Research to Accelerate Critical Minerals and Sustainable Development in SW England

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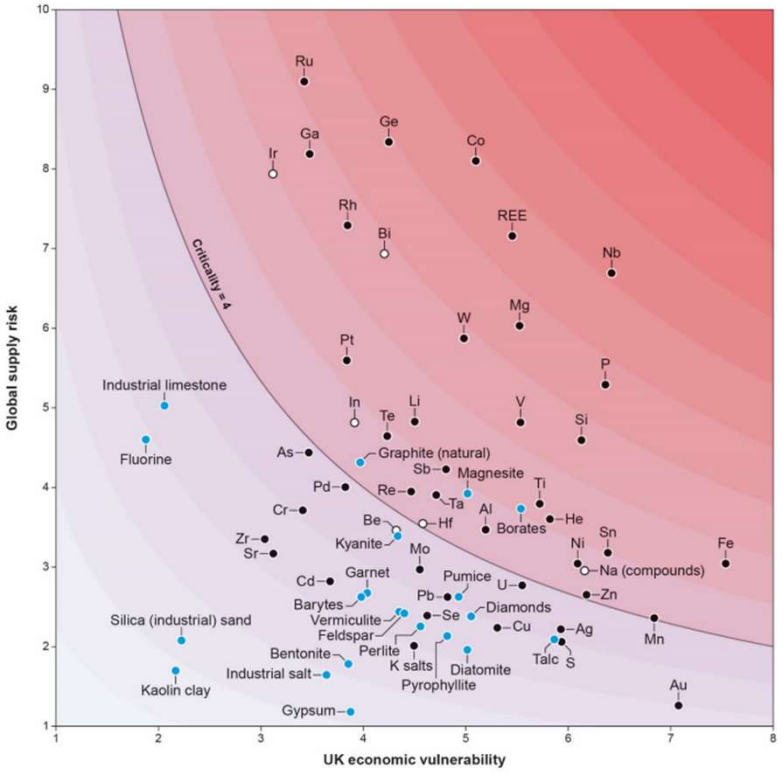
19 May 2026: Swedish Mining Research and Innovation Days

Critical Minerals – the Risk

EU 2023, a fifth list of 34 CRMs

Bauxite	**Coking Coal**	**Lithium**	**Phosphorus**
Antimony	**Feldspar**	Light rare earth elements	Scandium
Arsenic	Fluorspar	Magnesium	Silicon metal
Baryte	Gallium	**Manganese**	Strontium
Beryllium	Germanium	Natural Graphite	Tantalum
Bismuth	Hafnium	Niobium	Titanium metal
Boron/Borate	**Helium**	Platinum group metals	Tungsten
Cobalt	Heavy rare earth elements	Phosphate Rock	Vanadium
		Copper	**Nickel**

