CRIRSCO

COMMITTEE FOR MINERAL RESERVES
INTERNATIONAL REPORTING STANDARDS

INTERNATIONAL REPORTING STANDARDS

Stephen Henley,
International Raw Materials Observatory

Who am I?

- Geologist
- Founded "DATAMINE" mining software group in 1980s
- Independent consultant for last 25 years.
- Experience of working in Russia since 1990.
- Resource modelling and "due diligence" on a number of projects in Russia and central Asia.
- 2004-2011, independent geological adviser to Petropavlovsk plc
- Member of PERC since 2006, former chairman, represented PERC on CRIRSCO 2008-2013.
- 2018, appointed president of the International Raw Materials Observatory.

Why do we need reporting standards?

The mining industry *– an international business and a vital contributor to national and global economies;*

Based on depleting mineral assets *- knowledge is imperfect before extraction.*

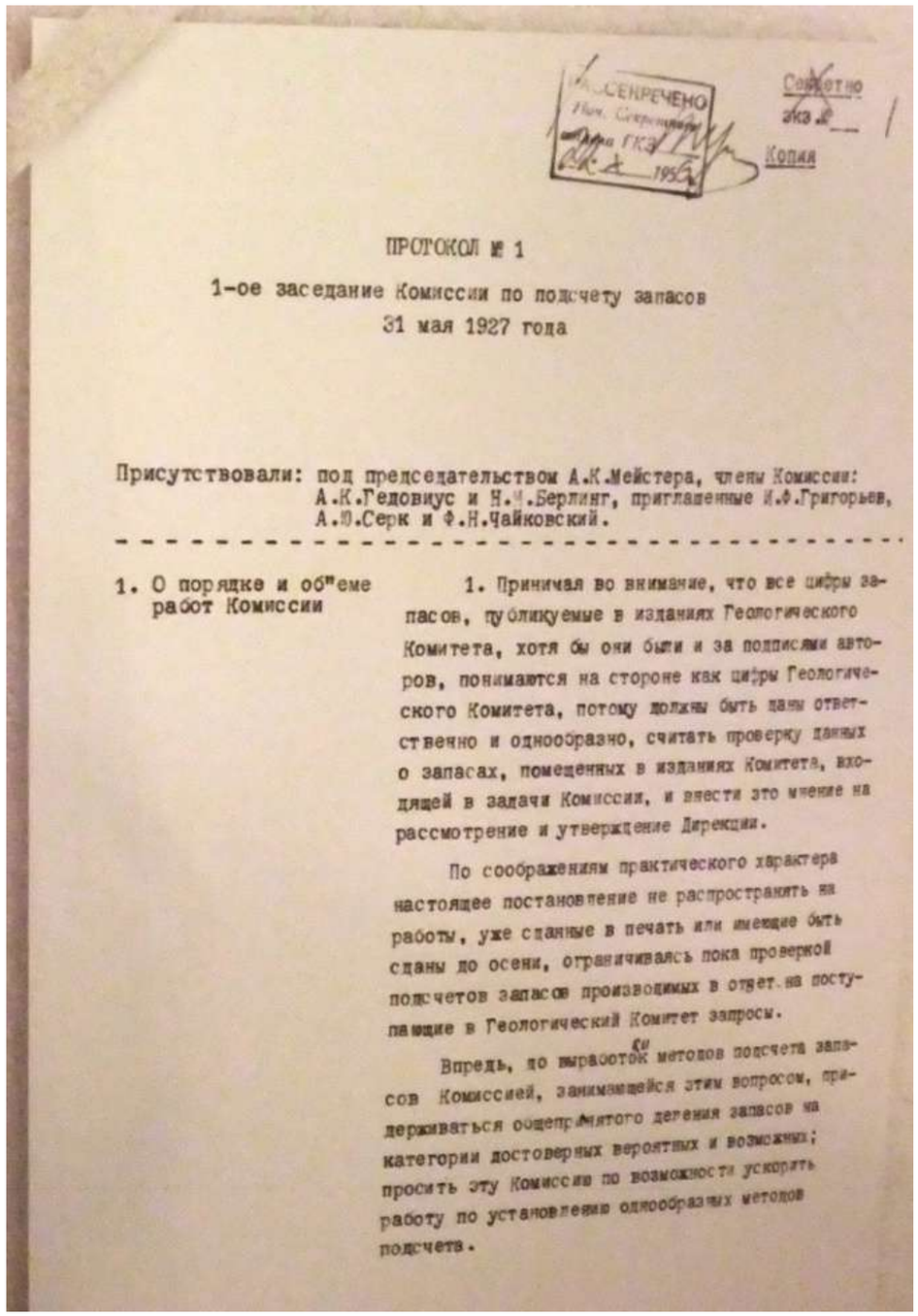
Requires clear communication of risks – *depends on the trust and confidence of investors and other stakeholders for its financial and operational well-being.*

Reporting: TWO main purposes

- For **GOVERNMENT** – to estimate raw materials supplies to assist development of national economic **policy** (“minerals inventory”) and for **administration** and **taxation**

- For **INDUSTRY** – to provide information for an accurate assessment of **financial risks for investors** (“resources and reserves”)

Government: the Soviet system: 1927



РАЗРЕШЕНО
Нач. Секретариата
Президиума ГКЗ
[illegible] 1952

Совершенно
Акз №

Копия

ПРОТОКОЛ № 1

1-ое заседание Комиссии по подсчету запасов
31 мая 1927 года

Присутствовали: под председательством А.К.Мейстера, члены Комиссии: А.К.Гедовиус и Н.Ч.Берлинг, приглашенные И.Ф.Григорьев, А.Ю.Серк и Ф.Н.Чайковский.

