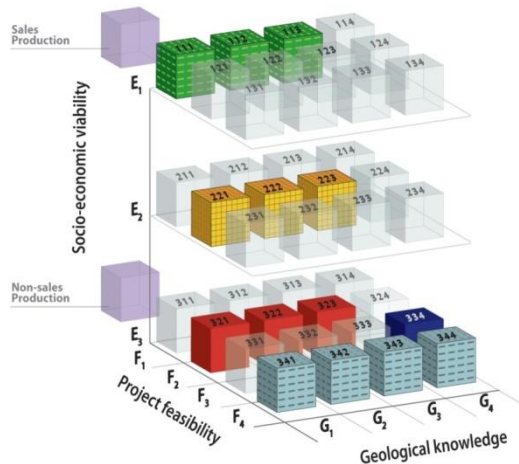


Workshop on UNFC-2009 Framework and Definitions

**Presented on behalf of the EGRC
by David MacDonald
EGRC Chair
VP Segment Reserves, BP**

UNFC Workshop
Geneva, 25 April 2017

Workshop Format



1. Introduction

2. Framework and Definitions

3. Generic Specifications

4. Bridging Documents

5. Case Study – Petroleum

6. Case Study – Solid Minerals

7. Future Developments and Summary



UNFC

Classification Framework and Category Definitions

Generic Specifications

*Bridging
Document*

*Bridging
Document*

*Bridging
Document*

Petroleum
Specifications
PRMS

Solid Mineral
Specifications
CRIRSCO

Other Aligned
Systems

Structure of system

Definitions

Classification
Framework

Specifications

Application
Rules

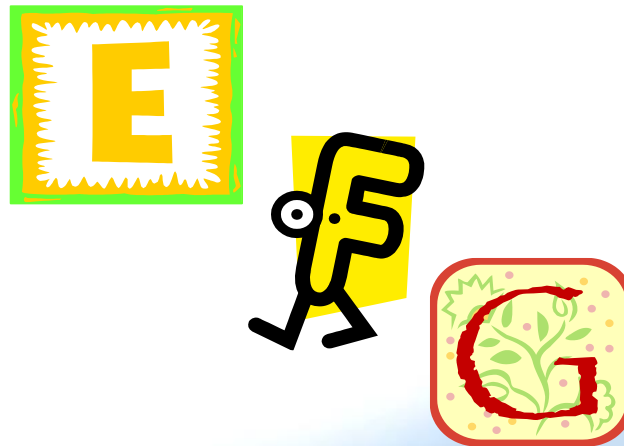
Guidelines

Non-
Mandatory
Guidance



Classification Framework

- **Based on three fundamental criteria**
 - **E**conomic and social viability
 - **F**ield project status and feasibility
 - **G**eological knowledge

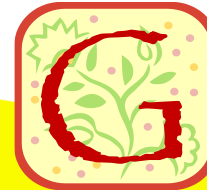


Why three criteria?

Proved reserves must be ...



