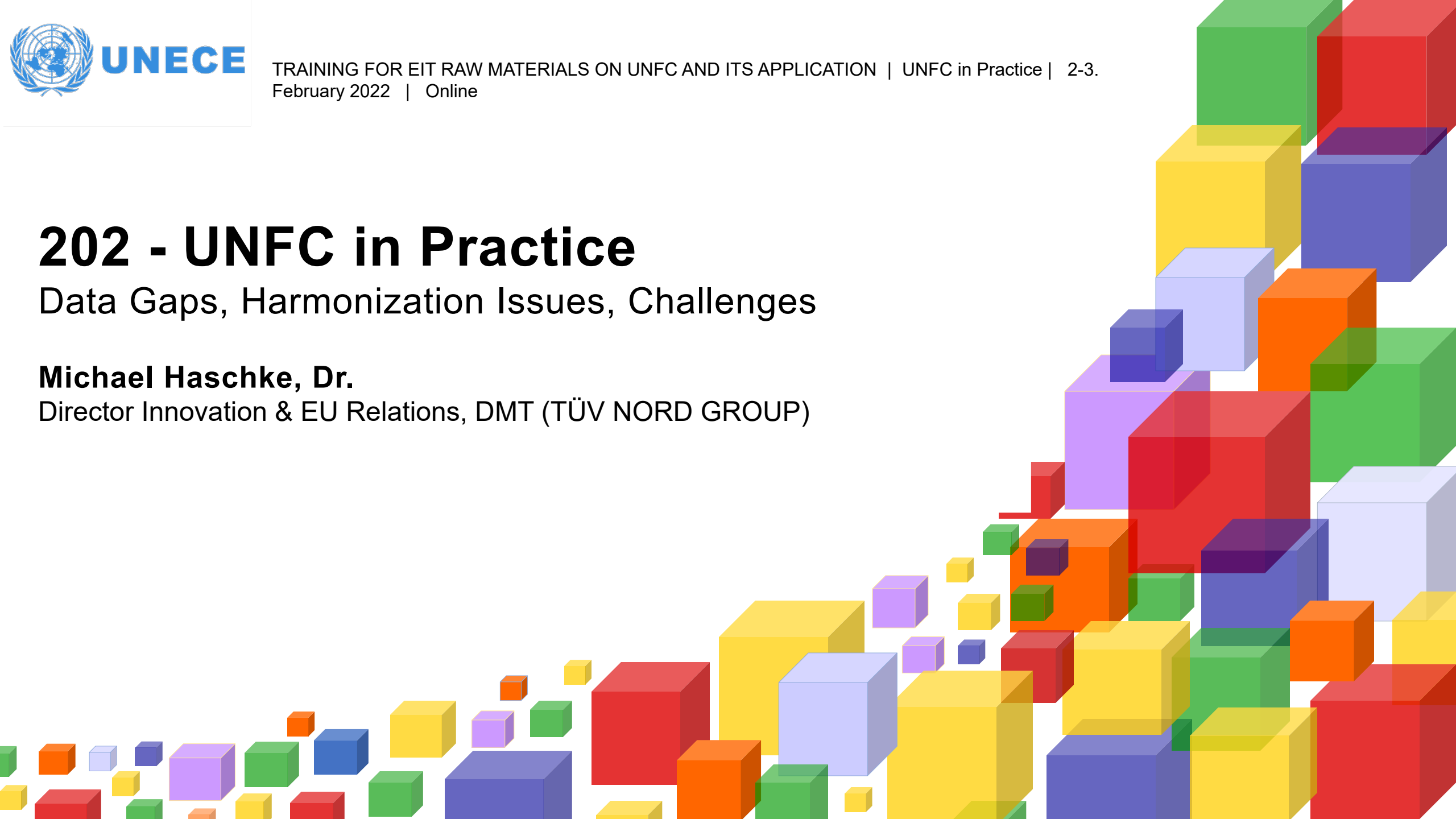


202 - UNFC in Practice

Data Gaps, Harmonization Issues, Challenges

Michael Haschke, Dr.