1. О порядке и об"еме работ Комиссии

1. Принимая во внимание, что все цифры запасов, публикуемые в изданиях Геологического Комитета, хотя бы они были и за подписями авторов, понимаются на стороне как цифры Геологического Комитета, потому должны быть даны ответственно и однообразно, считать проверку данных о запасах, помещенных в изданиях Комитета, входящей в задачи Комиссии, и внести это мнение на рассмотрение и утверждение Дирекции.

По соображениям практического характера настоящее постановление не распространять на работы, уже сданные в печать или имеющие быть сданы до осени, ограничиваясь пока проверкой подсчетов запасов производимых в ответ. на поступающие в Геологический Комитет запросы.

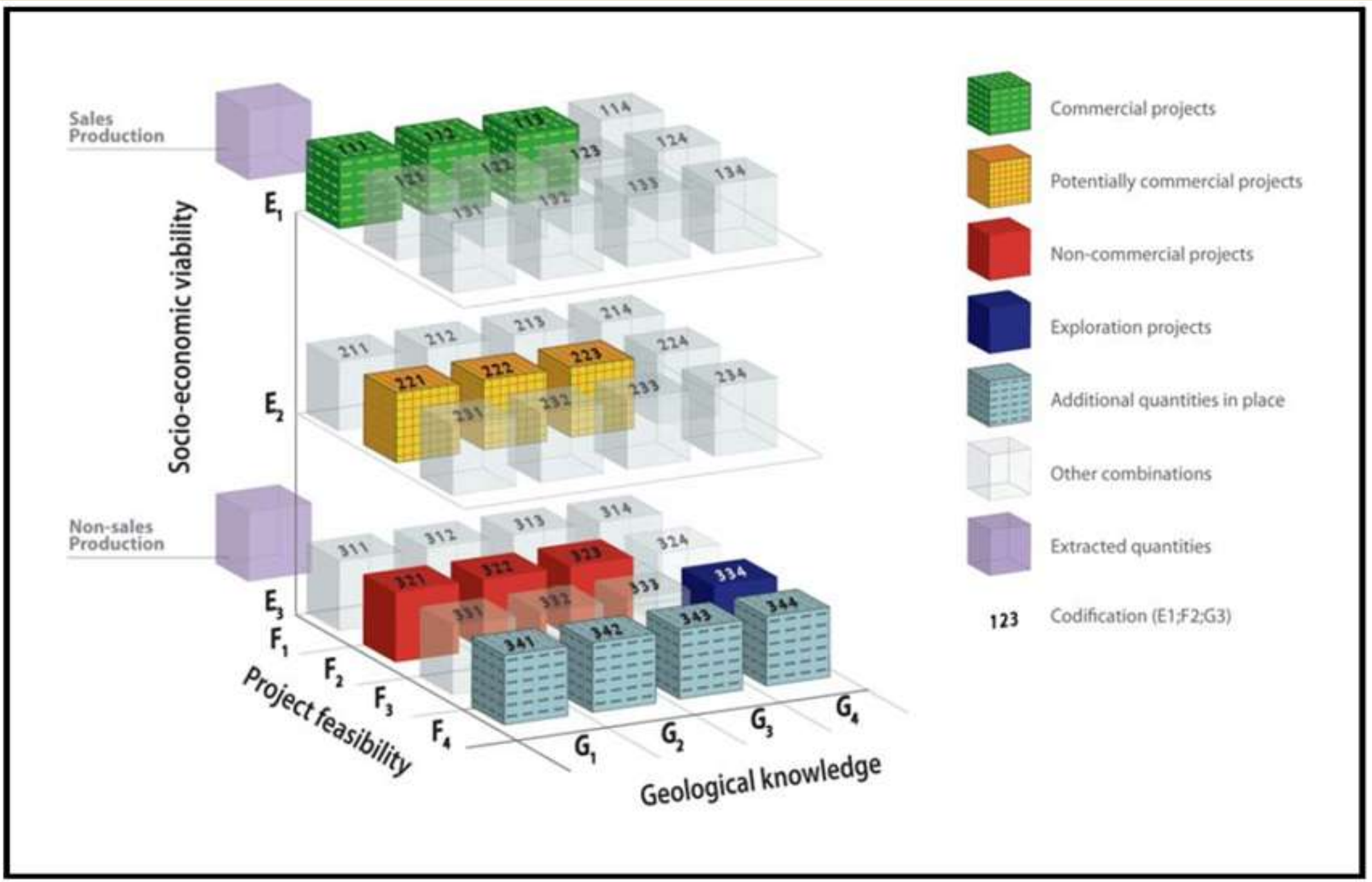
Впредь, до выработок методов подсчета запасов Комиссией, занимающейся этим вопросом, придерживаться общепринятого деления запасов на категории достоверных вероятных и возможных; просить эту Комиссию по возможности ускорить работу по установлению однообразных методов подсчета.

