documents will be conceived to be available on-line and distributed during promotion activities, with the necessary adaptations to different audiences.

A common graphical identity will be defined and used by the partners of the project in the documents produced, and the Dissemination Plans will detail the possible dissemination contexts and tools. The Dissemination Plans will include also dashboards and indicators to access results obtained and to refine communication processes and activities.

#### WP 7.2 Engagement with Geosciences data providers (EGS, EFG)

A specific dissemination plan tailored to data providers will be developed to ensure that community will continue cooperating and uploading, reviewing and validating new data continuously, on a voluntary basis. The scope of the plan is to ensure **MICA will remain an updated raw materials' intelligence repository after the funding period**. The involvement of data providers in high level conferences related to raw materials intelligence is one driver that can keep their interest alive, as well as the creation of bridges between EU data providers and best world players in the raw materials field.

The biggest group of data providers will naturally be the Geological Surveys, but Universities, Research Centers, NGOs and individuals are also expected to upload data. EGS, representing 37 Geological Surveys in 36 European countries, will regularly foster its members' interest on MICA, communicating project developments and achievements to all its members at least 2 times per year, and collecting suggestions, new ideas and market's opportunities, thus ensuring their constant involvement.

**WP 7.3 Engagement with Professionals (EFG, EGS)**

The objective of this task is to increase knowledge and stimulate the use of MICA's services among professionals that use geoscientific information on their activities, building up a strong engagement with MICA's outcomes. This will contribute to **pull the population of MICA databases, enabling an active co-generation of knowledge and co-ownership of processes providing input and validation of the data and information provided.**

EFG will use the network of its Members, representing more than 50.000 professional geoscientists from 24 European countries, to ensure the best possible coverage of professionals, building awareness and fostering the use of MICA through social media tools, LinkedIn groups and Twitter. The communication activities aiming professionals will be fostered by participation in workshops and conferences.

**WP7.4 Public outreach (EGS, EFG)**

Engaging with a broader stakeholder community is seen as an important additional objective of WP7 efforts, not just to keep a fully "transparent" project image, but also in order to **facilitate continued, long-term public support for the project overall objectives.** The emphasis will be on providing non-technical overview of project goals and activities, using illustrations whenever possible.

In order to reach the greater stakeholder community, including the public, existing dissemination channels will be used whenever possible. These channels include the European Minerals Day in 2017 (organised at around 120 sites all over Europe in at least 20 countries) or the European Researchers Nights in 2016 and 2017 (organised at around 400 sites all over Europe covering each EU countries). Social media channels will be used extensively to reach out to the general public across Europe, such as Twitter.

**Deliverables**

D7.1 Graphical Identity (M3)

D7.2. Teasers and promotion materials (brochures, gadgets, media kit, website, poster) (M6)

D7.3 Communication Strategy, developing linkages with relevant past, on-going and future initiatives (M9)

D7.4 MICA social network, based on LinkedIn Groups and Twitter (M12)

D7.5 MICA's annual dedicated workshops (2) and final event (M6-24).

**Table 3.1 b: List of work packages (WP)**

Work package No	Work package Title	Lead participant No	Lead participant Short Name	total Person-Months in WP	Start Month	End month
1	Management and Coordination	1	GEUS	13	1	24
2	Stakeholder identification, appraisal and mapping of stakeholder requirements	2	F-ISI	22.5	1	12
3	Data for raw materials intelligence capacity	3	NERC-BGS	30	1	22
4	Methods and tools for mineral intelligence	4	UL-CML	32	1	22
5	Minerals policy context	5	MinPol	22.5	1	22
6	European Raw Materials Intelligence Capacity Platform Development	6	BRGM	55	1	24
7	Communication, outreach and linkages	7	EGS	13.5	1	24
				Total months 188.5		

**Table 3.1 c: List of Deliverables**

<b>Deliverable (number)</b>	<b>Deliverable name</b>	<b>Work package number</b>	<b>Short name of lead participant</b>	<b>Type</b>	<b>Dissemination level</b>	<b>Delivery month</b>
D1.1	List of Advisory Board Members	1	GEUS	R	PU	4
D1.2	First year progress report	1	GEUS	R	PU	12
D1.3	Summary of mid-way recommendation from Advisory Board	1	GEUS	R	PU	12
D1.4	Final project report	1	GEUS	R	PU	24
D2.1	Stakeholder Report	2	F-ISI	R	PU	6
D2.2	Map of Stakeholders' RMI needs and requirements	2	F-ISI	R	PU	12
D 3.1	Draft inventory of data on raw materials	3	BGS	R	PU	12
D3.2	Final inventory	3	BGS	R	PU	18
D3.3	Report on the transformation of data into information and knowledge	3	BGS	R	PU	20
D3.4	Report on raw materials data inventory and future strategy	3	BGS	R	PU	22
D4.1	Fact sheets of methods	4	UL-CML	R	PU	8
D4.2	Report or paper on the use of methodologies for stakeholder questions	4	UL-CML	R	PU	12
D4.3	Case study reports	4	UL-CML	R	PU	20
D4.4	Recommendations document	4	UL-CML	R	PU	22
D5.1	Report on the RMI tools and methods	5	MinPol	R	PU	12
D5.2	Report on the development and application of the RMI-MATRIX	5	MinPol	R	PU	18
D5.3	Report on Foresight Logframe	5	LPRC	R	PU	12
D5.4	Report on Pilot Foresight	5	LPRC	R	PU	18
D5.5	Raw materials Foresight Guide	5	LPRC	R	PU	18
D5.6	Report on RMI implementation status quo and needs in EU-28	5	MinPol	R	PU	24
D6.1	Description of the EU-RMICP system methodology	6	BRGM	R	PU	20
D6.2	Delivery and integration of the EU-RMICP system	6	BRGM	OTHER	PU	23
D7.1	Graphical Identity	7	EGS	OTHER	PU	3
D7.2	Teasers and promotion materials (e.g., brochures, media kit, website, poster)	7	EGS	OTHER	PU	6
D7.3	Communication Strategy	7	EGS	R	PU	9
D7.4	MICA social network	7	EGS	OTHER	PU	12
D7.5	MICA dissemination events ("mid-way" and final)	7	EGS	OTHER	PU	12, 24

## 3.2 Management structure and procedures

### 3.2.1 MICA management structure

The management strategy of the MICA project will be based on clear responsibilities, professional planning, communication and progress monitoring throughout the project lifetime. The coordinator, GEUS is responsible for project management including monitoring the progress of the project, controlling the quality of participant contributions, ensuring that deadlines are met and strict financial management. The coordinator is responsible for maintaining contacts with the European Commission, the General Assembly and the Management Board ensuring a smooth and transparent running of the project. GEUS has vast experience in coordinating and participating in large international projects and collaboration with both Academia and Industry.

The MICA consortium includes 16 partners and 15 third party participants from a total of 22 European countries. They will undertake the execution of seven inter-related work packages over a period of two years supervised by the group of WP leaders forming the Management Board. A majority of the partners are experienced contributors to large international projects.

The relative large number of partners and third parties involved in MICA makes necessary a strong and well defined management structure (**Fig. 11**), coupled with an efficient and transparent decision-making mechanism. The availability of solid management tools as well as a structured process of project revision and monitoring is the necessary basis on which to build to the achievement of the objectives.

All consortium partners will enter into a Consortium Agreement (CA) based on the DESCA 2020 model with minor modifications. The Governance structure of the MICA consortium, including operational rules and decision making procedures, will be laid down in detail in the CA. The most important elements are described below.

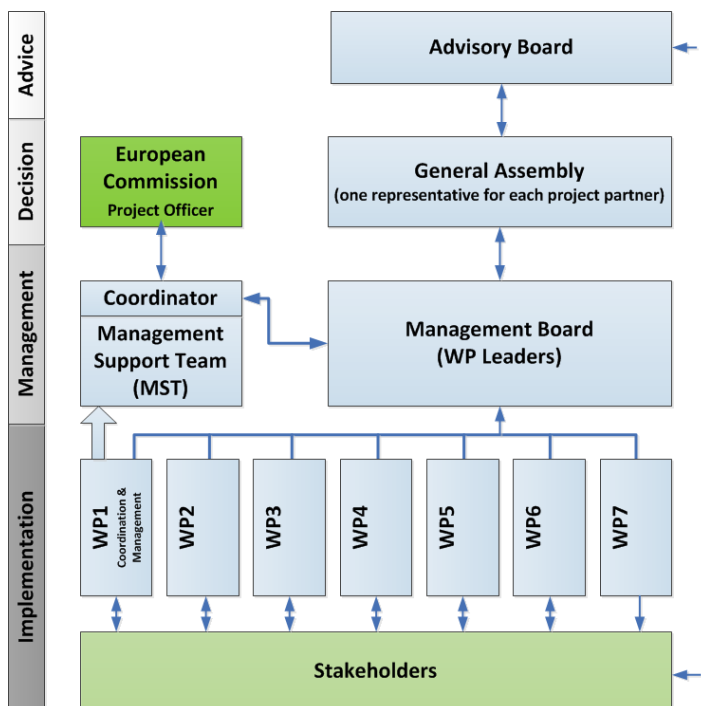


Figure 11: MICA management structure.

Management Body	Participants	Responsibility	Reports to
Coordinator	GEUS	Project Management	EC
Management Support Team	GEUS, administrative staff	Project Administration	Coordinator
Management Board	Work Package leaders	Technical coordination at project level	Coordinator
Work Packages (1-7)	Beneficiaries and third parties	Execute the tasks contained within the seven work packages	WP Leaders
General Assembly	One representative for each project partner	Major decisions regarding the work plan. Project amendments.	Coordinator
Advisory Board	External Experts and community representatives (EC representatives, chairpersons of European and global initiatives, coordinators of important EU projects etc.)	Advice on external developments, maximising exploitation benefits and dissemination of MICA results beyond the consortium	Coordinator

### Coordinator

The Coordinator of **MICA** will be Partner 1 (GEUS). GEUS will be represented by Mrs. **Karen Hanghøj**, who will be the contact person to the EC. Moreover, she will be the chairperson of the Management Board and responsible for day-to-day project management, carried out by the Management Support Team. Karen Hanghøj has a Ph.D. in geology and is Head of Department of Petrology and Economic Geology at GEUS. Karen has worked as a consultant to the minerals exploration industry for more than 20 years and has been involved in the EU-funded FP7 projects Minerals4EU and EURare. Karen is the Executive Secretary of ETP-SMR (European Technology Platform - Sustainable Mineral Resources) and has a strong European and international network in the raw materials community.

The responsibilities of the Coordinator shall be:

- monitoring compliance by the Parties with their obligations
- collecting, reviewing to verify consistency and submitting reports, other deliverables (including financial statements and related certifications) and requested documents to the Funding Authority
- keeping the address list of Members and other contact persons updated and available
- transmitting documents and information connected with the Project to any other Parties concerned
- administering the financial contribution of the Funding Authority and fulfilling the financial tasks described in the CA
- providing, upon request, the Parties with official copies or originals of documents which are in the sole possession of the Coordinator when such copies or originals are necessary for the Parties to present claims.

### Management Support Team

Head of the Management Support Team (MST) will be the Coordinator (Karen Hanghøj). The MST will furthermore be composed of a designated assisting Project Manager and a designated financial secretary. The MST will be reinforced by GEUS' permanent EU Project Office which has extensive experience in all aspects of managing EU projects, and comprises both legal, economic and project management expertise. The MST shall assist and facilitate the work of the Coordinator in the day-to-day management of the Project, and assist the Coordinator and the Management Board in executing the decisions of the General Assembly. The assistant Project Manager will assist the Project Coordinator with executive management tasks (preparation of meetings,

coordinating the preparation of reports, etc.). The Financial Secretary will assist the Coordinator by managing adequate financial reporting, compliance of all budgets and cash flow.

### **General Assembly**

The General Assembly shall consist of one representative of each consortium member. Each General Assembly member shall be deemed to be duly authorised to deliberate, negotiate and decide on all matters listed below. The Coordinator shall chair all meetings of the General Assembly, unless decided otherwise by the General Assembly. The Parties agree to abide by all decisions of the General Assembly. This does not prevent the Parties to submit a dispute to resolution in accordance with the provisions of settlement of disputes in the Consortium Agreement.

*Decisions of the General Assembly:* The General Assembly shall be free to act on its own initiative to formulate proposals and take decisions in accordance with the procedures set out in the Consortium Agreement. In addition, all proposals made by the Management Board shall also be considered and decided upon by the General Assembly. The following decisions shall be taken by the General Assembly:

- Proposals for changes to Annex I of the EC-Grant Agreement to be agreed by the European Commission
- Changes to the Consortium Agreement
- Decisions related to Intellectual Property
- Withdrawal of a Party from or entry of a new Party to the Consortium and approval of the settlement on the conditions of the withdrawal/accession of such a new Party
- Identification of a breach by a Party of its obligations under this Consortium Agreement or the Grant Agreement
- Declaration of a Party to be a Defaulting Party; remedies to be performed by such a Party as well as termination of a Defaulting Party's participation in the Consortium
- Proposal to the European Commission for a change of the Coordinator; for suspension of all or part of the Project; or for termination of the Project and the Consortium Agreement

### **Management Board**

The members of the Management Board shall be the **WP leaders**. The Coordinator shall chair all meetings of the Management Board, unless decided otherwise by a 2/3 majority of the Management Board members. The Management Board shall monitor the effective and efficient implementation of the Project. The Management Board shall furthermore;

- support the Coordinator in preparing meetings with the Funding Authority and in preparing related data and deliverables
- prepare the content and timing of press releases and joint publications by the consortium or proposed by the Funding Authority in respect of the procedures of the Grant Agreement.
- In the case of abolished tasks as a result of a decision of the General Assembly, the Management Board shall advise the General Assembly on ways to rearrange tasks and budgets of the Parties concerned. Such rearrangement shall take into consideration the legitimate commitments taken prior to the decisions, which cannot be cancelled.

The Management Board is also responsible for the coordination and quality control of MICA. In this sense, tasks of the Management Board include;

- monitoring of the project progress, quality and output, on the basis of half-yearly progress reports provided by the WP leaders;
- monitoring and assuring adequate exchange of information between different WP's
- formulation of new points of interest during the project;
- adapting the planning where necessary and appropriate;
- approving periodic and final reports to the EU;
- approving the Dissemination Plan.

## Work Packages

Each WP will be led by a WP leader. They will be responsible for day-to-day management and technical coordination of their respective WPs. Their tasks include:

- assuring the quality of the work within the respective work package;
- managing and reaching the respective deliverables and milestones of the WP;
- solving problems and managing the time schedule;
- ensuring the flow of communication both inside and outside their respective WPs, including dissemination of the results generated within their WP;

All **WP Leaders** have a seat in the **Management Board** to ensure direct communication lines with the researchers, and representation of all **MICA** research lines at the management level.

Day-to-day communication within WPs between participants in different institutions will primarily be upheld by telephone, e-mail contact and web-based tools (Skype, Lync etc.) or, if needed, by (Teleconference) meetings. Major problems will be communicated to, and discussed in the Management Board or on *ad hoc* basis where needed.

## Advisory Board

Shortly after the start of the project, an Advisory Board will be established. The management and contact to the Advisory Board will be an integral part of WP1. In general, the members of the Advisory Board will advise on

- external developments relevant to achieving progress towards the impacts of the call;
- maximizing MICA exploitation benefits;
- dissemination of MICA results beyond the consortium.

Members of the Advisory Board will be invited to the Kick-off meeting and Final Event as well as to two Full Consortium Meetings. Members of the Advisory Board will be invited to provide their advices in written form after each meeting to the Coordinator, who will compile the individual contributions into reports that will be circulated to the General Assembly and considered by the Management Board in the further planning.

### 3.2.2 Preparation and organisation of meetings

The chairperson of a Consortium Body shall convene meetings of that Consortium Body. The frequency of meetings is given in the table below and the meeting plan is shown in **Figure 12**. In addition, the Management Support Team (all located at GEUS) will meet at least every second month to discuss project management issues.

Consortium Body	Ordinary meeting	Extraordinary meeting
General Assembly	Every half year	At any time upon written request of the Management Board or 1/3 of the Members of the General Assembly
Management Board	At least quarterly, every second time through as web meetings	At any time upon written request of any Member of the Management Board
Advisory Board	Will be invited to four meetings with the General Assembly.	
Work Package meeting	Workshops during the project; coordinated with General Assembly meetings	

The rules related to meetings will be detailed in the Consortium Agreement, but it is envisaged that the following rules will apply;

- All invited partners can suggest amendments to the meeting agenda;
- Decisions can be made by voting. Any meeting participant can request written voting. The decision will follow the majority. In case of equality, the vote of the Coordinator will decide the result.



- No members can veto decisions made by voting;
- The preparation and finalisation of meeting minutes is the responsibility of the meeting organiser.



**Figure 12:** The MICA project meeting plan. The first General Assembly is the Kick-off meeting in Copenhagen organised by GEUS. The General Assembly in Brussels in month 8 will be organized by a meeting committee consisting of members of WPs 2, 4, 6, and 7 in order to coordinate seminars and activities involving participation of external stakeholder representatives. The logistics for the meeting will be taken care of by EGS. A Dissemination Event at about half point of the project (approx. month 14) will be organized by EGS (WP7) in Brussels in conjunction with WP 4 and WP5 events involving external stakeholders and experts. A General Assembly is again scheduled for month 18; organized in Orléans by BRGM. This will also involve external stakeholders/experts contributing to a joint WP3/WP4 workshop. The final event (month 24) is a combination of a Dissemination Event and a General Assembly organized by EGS in Brussels. Management Meetings in person (green diamonds) and teleconferences (white squares) are shown on the left.

### 3.2.4 Internal communication, management of project progress and quality control

The progress of the project will be monitored by timeline-based regular reporting and meetings of the Management Board. The monitoring of the project at different levels is outlined below:

- The Coordinator will use milestones as an instrument to ensure that important dependencies in timing of individual deliverables across work packages is not compromised. Table 3.2a lists milestones that have been identified for the project as a whole at the end of each of the main project phases which coincide with a number of key deliverables.
- The secured “forum” section of the website established within WP7, will serve as the main platform for direct exchange of information between partners within and between WP’s.
- The WP Leaders will at least monthly monitor progress of participants of their WP, and participants will inform their WP Leaders when problems are encountered. He/she will take appropriate measures. Major problems will be discussed in teleconference meetings with the Coordinator;
- Teleconference meetings between teams of different WP’s will be organised by the responsible WP Leaders at the moment interaction between WP’s is required;
- Progress reports will be prepared by the participants of the WP’s and assembled by the WP leaders (using the Web-based management tool);
- On the basis of the progress reports, the Management Board will monitor progress of the project, identify major bottlenecks and find solutions for these problems. Where needed, adaptations to the project plan will be made, with the aim to ensure the delivery of the project results as agreed with the European

Commission. Major adaptations need to be approved by the Management Board. The progress reports will also form the basis for the annual reports for the Management Board.