**Economic to extract
(commercially feasible)**

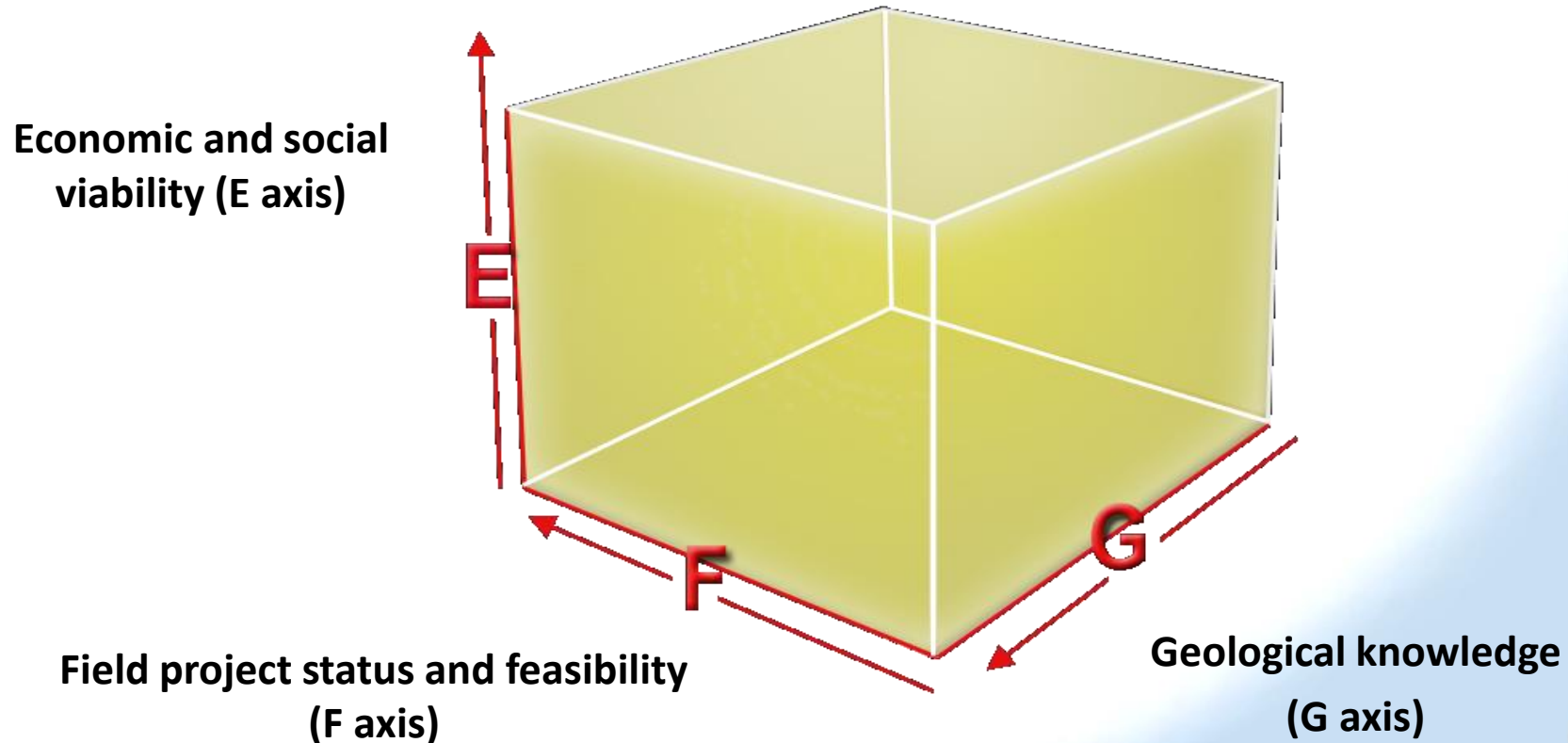


**Geologically well defined
(with high confidence)**

**Technically feasible
to extract**



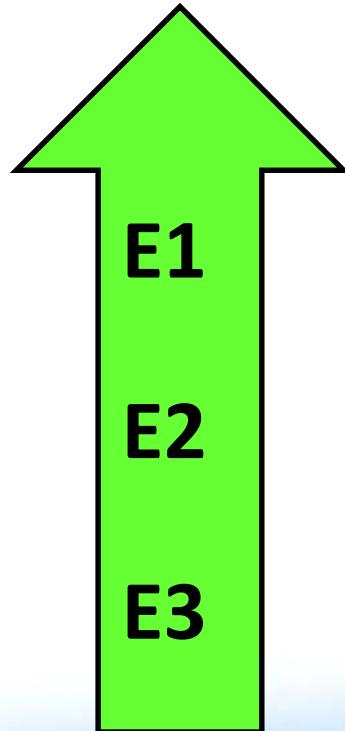
UNFC – The three criteria



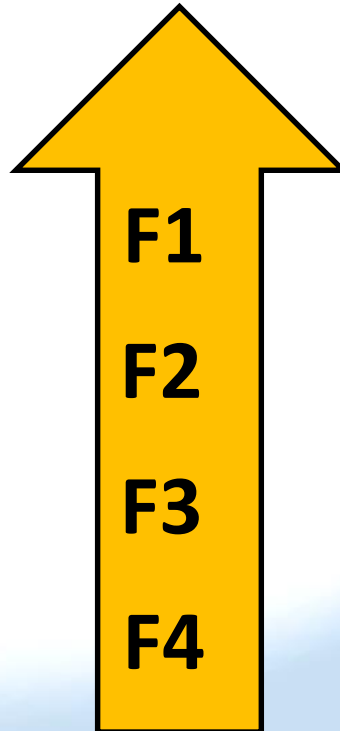
Criteria and Categories

Numerical coding system based on the three criteria, sub-divided by categories:

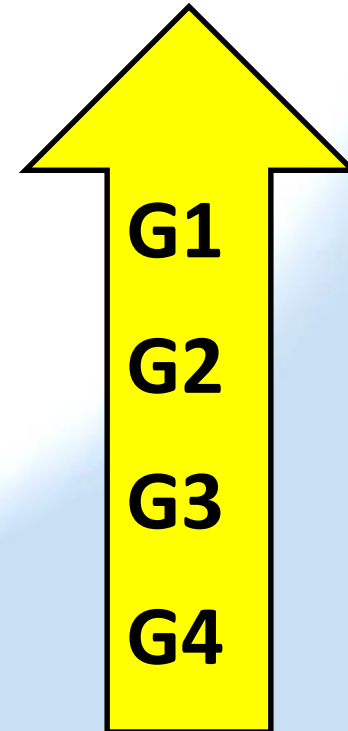
**Economic and
social viability**



**Field project status
and feasibility**

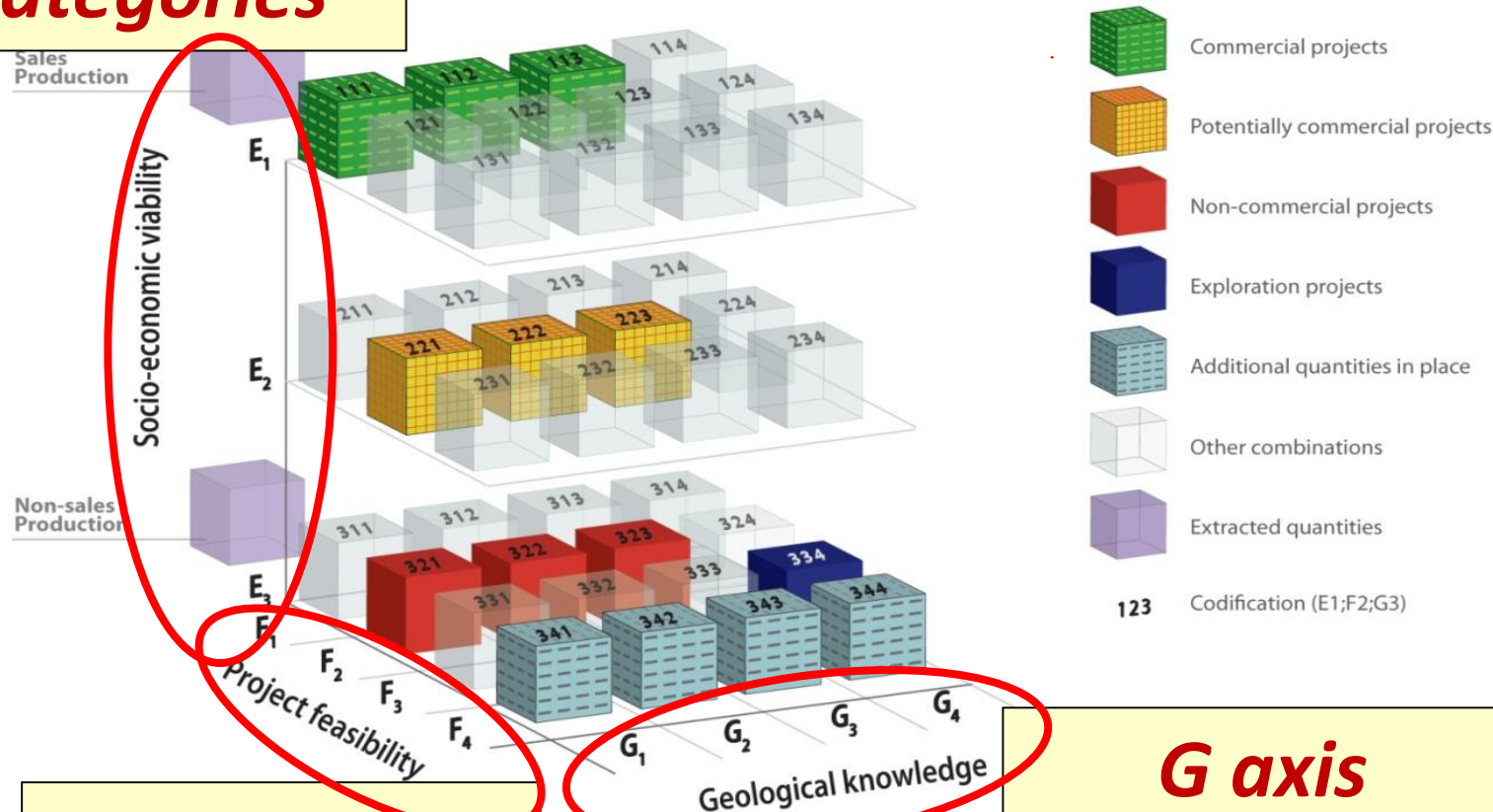


**Geological
knowledge**



Categories and Classes ... Codification

***E axis
categories***

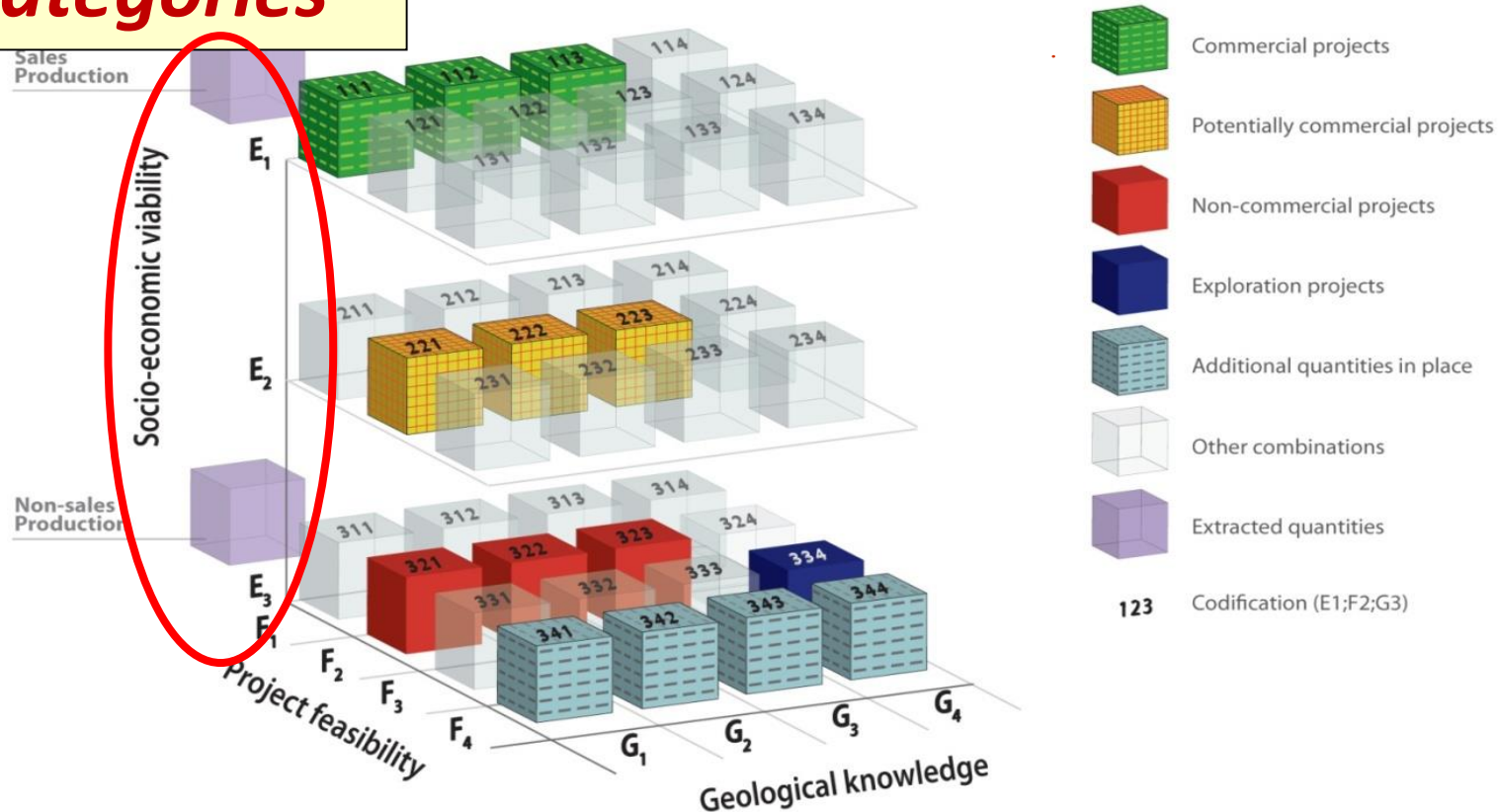


***F axis
categories***

***G axis
categories***

UNFC – category definitions

E axis categories



UNFC – E axis

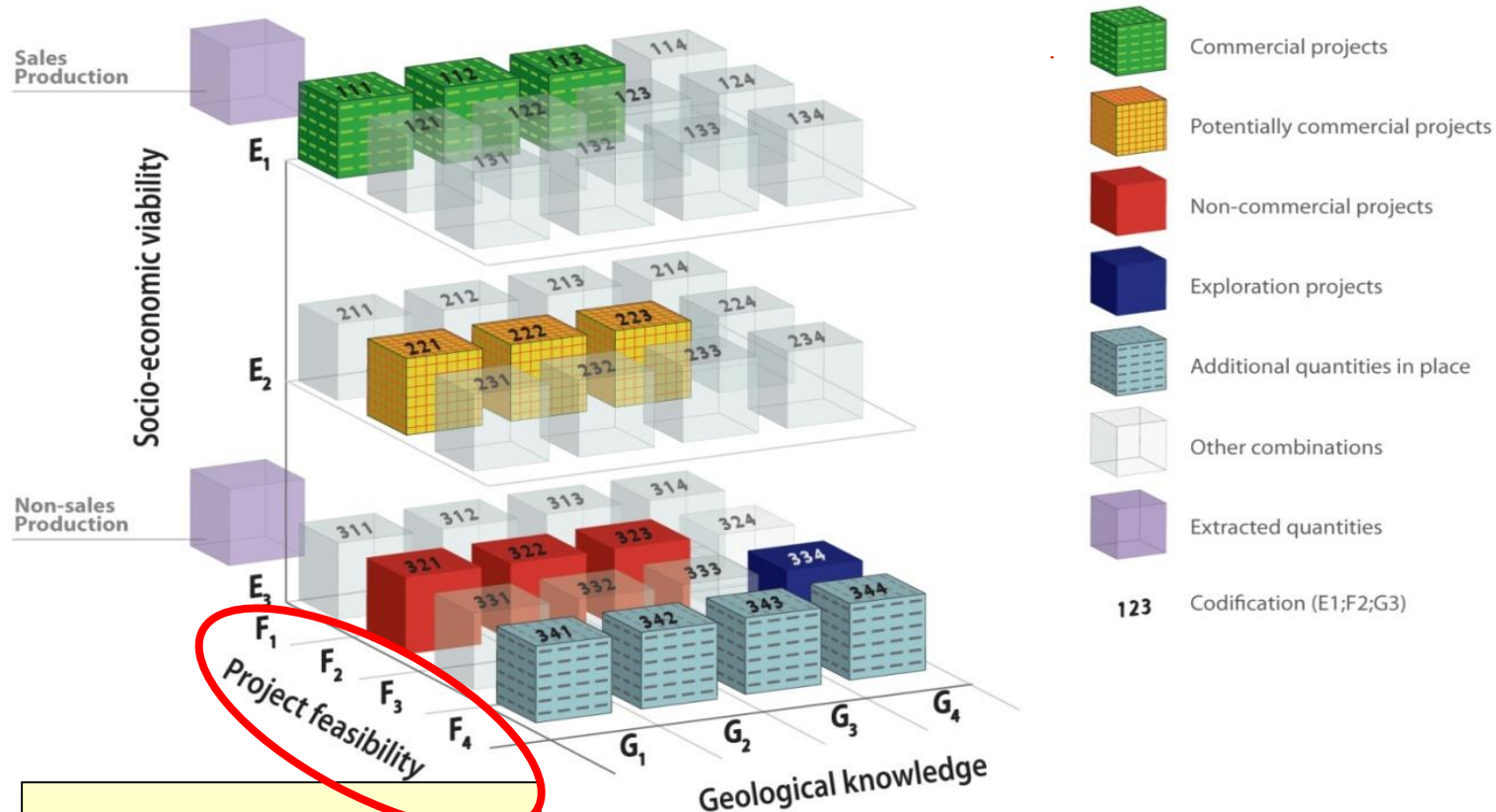
- Degree of favourability of social and economic conditions in establishing the commercial viability of the project
- Includes consideration of market prices and relevant legal, regulatory, environmental and contractual conditions
- E1, E2 and E3 categories
- E1 is “best”
- Definitions should always be read in conjunction with supporting explanation

E axis category definitions

Category	Definition
E1	Extraction and sale has been confirmed to be economically viable.
E2	Extraction and sale is expected to become economically viable in the foreseeable future.
E3	Extraction and sale is not expected to become economically viable in the foreseeable future or evaluation is at too early a stage to determine economic viability.

The phrase “economically viable” encompasses economic (in the narrow sense) plus other relevant “market conditions”, and includes consideration of prices, costs, legal/fiscal framework, environmental, social and all other non-technical factors that could directly impact the viability of a development project.