- GKZ formed: State Commission on Mineral Reserves
- Protocol No.1 of 31 May 1927
- Defined reserves categories “**Proved**”, “**Probable**”, and “**Possible**”

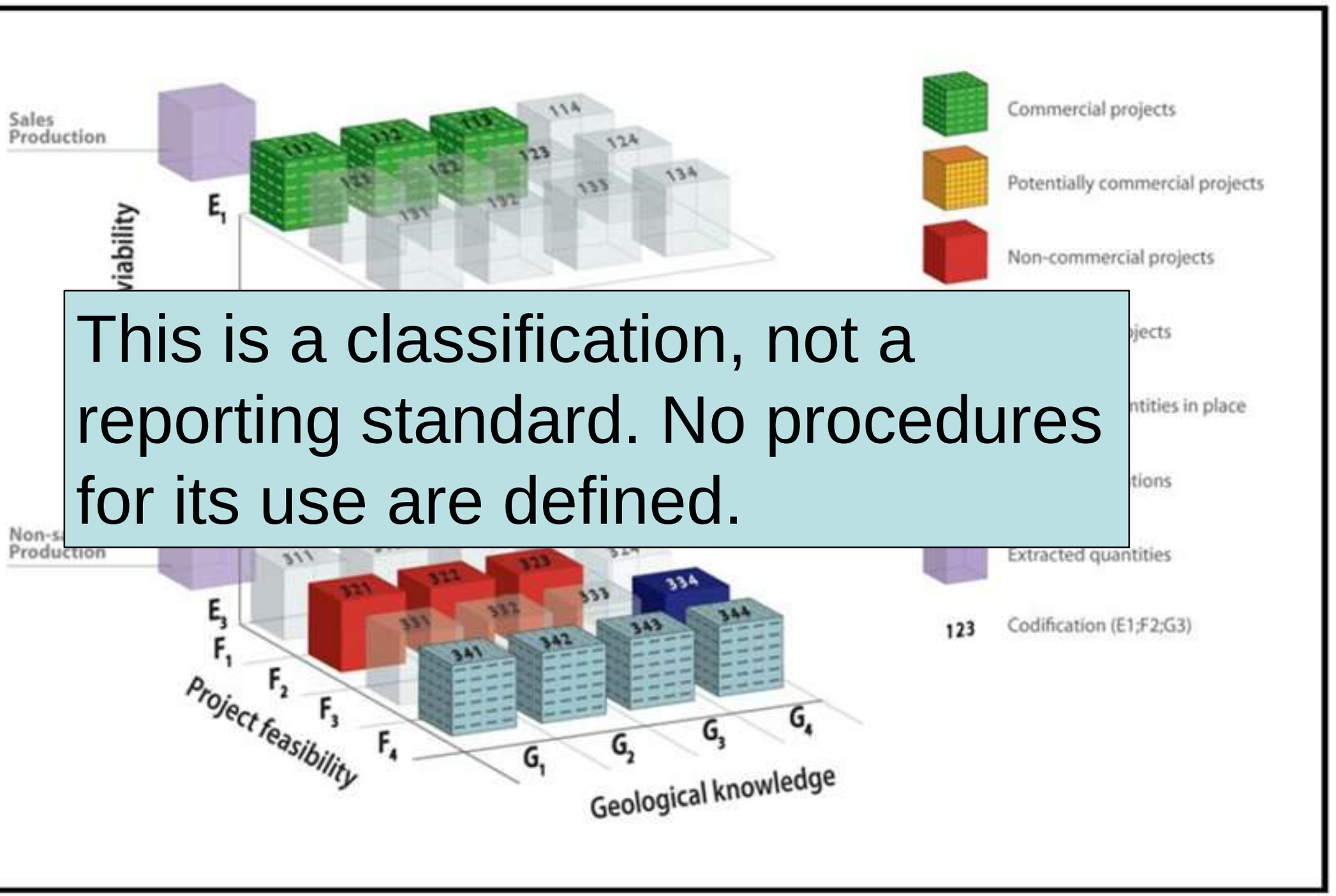
The Russian (GKZ) Reporting System

- Published 1966, updated 1981 and 2008 (and 2018?)
- Entire range of resources and reserves from regional exploration planning to detailed blocked-out reserves in operating mines
- Integrated with Russian mining law and taxation system
- Intended for **administration**, **management,** and **planning**, not primarily for market financing

International: UNFC-2009 classification



International: UNFC-2009 classification



This is a classification, not a reporting standard. No procedures for its use are defined.

