INTERMIN
Consortium Meeting
30 January 2019

La Palma Research Centre

Work Package 2 – Raw materials sector skills, gaps and needs
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INTERMIN Consortium meeting, Madrid, 30th & 31st January 2019

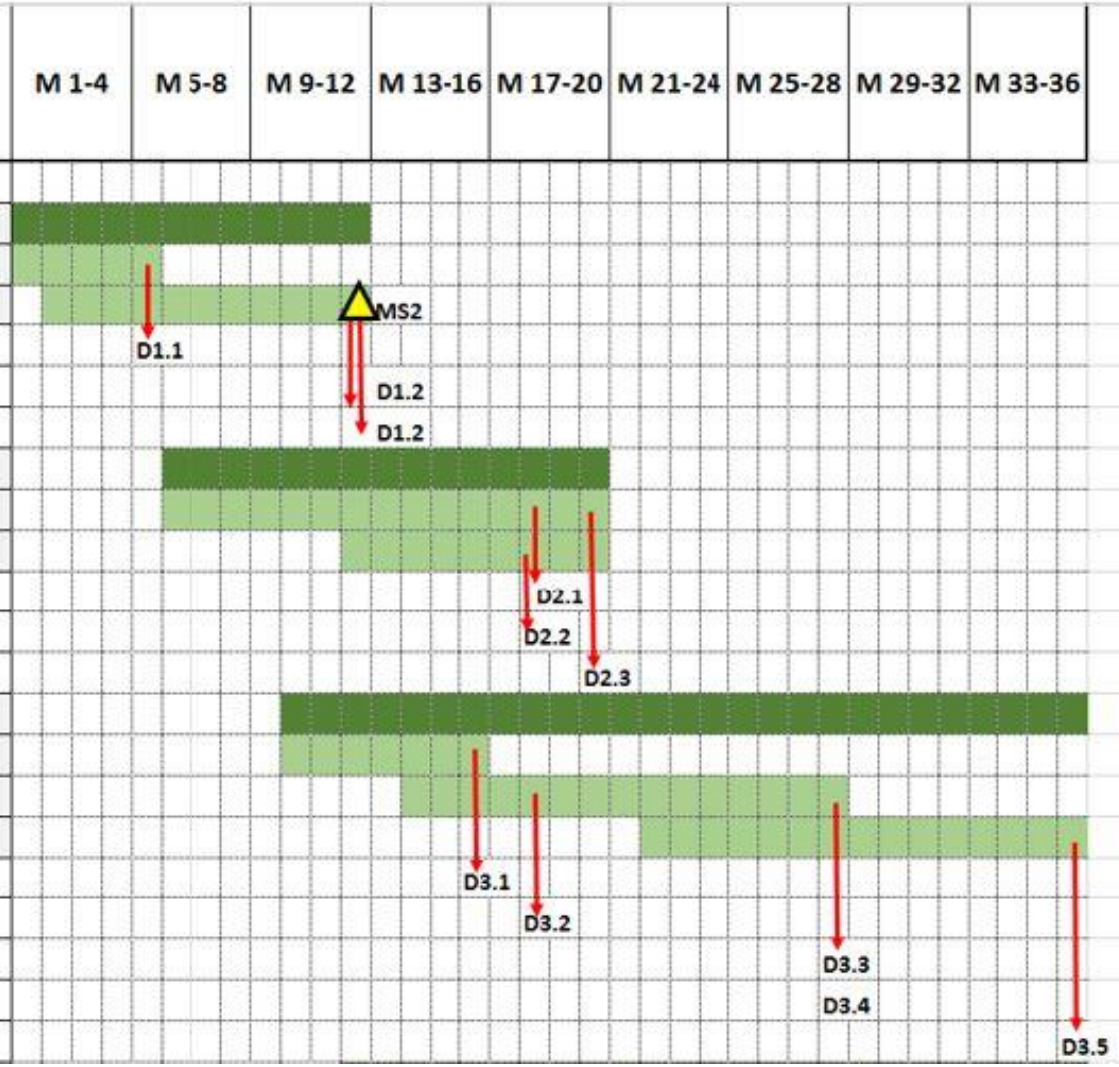
This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 776642

