

APPENDIXES

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APPENDIX I: EXAMPLES OF PROJECTS

The case studies presented below are examples of (hypothetical) identified business opportunities. They are based on the project partners knowledge and background and have the purpose of illustrating the potential impact of MINE.THE.GAP across the participant regions and sectors. These examples highlight the potential matching opportunities in the areas represented by the project partners and, far from being unique, they are just a sneak peek of a vast number of opportunities.

CASE STUDY 1: LINKING ICT AND MINING – A REINFORCED VALUE CHAIN

SME1 is a junior mining company with 10-15 employees established in a province of North western Spain. Recently, the company has been granted the exploration rights of a land where first evidence shows the presence of what could be a profitable deposit of tungsten. This is a strategic mining project both for the region and Europe, as tungsten is a key element in high-temperature components for high value-added industries. The mine could have a production life of 15-20 years, but all evidence has been obtained through ground-based operations in an area of difficult access. Lack of accuracy could delay the exploration phase for years and put the whole project at risk due to lack of financing for subsequent phases.

SME2 is a German company created 5 years ago. They are experts in remote sensing technology, satellite imagery and geospatial services. Their main customers come from the agricultural sector, where they provide services for land management, production yield assessment and crop condition monitoring. They provide highly tailored solutions for their customers, but their client base is still very limited. They are looking for opportunities to open their high-tech solutions to new market segments.

The opportunity: The use of satellite imagery and remote sensing technology may provide a way to drastically reduce the time of the exploration phase and the costs associated with field inspection at mine site. The detailed data acquired will be a very efficient way to reduce uncertainty and gain geological understanding about the nature of the rock, the resource quality, the depth of the deposit and the means needed for the exploitation phase.

The project: Through one of the MINE.THE.GAP calls, SME1 and SME2 work together in adapting the satellite and remote sensing technologies previously used in agriculture to the needs of the future Tungsten mine. As a result:

Impact on SME1: Less staff needed in the field; exploration phase speeds up; financing comes earlier; they will incorporate techniques that can be extended to the next phases of the mine production life.

Impact on SME2: Enters a new market; gains new knowledge; offers new service; strengthen international presence.

Medium-, long-term impact: Local community grows in employment and well-being, improving public acceptance of mining activities. The value chain is reinforced by drastically reducing the time of the exploration phase. Both SMEs become actors of a wider cross-regional, cross-sectoral ecosystem that promotes innovation, offering market gains and positioning to their members.

Case study 1: Linking ICT and mining – A reinforced value chain

A junior mining company in Spain incorporates cutting-edge remote sensing and satellite technology from a German SME, replacing traditional, ground-based exploration methods on the field in a new Tungsten mine.

01



The problem

The mine is in an area of difficult access, where ground-based exploration is challenging. This exploration phase is taking longer than expected, hindering access to finance and jeopardising the whole project.

02



The technology

Satellite imagery and remote sensing previously used in agriculture can highlight ore bodies, their mineralisation or alteration, variability through the mine site and associated structural features.

03



The project

A Spanish mining company and a German ICT company receive funding through MINE.THE.GAP, resulting in a cross-regional, cross-sectoral project for adapting satellite technology to the mining industry needs.

THE IMPACT

The mining company

- Accelerate exploration phase
- Improve access to finance
- Reduce operational costs
- Can use the technology in subsequent phases



The ICT company

- Access a new market
- Gain new knowledge
- Offer a new service
- Strengthen international presence



THE BIG PICTURE



SHORTER, REINFORCED
VALUE CHAIN



ECONOMY THRIVES AT
LOCAL MINE SITE



INTERREGIONAL LINKS
STRENGTHEN



SOCIAL ACCEPTANCE
IMPROVES

FIGURE 6-CASE STUDY 1

CASE STUDY 2: LINKING ADVANCED MINERALS PROCESSING AND CIRCULAR ECONOMY – A NEW VALUE CHAIN ECONOMY – A NEW VALUE CHAIN

SME1 is a Polish company that offers WEEE management services to small and medium companies. They comply with Directive 2012/19/EU by collecting, recycling and securing disposal of a wide variety of E&E waste. They are aware that many of this electronic waste contains valuable materials such as rare earth elements (REE) and other critical raw materials (CRM), but they lack the knowledge and the technology to get this value. The resulting mixed alloy is sold to the metallurgical industry for further reuse as raw material in lower value applications.

SME2 is a Finnish company expert in the implementation of advanced, highly customised and environmentally friendly hydrometallurgical processes for the mining industry. Their main customers are junior mining companies exploring tailings for the recovery of high added value metals. They are looking for opportunities to apply their specialised know-how to new market segments within the circular economy principles.

The opportunity: Applying advanced hydrometallurgical processes used in the mining industry for the recovery of valuable, scarce metals from WEEE a new value chain can arise where previously dismissed metal waste finds new value for high-tech applications.

The project: Through one of the MINE.THE.GAP Open Calls, SME1 and SME2 work together in adapting hydrometallurgical technologies applied in mining to the recovery of critical elements from WEEE. As a result:

Impact on SME1: Add new value to their products, expand their customer base from metallurgical companies to high-tech companies. They also improve their knowledge on materials recovery leading to a higher skilled workforce.

Impact on SME2: Access new market, gain new knowledge, offer a new service and strengthen internationalisation.

Medium-, long-term impact: A new value chain is created, reinforcing the circular economy both at local and EU level, reducing the dependence on imports of REE and other CRM from third countries. SME1 and SME2 become actors of a wider cross-regional, cross-sectoral ecosystem that promotes innovation across the raw materials sector.

