

Reserves classification systems around the world

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Public reporting of exploration results, resources and reserves - purposes

- **Disclosure for companies quoted on stock exchanges.**
 - Objectives: Reliable, transparent information for investors and potential investors
- **Governmental, inter-governmental, or NGO reporting of mineral resource estimates and forecasts.**
 - Objectives: Reliable mineral inventory to underpin minerals policies (especially cross border e.g. Europe), available to exploration and mining companies to attract inward investment and exploration activity



Two international systems for classifying and reporting solid mineral reserves and resources

- Standards and Codes developed by members of the Committee for Mineral Reserves International Reporting Standards (**CRIRSCO**) and
- The United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources (**UNFC**).



Others, including ...

- Russian ('GKZ') system used for licensing, administrative, and national inventory – and similar systems in other FSU republics.
 - GKZ-CRIRSCO mapping published in 2010.
- Chinese system, adapted from an old UNFC version
- USA – SEC system



Committee for Mineral Reserves International Reporting Standards

CRIRSCO

*To promote International Best Practice in the
Reporting of Mineral Exploration Results,
Mineral Resources and Mineral Reserves*



CRIRSCO provides an international forum that enables **countries** to ensure consistency of their **reporting** standards in an international setting and to contribute to the development of best practice international reporting.

CRIRSCO is an international **advisory** body without legal authority and relies on its constituent members to ensure regulatory and disciplinary oversight at a national level.



CRIRSCO – a short history

- National systems: Russia (1927), USGS (1976,1980), SEC (1981), JORC (1989), IMM (1991), ...
- 1994 Sun City: CRIRSCO formed, 5 members (CMMI Mineral Definitions Working Group)
- 1997 “Denver Accord”: agreed definitions
- 1998-9 Geneva: CRIRSCO / UNECE agreement
- 2006 CRIRSCO Template published
- 2010 Russian national system mapped to CRIRSCO
- 2011 UNFC-2009 with full CRIRSCO mapping
- Chile joined in 2004; Russia joined in 2011; several other candidate members

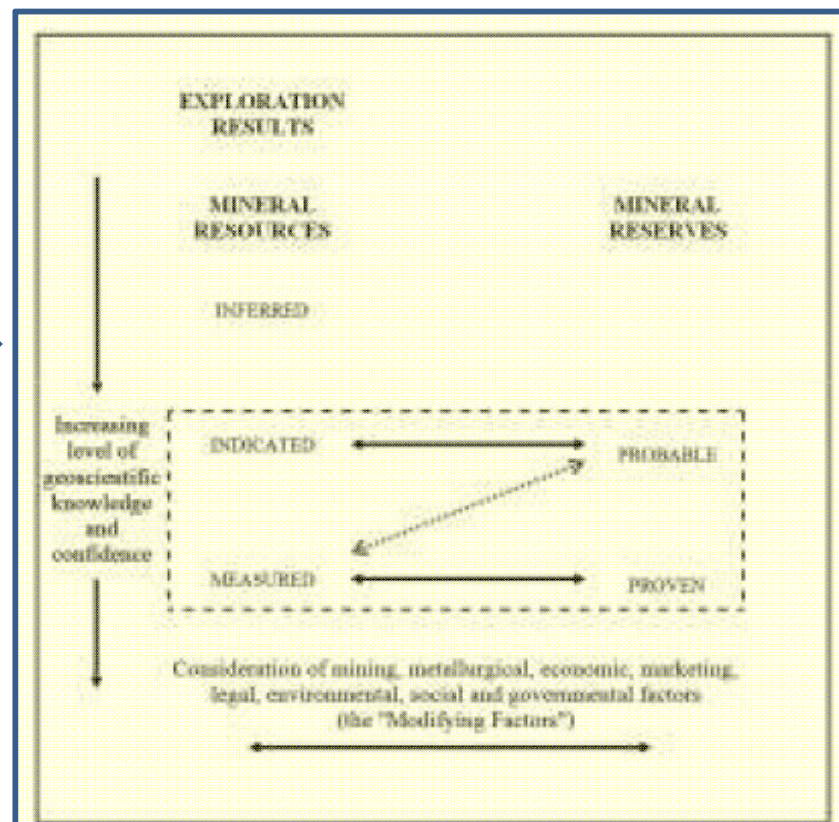
USGS Bulletin Was The Precursor to Modern Codes

USGS Bulletin 1450-A and USS Circular 831

Cumulative Production	IDENTIFIED RESOURCES		UNDISCOVERED RESOURCES		
	Demonstrated		Inferred	Probability Range	
	Measured	Indicated		Hypothetical	Speculative
ECONOMIC	Reserves		Inferred Reserves		
MARGINALLY ECONOMIC	Marginal Reserves		Inferred Marginal Reserves		
SUB- ECONOMIC	Demonstrated Subeconomic Resources		Inferred Subeconomic Resources		
Other Occurrences	Includes nonconventional and low-grade materials				



McKelvey diagram: geologic confidence and economic feasibility axes



JORC, SME Guide, PERC, CIM,
CRIRSCO Template,



SEC IG7 – Proven and Probable Reserves
as reportable, Measured, Indicated, and
Inferred Resources not reportable



CRIRSCO: affiliation

- CRIRSCO was set up in 1994 by CMMI – the Council of Mining and Metallurgical Institutes.
- CMMI disbanded in 2002
- CRIRSCO is now a partner organisation of, and is partly funded by, ICMM (International Council on Mining and Metals)
 - <http://www.icmm.com/>





CRIRSCO Members

National Reporting Organisations (NROs)