WP2 – Raw materials sector skills, gaps and needs

- **Tasks:**
  - T2.1 Assessment of employers' needs (M6-20)
    - Catalogue/matrix of RM jobs, skills and thematic activities
    - 'Manifesto' for shifts in training and education
  - T2.2 Develop a competency model for the raw materials sector (M12-20)

- **Deliverables:**
  - D2.1 Report on skills gaps (M18)
  - D2.2 Integrated competency model for employment across the raw materials sector (M18)
  - D2.3 Roadmap on skills provisioning for the raw materials sector (M20)

WP ID Task ID *Deliverable*	Work Package Tittle	Start / month	End / month	M 1-4	M 5-8	M 9-12	M 13-16	M 17-20	M 21-24	M 25-28	M 29-32	M 33-36
WP1	**Worldwide mapping of educational-research programs (Atlases)**	**1**	**12**									
T1.1	Scoping	1	5									
T1.2	Mapping	2	12									
D1.1	*Skills catalogue for the raw materials sector*		*5*									
D1.2	*Database process manual*		*12*									
D1.3	*Global repository of training programs and networks*		*12*									
WP2	**Raw materials sector skills, gaps and needs (Gaps)**	**6**	**20**									
T2.1	Assessment of employers' needs	6	20									
T2.2	Develop a competency model for the raw materials sector	12	20									
D2.1	*Report on skills gaps*		*18*									
D2.2	*Integrated competency model for employment across the raw materials sector*		*18*									
D2.3	*Roadmap on skills provisioning for the raw materials sector*		*20*									
WP3	**Towards enhanced training programmes (Response)**	**10**	**36**									
T3.1	Definition of reference points and best training practices	10	16									
T3.2	Driving knowledge transfer and adaptation of existing training programmes practices	14	28									
T3.3	Advancing joint international technical and vocational training programmes	22	36									
D3.1	*International qualification framework for the raw materials sector*		*16*									
D3.2	*Report on tailored metrics and reference points*		*18*									
D3.3	*Best practice guidelines for training in the raw materials sector*		*28*									
D3.4	*Action Plan to close skill gaps and enhance existing education and training programmes*		*28*									
D3.5	*Joint training programmes for the raw materials sector*		*36*									



Short and Medium-term (M6)

Short-Term (2.1.1) – 5 years
LPRC, MUL, BRGM

Review of Industry Position Papers → Collection of subjects, drivers and trends

Workshop M6 → Refinement, discussion and validation

Interviews with employers → Validation – Gaps-focused

Outputs: - 5-year curricula recommendations => *Input for Roadmap*
- Guidelines of drivers, trends and portfolio of subjects
- Catalogue/matrix of RM jobs, skills and thematic activities

