

Mineral Resource Classification – are we suffering from group think?

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Agenda

- 01** Audience participation
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Participation

It's about audience participation

The questions raised in this presentation are engendered to foster constructive audience discussion and participation.

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Where and what do we report?

Where and what did we report in 2024?

Rank	Exchange (Primary)
1	Australia – ASX
2	Canada – TSX / TSX-V, ASE, VSE, etc.
3	UK – LSE / AIM
4	USA – NYSE, NASDAQ, etc.
5	OTC (Over the Counter)
6	Indonesia – IDX
7	Private
8	South Africa – JSE

Rank	Primary Commodity
1	Gold
2	Lithium
3	Copper
4	Silver
5	Uranium
6	REEs
7	Graphite
8	Iron

Implications...

- Regulatory requirements / guidance and method for any MRMR reporting standard will continue to be driven by Australian, Canadian, and American reporting requirements.
- Gold (with its variations) had 7x more reports filed than the next nearest commodity, lithium, and 9x more announcements than copper (with its variations).
- In the EU context, the implications of the Critical Raw Materials Act (CRM Act) remain to be understood, as EU Strategic mineral projects must be reported using the United Nations Framework Classification for Resources (UNFC). Strictly speaking this is not public reporting; it is an obligation for reporting to the EU Commission by National Governments and promoters of Strategic Projects; however, it does carry financial implications.

The purpose of reporting



Why do we report?

*“Thousands of public and private companies focus on **creating value** through the discovery, advancement and conversion of Mineral Resources to Reserves to lay the groundwork for **future mines**. Advancing projects from Resource to Reserve is vital to the mining industry, offers distinct **investment opportunities**, and provides the world with the minerals needed to construct our modern world”.*

*“The businesses of mining project development and mine production by nature contain significant risks. They depend upon, among other things, **reliable estimation** of Mineral Resources and Reserves and **competent management**.*

*“Mineral Resources and Reserves are the **foundation of a mining or mineral company**, as they represent the basis for the **future viability of the company's operations**. Therefore, it is critical that their **quantity and quality are estimated correctly**.”*

Sources:

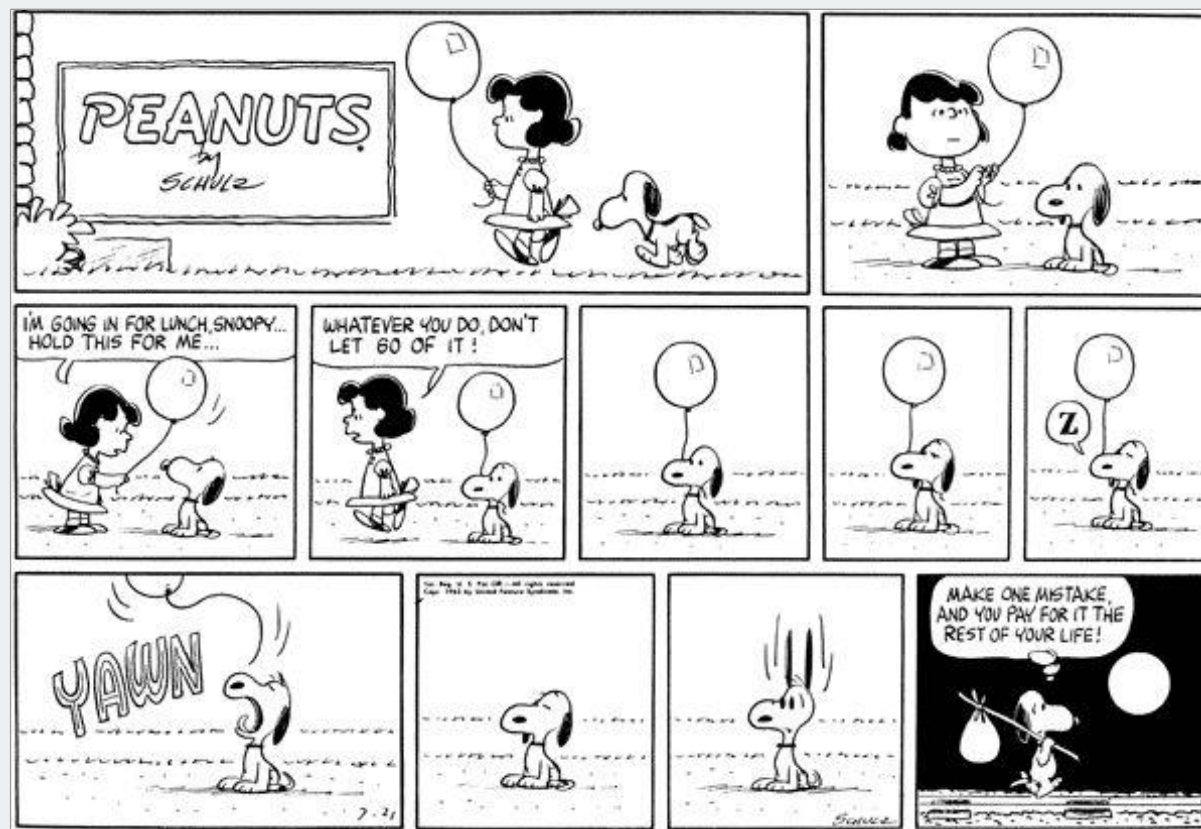
- <https://resourcecapitalfunds.com/insights/rcf-partners-blog/mineral-resources-reserves/>
- <https://www.deloitte.com/za/en/services/consulting/perspectives/the-importance-of-reliable-mineral-resources-and-reserves-reporting.html>
- <https://www.miningnewsnorth.com/story/2023/01/06/mining-history/the-biggest-canadian-gold-hoax-of-all-time/7698.html>