MINING INDUSTRY

- Some major financial scandals related to minerals reporting during 1960s to 1990s. Examples:
  - (Australia, 1970) Poseidon nickel boom / bust
  - (Canada, 1997) Bre-X large-scale fraud

- **Necessary formalisation of reporting standards: first in Australia, US, UK, Canada, South Africa**

- Self-regulation imposed by stock exchanges

- **CRIRSCO was formed in 2002 to standardise minerals reporting internationally**

Importance of Mineral Reporting Codes

Mines are based on

- Depleting Assets
- Imperfect knowledge before extraction starts

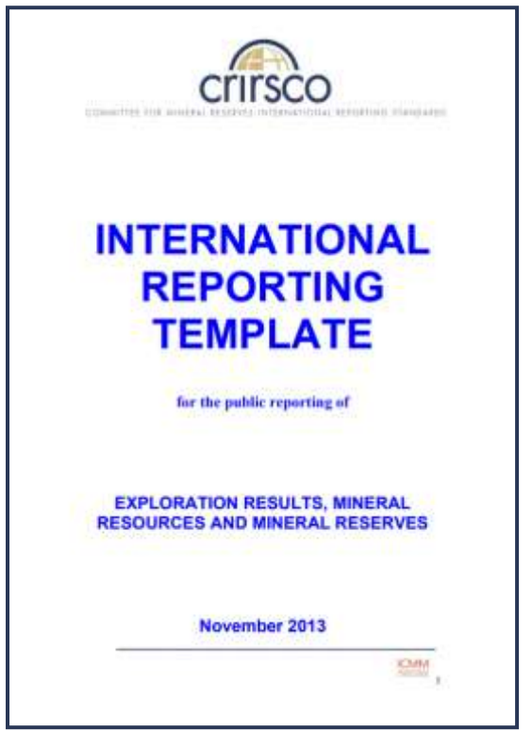
Developing a mining project or mine involves

- Technical expertise
- Long term, large capital investment
- Carries numerous risks: not just geological but engineering, environmental, social, political, and financial

Why was CRIRSCO created?

