



**Recovery of Tungsten, Niobium and Tantalum occurring as by-products in mining and processing waste streams**

**(TARANTULA)**

**D8.8 Report on TARANTULA's clustering activities with other EU H2020 ETN/RIA/IA projects with a specific focus on SLO and LCA methodologies**

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Responsible partner	TECNALIA
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## Abbreviations and acronyms

ART-ER	Attractiveness Research Territory
CORDIS	Community Research and Development Information Service
CRM	Critical Raw Materials
DES	Deep Eutectic Solvent
EASME	Executive Agency for Small and Medium-sized Enterprises
EU	European Union
ICAMCYL	International Centre for Advanced Materials & raw materials of Castilla y Leon
ICT	Information and Communication Technology
IL	Ionic Liquid
IRP	International Resource Panel
JRC	Joint Research Centre
KUL	Katholieke Universiteit Leuven
LCA	Life Cycle analysis
MEP	Member of the European Parliament
MW	Microwaves
NGO	Non-governmental organization
PPIF	Post-Project Impact Follow Up Committee
REEs	Rare Earth Elements
RMIS	Raw Materials Information System
SLIM	Sustainable Low Impact Mining
SDLO	Sustainable Development License to Operate
SLO	Social License to Operate
SMS	Strategic Minerals Spain
SoA	State of the Art
TRL	Technology Readness Level
UN	United Nations
UNEP	United Nations Environment Programme
VITO	Vlaamse Instelling voor Technologisch Onderzoek



## Executive summary

In this report, the contribution to clustering activities with other relevant EU Horizon 2020 projects during the development of the TARANTULA project is presented. These clustering events have been a good opportunity to share different point of views concerning important issues related to the valorization of critical metal contained in low-grade mining resources and processing waste streams. Also, joint activities between projects under development are an efficient tool to establish common procedures to work together on these issues.

The topics should transcend the individual projects and be of key importance for Europe's and EIP Raw Materials' strategies. Two identified topics at the starting point of the project were SLO (Social License to Operate) and LCA methodologies, both confirmed as generic domains for Europe's raw materials strategies. In addition, other subjects of interest were also covered.

During the duration of the project TARANTULA, different partners of the consortium have participated in 15 clustering (co)organized workshops, in which several topics have been addressed as explained in detail in the following chapters.



## 1. Introduction

Nowadays, two important topics of great concern for mining companies are SLO (Social License to Operate) and LCA (Life Cycle Assessment). On one hand, the exploitation of mining deposits has always an impact in the local communities. Currently, any mining project needs to count with the permission of local stakeholders to operate. For this reason, there is a great debate in the EU on the way we tackle with this issue, as well as the relation between the companies and the local communities (educational programmes, local events, ...). On the other hand, the environmental impact associated with the life cycle of CRMs is a very important topic to be considered. Also, the scarcity of CRM in Europe is a subject of concern and recycling is not only an option but a must in EU.

Table 1 shows the clustering events organized in the frame of TARANTULA project. A detailed description of each (hosting event, topic, agenda, projects involved, etc.) is presented in this report, with a special mention on how TARANTULA project contributed.



**Table 1. Clustering events organized in the frame of TARANTULA project**

Date	Event	Topic	Place
22/11/2019	Public acceptance of mining and recycling in Europe: six recommendations ( <i>EU "Raw Materials Week 4<sup>th</sup> ed. 18-22<sup>nd</sup> November 2019</i> )	SLO	Brussels
12/03/2020	The Green transition challenged by the metal supply chain	LCA	Brussels
23/09/2019	The secrets of the Social License to Operate	SLO	Brussels
08/07/2019	Mineral Resources Governance in the 21 <sup>st</sup> Century – Gearing Extractive Industries Towards Sustainable Development	SLO	Brussels
05-06/06/2019	Ensuring SLO is Adaptive and Resilient	SLO	Brussels
10-12/06/2020	Cluster to Cluster Meeting Innovat&Match Brokerage Event	Sustainable growth	Italy (online)
27/10/2020	Sustainable Low Impact Mining solution for exploitation of small mineral deposits based on advanced rock blasting and environmental technologies (final event of SLIM project)	SLIM	online
27/04/2021	Recycling mining waste a new business	CRM recovery	online
17-18/05/2022	(Re) Mining Extractive Waste	Mining waste recycling	Mechelen (Belgium)
11/05/2022	The use of Deep Eutectic Solvents and Ionic Liquids for metal recovery	Results exploitation	online
3/12/2020	Chanelling knowledge from European projects into the Raw Materials Information System (RMIS)	RMIS	
10/12/2020	7 <sup>th</sup> Prometia Scientific Seminar	From H2020 to Europe	online
19/04/2023	Social License to Operate (SLO) in mining sector and LCA methodologies for (re)processing of low-grade primary and secondary resources	SLO, LCA	Leon (Spain)
13/11/2023	Horizon Technology Success Stories ( <i>EU Raw Material Week 8<sup>th</sup> ed. 13-17 November 2023</i> )	Result exploitation	Brussels
24/11/2023	Success stories from the current framework of sustainable mining and process innovation	Result exploitation	Leon (Spain) & online



## 2. Clustering events organized during the project.

### 2.1. Public acceptance of mining and recycling in Europe: six recommendations

The clustering event *“Public acceptance of mining and recycling in Europe: six recommendations”* took place on 22<sup>nd</sup> November 2019 in Brussels (concerning topic SLO). The event was introduced by Mrs. Veronique Voulé-Ebongué (EASME) who emphasized the relevance of the approval and broad acceptance of society for the mining industry, and the risks associated to the lack of social acceptance for the EU production of raw materials. She also referred to the raw materials initiative: Raw Materials Information System (RMIS) and European Innovation Partnership (EIP) on raw materials.

Next, six speakers (from industry, government, NGO, local citizens, academic) showed their perspective about the topic Public Acceptance and Social License to Operate (SLO). Each of them put in value one key recommendation to deal with public acceptance and social impact on mining activities.

Finally, a panel debate, moderated by KUL, took place where the concept of legitimacy was discussed throughout the session. Important issues as the property rights, routinely defined by governments according to political priorities, and the need of more sustainable development were debated.

#### 2.1.1. PROJECTS INVOLVED

The projects TARANTULA, NEMO, CROCODILE, SecREETs , INFACT and CHROMIC, hosted the event.