Medium-term (2.1.2) – 15 years
AGI, IGME, BRGM, LPRC, MUL, UQ, YES

Monitoring 2.1.1

Establish Criteria + Assemble Focus Group

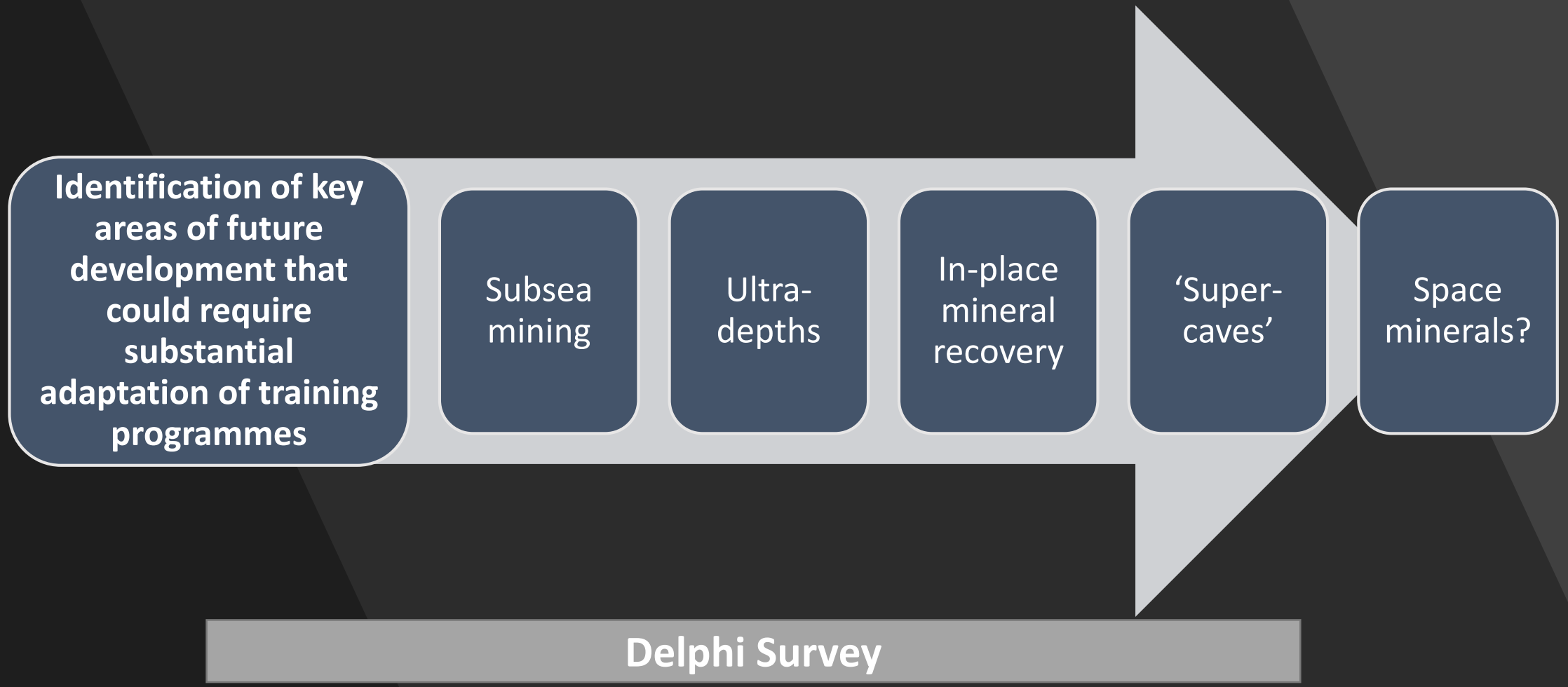
Workshop M6 → Focus Group kick-off

Periodic online meetings + draft reports

Workshop M12 → Focus Group finalisation

Outputs: - 15-year curricula recommendations => *Input for Roadmap*
- Manifesto: Shifts in training/education

Task 2.1.3 - New Frontiers (+15-30 years)