Director Innovation & EU Relations, DMT (TÜV NORD GROUP)



UNFC in Practice

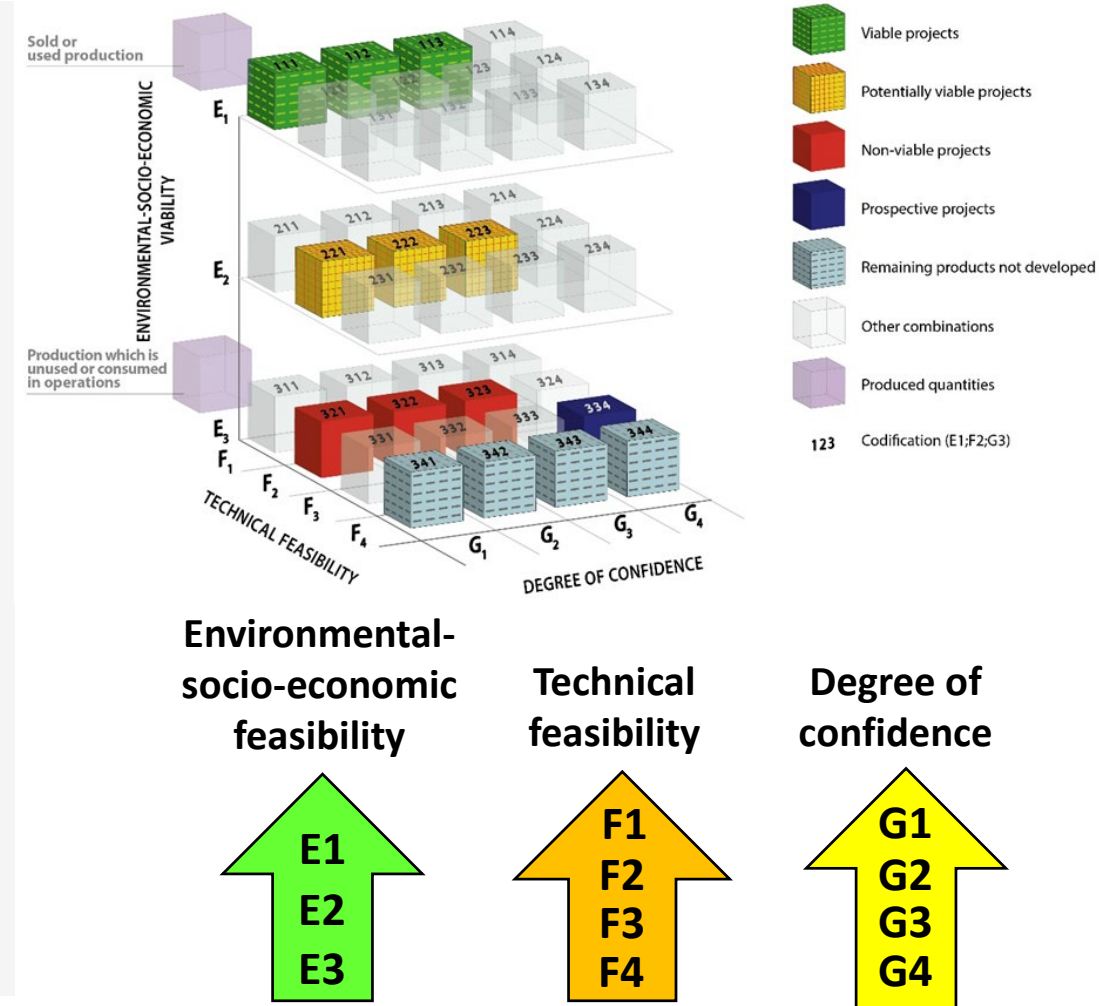
Data Gaps, Harmonization Issues, Challenges

Purpose - Discuss UNFC Application in Practice

- Show how United Nations Framework Classification for Resources (UNFC) reporting **increases harmonization of mineral resource data**, and **demonstrate strength of the United Nations Resource Management System (UNRMS)** as a tool for improving the accuracy of Pan-European mineral inventories.