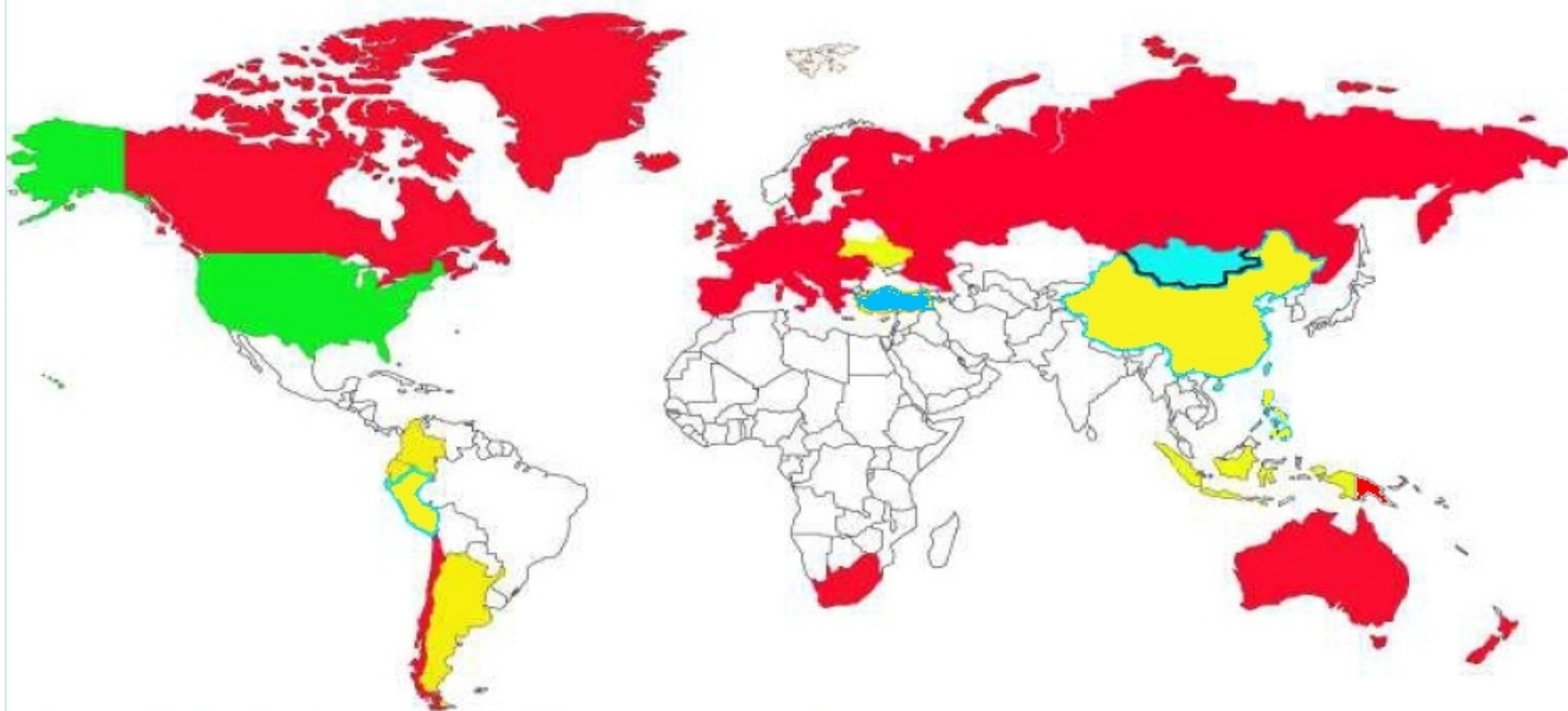
Bodies which develop and are responsible for mineral reporting codes, standards and guidelines for a country or a group of countries



NROs

- **AUSTRALASIA (JORC)**
- **CANADA (CIM)**
- **CHILE (Comisión Minera)**
- **EUROPE (PERC)**
- **RUSSIA (NAEN)**
- **SOUTH AFRICA (SAMREC)**
- **USA (SME)**

CRIRSCO-family code usage



	Recognized by Law or Listing Rules
	Recognized, if specified by foreign or state law
	Memorandum of Understanding to establish code
	Preliminary discussions



CRIRSCO's scope and aims

- **SCOPE: All solid minerals** (metals, gemstones, bulk commodities, aggregates, industrial minerals, energy minerals such as coal and uranium)
- **AIM: *Promoting International Best Practice in the Reporting of Mineral Exploration Results, Mineral Resources and Mineral Reserves***
 - International consensus on reporting standards
 - Encourages consistent and high quality reporting – through maintenance of Competent Person standards
- Users of CRIRSCO-family standards include
 - **Mining Companies**
 - **Financial Institutions**
 - **Stock Exchange Regulators**
 - **Governments**
 - **Shareholders**



The CRIRSCO Template

- The set of standard definitions and principles common to all CRIRSCO reporting standards:
 - JORC (Australia)
 - CIM (Canada)
 - SAMREC/SAMVAL (South Africa)
 - PERC (Europe)
 - SME (United States)
 - Comisión Minera de Chile (Chile)
 - NAEN (Russia)



The CRIRSCO Template

- **Advisory** only - national codes take precedence.
- Intended to assist countries to produce a **new** code consistent with international best practice.
- A consolidated version of national codes that may be used in **comparisons** with other international reporting systems.
- **'Template'** is used to indicate that this document is a **model** for code development and does **not** constitute a **'code'** with legal or other regulatory force.



