

# **COOPERATION BETWEEN CRIRSCO AND THE UNECE IN THE DEVELOPMENT OF THE UNFC FOR SOLID MINERALS**

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**THE DENVER ACCORD  
AND  
CRIRSCO CODE**

# In-situ

# To Plant

**Mineral Resources**

**Mineral Reserves**

Increased confidence  
↓

**Inferred**

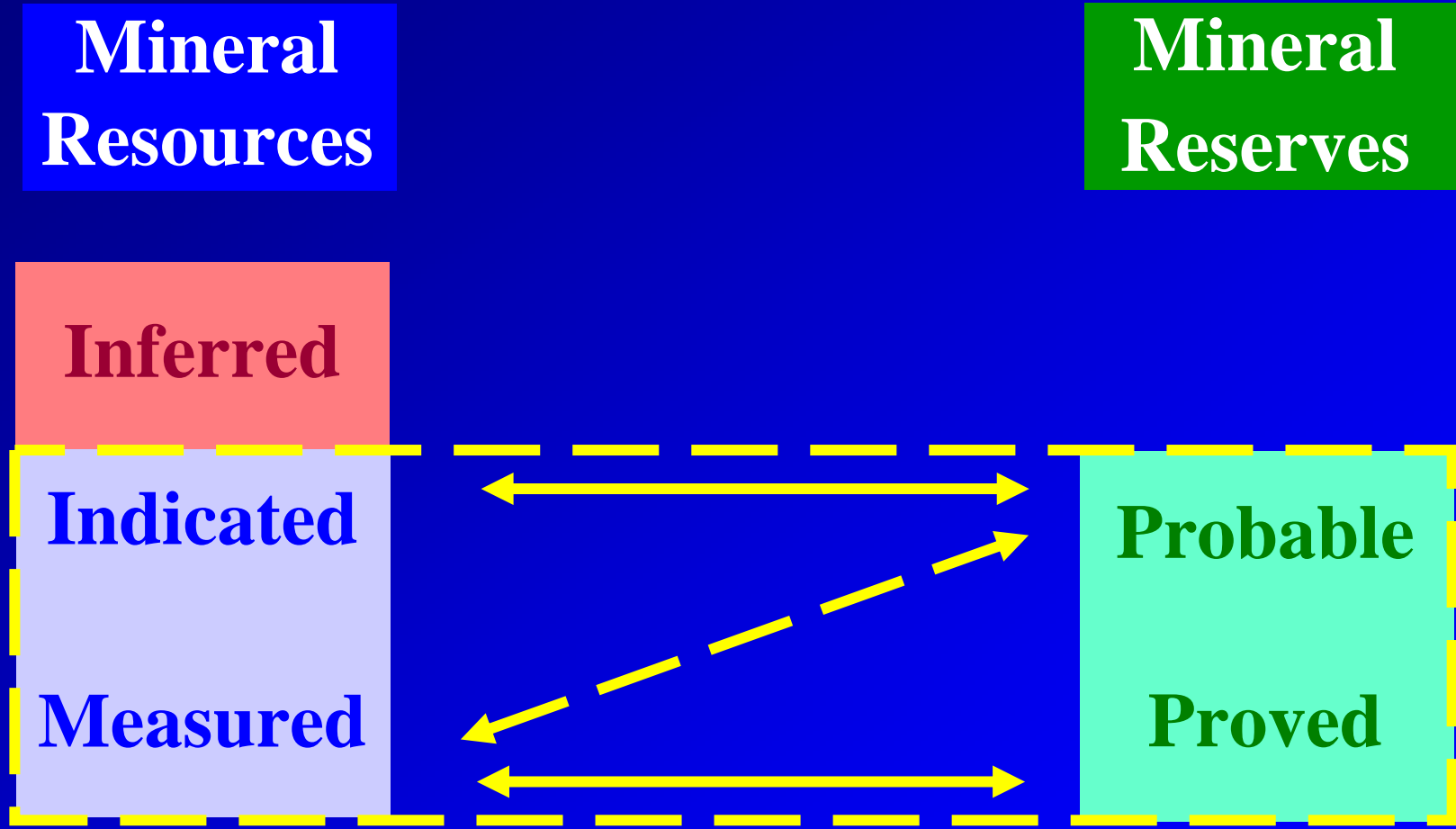
**Indicated**

**Measured**

**Probable**

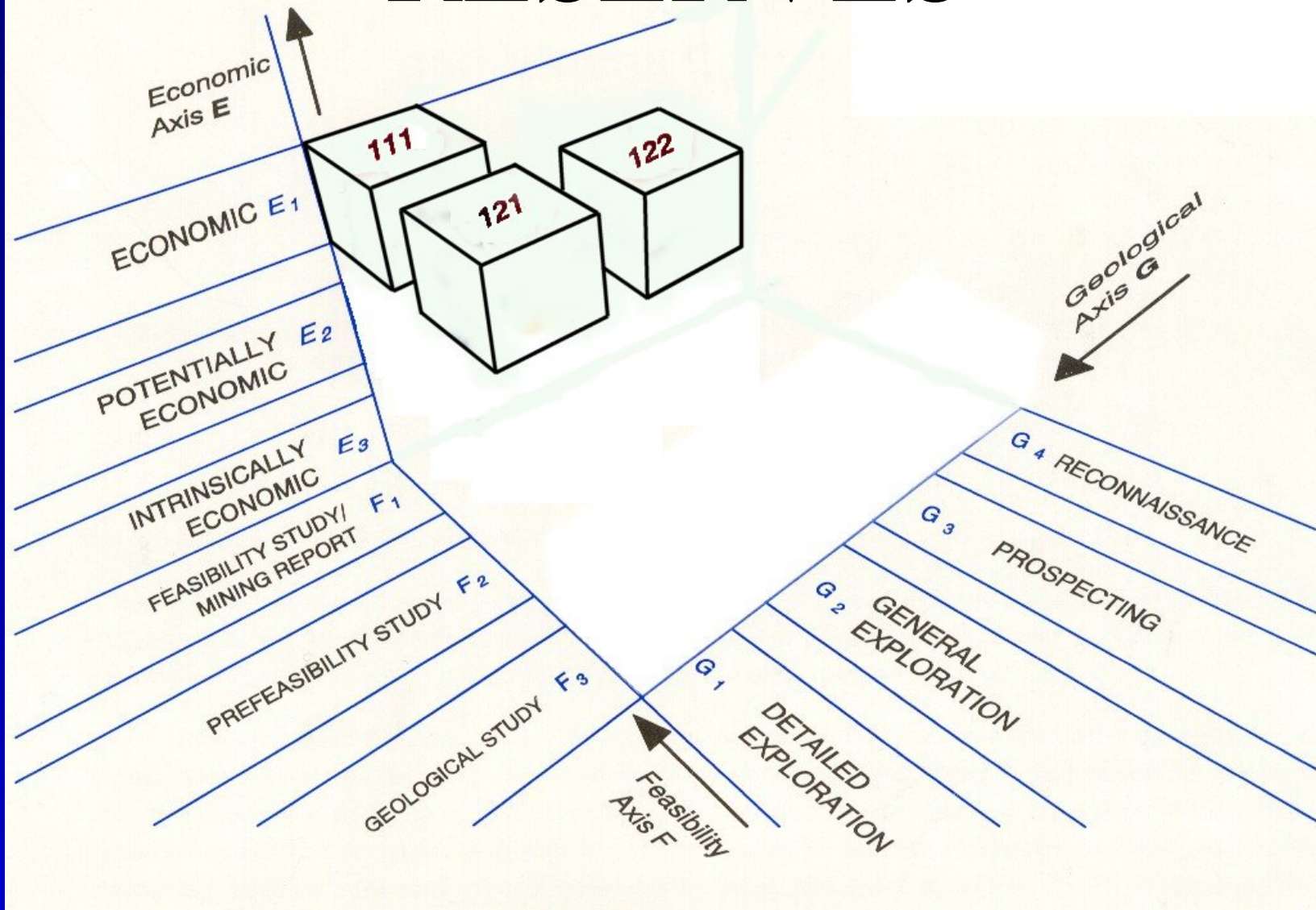
**Proved**

←————→  
The 'Modifying Factors'