**Table 3.1 d: List of milestones**

<b>Milestone number</b>	<b>Milestone name</b>	<b>Related work package(s)</b>	<b>Estimated date</b>	<b>Means of verification</b>
MS1	Preliminary stakeholder and requirement mapping	WP2	M2	Inception paper
MS2	Definition of Stakeholder RMI requirements, data and methods assessments	WP2, WP3, WP4	M12	Report
MS3	Integration of results, RMI Matrix, foresight guide	WP3, WP4, WP5	M20	Report
MS4	Recommendations, EU-RMICP system delivery, dissemination	WP3, WP4, WP5, WP6, WP7	M24	Report, database platform

### 3.2.5 Conflict resolution

In case of conflict, the WP leaders will have first responsibility to find an amicable solution, if appropriate in consultation with the Coordinator. In case the conflict cannot be resolved, the WP leader will put the issue forward to the Management Board. If the Management Board is unable to find an amicable solution, the issue will be voted on by the Management Board members. In case this happens, the issue and its outcome will be reported to the Project Officer. Further details will be laid down in the Consortium Agreement.

### 3.2.6 Dissemination management

Dissemination activities will be guided by the Plan for Dissemination and Exploitation (PDE) prepared in WP7. The responsible for this task is EuroGeoSurveys (EGS). EGS can build on its extensive contacts with geological survey organisations and associations across the globe, EU institutions, academic and industry networks, and – through the EGS members – national and regional stakeholders to optimise outreach. The PDE will identify dissemination actions to be carried out both during and after the project. During the project, dissemination actions will be closely coordinated with WP2 (mapping and engaging with stakeholder communities) in particular. EGS intends to appoint an Exploitation Manager responsible for the implementation of the PDE during the project.

### 3.2.7 Risk management

Other technical risks will be managed making use of a classical and widely tested process for risk management. This process aims at identifying, analysing and prioritizing risks inherent in the project and then determining the appropriate actions to eliminate or mitigate them. Risk assessment is not simply concerning the identification of risks in order to make project's participants aware of them. It involves assessing the potential severity of these risks, thereby identifying where to most effectively focus attention and resources in mitigating them. To assess the exposure for each risk, the following information should be determined:

- Impact of risk: The deviations of schedule, effort, or costs from the plan if the risk occurs.
- Likelihood of Occurrence: The probability that the risk will actually occur.
- Risk exposure: Calculated by multiplying the Impact by the Likelihood of Occurrence.

Once the probability and impact of a risk have been estimated, the potential seriousness of the risk can be identified. A five-point scale is used, ranging from 1 or Very Low, to 5 or Very High, as shown in the table below.

	Scale	Probability	Impact
1	Very Low	Unlikely to occur	Negligible impact.
2	Low	May occur occasionally	Minor impact on time, cost or quality.
3	Medium	Is as likely as not to occur	Notable impact on time, cost or quality.
4	High	Is likely to occur	Substantial impact on time, cost or quality.
5	Very High	Is almost certain to occur	Threatens the success of the project.

A Risk Assessment Report will be prepared based on the Risk Assessment Scheme given below. A major concern is the appropriate communication of risk information in a manner readily understandable. It must, however, be emphasised that risk assessment is a continuous process, rather than one that occurs only at specific intervals during a project.

Risk #	Risk Description	Probability of risk occurring (1-5)	Impact on time (1-5)	Impact on cost (1-5)	Impact on performance (1-5)	Risk Factor (1-20)
1	Communication	2	2	1	1	6
2	PP <sup>14</sup> engagement	1	1	1	2	5
3	Biased results	2	1	1	1	5
4	Personnel loss	2	2	1	3	8
5	Deliverables not delivered on time	2	2	1	3	8
6	Start of activities	3	2	1	1	7
7	Stakeholder engagement	3	3	1	2	5
8	Milestone plan	2	3	1	1	7
9	IPR	3	1	1	2	7
10	Resources mapping	1	1	1	4	7
11	Constraints mapping	1	1	1	4	7

The subsequent step of the risk management process is the identification of mitigation strategies to reduce both the probability that a given risk will occur and its actual impact. The project management will review the technical risks foreseen for the forthcoming activities and decide upon specific actions to monitor/counteract those risks. Some examples of the risk factors, with an assessment of their criticality and control measures, are summarised below.

#### *Examples of risk factors and assessment of criticality*

Risk #	Major Generic Risk & Potential Effect	Mitigation Strategy
1	Poor engagement of some PP – coverage and information on status, infrastructure and IPR not complete.	Proactive Work Packages (1&10) dedicated to engaging with them.
2	Biased approach – PP developing a non-realistic/biased model of MICA	Forming of Stakeholder Panel & Advisory Board from external renowned experts representing academia, public sector (EU), EU agencies, and industry.

<sup>14</sup> PP: Project Partner

3	Loss of key project personnel – incomplete or bad performance, loss of direction/scope of project	The organisations with major roles in this project are substantial and have expertise in depth. In addition to that shared responsibilities within WP and Tasks provide stability in case of unexpected key project personnel loss.
4	Deliverables not delivered on time – delays in project, domino effect where deliverables are connected or interdependent	Day-to-day communication between coordinator and WP leaders and further between WP leaders and performers of tasks/deliverables. Defining clear protocols for communication, format of internal reporting and deliverables.
5	Delayed start of activities – shift of activities in the plan and potential prolongation of the project	The teams of experts and PP have worked together in the past and their communication is well established. PPs also have extensive experience in carrying out EU projects.
6	Poor stakeholder engagement – incomplete feedback on demands and expectations	Long-term experience of PP in the field of cooperation and communication with stakeholders would minimise this risk. Proactive WP 1, 2 & 7 will minimise this risk. The Advisory Board will also represent major stakeholders.
7	Milestone plan failure– shift of activities & milestones in the plan and potential prolongation of the project	Day-to-day communication between coordinator, WP leaders and PP. In case of delays, instant adaptation of plan with as minimum impact on the content of studies as possible.

### 3.3 Consortium as a whole

The MICA project team represents a multidisciplinary group with abundant experience in the diverse facets of raw materials research. The consortium includes geological surveys (GEUS, BGS, BRGM, BGR, GTK, GeoZS), research institutions (F-ISI, LPRC, JRC), universities (UL-CML, UJF-LIG, NTNU, UCL ISR), professional associations (EFG, EGS) and a SME (MinPol). These groups represent experts in their respective fields as outlined in Section 4 of this proposal. In order to resolve the challenges outlined in the call these groups are brought together in this project as a powerful team.

The structure of the project ensures that project partners maximize on the opportunities to combine their expertise in tasks that are organized across work packages. Also, there is an emphasis on collaboration reflected in the distribution of work time (person months) so that most consortium partners are active in more than one work package. Importantly, the WP2 leader F-ISI, responsible for characterization of stakeholder requirements, is represented in all work packages to ensure that the results of WP2 are carried on through the work of the other work packages.

The emphasis on collaboration is also reflected in the meeting plan which is organized in a way that combines workshops and seminars that are taking place during one larger event to maximize the potential for cross fertilization of ideas and concepts between work packages. Also, synchronizing the work package seminars/workshops has the advantage that representatives of the contributing geological surveys can easily be incorporated, especially when stakeholder representation and expert knowledge are important.

#### Contributing geological surveys

A group of 15 European geological surveys is contributing to the work of the MICA project as third parties. This group represents a substantial asset to the MICA project since many have been involved with raw material-oriented EU programs previously and are familiar with the working structure of such projects and the questions addressed. Achieving the goals of the work packages, in particular with regard to stakeholder requirement definition, data coverage investigations and construction of the EU-RMICP solution will rely on their

involvement. Also, this will ensure that the final product will receive the support of a large European geoscience community when it comes to the incorporation into a sustained European raw materials network structure at the end of the project lifetime.

All the national geological surveys that are members of EuroGeoSurveys (EGS), and not already members of the MICA consortium, have been invited to join MICA as third parties. In total, 15 of these have accepted to contribute and participate in MICA and GEUS will manage and coordinate this group under work package 1. These partners have specific roles in the fulfilment of tasks in different work packages, as specified below:

- Geological Survey of Norway (NGU): WP3 regional review of data availability (Scandinavia)
- Polish Geological Institute (PGI): WP2 (stakeholder requirements)
- Laboratório Nacional de Energia e Geologia (Portugal) (LNEG): WP3: regional review of data availability; WP2: stakeholder requirements
- Geological Institute of Romania (GIR): WP3 regional review of data availability (Eastern Europe)
- Sveriges Geologiska Undersökning (SGU): WP2: stakeholder requirements
- Swisstopo (Switzerland): WP3 regional review of data availability (Central Europe)
- Geological and Geophysical Institute of Hungary (MFGI): WP2: stakeholder requirements
- Albanian Geological Survey (AGS): WP6 – flow sheets
- Geological Survey of Belgium (GSB): WP6 – flow sheets
- Croatian Geological Survey (HGI-CGS): WP6 – flow sheets
- Geological Survey Department (Cyprus): WP6 – flow sheets
- National Center of Sustainable Development (EKBA) - Institute of Geology and Mineral Exploration (IGME) (Greece): WP6 – flow sheets
- Geological Survey of Ireland (GSI): WP6 – flow sheets
- Spanish Geological Survey (IGME): WP6 – flow sheets
- Geological Survey of Italy (ISPRA): WP6 – flow sheets

### 3.4 Resources to be committed

**Table 3.4a: Summary of staff effort**

	WP1	WP2	WP3	WP4	WP5	WP6	WP7	Total Person/ Months per Participant
<b>Participant#1 GEUS</b>	10	1	1	0	0.5	8	1	21.5
<b>Participant#2 F-ISI</b>	0.5	10	2	4	1	1	0.5	19
<b>Participant#3 NERC-BGS</b>	0.5	1	18	4	1	1	0	25.5
<b>Participant#4 UL-CML</b>	0.5	2	2	14	0	2	0	20.5
<b>Participant#5 MinPol</b>	0.5	1.5	1	0	10	0	0.5	13.5
<b>Participant#6 BRGM</b>	0.5	1	2	2	0	15	0	20.5
<b>Participant#7 EGS</b>	0.5	2	0	0	0	0	8	10.5
<b>Participant#8 BGR</b>	0	0	1	0	0	0	0	1
<b>Participant#9 GTK</b>	0	0	1	0	0	4	0	5
<b>Participant#10 LIG</b>	0	0	0	0	0	12	0	12

<b>Participant#11 LPRC</b>	0	0	0	0	9	0	0	9
<b>Participant#12 EFG</b>	0	3	0	0	0	0	3	6
<b>Participant#13 NTNU</b>	0	1	2	4	0	0	0	7
<b>Participant#14 UCL ISR</b>	0	0	0	4	1	0	0	5
<b>Participant#15 GeoZS</b>	0	0	0	0	0	6	0	6
<b>Participant#16 JRC</b>	0	0	0	0	0	6	0.5	6.5
<b>Total Person/Months</b>	13	22.5	30	32	22.5	55	13.5	188.5

**Table 3.4b: other direct costs**

<b>Participant# 1 GEUS</b>	<b>Cost (€)</b>	<b>Justification</b>
<b>Travel</b>	9.000	Travel to MICA project meetings
<b>Equipment</b>		
<b>Other goods and services</b>	121.500	Budget of 75.000€ for 15 contributing European geological surveys (5.000 € each) for travel to meetings and contribution to work packages. 3.000€ for organizing the Kick-off meeting. 17.500€ for travel costs of the Advisory Board members. 26.000€ for reimbursement of travel expenses of “non project members” such as external experts and stakeholder representatives for distribution WP2 (ca. 10.000€); WP3 (ca. 5.000€); WP4 (ca. 6.000€); WP5 (ca. 5.000€).
<b>Total</b>	130.500	

<b>Participant# 7 EGS</b>	<b>Cost (€)</b>	<b>Justification</b>
<b>Travel</b>	10.000	Representation of the MICA projects at international meetings
<b>Equipment</b>		
<b>Other goods and services</b>	50.000	Budget of 40.000€ for preparation of outreach and dissemination material. Organization of 3 MICA meetings in Brussels (General Assembly; Dissemination Event; Final Event). 10.000€ for subcontracting (graphical design for website, book, flyers, etc.).
<b>Total</b>	60.000	

### 4.1. Participants (applicants)

#### **GEUS**

The Geological Survey of Denmark and Greenland (GEUS) is an independent research and advisory institution in the Ministry of Climate, Energy and Building. GEUS serves an advisory role for the Danish and Greenlandic Governments including the ministries of Climate, Energy and Building, Environment, Foreign Affairs and Higher Education and Science. GEUS also operates in the private sector. GEUS has 330 employees. GEUS' main tasks are geological mapping, data collection and storage, to carry out research projects, to give advice, and to disseminate geoscientific knowledge. GEUS co-operates with numerous scientific institutions and networks, and other organizations including EuroGeoSurveys (EGS) and the European Environmental Agency (EEA). GEUS participates in research and aid programs in Europe and a number of developing and middle income countries in Africa, South America, and Asia. Web-site: [www.geus.dk](http://www.geus.dk).

GEUS has the long-term responsibility of collecting basic geo-scientific information about natural resources in Greenland and Denmark, as well as the experience in resource assessments and evaluation. GEUS arranges an annual quantitative mineral assessment workshop in collaboration with the Greenlandic Bureau of minerals and Petroleum, USGS and other relevant partners. The raw materials group at GEUS comprises 40 employees and includes a state of the art 3D photogrammetric mapping laboratory. GEUS has a strong role in the recently launched project ProSum as well as the ongoing projects Minerals4EU and EURARE.

In the role of national data centre, GEUS has developed and maintained nationwide databases for mineral- and energy resources, boreholes, geochemistry, geophysics, geological samples, digital reports, digital maps and geological models for more than 25 years. GEUS has contributed to the EU-financed data-harmonisation and -integration projects EUMARSIN, EUROSEISMICS, GeoSeas, eWater, GEOMIND, OneGeologyEurope, EuroGeoSource, EMODnet-geology, EGDI-Scope and InGeoCloudS and through this gained experience with data exchange and standards.

In MICA, GEUS will be the overall project coordinator and will hence lead WP1. The project leader (Karen Hanghøj) has extensive experience with project management of mineral resource related projects, and especially with establishing projects that describe complex value and supply chains for Mineral Resources. GEUS will furthermore contribute to WPs 2, 3, 6 and 7.

#### *Publications and services:*

1. Kalvig, P., Clausen, R.J., Fold, N. and Hanghøj, K. 2014: To what extent is Denmark vulnerable to mineral supply shortage? In Geological Survey of Denmark and Greenland Bulletin 31, p. 95-98 ([http://www.geus.dk/DK/publications/geol-survey-dk-gl-bull/31/Documents/nr31\\_p95-98.pdf](http://www.geus.dk/DK/publications/geol-survey-dk-gl-bull/31/Documents/nr31_p95-98.pdf)).
2. Keulen, N., Thrane, K., Stensgaard, B.M. & Kalvig, P. 2014: An evaluation of the potential for uranium deposits in Greenland. MiMa report 2014/1 (<http://mima.geus.dk/publikationer/mima-rapport-20141/>)
3. Kalvig, P., Thrane, K. & Hanghøj, K. 2014: Uranium – From exploration to demand (In Danish). MiMa report 2014/2 (<http://mima.geus.dk/publikationer/mima-rapport-20142/>)
4. FACT SHEETS – Exploration and mining in Greenland ([http://www.geus.dk/minex/fact\\_sheets-uk.htm](http://www.geus.dk/minex/fact_sheets-uk.htm))
5. Greenland Mineral Resources Portal (<http://www.greenmin.dk>)

*Involvement in other relevant European and national projects:*

- Minerals4EU (<http://www.minerals4eu.eu>)
- EURare (<http://www.eurare.eu>)
- EuroGeoSource (<http://www.eurogeosource.eu>)
- ProSum
- EU needs with Regard to Co-operation with Greenland FP7
- Vulnerability analyses of the Danish Society with regard to Mineral Resources
- Analysis of Danish Raw Material resources

*Profiles of key staff members:*

**Karen Hanghøj (Female):** Head of Department of Petrology and Economic Geology. Karen holds a PhD in Geology from University of Copenhagen, and has worked extensively with research on geological processes in the lower crust and mantle and their associated mineral deposits. She has spent more than ten years working in the US as a Research Associate at Woods Hole Oceanographic Institution and as a Research Scientist at Columbia University and has furthermore worked as a consultant to the minerals exploration industry for more than 20 years. Karen is involved in the EU-funded projects Minerals4EU and EURare, is a member of the EGS mineral resource expert group and the executive secretary for the European Technology Platform for Sustainable Mineral Resources.

**Holger Paulick (Male):** Ph.D. in ore geology. Senior research Scientist in Petrology and Economic Geology Department of GEUS. Has extensive project management experience from previous employment at the mining company Boliden (Sweden, 2008 to 2014). Technical expertise in raw material resource models and exploration. Also involved in securing “social license to operate” via stakeholder engagement at Boliden and outreach activities of the MiMa center for raw materials recently established at GEUS.

**Lars Lund Sørensen (Male):** M.Sc. in ore geology. Wide knowledge of the Greenlandic mineral resource legislative system including fiscal, social and legal terms. Participant in the EU-funded projects Minerals4EU, EURARE and “Study on EU Needs with Regard to Co-operation with Greenland”.

**Jørgen Tulstrup (Male):** M.Sc. in Geology/Geophysics. Head of Department at Geological Datacenter. Responsible for GEUS’ databanks and GIS. Jørgen has been working with establishing databases for geological and other geodata for more 30 years and has been a participant in several EU funded projects including OneGeologyEurope, EuroGeoSource, EUMARSIN, InGeoCloudS, EGDI-Scope and Minerals4EU.

**Mikael Pedersen (Male):** Ph.D. in ore geology. Chief Adviser. Head of GIS Section. Has since 2003 worked with project management, web publication of geological data by GIS, databases, data infrastructures etc. Participant in the EU-funded projects GeoMind, GeoSeas, InGeoClouds and EGDI-Scope (WP lead). Project manager of numerous large national projects. Experienced user of ISO standards for metadata and GeoSciML.



## Fraunhofer Institute for Systems and Innovation Research ISI

The Fraunhofer Institute for Systems and Innovation Research ISI analyses the origins and impacts of innovations. We research the short- and long-term developments of innovation processes and the impacts of new technologies and services on society. On this basis, we are able to provide our clients from industry, politics and science with recommendations for action and perspectives for key decisions. Our expertise is founded on our scientific competence as well as an interdisciplinary and systemic research approach.