The CRIRSCO Template

- The core of the various standards is practically identical (and becoming ever more closely aligned)
- Inclusion of national regulatory requirements provides small but important differences
- But for the geoscientist, a report prepared under one national standard can readily be referenced to the requirements of another



The CRIRSCO Template

- **Transparency, Materiality, Competence**
are central principles



Transparency

The reader of a Public Report must be provided with **sufficient information**, the presentation of which is **clear and unambiguous**, so as to understand the report and not be misled.



Materiality

A Public Report must contain **all the relevant information** which investors and their professional advisers would reasonably require, and reasonably expect to find, for the purpose of making a reasoned and balanced judgement regarding the Exploration Results, Mineral Resources or Mineral Reserves being Reported.



Competence

A Public Report must be based on work that is the responsibility of **suitably qualified and experienced persons** who are subject to an **enforceable professional code of ethics** and rules of conduct.



Competence

- Reports are signed off by a **Competent Person** (Qualified Person in Canada) who takes personal responsibility
- CPs/QPs must have minimum relevant **experience** and hold professional **qualifications**. Acceptable qualifications (titles) are listed in all the codes and standards; for some jurisdictions (e.g. Chile) registration may also be required
- Recognition between NROs of suitable qualifications (RPO agreements) – periodic auditing of listed RPOs and membership classes by other NROs and by regulatory bodies
- **Discipline of professionals is by professional bodies.**
- **Discipline of companies listing and relying on the report is through the stock exchange regulator**



The CRIRSCO Template

- Three sorts of information: exploration results, mineral resources, mineral reserves. All must be supported by geological data
 - **Exploration results** can be quoted only as ‘raw’ data, not tonnage and grade
 - **Mineral Resources** are estimates of mineral in the ground
 - **Mineral Reserves** are estimates of mineral as mined (allowing for losses/dilution)

**Relationship between exploration results, mineral resources & mineral reserves
in the CRIRSCO template**

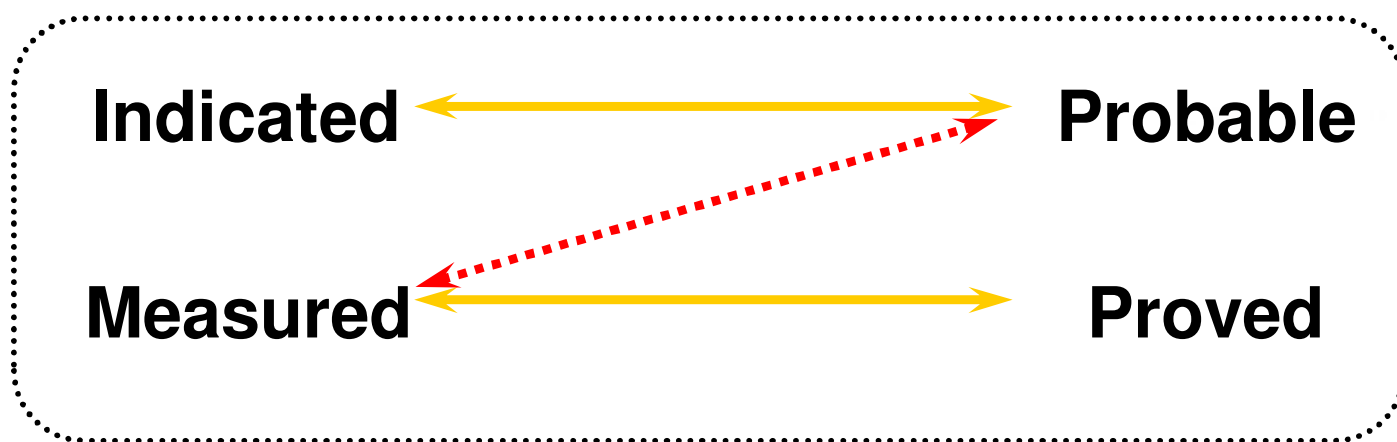
**Geoscientists with appropriate
experience and professional
credentials are responsible for
progression down this axis**