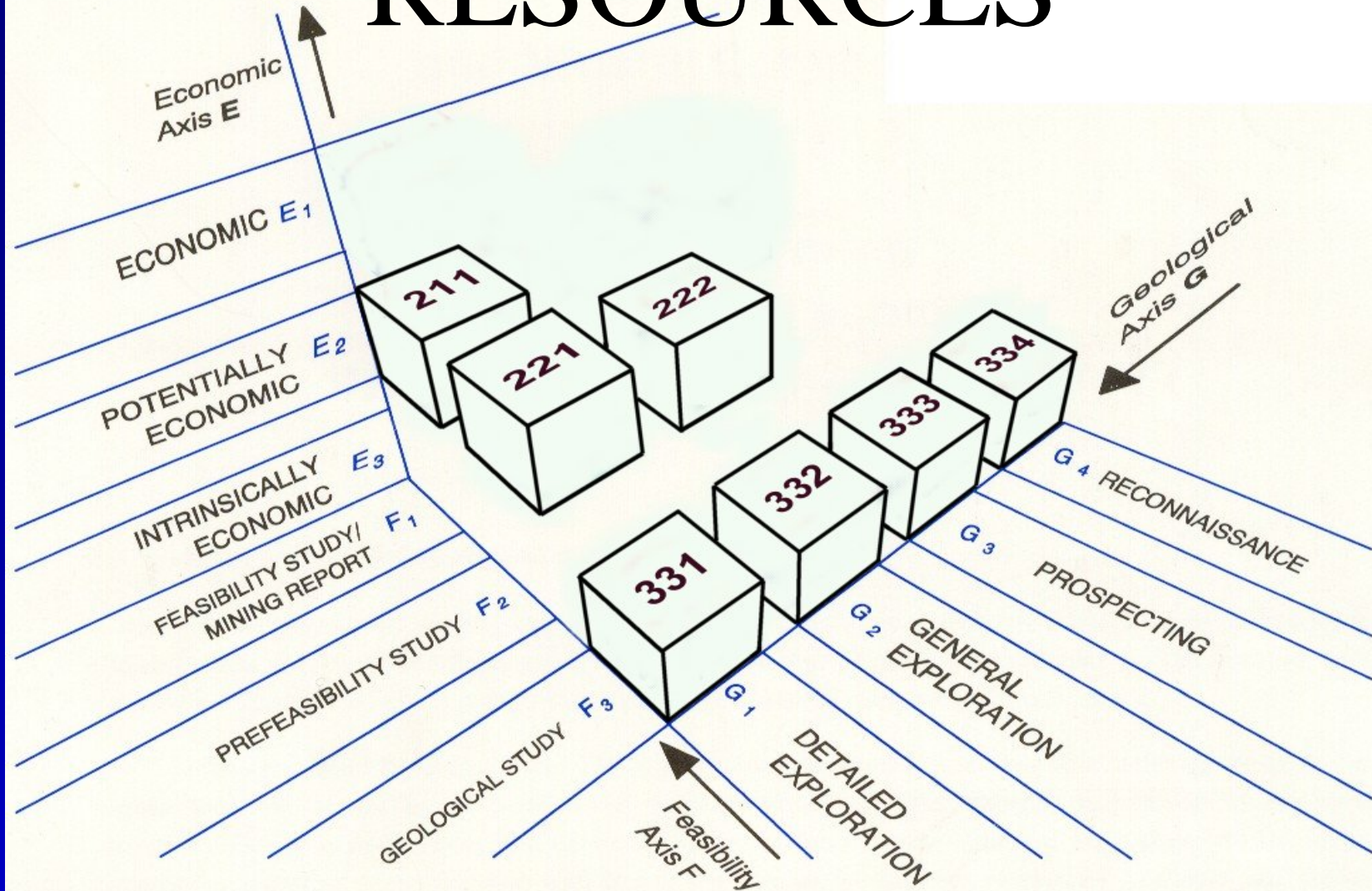


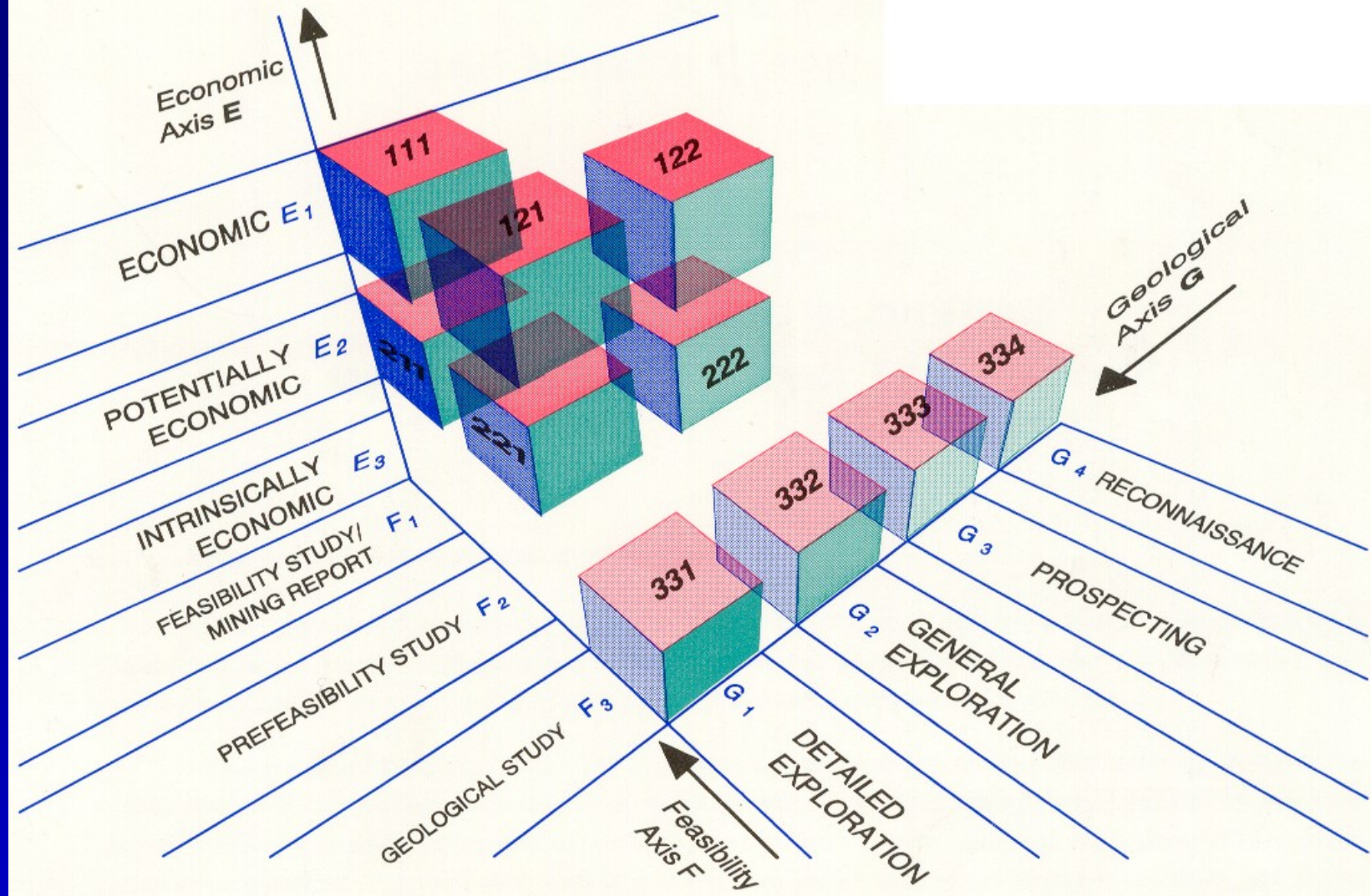
# THE UNFC

# RESERVES



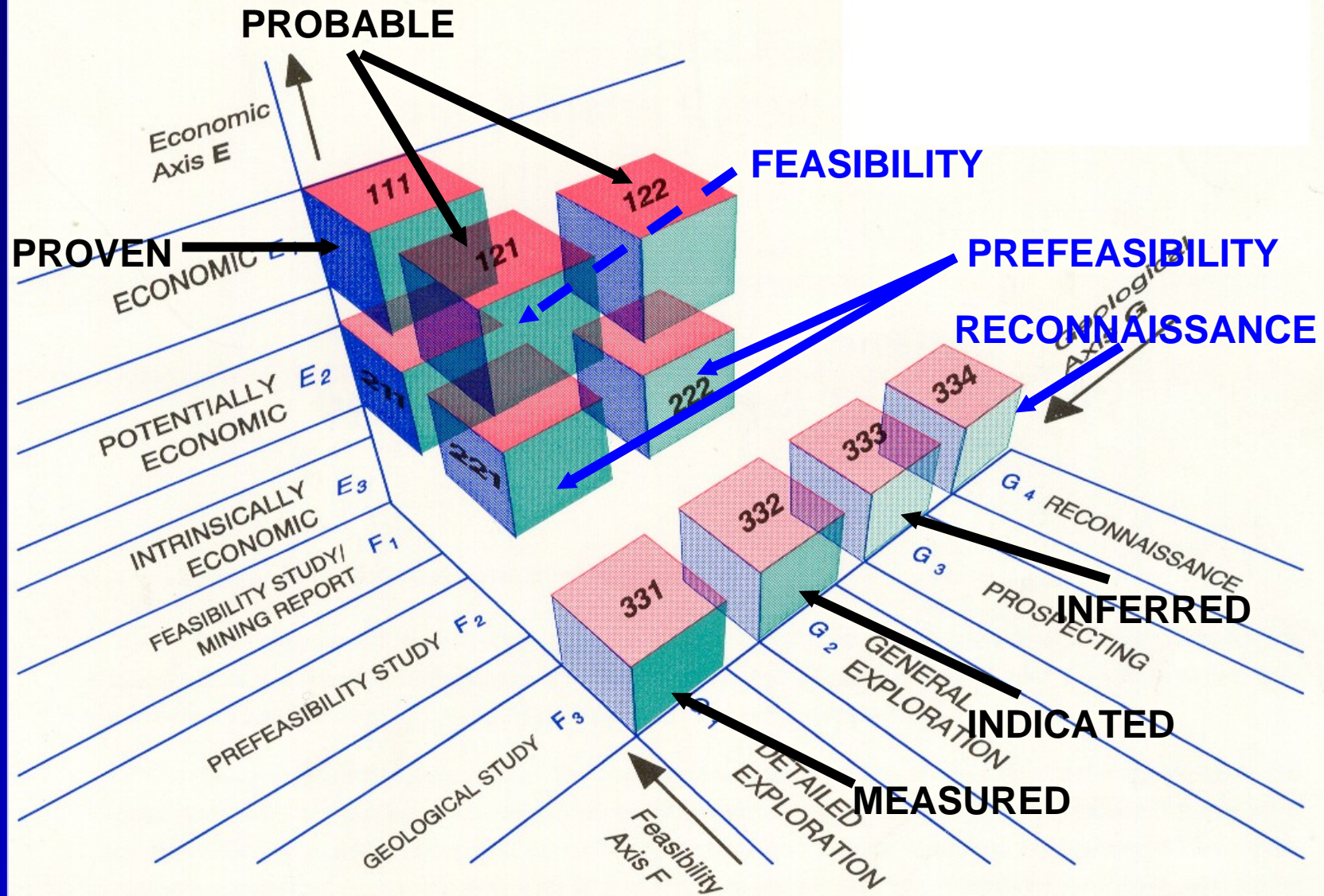
# RESOURCES





# THE GENEVA ACCORDS





**CMMI/UN**

**Proved**

**Probable**

**Measured**

**Indicated**

**Inferred**

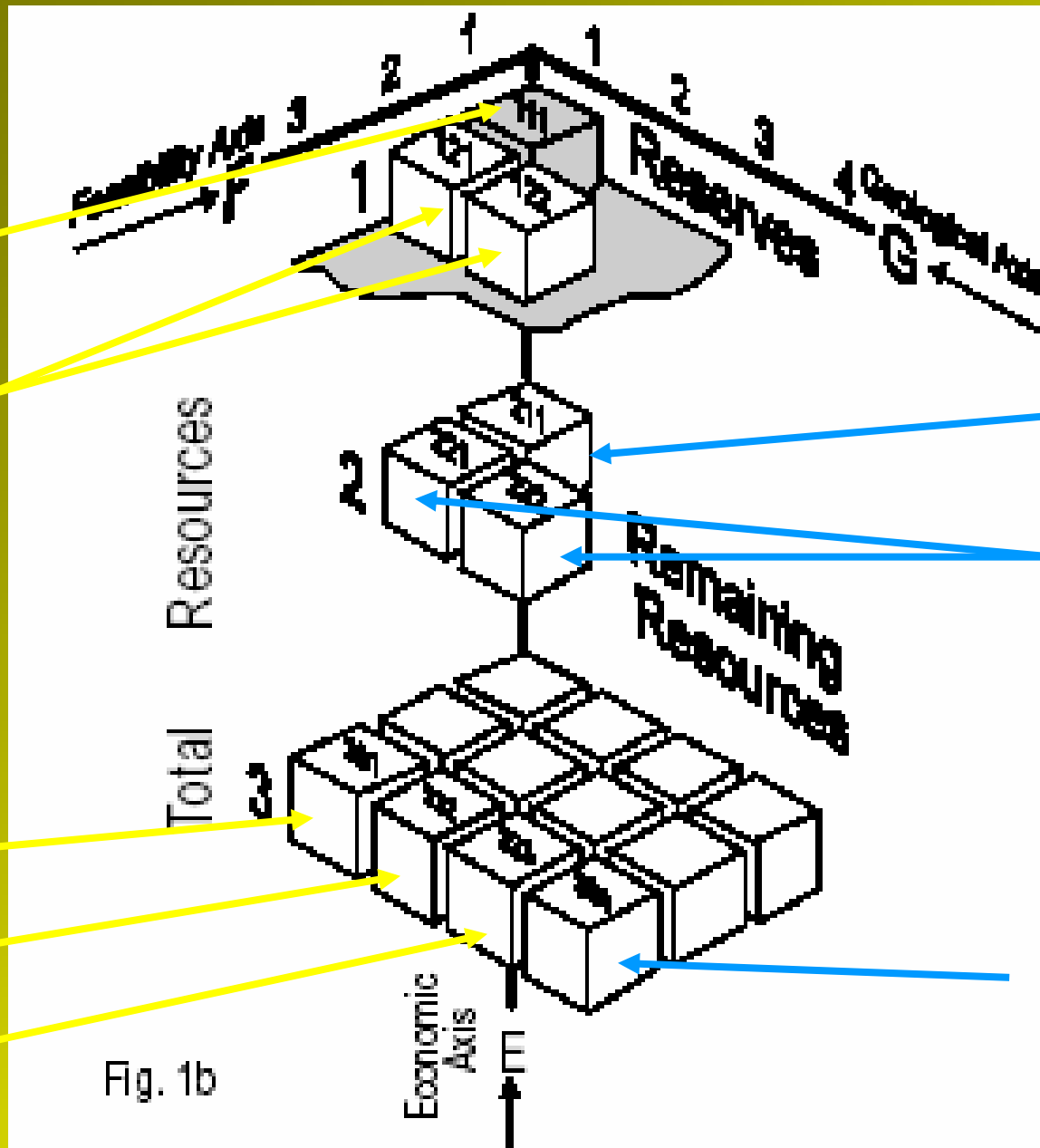


Fig. 1b

**UN Only**

**Feasibility**

**Prefeasibility**

**Reconnaissance**

# United Nations International Framework Classification for Reserves/Resources - Solid Fuels and Mineral Commodities -

UN International Framework		Detailed Exploration	General Exploration	Prospecting	Reconnaissance
↓	National System ↓				
Feasibility Study and / or Mining Report		1 Proved Mineral Reserves (111) 2 Feasibility Mineral Resources (211)	Usually not relevant		
Prefeasibility Study		1 Probable Mineral Resources (21) (22) 2 Prefeasibility Mineral Resources (221) (222)	relevant		
Geological Study		1-2 Measured Mineral Resources (331)	1-2 Indicated Mineral Resources (332)	1-2 Inferred Mineral Resources (333)	? Reconnaissance Mineral resources (334)

Economic Viability Categories:  
Code:

1 = economic  
2 = potentially economic  
(11)

1-2 = economic to potentially economic (intrinsically economic)  
? = undetermined

Date : .....

# Introduction-Chinese Standard

## Codification

	Identified mineral resources			Potential mineral resources	
	Measured (Proved)	Indicated (Controlled)	Inferred	Reconnaissance	
Economic	Mineable reserve(111)				
	Basic reserve(111b)				
	Pre-feasibility reserve(121)	Pre-feasibility reserve(122)			
	Basic reserve(121b)	Basic reserve(122b)			
Marginal economic	Basic reserve(2M11)				
	Basic reserve(2M21)				Basic reserve(2M22)
Sub-Marginal economic	Resources(2S11)				
	Resources(2S21)				
Intrinsic economic	Resources(331)	Resources(332)	Resources(333)	Resources(334)?	