What we forget (sometimes)?

- The grade estimate (block model) is not the Mineral Resource estimate (MRE).
- The semivariogram is not the estimation search distance.
- Boreholes every 100 metres does not tell you what lurks in between.
- What is not recorded (or sampled), will not suddenly show up in the geology model or MRE.
- Do MRE's always include the right information at the right level of detail (fit for purpose and use)?
- Why do we forget the “other stuff”?
 - “A ‘Measured Mineral Resource’ is that part of a Mineral Resource for which quantity, grade (or quality), **densities, shape, and physical characteristics are estimated with confidence sufficient** to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit”.*

Source: https://www.jorc.org/docs/JORC_code_2012.pdf

There are implications



Source: <https://uk.pinterest.com/pin/352899320813018446/>

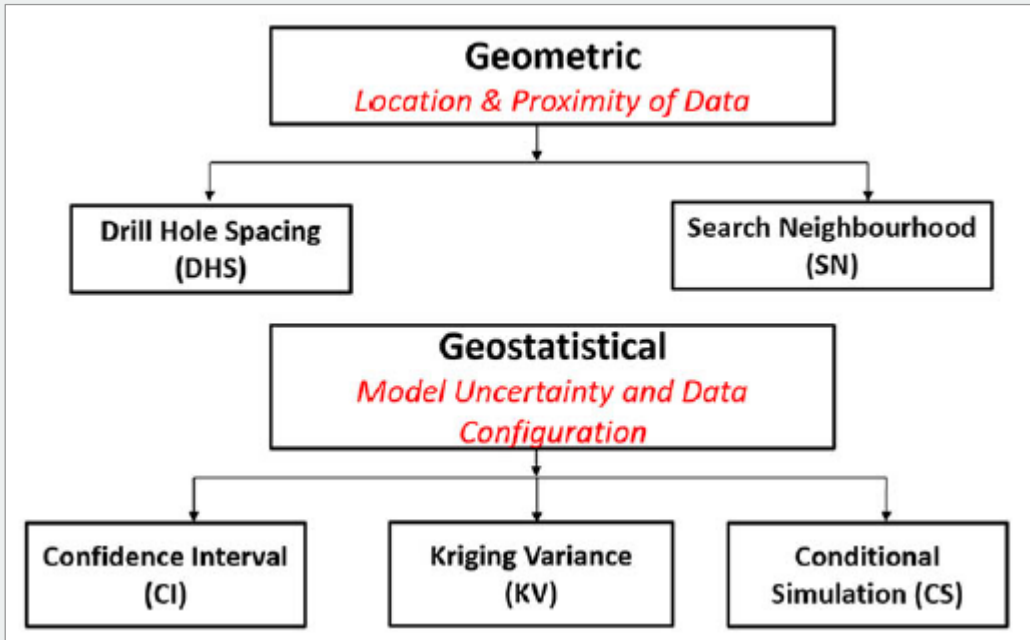
Do geologists herd?