Exploration Results

**MINERAL
RESOURCES**
Inferred

**MINERAL
RESERVES**

of



**Many professionals (including geologists and other
geoscientists) may be responsible for progression
along this axis**

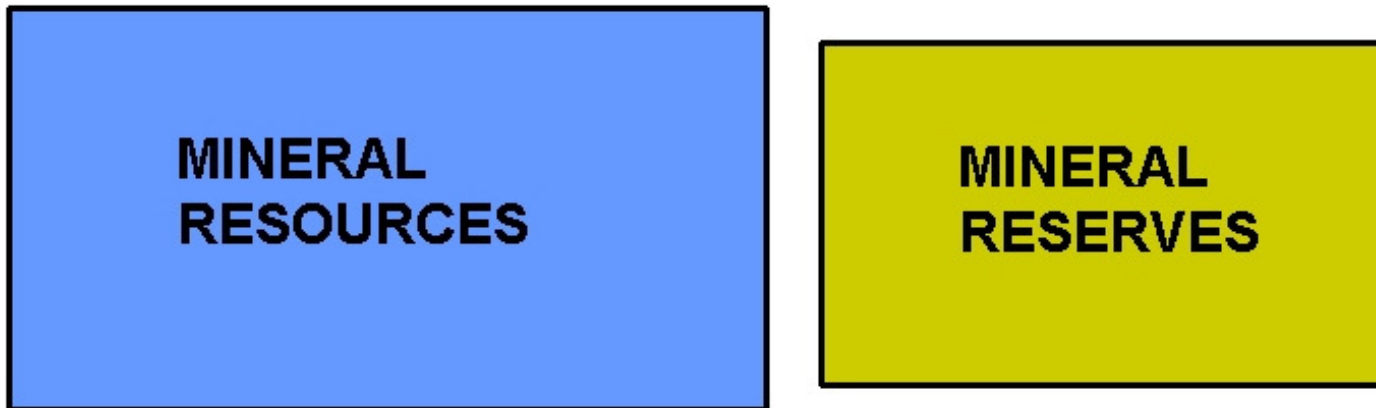


Constraints on Reserves reporting

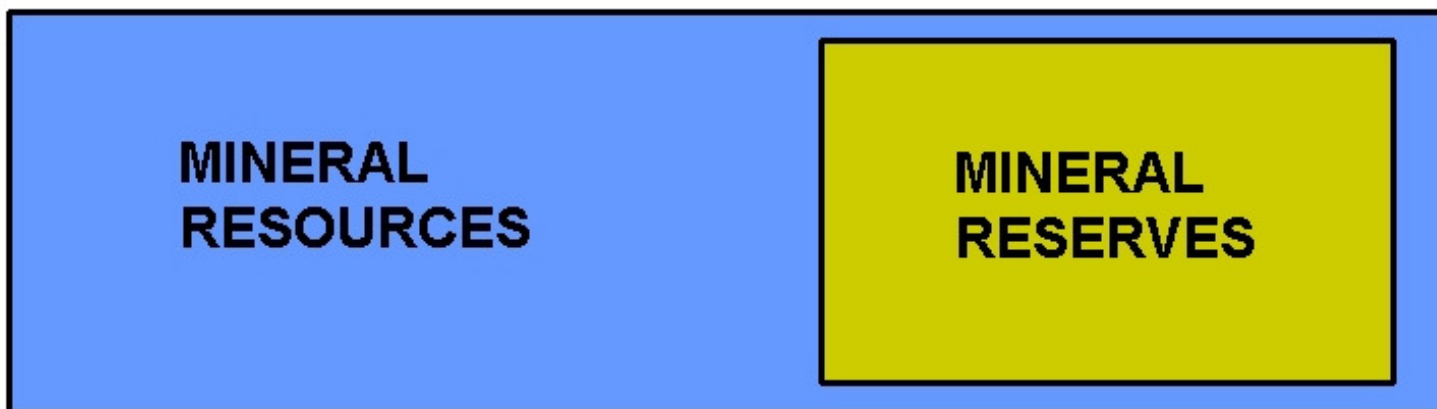
- Mineral **Reserve** estimates must **not** be **added** to Mineral **Resource** estimates to report a single combined figure.
- A statement must be included in the report which clearly indicates whether the Mineral Resources are **inclusive** of, or **additional** to, the Mineral Reserves.

Resources & Reserves: two possible conventions. Don't add them!

(1) “Resources quoted **exclusive** of material used to estimate reserves”



(2) “Resources quoted **inclusive** of material used to estimate reserves”





IASB:

International Accounting Standards Board

- Mapping project (2006-2007)
- Informal feedback on Asset Definition and Measurement (2008-2009)
- Response to Discussion Paper (2010)
- Agenda setting (2011)
- **Working with IASB to implement the CRIRSCO Template as a standard embedded in IFRSs for public disclosure of Mineral Resources and Mineral Reserves**



IASB: Extractive Activities Project Discussion paper (2010) (2)

“The project team recommends that the CRIRSCO Template and PRMS definitions of reserves and resources are suitable for use in a future IFRS for extractive activities. In the project team’s view, the nature and extent of the similarities that exist between the CRIRSCO Template and the PRMS reserve and resource definitions indicates that these definitions are capable of providing a platform for setting comparable accounting and disclosure requirements for both minerals and oil and gas properties.”

CRIRSCO - ICMM: Strategic Partnership

- **ICMM MEMBERSHIP**
 - 22 mining and metals companies
 - 34 national and regional mining associations and global commodity associations.
- **ICMM POLICY: PUBLIC ACCOUNTABILITY**
 - Sustainable Development Framework
 - ICMM member companies are required to make a public commitment to transparent and accountable reporting practices.



CRIRSCO - ICMM: Strategic Partnership

- Resources and reserves are the principal assets of the minerals industry – **CRIRSCO reporting standards are central to ICMM's public accountability policy**
- Use of the Template categories enables companies to report their pipeline of forthcoming projects and levels of confidence. All stakeholders can see the sustainable development plans of companies.

EUROPE: the PERC Standard

- a member of the CRIRSCO family

- 2006: PERC set up to replace the previous IMM Reserves Committee and an *ad hoc* European working group
 - Four parent organisations: EFG, IOM3, GSL, and IGI
- 2008: CRIRSCO-aligned PERC Reporting Standard
- 2012: A registered not-for-profit organisation, now based in Brussels
- 2012: Revised standard in progress
 - Includes specific provision for industrial and construction minerals, coal, historic estimates, ...