With a current workforce of about 250 staff members from science, technology and infrastructure, we offer a highly motivated team. The success of our work is documented by the increase in our annual budget to nearly 24 million euros in 2013, which was generated in more than 380 projects.

As an internationally leading innovation research institute, we cultivate an intensive, scientific dialog with the US, Japan and BRICS countries, for example via the exchange of visiting scholars.

Fraunhofer ISI works closely with its partners: the Karlsruhe Institute of Technology (KIT), the University of Kassel, the Université de Strasbourg, the ETH Zürich, the Virginia Tech in the US und the Institute of Policy and Management (IPM) in Beijing. Web-site: <http://www.isi.fraunhofer.de/isi-en/index.php>.

ISI conducts applied research in seven Competence Centers with a total of 24 Business Units and sees itself as an independent institute for society, politics and industry. The two Competence Centers involved in MICA, 'Foresight' and 'Sustainability and Infrastructure Systems' are among the world-leading research groups in its respective research realms.

The Competence Center 'Foresight', leading WP2 in MICA, focuses on future oriented stakeholder dialogues (foresight). The team is advancing and implementing cutting-edge foresight approaches such as scenario-building, visioning, Delphi surveys and road mapping. The group is one of the leading foresight teams in Europe and has carried out numerous foresight processes for decision makers all-over the world. The Foresight team will closely cooperate with other ISI research teams and – if required - with other Fraunhofer Institutes in specific domains in order to provide the expertise required for the stakeholders' requirements appraisal in MICA. The Competence Center 'Foresight' has been conducting several stakeholder identification exercises at EU (e.g. VERA) and national level (e.g. SIRA). Multi-stakeholder workshops are state-of-the-art in our foresight projects, many of them at EU level, e.g. on research and innovation futures (RIF), security (ETTIS) and in materials (CRM\_InnoNet).

The Competence Center 'Sustainability and Infrastructure Systems' has extensive experience in the area of raw materials and resource efficiency. Examples in the relevant areas of work are the criticality assessments for the EU (DG ENTR, DG GROW), the FP7 Projects CRM\_InnoNet (Critical Raw Materials Information Network) and POLINARES (Policy on Natural Resources), support work for the German Parliament on raw materials policy, several projects for the German Federal Ministry of Education and Research in the field of resource efficiency, projects on emerging technologies and raw materials supply and demand for the German Federal Ministry of Economics and Technology and the German Raw Materials Agency, networking support for the German Federal Ministry of Education and Research in the field of resource efficiency, helping to establish a Pole of Competence for environmental technologies (Green Technology Cluster) under the auspices of North Rhine-Westphalia's Ministry for the Environment and Conservation, Agriculture and Consumer Protection. Through these and related projects, we contribute to the formulation of policy recommendations at the national and EU level.

In MICA, ISI will lead WP2. The project leader (Lorenz Erdmann) has extensive experience with project and work package leads of mineral resource related projects, and especially with taking diverse stakeholder perspectives into account. ISI will furthermore contribute to WPs 4, 5 and 6.

*Publications and services:*

1. Cuhls, K. (2015): Comment on Harold A. Linstone: When is a Need a Need? The Problem of Normative Forecasting in a Changing Environment, in: Technological Forecasting and Social Change 1 (1969), 55-71. In: Technological Forecasting and Social Change 2015 (accepted 18 March 2015).
2. Erdmann, L., Schirrmeister, E. Warnke, P., Weber, M. (2013): Research & Innovation Futures 2030 (RIF): From explorative to transformative scenarios. Deliverable 2.1: Modular Scenario Report. ISI, AIT. [http://www.rif2030.eu/wp-content/uploads/2013/09/RIF-D2-1-Scenario\\_Report-Synthesis-20130515final-2.pdf](http://www.rif2030.eu/wp-content/uploads/2013/09/RIF-D2-1-Scenario_Report-Synthesis-20130515final-2.pdf) . (Article in Foresight 2015 upcoming)
3. Glöser, S.; Soulier, M.; Tercero Espinoza, L. A. (2013): Dynamic analysis of global copper flows. Global stocks, postconsumer material flows, recycling indicators & uncertainty evaluation. Environ. Sci. Technol. 47 (12), pp. 6564–6572. DOI: 10.1021/es400069b
4. Glöser, S.; Tercero Espinoza, L.; Gandenberger, C.; Faulstich, M. (2015): Raw material criticality in the context of classical risk assessment. Resources Policy 44, pp. 35–46. DOI: 10.1016/j.resourpol.2014.12.003
5. Hoenderdaal, S.; Tercero Espinoza, L.; Marscheider-Weidemann, F.; Graus, W. (2013): Can a dysprosium shortage threaten green energy technologies? Energy 49, pp. 344–355. DOI: 10.1016/j.energy.2012.10.043
6. Haegemann, K.; Warnke, W., Degelsegger, A. et al. (2012): Visions on the European Research Area (VERA) Communication Strategy. Deliverable 6.2: Stakeholder Engagement and Communication Strategy. JRC-IPTS, Fraunhofer ISI, ZSI. [http://eravisions.eu/attach/D6-2\\_Communication\\_Strategy-Final.pdf](http://eravisions.eu/attach/D6-2_Communication_Strategy-Final.pdf).

*Involvement in other relevant European and national projects:*

- Forward Visions on the European Research Area (VERA, EU FP7): Lead of the stakeholder identification and classification process in WP6 'Stakeholder Engagement & Communication Strategy'. Lead of WP3, a multi-stakeholder process for the development of future scenarios on ERA.
- Security in public space (SIRA, German Federal Ministry of Education and Research): Lead of WP4 Assessment of innovative security technologies, thereby stakeholder identification and classification. Tailoring the technology assessment to different audiences.
- European trends and threats in society (ETTIS, EU FP7): Lead of WP4, Threat scenarios and need assessment. Conduct of a series of interviews with a selection of identified stakeholders to understand their strategic, tactical, operational and societal needs, focus group and multi-stakeholder validation workshop.
- Critical Raw Materials Innovation Network (CRM\_InnoNet, FP7 CSA): Leader of WP3 on mapping current substitution options for critical raw materials, and of policy instruments being used by EU Member States and selected non-EU countries. Significant contribution to WP4 on value-chain assessment. Leader of Roadmap on Magnetic Materials and Electric Drives within WP5.
- Raw Material Demand of Emerging Technologies (German Federal Ministry of Economic Affairs and Energy, 2008-2009) and Update of the Study (German Raw Materials Agency, 2014-2015): Technological assessment and quantitative scenarios for raw materials demand for a broad selection of emerging technologies.
- Critical Raw Materials for the EU (Technical Support to the Ad-hoc Working Group on defining Critical Raw Materials, 2009-2010 and 2013-2014): Significant contribution to methodology development, testing and implementation, preparation of the List of Critical Raw Materials (featured in COM(2011) 25 final and COM(2014) 297 final, respectively)

### *Profiles of key staff members:*

**Lorenz Erdmann (Male):** M.Sc. environmental engineering. Coordinator of Business Unit “Future Alternatives and Society” at Competence Center Foresight. Has worked on materials from cradle to grave for more than 15 years, thereby advising the OECD, EC and the German Sustainability Council. In 2010 he had a three-month research stay on criticality research at the Center of Industrial Ecology of Yale University. Lorenz gathered comprehensive experience and competences in multi-stakeholder processes by sustainability research and foresight processes, e.g. the RIF and VERA projects on research and innovation futures commissioned by the EU.

**Ms. Philine Warnke (Female):** Dr. phil sociology of technology. She leads the Competence Center Foresight business unit “Futures Thinking and Futures Dialogues”. For more than a decade she has been active as project and team leader in Foresight and innovation policy at Fraunhofer ISI, the „Institute for Prospective Studies“ of the European Commission (JRC-IPTS) and the Austrian Institute of Technology AIT in Vienna. Philine designed and implemented participatory Foresight processes for clients worldwide. Her research is focusing on Foresight methodology and process design as well as research and innovation policy strategies.

**Björn Möller (Male):** Dr-Ing. process engineering. Björn Moller is senior researcher at the Competence Center Foresight since 2011. He is working on Strategies for Material Technologies and Technology Evaluation. After having finished his studies of Nanotechnology at the University of Würzburg and the University of British Columbia, Vancouver, he worked on his PhD at the University of Stuttgart in cooperation with the Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB. Björn has worked on a wide variety of material aspects, e.g. in the project INTRA r<sup>3</sup> + — Integration and transfer of the r<sup>3</sup> research results on securing a sustainable supply of strategic metals and minerals (German Ministry for Education and Research).

**Katharina Eckartz (Female):** Katharina has a background in Economics (B.Sc., M.Sc., Dr. rer. pol.) with a major in Behavioural Economics. She is an experienced researcher in basic research on behavioural as well as environmental economic topics. She joined Fraunhofer ISI as a researcher in 2014, and is affiliated with the Business Unit “Systemic Risks”. The focus of her work is mainly on raw materials, in particular critical raw materials, on understanding raw material markets, and on policy analysis. Among others, she was in charge of the policy mapping of CRM policies in CRM\_InnoNet.

**Luis Tercero (Male):** Luis received his training in chemical engineering (B.Sc., M.Sc., Dr.-Ing.) in Nicaragua, U.S.A. and Germany. He had a leading role in supporting the Ad-hoc Working Group on Defining Critical Raw Materials (2009-2010 and 2013-2014) in the context of the EU Raw Materials Initiative and has managed or been actively involved in a variety of projects (German, EU, Industry) related to critical raw materials, raw material supply and demand, changing demand through emerging technologies, dynamic modelling of material flows, raw materials policy and resource efficiency. He is a member of and Rapporteur in Operational Group 3 (Regulation, Knowledge & Infrastructure) of the European Innovation Partnership (EIP) on Raw Materials as well as Speaker of Working Group 4 (Resource efficient production and supply of raw materials) of the Baden-Württemberg Platform for Resource Efficiency. Within Fraunhofer ISI, he coordinates the Business Unit “Systemic Risks” (2011-today) in the Competence Center Sustainability and Infrastructure Systems and recently assumed responsibility for the Theme “Materials and Raw Materials” across all Competence Centers.

## Natural Environment Research Council (British Geological Survey)

The British Geological Survey (BGS) is a component organization of the Natural Environment Research Council (NERC), which is the UK's leading body for basic, strategic and applied research and monitoring in the environmental sciences. The BGS itself was founded in 1835 and is the world's longest established national geological survey. BGS seeks to advance the understanding of the structure, properties and processes of the solid Earth system through interdisciplinary surveys, monitoring and research for the benefit of society. BGS is a public sector organization responsible for advising the UK government on all aspects of geosciences, as well as providing impartial geological advice to industry, academia and the public. It is the UK's premier provider of objective and authoritative geoscientific data, information and knowledge for sustainable use of natural resources, reducing risk and living with the impacts of environmental change.

BGS is a world leader in the compilation of mineral statistical information and analysis. It has one of the largest databases in the world on the production and trade of minerals and publishes three annual publications together with ad hoc or customised reports to suit particular requirements. Furthermore, it is the custodian of an historical dataset containing mineral production and trade data, by commodity and country from 1913 to present. BGS highly-respected Mineral Profile series includes detailed reviews and analysis of the market dynamics and end-uses for number of raw materials detailed reviews and analysis of the market dynamics and end-uses for a number of raw materials and these are available on our dedicated minerals web portal ([www.mineralsUK.com](http://www.mineralsUK.com)). BGS published a risk index, which provides an indication of the relative risk to supply of chemical elements we need to maintain our economy and lifestyle. BGS is accredited to ISO 9001:2008 at its Keyworth, Edinburgh, Wallingford and Cardiff sites. The BSI has provided BGS with independent third party certification of its Management System and the interacting business processes across all its activities. Corporate procedures ensure that all work carried out by the organisation conforms to the BGS Corporate Aims and satisfies the requirements of our clients and users.

BGS has contributed to and led work packages on a number of relevant EU-funded projects including Minventory (statistical information on EU raw materials deposits), Minerals4EU (EU minerals intelligence network), and EURARE (development of a basis for an EU rare earth elements industry). These projects have resulted in diverse range of relevant collaborations and an expanding network of contacts in the European raw materials arena.

In MICA, NERC, as a global leader in the provision of raw materials data BGS will lead WP3: data for raw materials intelligence capacity (Data). The work package leader Evi Petavratzi has extensive knowledge of the availability of data for primary and secondary raw materials. NERC will also contribute to WP2, WP4, WP5 and WP6.

### *Publications and services:*

1. World Mineral Statistics database and its associated annual publications: World Mineral Production, European Mineral Statistics and United Kingdom Minerals Yearbook
2. Gunn, A G (Ed). 2014. Critical Metals Handbook. John Wiley & Sons Ltd, Chichester, UK
3. MineralsUK website (<http://www.bgs.ac.uk/mineralsuk/>) delivering the BGS mineral statistics publications, mineral profiles (for example: REE mineral profile) and risk list
4. Shaw, R A.; Petavratzi, E; Bloodworth, A J. 2013 Resource recovery from mine waste. In: Hester, R.E.; Harrison, R.M., (eds.) Waste as a resource. Royal Society of Chemistry, 44-65.
5. Lusty, P A J, and Gunn, A G. 2014. Challenges to global mineral resource security and options for future supply. Ore Deposits in an Evolving Earth. Jenkin, G R T, Lusty, P A J, McDonald, I,

Smith, M P, Boyce, A J, and Wilkinson, J J (editors). Special Publication 393. (London: Geological Society).

*Involvement in other relevant European and national projects:*

- Minventory ([www.minventory.eu](http://www.minventory.eu))
- Minerals4EU ([www.minerals4eu.eu](http://www.minerals4eu.eu))
- EURare ([www.eurare.eu](http://www.eurare.eu))
- OneGeology
- EGD-scope

*Profiles of key staff members:*

**Evi Petavratzi (Female):** Senior Mineral Commodity Geologist. Evi works for the Ore Deposits and Commodities team at the British Geological Survey (BGS). In this position she has actively been involved in research that explores ways to enhance the production and use of data for raw materials (primary and secondary), including working in areas relevant to material flow analysis, mineral statistics, critical raw materials and resource efficiency for the mining sector. For the past 2 years, Evi has also been working on the Minerals4EU and Minventory projects. These projects interrogate data availability on mineral resources, mineral reserves, mineral production and trade and exploration activity across 40 countries in Europe. Evi holds a PhD in mining engineering and is chartered from the Chartered Institute of Waste Management.

**Murray Lark (Male):** Environmental Statistician. Murray holds a D.Phil. in environmental statistics from University of Oxford, and has over 20 years post-doctoral experience in the use of statistics for the spatial and spatio-temporal assessment of natural resources. He has particular interest in the evaluation and communication of uncertain information with experience in statistical approaches, the use of fuzzy logic, and the use of expert elicitation.

**Paul Lusty (Male):** BGS Team Leader-Ore Deposits and Commodities. Paul has more than 12 years commercial and research experience in the minerals sector, primarily focused on exploration for metals, mineral deposit research, resource evaluation and analysis of the supply-demand dynamics and economics of a range of minerals critical to the economy. He leads the BGS Ore Deposits and Commodities Team, and is responsible for formulating and directing multidisciplinary research on ‘critical’ raw materials, with an emphasis on improving understanding of ore deposit formation, and provision of data and analysis to inform lifecycle research, criticality assessment and policy making. He manages the BGS–University of Exeter Critical Metals Alliance, an initiative to improve UK capability in critical metals research. He represents the UK on a Working Group of the European Rare Earths Competency Network (ERECON) and is a member of the Pan-European Reserves & Resources Reporting Committee (PERC).

**Gus Gunn (Male):** Principal Economic Geologist. Gus is a geologist with 38 years experience in metals, in UK and overseas. He has extensive experience in the field of critical metals. He was the UK representative on the EU ad hoc working group ‘Defining critical raw materials’ in order to implement recommendations of the Raw Materials Initiative (RMI). He was editor of the Critical Metals Handbook published by Wiley-Blackwell in February 2014 and author of two chapters in this book on platinum-group metals and cobalt. He is the BGS representative on the European Technology Platform for Sustainable Mineral Resources and an expert member of the operational group dealing with exploration, extraction, processing and recycling contributing to the preparation of the European Innovation Partnership on Raw Materials. He is currently involved in three EU-funded projects concerned with

competitiveness of the EU minerals industry, the EU's mineral resources and reserves, and the development of a minerals intelligence capability for the EU.

**Teresa Brown (Female):** Mineral Commodity Geologist. Teresa works for the Ore Deposits and Commodities team at the British Geological Survey (BGS). She has amassed considerable experience in the geology, production and global trade of a wide range of mineral commodities and she is the Project Leader for the BGS's long-running work relating to Minerals Information and Analysis, which produces the World Mineral Production and European Mineral Statistics publications on an annual basis. Teresa is a co-author of two chapters of the Critical Metals Handbook and she has been extensively involved in the BGS Mineral Profile Series, authoring profiles on tungsten and uranium. Teresa is the BGS lead for the ongoing EU-funded Minerals4EU project with specific responsibilities for the Mineral Statistics work-package and the development of a new, digital European Minerals Yearbook. Teresa holds an MSc in GIS.

**Jo Mankelow (Male):** BGS Team Leader-Mineral Resources and Policy. Jo is BGS Team Leader of Mineral Resources and Policy team and is responsible for delivery of high quality outputs from applied research on issues related primarily to the supply of aggregate minerals and other mineral resources to the UK economy. He compiles, manages and delivers up-to-date spatial, technical and statistical mineral information used to provide mineral planning policy decision-support and advice to government and industry. Jo has been working on the Minventory and Minerals4EU projects. He also led projects to deliver mineral resource maps for England, Wales and Central Scotland and is responsible for the BGS [www.MineralsUK.com](http://www.MineralsUK.com) website. Jo is well connected at a European level and was a member of the DG Enterprise EU Raw Materials Initiative Working Group - Exchanging best practices on land use planning, permitting and geological knowledge sharing, and nationally he is a member of the UK Minerals Forum Working Groups. Jo holds a PhD in Engineering Geology.

## **Leiden University-Institute of Environmental Sciences (LU-CML)**

The Institute of Environmental Sciences (CML) is part of the Faculty of Science of Leiden University. The main area of work is research and education in the multidisciplinary field of sustainability science, drawing from both the natural and social sciences. CML has two research departments: Conservation Biology (CML-CB), dealing with issues of biodiversity and sustainable land use and Industrial Ecology (CML-IE), dealing with research into the development of tools for decision making on sustainable production and consumption. CML has led several Framework Programme projects and has participated in dozens.