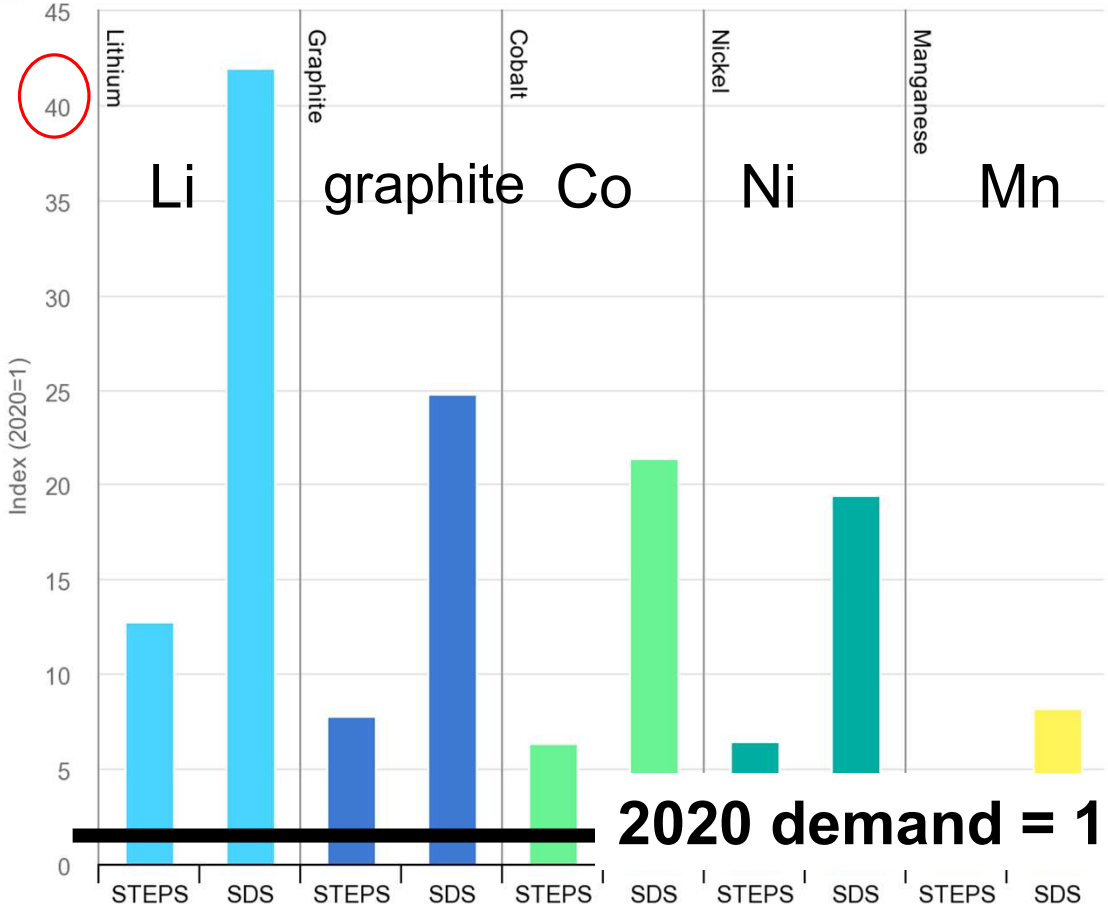
UK 2024, 34 CRMs

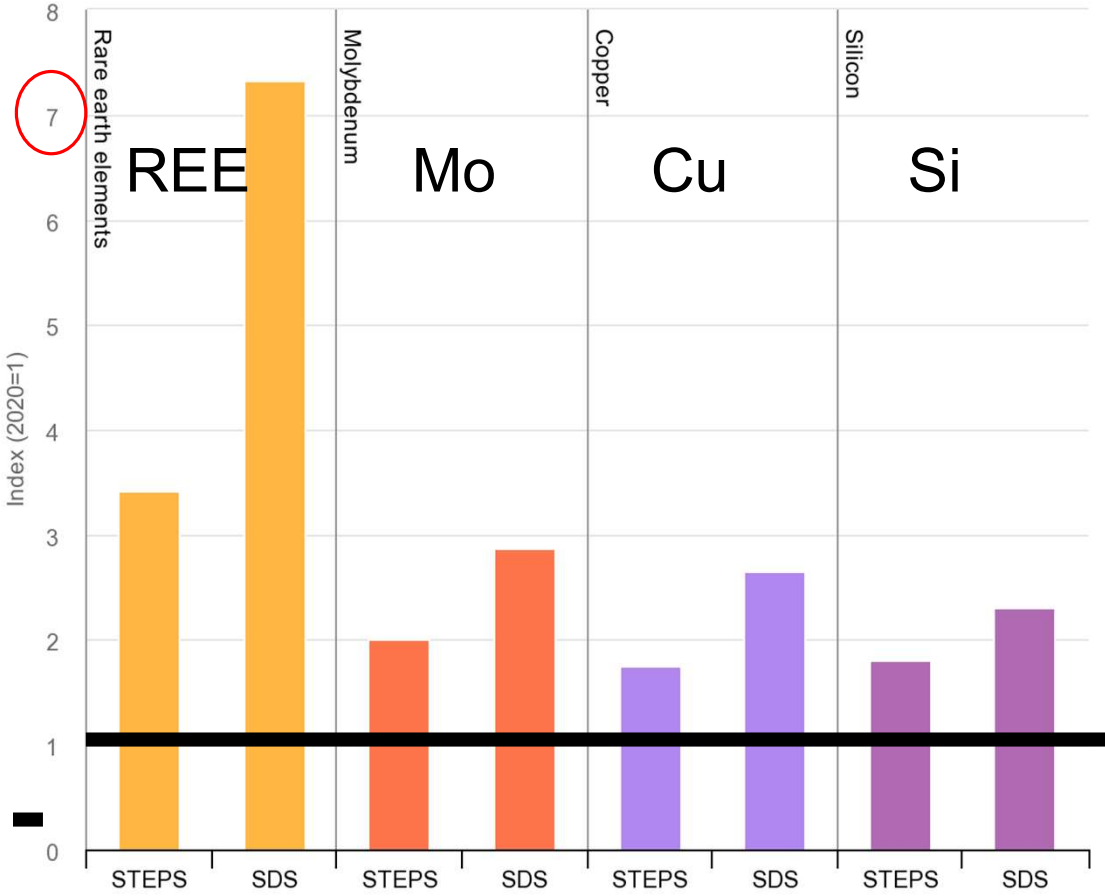


https://www.ukcmic.org/downloads/reports/ukcmic-2024-criticality-assessment.pdf

Critical Minerals – the opportunity

All models predict rapid increases in metals demand. This example: two scenarios from the International Energy Agency change from 2020 to 2040





IEA (2021), The Role of Critical Minerals in Clean Energy Transitions, IEA, Paris https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions, License: CC BY 4.0

What do people really want from production of critical minerals?