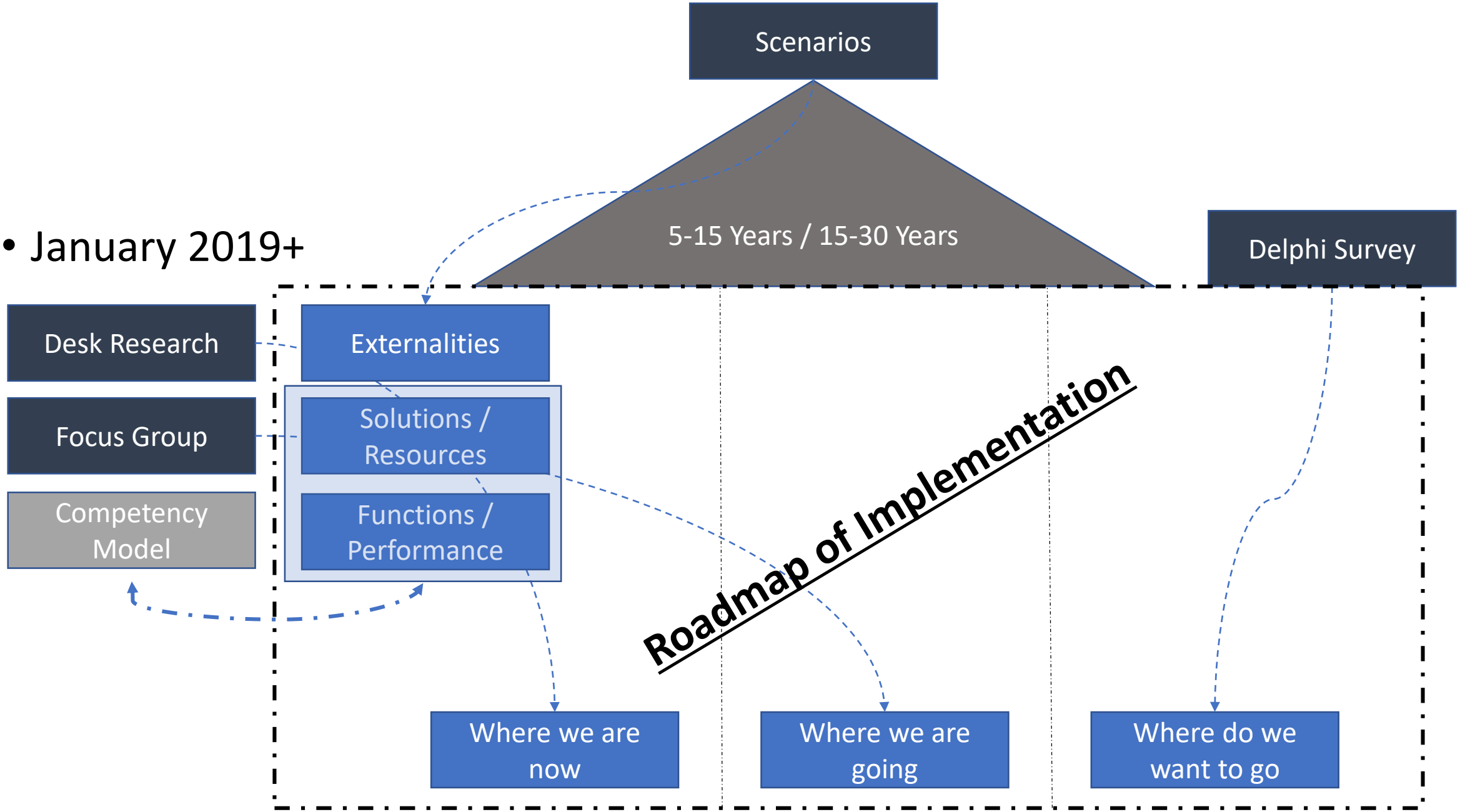
Task 2.2 – Competency Model

Competency model: desired competencies including description of single competencies as well as indicators to measure performance and outcomes

Future needs depend on social and economic hypotheses shaped by key drivers of change e.g. geopolitical orientations, circular economy, resource consumption patterns etc.

Scenarios will be developed about such variables under two different time frames – 5-15 years / 15-30 years

- January 2019+



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Current Situation

- **Technological Advances**
  - Industry 4.0
- **Cyclicity**
  - Lags in trained staff
- **Demographics**
  - Ensure talent availability across geographies
  - “Knowledge flows” – Ageing workforce

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Employers Behavior

- Up- and re-skilling current employees
- Support mobility and job rotation
- Collaboration
- Target female talent
- Services vs. operations career
  - More outsourcing = more diversity

- Building up competition for ‘tech-savvy’ professionals
- Cultural-shift
- Same direction, different pathways
- Integrated value chain models

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Employers Behavior

- Automation impacts not only skill shifts for individuals. But also changes the workplace and ways companies are organized.

- Future workforce-skills needs. depending on business model, market dynamics and current skill mix + size

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Projected (2022) effects on workforce - % companies

Future of Jobs Survey, WEF (2018)

Reduce workforce due to automation – 72%

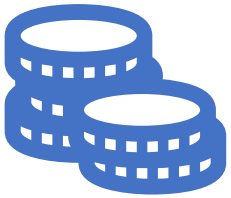
Expand task-specialized contractors – 56%

Modify locations of operation – 44%

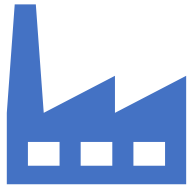
Modify value chain – 44%

Factors determining job location decisions, 2018–2022

Future of Jobs Survey, WEF (2018)



