

# **DATABASE PROCESS MANUAL**

## *Deliverable 1.2*



Horizon 2020

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### Intermin project partners

 Instituto Geológico y Minero de España	INSTITUTO GEOLÓGICO Y MINERO DE ESPAÑA	IGME	ES
 EUROGEO SURVEYS European Geosciences for Society The Geological Surveys of Europe	EUROGEO SURVEYS	EGS	BE
 brgm	BUREAU DE RECHERCHES GEOLOGIQUES ET MINIERES	BRGM	FR
 ASGMI Asociación de Servicios de Geología y Minería Iberoamericanos	ASOCIACIÓN DE SERVICIOS DE GEOLOGÍA Y MINERÍA IBEROAMERICANOS	ASGMI	ES
 LPRC LA PALMA RESEARCH CENTRE	LA PALMA RESEARCH CENTRE FOR FUTURE STUDIES SL	LPRC	ES
 UNIVERSIDAD POLITÉCNICA DE MADRID	UNIVERSIDAD POLITÉCNICA DE MADRID	UPM	ES
 FEDERATION EUROPEENNE DES GEOLOGUES	FEDERATION EUROPEENNE DES GEOLOGUES	EFG	FR
 MONTAN UNIVERSITÄT	MONTANUNIVERSITÄT LEOBEN	MUL	AT
 CCOP COORDINATING COMMITTEE FOR GEOSCIENCE PROGRAMMES IN EAST AND SOUTHEAST ASIA	COORDINATING COMMITTEE FOR GEOSCIENCE PROGRAMMES IN EAST AND SOUTHEAST ASIA	CCOP	TH
 AGI american geosciences institute connecting earth, science, and people	AMERICAN GEOLOGICAL INSTITUTE	AGI	US
 THE UNIVERSITY OF QUEENSLAND AUSTRALIA	THE UNIVERSITY OF QUEENSLAND	UQ	AU
 YES Network	YOUNG EARTH SCIENTISTS NETWORK	YES	BE
 SVENSKA SVERIGES GEOLOGISKA UNDERSÖKNING	SVERIGES GEOLOGISKA UNDERSÖKNING	SGU	SE

## **SUMMARY**

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# 1. INTRODUCTION - DATABASE AND COLLECTION OF DATA

WP1 of the Intermin project followed several goals. After a proper definition of training and education – relevant terms as used in the context of this project (e.g. skills, knowledge, learning outcomes, ...) a database should be established collecting a wide range of information about currently available raw materials education programmes world-wide, but with a special focus on the European Union. This information shall be made available internally for the project partners to build their concepts based on real data but also for the general public. The goal was to generate a web-platform including geographical information and relevant information about the programmes. Whilst the first task was reported in D1.1, this report explains the procedure of gathering and evaluating the data.

## 1.1 Collection of data

According to our estimations the world offers roughly 600 different departments /institutions with geoscientific and mining programmes. Our goal was to get as much information about these programmes as possible. Information should be in line with the key definitions of D1.1, in order to enable proper evaluation of the information.

The problems associated to this very comprehensive goals are as follows: 1) Most of them won't have proper websites, or at least websites which are not translated into English, Spanish or other languages available in the consortium; 2) Outsiders to the respective programmes will face significant problems interpreting the contents of the curricula and providing the "right" information for our database. Therefore, we decided to create an online survey asking for the relevant information. By generating and sending an online survey we could very easily spread information about the survey and collect relevant information, also from institutions and people we were not aware of. The survey was sent out to relevant contacts of all consortium members, members of professional organisations like Society of Mining Professors (SOMP), Society of Mining Metallurgy and Exploration (SME) and others, and was distributed through social networks LinkedIn and Twitter and the Intermin homepage.

The survey was programmed in a tool called “Limesurvey” (<https://www.limesurvey.org/>). The structure of the survey very much followed the structure of the “skills catalogue” from D1.1. Additional demographic data asked for the achievable degrees, teaching languages, websites, hierarchical rank of the respondent, name and e-mail (the latter data is for quality control only. The information will not be publically disclosed and will be deleted once the results are finally evaluated). The survey will be online until September 2019 and open for additional input (<https://intermin.limequery.com/324595?lang=en>). A printable version of the survey can be found in the Annex.

## 1.2 Responses and evaluation of data

Up to the 26<sup>th</sup> of February 2019 we could acquire 215 full responses from 92 countries. Although it is not yet inclusive, it is in the order of magnitude of answers to be expected. Fig. 1 demonstrates that answers have come from almost the entire world, with some gaps in Africa, however.



*Fig. 1: World map representing all countries with responses to the questionnaire*

The data has been evaluated manually and integrity of data has been checked. Where necessary email-addresses have been used to contact the respondent clarifying open points.

The only way to export data from the online survey tool is as a table. Either for MS Excel®, txt. or tab-separated. Each respondent is listed as a separate line, with the answers in columns. Answers to specific questions are listed as text, answers to check boxes are listed as either “Yes”, “No, or “N/A”. This excel file is part of D1.3. It is uploaded as “SurveyResults.xlsx” to the repository. However, D1.3 should also provide a searchable web-interface displaying all the relevant results of the survey to the general public. The following procedure was applied to display the data:

- 1) Data was prepared and extracts for different sub-categories (language, programme, skills, SubAreas, Teaching areas) were prepared (.hyper-files). The workflow in Tableau prep is shown in Fig. 2.