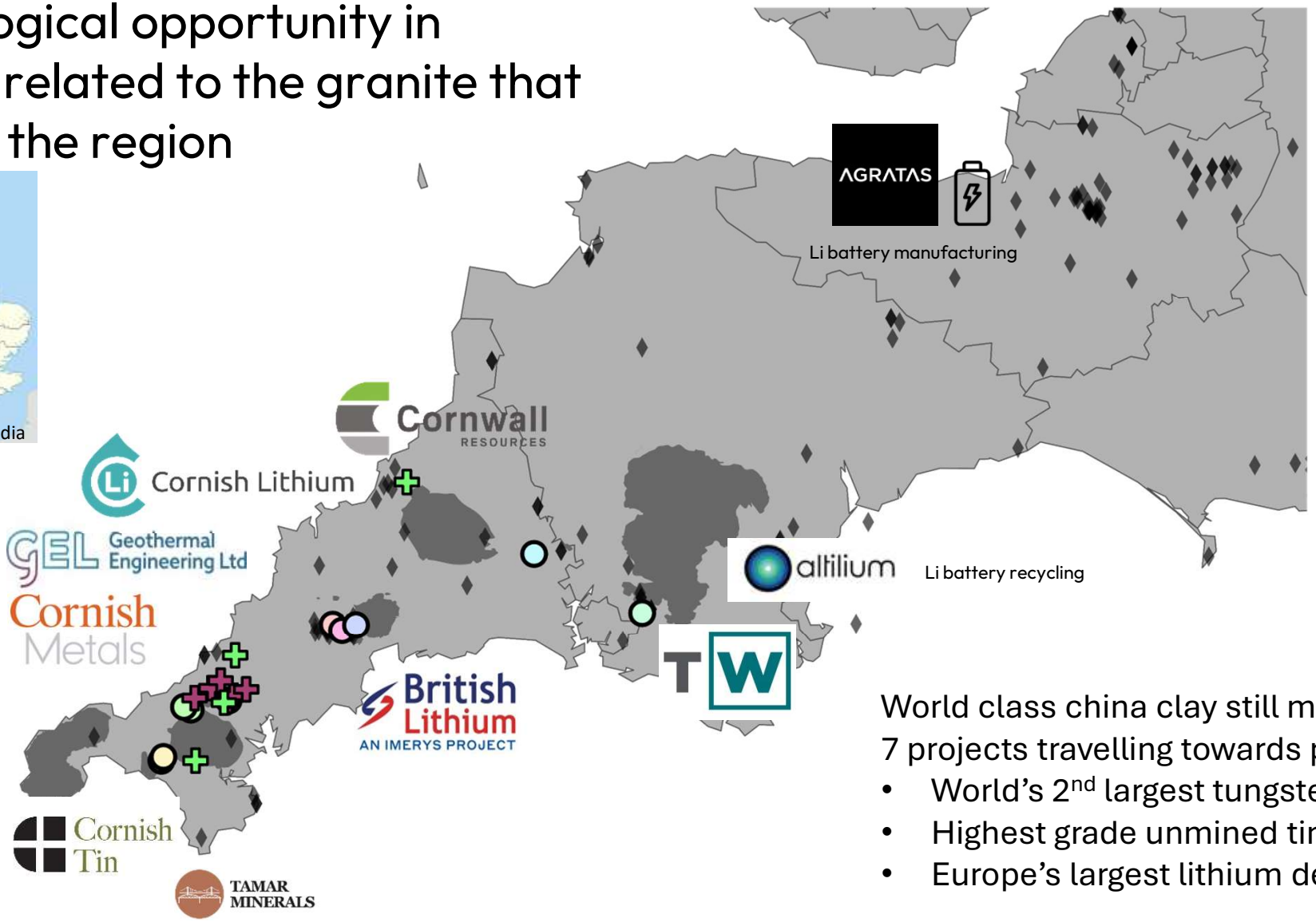
Critical Minerals Challenge Centre

University of Exeter

UK Research and Innovation

Resource riches or Resource Curse?