## 2.1.2. AGENDA

14:00	Welcome and introduction
14:05	Introductory remarks by Veronique WOULE-EBONGUE (EC – EASME)
14:15	Perspectives on social acceptance (10' pp): <ul style="list-style-type: none"><li>• prof. Paul Ekins (UNEP – IRP): Gearing Extractive Industries Towards Sustainable Development</li><li>• Mrs. Riikka Aaltonen (Ministry of Economic Affairs and Employment of Finland): Political, legal versus social license negotiation and facilitation</li><li>• Dr. Cathryn MacCallum (SRK): Industry perspective on inking social risk to social acceptance</li><li>• Mr. Carlos Gutiérrez Álvarez (neighbour from Tapia de Casariego, Asturias (Spain): Local experiences from Asturias, the case of Oro de Salave</li><li>• Mr. Alberto Vazquez (CATAPA): From SLO model to practice: pitfall and drivers for a transparent dialogue</li><li>• Dra. Marieke Meesters (WUR): Academic review of the literature on social acceptance and Social License to Operate (SLO)</li></ul>
15:15	Coffee break
15:45	Panel debate: aligning policy recommendations
16:45	Conclusions
17:00	Networking cocktail
18:00	End



## 2.2. The green transition challenged by the metal supply chain

The clustering event “*The green transition challenged by the metal supply chain*” took place in Brussels on 12<sup>th</sup> March 2020 in Brussels (concerning topic LCA). The event was introduced by Mr. Arnoldas Milukas (EASME) who described the EU Green Deal as a package of legislative and policy initiatives towards climate neutrality by 2050. In the frame of the EU Green Deal, raw materials were clearly identified as enablers for carbon-neutral solutions in all sectors of economy. For this reason, a sustainable supply of metals and minerals is of a great importance to guarantee Europe's energy and climate targets for 2030, reducing environmental impacts and risks linked to the raw materials sector.

Following the introduction, five experts (from private sector, NGOs, academia and civil society) shared their perspective about the European Green Deal and the resources needed to realise it.

After the presentations, a panel debate, moderated by Martin Watson from Prospex institute, took place around four topics taken from the presentations:

- How to secure a stable supply of critical raw materials for the Green Deal?
- How to address public concerns over mining and manufacturing in the EU?
- How to get the optimal mix of manufacturing in the EU vs. imports from outside the EU?
- How to design, manufacture and recycle products for social and environmental standards?

Finally, Piet Wostyn (KU Leuven, SLO project manager for H2020 projects TARANTULA, NEMO and CROCODILE) was invited to present some of the key lessons learned from this event.

### 2.2.1. PROJECTS INVOLVED

This event is organised by a broad cluster of EU projects funded by the EU Research and Innovation ‘Horizon 2020’ programme (TARANTULA, NEMO, CROCODILE, ION4RAW, NEXT, MIREU and SecREETs), and by the Make-ICT-Fair project (funded by the EU's EuropeAid programme) and the Fair-ICT-Flanders project (funded by the Flemish Government's ‘Embedding the International Development Agenda in Flanders’ framework).



## 2.2.1. AGENDA

The agenda of the clustering event is shown in Table 2

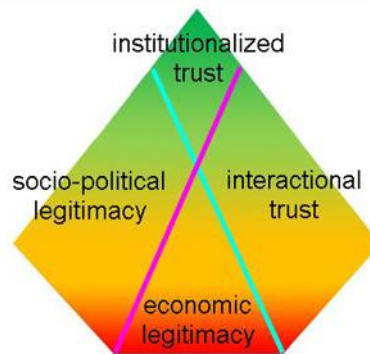
**Table 2. Agenda of the clustering event “The green transition challenge by the metal supply chain”**

12:30	Registration (mandatory to enter the Flemish Parliament)
13:30	Welcome and introduction by EASME Mr. Arnoldas Milukas (Head of Unit H2020 Environment and Resources)
13:40	Prof. Ester van der Voet of UNEP – International Resource Panel (IRP): <i>Keynote on the latest scenarios on the metals needed for climate neutrality</i>
14:00	Challenging the Green Transition at each link of the metal supply chain (15’ pp): Mr. Wies Willems (NGO Broederlijk Delen – Belgium): <i>A Just Transition? Local implications of the extraction of necessary metals</i> Mr. Jan Tytgat (UMICORE): <i>Some Suggestions for Regulatory Optimization</i> Mr. Lap Hang Au (Labour Education and Service Network – Hong Kong): <i>Labour &amp; Electronics: Tackling working conditions in factories</i> Prof. Markus Reuter (Helmholtz Institute Freiberg for Resource Technology – Germany): <i>Recyclability of materials: overcoming technological and legal boundaries</i>
15:15	Coffee break + poster session
15:45	Interactive panel debate
16:45	Conclusions by Saïd El Khadraoui (former MEP – European Political Strategy Centre)
17:00	Networking reception + poster session
18:00	End



## 2.3. The secrets of the Social License to Operate (SLO)

The clustering event *“The secrets of the Social License to Operate (SLO)”* took place on 23<sup>rd</sup> September 2019 in Brussels (concerning topic SLO). In this event, an innovative SLO-approach (Boutillier & Thomson Figure 1) was applied to the SecREEs project. The main objective of this project is to support a competitive and environmentally friendly European value chain for rare earth elements (REEs). The SLO approach was compared with the activities of the SecREEs projects in terms of economic legitimacy, socio-political legitimacy, interactional trust and institutionalized trust.



**Figure 1. Levels of Social License with the Four Factors that Determine the Proportions of Stakeholders at Each Level (Boutillier & Thomson)**

After the presentation, a panel debate, attended by partners from other projects including TARANTULA, brings out questions and comments about this approach.

### 2.3.1. PROJECTS INVOLVED

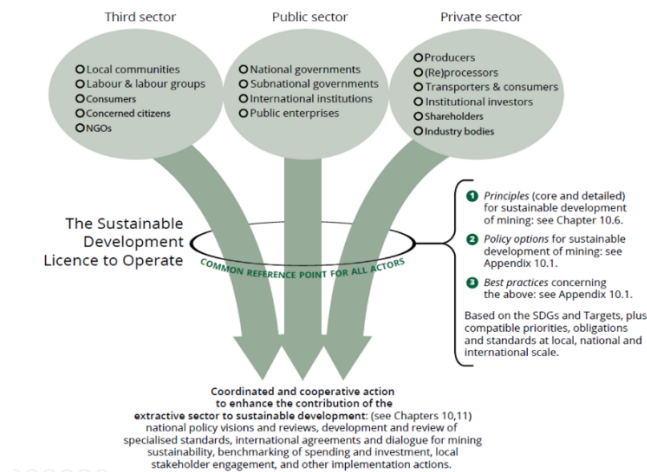
This event involves the participation of the projects NEMO, CROCODILE, SecREEs and TARANTULA



## 2.4. Mineral Resources Governance in the 21<sup>st</sup> Century – Gearing Extractive Industries Towards Sustainable Development

A short webinar took place on 8<sup>th</sup> July 2019 about the recent report launched by the UN International Resource Panel called “*Mineral Resources Governance in the 21st Century – Gearing Extractive Industries Towards Sustainable Development*”. In this report, the concept of ‘Sustainable Development License to Operate’ (SDLO) was introduced. With this webinar, the high-level multi-stakeholder expert panel continued its activities towards the development of a series of policy recommendations for the EC.