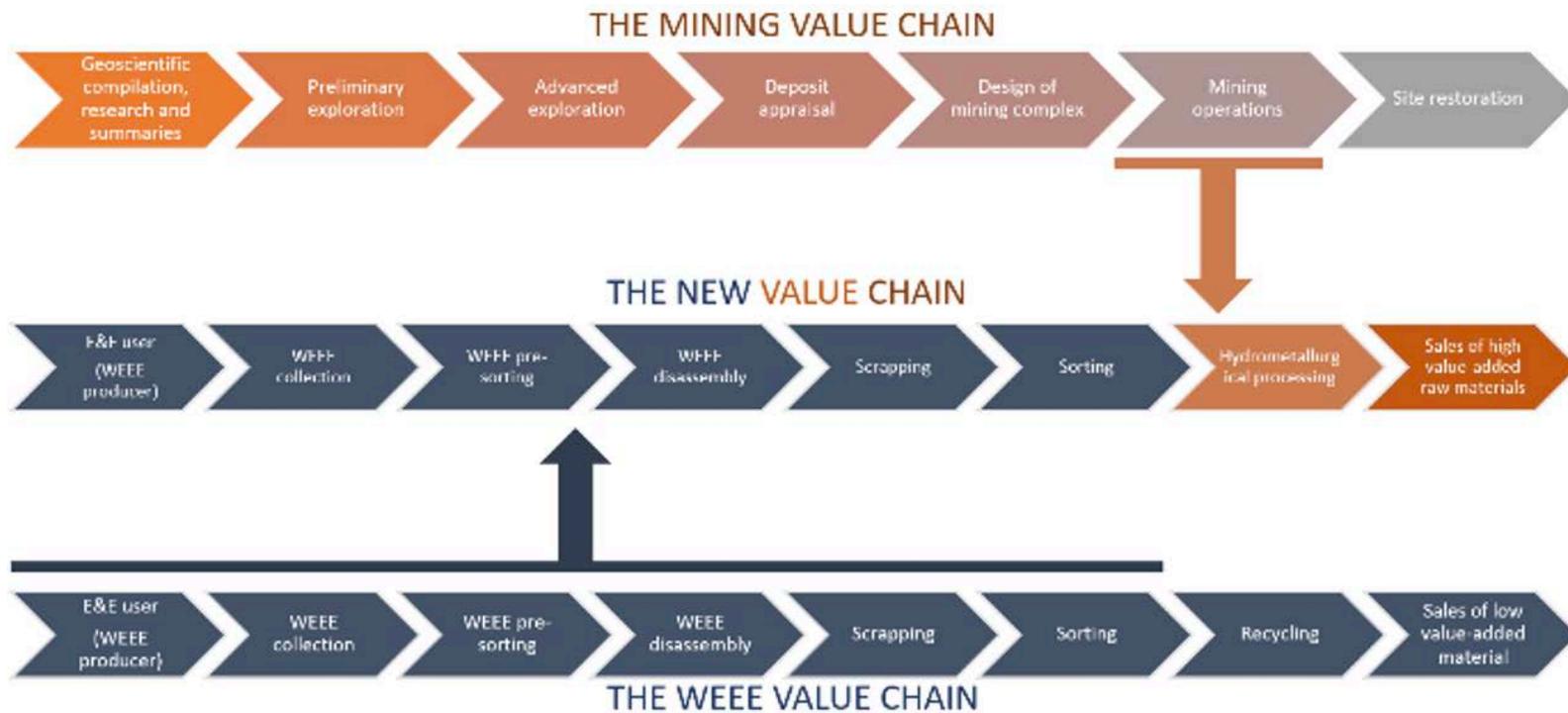


FIGURE 7-CASE 2 VALUE CHAIN

Case study 2: Linking advanced minerals processing and circular economy – A new value chain

A WEEE management company in Poland incorporates advanced, tailored-made hydrometallurgical processes from a Finnish company for recovery and reuse of high added value rare earth elements (REE) and other critical raw materials (CRM).

01



The missed opportunity

Metal scrap is recovered from electronic waste and sold to metallurgical companies as a mixed alloy for lower value applications. However, it contains significant amounts of highly valuable elements (REE & other CRM).

02



The advanced technology

Recently developed hydrometallurgical technologies allow tailored-made solutions for the recovery of REE and other CRM in a cost-effective, environmentally-friendly and sustainable process.

03



The project

MINE.THE.GAP Open Calls provide a hub where a Finnish company specialised in advanced processing technologies joins a Polish WEEE company for the recovery of products of higher added value.

THE IMPACT

The recycling company

- Add new value to its products
- Contribute to the circular economy
- Extend its customer base
- Improve its knowledge on materials recovery



The AM company

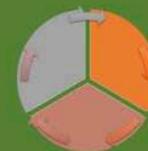
- Access a new market
- Gain new knowledge
- Offer a new service
- Strengthen international presence



THE BIG PICTURE



A NEW VALUE CHAIN IS CREATED



THE CIRCULAR ECONOMY IS REINFORCED



INTERREGIONAL LINKS STRENGTHEN



DEPENDENCE ON IMPORTS LESSENS

FIGURE 8-CASE OF STUDY 2

CASE STUDY 3: LINKING CLEAN ENERGY GENERATION AND MINE SITE REHABILITATION – A SYMBIOTIC VALUE CHAIN

SME1 is a French solar energy company with 15-20 employees offering cost-effective solutions for the installation of high-efficiency solar panels. Most of their projects are limited to their region, Rhone-Alpes, and located in land previously dedicated to crop growing.

SME2 is a mining company responsible for the exploitation of a recently closed coal mine of around 200ha in the central region of Portugal. Hoping for a good business opportunity, they are exploring different ways of setting up a profitable rehabilitation project.

The opportunity: In most cases, although this can vary depending on each country's legislation, exploitation mining companies must assume liability for cleaning up the mine site once the extraction activities stop and then repurpose the mined land. In recent years, renewable energy has emerged as a possible solution to rehabilitate closed mines contributing, at the same time, to reducing GHG emissions. After EU Council Decision 2010/787/EU to promote the closure of uncompetitive coal mines across Europe, renewable energy generation can become an untapped opportunity for mining companies to transform liabilities into revenue-generating assets and for local communities to overcome loss of wealth and employment derived from the transition to a low-carbon economy.

The project: SME1 and SME2 collaborate, through a MINE.THE.GAP Open Call, in a pilot project to cover 37ha of disused land in a closed coal mine with high-performance solar arrays, transforming part of the coal mining field into a renewable energy power production site of up to 12,3 MW. Thus, rehabilitation become a way of generating high value to post-mining land.

Impact on SME1: Access a new market by offering post-mining solutions to junior mining companies; gain new knowledge and expand their territorial scope, contributing to creating a new, symbiotic value chain.

Impact on SME2: Add new value to post-mining site; start a new profitable business by operating the solar farm; can expand and replicate the project in other post-mining lands.

Medium-, long-term impact: Local community finds benefits in the form of new job opportunities in the solar farm. Renewable energy generation help reduce global emissions and carbon footprint and stimulate innovation in the area. Moreover, using mined land as a clean energy generator relieves green field areas that can still be used for agriculture. The solar farm becomes a demonstrator of how post-closure of mines can be effectively and profitably handled, and the good management improves social license to operate not only



in the area, but EU wide, thanks to effective dissemination and communication actions.

Case study 3: Linking clean energy generation and mined land rehabilitation

– A symbiotic value chain –

A solar energy company in France and a junior mining company in Portugal develop a pilot project to create a solar farm in a recently closed coal mine in central Portugal.

01



A closed coal mine site

Closed coal mines are proliferating across EU due to Council Decision 2010/787/EU to stop supporting uncompetitive mines. This has become a liability for mine owners, who look for innovative and profitable solutions.