The geological opportunity in SW UK is related to the granite that underlies the region



World class china clay still mined

7 projects travelling towards production:-

- World's 2nd largest tungsten reserve
- Highest grade unmined tin
- Europe's largest lithium deposit

Map plotted by Will Parker, see Cornwall Mining and Georesources Alliance https://cmga.org.uk/ for cluster of local businesses, https://criticalmineralschallengecentre.co.uk/ for RD&I,

Cornwall

Photo F Wall

Photo F Wall

Cornish Metals reopening South Crofty mine

2,896kt (indicated)	1.50% Sn	43.6kt Sn
2,626kt (inferred)	1.42% Sn	374kt Sn

https://cornishmetals.com/project/uk/south-crofty-tin-project/

Hemerdon W-Sn Mine, Devon

TUNGSTEN WEST

UK was 4th largest global tungsten producer 2018. New company Tungsten West producing small amounts now and ramping back up to full production

Total Ore Reserve comprising 70.7Mt at 0.15% WO_3 (wolframite) and 0.03% Sn (cassiterite) https://www.tungstenwest.com/

Lithium-bearing micas are separated from feldspar, quartz and other micas in the granite and then further processed/refined to lithium carbonate or lithium hydroxide

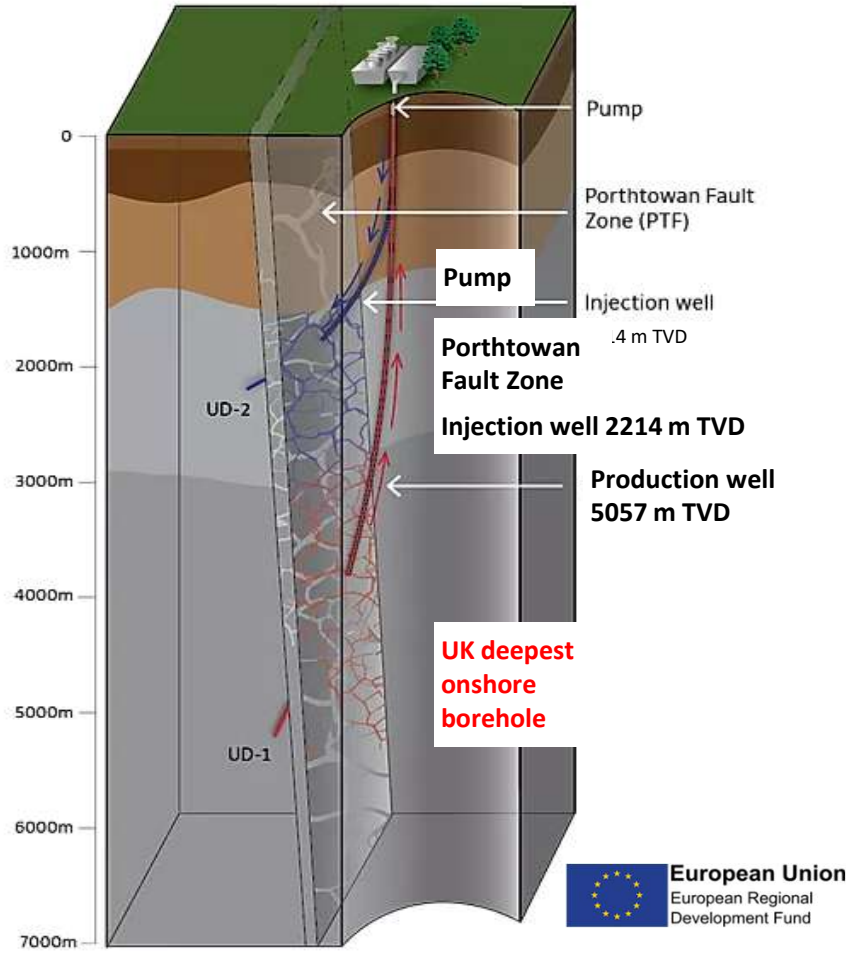
University of Exeter

Photos F Wall at Imerys British Lithium, March, 2025

Polylithionite – siderophyllite (zinnwaldite, lepidolite group)

Deep geothermal

SW England is most prospective area in UK – major projects involving 4-5 km deep boreholes that extract heat – and lithium – from granite.



Images from Eden Project and GEL

Legacy Mine Waste – In a UNESCO Mining LandscapeWorld Heritage Site in Cornwall and West Devon

Photo F Wall

Critical Minerals Challenge Centre team & partners ready for transdisciplinary research – all research co-created and co-lead by industry partners with the academics