PERC: The Competent Person

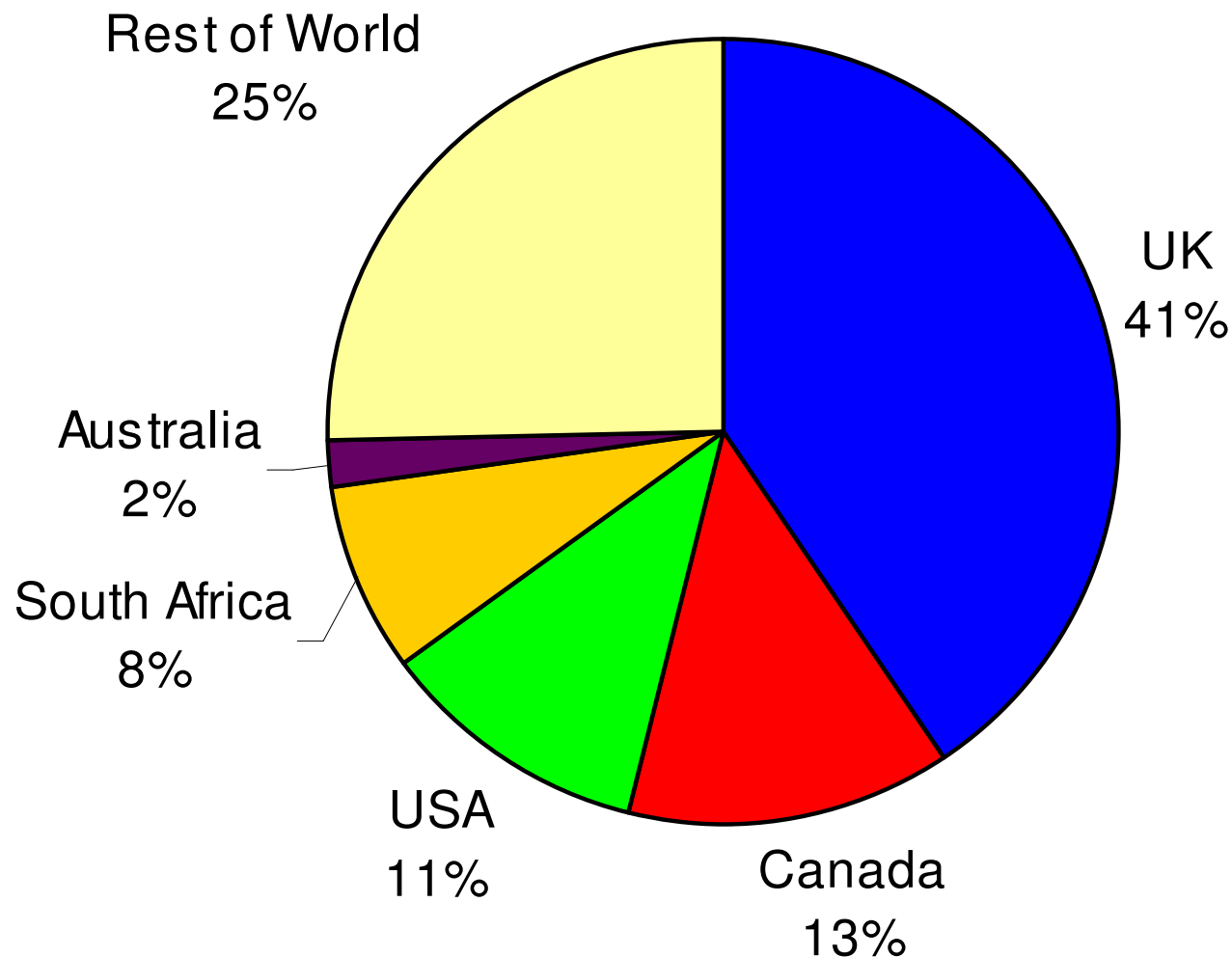
- CRIRSCO-style standards require publicly reported reserve and resource information to be based on work undertaken by a Competent Person
- The Competent Person is **named** in the public report
- It is the Competent Person's **responsibility** to ensure that the estimates have been performed properly
- The Competent Person may be either an employee or a consultant

PERC: The Competent Person

- must have at least five years **relevant** experience
- must be a **member** of EFG, IoM3, GSL, IGI or other recognised **professional organisation** that:
 - requires compliance with professional and ethical standards
 - has disciplinary powers, including the power to expel a member



PERC: a standard for European markets



**Relative sizes of
mining capital
markets –**

**EU total
estimated in the
region of 45-50%**



ESMA: the European Securities & Markets Authority

- Defines regulations for EU stock markets
- Minerals company prospectus regulations issued in 2011 after consultation in 2010
- Allows use of CRIRSCO family of reporting standards – **and no others**
- Clarification issued in 2012 for cement companies



USA: SME Guide and SEC IG7

- Two reporting standards:
- SEC IG7 – the only standard used by US stock markets. Reserves only – not Resources. No Competent Person requirement.
- SME Guide – CRIRSCO-aligned. Recognised in Canadian and European stock markets



CRIRSCO and UN-ECE

- 1997 agreement between CRIRSCO and UNECE on common definitions for UNFC (“United Nations Framework Classification”)
- 2005 CRIRSCO and SPE re-engage with UNECE
- 2009 mapped CRIRSCO Template, SPE/PRMS, UNFC
- 2011 CRIRSCO Template and PRMS officially recognised as commodity-specific codes of the UNFC-2009

UNFC: United Nations Framework Classification for fossil energy & mineral resources

- Classification for resources of solid minerals and for oil and gas
- **Only a classification**; but provides a neutral framework for mapping from/to complete **reporting systems**
- Includes all possible material – including “uneconomic” and even “undiscovered” (so it can include stuff that may not even exist!)