<u>For the mining industry:</u>

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

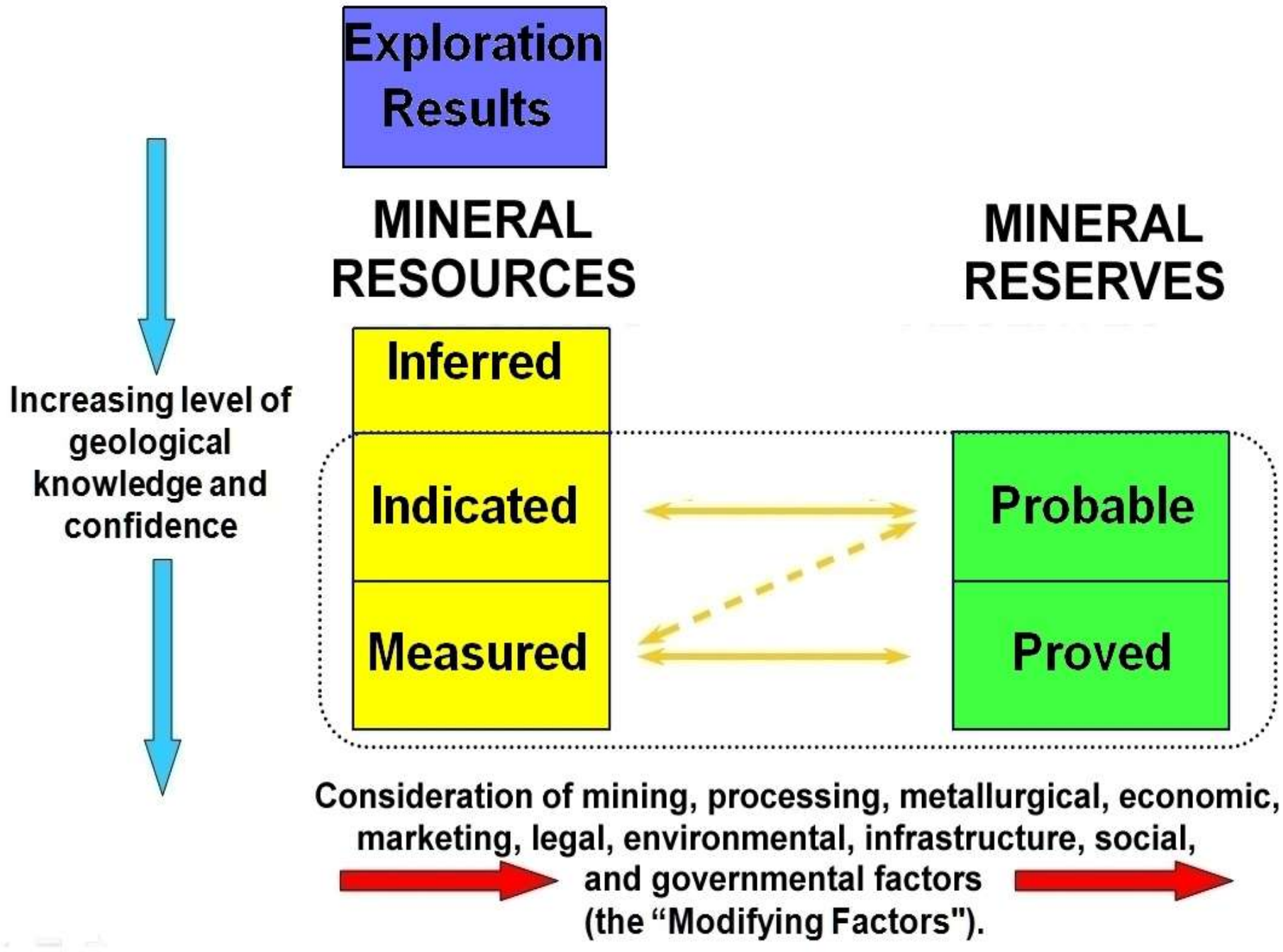


Provides the framework for a **<u>required minimum standard</u>** for the **<u>Public Reporting</u>** of Exploration Results, Mineral Resources and Mineral Reserves

Relevant to **<u>all solid minerals</u>**

<u>Common concepts applicable worldwide</u>

Figure 1: the CRIRSCO classification



Standard Definitions

- Public Reports
- Competent Person
- Exploration Target
- Exploration Results
- Mineral Resource
- Indicated Resource
- Inferred Resource
- Measured Resources
- Modifying Factors
- Mineral Reserve
- Probable Reserve
- Proved Reserve
- Scoping Study
- Pre-Feasibility Study
- Feasibility Study

The Competent Person

Requirements for a Competent Person

A minerals industry professional

- Often a geologist or mining engineer
- Active in the extractive industry
- May work locally or internationally

A member of a Recognised Professional Organization (RPO)

- Appropriate membership level
- Subject to ethics and disciplinary codes

Minimum five years relevant experience

- Style of mineralization
- Type of deposit
- Activity or area of technical input which that person is undertaking

Can the Competent Person face their peers and demonstrate competence in the commodity, type of deposit and reporting activity they are undertaking?

Note: These requirements are also subject to any additional restrictions or conditions which may be required by relevant stock exchanges or governmental/regulatory authorities.

13 CRIRSCO Members

CRIRSCO comprises 13 self regulating national bodies

CRIRSCO

- **JORC** (Australasia) *1994*
- **CBRR** (Brazil) *2015*
- **CIM** (Canada) *1994*
- **Comision Minera** (Chile) *2003*
- **CCRR** (Colombia) *2018*
- **PERC** (Europe) *1994 (as IMM Code)*
- **Kombers-KCMI** (Indonesia) *2017*
- **KAZRC** (Kazakhstan) *2016*
- **MPIGM** (Mongolia) *2014*
- **NAEN** (Russia) *2011*
- **SAMCODES** (South Africa) *1994*
- **UMREK (Turkey) 2018**
- **SME** (United States of America) *1994*

The National Reporting Organizations (NROs)

Global reach, providing a single view

What is an NRO?

National Reporting Organisation

Represents a single country or defined group of countries

Develops and is responsible for reporting code, standards and guidelines

Single or multiple professional bodies (RPOs)

Other participating bodies

(may also be advisors or observers)

Practising mineral professionals/ experts

Company representation

Regulatory/ government agencies

Stock exchanges

- NROs are self funded and managed bodies
- Structures and organizational arrangements vary depending on national/regional needs
- NROs may also act as the RPO
- There is no one 'standard' model for NROs

CRIRSCO does not define or direct activities of NROs

Russia joined CRIRSCO in 2011

2006 **GKZ-CRIRSCO working group founded to address basic questions**

2008 **Protocol of Intent GKZ-CRIRSCO**

2010 **Guidelines for harmonisation of reporting standards**

OERN Round Table to discuss Guidelines

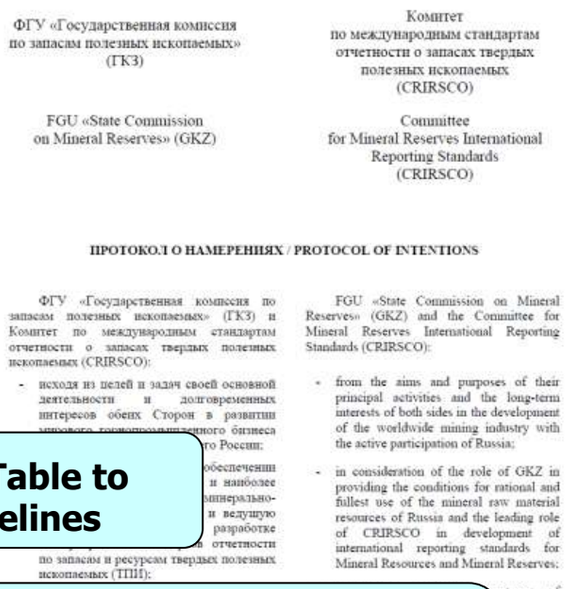
Protocol of Intent GKZ-CRIRSCO-OERN

International conference: "Russia and international reporting standards for mineral resouirces and reserves"

2011 **Russian CRIRSCO-aligned Code for public reporting exploration results, resources, and reserves**