Critical Minerals Accelerating the Green Economy Centre

TWP1
Analytical & geo-metallurgy protocols
Industry lead: Petrolab

TWP2
Value from Mine Waste
Industry lead: Cornwall Resources

TWP3
Exploration and Extraction Technologies
Industry lead: Geolorn

TWP4
Smaller projects with cluster, workshops, building new projects

15 academics

2.5 management

commercialisation, policy, comms., coordination

Innovation fellows all in different disciplines for transdisciplinary team

Researcher co-lead

AI/Software

Regional Government

National Government

31 partners

Companies

NGOs

https://criticalmineralschallengecentre.co.uk/

Centre team and partners ready for transdisciplinary research - six post-doctoral innovation fellows in different disciplines

https://criticalmineralschallengecentre.co.uk/

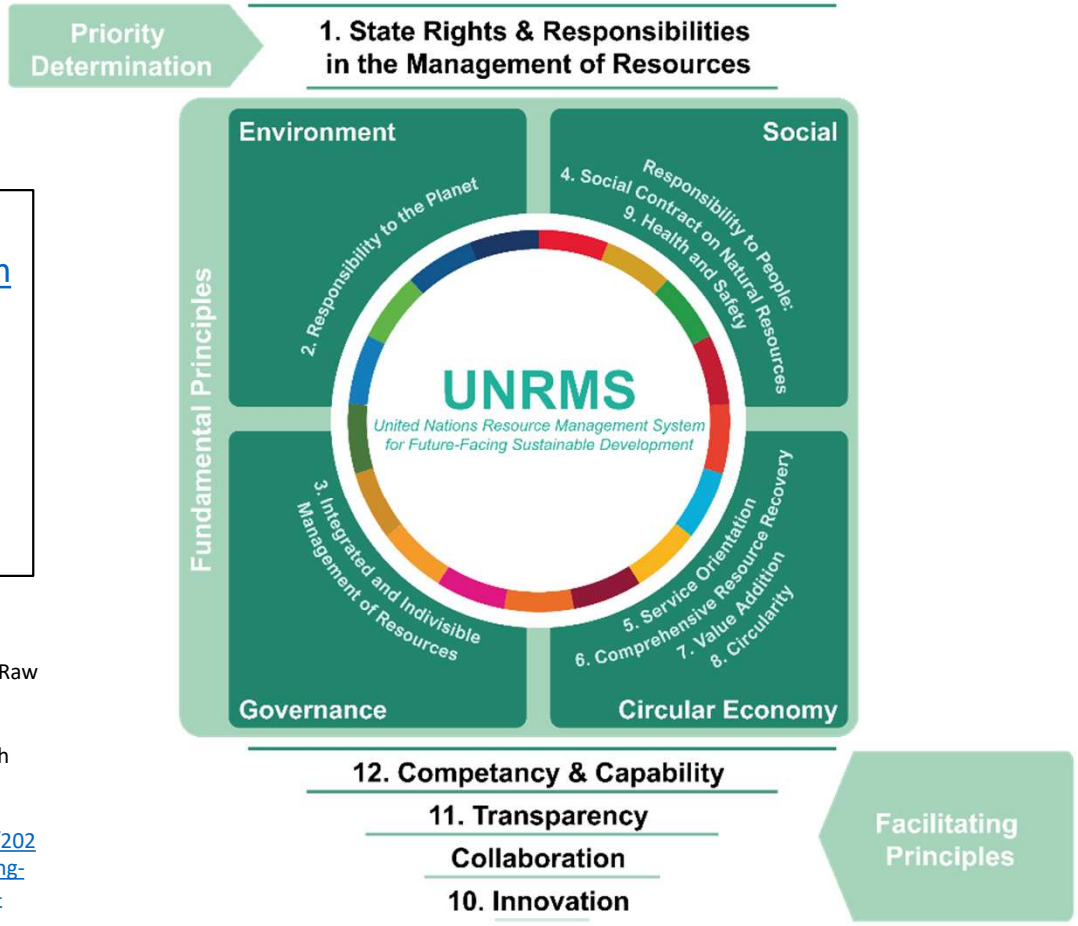
Met4Tech

United Nations Resource Management System (UNRMS)

12 Principles (and 54 underlying requirements)

1.What is UNRMS? https://youtu.be/4BryhgEwDa8

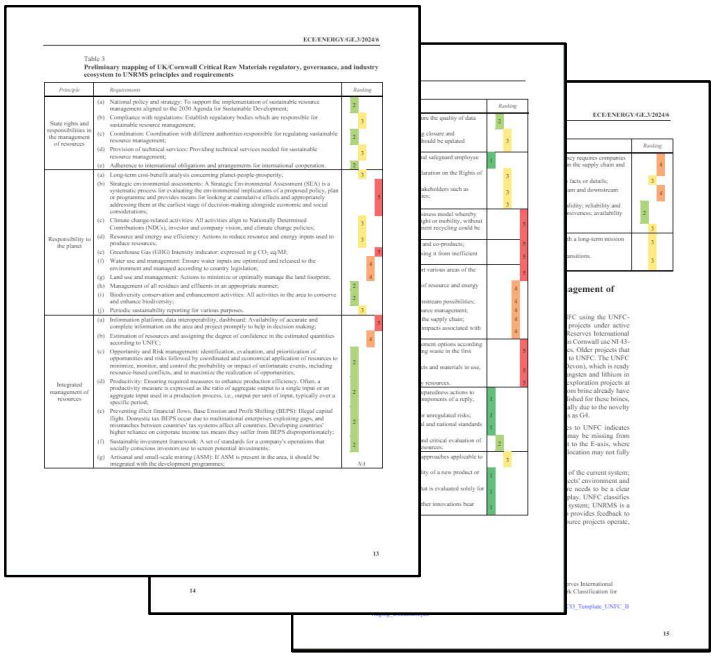
2. Introduction to the Cornwall case study using UNRMS: https://youtu.be/IR6SvZdNFs0