## EQUIVALENCE

<b>CRIRSCO Categories</b>	<b>UNFC Equivalent Codes</b>
<b>Measured Mineral Resources</b>	<b>331</b>
<b>Indicated Mineral Resources</b>	<b>332</b>
<b>Inferred Mineral Resources</b>	<b>333</b>
<b>Proven Mineral Reserves</b>	<b>111</b>
<b>Probable Mineral Reserves</b>	<b>121 and 122</b>

## Major similarities between the two classification systems

<b>Item</b>	<b>Similarities</b>
<b>Competent Person</b>	<b>General concept only</b>
<b>CRIRSCO definition of Mineral Resources and of its three categories: Inferred, Indicated and Measured</b>	<b>Whole text</b>
<b>CRIRSCO definitions of Mineral Reserve and of its two categories: Probable and Proved</b>	<b>Whole text</b>
<b>Check-list/List of items to be addressed</b>	<b>Extensive</b>

# Major differences

Items	CRIRSCO	UNFC
<b>Competent Person</b>	<b>5 years relevant experience</b>	<b>Relevant experience</b>
	<b>Must be member of a recognized professional organisation</b>	<b>Not required</b>
	<b>Must sign off report Competent Person Report (CPR)</b>	<b>Not required</b>
	<b>Takes responsibility for CPR</b>	<b>Not required</b>
<b>Governing principles</b>	<b>Transparency, materiality and competence</b>	<b>Harmonisation of terms</b>
<b>Objective</b>	<b>Reporting of reserves and resources with reasonable and realistic prospects for economic extraction at the time of assessment</b>	<b>Classification of reserves, resources inclusive of sub-economic or yet-to-be-discovered categories of mineralization or resources</b>
<b>Categorisation of resources</b>	<b>Primarily along the geological knowledge - confidence axis</b>	<b>Along the three axes: economic, feasibility and geological</b>
<b>Number of categories</b>	<b>Five</b>	<b>Ten commonly used but 36 allowed for, plus a series of sub-divisions.</b>
<b>Guidelines</b>	<b>Extensive throughout</b>	<b>Generally lacking throughout</b>
<b>3-D space codification</b>	<b>Not applied</b>	<b>Fundamental</b>
<b>List of items to be addressed</b>	<b>Check-list only</b>	<b>Check-list and definitions</b>
<b>Glossary</b>	<b>Reduced to a few terms</b>	<b>Extensive</b>

## AHGE Meeting – November 2005

- The definitions of the Geneva Accord remain unchanged in new UNFC
- CRIRSCO is responsible for clauses and guidelines - solid minerals
- The process is a joint venture with the UNECE
- Joint UNECE/CRIRSCO Committee - 3 CRIRSCO representatives + 3 AHGE representatives. Observer members : (IASB), (SPE), (IAEA) and the AHGE- Coal and Minerals
- The Joint Committee: co-chairs Ferdi Camisani and Andrej Subelj who have veto powers
- A South African working group consisting of mining experts co-opted to develop original draft as determined by the Joint Committee compatible with both existing CRIRSCO-type Codes and the UNFC
- The wording of the definitions and guidelines will be decided by CRIRSCO via the Joint Committee and will be reproduced in the UNFC. Any alterations or amendments, including updates, will similarly be carried out by CRIRSCO via the joint Committee.



**JOHANNESBURG MEETING – MAY 2006**

**And**

**GENEVA MEETING – OCTOBER 2006**

# **OPTION CONSIDERED FOR UNFC SOLID MINERALS SECTION**

**CRIRSCO did not present this option as its preferred approach, as it recognises disadvantages for both CRIRSCO and UNFC**

**A major disadvantage for CRIRSCO was the embedding of its core product, the CRIRSCO Template, in a system over which it does not have full control**

**CRIRSCO may consider alternative options such as the SPE approach based on using a mapping module and making changes to the UNFC preamble to focus on principles**

# SOLID MINERALS SECTION

- **PART A**                      **ECONOMIC MINERALISATION**
- **PART B**                      **NON-ECONOMIC MINERALISATION  
INVENTORY**
- **APPENDICES**              **GLOSSARY OF TERMS**

# **CRIRSCO's POLICY**

**PART A = THE CRIRSCO TEMPLATE**

**OWNED AND MANAGED BY CRIRSCO**

**Current CRIRSCO Template available in:**

**[www.crirSCO.com](http://www.crirSCO.com)**

# PART A

## CLASSIFICATION AND REPORTING OF ECONOMIC MINERALISATION

- Financial Institutions
- Mining Groups
- Governments and State Organisations
- National and Super-national Organisations and Agencies

### Part A = CRIRSCO Template, owned and managed by CRIRSCO

- Integral part of UNFC (core of the option) or referred to in the UNFC (currently not recommended), (modalities & agreement pending)
- Contemporaneous Publication on UNECE website and CRIRSCO website for relevant updates of UNFC and CRIRSCO Template respectively (modalities pending)
- Appendices
  - Check-list
  - Code of Ethics
  - List of Synonyms

# TRADITIONAL UNFC CODES

## PART A

**Exploration Results**

**Mineral Resources**

**Inferred**

**333**

**Indicated**

**332**

**Measured**

**331**

**Mineral Reserves**

**Probable**

**121+122**

**Proved**

**111**



# PART B

## CLASSIFICATION AND REPORTING OF NON-ECONOMIC MINERALISATION

- Mining Groups
- Governments and State Organisations
- National and Super-national Organisations and Agencies

### Part B = ADDITIONAL TO & INDEPENDENT OF PART A

- No Commodity-specific sections
- Transparency, Materiality and Competence Principles and Standards apply, as per Part A