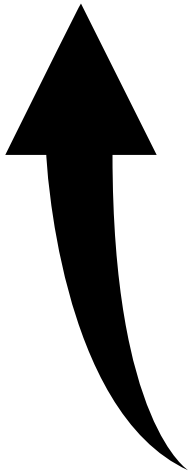
Labour cost



Production cost

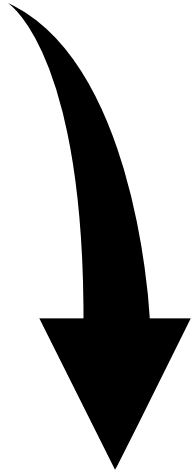
Talent availability

Skills shift – Mining & Energy (MGI, 2018)



- Higher cognitive skills
  - Creativity
- Social & Emotional skills
  - Communication
  - Interpersonal skills
  - Complex problem-solving
- Technological skills
  - Advanced IT and programming

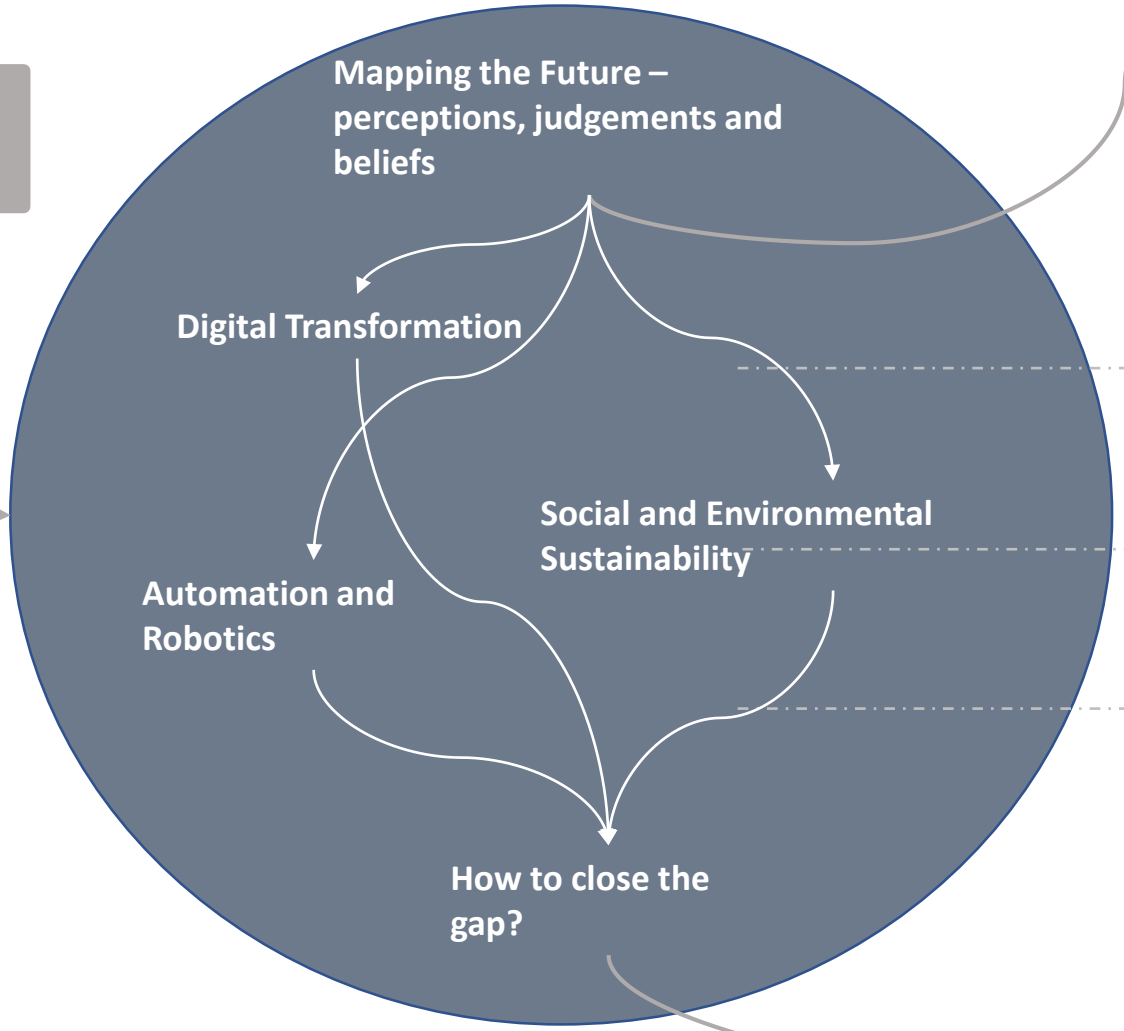
- Physical and manual
  - General equipment operation
- Basic cognitive
  - Basic data input and processing