Antonio Pedro (member of the IRP) made a presentation where he introduced the concept of “Sustainable Development License to Operate” SDLO (Figure 2) in the frame of the report “Mineral Resource Governance in the 21<sup>st</sup> Century – Gearing Extractive Industries Towards Sustainable Development”.



**Figure 2. The Sustainable Development License to Operate concept addresses the nexus of environmental, social and economic concerns at multiple levels and scales**

After the presentation, a panel debate moderated by KUL was opened, where comments and questions about this new perspective were raised.

### 2.4.1. PROJECTS INVOLVED

The event involved three projects: TARANTULA, NEMO and CROCODILE



## 2.5. Ensuring SLO is Adaptative and Resilient

The workshop called “Ensuring SLO is Adaptative and Resilient” took place on 5-6<sup>th</sup> June 2019 in Brussels (concerning topic SLO). The workshop included several sessions in which the global and European context, the rules of engagement and the way forward for SLO were analyzed. The workshop was introduced by Wolfgang Reimer (GKZ) who analyzed if the SLO process is part of a future oriented vision, or rather tends to become utopia.

After this opening presentation, Ugo Miretti (SCALE project), Ian Thomson (Shinglespit Consultants) and Prof. Palma-Oliveira made new presentation about the application of SLO in different real cases. Pamela Lesser (Lapland University) presented a brief keynote on “the SoA of the research on SLO” as the MIREU model (Figure 3)

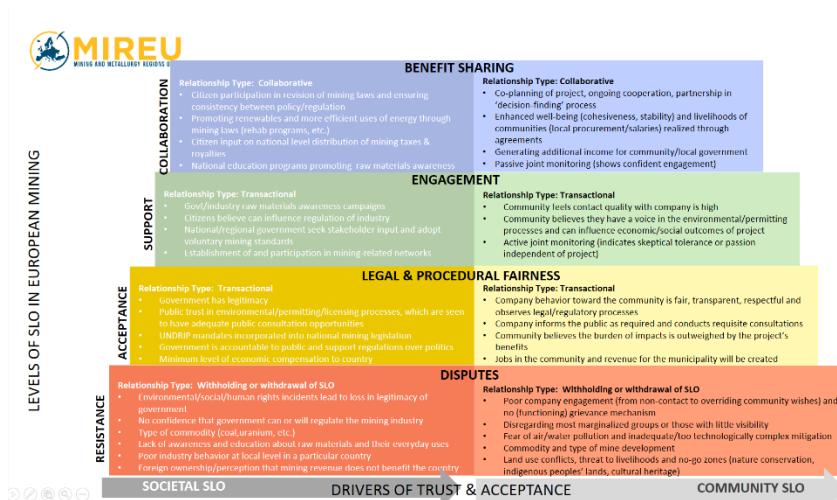


Figure 3. The MIREU model identifies four levels of SLO

A panel debate where different stakeholders (private sector, NGO, academic) participated took place. As final conclusions of this debate, four lessons were learned:

- Link production processes and end product
- Distinguish between end product and production processes
- SLO reflects a long term relationship
- There is no European policy on SLO yet

### 2.5.1. PROJECTS INVOLVED

The event was organized by MIREU project, in collaboration with TARANTULA, NEMO and CROCODILE.



## 2.6. Cluster to Cluster Meeting Innovat&Match Brokerage Event

The Cluster to Cluster Meeting Innovat&Match Brokerage Event (Figure 4) took place over three days (10<sup>th</sup>-12<sup>nd</sup> June 2020) as an strategic approach to fostering collaboration and partnerships among various stakeholders, including companies, universities, research centers, and clusters.



Figure 4. International Cluster-to-cluster meeting Innovat&Match Brokerage Event

This clustering event was dedicated to three main family of topics (Blue Growth, Digital Growth and Sustainable Growth). The last one contains topics as Circular Economy, low carbon economy or sustainable development that fit very well with the objectives and purposes of the TARANTULA project

The virtual event was organised by ART-ER Attractiveness Research Territory in cooperation with the Emilia-Romagna Enterprise Europe Network partners of the SIMPLER Consortium.

### 2.6.1. AGENDA

Figure 5 shows the agenda of the clustering event.



## 10 June, Cluster-to-Cluster

09:00	<b>Welcome &amp; Briefing</b> <a href="#">Giovanni Anceschi</a> - President of ART-ER
-	
09:30	<b>Opening remarks</b> <a href="#">Ulla Engelmann</a> - Head of Unit Advanced Technologies, Clusters and Social Economy at European Commission
09:30	<b>Keynote Talk: Cluster organisations and sustainability: how to face the crisis?</b>
-	<a href="#">Alain Tubiana</a> - Chairman, Gnomon SAS and Head of Master in Cluster Management, Strasbourg University
10:00	
	Moderator: <a href="#">Lucia Seel</a> - Member of the European Cluster Expert Group of the European Commission
10:00	<b>C2C meetings   Session 1</b>
-	
13:00	Cluster-to-cluster bilateral meetings
14:00	<b>Keynote Talk: Cluster leadership in times of adversity.</b> <a href="#">Bianca Dragomir</a> - CEO Avaesen Cluster, Founder Clusters of Change
-	
14:30	
	Moderator: <a href="#">Lucia Seel</a> - Member of the European Cluster Expert Group of the European Commission
14:30	<b>C2C meetings   Session 2</b>
-	
18:30	Cluster-to-cluster bilateral meetings

## 11 - 12 June, Innovat&Match

11 June	14:00 - 17:00 B2B Meetings   Session 1
12 June	14:00 - 17:00 B2B Meetings   Session 2

*Open to industry, SMEs, researchers, clusters, start-ups and other innovation protagonists*

**Figure 5. Agenda of the clustering event**

### 2.6.1. TARANTULA PROJECT PARTICIPATION OBJECTIVE

The participation in the event aligns with WP8, which combines communication, dissemination, exploitation, and clustering.

- Identify and engage relevant stakeholders, considering the specific interests of various groups, such as civil society, industry, and other projects.
- Contribute to the identification and updating of related projects to foster collaboration and knowledge sharing.
- Actively participate in clustering workshops and activities to enhance collaboration and synergy with other projects.





## 2.7. Sustainable Low Impact Mining solution for exploitation of small mineral deposits based on advanced rock blasting and environmental technologies.

The SLIM Project Sustainable Low Impact Mining solution for exploitation of small mineral deposits based on advanced rock blasting and environmental technologies, funded under Horizon 2020, presented the final results achieved during the 4 years-work on during an online event on the 27<sup>th</sup> of October 2020.

The event was organised as a clustering one, where other 7 running projects of the mineral sector were invited to join and present their views.