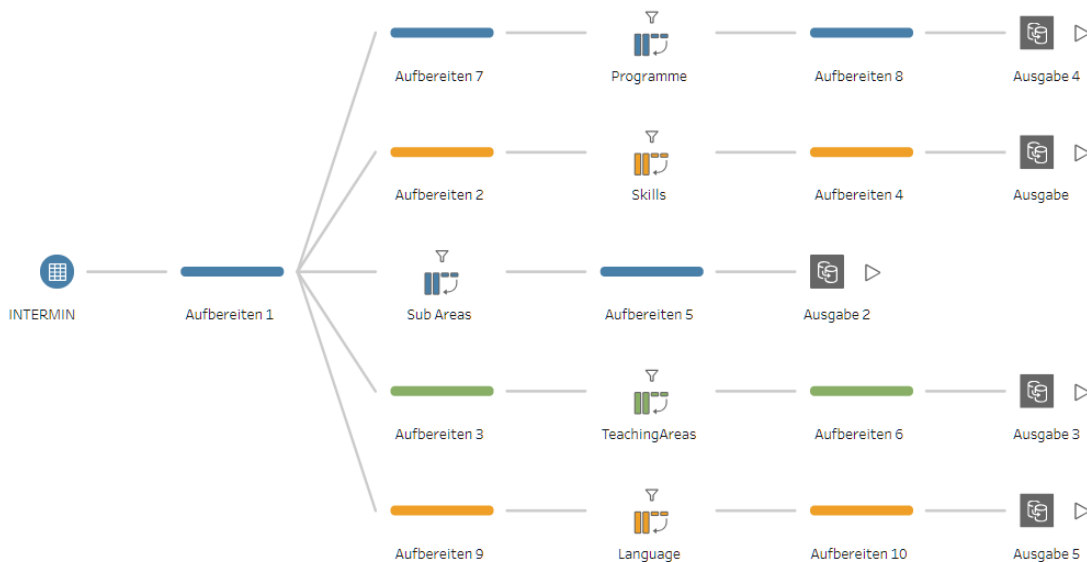


Fig. 2: Workflow in Tableau Prep as used for creating extracts for further data-processing.

- 2) The extracts were uploaded into Tableau Desktop software, where different evaluations and display possibilities have been generated.
- 3) These worksheets have been compiled to a Tableau Dashboard including sub-fields for the name of the programme, Teaching Areas, Sub Areas, Skills, Teaching Languages, and the maps. Data in this dashboard are interlinked and allow for comprehensive evaluation and analysis of the information one wants to look at. E.g. by clicking on a country either in the map or in any of the text-fields all universities, their languages, programmes etc. will be highlighted. This dashboard looks as shown in Fig. 3.



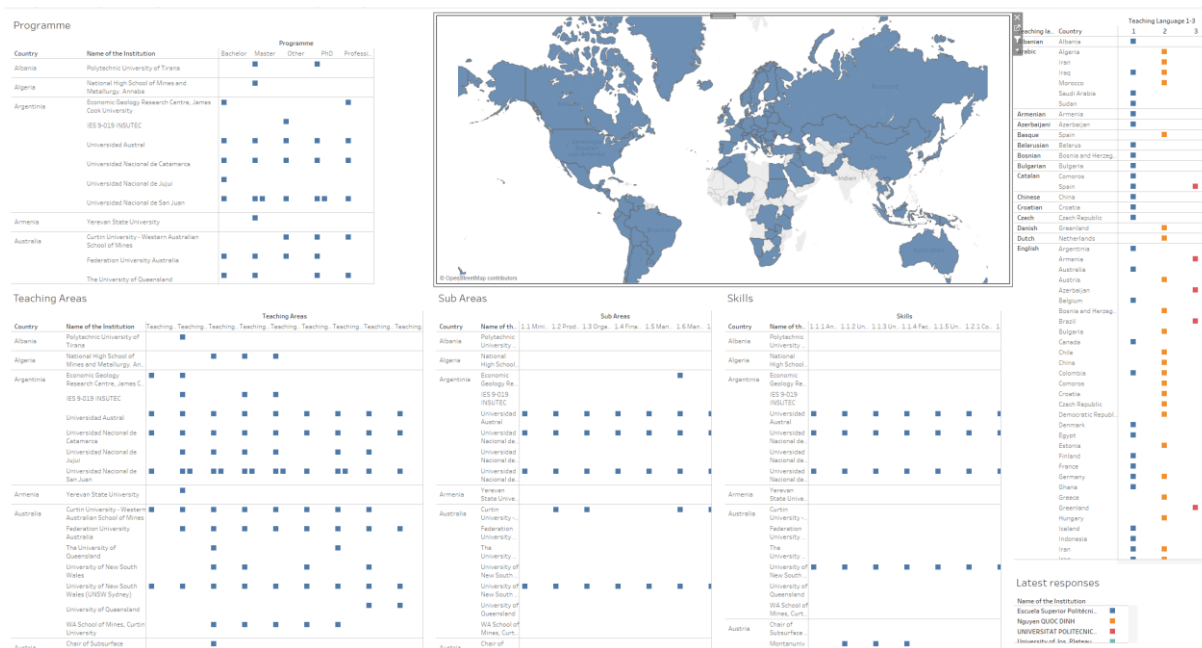


Fig. 3: Overview of the Tableau Dashbord used for data visualisation.

4) The dashboard can be uploaded to Tableau Public®, an online repository of the analysis. The repository is currently linked to the personal account of Philipp Hartlieb (Montanuniversitaet Leoben). In future other ways of saving the data will be discussed and evaluated. Due to the ease of use and having a first glimpse at the information we have used Tableau in this first step. This repository offers an URL that can be used in any homepage. We embedded this code into the intermin-homepage, where the general public can access this dashboard and search for relevant information or study programmes online. This is the link: <http://interminproject.org/preliminary-survey-results/> (= also D1.3)

All files necessary for the evaluation are uploaded to Intermin Intranet for further use by the project partners. The following files are included:

- SurveyResults.xlsx. Raw Data from the survey
- InterminIndividual.tfl Tableau Prep file using the raw data and generating the .hyper-files
- Programme.hyper, Skills.hyper, SubAreas.hyper, TeachingAreas.hyper, TeachingLanguage.hyper used for processing in
- InterminSurveyIndividual.twb Tableau Analysis file making use of the hyper-files

Demographic data, which might contain sensitive information was excluded from these files.

## **2. ANNEX 1 – PRINTABLE VERSION OF THE SURVEY**

# INTERMIN

The H2020-Project INTERMIN commenced in February 2018. Its goal is to create a feasible, long-lasting international network of technical and vocational training centres for mineral raw materials' professionals. This survey will help us compiling a database of existing raw-materials related education programmes. We want to know which topical areas you teach and what essential skills your graduates acquire. Therefore we prepared a list of pre-defined "teaching areas" (e.g. mining methods) "teaching sub-areas" (e.g. underground mining) and "skills/knowledge" (e.g. designs stopes). We know that the list will not be comprehensive or that there will always be exceptions, but are sure that most of the essential topics are represented.

We rely on your feedback and ask you to supply information about the study programme(s) you are personally responsible for / affiliated with at your institution. Please do not answer for the entire university but only for your discipline. This will a) ease your workload and b) increase the precision of answers.