The Industrial Ecology program of the Institute of Environmental Sciences (CML-IE) conducts fundamental and policy-oriented research in the area of the use and management of natural resources and the impacts of resource use on the environment. CML-IE research projects include both methodology development and application on various fields. CML-IE has been at the cradle of the development of Life Cycle Assessment, presently broadening it to Life Cycle Sustainability Analysis. Also methods such as Material Flow Analysis and Accounting and Environmentally Extended Input-Output analysis belong to the CML-IE core expertise. Application of these methods has taken place in the field of metals and minerals, food, biofuels, and various product groups such as paints, additives, nutrients and many others. CML-IE is often asked as a partner in EU project because of their methodological expertise, the domain knowledge coming from the other partners.



In MICA, LU-CML will lead Work Package 4, on methodologies and tools for raw materials intelligence. LU-CML will bring in core expertise on industrial ecology tools and methods, and will provide the framework for producing fact sheets on all different methods and tools involved. LU-CML will contribute to other work packages from the point of view of translating stakeholder information needs into requirements for methods and tools, and will also make the connection with WP3 (data requirements) and WP6 (translation to web-based information centre).

*Publications and services:*

1. Voet E. van der, Salminen R., Eckelman M., Mudd G., Norgate T. & Hisschier R. (2013). Environmental Risks and Challenges of Anthropogenic Metals Flows and Cycles, A Report of the Working Group on the Global Metal Flows to the International Resource Panel. UNEP. ISBN: 978-92-807-3266-5.
2. Odegard I.Y.R. & Voet E. van der (2014), The future of food — Scenarios and the effect on natural resource use in agriculture in 2050, Ecological Economics 97: 51-59.
3. Hauschild M., Goedkoop M.J., Guinée J.B. , Heijungs R., Huijbregts M.A.J., Joliet O. , Margni M., Schrijver A. de, Humbert S., Lauren A, Sala S. & Pant R. (2013) Identifying best existing practice for characterization modelling in Life Cycle Impact Assessment. International Journal of Life Cycle Assessment 18(3): 683-697
4. Henriksson, P.J.G., D.C. Little, J.B. Guinée & R. Kleijn (2012) Life-cycle assessment and aquaculture. The Practical Asian Aquaculture 3(9):14-16.
5. Guinée, J.B. & R. Heijungs (2011) Life Cycle Sustainability Analysis, Framing questions for approaches Journal of Industrial Ecology 15(5):656-658.

*Involvement in other relevant European and national projects:*

LU-CML still is or recently was involved in the following European funded projects:

- Partner in “Holistic Innovative Solutions for an Efficient Recycling and Recovery of Valuable Raw Materials from Complex Construction and Demolition Waste”(HISER); H2020-WASTE-2014
- Partner in Sustaining Ethical Aquaculture Trade (SEAT); FP7-KBBE
- Partner in Increasing Industrial Resource Efficiency in European Mariculture (I-DREEM); FP7-ENV-2012
- Partner in “Carbon emission mitigation by Consumption-based Accounting and Policy” (CARBON CAP); FP7-ENV-2013
- Partner in “DEvelopment of a System of Indicators for a Resource efficient Europe”(DESIRE); FP7-ENV-2012
- Partner in “Choosing Efficient Combinations of Policy Instruments for Low-carbon development and Innovation to Achieve Europe's 2050 climate targets” (CECILIA 2050); FP-ENV-2012
- Partner in Assessment of Scenarios and Options towards a Resource Efficient Europe (Study Contract)
- Partner in “Environmental Macro Indicators of Innovation” (EmInInn); FP7-ENV-2012-Eco-Innovation

*Profiles of key staff members:*

**Dr. Ester van der Voet (Female)** is Associate Professor at CML. Research topics are, among others: resource efficiency, resource management, resource linkages, life-cycle assessment, biodiversity policy, natural resource accounting, indicator development, material flow accounting, substance flow analysis. She has conducted research in many EU projects as work package leader, among others EmInInn,

CarbonCap, P-THREE and RiskCycle. She has initiated a Masters program in Industrial Ecology, together with the universities of Delft and Rotterdam, and an international Erasmus Mundus Master Industrial Ecology program with universities of Graz and Chalmers, Göteborg. She is a member of UNEP's International Resource Panel.

**Dr. René Kleijn (Male)** is an Industrial Ecologist, working as an assistant professor, project manager and director of education at the Department of Industrial Ecology at LU-CML. Since the start of his academic career in 1990, the focal point of his research is the systematic analysis of sustainability issues using tools like LCA and MFA. He applied these different tools in many domains including recycling technologies, energy systems and chemical industry. In recent years, he studied the apparent new epoch of material scarcity. His research resulted in over 35 peer reviewed scientific journal papers as well as many research reports, conference papers and columns. He has over 20 years of experience in scientific research with a focus on substance and material flow analysis, lifecycle assessment and resource scarcity. He has been involved in over 10 large European research projects.

**Drs Laurant van Oers (Male)** graduated as a biologist in 1988 at Leiden University, with a major in Environmental Science. He has been employed as a researcher at the Centre of Environmental Science since 1989. Research areas are among others: Life Cycle Assessment, Material Flow Accounting, Environmental Extended Input Output Analysis and combinations thereof. He has a wide experience in product and materials related studies, both methodology development (e.g. impact assessment of the depletion of abiotic resources) and case studies (e.g. biofuels). He also is experienced in SFA studies, especially in the area of heavy metals and nutrients. He graduated from the Rotterdam Academy of Arts in 1998 and is now the CML expert on graphical representation of research results and on designing posters and PowerPoint presentations.

**Valentina Prado Lopez, MSc (Female)** is a post doc at CML. Research topics includes incorporation of decision analysis methods for life cycle assessment, life cycle assessment (LCA) for emerging technology applications and interpretation. Valentina obtained a PhD and MS in Sustainable Engineering at Arizona State University, both degrees focusing in LCA interpretation methods. Prior to that, she earned a BS in Civil Engineering at Jackson State University. Valentina is an active member in SETAC in the global LCA advisory group

## **MinPol / Agency for international Mineral Policy**

MinPol - Agency for International Minerals Policy is a private limited partnership (KG) in Austrian law. Apart from the business activities, which are described in the section "What we do" in more detail ([www.minpol.com](http://www.minpol.com)), MinPol is also running an international network of experts of every branch in the field of minerals policy that is continuously growing. The network is already by now covering almost all continents, which underpins the world-wide approach of MinPol.

The network members contribute to discussions around the minerals policy fields and provide their individual expertise. They also provide ideas for future activities so that MinPol benefits from the network especially in its research activities. However, network members may also support in the MinPol business activities on contractual basis and thus form an extraordinary source of expertise for MinPol.

The MinPol-network members have longstanding experiences in the field of international minerals policy and delivered scientific expertise on domestic and international level. Together we develop scientific reports, recommendations, position papers or even entire projects (from the analysis of available resources to consumption scenarios in the future). This allows MinPol to provide maximum support to clients in terms of international minerals policy, mining and environmental engineering,



geology and IT. MinPol will be responsible for development and management of WP5 and also ensure that the policy context will be taken into account in WP2 and WP3. MinPol will also contribute to the identification of stakeholder needs.

*Publications and services:*

1. Blengini, G.A., Garbarino, E., Šolar, S., Shields, D.J., Hámor, T., Vinai, R., Agioutantis, Z. (2012): Life Cycle Assessment guidelines for the sustainable production and recycling of aggregates: the Sustainable Aggregates Resource Management project (SARMA). *J. Cleaner Prod.*, 27(5):177-181.
2. Christman, P., et al. (2014): Recommendations on the framework conditions for the extraction of non-energy raw materials in the European Union – Report of the Ad Hoc Working Group on Exchange of best practices in minerals policy and legal framework, information framework, land-use planning and permitting. Brussels, 35 p.
3. Falck, W.E., Spangenberg, J.H., Wittmer, D. (2014): Social licensing in Uranium Mining: Empowering Stakeholders Through Information.- In: Merkel, B.J., Arab, A. [Eds.], *Uranium – Past and Future Challenges*, Proc. 7th Int. Conf., Uranium Mining and Hydrogeology, Freiberg, Germany, 21-25 September 2014: 79-86, Heidelberg etc. (Springer).
4. Falck, W.E., Hilton, J., Schnell, H., Tulsidas, H. (2014): Social licensing and Stakeholder Communication in Uranium Exploration and Mining.- In: Merkel, B.J., Arab, A. [Eds.], *Uranium – Past and Future Challenges*, Proc. 7th Int. Conf., Uranium Mining and Hydrogeology, Freiberg, Germany, 21-25 September 2014: 87-94, Heidelberg etc. (Springer).
5. Hámor, T., Tiess, G., Kager, J., Heimbürg, J. (2011): European Community law relevant to aggregates. SARMA project, Budapest, 46 p.
6. Tiess, G. (2011): General and International Mineral Policy. Focus Europe (<http://rd.springer.com/book/10.1007/978-3-211-89005-9/page/1>)
7. Tiess, G. (2011), Legal Basics of Mineral Policy in Europe (<http://rd.springer.com/book/10.1007/978-3-211-89003-5/page/1>)

*Involvement in other relevant European and national projects:*

- MINATURA 2020 (EU-funded project, 2015-2018). The overall objective of MINATURA 2020 is to develop a concept and methodology (i.e. a harmonised European regulatory/guidance/policy framework) for the definition and subsequent protection of “mineral deposits of public importance” in order to ensure their “best use” in the future. Providing a policy planning framework that comprises the “sustainability principle” for mining is the key driving force behind MINATURA. MinPol is project coordinator (G.Tiess). MINATURA is highly relevant for MICA because of the relevance of the topic ‘mineral deposits of public importance’. (both calls are strongly interconnected)
- INTRAW (EU-funded project, 2015-2018). INTRAW will map and develop new cooperation opportunities related to raw materials in Australia, Canada, Japan, South Africa, and the United States, addressing: Research and innovation; Raw materials policies and strategies; Joint educational and skills programmes; Licensing and permitting procedures; Data reporting systems; Exploration, extraction, processing and recycling practices; Management and substitution of Critical Raw Materials. The outcome of the mapping and knowledge transfer activities will be used as a baseline to set and launch the European Union’s International Observatory for Raw Materials as a definitive raw materials intelligence infrastructure, operating internationally. MinPol is task leader (Task 1.1: ‘Mapping’) and involved in other WPs as well. INTRAW is highly relevant for MICA because of its international dimension.

- UmSoRes (German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, 2013-2015). “Approaches for the Reduction of Negative Environmental and Social Impacts during the Recovery of Metal Raw Materials”. This project explores the effectiveness of globally environmental and societal standards related to the mining sector. For this purpose, the role of standards is analysed for five selected metallic minerals/metals i.e., bauxite, aluminium, gold, copper, rare earths, and tin. Further, more than 30 standards and conventions are analysed regarding strengths and weaknesses. Based on a broad understanding of the problems regarding social and environmental risks and challenges associated with the production of metallic raw materials, the goal of this project is to analyse and identify concrete policy approaches for the further development of global dissemination of and compliance with internationally recognized environmental and social standards related to raw material extraction. The specific focus is on the contribution of environmental policy. MinPol is involved in several WPs of the project with focus on analyses of standards and conventions. UmSoRes is relevant for MICA because of the environmental dimension as important limitation for mining activities.
- Mineral commodity summaries of the Czech Republic (2013). Elaboration of aggregates prices of (Central) European market for the minerals yearbook „Mineral commodity summaries of the Czech Republic 2013“ (Ministry of the Environment of the Czech Republic); <http://www.geology.cz/extranet-eng/publications/online/mineral-commodity-summaries/MINERAL-COMMODITY-SUMMARIES-OF-THE-CZECH-REPUBLIC-2013.pdf>. MinPol was a contributor to this project that is related to the economical dimension of MICA.
- EXTRACT-IT (EU-funded project, 2012-2013). “Defining FET research topics supporting the ICT challenges of mineral extraction under extreme geo-environmental conditions”. The project mission of EXTRACT-IT was to identify multidisciplinary research topics in the cross-section of future ultra-deep mining and ICT. These research topics was exploratory in nature, representing a challenge way beyond what was considered “applied research”. It fuels ICT research of fundamental character and provided novel pathfinder topics for researchers within the ICT and mining research communities. Furthermore, the project initiated a dialogue between these two research communities, bridging the gap and fostering synergies. The main task of MinPol was to contribute through its thorough understanding of present day EU policies and research agendas in creating a realistic baseline scenario for the future and to make sure that
- the recommendations and the proposed topics support evolving EU policies and overall research agendas. EXTRACT-IT is relevant to MICA because of its (technical) innovative character.

#### *Profiles of key staff members:*

**Prof. Dr. W. Eberhard Falck (Male):** He obtained a diploma in applied geology (Dipl.-Geol.) from the Christian-Albrechts University in Kiel/Germany after studies at this university and the ETH Zürich/Switzerland. He received his PhD (Dr. rer. nat.) in 1988 from the Technical University Darmstadt/Germany with a thesis on applied hydrogeochemistry.

His professional career took him from Nottingham/UK (British Geological Survey, 1987-1991), via Bergamo and Rome/Italy (ISMES S.p.a., 1991/1992), Berlin (WS Atkins, 1992-1994, and as independent consultant 1994-1999), Vienna/Austria (International Atomic Energy Agency, 1999-2006), to Petten/NL (European Commission Joint Research Centre, 2006-2009). Since 2009 he is a professor of environmental sciences at the Université de Versailles St. Quentin-en-Yvelines (UVSQ). He also works on a contract basis as project manager for MIRO in the UK, as well as a consultant to the IAEA in Vienna and the OECD-NEA in Paris.

While his original field of research was the safe management of radioactive waste, he has been working over the past 20 years particularly in the field of long-term management of uranium mining legacies. Over the past 20 years stakeholder and sustainability issues have become increasingly a focal area in both, uranium as well as mining projects in general. This is reflected in a considerable number of (technical) guidance books he edited and the policy support provided to inter alia the European Commission on such matters.

Most recently he acted/acts as a project manager for a number of European Commission Framework 7 projects, including EO-Miners, SUSTAMINING and I2Mine. His teaching at UVSQ and as a visiting professor at the Ecole de Mine de Nantes covers subjects such as the interaction between environmental sciences and society, natural risks and their management, and remediation of mining legacies.

**Dr. habil. Associate Professor Günter Tiess (Male):**

He is the managing director of MinPol, Agency for international Mineral Policy (SME). MinPol is also running an international network of experts of every branch in the field of minerals policy that is growing continuously. The network is already by now covering almost all continents, which emphasizes the world-wide approach of MinPol. An economy geologist by training (PhD, 'Habilitation'), he has more than fifteen years of experience in research focused on international mineral policy, mining and sustainability (Montan Universität Leoben [2002 – 2014]; Technical University of Ostrava [since 2015]; since 2011 in close relationship with the Department of Mining Engineering, Indian Institute of Technology, Kharagpur). He is involved in the EIP on Raw Materials Initiative (OG 3 and 5), and ERECON (European Rare Earths Competency Network) Initiative on rare earth minerals (chair of WG1 (mining and processing). He is coordinator of the H2020 project MINATURA 2020 (mineral deposits of public importance, 2015-2018). He was coordinator of the (EU-) SNAP-SEE project 2012-2014 ([www.snapsee.eu](http://www.snapsee.eu)). During his career, he has given presentations in international congresses and workshops and delivered publications at conference proceedings and also in peer reviewed journals. He was involved in the SARMA project (2009-2011 and prepared position papers for EU initiatives. Moreover, he is the author of the books: "General and International Mineral Policy, Focus Europe" and "Legal Basics of Mineral Policy in Europe". Finally, he is one of the Editors-in-Chief of the ongoing encyclopedia project (Encyclopedia of Mineral and Energy Policy) with Springer (<http://refworks.springer.com/mrw/index.php?id=5092>).

**Dr. sc. tech. Dominic Wittmer (Male):** Dominic Wittmer graduated from the Johannes Gutenberg University Mainz with a diploma in Geology with focus on Structural Geology. He then obtained Doctorate of technical sciences (Dr.sc.tech.) at the Swiss Federal Institute of Technology (ETH), Zürich. From 2008 until 2013 he worked as research fellow at the research group Material Flows and Resource Management of the Wuppertal Institute, a Think Tank in Sustainability Sciences. Since 2014 he works at the German Federal Institute for Geosciences and Natural Resources (BGR). His research focus is on environmental and societal issues in mining, sustainable resource management, material flow accounting and analysis (MFA/SFA), and mineral statistics. His professional experience covers research in Urban Mining, Sustainable Resource Management, and how scientific results can contribute to EU or national policies on resource efficiency.

**Dr. Tamas Hamor (Male):** Tamas HAMOR is a geologist mining engineer, post-grad. economist and jurist engineer, and he holds a Ph.D. in earth sciences. He works at the Hungarian Office for Mining and Geology as head of Division of Management & Legal Affairs.

He previously worked for the European Commission's Joint Research Centre, the Hungarian Geological Survey, and the Geological Institute of Hungary. His professional experience covers EU policies, raw materials, geothermal energy, geological exploration, radioactive and mining wastes, public administration, legislation, and natural resources management.

At the European Union level he is a RMI-EIP WG4 rapporteur, ER-MIN project task leader, Raw Materials Supply Group member, FP evaluator, TAIEX expert, Mining Waste Directive TAC member and WG co-chair, ALTENER GTR-H geothermal project member, SEE SARMA project WP leader,

member of national inter-service committee on EU matters. Other international activities are related to the IAEA and UN-CSD, UNESCO-IGCP and IUGS, OECD-NEA, NATO-ASI.

He is the author of 95 publications. He is an honorary associate professor of Miskolc University, and the first co-president of the Geological Society of Hungary. Tamas Hamor was awarded by Fulbright, DAAD, MTA Szádeczky, Eötvös, Soros, Magyar Tudományért, Semsey, Comitatus funds.

**Dr. Horst Hejny (Male):** Dr. Horst Hejny studied chemical and process engineering in Dortmund, Germany. Since May 2004, he works as independent consultant in the field of mining and tunnel safety with main emphasis on project development and management. One crucial point in all project initiatives was the contribution to and impact on mineral raw materials policy assessment and development of the related project results. Between 2002 and 2005 he coordinated the European Thematic Network NESMI (Network on European Sustainable Minerals Industries), which was the nucleus of the European Technology Platform on Sustainable Mineral Resources (ETP SMR). For the ETP SMR, he was the main responsible (together with many other members of the Platform) for the first Strategic Research Agenda and for several revisions of this document. He also wrote the first ETP SMR Implementation Plan.

## **Bureau de Recherches Géologiques et Minières (BRGM)**

BRGM (the French Geological Survey) is a French Public Institution responsible for mobilising the Earth Sciences in the sustainable management of georesources and the subsurface domain. BRGM's research and development programs, financed by the Ministry of Research, support innovation and work towards advancing the Earth Sciences in strategic areas, both on a national and international scale.