02



Clean energy generation

The energy solar company offers cost-effective solutions for the installation of large, high-performance solar farms. They look for challenging projects in which to apply their expertise and innovative product.

03



The project

MINE.THE.GAP Open Calls trigger collaboration between the solar energy company in France and the mining company in Portugal to start a pilot solar farm that will add high value to the post-mining site.

THE IMPACT

The mining company

- Add value to an abandoned mined land
- Contribute to clean energy provisioning
- Obtain benefits from solar farm operation
- Can replicate project in other mines



The solar energy company

- Access a new market
- Gain expertise in mines-related projects
- Offer a new service
- Strengthen international presence



THE BIG PICTURE



A SYMBIOTIC VALUE CHAIN IS CREATED



CLEAN ENERGY TRANSITION IS REINFORCED



STIMULATES ECONOMY IN POST-MINING SITES



SOCIAL ACCEPTANCE IMPROVES

FIGURE 9-CASE STUDY 3

APPENDIX II: KEY TECHNOLOGIES TO APPLY AS 'PROVIDERS'



Information & Communication Technologies (ICT)



Integration of automation & robotics in mining environments: sensors, devices, robots



Enhanced connected mobility for the digital mine (VR, AR)



Analytics & decision support tools for prediction and planning (AI, Machine Learning)



Big Data solutions for data collection, storage, analysis & integration



Development of communication protocols, interoperability & cybersecurity



Integration of earth-observation technologies & services



Tracking and wearable devices for enhanced safety



Portable gadgets for in-situ analysis



Drone technologies for mapping, maintenance and operations



Advanced Manufacturing



Towards the concept of Industry 4.0 in the mining and raw materials scenario



Application of additive manufacturing and 3D printing technologies to mining operations



Advanced production processes: automation & robotics



New electric/electronic components & systems



Integration of future and emerging technologies in the mining & raw materials environment



State-of-the-art drilling rigs for hands-free operations



Integrated ore-sorting technologies for waste minimization

 **Environment & Resource Efficiency** 

-  Resource-efficient processing, production & remanufacturing
-  Mining in challenging environments
-  Alternative & renewable energy sources in raw materials extraction & processing
-  Reduction in carbon dioxide emissions & other harmful gases
-  Novel geological models and 3D mapping technologies
-  Ventilation and climate control “on-demand”
-  Development and implementation of new business models & impact assessment tools
-  Product design for better efficiency & durability of components

 **Circular Economy** 

-  Smart mining and raw materials technologies: exploration, extraction & closure/post-closure
-  Minimization and waste valorisation of residues
-  Substitution of (critical) raw materials
-  Recycling and re-use of end-of-life products
-  Energy consumption reduction
-  Tailings management
-  Responsible sourcing and sustainable raw materials supply chains

APPENDIX III: HOW TO APPLY FOR MINE.THE.GAP FUNDING

1. Apply to MINE.THE.GAP funding

The application is done through an online form on the MINE.THE.GAP website. To apply, a person needs to have created a MINE.THE.GAP user account (see annex how to register).

The project application is submitted in two forms: through the upload of the templates in PDF format and in filling in the same information in the online application form. All documents that are part of the application are available as templates under <https://h2020-minethegap.eu/open-calls/>

It is mandatory to use these templates for the application.

The following descriptions guide you through the application process, how you fill in the form, and how you send your application.

2. Application process

STEP 1

There are two ways how to access the application form: under the page “open calls” or the internal collaboration space under “partner search”.

If you are on the MINE.THE.GAP home page and click on “open calls”, you receive the current information on open calls and the corresponding templates.

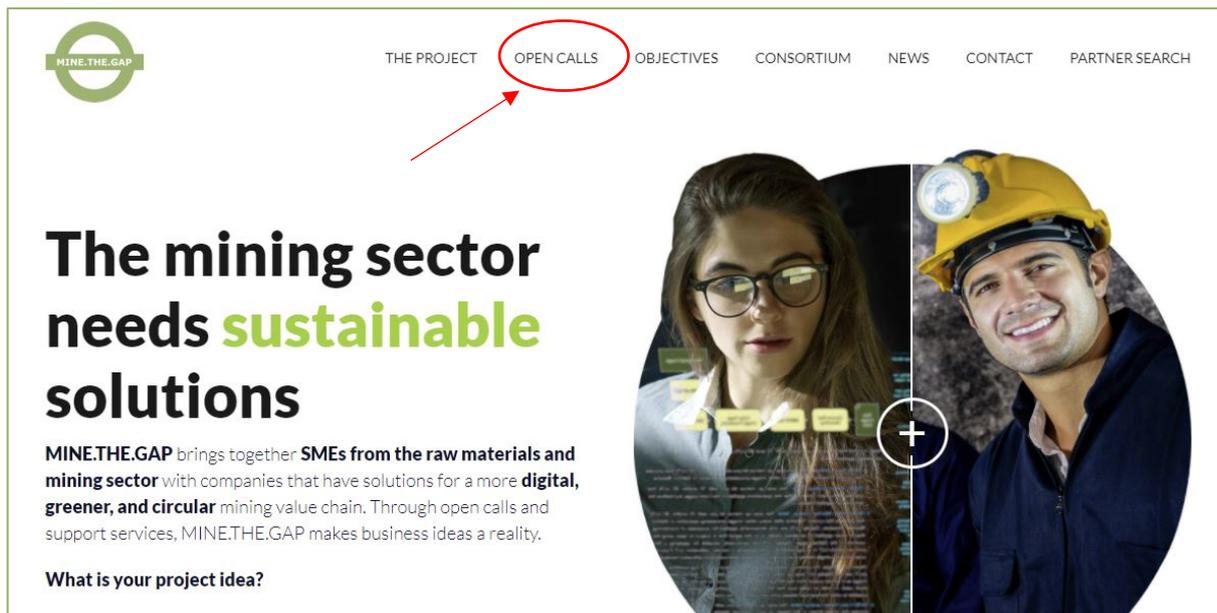
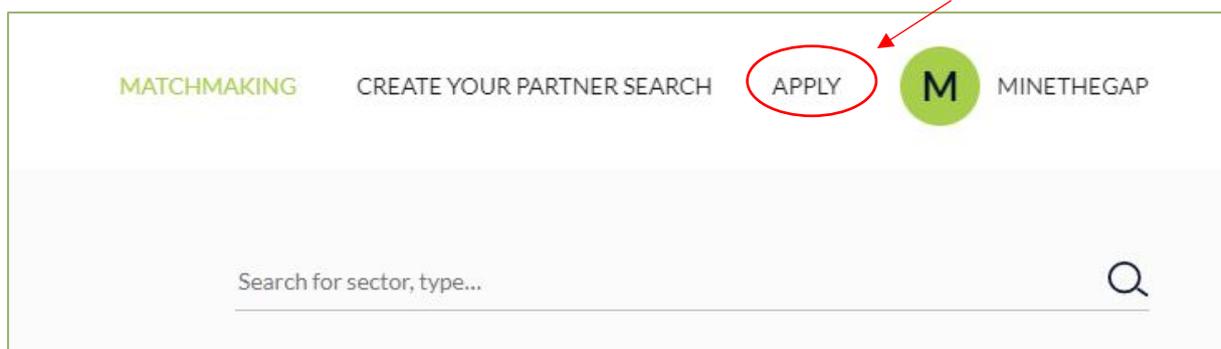


FIGURE A2.1 – MENU TAB “OPEN CALLS”

Click on the button “Apply” to access the online form. If you are not logged in, you will be first redirected to the log-in page.