For more information please see our homepage at [www.interminproject.org](http://www.interminproject.org) (<http://www.interminproject.org>), or follow us on LinkedIn <https://www.linkedin.com/in/interminproject/> (<https://www.linkedin.com/in/interminproject/>) or twitter <https://twitter.com/interminproject> (<https://twitter.com/interminproject>)

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Thank you very much for taking the time for answering this questionnaire. It will take approx. 10-15 minutes and we highly appreciate your effort.

Sincerely,

The Intermin-Team

There are 77 questions in this survey.

## About Yourself

\*

## About Your Institution

Highest achievable degree & the name of the study programme(s) you are representing within your institution. Devide multiple programmes by commas (e.g Raw Materials Engineering, Applied Geosciences, ...)

❗ Comment only when you choose an answer.

Please choose all that apply and provide a comment:

Bachelor

Master

PhD

Professional part-time course / professional development

Other:

Teaching languages

## Country \*

❗ Choose one of the following answers

Please choose **only one** of the following:

- Afghanistan
- Albania
- Algeria
- Andorra
- Angola
- Antigua and Barbuda
- Argentina
- Armenia
- Australia
- Austria
- Azerbaijan
- Bahamas
- Bahrain
- Bangladesh
- Barbados
- Belarus
- Belgium
- Belize
- Benin
- Bhutan
- Bolivia
- Bosnia and Herzegovina
- Botswana
- Brazil
- Brunei
- Bulgaria
- Burkina Faso
- Burundi
- Cabo Verde
- Cambodia
- Cameroon

- Canada
- Central African Republic (CAR)
- Chad
- Chile
- China
- Colombia
- Comoros
- Democratic Republic of the Congo
- Republic of the Congo
- Costa Rica
- Cote d'Ivoire
- Croatia
- Cuba
- Cyprus
- Czech Republic
- Denmark
- Djibouti
- Dominica
- Dominican Republic
- Ecuador
- Egypt
- El Salvador
- Equatorial Guinea
- Eritrea
- Estonia
- Eswatini (formerly Swaziland)
- Ethiopia
- Fiji
- Finland
- France
- Gabon
- Gambia
- Georgia
- Germany
- Ghana

- Greece
- Grenada
- Guatemala
- Guinea
- Guinea-Bissau
- Guyana
- Haiti
- Honduras
- Hungary
- Iceland
- India
- Indonesia
- Iran
- Iraq
- Ireland
- Israel
- Italy
- Jamaica
- Japan
- Jordan
- Kazakhstan
- Kenya
- Kiribati
- Kosovo
- Kuwait
- Kyrgyzstan
- Laos
- Latvia
- Lebanon
- Lesotho
- Liberia
- Libya
- Liechtenstein
- Lithuania
- Luxembourg

- Macedonia
- Madagascar
- Malawi
- Malaysia
- Maldives
- Mali
- Malta
- Marshall Islands
- Mauritania
- Mauritius
- Mexico
- Micronesia
- Moldova
- Monaco
- Mongolia
- Montenegro
- Morocco
- Mozambique
- Myanmar (formerly Burma)
- Namibia
- Nauru
- Nepal
- Netherlands
- New Zealand
- Nicaragua
- Niger
- Nigeria
- North Korea
- Norway
- Oman
- Pakistan
- Palau
- Palestine
- Panama
- Papua New Guinea



- Paraguay
- Peru
- Philippines
- Poland
- Portugal
- Qatar
- Romania
- Russia
- Rwanda
- Saint Kitts and Nevis
- Saint Lucia
- Saint Vincent and the Grenadines
- Samoa
- San Marino
- Sao Tome and Principe
- Saudi Arabia
- Senegal
- Serbia
- Seychelles
- Sierra Leone
- Singapore
- Slovakia
- Slovenia
- Solomon Islands
- Somalia
- South Africa
- South Korea
- South Sudan
- Spain
- Sri Lanka
- Sudan
- Suriname
- Swaziland (renamed to Eswatini)
- Sweden
- Switzerland

- Syria
- Taiwan
- Tajikistan
- Tanzania
- Thailand
- Timor-Leste
- Togo
- Tonga
- Trinidad and Tobago
- Tunisia
- Turkey
- Turkmenistan
- Tuvalu
- Uganda
- Ukraine
- United Arab Emirates (UAE)
- United Kingdom (UK)
- United States of America (USA)
- Uruguay
- Uzbekistan
- Vanuatu
- Vatican City (Holy See)
- Venezuela
- Vietnam
- Yemen
- Zambia
- Zimbabwe

## Your role at the Institution \*

🗨️ Choose one of the following answers

Please choose **only one** of the following:

- Professor / Head of Department or Institute
- Scientific Staff / Research Staff
- Administration
- Student
- External

## Please choose appropriate teaching areas representing your study programme(s)

\*

🗨️ Check all that apply

Please choose **all** that apply:

- Business Management
- Geology
- Exploration
- Resources and reserves
- Mining geomechanics and technical mine design
- Mining methods
- Mining equipment and systems
- Mining services
- Mineral production and processing
- Generic, health and social tasks
- Social Performance

## SUB-AREA

### 1. Business Management \*

Only answer this question if the following conditions are met:

Answer was 'Business Management' at question '7 [TeachingArea]' (Please choose appropriate teaching areas representing your study programme(s) )

🚫 Check all that apply

Please choose **all** that apply:

- 1.1 Mining in a global environment
- 1.2 Production analysis and mine optimisation
- 1.3 Organisational structures
- 1.4 Financial operations and production costs
- 1.5 Managing mining operations – Monitoring and compliance
- 1.6 Management
- 1.7 Risk management

## *Skills / Knowledge*

### *1.1 Mining in a global environment*

Only answer this question if the following conditions are met:

Answer was at question '8 [BusinessManagement]' (SUB-AREA 1. Business Management)

🚫 Check all that apply

Please choose **all** that apply:

- 1.1.1 *Analyses the market to predict future demand/supply trends.*
- 1.1.2 *Understands mine economics and the minerals market and their influence on mining systems*
- 1.1.3 *Understands the impacts of commodity price fluctuations*
- 1.1.4 *Facilitates the implementation of environmental, engineering, mining and social best practices*
- 1.1.5 *Understands and applies the 'license to operate' philosophy*

## Skills / Knowledge

### 1.2 Production analysis and mine optimisation

Only answer this question if the following conditions are met:

Answer was at question '8 [BusinessManagement]' (SUB-AREA 1. Business Management)

🚫 Check all that apply

Please choose **all** that apply:

- 1.2.1 Completes first-principles cost modelling
- 1.2.2 Understands and applies business analysis techniques (e.g. 6 sigma, Lean Processes)
- 1.2.3 Conducts simple financial analyses for optimisation projects
- 1.2.4 Undertakes accurate and reliable cost benefit analyses
- 1.2.5 Understands the basic KPI's used in mining (e.g. \$ /oz etc.)