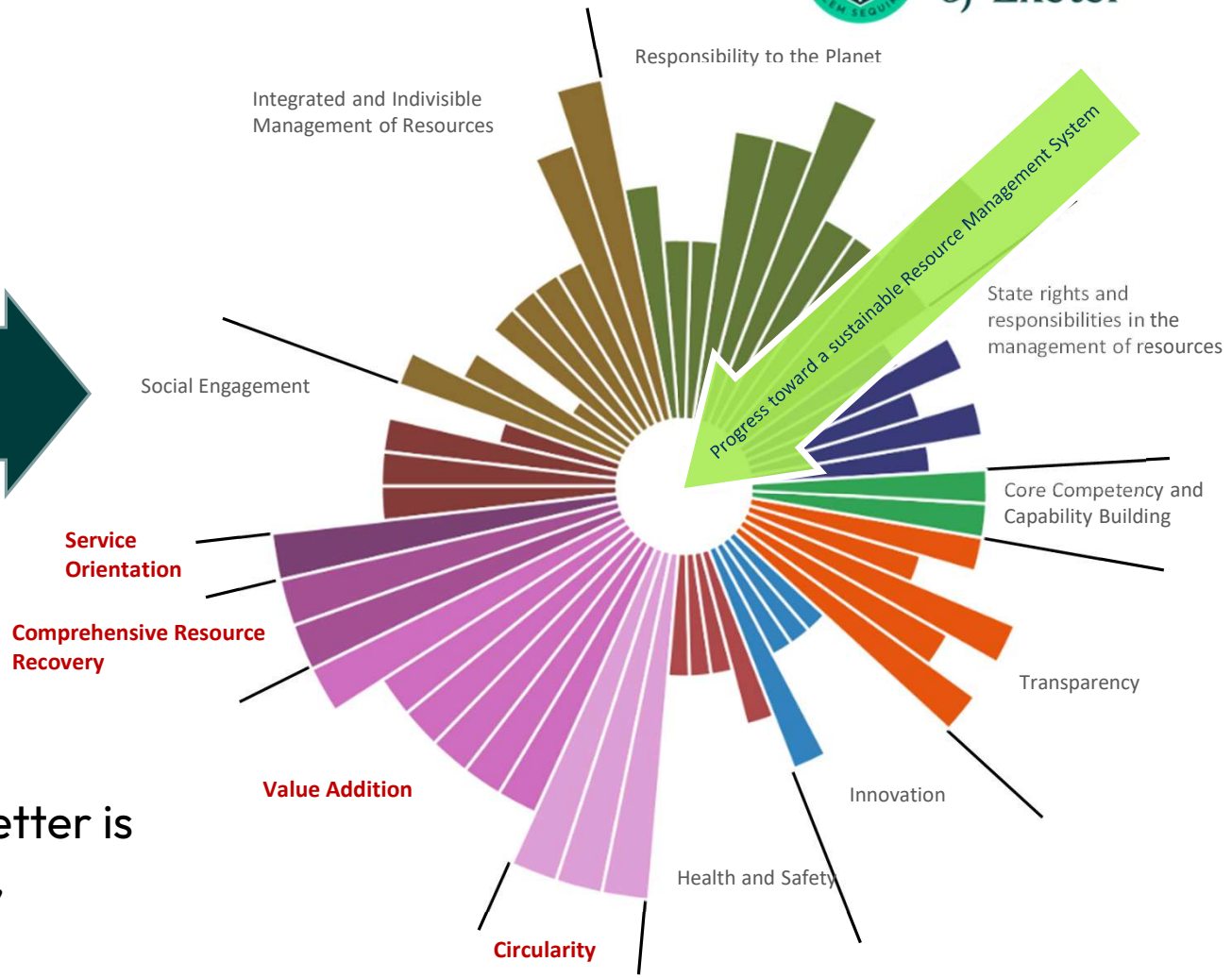


UNRMS adapted for Cornwall Case Study

Marquis et al, 2024, Optimizing Resource Management for Critical Raw Materials: A Case Study of the Application of the United Nations Resource Management System with Cornwall Regional Government, United Kingdom, UNECE https://unece.org/sed/documents/2024/04/working-documents/optimizing-resource-management-critical-raw-materials-case