# PART B

## TRADITIONAL UNFC

### CODES



**Non-economic Mineralisation<sup>1</sup>**

**Reconnaissance**

**334**

**Pre-feasibility**

**221+222**

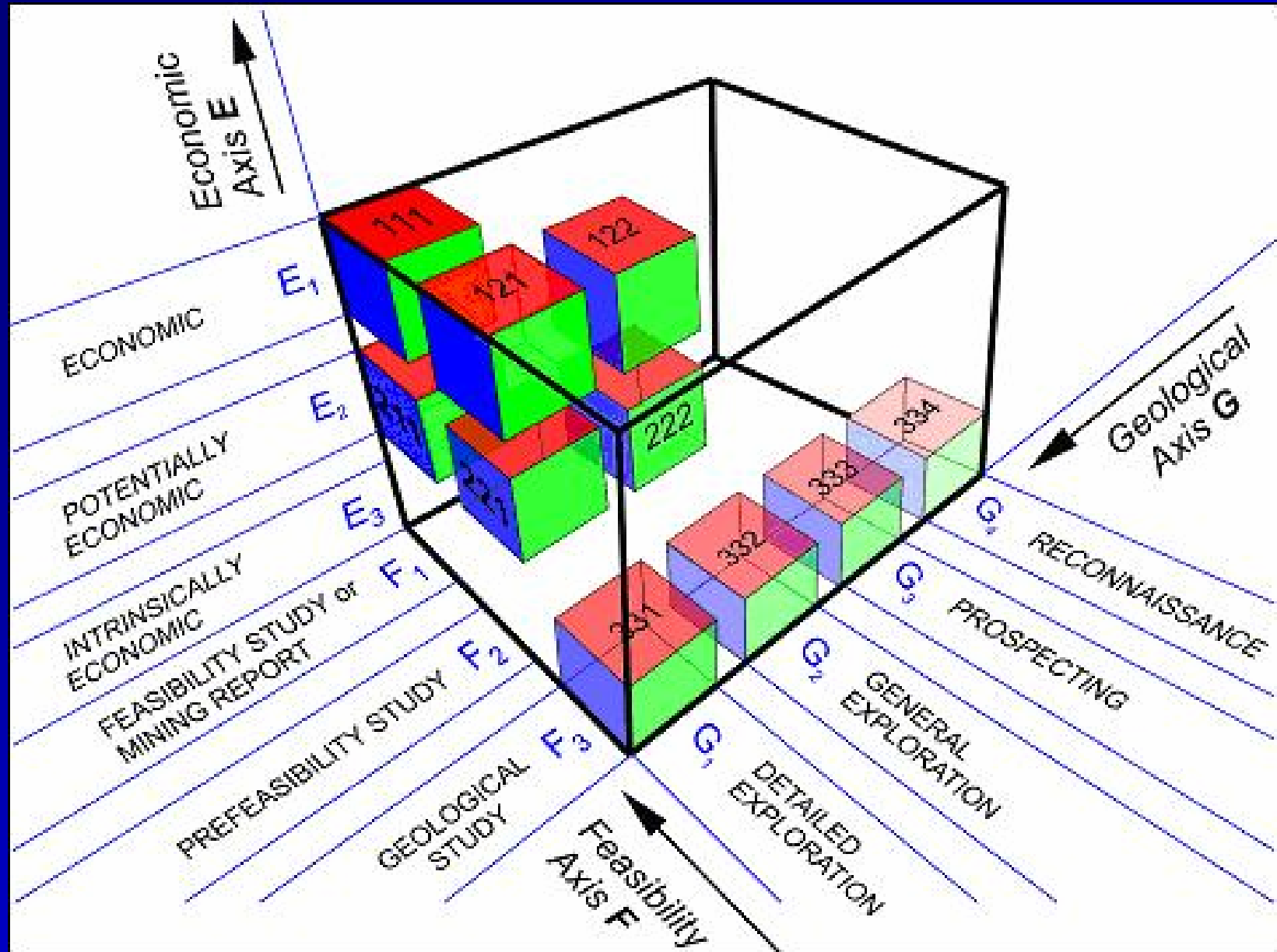
**Feasibility**

**211**

<sup>1</sup> Agreement on terminology pending



**SUGGESTED CHANGE  
PROPOSALS ON TRADITIONAL ALPHA-  
NUMERICAL UNFC CODIFICATION IN THE 3-  
DIMENSIONAL SPACE**



# NECESSITY FOR CODIFICATION CHANGES

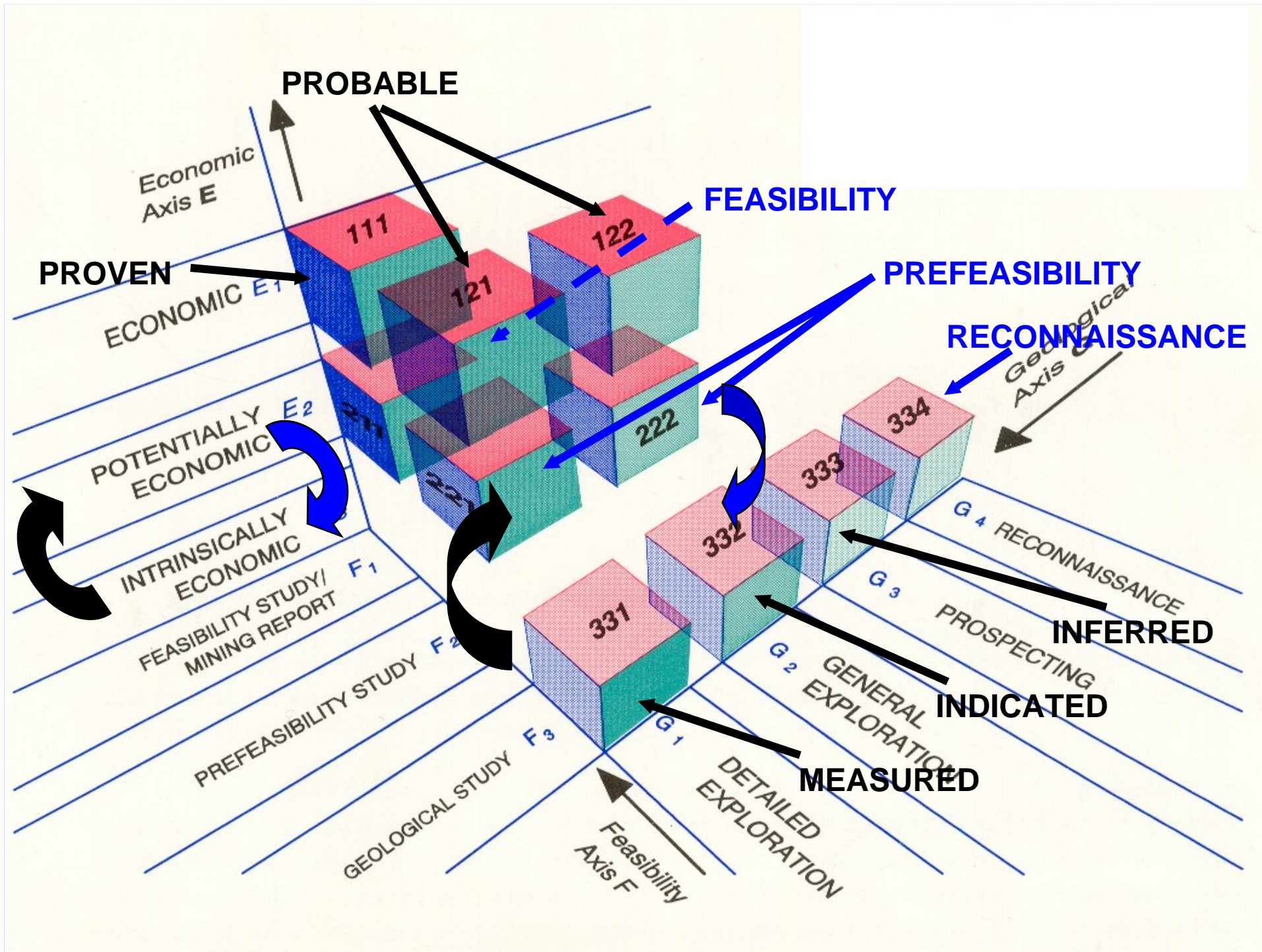
## ECONOMIC AXIS (Traditional UNFCs representation)