Source

- MINTELL4EU (2021) **Report on harmonization issues, data gaps and challenges**, reviewing also the quality of Pan-European aggregated inventories for selected commodities, by Janne Hokka, Pasi Eilu (Geol. Surv Finland), Frands Schjoth (Geol. Surv. Denmark), Kari Aslaken (Geol. Surv. Norway), 20. Sept 2021.



UNFC in Practice

Data Gaps, Harmonization Issues, Challenges

Country	Commodities assessed	Additional Notes
Austria	Aggregates (sand and gravel)	GIS-based assessment; local regional study
Belgium	Phosphate	Local regional
Croatia	Aggregates	GIS-based assessment; local regional study
Denmark	Carbonates	Partly GIS-based assessment
Denmark	Marine aggregates	Country-wide aggregated assessment. Information from national resource database
Finland	Cobalt, copper, gold, graphite	Country-wide aggregated assessments. Information from national resource database

Country	Commodities assessed	Additional Notes
Finland	Peat	Local regional assessment, 3 different types of applications mapped into UNFC for the same resource
Hungary	Manganese, perlite, gypsum–anhydrite	Local regional; country-wide
Norway	Aggregates from hard rock sources	Local regional
Norway	Dimension stone	Local regional, focus on one rock type with a long history of production
Norway	Graphite, phosphate	Local focus and extension to country-wide assessment
Slovenia	All national resources	Mapping all resources into UNFC; scant information in the case study report
Sweden	REE	2 deposit cases with a resource, 1 no-resource case where the REE are in iron ore

Case studies received in MINTELL4EU (WP4), Nov 2020 and Jun 2021.



UNECE



ISSUES IN APPLYING THE UNFC CLASSIFICATION SYSTEM (1/4)

- **E-axis** refers to degree of favorability of **environmental**, **social**, and **economic** [non-technical] **conditions** in establishing the viability of a project, incl. market prices, relevant legal, regulatory, social, environmental and contractual conditions. **E-axis issues** in case studies included:
 - **E1** or **E2** case study classifications **without** information on **relevant permits**.
 - **E-axis** classification derived from (attractive) **commodity grade**.
 - **E-axis** classification derived from **exploration (drilling) data**.
 - **Ineffective use of UNFC sub-classes** to distinguish and enhance clarity in differences between environmental and social issues.



ISSUES IN APPLYING THE UNFC CLASSIFICATION SYSTEM (2/4)

- **F-axis** refers to **technical feasibility** which indicates **maturity of technology**, **studies** and **commitments** necessary to implement the project. Projects generally range from early mapping and exploration studies to active mining stage, and reflect standard value chain management principles. **F-axis challenges** were:
 - **E-axis categories affect the F-axis values** (e.g. 1. A resource being „inside legal ban“ resulted in F4, 2. A „mining application pending“ resulted in F1, 3. A „filed application for a mining permit“ becomes F1).
 - **Built land, road and railway lines mapped as F4**, purely based on the assumption that these are no-go areas for mining.
 - **High confidence F1/F2 categories** given to non-active projects (with historical estimates) or predictive models, without PEAs / FS by the operator.



ISSUES IN APPLYING THE UNFC CLASSIFICATION SYSTEM (3/4)

- **G-axis** refers to degree of **geological confidence defined by exploration data** which defines the qualitative and quantitative resource estimation of a project. Reflects the spatial distribution of exploration data, ore grade, volumes of mineralized rock above cut-off grade, and/or volume and locations of aggregate bulk material. G-axis categories also reflect geological uncertainties (e.g. ore grade variability). **G-axis challenges** were:
 - **G-axis categories were affected by exclusion zones** (e.g. building land, environmentally protected areas, cultural areas).
 - **G-axis values were assigned by using external factors** (e.g. distance to markets as confidence threshold for economic viability).
 - Application of UNFC categories, e.g. UNFC 224 unrealistic and not aligned with JORC, NI43-101, PERC. Probable reserves assigned with UNFC G1 (should be G2).
 - **Tonnage** and **grade figures** not quoted according to level of estimate accuracy and precision.