UNFC and CRIRSCO

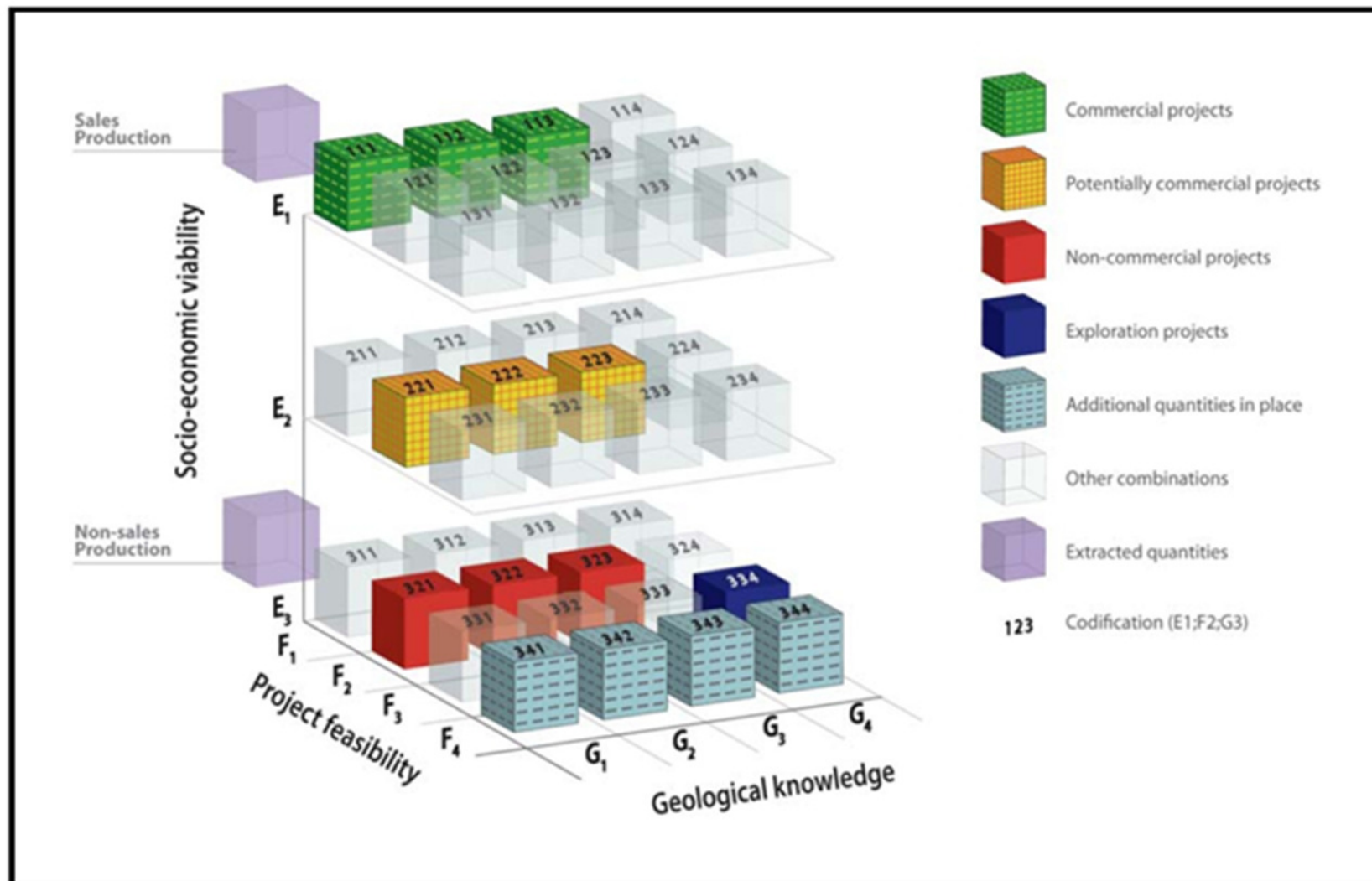
- CRIRSCO resource categories are mapped to corresponding UNFC categories (common terminology)
- **The CRIRSCO Template is the set of commodity-specific definitions in UNFC for all solid minerals**
- SPE PRMS oil and gas resource categories are also mapped to UNFC



CRIRSCO and UNFC

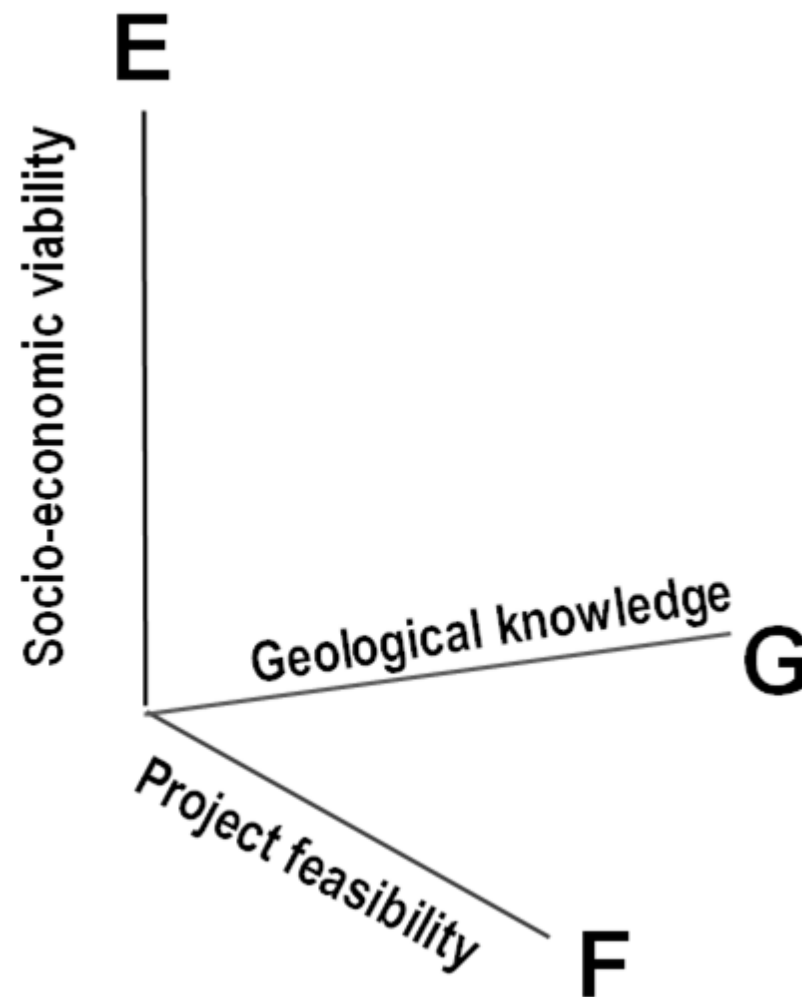
- “In accordance with the existing agreements with CRIRSCO and SPE, they have provided the commodity-specific specifications for minerals and petroleum via the CRIRSCO Template and SPE-PRMS. Along with the Generic Specifications, these provide the foundation and keystones for consistent application of UNFC-2009.” -- *UNECE report ECE/ENERGY/GE.3/2011/2 ,10th June 2011*