## Skills / Knowledge

### 1.3 Organisational structures

Only answer this question if the following conditions are met:

Answer was at question '8 [BusinessManagement]' (SUB-AREA 1. Business Management)

🚫 Check all that apply

Please choose **all** that apply:

- 1.3.1 Understands the organisational, hierarchy and information flows for typical mining businesses and operations

## Skills / Knowledge

### 1.4 Financial Operations and production costs

Only answer this question if the following conditions are met:

Answer was at question '8 [BusinessManagement]' (SUB-AREA 1. Business Management)

🚫 Check all that apply

Please choose **all** that apply:

- 1.4.1 Understands business development principles applicable to the mining industry
- 1.4.2 Interrogates and interprets financial statements
- 1.4.3 Uses financial models and Analyses financial data. Forecasts cash flows
- 1.4.4 Identifies the significant cost areas related to the operation
- 1.4.5 Delivers cost/benefit analyses

## Skills / Knowledge

### 1.5 Managing mining operations - Monitoring and compliance

Only answer this question if the following conditions are met:

Answer was at question '8 [BusinessManagement]' (SUB-AREA 1. Business Management)

🚫 Check all that apply

Please choose **all** that apply:

- 1.5.1 Reviews planned operations
- 1.5.2 Oversees the implementation of plans and risk management
- 1.5.3 Reports outcomes to senior management and defines objectives
- 1.5.4 Reports outcomes and recommendations to relevant stakeholders

## Skills / Knowledge

### 1.6 Management

Only answer this question if the following conditions are met:

Answer was at question '8 [BusinessManagement]' (SUB-AREA 1. Business Management)

🚫 Check all that apply

Please choose **all** that apply:

- 1.6.1 Manages the business, managerial capacities
- 1.6.2 Manages change and risk, adapts to new situations
- 1.6.3 Manages projects, organisations and teams. Leadership
- 1.6.4 Prepare and manages budgets and assets. Allocate resources
- 1.6.5 Manages contracts, contractors and consultants

## Skills / Knowledge

### 1.7 Risk management

Only answer this question if the following conditions are met:

Answer was at question '8 [BusinessManagement]' (SUB-AREA 1. Business Management)

🚫 Check all that apply

Please choose **all** that apply:

- 1.7.1 Develops and implements risk management strategies and plans
- 1.7.2 Monitors and reviews the effectiveness of risk management strategies and plans

## SUB-AREA

### 2. Geology, Exploration, Resources and reserves \*

Only answer this question if the following conditions are met:

Answer was at question '7 [TeachingArea]' (Please choose appropriate teaching areas representing your study programme(s) )

📌 Check all that apply

Please choose **all** that apply:

- 2.1 General Geology / Geography
- 2.2 Applied Geology
- 2.3 Exploration and sampling
- 2.4 Mineral deposit modelling
- 2.5 Mine feasibility studies

## *Skills / Knowledge*

### *2.1 General Geology / Geography*

Only answer this question if the following conditions are met:

Answer was at question '16 [GeologyExploration]' (SUB-AREA 2. Geology, Exploration, Resources and reserves)

📌 Check all that apply

Please choose **all** that apply:

- 2.1.1 *Understands the basic principles of geology, deposit formation, geological controls and structures*
- 2.1.2 *Reviews and interprets geological maps*
- 2.1.3 *Understand and apply fundamentals of stratigraphy, sedimentology, geomorphology and structural geology, relationship to subsurface geology*
- 2.1.4 *Identify basic rock-forming minerals and rocks in the field, in hand sample and in thin section, including economic minerals*
- 2.1.5 *Use standard GIS software (ArcGIS or similar) to display and interpret geographic and geologic data*
- 2.1.6 *Recognize different tectonic environments*
- 2.1.7 *Recognize different types of natural hazards and zonation*
- 2.1.8 *Analytical chemistry with regards to various geological sampling techniques and how to apply these concepts to real world problem aired by others.*
- 2.1.9 *Geographic resource interpretation skills*

## Skills / Knowledge

### 2.2 Applied Geology

Only answer this question if the following conditions are met:

Answer was at question '16 [GeologyExploration]' (SUB-AREA 2. Geology, Exploration, Resources and reserves)

🚫 Check all that apply

Please choose **all** that apply:

- 2.2.1 *Collect, store and analyse data using adequate field and laboratory techniques. Demonstrate basic field and laboratory safety techniques*
- 2.2.2 *Process, prepare and interpretation and presentation of data using quantitative and qualitative techniques, as well as the adequate software.*
- 2.2.3 *Elaboration and interpretation, topographic, geological and thematic and engineering maps*
- 2.2.4 *Recognize different ore deposits models*

## Skills / Knowledge

### 2.3 Exploration and sampling

Only answer this question if the following conditions are met:

Answer was at question '16 [GeologyExploration]' (SUB-AREA 2. Geology, Exploration, Resources and reserves)

🚫 Check all that apply

Please choose **all** that apply:

- 2.3.1 *Design, plans and manages sampling programmes (e.g. grade control, processing)*
- 2.3.2 *Interprets and understand drilling and core logging*
- 2.3.3 *Understand drillings methods for mining exploration*



## Skills / Knowledge

### 2.4 Mineral deposit modelling

Only answer this question if the following conditions are met:

Answer was at question '16 [GeologyExploration]' (SUB-AREA 2. Geology, Exploration, Resources and reserves)

🗨 Check all that apply

Please choose **all** that apply:

- 2.4.1 Creates block models and estimates resources. Interrogates resource models to generate inputs for mine planning
- 2.4.2 Estimates yield/cut-off grade for resources
- 2.4.3 Demonstrates a knowledge of the JORC Code and other standards for resource classification requirements for reporting resources
- 2.4.4 Estimates reserves from a mining model (and interpretation)
- 2.4.5 Demonstrates an understanding of grade reconciliation, ore dilution and ore loss

## Skills / Knowledge

### 2.5 Mine feasibility study

Only answer this question if the following conditions are met:

Answer was at question '16 [GeologyExploration]' (SUB-AREA 2. Geology, Exploration, Resources and reserves)

🗨 Check all that apply

Please choose **all** that apply:

- 2.5.1 Prepares the required inputs for an economic evaluation of a mine (e.g. personnel, equipment etc.)
- 2.5.2 Provides input into feasibility studies
- 2.5.3 Develops production schedules. Prepares cost estimates for feasibility studies
- 2.5.4 Conducts sensitivity analyses recognising the geological, technical, financial, social and political uncertainties in mining operations

## SUB-AREA

### 3. Mining geomechanics and technical mine design \*

Only answer this question if the following conditions are met:

Answer was at question '7 [TeachingArea]' (Please choose appropriate teaching areas representing your study programme(s) )

📌 Check all that apply

Please choose **all** that apply:

- 3.1 Modelling, analysis and design
- 3.2 Implementing designs and plans
- 3.3 Integrated mine design
- 3.4 Mine rehabilitation and closure
- 3.5 Monitoring ground stability
- 3.6 Drilling, blasting and rock cutting  
Explosives

## *Skills / Knowledge*

### *3.1 Modelling, analysis and design*

Only answer this question if the following conditions are met:

**MiningGeomechanics\_SQ002 (/admin/questions/sa/view/surveyid/324595/gid/32/qid/2630) == "Y"**

📌 Check all that apply

Please choose **all** that apply:

- 3.1.1 *Reviews engineering geology and geotechnical data (including Identifies hazards and modes of failure*
- 3.1.2 *Designs testing programmes for geotechnical studies. Undertake geotechnical testing*
- 3.1.3 *Conducts rock mass and soil classifications*
- 3.1.4 *Understands rock and soil characteristics and identifies failure indications, fundamentals of rock mechanics*
- 3.1.5 *Conducts mine geotechnical mapping*
- 3.1.6 *Incorporates geology and geomechanic information when selecting mining methods*
- 3.1.7 *Provides input on geotechnical issues that influence drill and blast designs*
- 3.1.8 *Designs ground support and stope stability plans (e.g. underground, coal, hard rock)*

## Skills / Knowledge

### 3.2 Implementing designs and plans

Only answer this question if the following conditions are met:

Answer was at question '22 [MiningGeomechanics]' (SUB-AREA 3. Mining geomechanics and technical mine design)

🚫 Check all that apply

Please choose **all** that apply:

- 3.2.1 Procures and installs (or supervises the installation of) ground support
- 3.2.2 Assesses risk and implements controls and associated monitoring

## Skills / Knowledge

### 3.3 Integrated mine design

Only answer this question if the following conditions are met:

Answer was at question '22 [MiningGeomechanics]' (SUB-AREA 3. Mining geomechanics and technical mine design)

🚫 Check all that apply

Please choose **all** that apply:

- 3.3.1 Recommends methods, equipment and processes
- 3.3.2 Develops initial design
- 3.3.3 Uses simulation and other techniques to optimise designs
- 3.3.4 Monitors implementation of mine design

## Skills / Knowledge

### 3.4 Mine rehabilitation and closure

Only answer this question if the following conditions are met:

Answer was at question '22 [MiningGeomechanics]' (SUB-AREA 3. Mining geomechanics and technical mine design)

🚫 Check all that apply

Please choose **all** that apply:

- 3.4.1 Establishes project and evaluate plans
- 3.4.2 Develops mine rehabilitation and closure plans
- 3.4.3 Manages rehabilitation including monitoring and reporting processes

## Skills / Knowledge

### 3.5 Monitoring ground stability

Only answer this question if the following conditions are met:

Answer was at question '22 [MiningGeomechanics]' (SUB-AREA 3. Mining geomechanics and technical mine design)

🚫 Check all that apply

Please choose **all** that apply:

- 3.5.1 Oversees the implementation of plans
- 3.5.2 Knowledge of how to reviews progress against plans and take measures accordingly

## Skills / Knowledge

### 3.6 Drilling, blasting and rock cutting

#### Explosives

Only answer this question if the following conditions are met:

Answer was at question '22 [MiningGeomechanics]' (SUB-AREA 3. Mining geomechanics and technical mine design)

🚫 Check all that apply

Please choose **all** that apply:

- 3.6.1 Design, operation and maintenance of explosive production plants
- 3.6.2 Designs drill and blast patterns (e.g. spacing, burden, charge, fragmentation)
- 3.6.3 Controls fragmentation size by blasting
- 3.6.4 Understands and applies knowledge and experience of production drilling operations and equipment
- 3.6.5 Determines the most suitable drill and blast techniques to achieve desired outcomes
- 3.6.6 Understands and uses drill and blast software
- 3.6.7 Identifies hazards, assesses risk and implements suitable controls

## SUB-AREA

### 4. Mining methods \*

Only answer this question if the following conditions are met:

Answer was at question '7 [TeachingArea]' (Please choose appropriate teaching areas representing your study programme(s) )

🚫 Check all that apply

Please choose **all** that apply:

- 4.1 General mining methods
- 4.2 Surface mining methods
- 4.3 Underground mining methods
- 4.4 Fill systems
- 4.5 Reclamation

## *Skills / Knowledge*

### *4.1 General mining methods*

Only answer this question if the following conditions are met:

Answer was at question '29 [Miningmethods]' (SUB-AREA 4. Mining methods)

🚫 Check all that apply

Please choose **all** that apply:

- 4.1.1 *General knowledge of mining methods and operations*
- 4.1.2 *Comprehends 3D mine plans*
- 4.1.3 *Understands the importance of cycle time and its impact on mine productivity*
- 4.1.4 *Understands how the planning, geology and mine operations teams work together*

## Skills / Knowledge

### 4.2 Surface mining methods

Only answer this question if the following conditions are met:

Answer was at question '29 [Miningmethods]' (SUB-AREA 4. Mining methods)

🚫 Check all that apply

Please choose **all** that apply:

- 4.2.1 Understands the design methods and standards used in pit, ramp and dump design
- 4.2.2 Calculates basic pit/dump designs and overall pit wall angles for given design parameters
- 4.2.3 Designs truck and shovel excavations
- 4.2.4 Develops airborne dust management plans
- 4.2.5 Optimises open pit design (e.g. Whittle)

## Skills / Knowledge

### 4.3 Underground mining methods

Only answer this question if the following conditions are met:

Answer was at question '29 [Miningmethods]' (SUB-AREA 4. Mining methods)

🚫 Check all that apply

Please choose **all** that apply:

- 4.3.1 Selects a mine stope and method system for a generic ore body
- 4.3.2 Know wood timbering techniques (small scale mining and temporary openings)
- 4.3.3 Designs stope, roof and galleries support
- 4.3.4 Conducts underground testing of support elements