### 2.7.1. TARANTULA PARTICIPATION IN THE EVENT

During the event, Dr. Lourdes Yurramendi (Figure 6) explained the main objectives and technologies developed in the TARANTULA project with the presentation "Recovery of Tungsten, Niobium and Tantalum occurring as by-products in mining and processing waste streams".



Figure 6. Presentation of TARANTULA project in the SLIM project final event by Dr. Lourdes Yurramendi (TECNALIA)



## 2.8. Recycling mining waste a new business

The event *Recycling mining waste a new business* (Figure 7) took place on 27<sup>th</sup> April 2021 as a zoom event. The event attracted more than 400 participants of which 220 attended online. The event was focused on CRM recovery from mining wastes. Real cases from historical and current mining sites were presented. The TARANTULA project was represented by Dirk Musser (CRONIMET) as a partner of the project.

This event is presented more in detail in *D8.9 Lessons learnt from the TARANTULA high-level multi-stakeholder transition arena gatherings and TARANTULA local events with respect to civil society engagement*.



THE HORIZON2020 NEMO PROJECT INVITES FOR A LUNCH EVENT & PANEL DEBATE

# RECYCLING MINING WASTE A NEW BUSINESS?

27/04/2021 • 12.30pm (CET)

**Christian Wimmer**  
Senior Expert unit "Waste Management & Secondary Materials"  
European Commission, DG for Environment

**Anders Sand**  
Research manager  
Boliden mines

**Dirk Musser**  
Head of Project Management  
CRONIMET Raw Materials Suisse AG

The NEMO, SULTAN, TARANTULA and CROCODILE projects have received funding from the European Union's EU Framework Programme for Research and Innovation Horizon 2020 under Grant Agreement No. 778494, No. 812586, No. 821159, No. 176922.

The RE-ACTIVATE project has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under Horizon 2020, the Framework Programme for Research and Innovation.

The SMART project is financially supported by the Flemish Institute for Materials (IMI), in the context of the IMI-RE-ACTIVATE project with Grant no. IMI-2018-01618.

Figure 7. Recycling mining waste: a new business?

### 2.8.1. PROJECTS INVOLVED

The event was organized by NEMO project in collaboration with TARANTULA and several other projects (SULTAN, CROCODILE, RE-ACTIVATE and SMART).



## 2.9. (Re) Mining Extractive Waste

The event (Re)Mining Extractive Waste took place in Mechelen (Belgium) on 17-18<sup>th</sup> May 2022 (Figure 8). The term “extractive waste” is related to the vast quantities of waste coming from primary mining and metal processing industry, that have been landfilled or stockpiled since the earliest days of the Industrial Revolution. Due to the presence of sulphidic mine tailings in these wastes, acidic waters and residual heavy metals can be released, resulting in the contamination of the surface and ground waters.



Figure 8 (Re) Mining Extractive Waste: a new business

### 2.9.1. PROJECTS INVOLVED

The clustering event was organized by NEMO and SULTAN with the support of TARANTULA and CROCODILE project.

### 2.9.2. TARANTULA PROJECT PARTICIPATION IN THE PROJECT

The treatment of tungsten tailings is one of the main objectives of TARANTULA. In this context, Jeroen Spooren (VITO) made a presentation (Figure 9) about one of the processes that are a subject of research within the TARANTULA project. The title of the presentation was “Aqueous leaching of tungsten from scheelite after MW-assisted fusion with a low-melting eutectic alkali hydroxide salt system” under the event’s topic of Circular Economy.



Figure 9. Presentation of TARANTULA project in (Re) Mining Waste event by Dr. Jeroen Spooren (VITO)



## 2.10. The use of Deep Eutectic Solvents and Ionic Liquids for metal recovery

The online event “*the use of Deep Eutectic Solvents and Ionic Liquids for metal recovery*” was organized by the projects TARANTULA, ION4RAW, PEACOC and CROCODILE. The event was moderated by PNO and brought together top research organizations as well as industrial partners to present the project results and the latest technological innovations using Deep Eutectic Solvents and Ionic Liquids for metal recovery. The event took place on 11<sup>th</sup> May 2022 around the topic *Result exploitation*.

### 2.10.1. AGENDA

The agenda of event is presented in Table 3.

**Table 3. Agenda of the event “the use of Deep Eutectic Solvents and Ionic Liquids at Industrial level”**

9-9.05	<b>Welcome and introduction</b>	PNO
<b>9.05-10.40</b>	<b>The use of Deep Eutectic Solvents and Ionic Liquids in the context of EU-funded R&amp;D projects (ION4RAW, PEACOC, TARANTULA, CROCODILE)</b>	
9.20-9.35	The use of Deep Eutectic Solvents and Ionic Liquids in ION4RAW	Maria Tripijana (IDENER)
9.35-9.50	The use of Deep Eutectic Solvents and Ionic Liquids in CROCODILE	Jokin Hidalgo (Tecnalia)
9.50-10.05	The use of Deep Eutectic Solvents and Ionic Liquids in TARANTULA	Dr. Javier Nieto (Tecnalia)
10.05-10.20	The use of Deep Eutectic Solvents and Ionic Liquids in PEACOC	Dr. Elisabet Andres (Tecnalia)
10.20-10.30	Q&A to speakers	
10.30-10.40	Coffee break	
<b>10.40-11.55</b>	<b>The use of Deep Eutectic Solvents and Ionic Liquids at industrial level</b>	
10.40-10.55	The use of Deep Eutectic Solvents and Ionic Liquids by Solvionic	Dr. Sebastien Fantini (Solvionic)
10.55-11.10	The use of Deep Eutectic Solvents and Ionic Liquids by IOLITEC	Dr. Boyan Iliev/Prof.Dr. Schubert
11.10-11.25	The use of Deep Eutectic Solvents and Ionic Liquids by FFI Ionix	Mr. Bamdad Bahar
11.25-11.35	Q&A to speakers	
<b>11.35-11.55</b>	<b>Panel discussion on challenges and opportunities for the use of Deep Eutectic Solvents and Ionic Liquids for metal recovery &amp; Q&amp;A</b>	
	All speakers from previous sessions, moderated by PNO	
<b>11.55-12.15</b>	<b>Wrap up</b>	PNO



During the event, the three above-mentioned projects had the opportunity to explain the main progresses concerning Deep Eutectic Solvent (DES) and Ionic Liquids (IL) technologies. Afterwards, three relevant companies (Solvionic, Iolitec and FFI Ionix) made presentations. Finally an interesting panel discussion about challenges and opportunities for these promising technologies (DES, ILS) took place.