UNFC 2009: a 3-D classification



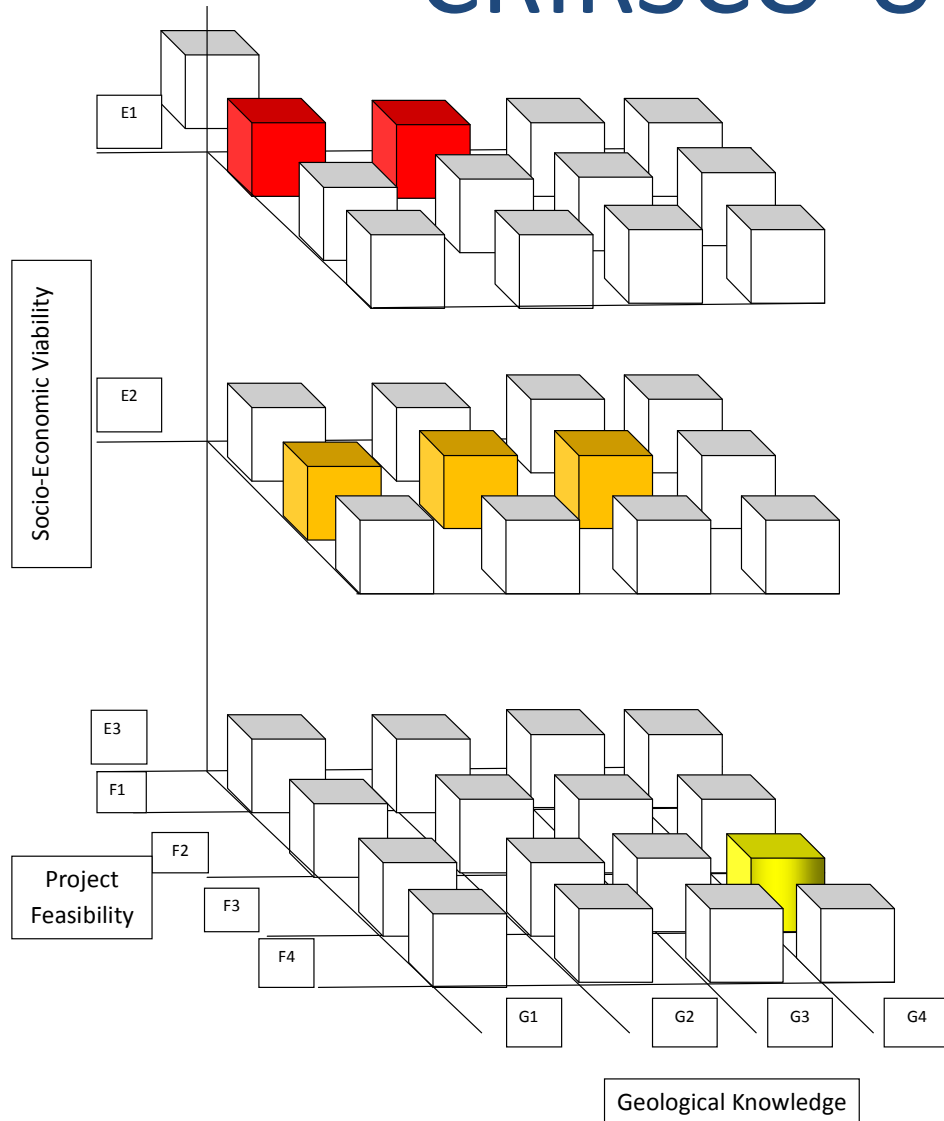


The UNFC cube has 3 axes ...





CRIRSCO-UNFC mapping



MAPPING:

111 = Proved Reserves

112 = Probable Reserves

221 = Measured Resources

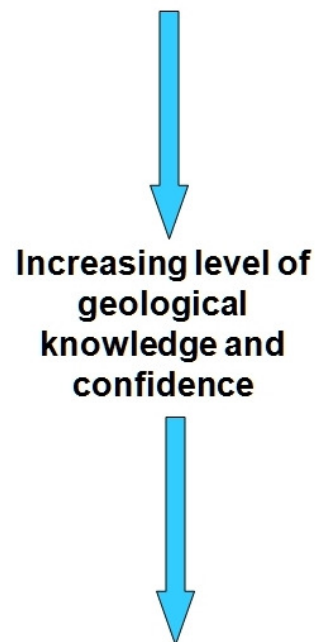
222 = Indicated Resources

223 = Inferred Resources

334 = Exploration Results



Mineralisation beyond “Inferred”