Seminar on International Standards for reporting mineral reserves and resources

Adoption of the Code for public reporting



ФГУ «Государственная комиссия по запасам полезных ископаемых» (ГКЗ)

Комитет по международным стандартам отчетности о запасах твердых полезных ископаемых (CRIRSCO)

FGU «State Commission on Mineral Reserves» (GKZ)

Committee for Mineral Reserves International Reporting Standards (CRIRSCO)

ПРОТОКОЛ О НАМЕРЕНИЯХ / PROTOCOL OF INTENTIONS

ФГУ «Государственная комиссия по запасам полезных ископаемых» (ГКЗ) и Комитет по международным стандартам отчетности о запасах твердых полезных ископаемых (CRIRSCO):

- исходя из целей и задач своей основной деятельности и долговременных интересов обеих Сторон в развитии мирового горнопромышленного бизнеса и горно России;

FGU «State Commission on Mineral Reserves» (GKZ) and the Committee for Mineral Reserves International Reporting Standards (CRIRSCO):

- from the aims and purposes of their principal activities and the long-term interests of both sides in the development of the worldwide mining industry with the active participation of Russia;

- in consideration of the role of GKZ in providing the conditions for rational and fullest use of the mineral raw material resources of Russia and the leading role of CRIRSCO in development of international reporting standards for Mineral Resources and Mineral Reserves;

Федеральное государственное учреждение «Государственная комиссия по запасам полезных ископаемых» (ФГУ «ГКЗ») Объединенный Комитет по международным стандартам отчетности о запасах (CRIRSCO)

Руководство по гармонизации стандартов отчетности России и CRIRSCO.

Москва, 2010 г.

crirsco

Russian Federal Government Agency State Commission on Mineral Reserves (FGU GKZ) Committee for Mineral Reserves International Reporting Standards (CRIRSCO)

Guidelines on Alignment of Russian minerals reporting standards and the CRIRSCO Template

Moscow 2010

The Russian (NAEN) Code

- Developed by NP NAEN, OERN, GKZ, CRIRSCO
- Based on the CRIRSCO Template with guidelines from the Russian national system
- Establishes minimum requirements for public reporting by mining and exploration companies
- Designed for use in international markets, used in parallel with the Russian national classification

PERC: Structure

PERC: Pan-European Reserves & Resources Reporting Committee

PERC is registered in Brussels as a not-for-profit organization (absl)

PERC PAN-EUROPEAN RESERVES & RESOURCES REPORTING COMMITTEE

Executive

Pim Demecheleer (Chair) EFG
Neil Wells (Deputy Chair) IoM3
Edmund Sides (Executive Secretary) IGI
Ruth Allington (Treasurer) EFG

Trustees

Gordon Riddler
John Clifford
Steve Henley IoM3

RPOs *

EFG	GSL	IGI	IOM3	FAMMP	IBEM
European Federation of Geologists	Geological Society of London	Institute of Geologists of Ireland	Institute of Materials, Minerals and Mining	Fennoscandian Association for Minerals and Metals Professionals	Iberian Mining Engineers Board

Co-opted Members

* RPO = Recognised Professional Organisation

PERC: EU “Horizon 2020” Projects

INTRAW (2015-2018)

- EU “Horizon 2020” project, led by EFG to establish a European “**Raw Materials Observatory**” on mineral non-energy raw materials
- PERC is a consortium partner, with the project co-ordinated by the EFG
- Collaboration with participants from Australia, South Africa and United States)

MINATURA 2020 (2015-2018)

- Developing harmonised European regulatory guidance and policy framework for defining and safe-guarding ***'mineral deposits of public importance'*** to ensure their future '*best use*'
- Promoting mineral security and raising mineral planning profile in land use considerations

Intraw

International Raw Materials Observatory

The International Raw Materials Observatory

a not for profit international association,

Intraw

International Raw Materials Observatory

The International Raw Materials Observatory

a not for profit international association,

to support worldwide cooperation on mineral raw materials

- research & innovation
- education & outreach
- industry & trade
- recycling, management & substitution

Platform for dialogues

NFP international association

Foresight on raw materials

Future scenarios for the world of raw materials 2050

2050

Scenario 2:

UNLIMITED TRADE

Increased global consumption leads to raw materials growth.

In 2050, the world of raw materials has experienced **steady growth**, mainly due to ever-growing consumption. International cooperation and dialogue have created **new opportunities to produce and trade** raw materials. Access to capital has led to **industry integration, technology development and productivity improvements** alike.

- The growth of the BRICS states has been amplified by other fast-growing economies (Mexico, Indonesia etc.).
- The world's economic giants (the U.S., China and India) have opted to intensify dialogue and to cooperate.
- Despite the wide existence of backup strategies related to interrupted supply, raw material prices remain stable.
- As capital is available, the extraction of raw materials goes on and new mines are opened.
- Open data repositories enable collaborative research, innovation and planning.
- Secondary raw materials play an increasingly important role, but cannot satisfy total demand.
- Positive public image of mining – it is regarded as a diverse and high-tech industry.
- Technological progress has many effects (better exploration, higher automation, reduced need for energy & water, mining of previously sub-economic mines).