But, by UNFC definition, **Intrinsically E. = Economic to Potentially E.**

**Result: Vertical Misplacement Causing Confusion and Misunderstanding**

**(ie Measured Resource relegated to E3 level when it directly feeds Proven Reserve at E1 level)**



CMMI/UN

UN Only

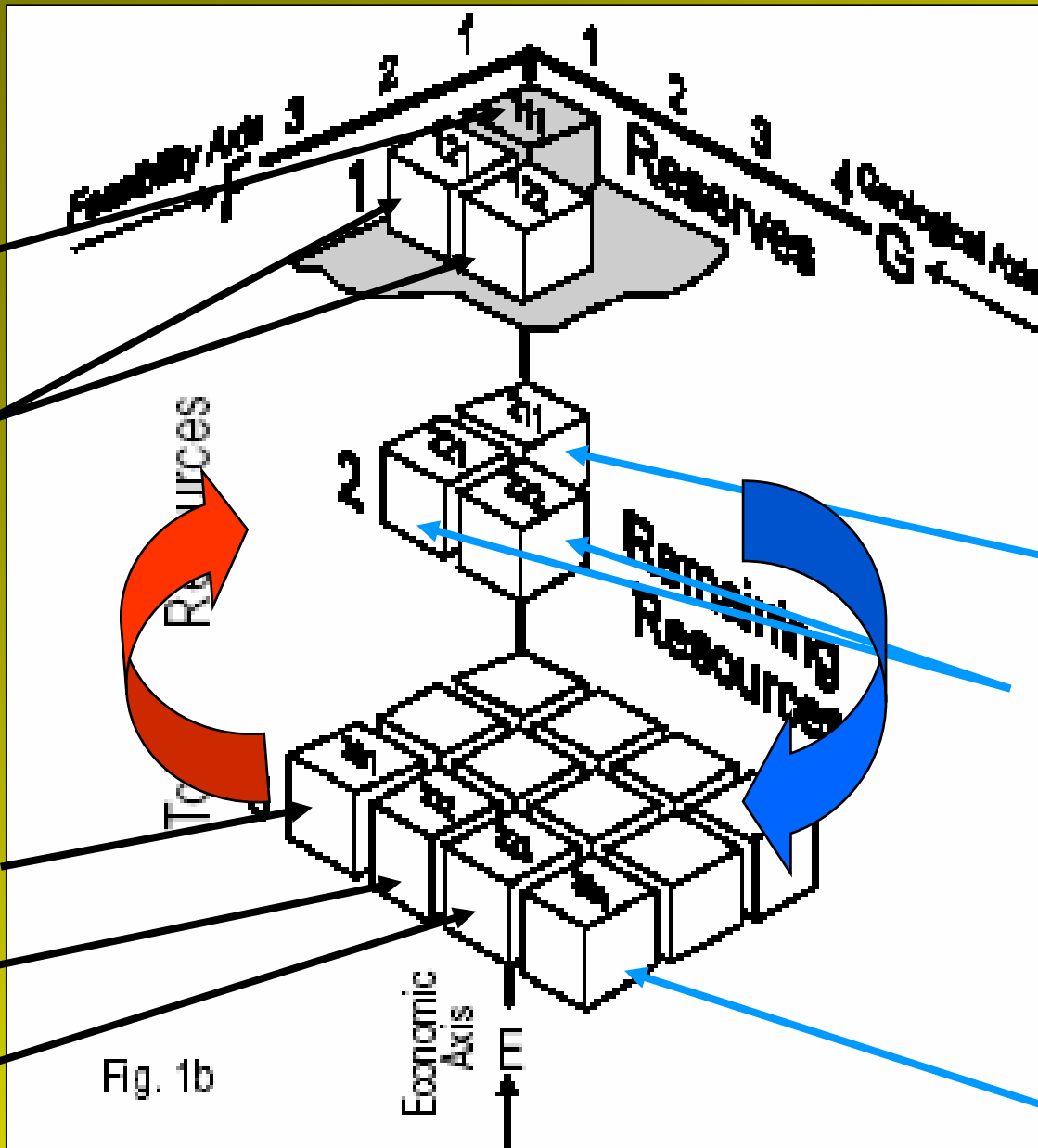
Proved

Probable

Measured

Indicated

Inferred



Feasibility

Prefeasibility

Reconnaissance

# POSSIBLE CODIFICATION CHANGES<sup>1</sup>

## ECONOMIC MINERALISATION

<b>Mineral Resources</b>	<b>Historical</b>	<b>Possible Change ?</b>
<b>Inferred</b>	<b>333</b>	<b>→ 232</b>
<b>Indicated</b>	<b>332</b>	<b>→ 231</b>
<b>Measured</b>	<b>331</b>	<b>→ 221</b>
<b>Mineral Reserves</b>		
<b>Probable</b>	<b>121+122</b>	<b>→ 121</b>
<b>Proved</b>	<b>111</b>	<b>→ 111</b>

<sup>1</sup> Pending on new mandate, agreement and further investigations

# POSSIBLE CODIFICATION CHANGES<sup>1</sup>

## NON-ECONOMIC MINERALISATION

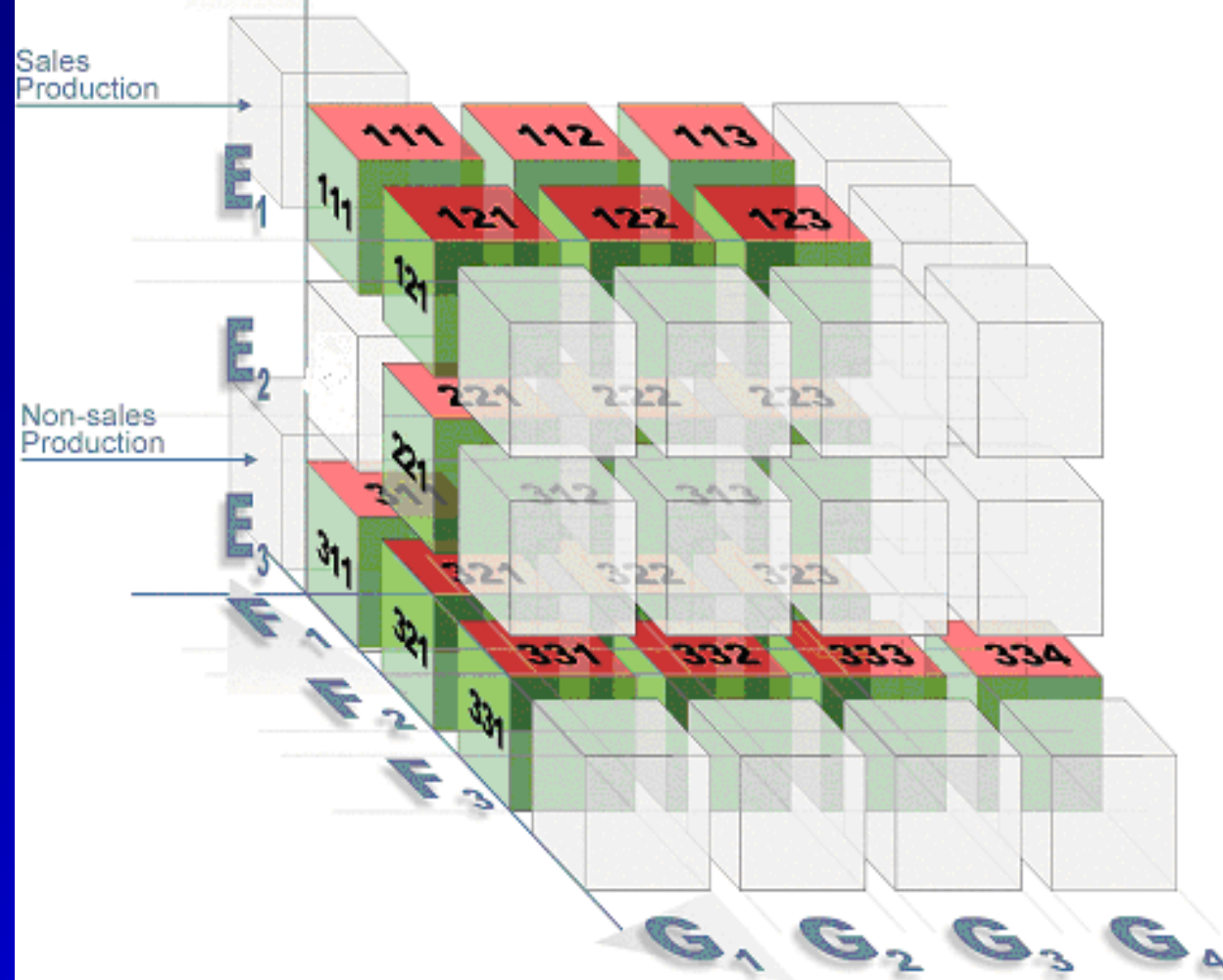
	Historical	Poss. Change ?
Reconnaissance	334	→ 334
Pre-feasibility	221+222	→ 321
Feasibility	211	→ 311

<sup>1</sup> Pending on new mandate, agreement and further investigations

# The UNFC for Petroleum



## 2004 edition of the UNFC for Petroleum



# UNFC in matrix form applied to petroleum

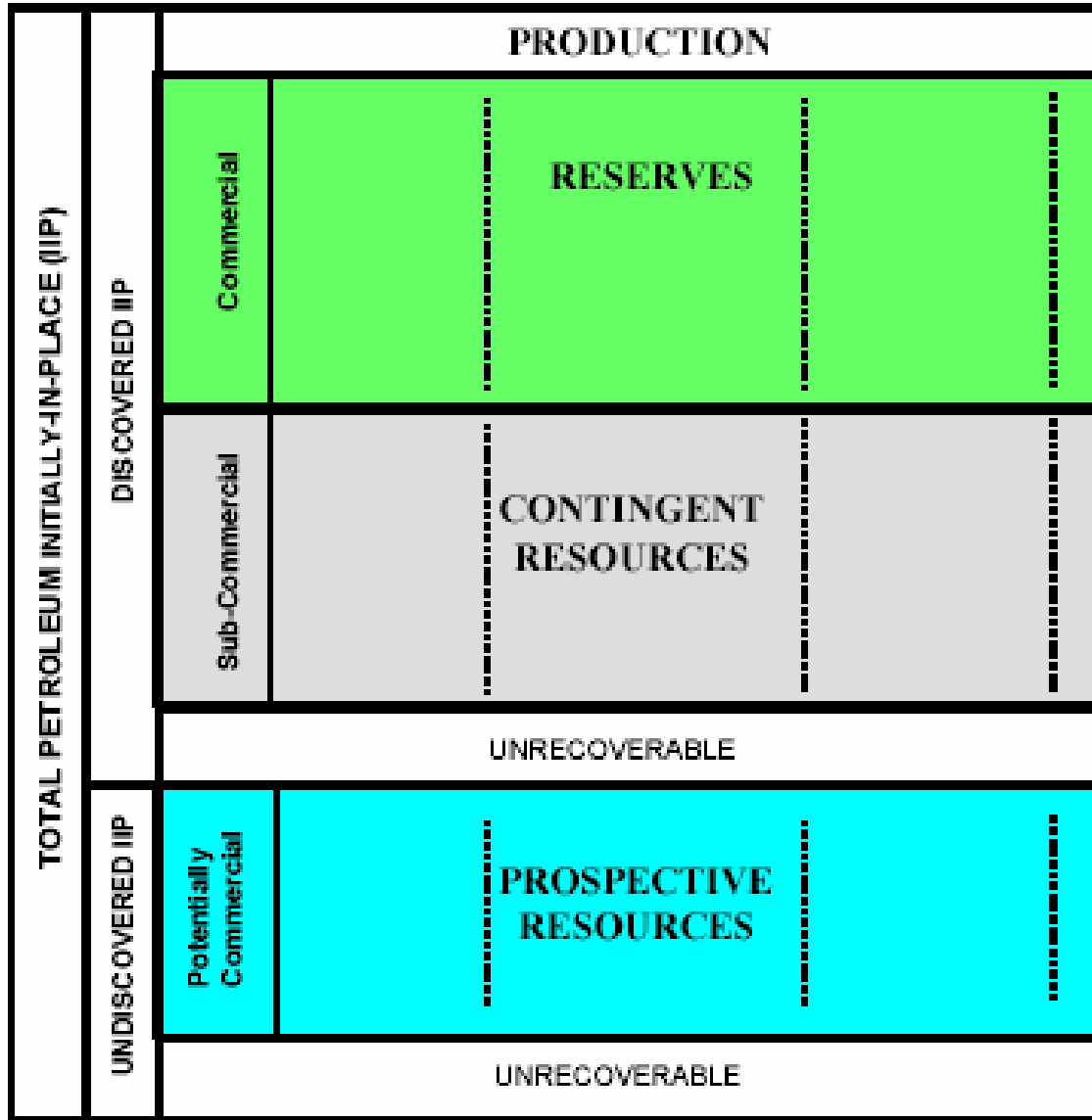
UNFC	National system	Reasonably assured geological conditions	Estimated geological conditions	Inferred geological conditions	Prospective geological conditions
Justified		1 <input type="text" value="111"/>	<input type="text" value="112"/>	<input type="text" value="113"/>	
		3 <input type="text" value="311"/>	<input type="text" value="312"/>	<input type="text" value="313"/>	
Contingent		1 <input type="text" value="121"/>	<input type="text" value="122"/>	<input type="text" value="123"/>	
		2 <input type="text" value="221"/>	<input type="text" value="222"/>	<input type="text" value="223"/>	
		3 <input type="text" value="321"/>	<input type="text" value="322"/>	<input type="text" value="323"/>	
Project undefined		3 <input type="text" value="331"/>	<input type="text" value="332"/>	<input type="text" value="333"/>	<input type="text" value="334"/>