UNFC – category definitions



***F axis
categories***

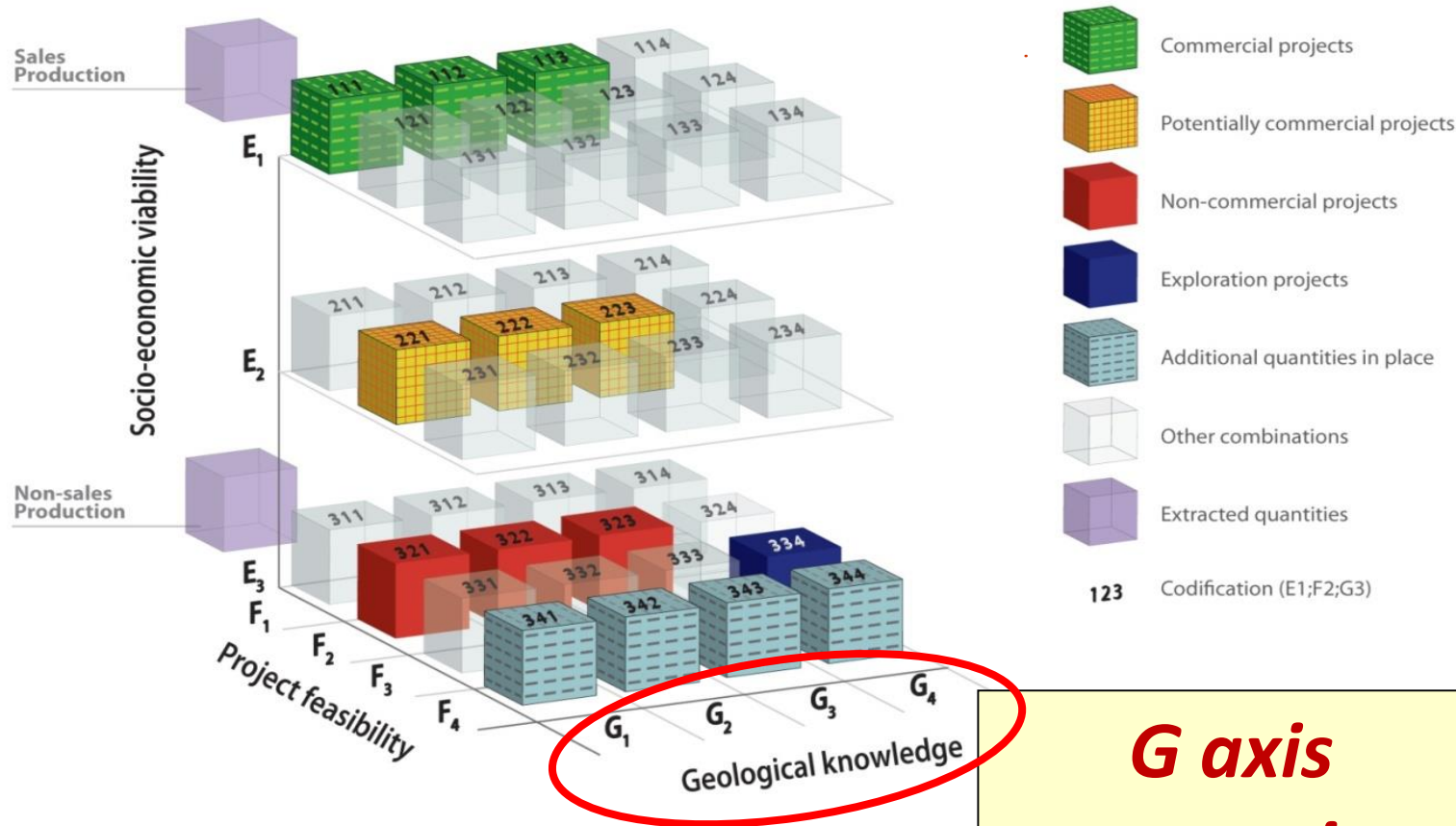
UNFC – F axis

- **Maturity of studies and commitments necessary to implement mining plans or development projects**
- **These extend from early exploration efforts before a deposit or accumulation has been confirmed to exist through to a project that is extracting and selling a commodity**
- **F1, F2, F3 and F4 categories**
- **F1 is “best”**
- **Definitions should always be read in conjunction with supporting explanation**

F axis category definitions

Category	Definition
F1	Feasibility of extraction by a defined development project or mining operation has been confirmed.
F2	Feasibility of extraction by a defined development project or mining operation is subject to further evaluation.
F3	Feasibility of extraction by a defined development project or mining operation cannot be evaluated due to limited technical data.
F4	No development project or mining operation has been identified.

UNFC – category definitions



***G axis
categories***

UNFC – G axis

- **Level of confidence in the geological knowledge and potential recoverability of the quantities**
- **Generally defined as discrete increments for solids, but often defined as scenarios for fluids (G1, G1+G2, G1+G2+G3)**
- **G1, G2, G3 and G4 categories**
- **G1 is “best”**
- **Definitions should always be read in conjunction with supporting explanation**