BRGM is involved in a high standard of research activities under the supervision of the Research Division, which ensures the quality of the undergoing research projects. BRGM activity covers the whole spectrum of the management of mineral resources, from fundamental research (e.g. ore forming processes, metallogenic syntheses, predictive mapping, etc.), including exploration, expertise, development of geological and mining data infrastructures, management of after mine problems, to raw material economy. In the same way, BRGM has an international expertise in information systems, being part or leading European drafting teams and working group of the INSPIRE directive. At national level, it is in charge of the development and hosting of the National Environment Portal and of the National Geo-catalogue (national catalogue for INSPIRE), and of the “National Portal about Environment”. Promoting interoperability in geosciences and environmental information, BRGM is contributing to OGC development and to GeoSciML and ERML (through IUGS/CGI).

BRGM is a main contributor of (i) the EU- project OneGeology-Europe to make available metadata and map services of the national geological maps to build on-line the geological map of Europe, (ii). the pan-European Geological Data Infrastructure (EGDI-Scope, GNEISS [submitted]), an action which will provide the backbone for serving interoperable, pan-European geological data currently held by Geological Surveys, and data from past, ongoing and future European projects and (iii) the INspired GEOdata CLOUD Services project (InGeoCloudS) which aims at demonstrating the feasibility of employing a cloud-based infrastructure coupled with the necessary services to provide seamless access to geospatial public sector information, especially targeting the geological, geophysical and other geoscientific information. BRGM is also WP5 Leader of the EU-FP7 Minerals4EU project, a key-partner of the EURARE EU-FP7 project and WP6 Leader of the new H2020 ProSUM project.

BRGM has also a strong experience in predictive mapping (Leader of the WP1 - EU-FP7 ProMine project – Pan-European inventory of mineral resources and critical raw materials predictivity mapping) and in 3D modelling (development of the 3D GeoModeler commercial software).

For a number of years, BRGM has been deeply involved in research aimed at combining both primary (extracted) and secondary (reused, recycled) sources of mineral raw materials in a systemic analysis of

the relationships between supply and demand, all along the value chain. Advanced tools and methods such as material flow analysis (MFA), input-output leontief matrices, life cycle analysis (LCA), etc., have been applied to the understanding of flows and stocks of mineral raw materials, including environmental externalities, and to the study of the balance between supply and demand. BRGM has also investigated the issue of representing and propagating uncertainties in such a context. In addition to the development of methods and tools for mineral raw material intelligence, BRGM develops processes for the recovery of mineral raw materials from a variety of sources including old mine tailings and various waste materials (WEEE, cement, magnets, etc.).

#### *Publications and services:*

1. Cassard D., Serrano J.-J., Vuollo J. (2012). 'The use of the standard exchange EarthResourceML in the ProMine project'. 34th International Geological Congress, Brisbane, August 2012, Abstracts on CD-ROM.
2. Cassard D., Bertrand G., Billa M., Serrano J.J., Tourlière B., Angel J.M. and Gaàl G. (In Press). ProMine mineral databases: new tools to assess primary and secondary mineral resources in Europe. Accepted for publication in: Weihed P. (ed.), 3D, 4D and Predictive Modelling of Major Mineral Belts in Europe, Springer Special Volume
3. Cassard D., Tertre F., Bertrand G., Schjøth F., Tulstrup J., Heijboer T., Vuollo J., Bogaard P., Gruijters S., Waardenburg F. (In Prep.). EURARE IKMS: An Integrated Knowledge Management System for Rare Earth Element Resources in Europe. To be submitted for publication In: Leal W. & Lima I. (Eds.), Rare Earths Industry: Technological, Economic and Environmental Implications, Elsevier special publication.
4. Guyonnet, D., Planchon, M., Rollat, A., Escalon, V., Tuduri, J., Charles, N., Vaxelaire, S., Dubois, D., Fargier, H., 2015. Material flow analysis applied to rare earth elements in the EU-28.
5. Serrano J.-J., Kauniskangas E., Cassard D. (2010). 'ProMine: architecture, portal and web services to provide a European mineral resources information system', 4th INSPIRE Conference. Krakow, 22-25 June.

#### *Involvement in other relevant European and national projects:*

- H2020 project ProSUM (WP leader for the development of the EU-Urban Mining Knowledge Data Platform),
- EU-FP7 project EURARE (Task leader for the development of the EU-Integrated Knowledge Management System on REEs),
- EU-FP7 project Minerals4EU (WP leader for the development of the EU-Mineral Resources Knowledge Data Platform),
- EU-FP7 project EGDI-Scope (WP leader for the technical design of the future European Geological Data Infrastructure),
- EU-FP7 project InGeoCloudS (WP leader for the evaluation of the infrastructure and the gain for future users).

#### *Profiles of key staff members:*

**Daniel Cassard (Male):** PhD, Programme Scientific Coordinator, Minerals4EU WP5 Leader, ProSUM WP6 Leader, INSPIRE TWG 'Mineral Resources' Expert, IUGS/CGI/ Interoperability Working Group member. Deputy Chair of the EuroGeoSurveys Mineral Resources Expert Group;

**François Tertre (Male):** Project leader in Information Systems and Technology, managing IT projects at national and European levels. Project leader in the ENVISION EU-FP7 project, also involved in the Initial Operating Capabilities task force for INSPIRE;

**François Robida (Male):** Mining engineer and Geostatistician. Deputy Head of Information Systems and Technologies division, Member of the Board of Directors of OGC (Open Geospatial Consortium) and coordinator of the French OGC Forum, Chair of the EuroGeoSurveys INSPIRE and GI working group, member of the IUGS/CGI Council, and member of ICT board of the EPOS initiative;

**Agnès Tellez-Arenas (Female):** PhD, project leader in Information Systems and Technology, OneGeology and Pangeo EU-FP7 project WP Leader, GeoSciML group of the IUGS/CGI Co-Chair of the test-bed working group;

**Guillaume Bertrand (Male):** PhD, Research Scientist in mineral resources, thematic databases design and data treatment Expert, involved in the ProMine, EURARE and Minerals4EU EU-FP7 projects and H2020 ProSUM project;

**Jacques Villeneuve (Male):** PhD, Mineral Processing Engineer, expert in the analysis of raw materials supply and demand, including environmental externalities;

**Dominique Guyonnet (Male):** PhD, previously Head of BRGM's waste management unit, now Director of ENAG (French national school for applied geosciences), also involved in research activities on the application of material flow analysis (MFA) to mineral resources;

**Gabriel Courroix (Male):** PhD, structural geologist, expert in 3D modelling, co-developer of the BRGM/Intrepid 3D GeoModeler software.

## **EuroGeoSurveys (EGS)**

EuroGeoSurveys (EGS) is the organisation of the Geological Surveys of Europe, the national institutions responsible for the geological inventory, monitoring, knowledge and research for the security, health and prosperity of the society. Its mission is to provide public Earth science knowledge to support the EU's competitiveness, social well-being, environmental management and international commitments. According to its Statutes, EGS pursues activities that lie exclusively in the public interest or in the interest of public administration and of the European Union. In particular, EGS provides a unique, independent, source of scientific expertise and advice to the EU institutions, deriving from its 37 members (from 36 European countries: 2 members for Bosnia & Herzegovina), on all matters related to on-shore and off-shore geological resources and/or hazards.

Collectively EGS members contributed to over 160 FP5, FP6 and FP7 European Research Projects. In the frame of this project EGS will especially lead WP7 'Communication, Outreach and Linkages' for which it is most qualified, since it already acts in similar ways in the implementation of its work programme. EGS is also very experienced in communicating science in the frame of large EC projects, such as the Minerals4EU project, involving 32 European countries, or the I2Mine project, with 23 partners and a budget of over 25M Euro. Moreover, the staff involved has successfully coordinated the communication of the strategic and renowned EGDI-Scope and OneGeology-Europe projects.

### *Publications and services:*

1. Geochemical mapping of agricultural and grazing land soil of Europe, Reimann, C., Birke, M., Demetriades, A., Filzmoser, P., O'Connor, P. (Editors), 2014, ISBN 978-0-4470-74724-7
2. OneGeology-Europe, applying Geoscience for society, OneGeology-Europe Consortium (Editors), 2010 ISBN 978-0-85272-668-6
3. Geochemistry of European Bottled water, Reimann & Birke (eds.) 2010., ISBN 9783443010676
4. The Geological Surveys of Europe for Europe, the EuroGeoSurveys vision towards a Geological Service for Europe, EuroGeoSurveys Strategy Task force, (Editors), 2014, ISBN 9789082254709
5. Minerals in your life, EuroGeoSurveys, (Editors), 2014, ISBN 9789090281476

### *Involvement in other relevant European projects:*

- EGDI-Scope: <http://www.egdi-scope.eu>
- PanGeo: <http://www.pangeoproject.eu/>
- Minerals4EU: <http://www.minerals4eu.eu>
- OneGeology-Europe: [www.onegeology-europe.org](http://www.onegeology-europe.org) and portal <http://onegeology-europe.brgm.fr/geoportal/viewer.jsp>
- Edmonet: <http://www.emodnet-geology.eu/emodnet/srv/eng/home>

### *Profiles of key staff members:*

**Luca Demicheli (Male):** Since April 2009 Luca Demicheli has been Secretary General of EuroGeoSurveys, the Brussels based organisation representing the Geological Surveys of Europe – the national institutions responsible for the geological inventory, monitoring, knowledge and research for the security, health and prosperity of the society. Following a Decree of the Italian Minister of the Environment, Luca has previously covered the position of Secretary General of the Italian Committee for the International Year of Planet Earth, a UNESCO initiative to promote earth sciences among decision-makers and public at large. Formerly responsible for the coordination of the international activities of the Geological Survey of Italy, he also served for several years within the European Commission where launched and coordinated the environmental strategy of several major international scientific projects. A geologist specialised in environmental engineering and environmental management and planning, performed his post-graduate studies at the Swiss Federal Institute of Technology, at the National Technical University of Athens, and at the Imperial College London. He is member of several both national and international task forces, committees and management boards.

**Claudia Delfini (Female)** is a communication specialist, holding a degree in sociology with specialisation in social planning and communication from the University of Roma “La Sapienza” and a post-graduated diploma in Public Communication and Journalism. Since 2004, as a member of the communication staff of ISPRA, she has been involved in several national and international projects concerning natural disasters, nuclear energy, geological mapping, environmental data management, etc., as well as the International Year of Planet Earth. . In particular, she has coordinated the communication strategy of the EGD-Scope project, Minerals4EU project, Pangeo project, OneGeology-Europe and of the ViaGeoAlpina projects. Currently she is also charged of providing support to the EuroGeoSurveys Secretariat, where she was nominated Communication Manager, developing the communication strategy and taking care of the communication activities. Finally, Claudia is lecturer and consultant in corporate communications at the Training Company 'Lattanzio e Associati' inc.

**Christeline Mottet (Female)** is a Junior Scientific Officer at EuroGeoSurveys, The Geological Surveys of Europe. Christeline, who holds a Master of Science Degree in Geology from the University of Liège, Belgium, works at EuroGeoSurveys since 2013, where she is responsible for the domains of Marine



Geology, GeoEnergy, International Cooperation and Development and Mineral Resources. European research projects in which Christeline is involved with different roles, include Minerals4EU - Minerals Intelligence Network for Europe (The Minerals4EU project is designed to meet the recommendations of the Raw Materials Initiative and will develop an EU Mineral intelligence network structure which will provide data, information and knowledge on mineral resources around Europe), I<sup>2</sup>Mine - Innovative Technologies and Concepts for the Intelligent Deep Mine of the Future (The I<sup>2</sup>Mine project will develop the innovative methods, technologies, machines and equipment necessary for the efficient exploitation of minerals and disposal of waste, all of which will be carried out underground), and “Geoscientific knowledge and skills in African Geological Surveys” (The aim of the project is to contribute to capacity building and facilitate communication and cooperation between the EU and AU and individual African countries in the field of Earth sciences and sustainable use of mineral resources).

**Francesca Siciliano (Female)** is Communications Assistant at the international organization EuroGeoSurveys (EGS), where she follows the internal and external communications for EGS and several research projects in all aspects (media relations, web, copywriting, etc.). Previously she worked as trainee at the European Commission DG Joint Research Centre disseminating information on scientific research projects under the Digital Agenda for Europe (DAE) EU flagship initiative. Before, she worked in Spain in Marketing and Communications by joining the European Transitional Mobility Programme. She obtained a MA's degree in Communications and Persuasive Languages from the University of Siena in 2009. Since her studies she has been fascinated with multicultural and multilingual environments and developed a deep interest for environmental and science communications.

**Patrick Wall (Male)** is a scientist by training, holding a Bachelor of Science Degree in Chemistry and a Master of Science Degree in Environmental Science from University College Dublin, Ireland. In 2010, he entered the scientific policy sector through an internship at the European Commission Directorate General for Research and Innovation where he was heavily involved in their communication activities promoting various FP7-funded projects under the theme “Environment”. Since 2011 he has held the position of Scientific Policy Officer at EuroGeoSurveys, involving communication activities in various projects including I<sup>2</sup>Mine (Innovative Technologies and Concepts for the Intelligent Deep Mine of the Future) and Minerals4EU (Minerals Intelligence Network for Europe) as well as those of both the EuroGeoSurveys Secretariat and the European Technology Platform on Sustainable Mineral Resources Secretariat. He is also charged with assisting EuroGeoSurveys in fulfilling their strategic ambitions and monitoring developments in the Group on Earth Observations, in which EuroGeoSurveys is a Participating Organization.

**Isabel Pino de Juana (Female):** EuroGeoSurveys Scientific Officer. Ms Pino is a Geologist working at EuroGeoSurveys. She is a specialist in the field of mineral resource management and sustainable development. She completed her studies at the Mines, Metallurgy, Geology and Environmental Engineering at the University of Guanajuato, Mexico and had the opportunity to work in the Mine sector and develop Geological Cartography with focus on Mineral Resources with the Mexican Geological Survey. Ms Pino got the Environmental Protection Agency (EPA) Asbestos Hazard Emergency Response Act (AHERA) Building Inspector diploma and worked as an Asbestos Inspector consultant for the private sector in USA and Spain.

## **The Federal Institute for Geosciences and Natural Resources (BGR)**

The Federal Institute for Geosciences and Natural Resources (BGR) is the central geo-scientific authority providing advice to the German Federal Government in all georelevant questions. BGR is a federal institute accountable to the Federal Ministry for Economic Affairs and Energy (BMWi). BGR provides neutral and independent advice and information about all geoscientific and natural resource issues.



BGR's work is supported by a modern scientific-technical infrastructure. Laboratories, collections, equipment and technical expertise are developed and provided as required for executing specific projects. In addition, central technical services such as the library, public relations work and information technology guarantee documentation and target-group oriented provision of data, information and publications.

With regards to topics related to raw materials BGR is working in the fields of the ore geology and mineralogy, the availability of mineral resources, development cooperation and the exploration of marine raw materials.

As consultants to the federal government and German industry BGR continuously analyses and evaluates global mineral resource potentials and markets for metals, industrial minerals and non-metals. BGR researches and develops new exploration methods and strategies in the run-up to industrial activities, in particular for high-tech metals, what are known as "critical resources" and specific industrial minerals. It develops resource and development policy instruments and concepts for utilising mineral resources based on ecological, social and economic criteria.

The DERA (German Mineral Resources Agency) is also an integral part of BGR and serves as the competence centre for mineral resources and the central platform for information and consulting services on non-renewable resources (metals, industrial minerals, rocks, and energy resources). This includes expert knowledge of resource efficiency and secondary raw materials.

Further BGR fields of scientific research include:

- Energy Resources
- Groundwater
- Soil
- Final Disposal of Radioactive Waste
- Deep Subsurface Use; Geological CO<sub>2</sub> Storage
- International Geoscientific Cooperation
- Geoscientific Information and Fundamentals
- Nuclear Weapons Test Ban; Geo-hazard Assessment

In MICA BGR will contribute to WP3. The main focus will be on data delivery and expertise on raw material databases, collection of data, critical raw materials.

*Publications and services:*

1. BGR (2014): Deutschland- Rohstoffsituation 2013, BGR, November 2014, ISBN: 978-3-943566-14-7
2. Buchholz, P., Huy, D., Sievers, H. (2012): DERA-Rohstoffliste 2012. Angebotskonzentration bei Metallen und Industriemineralen – Potenzielle Preis- und Lieferrisiken. DERA Rohstoffinformationen 10, Deutsche Rohstoffagentur (DERA), Berlin, ISBN: 978-3-943566-01-7.
3. Buijs, B. & Sievers, H. (2011): Resource Security Risks in Perspective - Complexity and Nuance, November 2011, CIEP-BGR Briefing Paper, [http://www.clingendaelenergy.com/inc/upload/files/Resource\\_security\\_risks.pdf](http://www.clingendaelenergy.com/inc/upload/files/Resource_security_risks.pdf)
4. Buijs, B. & Sievers, H. (2011): Critical Thinking about Critical Minerals - Assessing risks related to resource security, November 2011, CIEP-BGR Briefing Paper, [http://www.clingendaelenergy.com/inc/upload/files/Critical\\_thinking\\_critical\\_minerals.pdf](http://www.clingendaelenergy.com/inc/upload/files/Critical_thinking_critical_minerals.pdf)
5. Sievers, H. (2012): Kritische Rohstoffe- Langfristig betrachtet. Rechtsfragen des internationalen Rohstoffhandels, Vorträge des 16. Außenwirtschaftsrechtstages vom 27./28.10.2011, Verlag Recht und Wirtschaft, ISBN: 3-8005-1564-6

6. Sievers, H. für Polinares (2012): Critical raw materials: Developing long-term strategies. European Policy Brief, European Commission, FP7 Socio-economic Sciences and the Humanities, topic SSH-2009-4.1.1 ‘Competition and collaboration in access to oil, gas and mineral resources’, 06/2012, [www.polinares.eu](http://www.polinares.eu)
7. Tercero, L., Buijs, B., Sievers, H. (2012): Limits to the critical raw materials approach. Proceedings of the ICE - Waste and Resource Management, Volume 165, Issue 4, 01 November 2012, pages 201 –208 , ISSN: 1747-6526, E-ISSN: 1747-6534

*Involvement in other relevant European projects:*

- Minerals4EU ([www.minerals4eu.eu](http://www.minerals4eu.eu))
- Polinares ([www.polinares.eu](http://www.polinares.eu))
- MinVentory ([www.minventory.eu](http://www.minventory.eu))
- Intra r3 and Intra r4 (BMBF)

*Profiles of key staff members:*

**Dr. Henrike Sievers (Female):** Henrike Sievers joined the Mineral Economics team at the BGR in 2009. Prior to that she was working for the copper industry in the field of “environment and sustainability”, including life cycle analysis. She is a geologist and holds a doctoral degree in natural sciences from the RWTH Aachen University, where she worked a researcher on metallic raw material flows (2000-2005). Henrike was leading work packages in the EU-funded projects Polinares and Minerals4EU. She is member of the Mineral Resources Expert Group of EuroGeoSurveys.