You can also access the form from the internal collaboration space where you might have found your project partners, available by clicking on “Partner Search” in the menu. Click on “Apply” in the internal top menu.

FIGURE A2.2 – MENU TAB “APPLY” IN INTERNAL COLLABORATION SPACE



STEP 2

On accessing the application page, you are welcomed by an introductory text summarising the MINE.THE.GAP voucher scheme.

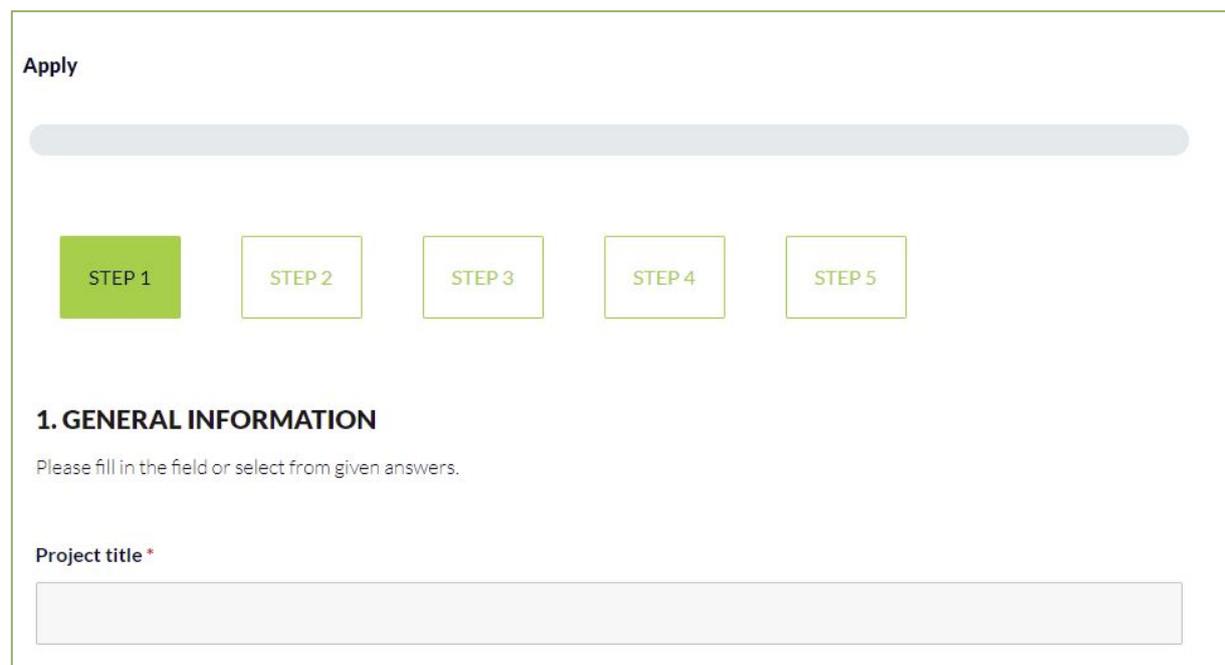
FIGURE A2.3 – INTRODUCTION TO THE APPLICATION

APPLICATION FOR
MINE.THE.GAP funding

MINE.THE.GAP aims to provide support for the reinforcement of existing value chain and the development of new industrial value chains in the raw materials and mining sector by means of cross-regional innovation and support service in cluster-related SMEs through synergies and interactions with providers and facilitators from the existing and emerging fields of ICT, circular economy, resource efficiency and advanced manufacturing.

This is the application form of the MINE.THE.GAP financial support following two innovation voucher schemes.

When scrolling down, you see the online application form. It is divided into five steps according to the MINE.THE.GAP application template.

FIGURE A2.4 – APPLICATION FORM

Apply

STEP 1 STEP 2 STEP 3 STEP 4 STEP 5

1. GENERAL INFORMATION

Please fill in the field or select from given answers.

Project title *



Please fill in all the fields with the same information with which you have filled out the application template and upload the completed templates as PDF. All fields required are marked with an asterisk *. Furthermore, the open text fields have a character limit, which includes spaces into the characters count.

FIGURE A2.5 – FIELDS TO BE FILLED OUT

Please fill in the short project summary (max. 1,500 characters) *

Please describe the specific objectives for the project action (max. 1,500 characters) *

Please describe the main idea, models or assumptions involved. Specify the methodology that you intend to use (max. 10,000 characters) *