UNRMS results for Cornwall – things to do



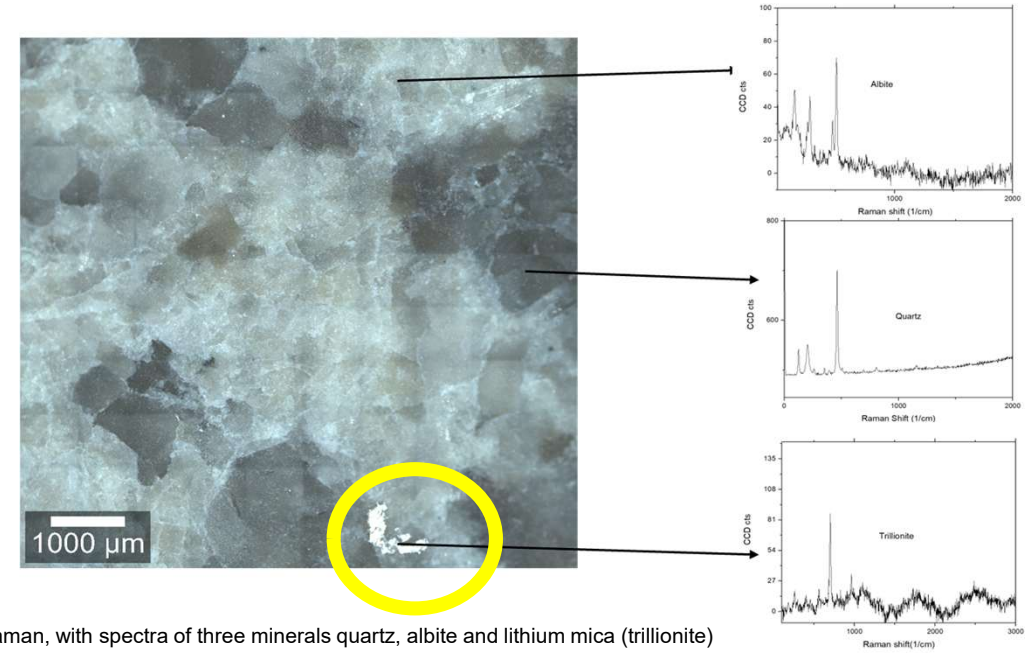


Eva Marquis' target diagram – better is closer to the centre of the target, larger means more to do

Geometallurgy of Li in granite

New protocols for characterisation and selection of mineral processing routes

- Lower projects risks
- Optimise separation efficiency
- Encourage nature positive solutions
- Accelerate financing



Raman, with spectra of three minerals quartz, albite and lithium mica (trillionite)

Critical Minerals Challenge Centre (Dr Lebogang Babedi) is using Raman and Hyperspectral imaging to study and identify Li-bearing micas for geometallurgy studies with industry partners, lead industry partner is Petrolab

https://criticalmineralschallengecentre.co.uk/

Value from Mine Waste

- Biodiversity net gain strategies including monitoring biodiversity rather than habitat
- eDNA sampling by Dave Hudson (ecology) with Eva Marquis (geology)
- Regulatory workshop – demonstrated the ‘vintage waste’ has many heritage and also biodiversity protections. More modern tailings have more potential
- UK Government interest and support
- Industry partners

photo Eva Marquis

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Social Sciences

3 Strands

Christie Van Tinteren

1. Future of Work
   - Drawing on good labour practices in the SW, to ensure prosperity for all –
2. Meeting Skills Needs
   - Developing and Social and community innovations to ensure a local talent pipeline. ‘Getting in and Getting on’
3. Philanthropy and Social Infrastructure
   - Looking at past Cornish industrial revolutions, to consider what we can learn from their legacy of social infrastructure.

- Cornwall Council (local government), Cornwall Community Fund (NGO), SW Trades Union Council and the local industry partners

photo Christie Van Tinteren

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Sustainable Finance

- Joint Business School and Camborne School of Mines study by Chenyan Lyu

- Conducting semi-structured research interviews with project leaders & investors
  - What are the gaps in funding?
  - Role of ESG?
  - How to speed up investment and project development?