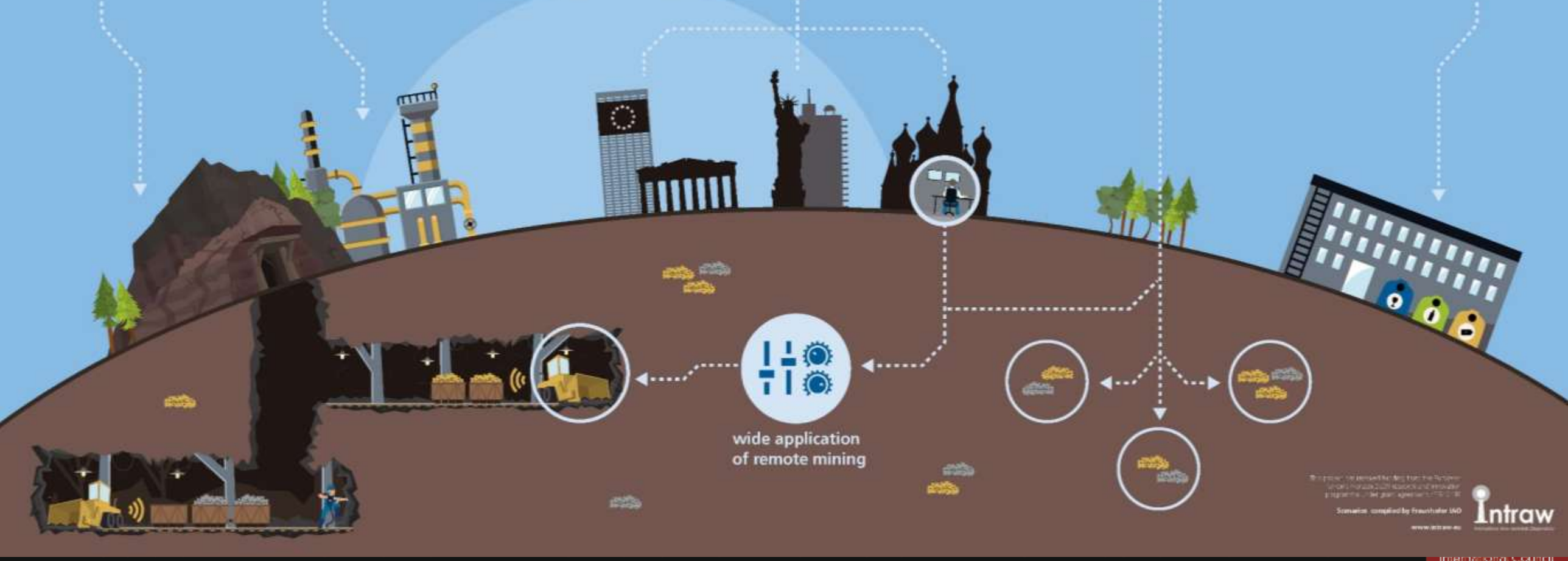
increased demand for raw materials due to growing consumption

vertical integration of processing industry

international cooperation and elimination of trade barriers

increased use of high tech for exploration and extraction

recycling gains importance



Scenarios compiled by Fraunhofer UMSICHT

Intraw

International Council on Mining & Metals

Future scenarios for the world of raw materials 2050

2050

Scenario 3:

NATIONAL WALLS

Economic standstill gives rise to nationalist politicians and protectionist measures.

In 2050, the world of raw materials got stuck as **social and demographic pressures** triggered a long period of economic standstill, which lead to a rise of **protectionist measures**. The absence of leadership and insufficient political will didn't help to improve the situation. **Each country fights for its own agenda**. There is **little progress in mining practices** as reforms have stalled and private investments are low.

- Conflicts related to the access to raw materials arise. International institutions are weak, they can barely settle disputes.
- Big countries dominate the raw material value chain
- Disparities between countries got worse, there is little economic growth.
- Securing access to raw materials is a major challenge, especially for the resource-poor countries. Old alliances are re-established.
- Nations focus on solving their own problems. They run national economic development programmes.
- Resource-poor countries re-start mining and invest into recycling, reuse & substitution.
- Resource-rich countries favour technologies that are readily available.

countries that abandoned mining, have re-started

no collaboration across national borders

mining technology development is at a standstill, but some countries have to catch up

little economic growth, mostly boosted by national government

acceptance of mining (it is a necessity)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 642210.

Scenarios compiled by Fraunhofer IAO

Intraw

International Council on Mining & Metals

Future scenarios for the world of raw materials 2050

2050

Scenario 1:

SUSTAINABILITY ALLIANCE

A new generation puts sustainability above everything else to keep deposits for future generations.

In 2050, the **circular economy has become the norm** in the big advanced economies. A new generation of political leaders has pushed forward a series of **reforms that focus on increasing sustainability**, not only in the raw materials industry. Almost **every product is produced in an environmentally-friendly way** with the aid of green technologies.