Exploration Results

**MINERAL
RESOURCES**
Inferred

**MINERAL
RESERVES**

Indicated

Probable

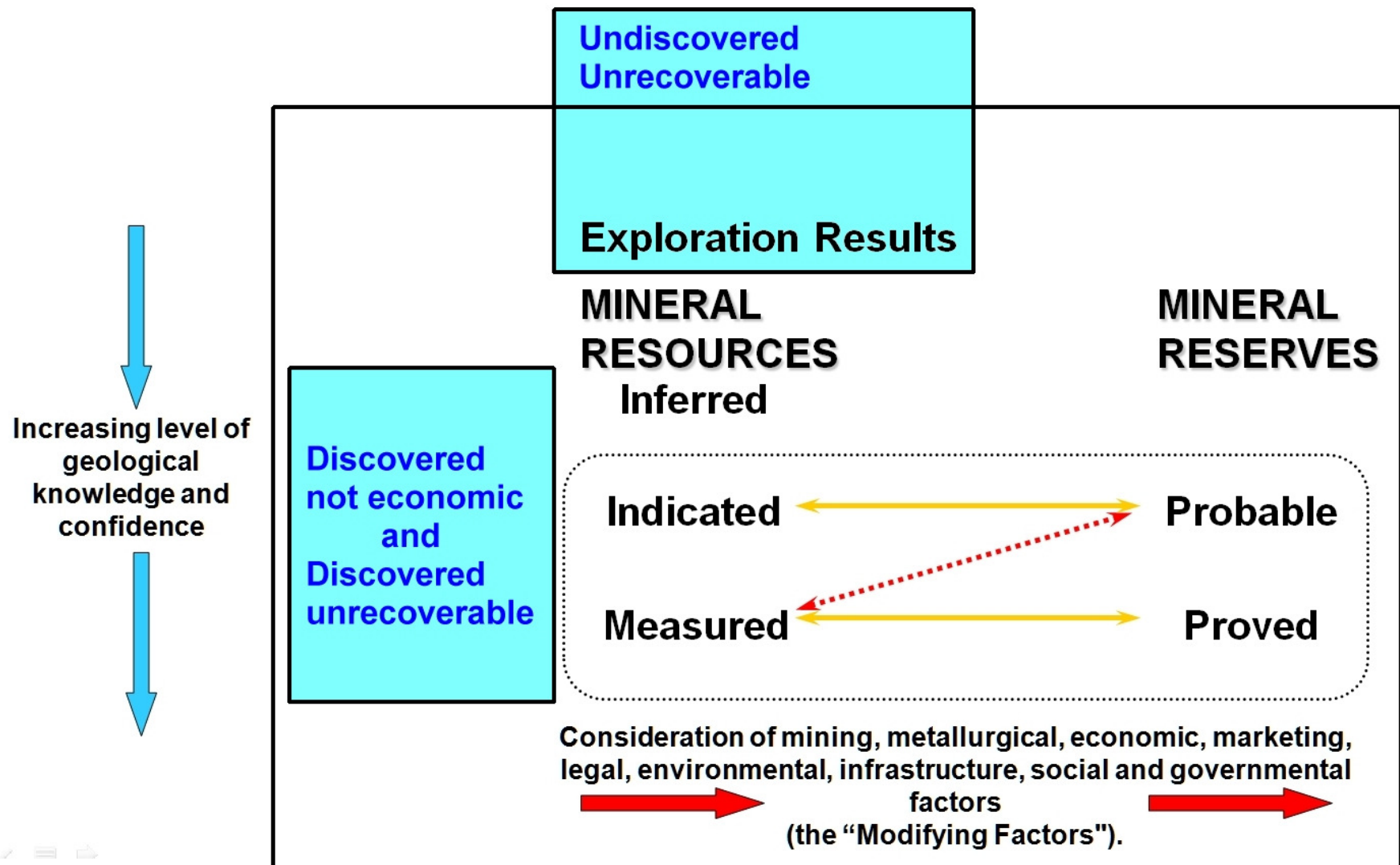
Measured

Proved

Consideration of mining, metallurgical, economic, marketing,
legal, environmental, infrastructure, social and governmental
factors
(the “Modifying Factors”).



Mineralisation beyond “Inferred”





Use CRIRSCO or UNFC ?

- These two systems are related and use consistent definitions but they are not interchangeable
- Neither provides a universal tool that can be applied to any situation where public reporting of mineral resources is necessary.



Use CRIRSCO or UNFC ?

- CRIRSCO standards require reporting **based directly upon geological data**
- There is thus no provision in CRIRSCO for any categories of **“undiscovered”** resources
- UNFC **must not** be used in Public Reporting by quoted companies



Use of UNFC

- Provides a method for **governments and NGOs** to **incorporate market data** (using the CRIRSCO classification) into **databases, mineral inventories**, and broader statistical summaries
- Provides a mechanism for **companies** to use a **standardised internal** classification beyond the publicly reported CRIRSCO categories



Final Comments

- CRIRSCO standards require all publicly declared resources to have **reasonable prospects for eventual economic extraction** (i.e. no “pie in the sky”)
- Short/medium term planning should use resources and reserves reported under CRIRSCO standards as a solid basis
- Longer term planning can simply migrate to UNFC, with introduction of prospective estimates of mineral potential

Acknowledgments

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PERC – <http://www.perc.co>

EFG - <http://www.eurogeologists.de/>

CRIRSCO – <http://www.crirSCO.com>

UNFC 2009 - <https://unp.un.org/Details.aspx?pid=21156>



Slides downloadable from
PERC – <http://www.perc.co>