ISSUES IN APPLYING THE UNFC CLASSIFICATION SYSTEM (4/4)

▪ ALL AXES & GENERAL ISSUES

- Aggregate resource classification with different criteria (e.g. UNFC 111 for both active production and non-production cases, or both probable and proven reserves (only latter can be UNFC 111)).
- Some **resources potential predicted by GIS models** (111, 112, 221, 222, 223 at E3, F3, G3, F4, G4 categories), partly based on unsubstantiated assumptions.
- UNFC classification **restricted to areas with exploration permits and/or mining rights** → prevents national compilation of resource data.
- **National** and/or **company resource data often confidential** → prevents external data compilation.
- Misuse of classification terminology, i.e. inconsistent mapping and use of classification UNFC categories (e.g. resources cannot be E1/F1 or 111, reserves cannot be E2/F2 or 222).



CRIRSCO vs. UNFC Bridging

(source: UNECE 2015 bridging document)

- Template illustrates the correlation between CRIRSCO template and UNFC classification.
- UNFC-2009 classes are identical to UNFC (2019) guidelines (source: UNECE 2020).

CRIRSCO Template		UNFC-2009 “minimum” Categories			UNFC-2009 Class
Mineral Reserve	Proved	E1	F1	G1	Commercial Projects
	Probable			G2	
Mineral Resource	Measured	E2	F2	G1	Potentially Commercial Projects
	Indicated			G2	
	Inferred			G3	
Exploration Target		E3	F3	G4	Exploration Projects



GENERAL SUGGESTIONS HOW TO SOLVE INCONSISTENT APPLICATION OF THE UNFC (1/2)

▪ ALL AXES & GENERAL ISSUES

- UNFC classification of mineral inventories predominantly reflect the maturity of mineral projects.
- Mapping of resource quantities into UNFC categories to be based on **robust references** → **no reported resource data, no UNFC classification**.
- When using CRIRSCO Bridging Doc, resources of **closed mines** may be UNFC 221 to 334 (221/222/223 requires CRIRSCO-compliant resource reporting, and must be active project). **Abandoned closed mines** are E3/F3-4.
- When using CRIRSCO-UNFC Bridging Doc (UNECE 2015) mapping quantities and grade information in UNFC (2019), „**Historical estimates**“ should not be classified into UNFC categories other than „exploration target“.
- (Accredited) evaluator always reports **independently**, and **cannot decide on behalf of the owner on commercial viability**.



GENERAL SUGGESTIONS HOW TO SOLVE INCONSISTENT APPLICATION OF THE UNFC (2/2)

■ ALL AXES & GENERAL ISSUES

- Evaluators **cannot make assumptions or predictions** on projects economic viability, geol. confidence, mining, processing, data coverage, metallurgical factors etc. of a mineral deposit.
- Assumptions & conclusions on economic viability are made by **commercial operators only based on results from technical feasibility and economic viability studies** prior to production.
- When using the CRIRSCO Bridging Document, Technical (pre)feasibility, pre-economic assessments and feed studies to be code-compliant (JORC, NI43, 101, PERC, SAMREC...), i.e. **follow internationally accepted reporting criteria.**



UNFC in Practice – CONCLUSION

Data Gaps, Harmonization Issues, Challenges



- Both national and Pan-European harmonization of mineral resource data compilation are essential.
- Achievable once data gaps are closed, challenges are solved, and the following conditions are fulfilled:
 - UNFC system application to be commonly understood and harmonized.
 - Variable (national) mineral resource and reserve reporting practices, incl. producing & maintaining a nationally restricted national resource data collection, should be uniform and consistent among European countries.
 - Harmonized data can be achieved via creation of a permanent, Pan-European instrument for training in harmonized mapping of national raw material resources according to the UNFC system.



Thank you!

Dr. Michael Haschke
Director Innovation & EU Relations, DMT (TÜV NORD GROUP)

UNECE

Date 2-3. Feb 2022, Geneva