**Dr. Michael Szurlies (Male):**

M. Szurlies is postgraduate in geology with more than 15 years experience in the fields of energy and mineral resources and leads the unit “Availability of Mineral Resources” at BGR. His unit advises the Federal Government, the German industry and the public on issues related to world-wide exploration and mining activities as well as the availability of mineral resources. M. Szurlies is acting as German representative at the International Study Groups on Lead-Zinc, Nickel, and Copper and holds a vice chair in the Standing Committee of the Lead and Zinc Study Group. He is Member of the Mineral Resources Expert Group of EuroGeoSurveys. His current activities focus on exploration and mining activities on base metals. As head of unit M. Szurlies is coordinating the activities of the staff involved in the project.

**Doris Homberg-Heumann (Female):** Doris Homberg-Heumann is responsible for BGR’s raw material databases and coordinates BGR’s work with regard to the International Study Groups on raw materials.

## GTK

Geological Survey of Finland (GTK) is national geological research centre operating under the Ministry of Employment and Economy. GTK is one of the most competent European service centres in applied earth sciences. The person-years worked amounts to 592 of which 47% are highly qualified professionals in various aspects of geology, environmental sciences, geophysics, geochemistry and IT technology, many of them with strong international background. GTK’s annual turnover totals 53 M€; the invoicing is over 12 M€. International references cover a wide spectrum of undertakings in about 40 countries of all continents. GTK provides consultancy services and basic geological information essential for assessment of raw materials, nature conservation, environmental studies, land use planning and for new applications. The geological earth resources of strategic and economic importance - such as precious and base metals, industrial minerals, groundwater, aggregates, dimensional stone and bioenergy sources - are in the core of GTK’s research mission. GTK’s has e.g. following research

Programmes: Natural resources Accounting (incl. LCA), Mineral Potential, Environmental Impact, Geoinformation and Minerals & Processing. Web-site: <http://en.gtk.fi>

GTK has acquired international experience by carrying out joint development projects, expert advisory work for the United Nations, and joint research projects with other institutes and EU Programmes. GTK is an experienced participant in various funding schemes the European Union has to offer. In 2014 GTK had dozens of ongoing projects which had EU –funding (e.g. FP7, LIFE, Interreg and ENPI). GTK was the coordinator of the ProMine project (FP7-NMP-2008-LARGE-2) and one of the Key Partners in EURARE-project. GTK is the coordinator of the ongoing Minerals4EU project (FP7-NMP NMP.2013.4.1-3; 608921). Science and technology projects include e.g. GIS and spatial analysis as a tool for predicting and locating mineral deposits, sustainable use of geological secondary materials of extractive and other industries, mineral exploration, mineral processing, data management, LCA, environmental techniques for the extractive industries

GTK has improved its databases and developed services related to them more than 25 years. GTK have nationwide databases for mineral- and energy resources, rock observations, boreholes, seamless bedrock and quarternary map sets, geochemistry, geophysics, peat resources, reports and ground water. Fraser annually publishes the results of a mining and exploration companies survey and according to the question “Quality of the geological database” - for the third consecutive year, Finland/GTK ranked number one in the survey (<http://www.fraserinstitute.org/uploadedFiles/fraser-ca/Content/research-news/research/publications/survey-of-mining-companies-2014.pdf>).

GTK also has contributed to the EU-financed projects like ProMine, OneGeologyEurope, PanGeo, Aegos, EMODnet-geology and EGDI-Scope. GTK has furthermore a strong role in the recently launched projects Minerals4EU and EURARE and is a facilitator of the INSPIRE Maintenance and Implementation Working Group for Mineral Resources.

In MICA project, GTK will take part to WP6, with the following duties: leading Task 6.1 “synthesis of stakeholder requirements and analysis of method functionalities” and take part of all the other WP6 tasks/sub-tasks.

#### *Publications and services*

1. Rasilainen, K. ; Eilu, P. ; Halkoaho, T. ; Karvinen, A. ; Kontinen, A. ; Kousa, J. ; Lauri, L. ; Luukas, J. ; Niiranen, T. ; Nikander, J. ; Sipilä, P. ; Sorjonen-Ward, P. ; Tiainen, M. ; Törmänen, T. ; Västi, K. (2014). Quantitative assessment of undiscovered resources in volcanogenic massive sulphide deposits, porphyry copper deposits and Outokumpu-type deposits in Finland, 60 p. ([http://tupa.gtk.fi/julkaisu/tutkimusraportti/tr\\_208.pdf](http://tupa.gtk.fi/julkaisu/tutkimusraportti/tr_208.pdf))
2. Kivinen (Tuusjärvi), M. 2013: From a mine to you : sustainability of the Finnish mining sector in the context of global supply chains of metals, 40 p. Helsinki : University of Helsinki Thesis
3. Vuollo, J., Eloranta, T., Cassard, D., Tomas, R., Schubert, C. 2014: Geoscience Data Transfers Standards: EarthResourceML and GeoSciML, tools to deliver mineral resources data in EU and globally. The EU-MKDP example Minerals in Circular Economy – Book of Abstracts, 2014 ([http://www.mince.fi/document/esitykset\\_new/Data\\_standards\\_Mince\\_JVuollo GTK.pdf](http://www.mince.fi/document/esitykset_new/Data_standards_Mince_JVuollo GTK.pdf) )
4. Cassard, D., Tertre, F.; Bertrand, G., Schjøth, F., Tulstrup, J., Heijboer, T. and Vuollo, J. 2014: EURARE IKMS: An Integrated Knowledge Management System for Rare Earth Element Resources in Europe. ERES 2014 (<http://www.eurare.eu/docs/eres2014/fifthSession/GuillaumeBertrand.pdf>)
5. Finland Mineral Resources Portal - <http://gtkdata.gtk.fi/mdae/index.html>

#### *Involvement in other relevant European and national projects:*

- ProMine: <http://promine.gtk.fi/> - coordinator and portal  
<http://ptrarc.gtk.fi/ProMine/default.aspx>

- EURARE: <http://www.eurare.eu>
- Minerals4EU: <http://www.minerals4eu.eu> – coordinator and portal - <http://minerals4eu.brgm-rec.fr/>
- Fennoscandian Metallogeny
- EIP Raw material Operational WG input
- INSPIRE Mineral Resource Data Specification and Thematic Cluster coordination
- Mineral policy – Finland - [http://en.gtk.fi/mineral\\_resources/mineralpolicy.html](http://en.gtk.fi/mineral_resources/mineralpolicy.html)

### *Profiles of key staff members*

**Dr. Jouni Vuollo (Male):** Ph.D. in geology. Chief geologist at GTK; geoinformation management and modelling.. He also is Adjunct Professor in GIS and geology at the University of Oulu. Jouni has been working with establishing databases for geological and other geodata more than 15 years. Member of INSPIRE Thematic Working Group Mineral Resources and Geology (2010-2013). Active chair of the EarthResourceML IWG since 09/2010 and a member of the IUGS/CGI IWG - GeoSciML and Concept Definition task group. Nominated (11/2013) as a facilitator of the INSPIRE Maintenance and Implementation Working Group for Mineral Resources. Has been a participant of in Minerals4Eu (2013-2015 and EURARE projects (2013-2017).

**Kalevi Rasilainen (Male):** Kalevi has a PhD in geology from University of Helsinki and works as a geologist in the Bedrock Geology and Resources division in the Southern Finland Office of GTK. He has a long experience in working with research on mineral deposits, especially base metals and gold. For the last seven years, Kalevi has been leading a project assessing the unknown mineral resources in the Finnish bedrock. He has also been involved in EU-funded projects PuPulse (2002–2005) and Minerals4EU (2013–2015), and in several other projects dealing with minerals intelligence.

**Juhani Ojala (Male):** Manager of Bedrock Mapping and Resources Division, Northern Finland office at the Rovaniemi in the GTK. Juhani has a PhD from the University of Western Australia in 1995. His post doctoral studies were on 3D structural controls, alteration and geostatistics on gold deposits. After post doctoral studies he worked as a principal geoscientist at Georeality Pty Ltd, Perth, Western Australia. In 2001, he moved back to Finland and worked in the Geological Survey of Finland (GTK) as a senior geoscientist in the Espoo office; in 2004 he was appointed to the Rovaniemi office as a Research Professor. In 2008, he joined Store Norske Gull AS and was leading the company's metal exploration in Northern Norway and Spitsbergen till 2014.

**Pasi Eilu (Male):** Pasi has a PhD in geology from University of Turku, Finland, and works as a Senior Scientist in the Bedrock Geology and Resources division in the Southern Finland Office of GTK. He also is Adjunct Professor in economic geology at the University of Turku. He has a long experience in working with research on mineral deposits, especially gold, and on metallogeny. Since 2003, Pasi has been leading the international Fennoscandian Metallogeny project between Finland, Norway Sweden and Russia. He also is working in a project assessing the 'undiscovered' mineral resources in the Finnish bedrock (2007- ), and was part of the project group formulating the Europe-wide mineral deposit database in the EU-funded Promine project (2008-2012). In addition, he developed the gold (1997–2009) and zinc (1999–2007) deposit databases of Finland, and has led, or participated in, several gold deposit geology research projects, in Finland, Sweden, Norway, Greenland, and Australia, since 1994, and participated in several other projects dealing with minerals intelligence.

**Niina Ahtonen (Female):** MSc. (geology and mineralogy, 1996), MSc. (computer science, 2003), Specialist Qualification in Management (2009). Senior scientist at GTK. More than ten years experience of the development of GTK's geo-information system which is based on corporate data warehouse concept. Project management. The process of information system development, requirement analysis, agile development. GIS, ArcGIS – products and geological data and geological data models, vocabularies. Databases and enterprise architecture

**Mari Kivinen (Female):** Mari Kivinen has a PhD in geology and works as a research scientist at GTK. Her key expertise is on mineral trade patterns, future uses of minerals and sustainable development theory applied to mining. Despite of short professional career, Kivinen has already a solid background in working with multidisciplinary research questions with international dimensions. This is due to working with EU-funded research projects (ProMine & Minerals4EU), and several multidisciplinary national projects.

## **UJF – LIG - STEAMER**

University Joseph Fourier Grenoble 1 (**UJF**) is a research intensive university in an international and high tech environment located in the middle of the Rhône-Alpes region, 2nd French region in terms of research activities. UJF has developed top level research and is involved in significant collaboration between national and international research and large instrument organisations. UJF also benefits from an international recognition : Shanghai Ranking 2014, ranked 150, 5th French university, top 75 in natural sciences and mathematics, top 100 in Physics, and top 150 in Engineering, technology and computer sciences.

UJF has a great experience in European framework programmes (FP), first projects were submitted in 1990, during the FP 3rd. It has managed the participation in 69 projects under the FP6 (2002-2006) More recently, under the FP7 (2007-2013) and H2020, UJF laboratories have succeeded in 117 projects, 26 of them being coordinated by UJF, 9 in the ERC program Around 35 M € are being managed up to now by UJF under FP7. Under H2020, UJF continues to actively participate and is already involved in 7 projects. 13 staff members are directly connected to European research projects at UJF (full or part-time of their activity).

UJF acts here on the behalf of the Grenoble Computer Science Laboratory (**LIG** – [www.liglab.fr](http://www.liglab.fr)). The LIG brings together almost 500 researchers, professors and associate professors, doctoral students, and research support personnel. The scientific project of the LIG is "ambient and sustainable IT". The goal is to leverage the complementary nature and recognised quality of the 24 research teams of the LIG to contribute to fundamental aspects of the discipline (modelling, languages, methods, algorithms) and to create a synergy between the conceptual, technological and societal challenges that surround this theme. The challenges to be addressed are indeed numerous and far-reaching. The diversity and dynamism of data, services, interaction methods, and contexts of use require an evolution of systems and software to guarantee essential properties such as reliability, performance, autonomy and adaptability. In rising to these challenges, there is a resonance between the five research areas explored by the LIG: Software and Information System Engineering, Formal Methods, Models, and Languages, Interactive and Cognitive Systems, Distributed Systems, Parallel Computing, and Networks, Data and Knowledge Processing at Large Scale.

The research Group **STEAMER** is involved in the latter area mentioned above (Data and Knowledge Processing at Large Scale). Created in 2007, STEAMER leads research on Information Systems, focusing more precisely on the spatial and temporal dimensions of data and knowledge. Our objective is to propose models, methods and tools in order to improve acquisition, modelling, querying, reasoning and visualization in Spatial and Temporal information Systems. In the last decade, tremendous advances in various technologies (wireless networks, mobile devices, global positioning systems...) have considerably enlarged the scope of applications involving Spatial and Temporal Information. These mutations, combined with the dramatic increase of data available (both due to the generalization of mobile devices and sensors, and to OpenData initiatives) have lead to substantial changes in the way spatio-temporal models must be thought. STEAMER's research, focused on the thematic of representing and reasoning with spatial and temporal information, takes place in this evolving technological and scientific context.



In MICA LIG-STeamer offers an international experience in the field of space-time database, knowledge representation and ontologies, modelling, querying and reasoning in multidimensional data and knowledge, integrating and publishing data and knowledge with semantic web and linked data technologies. This expertise will be used in WP6. The coordinator for the team will be Danielle Ziebelin, professor at UJF Grenoble, France.

#### *Publications and services:*

1. Cécile Saint-Marc, Paule-Annick Davoine, Marlène Villanova-Oliver. Methods for mapping volcanic events overlaid across time. The Journal of Maps, Taylor & Francis, 2014, 10 (2).
2. Mouna Snoussi, Paule-Annick Davoine. Methodological proposals to handle imperfect spatial and temporal information in the context of natural hazard studies. International Journal of Geomatics and Spatial Analysis, 2014, 3-4 (23), pp.495-517.
3. Xin Wang, Wei Gu, Danielle Ziébelin, Howard Hamilton. An Ontology-Based Framework for Geospatial Clustering, International Journal of Geographical Information Systems, Volume 24 Issue 11, 2010.
4. Wei Gu, Xin Wang, Danielle Ziébelin. An Ontology-Based Spatial Clustering Selection System. AI'09, the 22nd Canadian Conference on Artificial Intelligence, Kelowna, British Columbia (May, 2009).
5. Betül Aydin, Jérôme Gensel, Philippe Genoud, Sylvie CALABRETTO, Bruno Tellez. An Architecture for Surroundings Discovery by Linking 3D Models and LOD Cloud Workshop ACM SIGSPATIAL MobiGIS 2013, Nov 2013, Orlando (FL), United States. pp.9-16, 2013

#### *Involvement in other relevant European and national projects:*

- 2013 – 2016: COST TD1202 (Mapping and the citizen sensor)
- 2014 – 2015: KIGB “Knowing and Interacting while Gaming for the Blind” - STIC-Amsud Past
- 2011 – 2014: M4D Multi-Dimensional DataBase Design and Development - ESPON
- 2013 : Espon Cartographic Language - ESPON Programme
- 2008 – 2011: Database 2013 - ESPON Programme
- 2011 – 2013 : European Topic Center SIA (Spatial Information Analysis) - Environment European Agency

#### *Profiles of key staff members:*

**Paule-Annick Davoine (Female):** Head of LIG-STEAMER group. PhD from Grenoble University, Habilitated research director, Grenoble INP. Themes: spatial and temporal analysis and visualization.

**Philippe Genoud (Male):** Associate Professor, University Joseph Fourier. PhD from Grenoble University. Themes: Knowledge Representation, Semantic Web, Ontologies, Geographic Information Systems, Interoperability.

**Marlène Villanova-Oliver (Female):** Associate Professor, Université Pierre Mendès-France. PhD Grenoble University. Themes: Spatial and Temporal Analysis and Visualisation, Spatial and Temporal Semantic Web.

**Danielle Ziébelin (Female):** Full professor, Université Joseph Fourier. PhD University Joseph Fourier. Themes: Knowledge Representation and Reasoning, Semantic web and Ontologies, Knowledge engineering.

## La Palma Research Centre for Future Studies S.L. / LPRC

La Palma Research S.L. is an independent, internationally active geoscience think-tank headquartered in Spain. LPRC works in the intersection of minerals, foresights and public awareness raising related to technology and science. With the help of technology foresights the Centre assesses the long-term future of converging technologies with the aim to promote emerging innovations that are likely to produce the greatest economic and social benefits. The Centre is located in a 4-hectare foresight technology park, where indoor and outdoor facilities have been designed to support workshops and various group-work activities. Through its immediate business partner, the Centre can currently provide accommodation, catering and workshop facilities for about 30 people. Web-site: [www.lapalmacentre.eu](http://www.lapalmacentre.eu)

In MICA, LPRC will be in charge for; 1.) providing a methodology review of foresight methods, 2.) implementing a pilot foresight workshop, and 3.) public outreach activities in WP7. LPRC team leader Balazs Bodo, has extensive past experience in these domains.

### *Publications and services:*

1. Balazs Bodo, Adrienn Cseko: Bringing Earth Sciences to the public through actions designed to raise interest in geosciences (2014). *European Geologist* 40 | November 2014
2. Achim Maas, Balázs Bodó, Clementine Burnley, Irina Comardicea, Roger Roffey 2013: *Global Environmental Change: New Drivers for Resistance, Crime and Terrorism*. Paperback: 298 pages, Publisher: Nomos Publishers (October, 2013)
3. Ben Laenen, Balazs Bodo, Günter Tiess and David Lagrou: Exploratory research in mining: defining FET research topics supporting the ICT challenges of mineral extraction under extreme geo-environmental conditions (2013). *European Geologist* 36 | November 2013, Page 58-59
4. Cseko Adrienn, Bodo Balazs: Raising Public Awareness for the Work of Volcanologists and Geologists (2012). 1st Anniversary International Conference Commemorating the 2011-2012 El Hierro Submarine Eruption, October 10-15, Proceedings Vol 1, 2012.
5. Janos Foldessy, Balazs Bodo: Ore Mining and Environmental Technologies Information Network, OMENTIN (2003) In: *Approaches to Handling Environmental Problems in the Mining and Metallurgical Regions*. Earth and Environmental Sciences. pp. 139-144. Kluwer Academic Publishers. Dordrecht/Boston/London

### *Involvement in other relevant European and national projects:*

- VAMOS (“Viable and Alternative Mine Operating System”, Project No 642477). VAMOS is a 12-million EUR, 42-month investigation, financed by the EC H2020 programme. The project develops new robotic solutions for the extraction of metallic minerals from abandoned and flooded open pit mines. Deriving technologies from successful deep-sea mining techniques, the VAMOS solution aspires to lead to the re-opening abandoned mines and extensions of open cut mines in Europe. LPRC is in lead for two Work Packages (WPs): WP1 “Innovation Targets and Stakeholder Engagement” and WP6 “Feasibility, Viability and Market Up-Take”. Website: [www.vamos-project.eu](http://www.vamos-project.eu)
- EXTRACT-IT (“Defining FET research topics supporting the future technological challenges of mineral extraction under extreme geo-environmental conditions” Project number: 318149). LPRC developed and implemented a foresight exercise in support of the definition of a series of mining-related research topics under the FP7 Future and Emerging Technologies programme.