## 2.10.2. TARANTULA PARTICIPATION IN THE EVENT

During the event, Dr. Javier Nieto (TECNALIA) made a presentation titled “*The use of Deep Eutectic Solvents and Ionic Liquids in TARANTULA*” (Figure 10). In his presentation, he explained the main advances in the technology developed by TECNALIA *DES leaching + IL extraction* for the recovery of tungsten, tantalum and niobium within WP4. A flow-sheet for the recovery of W, Ta/Nb was presented, as well as the main goals achieved concerning yields and selectivity.



**Figure 10. Presentation of the project TARANTULA in the event “*The use of Deep Eutectic Solvents and Ionic Liquids for Metal Recovery*” by Dr. Javier Nieto (TECNALIA)**



## 2.11. Channelling knowledge from European projects into the Raw Materials Information System (RMIS)

The Technical Workshop Channelling knowledge from European projects into the Raw Materials Information System (RMIS) was held virtually on December 3<sup>rd</sup>, 2020. This event, co-organized by the Joint Research Centre (JRC) and the Executive Agency for Small and Medium-sized Enterprises (EASME), represented an important step forward to the already well-established dialogue between the JRC and the EU-funded projects on raw materials. This complements the information services of the CORDIS website and the EASME hub, providing further exploitation and insight in relation to selected project outputs.

The topic of the event was the Raw Materials Information System (RMIS).

### 2.11.1. AGENDA

The agenda of the meeting is presented in Figure 11.

### 2.11.2. PROJECTS INVOLVED

The projects involved in the event were the following: PANORAMA, ORAMA, MINLAND, COLLECTORS, CEWASTE, INTERMIN, RE-SOURCING, MINGUIDE, REMOVAL, TARANTULA, MINTELL4EU, ERAMIN.

### 2.11.3. TARANTULA PROJECT PARTICIPATION IN THE EVENT

During the event, Juan Riaza (ICAMCYL) made the presentation titled “TARANTULA: Recovery of Tungsten, Niobium and Tantalum occurring as by-products in mining and processing waste streams.”, covering different aspects concerning RMIS in the TARANTULA project.





3 <sup>rd</sup> December 2020, Thursday							
09.30 - 10.00	<p><b>Welcoming and introductory session</b> (Chaired by Constantin CIUPAGEA, HoU 'Land Resources', JRC)</p> <ul style="list-style-type: none"> <li>Giovanni DE SANTI, Director JRC.D Sustainable Resources</li> <li>Luisa PRISTA, Acting Director GROW.EASME.A</li> <li>Gwenole COZIGOU, Director GROW.C, Sustainable Industry &amp; Mobility</li> <li>Peter DROELL, Director RTD.F, Prosperity</li> <li>Massimo GASPARON, EIT Raw Materials – Director Innovation</li> </ul>						
10.00 – 10.30	<p><b>Background and Context</b> (Chaired by Constantin CIUPAGEA, HoU 'Land Resources', JRC)</p>						
	<table border="1"> <tr> <td>Overview of Horizon 2020 raw materials calls</td> <td><b>Marcin SADOWSKI</b>, "H2020 Environment &amp; Resources" Unit, EASME</td> </tr> <tr> <td>The Raw Materials Information System (RMIS): goal, scope, overview of content</td> <td><b>Constantin CIUPAGEA and Simone MANFREDI</b>, "Land Resources" Unit, JRC</td> </tr> <tr> <td>Overview of the JRC Raw Materials project-portfolio</td> <td><b>David PENNINGTON</b>, "Land Resources" Unit, JRC</td> </tr> </table>	Overview of Horizon 2020 raw materials calls	<b>Marcin SADOWSKI</b> , "H2020 Environment & Resources" Unit, EASME	The Raw Materials Information System (RMIS): goal, scope, overview of content	<b>Constantin CIUPAGEA and Simone MANFREDI</b> , "Land Resources" Unit, JRC	Overview of the JRC Raw Materials project-portfolio	<b>David PENNINGTON</b> , "Land Resources" Unit, JRC
	Overview of Horizon 2020 raw materials calls	<b>Marcin SADOWSKI</b> , "H2020 Environment & Resources" Unit, EASME					
The Raw Materials Information System (RMIS): goal, scope, overview of content	<b>Constantin CIUPAGEA and Simone MANFREDI</b> , "Land Resources" Unit, JRC						
Overview of the JRC Raw Materials project-portfolio	<b>David PENNINGTON</b> , "Land Resources" Unit, JRC						
<p><b>Technical guidelines for channelling knowledge into the RMIS, and examples of integration of projects' outputs</b> (Chaired by Simone MANFREDI, JRC)</p>							
10:30 – 11:30	<table border="1"> <tr> <td>Examples of integration into the RMIS</td> <td><b>Tamas HAMOR</b>, JRC</td> </tr> <tr> <td>The ProSUM results in the RMIS</td> <td><b>Jaco HUISMAN</b>, JRC</td> </tr> <tr> <td>Technical guidelines on integrations of knowledge output to the RMIS</td> <td><b>Theodor CIUTA</b>, JRC</td> </tr> </table>	Examples of integration into the RMIS	<b>Tamas HAMOR</b> , JRC	The ProSUM results in the RMIS	<b>Jaco HUISMAN</b> , JRC	Technical guidelines on integrations of knowledge output to the RMIS	<b>Theodor CIUTA</b> , JRC
	Examples of integration into the RMIS	<b>Tamas HAMOR</b> , JRC					
	The ProSUM results in the RMIS	<b>Jaco HUISMAN</b> , JRC					
Technical guidelines on integrations of knowledge output to the RMIS	<b>Theodor CIUTA</b> , JRC						
11:30 – 12:00	<p>Discussion, Questions &amp; Answers (All participants, moderated by Simone MANFREDI, JRC)</p>						
12:00 – 13:00	<b>Lunch break</b>						
13:00 – 14:30	<p>Projects' presentation of key outputs and plans of knowledge transfer into the RMIS (ca. 6-7 min. per project) (Chaired by Laura PETROV, EASME)</p> <p>Presentations:</p> <ul style="list-style-type: none"> <li>PANORAMA (EIT RM, 2019-2021), knowledge base</li> <li>ORAMA (CSA, 2016-2019), Knowledge base</li> <li>MINLAND (CSA, 2017-19), Framework conditions</li> <li>COLLECTORS (CSA, 2017-20), Reuse, recycling and recovery</li> <li>CEWASTE (CSA, 2018-2021), Reuse, recycling and recovery</li> <li>INTERMIN (CSA, 2017-2021), International cooperation</li> <li>RE-SOURCING (CSA, 2019-23), Responsible sourcing</li> <li>MIN-GUIDE (CSA, 2016-2019), Framework conditions</li> <li>REMOVAL (IA, 2018-22), Processing</li> <li>TARANTULA (RIA, 2019-23), Processing</li> <li>Mintell4EU (Geo-ERA), knowledge base</li> <li>ERA-MIN3, international cooperation / knowledge base</li> </ul>						
14:30 – 15:00	<p>Discussion, Question &amp; Answers (All participants, moderated by David PENNINGTON, JRC)</p>						
15:00 - 15.15	<p>Conclusions and closure of workshop</p> <ul style="list-style-type: none"> <li>Marcin SADOWSKI, EASME</li> <li>Constantin CIUPAGEA, JRC</li> </ul>						