Economic Viability Categories:

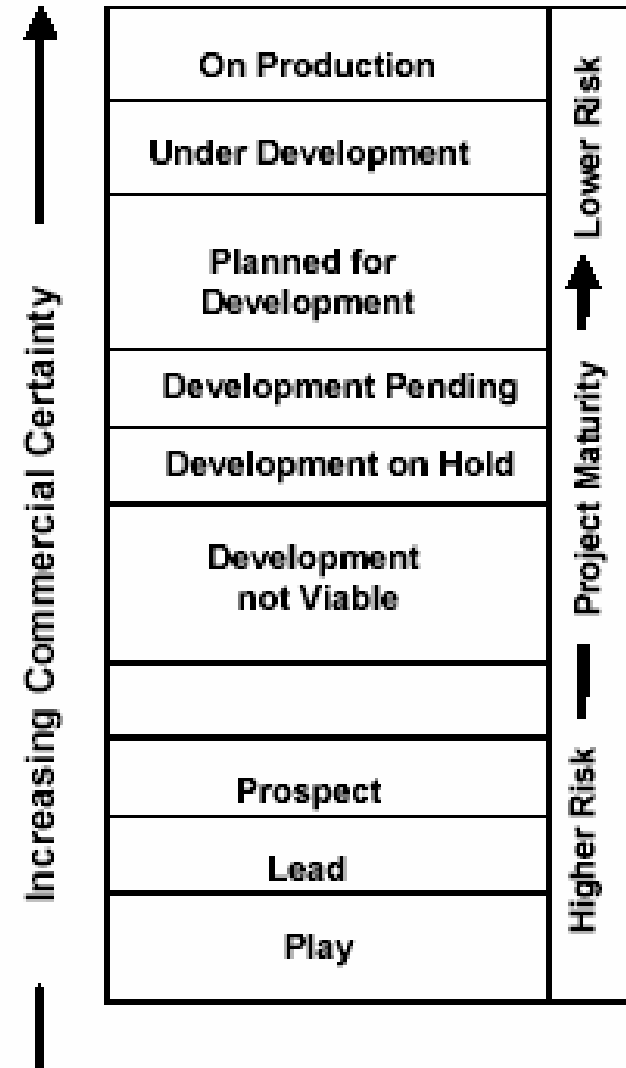
1: E1 (Economic)

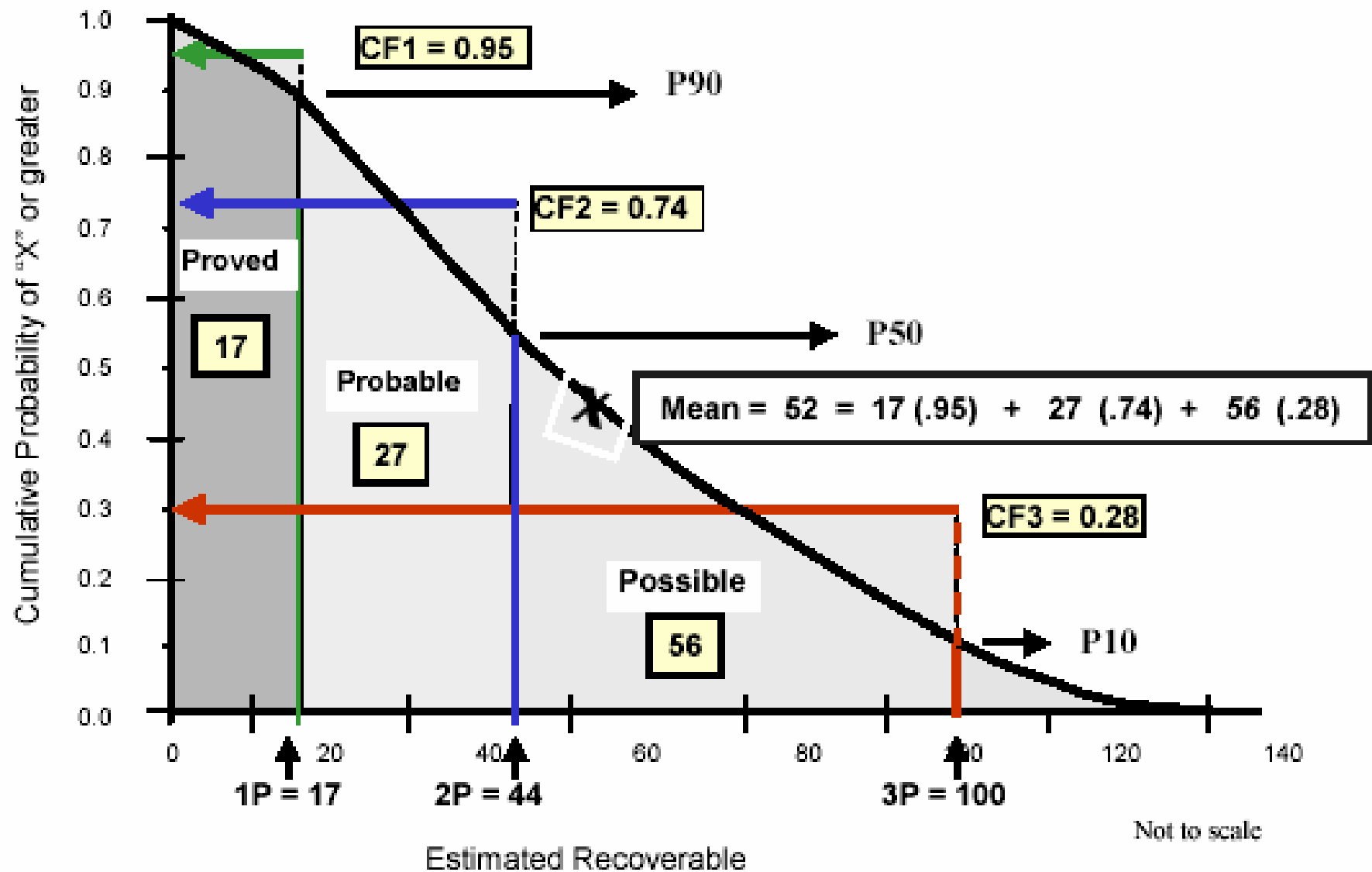
2: E2 (Potentially Economic)

3: E3 (Intrinsically Economic)