Cat herding 101?



Source: <https://medium.com/@baglanrhymes/herding-cats-determining-the-ethics-of-artificial-intelligence-55b112cc5b17>

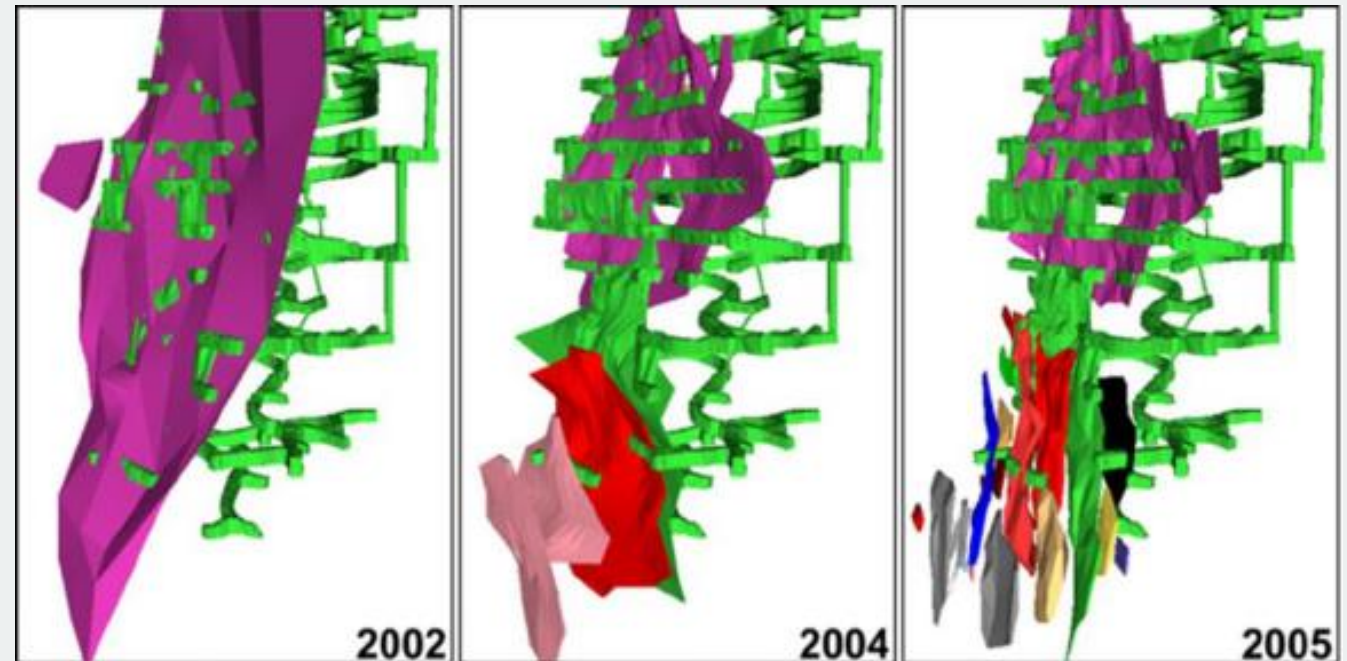
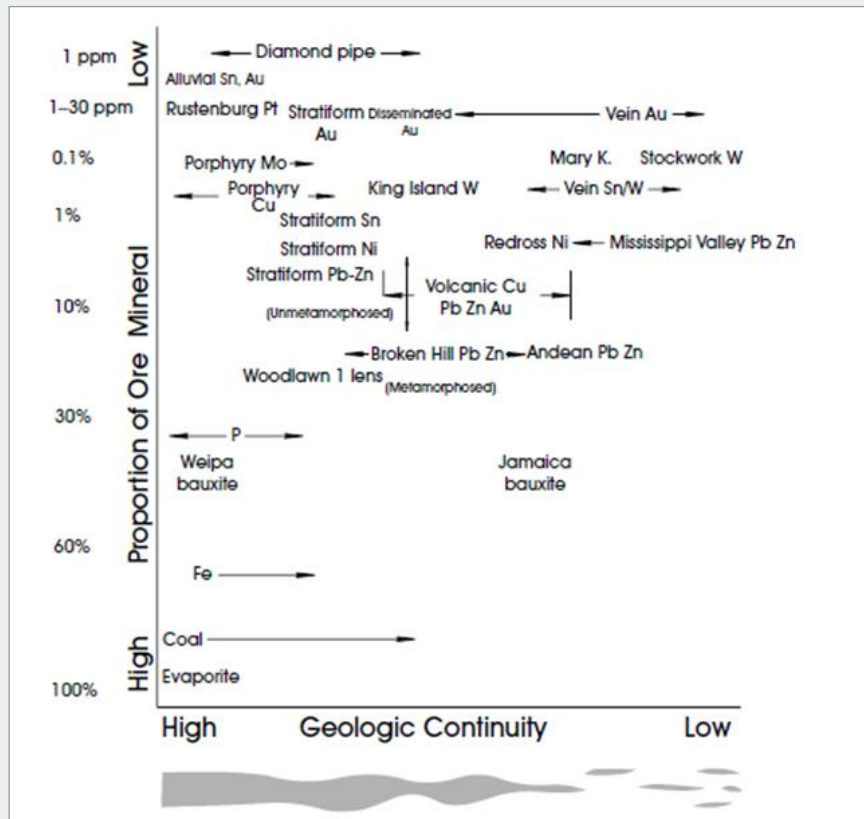
Classification approaches