Figure 11. Agenda of the event Channelling knowledge from European projects into the Raw Materials Information System (RMIS)



## 2.12. 7<sup>th</sup> Prometia Scientific Seminar

On December, 10<sup>th</sup> 2020, the 7<sup>th</sup> Prometia Scientific Seminar place in a virtual format. The topic of the event was *"From Horizon 2020 to Horizon Europe"*. In this event, the raw materials community's main achievements and the identification of the remaining challenges to be addressed in the next Horizon Europe research and innovation programme were revised. PROMETIA is an international non-profit association promoting innovation in mineral processing and extractive metallurgy for mining and recycling of raw materials. The Association aims to strengthen European technical skills and industrial know-how in raw materials processing.

### 2.12.1. PROJECTS INVOLVED

In this event, the following projects were involved: TARANTULA, ImpACT, Fine Future, Iterams, PREMA, VALOMAG, Chromic, SisAl.

### 2.12.2. PARTICIPATION OF TARANTULA PROJECT IN THE EVENT

The TARANTULA project was represented by Martina Orefice (KUL) (Figure 12) with the presentation titled *"Recovery of Tungsten, Niobium and Tantalum occurring as by-products in mining and processing waste streams: a general overview of TARANTULA project"*.



Figure 12. The project TARANTULA represented by Martina Orefice (KUL) in the 7<sup>th</sup> Prometia scientific Seminar

### 2.12.3. AGENDA

The agenda of the event is presented in Figure 13.





 <b>Mineral Processing and Extractive Metallurgy for Mining and Recycling Innovation Association</b>		
Time (CET)	Topic	Speaker
09:00	Welcome – Introduction Overview of PROMETIA activities and Services	Andrzej Chmielarz, President Stéphane Bourg, Chairman of ExCom
<b>From the mine to the metals chaired by Gro Eide (Elkem)</b>		
09:15	ImPaCT: Integrated Modular Plant and Containerised Tools for Selective, Low-impact Mining of Small High-grade Deposits	Jérôme Bodin, BRGM & Kate Moore, Exeter University
09:35	Fine Future: Innovative technologies and concepts for fine particle flotation: unlocking future fine-grained deposits and Critical Raw Materials resources for the EU	Stefan Dirlich, HZDR
09:55	Iterams: Integrated mineral technologies for more sustainable raw material supply	Päivi Kinnunen, VTT
10:15	PREMA : Pretreatment of Mn ores in a pilot-scale rotary kiln	Julia Noémie, Eramet
10:35	Break	
<b>From waste to resources chaired by Christian Ekberg (Chalmers University)</b>		
10:45	VALOMAG project: from the recovery of scrap magnets to the production of new magnets and rare earth oxides	Virginie Decottignies, SUEZ & Thibaut Marcon, CRM Group
11:05	Recovery of Tungsten, Niobium and Tantalum occurring as by-products in mining and processing waste streams: a general overview of TARANTULA project	Martina Orefice, KU Leuven
11:25	Chromic: effiCient mineral processing and Hydrometallurgical RecOvery of by-product Metals from low-grade metal containing seCondary raw materials	Liesbeth Horckmans, VITO
11:45	SisAL Project: Innovative pilot for Silicon production with low environmental impact using secondary Aluminium and silicon raw materials	Gabriella Tranell, NTNU
12:05	Q&A – discussion chaired by Gro Eide & Christian Ekberg	
12:30	Lunch	
<b>From H2020 to Horizon Europe – A panoramic view on Raw Materials Challenges chaired by Patrick d'Hugues (BRGM) &amp; Jordi Bruno (Amphos 21)</b>		
14:00	Overview from DG GROW	Daniel Cios
14:20	Overview from Era-Min	Dina Carrilho
14:40	Overview from EIT	Laurence Lamm / Patrick Nadoll (tbd)
15:00	Overview from EGS (Mineral Resource Expert Group)	Daniel Oliveira
15:20	Overview from PROMETIA	Stéphane Bourg
15:40	Business in recycling - Elkem	Cor Oldenzel
16:00	Q&A chaired by Patrick d'Hugues & Jordi Bruno	
16:15	Concluding remarks	Andrzej Chmielarz, IMN & Marion Lenoir, Eramet

Figure 13. Agenda of the event 7<sup>th</sup> Prometia Scientific Seminar



## 2.13. Social License to Operate (SLO) in mining sector and LCA methodologies for (re)processing of low-grade primary and secondary resources

The clustering event “Social License to Operate (SLO) in mining sector and LCA methodologies for (re)processing of low-grade primary and secondary resources”, organized by ICAMCYL with the support of PNO, took place on April, 19<sup>th</sup> 2023 in the Technological Park of Leon.

### 2.13.1. AGENDA

The agenda of the event is presented in Figure 14.

<u>AGENDA</u>	
10:00 - 10:10	Welcome and registration.
10:10 – 11:00	1st Panel discussion: TARANTULA PROJECT. Good practices and implementation of SLO throughout the project. <b>Lessons Learned. Vision of the mining companies involved in the project.</b> <ul style="list-style-type: none"><li>- Elena Terrón García. <i>Dic<sup>a</sup>. Legal y RRHH – Strategic Minerals Spain</i></li><li>- Agne Ahlenius. <i>CEO – SALORO</i></li></ul>
11:00 - 11:45	Round table. Participation of other projects and University <ul style="list-style-type: none"><li>- <i>Mathilde Legay LGI Sustainable Innovation. ION4RAW Project- As an example of a project that is also ending and how SLO has faced during its development.</i></li><li>- <i>Dr. Ing. Lukas Förster. DMT GmbH &amp; Co. KG. MADITRACE Project - As an example of a new project and how SLO will be included during its implementation.</i></li><li>- <i>Maria Mavroudi. Doctoral Researcher. Chair of Mining Engineering and Mineral Economics, University of Leoben. S34I Project - As an example of a new project and how SLO will be included during its implementation.</i></li></ul>
11:45 - 12:15	Coffee break
12:15 -13:00	2nd Panel discussion: LCA methodologies for (re)processing of low-grade primary and secondary resources <ul style="list-style-type: none"><li>- <i>Raúl Ugarte Lodeiro TECNALIA. TARANTULA Project: LCC and LCA methodologies</i></li><li>- <i>Mathilde Legay, LGI Sustainable Innovation. ION4RAW Project: preliminary results.</i></li><li>- <i>Dinos Sakkas, MNLT INNOVATIONS. PASSENGER Project: LCA methodologies for the conventional permanent magnets production processes.</i></li></ul>
13:00 - 13:30	Round table. <b>Lessons Learned. Challenges and opportunities.</b> <ul style="list-style-type: none"><li>- <i>Prof. Juan M. Menendez, University of Oviedo Mining and Minerals Engineering.</i></li></ul>
13:30 - 14:00	Q&A. Wrap-up and Conclusions.