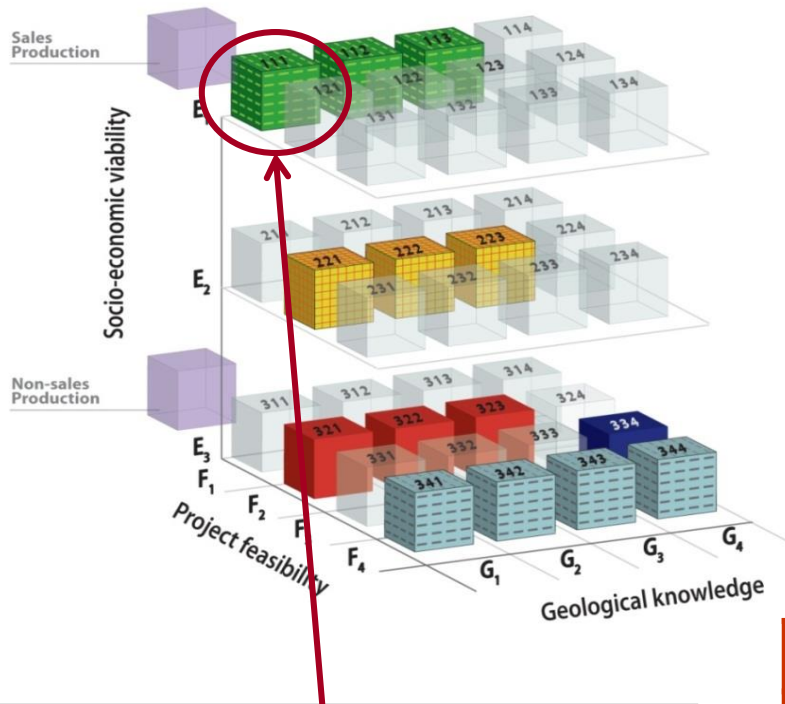
G axis category definitions

Category	Definition
G1	Quantities associated with a known deposit that can be estimated with a high level of confidence.
G2	Quantities associated with a known deposit that can be estimated with a moderate level of confidence.
G3	Quantities associated with a known deposit that can be estimated with a low level of confidence.
G4	Estimated quantities associated with a potential deposit, based primarily on indirect evidence.

UNFC – How it works

- **The category definitions are the building blocks of the system:**
 - Select the correct category for each of the three criteria
- **These are combined (E, F, G) in the form of classes**
- **Class 111 means that the reported quantities have satisfied the definitions for:**
 - **E1, F1 and G1**
- **There are no constraints on combinations, but not all will be meaningful**

UNFC – How it works



UNFC Class: 111

Category	Definition
E1	Extraction and sale has been confirmed to be economically viable.

Category	Definition
F1	Feasibility of extraction by a defined development project or mining operation has been confirmed.

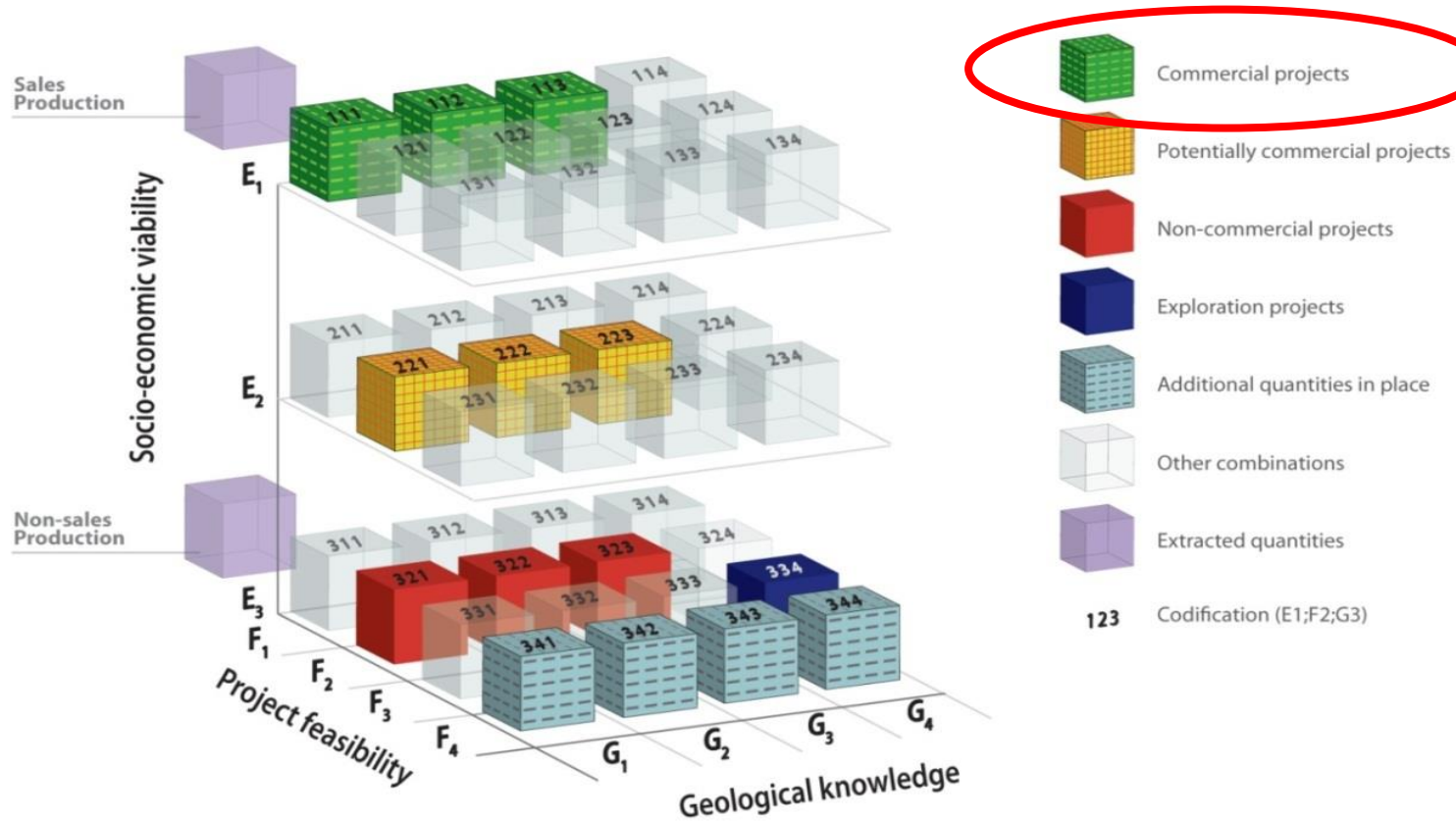
Category	Definition
G1	Quantities associated with a known deposit that can be estimated with a high level of confidence.