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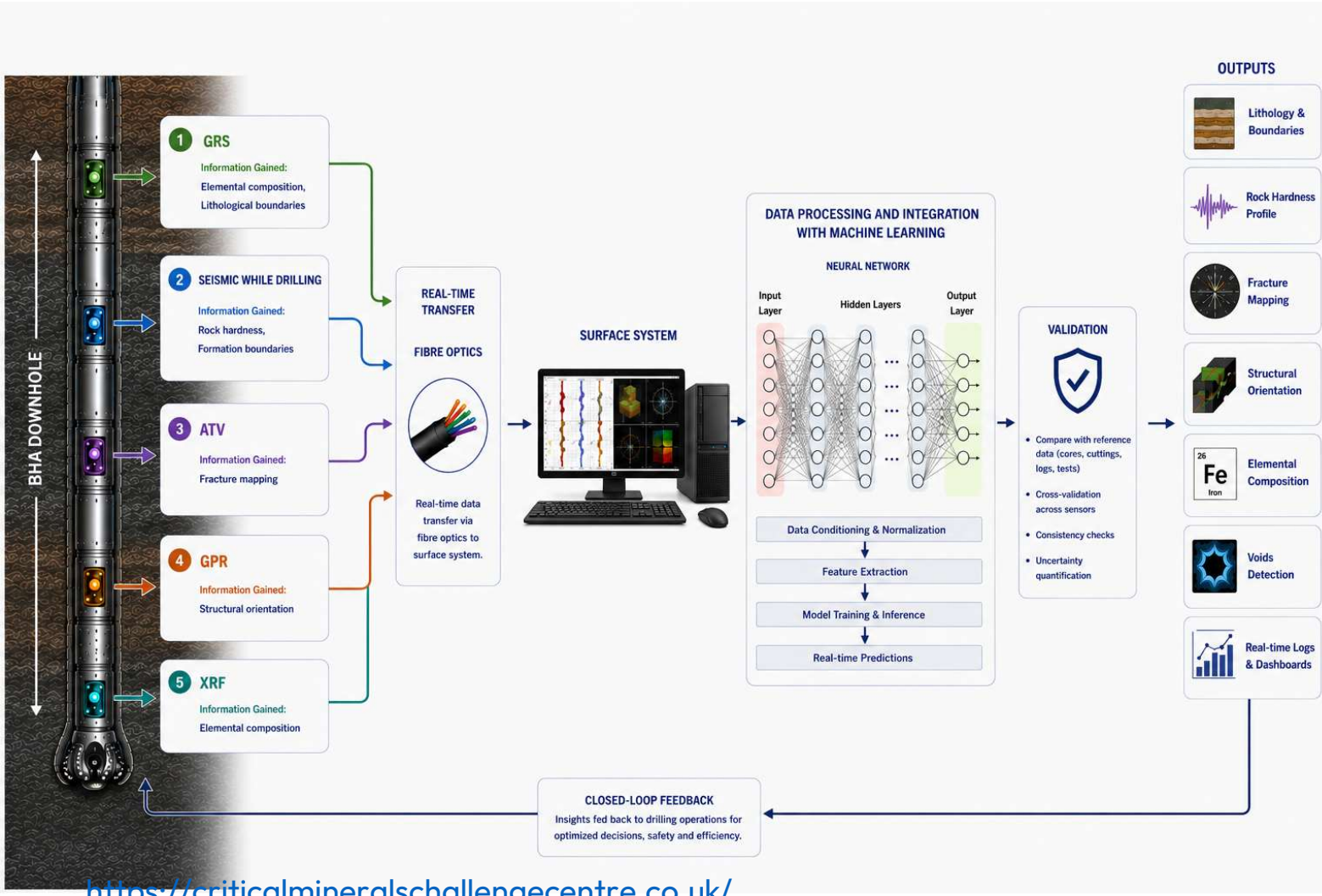
Extraction Technologies

Modelling future mining techniques, starting with a review of downhole sensors by Lesego Senjoba with Matt Eyre, Rich Crane, Matt Tonkins and industry partners, led by Geolorn



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Whole Systems approaches to materials stewardship including the Urban Mine

Critical Minerals Accelerating the Green Economy Centre

World class REE deposits in the UK?
None – but we can take geological views of resources available for recycling
We are doing this building on an LCA approach to household inventory of elements:

Based on household figures from Hu, X and Yan, X (2023) Estimation of critical metal consumption in household electrical and electronic equipment in the UK, 2011–2020, Resources, Conservation and Recycling, 97, 107084, doi.org/10.1016/j.resconrec.2023.107084

https://criticalmineralschallengecentre.co.uk/

What Success looks like

- Positive profile of projects attracts new green sector investment
- New UK products worldwide e.g. ecology services

Critical Minerals Accelerating the Green Economy Centre

- Well on the way to 3000 good, new jobs
- Strong Contribution to UK Industry strategic advantage

Photo: Cornish Metals

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Thank you!

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https://criticalmineralschallengecentre.co.uk/ - policy papers, MOOC, research

https://cmeh.co.uk – critical minerals equipment hub for commercial minerals processing and analysis

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