Figure 14. Agenda of the clustering event “Social License to Operate (SLO) in mining sector and LCA methodologies for (re)processing of low-grade primary and secondary resources”

### 2.13.2. PROJECTS INVOLVED

The following projects were involved: ION4RAW, MADITRACE, S34I and TARANTULA



### 2.13.3. TARANTULA PROJECT PARTICIPATION IN THE EVENT

The first Panel Discussion, titled “*TARANTULA Project. Good Practices and Implementation of SLO throughout the project. Lessons learned*”, was dedicated to TARANTULA project. In this section, the two mining companies involved in the project, STRATEGIC MINERALS SPAIN and SALORO, explained their vision about this subject. Elena Terron and Agne Ahlenius were the speakers respectively.

In the second Panel Discussion about “*LCA methodologies for reprocessing of low-grade primary and secondary resources*”, Raul Ugarte made the presentation “*TARANTULA project: LCC and LCA methodologies*” on behalf of the TARANTULA project. In his presentation Raul Ugarte explained the methodologies used in the TARANTULA project for the selection of the most promising technologies according to LCC and LCA analysis.



## 2.14. Horizon Technology Success Stories in Raw Material Week 2023

The Raw Materials Week 2023 took place from 13 to 17 November 2023 in Brussels, organized by EC. This Week, gathering a wide range of stakeholders, was centred around the European Critical Raw Materials Act and cover topics related to critical and strategic raw materials: strategic projects, investment, permitting, exploration, innovation, circularity, international partnerships etc.

Within this event, the session Horizon Technology Success Stories gathered several presentations of projects that were concluded (or near to their end) with success. This session took place on November, 13<sup>th</sup> 2023.

### 2.14.1. AGENDA

The agenda of the day 13<sup>th</sup> November 2023 is presented in Figure 15.

10.00-10.10	Welcome address	Ms. Kerstin JORNA, Director General, DG GROW, European Commission
10.10-11.00	From Research to Investments in Raw Materials Chair: Ms. Kerstin JORNA, Director General, DG GROW, European Commission	
10.10-10.20	Impulse speech:	Ms. Katarina NILSSON, President, European Technology Platform on Sustainable Mineral Resources, – ETP SMR Strategic Research and Innovation Agenda for 2025-2030
10.20-11.00	Panel discussion	Ms. Maive RUTE, Deputy Director General, DG GROW, European Commission Ms. Ana Maria ALONSO ZARZA, Director, IGME-CSIC, Geological and Mining Institute of Spain Mr. Peter MOSEER, Rector, University of Leoben, Austria Mr. Antti VASARA, CEO, VTT Technical Research Center of Finland, Finland Ms. Barbara JUSZCZYK, Managing Director, Lukaszewicz Research Network – Institute of Non-Ferrous Metals, Poland Ms. Darja ISAKSSON, Director General, Vinnova - Swedish Innovation Agency, Sweden
11.00-11.30	Coffee break	
11.30-12.30	Open funding opportunities for R&I projects in Raw Materials Chair: Ms. Merete CLAUSEN, Director, DG GROW, European Commission	
11.35-12.00	Mr. Daniel CIOS, Policy Officer, DG GROW, European Commission – Raw Materials topics in Cluster 4 & Raw Materials topics in Cluster 5	
12.00-12.15	Mr. Didier ZIMMERMANN, Education and Innovation Director, EIT Raw Materials – EIT RM funding opportunities	
12.15-12.30	Mr. Francesco MATTEUCCI, Programme Manager, European Innovation Council and SMEs Executive Agency EISMEA - Raw Materials in EIC Challenges	
12.30-14.00	Lunch	
14.00-15.45	Horizon Technology Success Stories Chair: Ms. Victoria PETROVA, Head of Unit, European Health and Digital Executive Agency HaDEA	
14.00-14.15	Introductory remarks	Ms. Merete CLAUSEN, Director, DG GROW, European Commission
14.15-14.30	Ms. Claudia HAASE – GREENPEG, H2020 project	
14.30-14.45	Mr. Teemu MAKIAHO - Dig_IT, H2020 project	
14.45-15.00	Ms. Katarina OKVIST - NEXGEN SIMS, H2020 project	
15.00-15.15	Ms. Asunción (Sunj) ARANDA – AlSiCol, H2020 project	
15.15-15.30	Ms. Lourdes YURRAMENDI SARASOLA – TARANTULA, H2020 project	
15.30-15.45	Mr. Manfred SPIESBERGER – PHOTORAMA, H2020 project	
15.45-16.15	Coffee break	
16.15-17.30	EU Innovation Fund funding opportunities Chair: Ms. Madalina IVANICA, Deputy Head of Unit, DG GROW, European Commission	
		Mr. Joao SERRANO GOMES, Policy Officer, DG CLIMA, European Commission
		Mr. Ugo MIRETTI, Project Adviser, European Climate, Infrastructure and Environment Executive Agency CINEA
		Mr. Stefan SAVONEN, Senior Vice President, LKAB - HYBRIT Project
		Ms. Sophie LEBOUILL, Project Control Manager, ERAMET - ReLieVe Project
		Ms. Elisa BIAVARDI, Manager, Bormioli Luigi S.p.A & Ms. Silvia BELLICCHI, Manager, Bormioli Luigi S.p.A - VITRUM Project
17.25-17.30	Closing remarks	Mr. Daniel CIOS, Policy Officer, DG GROW, European Commission

Figure 15. Agenda of the Raw Materials Week for 13<sup>th</sup> November 2023, where the session Horizon Technology Success Stories took place



## 2.14.2. PROJECTS INVOLVED

During the session *Horizon Technology Success Stories*, several H2020 projects presented their main achievements: TARANTULA, GREENPEG, Dig\_IT, NEXGEN SIMS, AISiCal, PHOTORAMA.

## 2.14.3. PARTICIPATION OF TARANTULA PROJECT IN THE EVENT

On behalf of TARANTULA project, Dr. Lourdes Yurramendi (Figure 16) made the presentation titled "Recovery of Tungsten, Niobium and Tantalum occurring as by-products in mining and processing waste streams" in the session *Horizon Technology Success Stories*.