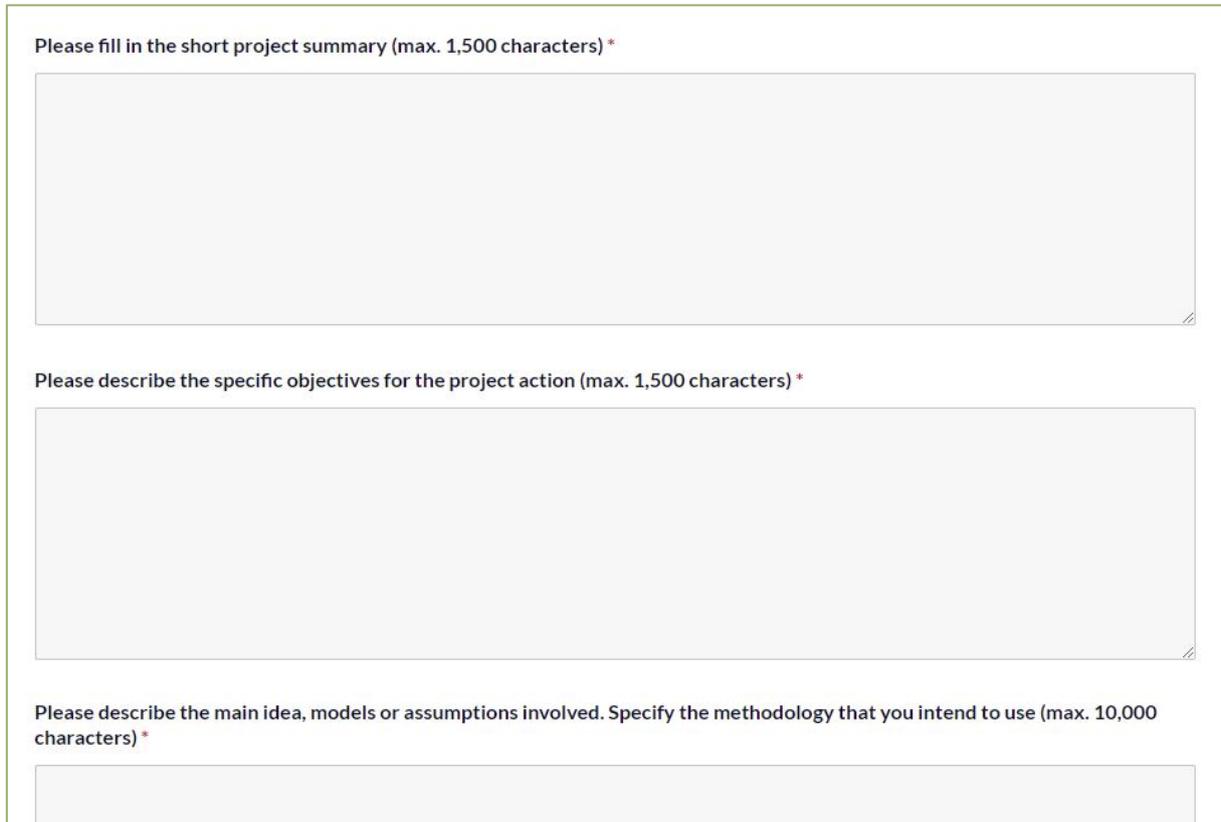
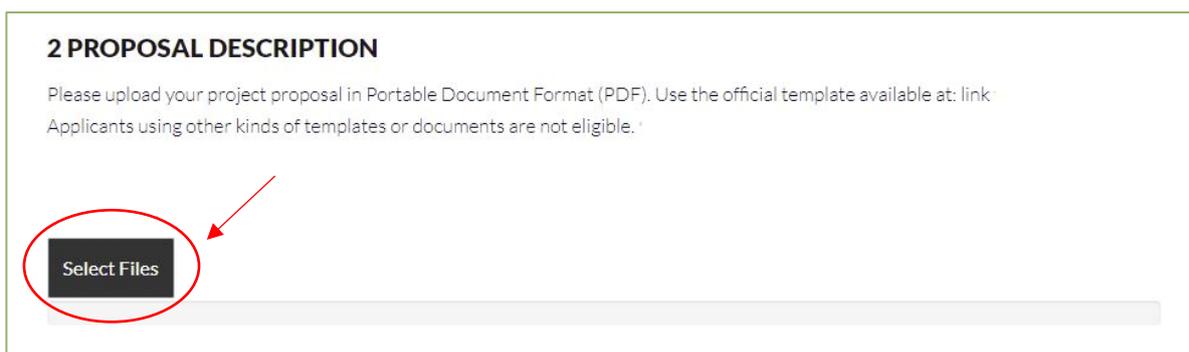


FIGURE A2.6 – PDF UPLOAD

2 PROPOSAL DESCRIPTION

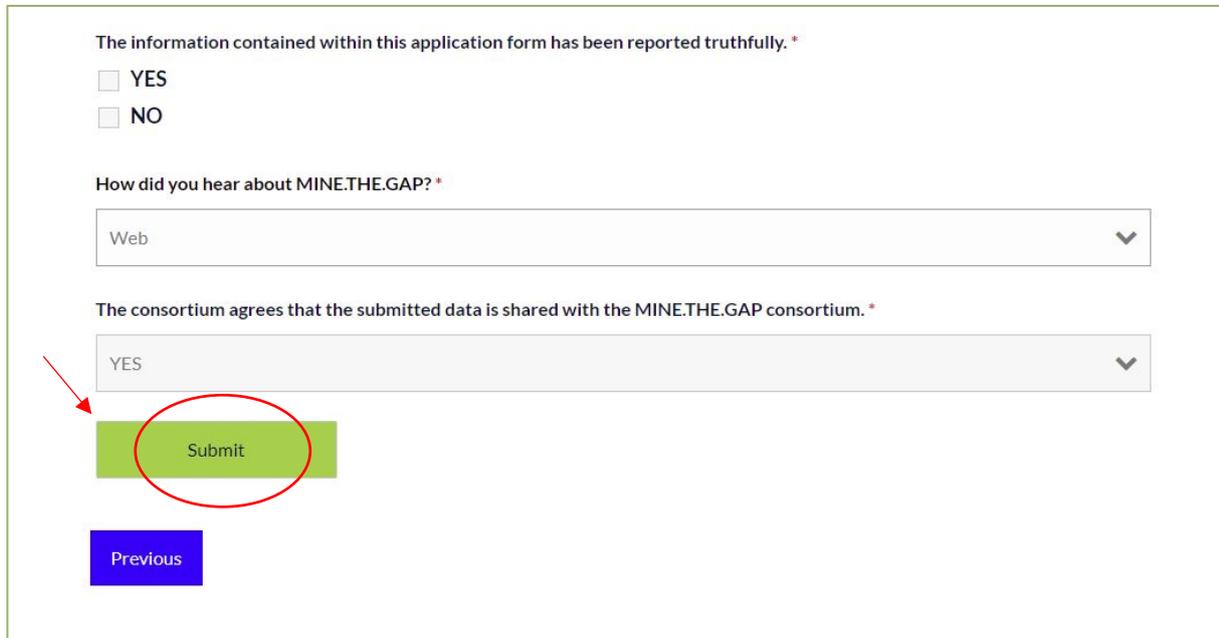
Please upload your project proposal in Portable Document Format (PDF). Use the official template available at: [link](#)
Applicants using other kinds of templates or documents are not eligible.

Select Files



STEP 3

After filling out all the required fields of the online application and uploading all required document, submit your application by clicking on “Submit” at the end of the form.

A screenshot of an online application form. At the top, it asks "The information contained within this application form has been reported truthfully.*" with radio buttons for "YES" and "NO". Below that is a dropdown menu for "How did you hear about MINE.THE.GAP?*" with "Web" selected. The next dropdown menu asks "The consortium agrees that the submitted data is shared with the MINE.THE.GAP consortium.*" with "YES" selected. A red arrow points to a green "Submit" button, which is also circled in red. Below the "Submit" button is a blue "Previous" button.