**Project Status**  
(2001 Supplemental Guidelines)





# **CONVERGENCE WITH OIL&GAS**

**EXERCISE IN PROGRESS**

**IMPORTANCE AND RELEVANCE RECOGNISED**

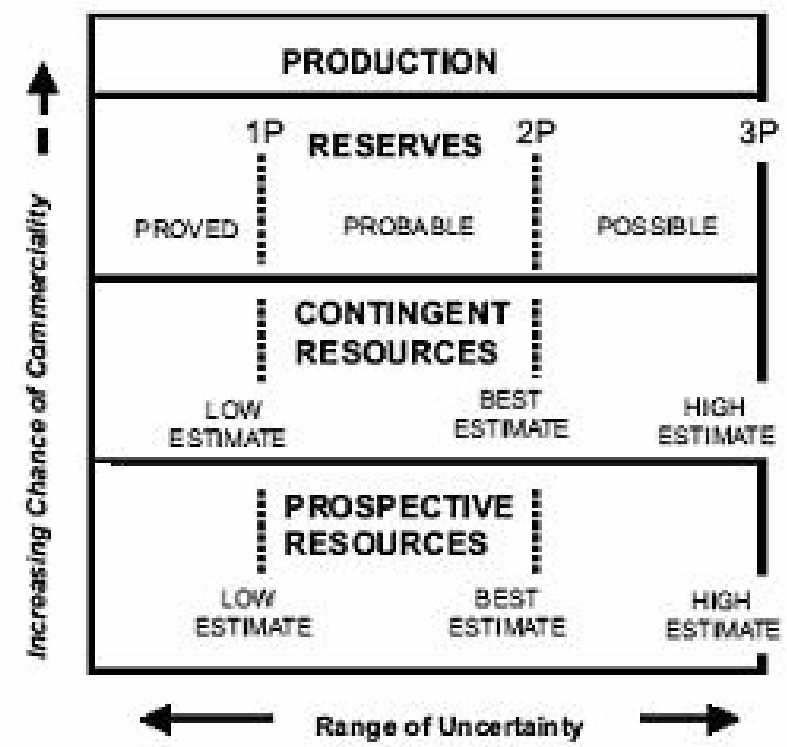
**PRIMARY CLIENT IS THE IASB**

**SCHEDULE CONSISTENT WITH IASB EXTRACTIVE  
INDUSTRIES RESEARCH PROJECT**

# Comparison of Hydrocarbon and Minerals Classifications

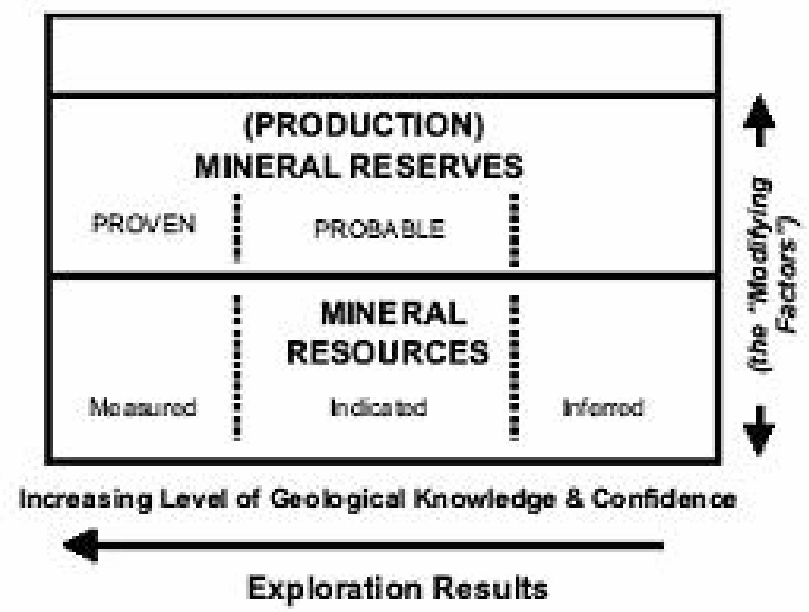
## Petroleum

SPE/WPC/AAPG 2000



## Minerals

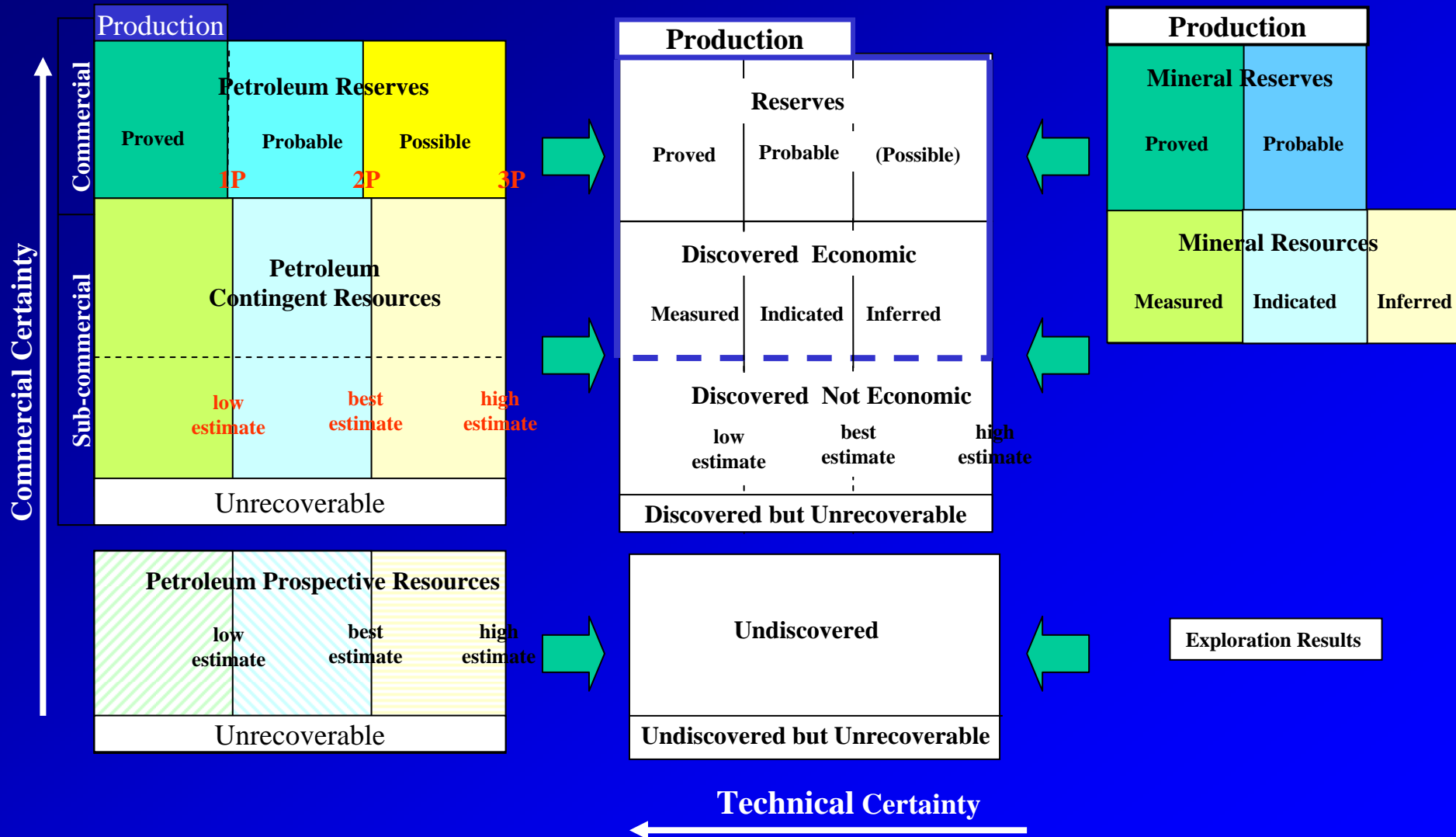
CRIRSCO 2004



# Petroleum/Minerals Mapping (February 2006)

## Petroleum (SPE 2000)

## Solid Minerals (CRIRSCO 2005)



## **CONCLUSION**

**The cooperation between CRIRSCO, UNECE, IASB and the SPE is beneficial to those organisations, their constituencies, the stakeholders and the extractive industry in general**



# CONCLUSION

**No alternative to this multifaceted approach in the current atmosphere of globalisation and transparency**

**A directional change to polarisation and localised interests is a step backward**

# CONCLUSION

It is now becoming increasingly clear that a basic universal document of common fundamental concepts for the classification and reporting of mineral reserves and resources, a sort of Rosetta Stone to which local codes are mapped to, is indispensable for the future of the extractive industry. This should be the new UNFC

## **CONCLUSION**

**The process of cooperation with the UN appears to have a realistic chance of success given the current expectations, efforts and goodwill from all involved parties**

# THE END

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April 24 - 27, 2007. Santiago - Chile.

APPLICATION OF COMPUTERS AND OPERATIONS  
RESEARCH IN THE MINERAL INDUSTRY



APCOM 2007 

# QUESTIONS ?

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**APCOM 2007** 