**Figure 16. Presentation of TARANTULA project by Dr. Lourdes Yurramendi in the session *Horizon Technology Success Stories* within the Raw Materials Week 2023**

Dr. Lourdes Yurramendi explained the main developments in the TARANTULA project, covering the different WPs of the project. The main achievements are here summarized as the conclusions of the presentation:

- A data base (near 4000 metal sites) with mining potential for tungsten, niobium and tantalum has been produced and standardized to provide input to RMIS platform.
- Novel technologies for the recovery of W, Ta and Nb from primary resources have been developed at lab scale and a ranking established according to technical economic and environmental criteria.
- A prototype has been constructed for the validation at TRL5 of the most promising flow-sheet produced at lab. scale.
- With the results of the upscaled process, a benchmarking with the SoA technology is being performed. Also, the obtained products are being characterized for their commercial validation.
- A Post-Project Impact Follow Up committee (PPIF) was created for the exploitation, communication and dissemination of the results over a sufficient period of time after the projet's completion



## 2.15. Success stories from the current framework of sustainable mining and process innovation

The clustering event “*Success stories from the current framework of sustainable mining and process innovation*” organized by ICAMCYL took place in Leon (Spain) on 24<sup>th</sup> November 2023. This event served as a pivotal gathering, bringing together trailblazers and experts to showcase transformative initiatives within the realms of sustainable mining and process innovation. The event was characterized by insightful interventions and engaging panel discussions, providing a comprehensive snapshot of the industry's dynamic evolution.

### 2.15.1. AGENDA

The agenda of the event is presented in Figure 17.

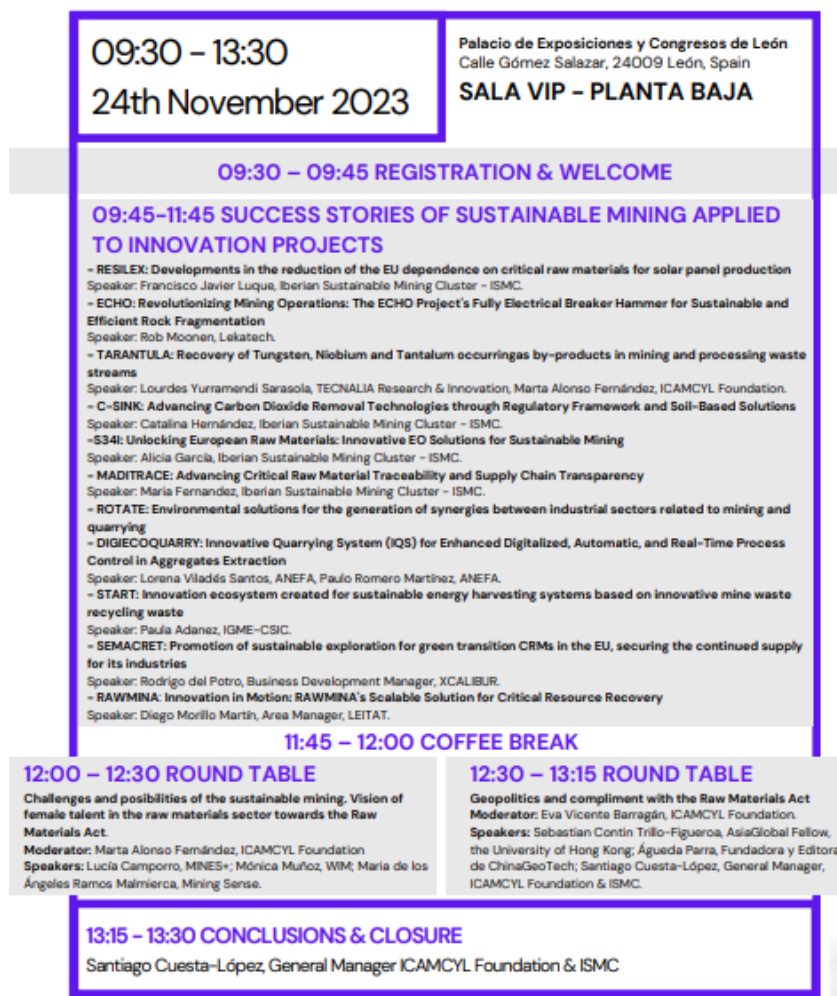


Figure 17. Agenda of the clustering event “*Success stories from the current framework of sustainable mining and process innovation*”



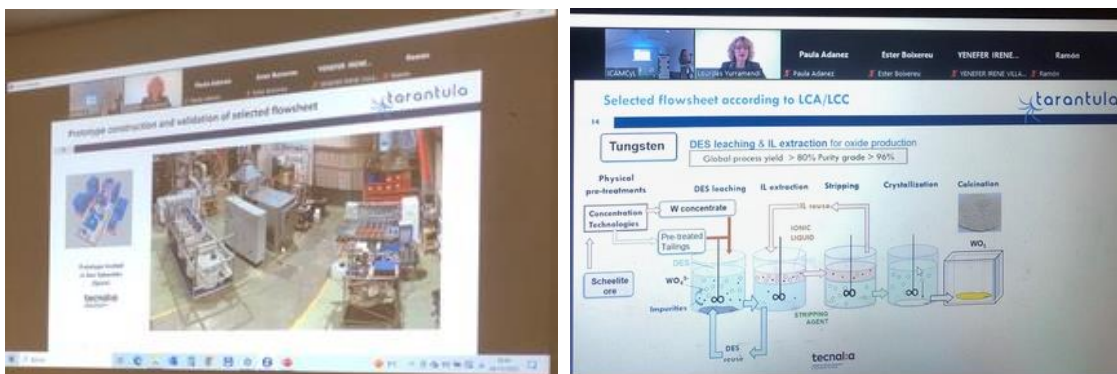


## 2.15.2. PROJECTS INVOLVED

In the event, several projects presented their main achievements and developments: RESILEX, ECHO, TARANTULA C-SINK, S34I MADITRACE, ROTATE, DIGIECOQUARRY, START, SEMACRET, RAWMINA.

### 2.15.1. TARANTULA PROJECT PRESENTATION IN THE EVENT

On behalf of the TARANTULA project, Dr. Lourdes Yurramendi (TECNALIA) and Marta Alonso Martínez (ICAMCYL) presented together the main achievements of the TARANTULA project in a titled "Recovery of Tungsten, Niobium and Tantalum occurring as by-products in mining and processing waste streams" (Figure 18).



**Figure 18. The TARANTULA project achievements presented by Lourdes Yurramendi (TECNALIA)**

On one hand, Marta Alonso (ICAMCYL) focused on the identification of new W, Nb and Ta sites from primary resources. An exhaustive inventory has been performed country by country, with the aim to provide accurate and reliable information to RMIS.

On the other hand, Lourdes Yurramendi (TECNALIA) focused on the technical issues: the summary of the different technologies developed in the project, the selection of the most promising flow-sheet (DES leaching + IL extraction) for W recovery, and finally the construction of a prototype in TECNALIA facilities for the validation of the selected flow-sheet.