The information contained within this application form has been reported truthfully.*

YES
 NO

How did you hear about MINE.THE.GAP?*

Web

The consortium agrees that the submitted data is shared with the MINE.THE.GAP consortium.*

YES

Submit

Previous

FIGURE A2.7 – SUBMIT THE APPLICATION

You will receive a confirmation notification on the website once your application is submitted successfully. The date and time of your submission will be registered.

APPENDIX IV: HOW TO REGISTER ON THE MTG COLLABORATION PLATFORM

1. Find partners on MINE.THE.GAP

MINE.THE.GAP aims to bring together companies across Europe to create new, more digital, and more sustainable value chains in the mining and raw materials sector. The idea is to join businesses with technological solutions, that can be applied to meet the challenges of the mining sector, and the mining companies which need those technologies.

That's why MINE.THE.GAP offers a collaborative space to look for potential partners to apply to the open calls and receive funding through the MINE.THE.GAP project.

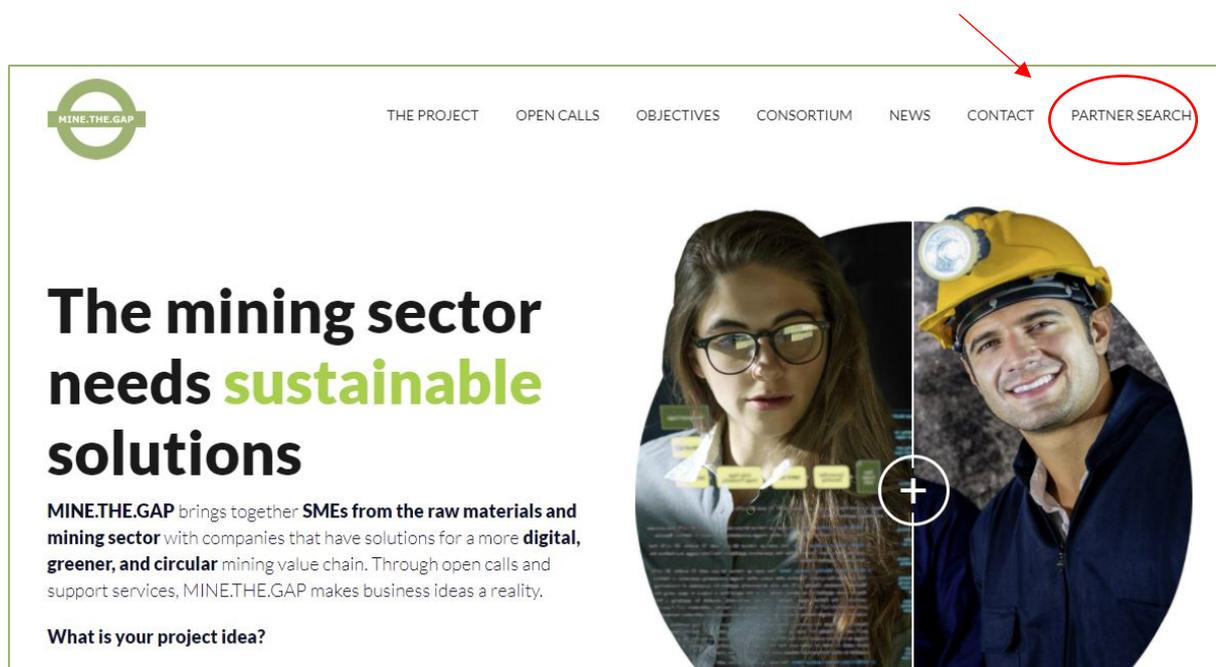
The following descriptions guide you through the registration process and explain how you can present yourself and look for partners.

2. Registration process

STEP 1

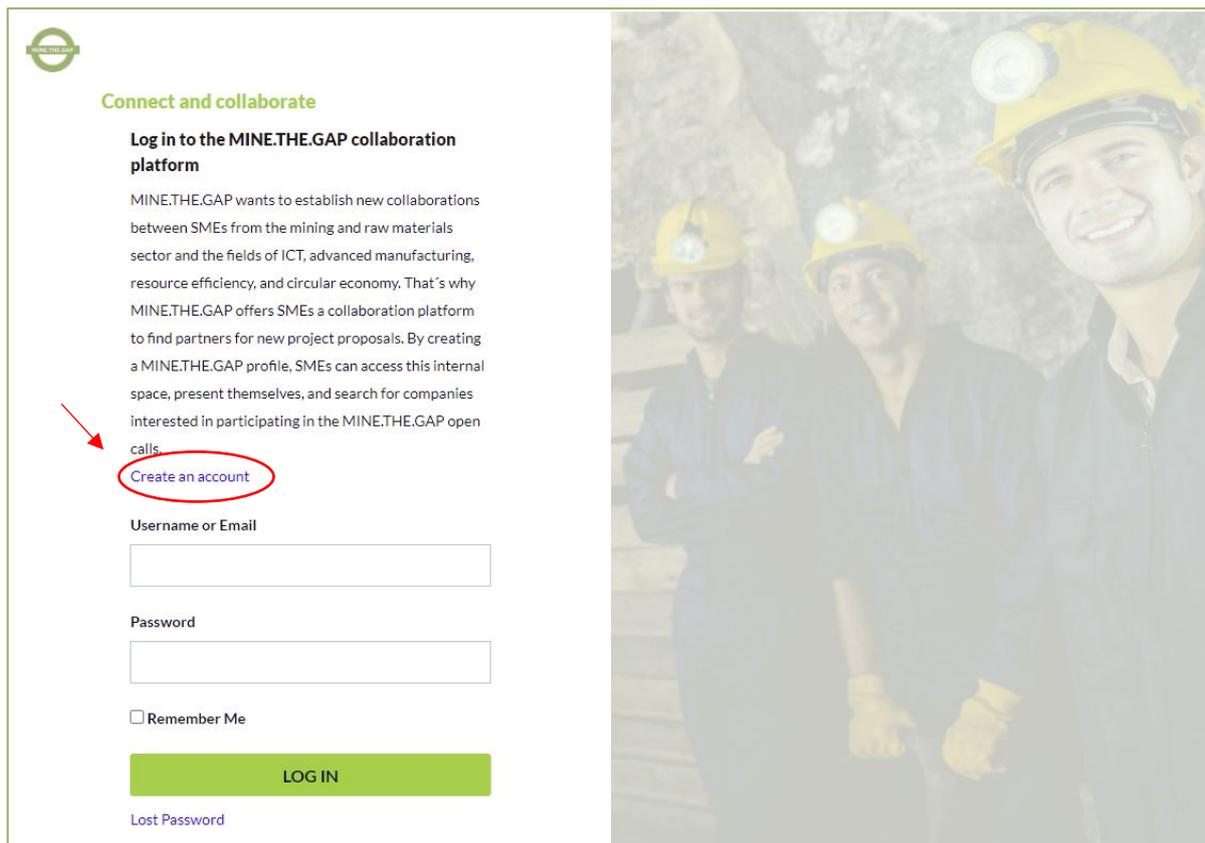
In the top menu of the website, go to "Partner search".