- This objective was reached with the help of a road mapping/foresight exercise that included surveys and a series of complementary workshops. Website: [www.extract-it.eu](http://www.extract-it.eu)
- INTRAW (“International cooperation on Raw materials”, Project No 642130). Financed by the EC H2020 programme INTRAW maps and develops new cooperation opportunities related to minerals and mining in Australia, Canada, Japan, South Africa and the United States, addressing best practices in research and innovation, raw materials policies and strategies, etc. The outcome of the mapping and knowledge transfer activities will be used to set and launch the European Union’s International Observatory for Raw Materials. Website: [www.intraw.eu](http://www.intraw.eu)
  - MINATURA (“Developing a concept for a European minerals deposit framework”, Project No 642139). MINATURA is funded by the EC H2020 programme with the mission to develop a concept and methodology (i.e. a harmonised European regulatory/guidance/policy framework) for the definition and subsequent protection of “mineral deposits of public importance” in order to ensure their “best use” in the future. Providing a policy planning framework that comprises the “sustainability principle” for mining is the key driving force behind MINATURA. Website: [www.minatura.eu](http://www.minatura.eu)
  - VOLCANOES' NIGHT I-II-III (“An awareness raising night for the work of volcanologist and geologist scientists” FP7 Project No 316558 and 610050, H2020 Project No 633310, Project Coordinator) were high-impact events in three consecutive years (2012-2013-2014) and a major success in explaining the work of geologists to the greater public. Funding has already been awarded for the 2015 action under H2020. This series of projects has been coordinated by LPRC since 2012. Website: [www.nochedevolcanes.es](http://www.nochedevolcanes.es)

#### *Profiles of key staff members:*

**Balazs Sandor Bodo (Male):** mining geologist with 15 years of international work experience in Europe and world-wide. He has been involved in several public and industry financed projects related to minerals, foresight, research road mapping and a combination of these. He was the Project Coordinator of FP5 OMENTIN - Ore Mining and Environmental Technologies Information Network (Ref. EU/HRP-CT-2001-00002) that synthesised information on mining technologies and FP7 SECURENV (Ref. 2181152) that used foresight for the identification of emerging issues in the intersection of security and environment. More recently he was the project manager of FP7 EXTRACT-IT (Project No: 318149) where he used technology foresight to create a research roadmap in support of the development mining solutions under extreme geo-environmental conditions. He is now Project Manager and WP leader for H2020 VAMOS (Viable Alternative Mine Operating System!) in charge for research road mapping, technology foresight and dissemination. He has been advising policy makers, the industry and the EU on strategic matters related to the challenges discussed in this project. His work will be supported by an IT manager (Sergio Montes Navarro) and an administrative staff (Conchi Ramirez).

## **The European Federation of Geologists (EFG)**

The European Federation of Geologists (EFG) is a not-for-profit professional geoscience organisation focused on the promotion of excellence in the application of geology, in raising public awareness of the importance of geosciences for society and in the setting and international benchmarking of professional standards and qualifications for geoscientists. EFG is based in Brussels, was established in 1981 and its membership covers today 23 European countries.



EFG adheres to the principles of professional responsibility and public service and certifies the competence, integrity and ethical conduct of professional geologists. Professional geologists contribute with their expertise in education, research and applied practice to industry and governments in a wide range of activities that are vital to society and to protection of the public (see [www.eurogeologists.eu](http://www.eurogeologists.eu)).

Professional geologists are among the target groups of MICA, because professional geologists are one of the main users of geological data and information for their practice. Therefore, the role of EFG touches the definition of the existing needs of this task group and the dissemination to geoscientists of MICA's achievements and outcomes. EFG has the capacity to make the assessment of needs of a population of 60.000 geoscientists in Europe, and to disseminate all these and to reach, through EFG's international counterparts, a global population of geoscientists estimated in nearly 500.000 professionals.

#### List of current EFG Members:

- Belgo-Luxembourg Union of Geologists, Belgium-Luxembourg;
- Croatian Geological Society, Croatia;
- Cyprus Association of Geologists And Mining Engineers, Cyprus;
- Czech Union of Geological Associations, Czech Republic;
- The Finnish Union of Environmental Professionals, Finland;
- French Geological Society, France;
- Professional Association of German Geoscientists, Germany;
- Association of Greek Geologists, Greece;
- Hungarian Geological Society, Hungary;
- Institute of Geologists of Ireland, Ireland;
- Italian National Council of Geologists, Italy;
- Royal Geological and Mining Society of the Netherlands, Netherlands;
- Portuguese Association of Geologists, Portugal;
- The National Association for Subsoil Use Auditing, Russia;
- Serbian Geological Society, Serbia;
- Union of Slovak Geological Associations, Slovakia;
- Slovenian Geological Society, Slovenia;
- Official Spanish Association of Professional Geologists, Spain;
- Geosection (Swedish Association of Scientists), Sweden;
- Swiss Association of Geologists, Switzerland;
- Ukrainian Association of Geologists, Ukraine;
- Geological Society of London, United Kingdom

EFG has strong and longstanding international relationships with other professional geosciences organisations, such as the IUGS or the AIG. EFG has agreements on mutual recognition with counterparts in USA and cooperation agreements with Canada, South Africa and Australia. EFG leads the IUGS Task Group on Global Geoscience Professionalism (<http://tg-ggp.org/>) which involves professional geoscience organisations from Canada, the US, South Africa, Australia, Bolivia and Brazil as well as other international groupings, including CRIRSCO.

### *Publications and services:*

1. Correia, V. (1998) O Ordenamento do Território e os Condicionalismos da Indústria Extractiva. (Land use constraints to the mining industry). Comunicações Técnicas, Visa-Consultores.
2. Correia, V. e J. Castro Coelho (1997). Developing a Marketing Approach as a success factor in producing and trading dimensional and industrial rocks. Eurominerals II European Congress. Notas e Comunicações. APIMINERAL. Correia, V. (2014).
3. Fernandez, I. and Szanyi, J. (2014). Geothermal energy assets have not been adequately exploited in Europe today and hold great potential, Pan European Networks: Government 12, pp 1-2
4. Fernandez, I., Hartai, É., Stein, A. (2012). Women in leading positions in geology. European Geologist, Vol. 33, pp. 32-37.
5. Fernandez I., (2011). Geotrainet, European Project on Geo-Education for a sustainable Geothermal heating and cooling market, The Parliament Magazine's, issue 20, pp 5-6.

### *Involvement in other relevant European and national projects*

- INTRAW: International cooperation on Raw Material, [www.intraw.eu](http://www.intraw.eu)  
INTRAW project aims to map and develop new cooperation opportunities related to raw materials in Australia, Canada, Japan, South Africa and the United States. The outcome of the mapping and knowledge transfer activities will be used as a baseline to set and launch the European Union's International Observatory for Raw Materials. Project reference H2020 – 642130. INTRAW is a 3 year project started in February 2015. EFG is coordinator.
- KINDRA: Knowledge Inventory for hydrogeology research, [www.kindraproject.eu](http://www.kindraproject.eu)  
The KINDRA project (Knowledge Inventory for hydrogeology research) aims at taking stock of this knowledge with the help of an inventory of research results, activities, projects and programmes, and then use the inventory to identify critical research challenges and gaps, with a view to avoiding overlaps. This approach takes into account the implementation of the WFD and new innovation areas within integrated water resources management, allowing at EU scale the future correct management and policy development of groundwater. Project reference: H2020 – 642047. KINDRA is a 3 year project started in January 2015. EFG is leader of the WP2 on data collection.
- MINATURA 2020 protecting mineral deposits of public importance, [www.minatura.eu](http://www.minatura.eu)  
The overall objective of MINATURA 2020 is to develop a concept and methodology (i.e. a harmonised European regulatory/guidance/policy framework) for the definition and subsequent protection of “mineral deposits of public importance” in order to ensure their “best use” in the future. Providing a policy-planning framework that comprises the “sustainability principle” for mining is the key driving force behind MINATURA. Project reference: H2020- 642139. MINATURA is a 3-year started in February 2015. EFG is leader of the WP6 on dissemination
- VAMOS: Viable Alternative Mine Operating System, <http://vamos-project.eu/>  
The aim of the ¡VAMOS! (Viable Alternative Mine Operating System) project is to design and build a robotic, underwater mining prototype with associated launch and recovery equipment, which will be used to perform field tests at four EU mine sites.  
Project reference: H2020- 642477. VAMOS is a 3.5-year project, started in February 2015.
- GEOTRAINET, Geo-Education for a sustainable geothermal heating and cooling market, EU project, Ref. No: IEE/07/581/S12.499061, [www.geotrainet.eu](http://www.geotrainet.eu). EFG coordinated a large group of partners involved in this project, co-financed by the European Commission's “Intelligent Energy – Europe” programme, that provided skills training to professionals installing ground source heat pumps (GSHP) across Europe.

- EUROAGES, European Accredited Geological Study Programmes, EU project, Lifelong Learning Programme, DG Education and Culture. Ref. No: EACEA/16/08, <http://www.euro-ages.eu>. EFG participated as partner in this program, that developed Europe-wide applicable quality standards and criteria for the assessment of higher education programs in geology in the context of the Bologna Process.
- TERRAFIRMA, Pan-European Ground Motion Hazard Information Service, EU project, Ref. NPA-GSE-4704-B-CCNS, [www.terrafirma.eu.com](http://www.terrafirma.eu.com). This project is still going on, and it is one of ten projects being supported by the European Space Agency's (ESA), Global Monitoring for Environment and Security (GMES) Service Element Programme. Terrafirma aims to provide a Pan-European ground motion information service which provides identification, assessment, understanding and monitoring of ground motions in the following thematic areas: Tectonics, Flood and Hydrogeology (including abandoned and inactive mines as well as landslides).
- PANGEO, Enabling Access to Geological Information in Support of GMES, EU FP7 Programme, <http://www.pangeoproject.eu>. EFG participated as partner. PanGeo provides free and open access to geo-hazard information in support of GMES. This is achieved by the generation of a validated Geohazard Data Layer supported by a Geohazard Summary for 52 of the largest towns listed in the GMES Land Theme's Urban Atlas, involving all 27 countries of the EU.
- ERA-MIN, Network on the Industrial Handling of Raw Materials for European Industries, EU FP7 Programme, <http://www.era-min-eu.org/>. EFG has recently joined the ERA-MIN consortium as partner. ERA-MIN is an ERA-NET program on the Industrial Handling of Raw Materials for European industries and it aims setting up networks and mechanisms to foster research in the field of industrial production and supply of raw materials, in line with the “EU Raw Materials Initiative”.

#### *Profiles of key staff members:*

**Vitor Correia (Male)** is a geologist with 22 years of international working experience in Europe, Africa and South America. He holds a post-graduate degree in business-to-business marketing strategy from the Kellogg Business School (US) and an MBA degree from the University of Lisbon. Vitor holds the professional qualification of European Geologist (EurGeol) and has experience in managing businesses in the mining industry, covering the licensing, the exploration and the exploitation stages, with different mineral deposits, including copper, gold, iron and industrial minerals. He has an extensive background in developing and implementing strategic plans and doing financials, marketing, and operations management and he is used to tackling different subjects, including investment decisions, resources evaluation, environmental impact assessment, exploration drilling and minerals processing. He participated in divers EU funded projects as a consultant (FP5) and later as Managing Director (FP7) in several companies. Vitor has been the President of EFG since June 2013 and he is the coordinator of the H2020 project INTRAW (nr. 642130).

**Isabel Fernandez Fuentes (Female)** is an engineering geologist, graduated from the Granada University, 1987, Master Engineering Geology, 1990, and PhD in Geology, 1997, from the University Complutense in Madrid, Spain. Since 1987, she worked as a researcher in applied Geophysics in the

Centre for Studies and Experimentation of the Ministry of Public Works, Madrid, Spain. From 2001 onwards, she has been the Executive Director of EFG, covering expertise and professional input including mineral resources and reserves, and environmental protection field. She has coordinated and participated in a range of European projects. Isabel also worked as an expert evaluator for the European Commission, DG Research.

**Anita Stein (Female)** followed a bilingual interdisciplinary Bachelor-programme in French-German studies at the University of Bonn, Germany, and the Université de la Sorbonne III, France. She graduated in 2010 with a Master's degree in Compared Political Sciences from the University of Brussels (ULB), Belgium. She followed complementary photography and graphic design trainings. Since October 2010, Anita works with the European Federation of Geologists, first as an Office Assistant and, since 2014, as Communication Officer. She carries out all tasks related to the communication and dissemination activities of the Federation.

## NTNU

The Norwegian University of Science and Technology (NTNU) is the primary Norwegian university in engineering and technology. With more than 21000 students, it is Norway's second largest university. As a full range university, NTNU encompasses 7 faculties and 53 departments. Between 250 and 300 PhD-degrees are awarded yearly, within the fields of technology, science, arts and humanities, social sciences and medicine. NTNU has a broad range of contacts with industry. The annual budget of NTNU is around € 600 million, 25% of which is externally funded. NTNU is an active participant in the EU R&D Framework Programmes and participated in 123 FP7 projects.

The Industrial Ecology group at NTNU studies the material side of the economy and society and investigates how resource use contributes to welfare, as well as how and where the environmental impacts occur. Its teaching and research activities bridge technology and the social sciences. The research group is closely involved in several national, European, and global committees such as the 5th Assessment Report of the IPCC and the UNEP International Resource Panel. According to the Nordic Institute for Studies in Innovation, Research, and Education, the Industrial Ecology group at NTNU is the most cited group in Engineering Sciences in Norway.

In MICA, NTNU will mainly contribute to WP4, but also to WPs 2, 3, and 5 mainly through a case study on aluminium. NTNU has developed a database for the global trade-linked metal cycles for aluminium and iron/steel. This database is currently extended and automatized in collaboration with World-Aluminium. A visualization tool is currently being developed to support the analysis and communication of the results. The database is further used to calibrate dynamic MFA models and long-term scenarios for the global metal cycles to make mass-balance consistent projections for the future

boundary conditions for industry (e.g., metal demand, scrap availability) and to test the consequences of different technology options over time.

#### *Publications and services:*

1. Liu G.; Bangs C.E.; Müller, D.B. (2013): Stock dynamics and emission pathways of the global aluminium cycle. *Nature Climate Change* 3 (April): 338-342.
2. Liu G.; Müller D.B. (2013): Mapping the global journey of anthropogenic aluminium: a trade-linked multilevel material flow analysis. *Environmental Science & Technology* 47(20): 11873-11881 (DOI: 10.1021/es4024404).  
→Awarded First Runner-Up for ES&T's Best Paper of 2013 in Environmental Technology
3. Pauliuk S.; Milford R.; Müller D.B.; Allwood J.M.; (2013): The Steel Scrap Age. *Environmental Science & Technology* 47(7): 3448-3454.
4. Løvik A.N.; Modaresi R.; Müller D.B. (2014): Long-term strategies for increased recycling of automotive aluminium and its alloying elements. *Environmental Science & Technology* 48(8): 4257-4265. (DOI: 10.1021/es405604g)
5. Müller D.B.; Liu G.; Løvik A.N.; Modaresi, Roja; Pauliuk, Stefan; Steinhoff, Franciska S.; Brattebø, Helge (2013): Carbon emissions of infrastructure development. *Environmental Science & Technology* 47(20): 11739-11746 (DOI: 10.1021/es402618m)

#### *Involvement in other relevant European and national projects:*

- IPCC AR5, WG3 (<http://www.ipcc.ch/report/ar5/wg3/>)
- International Resource Panel (<http://www.unep.org/resourcepanel/new/>)
- World-Aluminium: Data, models, and visualization tools (<http://www.world-aluminium.org/statistics/>)
- EU ProSum
- Norwegian Centre for Research-Based Innovation (SFI) on Metal Production ([http://www.forskningsradet.no/prognett-sfi/Nyheter/17\\_new\\_Centres\\_for\\_Researchbased\\_Innovation\\_SFI\\_announced/1254002416969/p1224067021177](http://www.forskningsradet.no/prognett-sfi/Nyheter/17_new_Centres_for_Researchbased_Innovation_SFI_announced/1254002416969/p1224067021177))

#### *Profiles of key staff members:*

**Daniel B. Müller (Male):** Professor in industrial ecology and director of the International Master Programme in Industrial Ecology, NTNU, and visiting professor at the Chinese Academy of Sciences. Daniel holds a PhD in Engineering Sciences from the Swiss Federal Institute of Technology (ETH) in Zurich. Prior to his appointment at NTNU, he worked at the Delft University of Technology and Yale University. His research focuses on the modelling of the socio-economic metabolism to inform policies in resource efficiency, energy use, and climate change mitigation. He was a founding member and first chair of the section “Socio-Economic Metabolism” of the International Society of Industrial Ecology.

**Amund N. Løvik (Male):** Ph.D. in industrial ecology at NTNU. Amund has a MSc in Material Sciences with studies at NTNU and University of California, Berkeley. In his PhD thesis, Amund is analysing the linkages between global metal cycles through alloying, impurity accumulation, and co-products using dynamic material flow analysis modelling with examples for aluminium and gallium. Amund is finishing his PhD in the fall of 2015.

**PhD student (t.b.d.):** In the frame of the Centre for Research-Based Innovation (SFI) Metal Production, we are going to employ a PhD student who will develop a dynamic MFA model and scenarios for the global trade-linked aluminium cycle with explicit treatment of the technologies and production capacities, energy use, and greenhouse gas emissions along the life cycle. This model and scenarios will be developed in close collaboration with World-Aluminium and the International Energy Agency, and will inform industry and government institutions on policies for resource efficiency, energy use, and climate change.