## Skills / Knowledge

### 4.4 Fill systems

Only answer this question if the following conditions are met:

Answer was at question '29 [Miningmethods]' (SUB-AREA 4. Mining methods)

🚫 Check all that apply

Please choose **all** that apply:

- 4.4.1 Knowledge of how to design mine backfilling systems, including delivery and quality requirements

## *Skills / Knowledge*

### *4.5 Reclamation*

Only answer this question if the following conditions are met:

Answer was at question '29 [Miningmethods]' (SUB-AREA 4. Mining methods)

🚫 Check all that apply

Please choose **all** that apply:

4.5.1 *Demonstrates a detailed knowledge of the reclamation process. Designs tailings disposal facilities*

4.5.2 *Management of residues and effluents: collect, store and reuse*

## **SUB-AREA**

### **5. Mining equipment and systems \***

Only answer this question if the following conditions are met:

Answer was at question '7 [TeachingArea]' (Please choose appropriate teaching areas representing your study programme(s) )

🚫 Check all that apply

Please choose **all** that apply:

5.1 General Mining equipment and systems

5.2 Electrical systems

5.3 Loading systems

5.4 Haulage systems

5.5 Mining software

## Skills / Knowledge

### 5.1 General Mining equipment and systems

Only answer this question if the following conditions are met:

Answer was at question '35 [Miningequipment]' (SUB-AREA 5. Mining equipment and systems)

🔔 Check all that apply

Please choose **all** that apply:

5.1.1 Uses key factors to select suitable mining machines (e.g. operational characteristics, costs, productivity, and performance)

5.1.2 Uses maintenance tactics to plan maintenance schedules

5.1.3 Evaluates the performance of mining equipment and machines, including to inform scheduling. Monitors equipment delays

## Skills / Knowledge

### 5.2 Electrical systems

Only answer this question if the following conditions are met:

Answer was at question '35 [Miningequipment]' (SUB-AREA 5. Mining equipment and systems)

🔔 Check all that apply

Please choose **all** that apply:

5.2.1 Design electrification projects in mines

## Skills / Knowledge

### 5.3 Loading systems

Only answer this question if the following conditions are met:

Answer was at question '35 [Miningequipment]' (SUB-AREA 5. Mining equipment and systems)

🔔 Check all that apply

Please choose **all** that apply:

5.3.1 Understands the characteristics of loading equipment and operations

5.3.2 Designs dragline excavations and spoil piles



## Skills / Knowledge

### 5.4 Haulage systems

Only answer this question if the following conditions are met:

Answer was at question '35 [Miningequipment]' (SUB-AREA 5. Mining equipment and systems)

📌 Check all that apply

Please choose **all** that apply:

- 5.4.1 Designs roads and haul roads with correct cambers, drainage, traffic consideration etc.
- 5.4.2 Prepares haulage and trucking plans
- 5.4.3 Designs, exports and analyses haulage models
- 5.4.4 Designs and develops schedule plans for continuous haulage systems (e.g. conveyor systems)
- 5.4.5 Designs efficient mine winder systems. Winch and shafts

## Skills / Knowledge

### 5.5 Mining software

Only answer this question if the following conditions are met:

Answer was at question '35 [Miningequipment]' (SUB-AREA 5. Mining equipment and systems)

📌 Check all that apply

Please choose **all** that apply:

- 5.5.1 Demonstrates proficiency in using at least one mining software package (e.g. VULCAN, DESWIK, XPAC)
- 5.5.2 GIS knowledge
- 5.5.3 Demonstrates proficiency in using 2D CAD software
- 5.5.4 Demonstrates proficiency in using 3D CAD software

## SUB-AREA

### 6. Mining services \*

Only answer this question if the following conditions are met:

Answer was at question '7 [TeachingArea]' (Please choose appropriate teaching areas representing your study programme(s) )

🚫 Check all that apply

Please choose **all** that apply:

- 6.1 General services and planning
- 6.2 Dewatering and Mine drainage and storage systems
- 6.3 Water treatment
- 6.4 Ventilation
- 6.5 Power supply systems
- 6.6 Communications systems
- 6.7 Surveying

## *Skills / Knowledge*

### *6.1 General services and planning*

Only answer this question if the following conditions are met:

Answer was at question '41 [MiningServices]' (SUB-AREA 6. Mining services)

🚫 Check all that apply

Please choose **all** that apply:

- 6.1.1 *Measurements, site planning, management and follow-up of engineering projects.*
- 6.1.2 *Earth movement control*
- 6.1.3 *Design of hydraulic and pneumatic systems applied to mining*

## Skills / Knowledge

### 6.2 Dewatering and Mine drainage and storage systems

Only answer this question if the following conditions are met:

Answer was at question '41 [MiningServices]' (SUB-AREA 6. Mining services)

🚫 Check all that apply

Please choose **all** that apply:

- 6.2.1 Designs dewatering systems for open pit and underground mines: inflow risks and aquifer interferences
- 6.2.2 Calculates water pumping capacity and pumping strategies
- 6.2.3 Designs storm water management systems for open pit mines
- 6.2.4 Designs dam spillways and discharge strategies

## Skills / Knowledge

### 6.3 Water treatment

Only answer this question if the following conditions are met:

Answer was at question '41 [MiningServices]' (SUB-AREA 6. Mining services)

🚫 Check all that apply

Please choose **all** that apply:

- 6.3.1 Calculates the water balance for a site, including tailings dams
- 6.3.2 Undertakes surveys and monitoring of water quality
- 6.3.3 Designs water treatment systems to achieve discharge requirements

## Skills / Knowledge

### 6.4 Ventilation

Only answer this question if the following conditions are met:

Answer was at question '41 [MiningServices]' (SUB-AREA 6. Mining services)

🚫 Check all that apply

Please choose **all** that apply:

- 6.4.1 Understands and applies the key principles to mitigate air pollution and toxic gas concentrations in underground mining
- 6.4.2 Uses ventilation software to model ventilation systems
- 6.4.3 Designs efficient ventilation systems for underground mine designs

## *Skills / Knowledge*

### *6.5 Power supply systems*

Only answer this question if the following conditions are met:

Answer was at question '41 [MiningServices]' (SUB-AREA 6. Mining services)

🚫 Check all that apply

Please choose **all** that apply:

6.5.1 Assists with the design of power reticulation systems

## *Skills / Knowledge*

### *6.6 Communication systems*

Only answer this question if the following conditions are met:

Answer was at question '41 [MiningServices]' (SUB-AREA 6. Mining services)

🚫 Check all that apply

Please choose **all** that apply:

6.6.1 Designs communication systems for Autonomous Mining systems

## *Skills / Knowledge*

### *6.7 Surveying*

Only answer this question if the following conditions are met:

Answer was at question '41 [MiningServices]' (SUB-AREA 6. Mining services)

🚫 Check all that apply

Please choose **all** that apply:

6.7.1 Undertakes basic mine surveys

6.7.2 Interprets survey data, plans, maps and photos

6.7.3 Manages surveying operations

## SUB-AREA

### 7. Mineral production and processing

\*

Only answer this question if the following conditions are met:

Answer was at question '7 [TeachingArea]' (Please choose appropriate teaching areas representing your study programme(s) )

🔔 Check all that apply

Please choose **all** that apply:

- 7.1 Feed systems and planning
- 7.2 Grade control
- 7.3 Comminution and sizing
- 7.4 Concentrator processes
- 7.5 Further treatment
- 7.6 Recycling and secondary mineral raw materials. Circular Economy

### *Skills / Knowledge*

#### *7.1 Feed systems and planning*

Only answer this question if the following conditions are met:

Answer was at question '49 [MineralProduction]' (SUB-AREA 7. Mineral production and processing )

🔔 Check all that apply

Please choose **all** that apply:

- 7.1.1 *Understands mineral processing route and feed grade/quality controls*

### *Skills / Knowledge*

#### *7.2 Grade control*

Only answer this question if the following conditions are met:

Answer was at question '49 [MineralProduction]' (SUB-AREA 7. Mineral production and processing )

🔔 Check all that apply

Please choose **all** that apply:

- 7.2.1 *Applies the quality blending and sampling logic of a site. Understands the implications of marginal stockpiles*

## Skills / Knowledge

### 7.3 Comminution and sizing

Only answer this question if the following conditions are met:

Answer was at question '49 [MineralProduction]' (SUB-AREA 7. Mineral production and processing )

🗨 Check all that apply

Please choose **all** that apply:

7.3.1 Recognises the characteristics of different comminution and sizing equipment and their limitations

## Skills / Knowledge

### 7.4 Concentrator process

Only answer this question if the following conditions are met:

Answer was at question '49 [MineralProduction]' (SUB-AREA 7. Mineral production and processing )

🗨 Check all that apply

Please choose **all** that apply:

7.4.1 Understands and applies knowledge of process steps, applications and limitations

## Skills / Knowledge

### 7.5 Further treatment and marketing

Only answer this question if the following conditions are met:

Answer was at question '49 [MineralProduction]' (SUB-AREA 7. Mineral production and processing )

🗨 Check all that apply

Please choose **all** that apply:

7.5.1 Understands and interprets details of sales contracts (e.g. custom smelter requirements)

7.5.2 Application of thermal, mechanical, chemical processes to optimize material properties

7.5.3 Materials quality control

7.5.4 Design, operation and maintenance of processing and treatment plants for minerals, industrial rocks, dimensional stone and waste material

7.5.5 Design, operation and maintenance of metallurgical plants

## Skills / Knowledge

### 7.6 Recycling and secondary raw materials

Only answer this question if the following conditions are met:

Answer was at question '49 [MineralProduction]' (SUB-AREA 7. Mineral production and processing )

🔔 Check all that apply

Please choose **all** that apply:

- 7.6.1 Knowledge of quality assessment and certification. EU and international standards and labels
- 7.6.2 Capacity to design recycling plants
- 7.6.3 Knowledge on the supervision and or operating recycling plants
- 7.6.4 Ability to perform investigation and development in the field of new materials and new processes
- 7.6.5 General knowledge on the renewable sources of energy
- 7.6.6 Knowledge on the regulatory barriers for secondary raw materials
- 7.6.7 General knowledge of the principles of circular economy, climate change and the recycling market
- 7.6.8 Practical knowledge on waste management

## SUB-AREA

### 8. Generic, health and social tasks \*

Only answer this question if the following conditions are met:

Answer was at question '7 [TeachingArea]' (Please choose appropriate teaching areas representing your study programme(s) )

🔔 Check all that apply

Please choose **all** that apply:

- 8.1 Environment
- 8.2 Workplace health and safety
- 8.3 Communication
- 8.4 Creative thinking, problem solving and research
- 8.5 Sustainability
- 8.6 Self-management
- 8.7 Working with people

## Skills / Knowledge

### 8.1 Environment

Only answer this question if the following conditions are met:

Answer was at question '56 [GenericHealth]' (SUB-AREA 8. Generic, health and social tasks)

🚫 Check all that apply

Please choose **all** that apply:

8.1.1 Knowledge and management of environmental impact assessment studies

## Skills / Knowledge

### 8.2 Workplace health and safety

Only answer this question if the following conditions are met:

Answer was at question '56 [GenericHealth]' (SUB-AREA 8. Generic, health and social tasks)

🚫 Check all that apply

Please choose **all** that apply:

8.2.1 Develops and disseminates safe practice guidelines

## Skills / Knowledge

### 8.3 Communication

Only answer this question if the following conditions are met:

Answer was at question '56 [GenericHealth]' (SUB-AREA 8. Generic, health and social tasks)

🚫 Check all that apply

Please choose **all** that apply:

8.3.1 Communication in native language

8.3.2 Community relations

8.3.3 Knowledge of a foreign relevant-word wide spread language (English, Spanish, French, German, Chinese, etc.)

8.3.4 Using internet in a critical manner as communication tool and source of information

8.3.5 Know and describes Social Geology and Geopolitics

8.3.6 Listens and communicates effectively. Chairs meetings. Prepares documents and reports

8.3.7 Promotes company, industry and profession

8.3.8 Ability to communicate Earth Science issues with the wider society



## Skills / Knowledge

### 8.4 Creative thinking, problem solving and research

Only answer this question if the following conditions are met:

Answer was at question '56 [GenericHealth]' (SUB-AREA 8. Generic, health and social tasks)

🚫 Check all that apply

Please choose **all** that apply:

- 8.4.1 Identifies, scopes and solves problems
- 8.4.2 Uses conceptual, critical, strategic and systems thinking skills
- 8.4.3 Researches new products, technologies and processes

## Skills / Knowledge

### 8.5 Sustainability

Only answer this question if the following conditions are met:

Answer was at question '56 [GenericHealth]' (SUB-AREA 8. Generic, health and social tasks)

🚫 Check all that apply

Please choose **all** that apply:

- 8.5.1 Engages with stakeholders. Recognises corporate social responsibility
- 8.5.2 Know and apply principles of sustainable development

## Skills / Knowledge

### 8.6 Self-management

Only answer this question if the following conditions are met:

Answer was at question '56 [GenericHealth]' (SUB-AREA 8. Generic, health and social tasks)

🚫 Check all that apply

Please choose **all** that apply:

- 8.6.1 Accepts responsibility
- 8.6.2 Develops and maintains networks
- 8.6.3 Initiative and entrepreneurship spirit

## Skills / Knowledge

### 8.7 Working with people

Only answer this question if the following conditions are met:

Answer was at question '56 [GenericHealth]' (SUB-AREA 8. Generic, health and social tasks)

🚫 Check all that apply

Please choose **all** that apply:

- 8.7.1 Works effectively in interdisciplinary and international teams
- 8.7.2 Recognises diversity and multiculturalism (Knowledge of other cultures and customs)
- 8.7.3 Identify objectives and individual and collective responsibilities and act correctly in such roles
- 8.7.4 Ethics. Transmit credibility and integrity
- 8.7.5 Coaching and leading teams

## SUB-AREA

### 9. Social Performance \*

Only answer this question if the following conditions are met:

Answer was at question '7 [TeachingArea]' (Please choose appropriate teaching areas representing your study programme(s) )

🚫 Check all that apply

Please choose **all** that apply:

- 9.1 Acquiring and using social data and baseline information
- 9.2 Monitoring and evaluating social projects
- 9.3 Engagement with Indigenous peoples
- 9.4 Grievance management, Prevention & management of conflict
- 9.5 Cultural heritage management
- 9.6 Community engagement
- 9.7 Agreements & implementation
- 9.8 Resettlement & influx management
- 9.9 Regional development
- 9.10 Local employment and workforce development
- 9.11 Community enterprise development

## ***Skills / Knowledge***

### ***9.1 Acquiring and using social data and baseline information***

Only answer this question if the following conditions are met:

Answer was at question '64 [SocialPerformance]' (SUB-AREA 9. Social Performance)

🚫 Check all that apply

Please choose **all** that apply:

9.1.1 *Capacity to understand and apply anthropological, ethnographic and archaeological Knowledge*

9.1.2 *Manage and apply concepts as a human right and gender equality*

## ***Skills / Knowledge***

### ***9.2 Monitoring and evaluating social projects***

Only answer this question if the following conditions are met:

Answer was at question '64 [SocialPerformance]' (SUB-AREA 9. Social Performance)

🚫 Check all that apply

Please choose **all** that apply:

9.2.1 *Monitoring Social projects ensuring its achieving community and business's objectives*

9.2.2 *Manages social research's tools to measure outcomes during and at the end of the social project*

## ***Skills / Knowledge***

### ***9.3 Engagement with Indigenous people***

Only answer this question if the following conditions are met:

Answer was at question '64 [SocialPerformance]' (SUB-AREA 9. Social Performance)

🚫 Check all that apply

Please choose **all** that apply:

9.3.1 *Identify potential conflicts related to the use of land and water by the project*

9.3.2 *Understanding and applying principles of Free Prior Informed Consent (FPIC)*

## *Skills / Knowledge*

### *9.4 Grievance management, Prevention & management of conflict*

Only answer this question if the following conditions are met:

Answer was at question '64 [SocialPerformance]' (SUB-AREA 9. Social Performance)

🔔 Check all that apply

Please choose **all** that apply:

- 9.4.1 *Implement and manage a grievance mechanism*
- 9.4.2 *Manage methodologies to detect previous or arising conflicts*
- 9.4.3 *Apply conflicts resolutions techniques*

## *Skills / Knowledge*

### *9.5 Cultural heritage management*

Only answer this question if the following conditions are met:

Answer was at question '64 [SocialPerformance]' (SUB-AREA 9. Social Performance)

🔔 Check all that apply

Please choose **all** that apply:

- 9.5.1 *Comprehend and apply Cultural Heritage Management (CHM)*
- 9.5.2 *Recognise stakeholders to work within CHM*

## *Skills / Knowledge*

### *9.6 Community engagement*

Only answer this question if the following conditions are met:

Answer was at question '64 [SocialPerformance]' (SUB-AREA 9. Social Performance)

🔔 Check all that apply

Please choose **all** that apply:

- 9.6.1 *Understand and practice dialogue skills in engaging with communities*

## Skills / Knowledge

### 9.7 Agreements & Implementation

Only answer this question if the following conditions are met:

Answer was at question '64 [SocialPerformance]' (SUB-AREA 9. Social Performance)

🚫 Check all that apply

Please choose **all** that apply:

9.7.1 *Multi-disciplinary stakeholder management to include different groups in the identification of previous agreements.*

## Skills / Knowledge

### 9.8 Resettlement & influx management

Only answer this question if the following conditions are met:

Answer was at question '64 [SocialPerformance]' (SUB-AREA 9. Social Performance)

🚫 Check all that apply

Please choose **all** that apply:

9.8.1 *Leadership skills to develop and coordinate relocation processes*

9.8.2 *Enlightening. Influencing and convincing policy makers and stakeholders*

## Skills / Knowledge

### 9.9 Regional development

Only answer this question if the following conditions are met:

Answer was at question '64 [SocialPerformance]' (SUB-AREA 9. Social Performance)

🚫 Check all that apply

Please choose **all** that apply:

9.9.1 *Knowledge of economic development framework to apply in a local a context*

## Skills / Knowledge

### 9.10 Local employment and workplace development

Only answer this question if the following conditions are met:

Answer was at question '64 [SocialPerformance]' (SUB-AREA 9. Social Performance)

🚫 Check all that apply

Please choose **all** that apply:

9.10.1 Works effectively with local employment organisation in order to register workforce's skills, availabilities and dynamics in the area.

## Skills / Knowledge

### 9.11 Community enterprise development

Only answer this question if the following conditions are met:

Answer was at question '64 [SocialPerformance]' (SUB-AREA 9. Social Performance)

🚫 Check all that apply

Please choose **all** that apply:

9.11.1 Apply entrepreneurship skill to support current or future local business

## Additional comments

Please write your answer here:

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Please choose **only one** of the following:

Yes

No

Thank you very much for your time and effort

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