- Severe environmental problems have reached a tipping point. Governments agree to place sustainability above growth and profit.
- Concerted actions incentivize the shift towards more sustainable approaches (not only in the raw materials industry but also in agriculture, energy, logistics etc.)
- Recycling and substitution technologies have reached a new level of maturity. Prices for secondary (recycled) material fell over time.
- Only high-tech, low-impact mining is tolerated. Consumers reward resource-efficiency, waste reduction and durable products.
- Sophisticated environmental monitoring, prevention and mitigation technologies are being deployed.

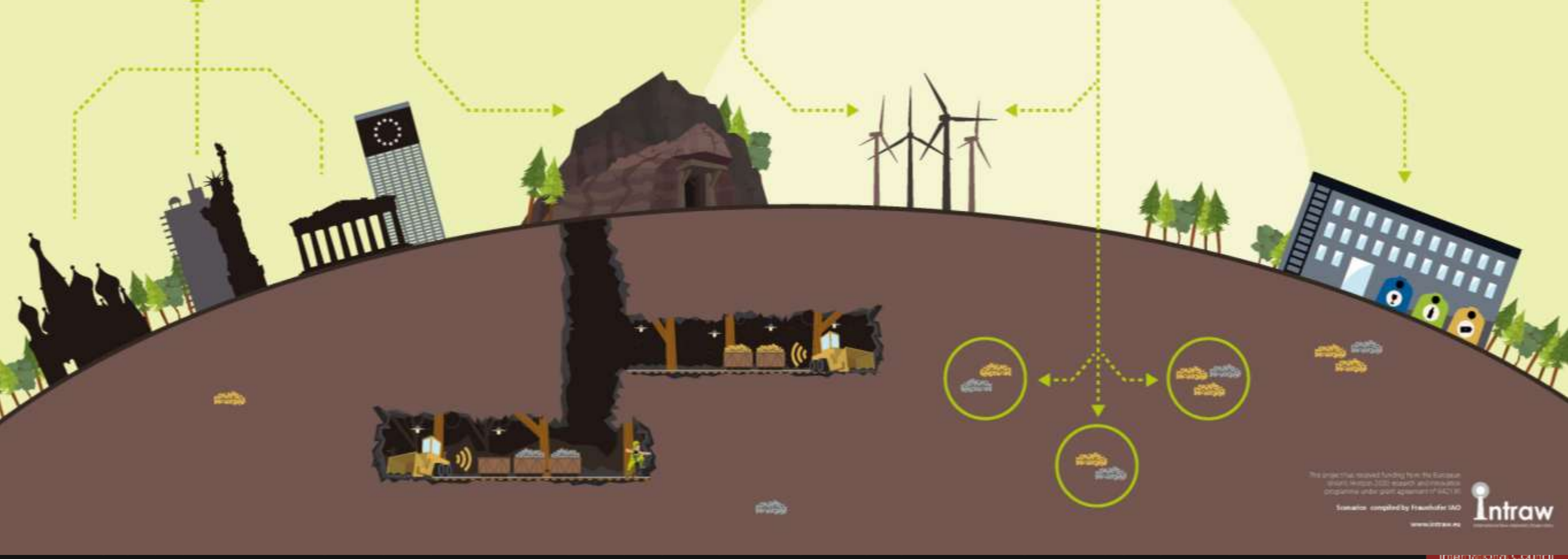
political leaders form an alliance to push reforms that focus on increasing sustainability

there is only green mining and a reduced consumption of primary raw materials

environment-friendly way of producing with the aid of green technologies

increased use of high tech for exploration and extraction

substantial progress in re-use, recycling and substitution of materials



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 642121.

Scenarios compiled by Fraunhofer ISI

www.intraw.eu

Intraw

Intraw

International Raw Materials Observatory

Diverse membership:

- Academic
- Industry
- Professional associations
- Research organisations
- Government

Open to all stakeholders

This project has received funding from the European Union's Framework Programme for Research and Innovation Horizon2020 under grant agreement nº 642130

Intraw

International Raw Materials Observatory

Diverse membership:

- Academic
- Industry
- Professional associations
- Research organisations
- Government

Open to all stakeholders

Services include:

- Reports & fact sheets
- Data repository
- Foresight studies
- Platform for dialogues
- A world barometer

This project has received funding from the European Union's Framework Programme for Research and Innovation Horizon2020 under grant agreement nº 642130

CRIRSCO Reporting Standards

- National CRIRSCO-aligned Standards are regularly updated

- Best features integrated into CRIRSCO Template updates

- Current update cycle includes
  - New guidance on specific commodities (dimension stone, industrial minerals)
  - Refinement of underlying principles

    Transparency, Materiality, Competence, Independence

CRIRSCO continues to grow

Recent new members

- Mongolia, Kazakhstan, Turkey, Indonesia
- Brazil, Colombia

Candidate members

- Argentina, Peru, Philippines
- ….. But most significantly……

CRIRSCO continues to grow

- CHINA
- INDIA

- Both expect to join soon. This will complete the BRICS representation in CRIRSCO

- CRIRSCO is very positive towards involvement in the Belt-and-Road Initiative

Downloadable from -- Можно скачать с

www.percstandard.eu/documents.asp

CRIRSCO

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ICMM
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