UNFC – How it works

- **Some users prefer the 3D representation of UNFC**
- **Other users prefer a 2D representation**
- **Consensus meant we needed both!**
- **They are simply different visualisations of the same system**
- **Classes may be a single code (e.g. 111) or groups of codes (e.g. 111, 112 and 113)**



UNFC – Examples of classes



UNFC – 2D representation

Total commodity initially in place	Extracted	Sales Production			
		Non-sales Production			
		Class	Categories		
			E	F	G
	Future recovery by commercial development projects or mining operations	Commercial Projects	1	1	1, 2, 3
	Potential future recovery by contingent development projects or mining operations	Potentially Commercial Projects	2	2	1, 2, 3
		Non-Commercial Projects	3	2	1, 2, 3
	Additional quantities in place associated with known deposits		3	4	1, 2, 3
	Potential future recovery by successful exploration activities	Exploration Projects	3	3	4
Additional quantities in place associated with potential deposits		3	4	4	

Each class is uniquely defined by its code

Alignment of systems (schematic)

UNFC-2009

Total commodity initially in place	Sales Production
	Non-sales Production
	<u>Class</u>
	Commercial Projects
	Potentially Commercial Projects
	Non-Commercial Projects
	Additional quantities in place
	Exploration Projects
	Additional quantities in place

PRMS

Production
<u>Class</u>
Reserves
Contingent Resources
Unrecoverable
Prospective Resources
Unrecoverable

CRIRSCO

Extracted
<u>Class</u>
Mineral Reserves
Mineral Resources
Not reported
Not reported
Exploration Results
Not reported

How can we use alignment?

- **Quantities can be estimated using current well-established commodity-specific systems**
- **Reporting under these systems can continue unchanged**
- **But the same quantities can also be reported under UNFC using the appropriate numerical codes**
- **The reporting is then independent of commodity type, extraction methodology and ambiguous terminology (e.g. “reserves”)**

UNFC sub-categories

- **The system allows further granularity through sub-categories**
- **These are optional**
- **They facilitate mapping with the project maturity sub-classes of PRMS**
- **These sub-classes also align with some mining companies' reporting practices and with the NEA/IAEA classification of production centres**

F axis sub-category definitions

Category	Definition
F1	Feasibility of extraction by a defined development project or mining operation has been confirmed.

Sub-Category	Definition
F1.1	Extraction is currently taking place.
F1.2	Capital funds have been committed and implementation of the development project or mining operation is underway.
F1.3	Sufficiently detailed studies have been completed to demonstrate the feasibility of extraction by implementing a defined development project or mining operation.

UNFC using all sub-categories

UNFC Classes defined by categories and sub-categories							
Total commodity initially in place	Extracted	Sales Production					
		Non-sales Production					
	Class		Sub-class	Categories			
				E	F	G	
	Known Deposit	Commercial Projects	On Production	1	1.1	1, 2, 3	
			Approved for Development	1	1.2	1, 2, 3	
			Justified for Development	1	1.3	1, 2, 3	
		Potentially Commercial Projects	Development Pending	2	2.1	1, 2, 3	
			Development On Hold	2	2.2	1, 2, 3	
		Non-Commercial Projects	Development Unclassified	3.2	2.2	1, 2, 3	
			Development Not Viable	3.3	2.3	1, 2, 3	
		Additional quantities in place			3.3	4	1, 2, 3
		Potential Deposit	Exploration Projects	[No sub-classes defined]	3.2	3	4
	Additional quantities in place			3.3	4	4	

In summary ...

- **UNFC-2009 is a generic, principles-based system**
 - Applicable to both solid minerals and fluids
 - Uses a numerical coding system
- **Based on three fundamental criteria**
 - Economic and social viability
 - Field project status and feasibility
 - Geological knowledge
- **Each criterion is sub-divided into 3 or 4 defined categories**
 - Optional use of sub-categories for more granularity
- **Classes are defined by a combination of a single category or sub-category for each of the three criteria**
 - Numerical category or sub-category for E, for F and for G
 - Always quoted in same sequence: E – F – G
 - Axis letters can be dropped: e.g. Class 221



UNFC

Classification Framework and Category Definitions

Generic Specifications

*Bridging
Document*

*Bridging
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Petroleum
Specifications
PRMS

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Other Aligned
Systems

Any questions?