Background Review

Sectoral reports on raw materials workforce & skills

Focus Group



First Workshop (M6)

Participants share their perceptions, definition of key areas to be explored

Online Discussions, Remote Work, Literature Review, Draft Reports production

Results are presented
Validation of findings

Final Workshop (M12)

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Industry 4.0

- More automation means focus shifting to complex problem-solving
- ‘Digital thinking’ is a core skill for changing companies thinking process under such new paradigm
- Equipment manufacturers and service providers will host a greater share of the raw materials workforce.
- T-shaped career progress – specialization in a specific area followed by a lateral broadening of skills spectrum.
- Managerial and leadership position will require skills on managing a diverse team with new and complementary skill sets

Industry 4.0

‘Background’ conversion – as industry demands ore math-heavy complex solving skills, disciplines such as electrical engineering and computer sciences could naturally become a ‘sought-after’ profile. Chemical processing techniques could be transported to the secondary resources industry.

Increasingly specialized and complex skills requirement might contribute to exacerbating the difference between big and small companies when affording in-house training or depending on other resources.

Social and Environmental aspects

- Dynamic balance between **'local economic benefit' and 'awareness of local impacts'** – e.g. automation might decrease economic support of local communities, while compensating with less issues over acceptance. There is also a **geo-political component and one of company size** – ability to operate under this complexities requires evolving competences.
- In the past topics such as HSE were neglected in academic curricula – only turning widespread in recent decades. The same process could be expected for social/community affairs.
- Response to this skill requirements might come as **more training at graduate level, certification and mentoring.** The latter can be particularly if implemented at a local level, considering social issues can be very site-specific.
- **Social performance for instance is a profession on its own right** likely to continue evolving. From and employer perspective, is important to understand what are the skills needed in that sense, and **to which extent traditional roles should develop these competences for their jobs**. This does not preclude the possibility of dedicating full-time work for this job.

Future RM skills, professions

- **Business Management**
  - **Middle management to connect tactics and strategy – many mining companies lack of strategic thinkers at these levels [Kunz (2013)]**
  - **Multi-generation interfacing skills**
  - **Extended & integrated value chain, Agile methodologies**
- **Geology Exploration – Resources & Reserves**
  - **Computational intelligence – e.g. Geoscientist + data scientist**
- **Mining – geomechanics, mine design & methods, equipment and systems, services**
- **Mineral Processing**
  - **Professional capable of performing with the advances from the IT realm:**
  - **Simulation & optimization, real-time tools**
  - **Advanced, predictive analytics**

Remarks

- **Fewer workers on-site, more automation/ more remote operation centres - more competition in urban centres = workers with broad foundational skills + deep technical expertise in their occupation**

- **Key challenges vary further depending on situation, geography, regulations and competitive environments.**

- **Competences of the future - ‘Opposing forces’: More technical, quantitative and IT literate jobs, while at the same time an increasing need of improving skills for dealing with social communication. For training providers this can be particularly challenging under different constraints of accreditation requirements and courses workload.**

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Questions?

The next 15 years

- What are the **necessary shifts in training and education** for overcoming the skills mismatch space?
    - What is going to change (and what is going to remain the same)?
        - How training itself is going to look like, which of these skills wouldn’t be taught at training centres?
- **Highlight 3-5 aspects against the INTERMIN skills database**