DHI: Drill-hole intercept
 DHS: Drill-hole spacing
 DNDH: Distance to nearest drill-hole
 ES: Ellipsoidal search
 KV: Kriging variance
 NDH: Number of drill-holes
 NS: Number of samples
 OS: Octant Search

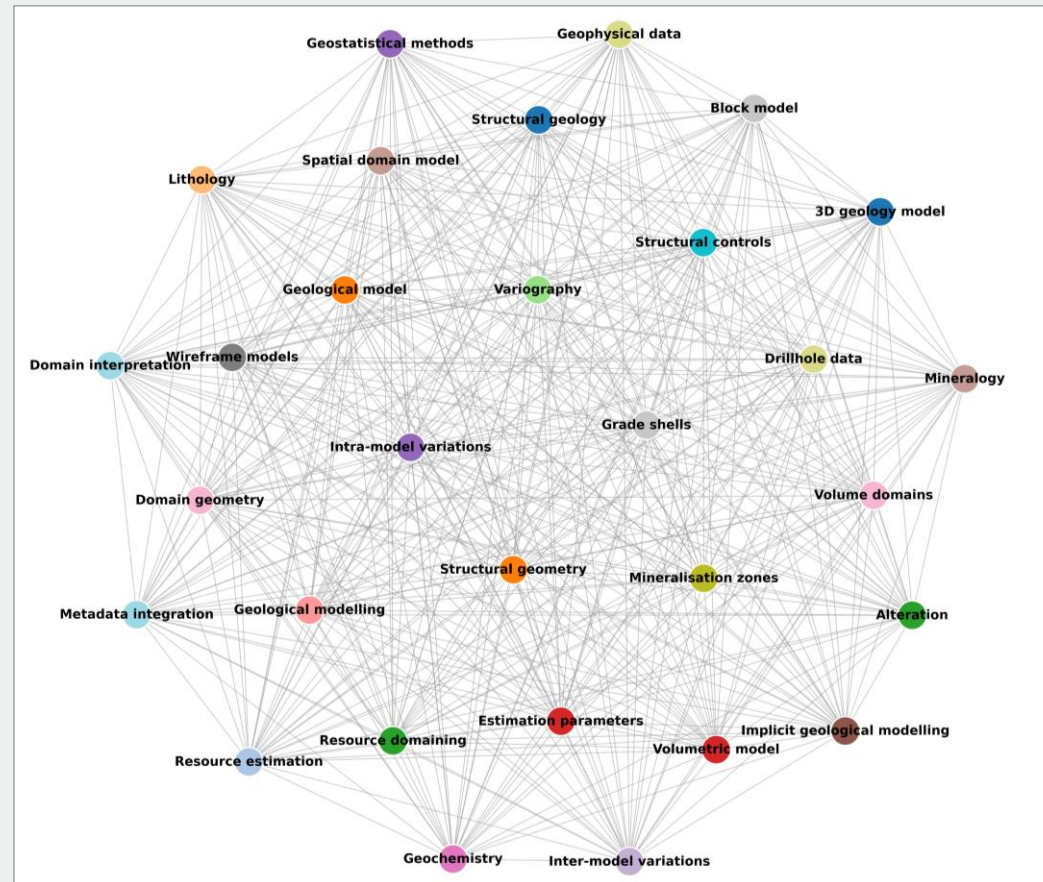
Classification technique	Count	Percentage(%)
NDH + ES	1	2.22
DHS +DNDH	1	2.22
DHS + NDH + DNDH	1	2.22
DHS + NS+ OS	1	2.22
NDH + NS + OS	1	2.22
DHS	2	4.44
DNDH	2	4.44
NS + DNDH	2	4.44
NDH +NS	2	4.44
NDH + NS + OS	2	4.44
KV + DNDH + NDH + NS	2	4.44
DHS + NDH	3	6.67
NS + ES	3	6.67
NS + OS	3	6.67
NDH+ DNDH	4	8.89
Unknown	4	8.89
NDH + NS + DNDH	5	11.11
DHI + NS	6	13.33