FIGURE A1.1 – MENU TAB "PARTNER SEARCH"



STEP 2

By clicking on the “Partner search”, you are directed to a log-in page for the internal collaboration space where you can create your account. Once the account is created, you can log in with your account details.



 **Connect and collaborate**

Log in to the MINE.THE.GAP collaboration platform

MINE.THE.GAP wants to establish new collaborations between SMEs from the mining and raw materials sector and the fields of ICT, advanced manufacturing, resource efficiency, and circular economy. That's why MINE.THE.GAP offers SMEs a collaboration platform to find partners for new project proposals. By creating a MINE.THE.GAP profile, SMEs can access this internal space, present themselves, and search for companies interested in participating in the MINE.THE.GAP open calls.

[Create an account](#)

Username or Email

Password

Remember Me

LOG IN

[Lost Password](#)

FIGURE A1.2 – CREATE AN ACCOUNT

STEP 3

If you want to create a new account, you are directed to a short self-assessment as a service to you to check whether you are eligible for the MINE.THE.GAP funding. Answer the four questions that will appear to create the account.

FIGURE A1.3 – CREATE AN ACCOUNT

MINE.THE.GAP

THE PROJECT OPEN CALLS OBJECTIVES CONSORTIUM NEWS CONTACT PARTNER SEARCH

Create your MINE.THE.GAP profile

MINE.THE.GAP offers you the possibility to get in contact with other companies interested in solutions for the mining and raw materials value chain. Register on the MINE.THE.GAP platform to create a company profile and look for project partners! It's easy - fill in your details, check your eligibility for the MINE.THE.GAP calls, and start networking. *

Let's get started ↓

1 STEP MEET THE REQUIREMENTS
Check whether you are eligible for the MINE.THE.GAP calls.

2 STEP FILL IN YOUR DETAILS
Let the community know who you are.

3 STEP START NETWORKING
Find the right partners for your project.

Are you an SME?

Are you a micro, small or medium-sized enterprise with less than 250 employees, an annual turnover of no more than €50 million and/or a balance sheet of no more than €43 million, and comply with the definition of an SME according to the European Union (Annex Regulation 2003/361/EC)?

Yes No

Fill in the answers to four questions step by step.



After you have filled in the required information, hit “submit”.

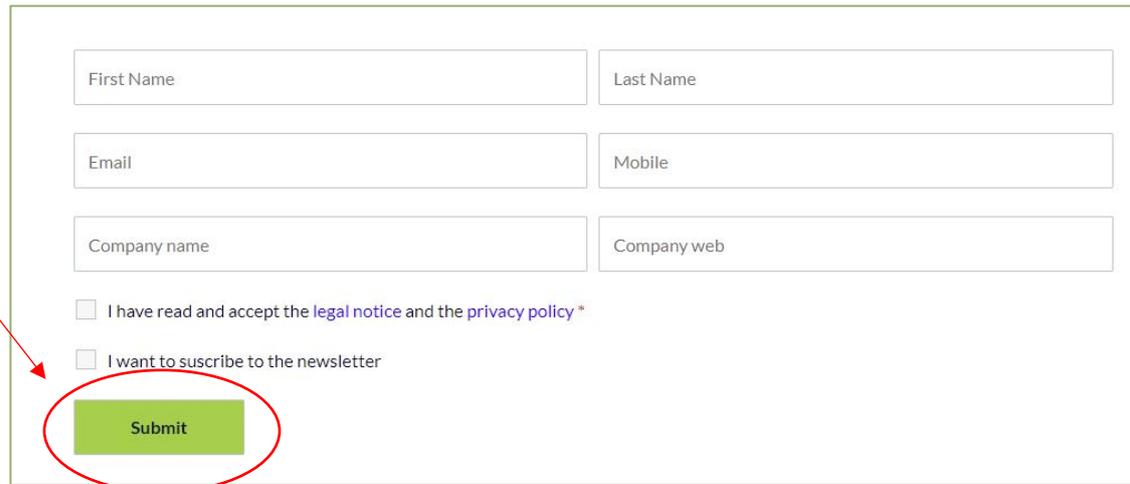


FIGURE A1.4 – SUBMISSION OF ACCOUNT REQUEST

If you are eligible, you will receive a confirmation that the MINE.THE.GAP team is reviewing your request and send you shortly the log-in details of your user account. You can change these details later.

FIGURE A1.5 – CONFIRMATION OF ACCOUNT REQUEST

Your form has been submitted successfully. We are reviewing your request. You will shortly receive an e-mail notification with a password for your user account.

In case you are not eligible for the MINE.THE.GAP funding, you will receive an automatic notification of your ineligibility.

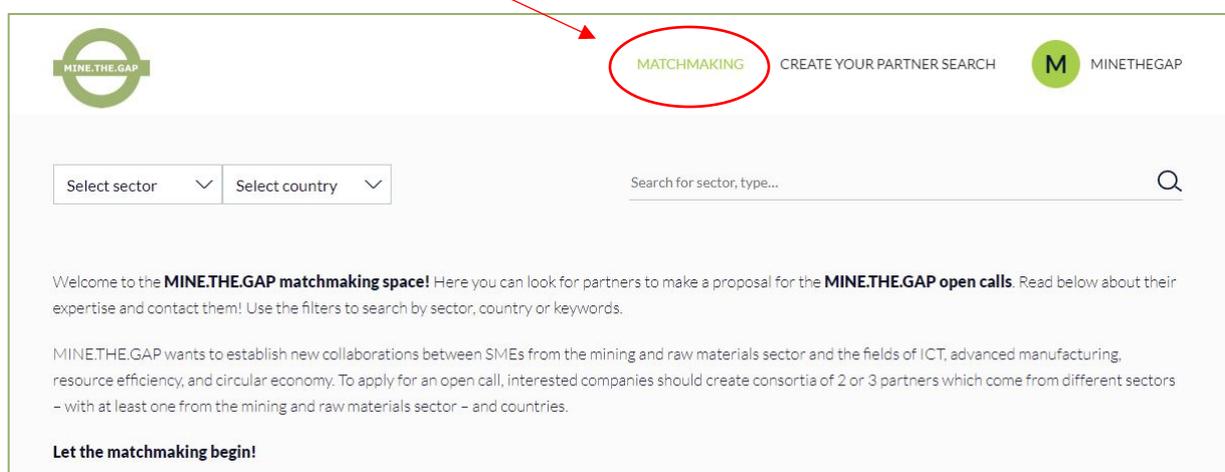
3. Matchmaking

STEP 4

Log in to the collaboration space. You see a feed with the partner searches that have already been published by companies interested in the MINE.THE.GAP funding schemes. This is under the menu tab “Matchmaking”.