## **UNIVERSITY COLLEGE LONDON Institute for Sustainable Resources (UCL ISR)**

UNIVERSITY COLLEGE LONDON Institute for Sustainable Resources (UCL ISR) was established in 2011 with the help of a grant from BHP Billiton Sustainable Communities. The UCL ISR is a cross-disciplinary Institute dedicated to generate knowledge to promote the globally sustainable use of natural resources. ‘Sustainable resources’ is a large and varied subject area and the UCL ISR works within a broad definition of both terms. In terms of resources, the Institute’s work includes both finite, such as mineral and petrochemical resources, and renewable resources, such as water and food. In addition it works with a definition of sustainability that acknowledges the widely accepted importance of the social, environmental and economic implications of resource and environment issues. UCL ISR employs its own staff and seeks to act as a forum and coordination mechanism for UCL staff in different departments working on resource and environment issues, transcending the boundaries between academic disciplines. In this way it will be able to assemble multidisciplinary teams, providing critical mass and capacity for large projects. UCL ISR is also a centre for doctoral training and research with regard to sustainable resource use. In 2011/12 it established its Doctoral Training Programme in Sustainable Use of Resources and the Environment by awarding its first five PhD studentships, which has grown significantly since then to 14 PhD students. Among them, there is a PhD that specifically focuses on critical raw materials. Research in this field is fundamentally collaborative and the Institute’s aim is to engage with partners and stakeholders at a range of levels. In 2011/12 UCL ISR began this crucial work forging early links with potential industry and government partners, leading to the creation of the Institute’s stakeholder group. The current research portfolio of the Institute includes a number of European FP7 and UK projects in the areas of resource management, resource efficiency, sustainability indicators, energy, waste, environmental engineering, climate change, corporate responsibility, eco-innovation, sustainable supply chain, management of mineral resources, international law and development in the Global South. Research in the area of abiotic resources includes research relating to fossil fuels, energy and mineral resources. Research in this area builds on work previously undertaken at the UCL Energy Institute, which has developed an energy system model (TIAM-UCL) with a unique and detailed description of global fossil fuel resources. This resource-related part of the work has been transferred to UCL ISR. In addition, UCL ISR is carrying out a major new programme of activity to include the material component of the energy system in the existing TIAM-UCL model, focusing especially on bulk minerals such as iron and steel, and scarce or potentially scarce resources such as rare



earth elements and water. In 2014, UCL ISR join the Ellen McArthur Foundation networks of Pioneering universities on the Circular Economy.

#### *Publications and services:*

1. Andrews-Speed, P., Bleischwitz, Raimund, Boersma, T., Johnson, C., Kemp, G., & VanDeveer, S. (2015). *Want, Waste or War? The Global Resource Nexus and the Struggle for Land, Energy, Food, Water and Minerals*. Routledge.
2. Bringezu, S., & Bleischwitz, R. (2009). *Sustainable Resource Management*. Greenleaf Publishing.
3. Bleischwitz, R., Dittrich, Monika, & Pierdicca, Chiara. (2015). Illicit trade with coltan and implications for certification. In Hartard, Susanne, Liebert, Wolfgang (Eds.), *Competition and conflicts on resource use* (pp. 155-176). Springer. doi:10.1007/978-3-319-10954
4. Bleischwitz, R. (2014). Transparency in the Extractive Industries: Time to Ask for More. *Global Environmental Politics*, 14 (4), 1-9. doi:10.1162/GLEP\_e\_00254
5. Bleischwitz, R., Johnson, C. M., & Dozler, M. G. (2013). Re-Assessing resource dependency and criticality. Linking future food and water stress with global resource supply vulnerabilities for foresight analysis. *European Journal for Futures Research*. doi:10.1007/s40309-013-0034-1
6. Bleischwitz, R., & Wilts, H. (2013). An international metal covenant: a step towards global sustainable resource management. In M. Angrick, A. Burger, H. Lehmann (Eds.), *Factor X: Re-source – Designing the recycling society*. (pp. 87-98). Heidelberg: Springer.
7. Bleischwitz, R. (2012). Towards a resource policy: unleashing productivity dynamics and balancing international distortions, in: *Mineral Economics*, Vol. 24, No. 2-3, pp. 135 – 144, <http://dx.doi.org/10.1007/s13563-011-0014-5>.
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11. Bleischwitz, R., Bahn-Walkowiak Bettina, Ekardt Felix, Feldt Heidi, & Fuhr Lili. (2012). *International resource politics : new challenges demanding new governance approaches for a green economy ((Publication series on ecology).)*. Berlin: Heinrich Böll Foundation.

#### *Involvement in other relevant European and national projects:*

- RECREATE is a project funded by the European Commission. Its overall objective is to support the development of the European Union's new research funding programme Horizon 2020, with a specific focus on "Challenge 5: Climate Action, Resource Efficiency and Raw Materials". <http://www.recreate-net.eu/dweb/>
- POLFREE is a FP7 project on Policy Options for a resource efficient Economy. [www.polfree.eu](http://www.polfree.eu)
- SINCERE project. International collaboration project with China on the circular economy and resource efficiency. ESRC, UK.

#### *Profiles of key staff members:*

**Raimund Bleischwitz (Male):** Prof Raimund Bleischwitz joined UCL ISR as BHP Billiton Chair in Sustainable Global Resources in August 2013. He was previously Co-Director on 'Material Flows and

Resource Management’ at the Wuppertal Institute in Germany, and has been Visiting Professor at the College of Europe in Bruges, Belgium since 2003. An economist by training (PhD ‘Habilitation’), he has more than twenty years’ experience in research on environmental and resource economics, raw material conflicts, minerals policy and sustainable resource management and has published extensively in the area of sustainable resource management, global resource nexus and supply risks of scarce metals. He is an influential policy adviser and cooperates with business and governments in projects in the fields of resources efficiency and raw materials, such as SINCERE or RECREATE.

**Teresa Domenech (Female):** Ph.D. in industrial symbiosis. Research Associate at the Institute of Sustainable Resources (UCL), her main area of research is resource efficiency and resource management, with a focus on industrial systems, with technical expertise on methodologies for optimisation of resource management such as material flow analysis and life cycle assessment. She has also extensive project management experience from her role as coordinator of the 8-institute-consortium FP7 project on resource efficiency (POLFREE).

## GeoZS

Geološki zavod Slovenije – Geological Survey of Slovenia (GeoZS) ([www.geo-zs.si](http://www.geo-zs.si)) is a public research institute established by the Government of the Republic of Slovenia. The Survey carries out fundamental, applied, developmental and object research within all geological branches and related fields of work. It consists of research – programme groups and geological expert services. The research programs cover all the fields of geology that are of national importance. The main goals are contributing to the knowledge about geological composition of the national territory, production of geological maps, assessment of geological hazards, natural and anthropogene, to living environments, assessment of threats to geological environment due to pollution and other anthropogene factors, assessment of groundwater, mineral resources and geothermal energy resources, assessment of natural geological heritage, and development of geological knowledge and research methods. The geological expert services carry out the collection, verification, storage and distribution of geological data, the maintenance of geological data bases and expert as well as material archive of all geological research activities carried out within the national territory, the geological supervision, and the expert geological basis needed by the governmental administration and legislation.

Our experiences on the field of MR and GIS include our engagement on mineral resource policy, mineral resource management and monitoring, decision-making and administrative procedures connected with exploration and exploitation of mineral resources, database management, designing GIS web application and data modelling.

GeoZS in a role of Mining Public Service supports Ministry in charge of mining with the wide programme of the main tasks: decision-making and administrative procedures connected with exploration and exploitation of mineral resources in Slovenia supported by GIS contains all geological, spatial and administrative data referring to mineral resources. It provides a total control and managing of



areas with mining rights as well as perspective mineral deposits, their exploitation and exploration, regarding environmental and spatial conditions.

GeoZS is involved in international and national projects. Among international projects following should be mentioned: SARMa – sustainable aggregates resource management project, Coordinated by GeoZS. This project focused very strongly among other aggregate topics also to the promotion of aggregates recycling, especially to the recycling of C&D waste. SNAPSEE project objective was to facilitate improved aggregates planning as a support to national/regional, primary and secondary, aggregates planning. GeoZS was the work package leader. EO-MINERS - the role of GeoZS is focused to the development of indicators, which can be monitored by earth observation techniques. In the project EuroGeoSource GeoZS is a work package leader and provides its experts for database management. In the projects Minerals4EU and PROSUM GeoZS is involved in building of Knowledge Data Platform.

In MICA, GeoZS will contribute to WP2 and 6.

#### Publications and services:

1. ROKAVEC, Duška. Evaluation of clay deposits in Slovenia referring to their prospects. RMZ - Materials and geoenvironment, ISSN 1408-7073, 2014, vol. 61, no. 2/3, str. 99-105. [COBISS.SI-ID 2343765]
2. ŠINIGOJ, Jasna, ROKAVEC, Duška. Web application for managing data on mineral resources sites. Mineral resources in Slovenia ..., ISSN 1855-4725, July 2012, str. 11-12. [COBISS.SI-ID 2098005]
3. Mineral resources portal: <http://akvamarin.geo-zs.si/ms/Default.aspx>

#### *Involvement in other relevant European and national projects:*

- Minerals4EU (<http://www.minerals4eu.eu>)
- EuroGeoSource (<http://www.eurogeosource.eu>)
- ProSum
- SARMa: <http://www.sarmaproject.eu/>
- SNAPSEE: <http://snapsee.eu/>
- Public Mining Service for Ministry of Infrastructure, Energy Directorate
- Sedimentology & Mineral resources scientific research program

#### *Profiles of key staff members:*

**Jasna Šinigoj (Female)**, trained geologist, is the head of Geological Information centre and has many years' experience working with different geo-science projects in Republic of Slovenia (head of the Infrastructure programme of GeoZS, Early warning system for landslides– MASPREM, ) as well as in different EU funded projects (Minerals4EU, eENVplus, EuroGeoSource, InGeoCloudS, OneGeology, INCOME... ). She has more than 16 years of experience as project manager in the Geological Survey of Slovenia and 20 years' experience in GIS in geological sciences. She is responsible for design and implementation of geological information system at Geological survey of Slovenia and establishment of a national information system of mineral resources and digital library of Geological Survey of Slovenia. She is involved in implementation of INSPIRE directive in Slovenia.

**Duška Rokavec (Female)**, Ph.D., senior geologist, is the head of the Department of Economic Geology. She has 26 year experiences as research assistant for evaluation and assessment of non-metal mineral deposits, economic geology with classification and categorization of reserves and resources, spatial planning of open pits etc. She is qualified as a court expert for mineral deposits and surface mining and she has gained the designation of European Engineer. She has contributed to creating and competing national Mining Act and Statutory Acts, as well as in estimating MR values for the purpose of imposing taxes. She co-operated in establishing and maintaining the MR database, including mining cataster. She is a president of national Republic Commission for determining mineral reserves and resources. Some EU funded projects she is/was involved in: Snap-SEE, EuroGeoSource, Minventory, Minatura2020.

**Mitja Požar (Male)** has more than 10 years of experience in developing and designing web and desktop GIS applications. The last 9 years he has been working in Geological survey of Slovenia on developing and designing web and desktop GIS application, database administration and administration of multiple ArcGIS Servers. He is involved in implementation of geological information system at Geological survey of Slovenia. He is also involved in several EU projects (Minerals4EU, EuroGeoSource, OneGeology, eWater, TransEnergy).

**Martin Podboj (Male)** has a B. SC. in computer science and has more than 10 years of experience in developing and designing web GIS applications. The last 5 years he has been working in Geological survey of Slovenia on developing and designing web and mobile GIS application, database administration and administration of multiple ArcGIS Servers. He is involved in implementation of geological information system at Geological survey of Slovenia and development of a national information system of mineral resources. That was also his Thesis: Web GIS application – Deposits of mineral resources in Slovenia. He is also involved in several EU projects (National information system of mineral resources of the Republic of Slovenia , InGeoCloudS, INCOME, StartItUp, Istra-Hidro and TransEnergy).

## JRC

The Joint Research Centre is one of the Directorates General of the European Commission. Its mission is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. The Institute for Environment and Sustainability (IES) is one of the JRC Institutes, and provides scientific and technical support to EU policies for the protection of the global environment contributing to sustainable development. The Digital Earth and Reference Data (H06) Unit, co-ordinates the scientific and technical development of INSPIRE (the Infrastructure for Spatial Information in Europe), and supports its implementation within the Commission and the Member States. The Unit also has led (since 2012) the development of the JRC wide knowledge sharing platform - MIDAS - “Modelling Inventory Database & Access Services”. MIDAS represents a database of scientific models that are in use in JRC. Accessible from within the

Commission Network, MIDAS gives access to model descriptions and to related input and output data, supported impact assessments and other policies, as well as related scientific documents and policy reports. It also includes sophisticated visualization tools to show e.g. established inter-model linkages.

**Role in the MICA Project:** The main role of JRC is planned in the field of the visualization of the information/knowledge collected during the project lifespan. (Task 6.3). JRC together with BRGM will develop a Dynamic Decision Graph (DDG) for visualization, navigation and selection utilizing the previous experience in the field (MIDAS). Together with BRGM, JRC will co-develop visualization tools implementing the DDG concept using open source libraries. JRC will also participate on the development of the central base of the EU-RMICP (Task 6.5) using the MInerrtals4EU and MIDAS database structure experience.

#### *Involvement in other relevant European and national projects:*

EC-JRC H06 Unit is the overall technical developer and coordinator of the MIDAS knowledge sharing platform. As such it is responsible for managing information about 160+ scientific models and 900+ related entities described in the system. It is clear that our experience with linking models, data, policies, and people in order to support knowledge sharing, information mining, model transparency and community building for sustainable digital science will be the major benefit for the project. Also gained experience (MIDAS) in applying novel visualization techniques will be of major benefit for the development of the DDG.

The EC-JRC H06 Unit has been or is involved in the following competitive FP7 research project activities, EuroGEOSS and GeoVOW (EU contribution to development of GEOSS), in FP7 Support and coordination actions, Minerals4EU (EU - Knowledge base and network on Minerals), GIGAS (coordination of the development requirements for GEOSS , INSPIRE and GMES) and SmeSpire (aiming to turn the challenges of the INSPIRE implementation into business opportunities for the Geo-ICT European SMEs. EC-JRC H06 Unit also contributes to international standardization efforts through the development of the INSPIRE technical specifications and its contributions to the work of CEN TC287, ISO TC211 and OGC.

#### *Profiles of key staff members:*

**Dr. Robert Tomas (Male):** Scientific/Technical Support Officer – Senior researcher, is a member of the EU&EEA INSPIRE Coordination team, has also been a coordinator of the development of geology related INSPIRE data specifications (including Mineral resources). Prior joining EC-JRC (2009) he worked for 10 years as a deputy director of the Czech Geological Survey for Geoinformatics. He has a long international experience in the field of geoscience data, information, knowledge management, semantic interoperability and standardization. Dr. Tomas served as a Chair of the Geoscience Information Consortium (2007-2013), Council member of the IUGS-CGI (since 2012-) or a funding

member of the OneGeology global initiative. He has also been participating in several EU projects such Minerals4EU (as a EC-JRC Scientific Responsible), OneGeology-Europe (WP leader) or GEOMIND.

**Dr. Nicole Ostlaender (Female)** is a Scientific / Technical Support Officer. She holds a diploma degree in Landscape Ecology and a Ph.D. Geoinformatics, both from the University of Muenster, Germany. She has worked for many years in the area of multi-disciplinary research combining natural and computer science, and contributing to information infrastructures for integrated modelling in the Arctic (BALANCE, FP5 project 2003 – 2006, at the Institute for Geoinformatics, University of Muenster, Germany) and for Risk Management in Europe (ORCHESTRA, FP6, 2006 – 2009, at the Joint Research Centre, Ispra, Italy). She is currently responsible for the development of the MIDAS platform, a knowledge base in support of model transparency for sustainable and reproducible digital science by means of novel visualization and data narration techniques.

#### 4.2. Third parties involved in the project (including use of third party resources)

*Please complete, for each participant, the following table (or simply state “No third parties involved”, if applicable):*

Does the participant plan to subcontract certain tasks (please note that core tasks of the action should not be sub-contracted)	Y
<p><b>EGS</b> EGS will hire a professional graphical designer for developing the layout, printing and distributing brochures, newsletters and other publication materials.</p> <p><b>JRC</b> JRC will use the framework contractor “INNOVATIA” (identification DI/07335 under the DESIS-III Lot2 Contractor) for programing (coding) of selected visualisation tools.</p>	
Does the participant envisage that part of its work is performed by linked third parties <sup>1</sup>	N
<p><i>If yes, please describe the third party, the link of the participant to the third party, and describe and justify the foreseen tasks to be performed by the third party</i></p>	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
<p><i>If yes, please describe the third party and their contributions</i></p>	

<sup>1</sup> A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action (Article 14 of the Model Grant Agreement).

## Section 5: Ethics and security

### 5.1 Ethics

No ethical issues.

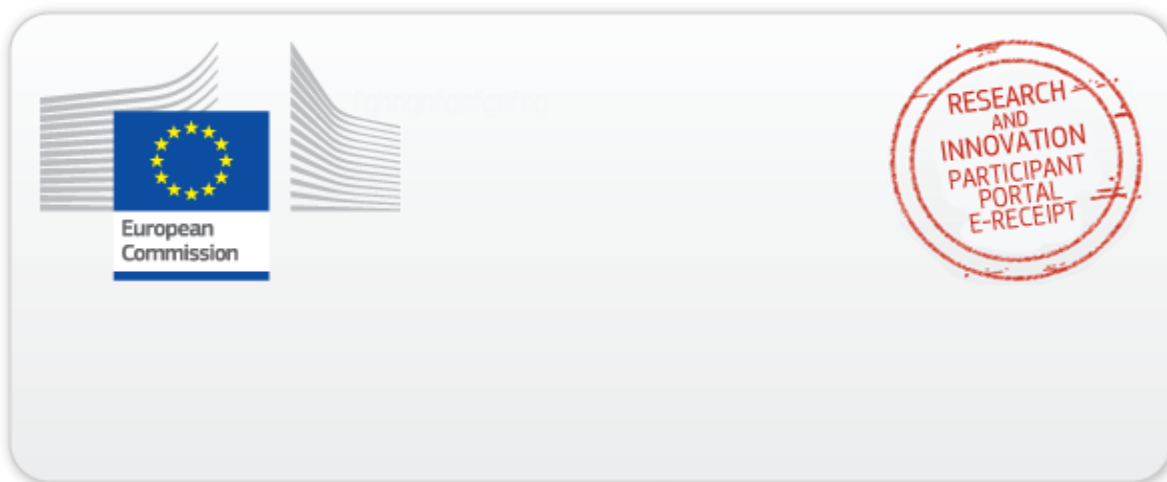
### 5.2 Security<sup>2</sup>

Please indicate if your project will involve:

- activities or results raising security issues: (NO)
- 'EU-classified information' as background or results: (NO)

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<sup>2</sup> Article 37.1 of the Model Grant Agreement: *Before disclosing results of activities raising security issues to a third party (including affiliated entities), a beneficiary must inform the coordinator — which must request written approval from the Commission/Agency.* Article 37.2: *Activities related to 'classified deliverables' must comply with the 'security requirements' until they are declassified. Action tasks related to classified deliverables may not be subcontracted without prior explicit written approval from the Commission/Agency. The beneficiaries must inform the coordinator — which must immediately inform the Commission/Agency — of any changes in the security context and — if necessary — request for Annex 1 to be amended (see Article 55).*



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