You can read about what the companies are offering and which partner(s) they are looking for. You can contact them via email or telephone.

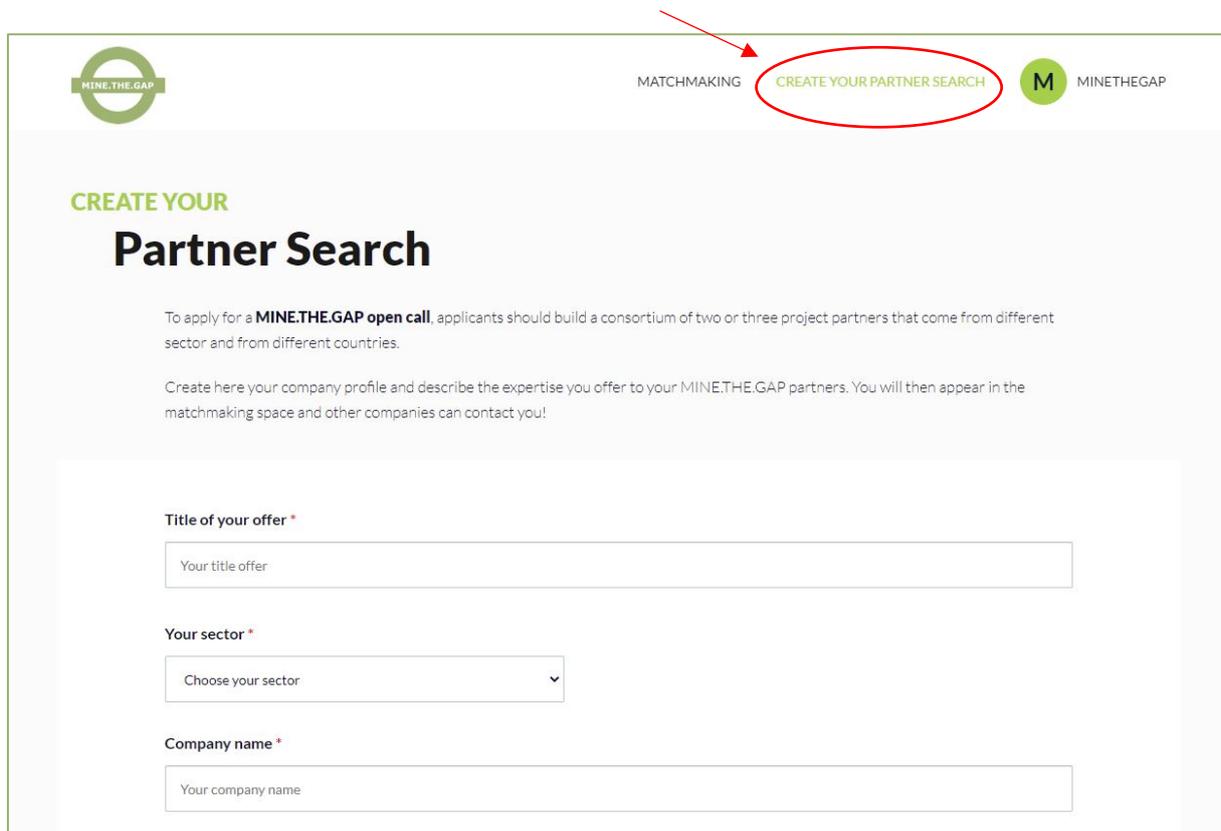
FIGURE A1.6 – MATCHMAKING FEED



STEP 5

Create your own partner search if you have an idea in mind and want to publish what you are offering and what you are looking for. Go to the menu tab “Create your partner search” and fill in the fields. After having filled in all your information, hit “submit”.

Your search for a partner will be published in the matchmaking feed for other registered users to see.

FIGURE A1.7 – CREATE YOUR PARTNER SEARCH

The screenshot displays the MINE.THE.GAP website interface. At the top, there is a navigation bar with the MINE.THE.GAP logo on the left, the text 'MATCHMAKING' in the center, and a green circular button labeled 'CREATE YOUR PARTNER SEARCH' on the right. A red arrow points to the 'CREATE YOUR PARTNER SEARCH' button, which is also circled in red. Below the navigation bar, the page title 'CREATE YOUR Partner Search' is displayed. The main content area contains the following text:

To apply for a **MINE.THE.GAP open call**, applicants should build a consortium of two or three project partners that come from different sector and from different countries.

Create here your company profile and describe the expertise you offer to your MINE.THE.GAP partners. You will then appear in the matchmaking space and other companies can contact you!

The form below contains the following fields:

- Title of your offer ***: A text input field with the placeholder text 'Your title offer'.
- Your sector ***: A dropdown menu with the placeholder text 'Choose your sector' and a downward arrow.
- Company name ***: A text input field with the placeholder text 'Your company name'.

STEP 6

You can manage your account data in the menu tab with your username. You can:

- Edit your published partner searches by updating information or deleting them
- Change your user information
- Change your password

These options are always available to keep your profile updated.

FIGURE A1.8 – MANAGE YOUR ACCOUNT

The screenshot shows the MineTheGap dashboard. At the top right, there is a user profile menu with a green circle containing the letter 'M' and the text 'MINETHEGAP'. A red arrow points to this menu. Below the menu, the text 'MATCHMAKING' and 'CREATE YOUR PARTNER SEARCH' is visible. In the center of the dashboard, there is a red arrow pointing to the text 'Update your partner searches'. Below this, there is a section titled 'MineTheGap's Dashboard' with the text 'You have created 4 (Open calls)'. A table lists four partner searches with their titles, statuses, and options. Below the table, there is a section titled 'Here you can edit your profile.' with two input fields for 'First Name*' and 'Last Name*'. A red arrow points to the 'First Name*' field with the text 'Update your account info'.

Title	Status	Options
Cluster IDIA answers questions about MINE.THE.GAP	Live	Edit Delete
Solutions in circular economy	Live	Edit Delete
Digital tools to save resources	Live	Edit Delete
Apply advanced manufacturing techniques to material processing	Live	Edit Delete

Update your account info



THE
CONSORTIUM



European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 873149

Topic:
H2020-
INNOSUP-
01-2018-
2020