Is it just geology?



Source: Sinclair, A.J. and Blackwell, G.H , (2004), Applied Mineral Inventory Estimation, Cambridge University press, 381pp.
<https://www.geoscience.nt.gov.au/gemis/ntgsjspui/handle/1/74226?mode=full>

A well-informed investment decision



Source: Professor Glen Nwaila

Or something more?

- Is Agency theory a reality?

“The study of problems and solutions related to the delegation of tasks from principals to agents, focusing on the conflicting interests between the parties.”

- Does the requirement for “*minimum standards, recommendations and guidelines for Public Reporting*” go far enough to establish robust reporting of Mineral Resources, or does it foster a wide range of approaches and outcomes? As an industry should we not strive to do more than just the minimum?
- Are we training, mentoring, and planning for the future? Long term planning not subject to commodity price cycles?

Sources:

- <https://www.sciencedirect.com/topics/social-sciences/agency-theory>
- https://www.jorc.org/docs/JORC_code_2012.pdf
- <https://ro.ecu.edu.au/cgi/viewcontent.cgi?article=1611&context=theses>

Do we need more guidance (or convergence)?


The easiest way to commit fraud

“Say you have a dog, but you need to create a duck on the financial statements. Fortunately, there are specific accounting rules for what constitutes a duck: yellow feet, white covering, orange beak. So, you take the dog and paint its feet yellow and its fur white and you paste an orange plastic beak on its nose, and then you say to your accountants, ‘This is a duck! Don’t you agree that it’s a duck?’ And the accountants say, ‘Yes, according to the rules, this is a duck.’ Everybody knows that it’s a dog, not a duck, but that doesn’t matter, because you’ve met the rules for calling it a duck.”

Source: <https://taylorpearson.me/bookreview/the-smartest-guys-in-the-room/#:~:text=%20Everybody%20knows%20that%20it's%20a,than%20they%20would%20have%20otherwise.>

How requirements have grown

	1989	1990	1991	1992	1996	1999	2001	2004	2006	2008	2011	2012	2013	2017	2019	2021	2024 (Code)	2024 (Guide)
JORC																		
Risk	0	0		0	0	1		2				2					13	17
Opportunity	0	0		0	0	0		0				0					2	4
Uncertainty	0	2		1	1	0		0				24					6	19
If not, why not	0	0		0	0	0		0				9					8	11
If so why so	0	0		0	0	0		0				0					2	0
Materiality	0	1		3	3	35		64				99					94	87
Transparency	0	0		0	0	2		5				8					10	11
Competency	11	12		31	37	51		94				144					169	140
PERC																		
Risk			0				2			5			5	8		50		
Opportunity			0				0			0			0	1		9		
Uncertainty			0				14			20			20	23		32		
If not, why not			0				0			0			0	4		34		
Materiality			2				50			63			73	87		122		
Transparency			0				0			0			0	0		13		
Competency			6				57			114			137	161		163		
CRIRSCO																		
Risk								2		0		2			22		23	
Opportunity								0		0		0			0		0	
Uncertainty								20		0		19			18		18	
If not, why not								0		0		0			4		4	
Materiality								51		2		47			94		96	
Transparency								2		0		2			9		9	
Competency								65		8		66			119		124	



Caution: Treat the word count for materiality with caution as both noun and adjective forms were included.

Quis custodiet ipsos custodes?



Source: <https://brewminate.com/the-praetorian-guard-in-ancient-rome-protection-and-imperial-intelligence/>

Some additional discussion points

- For certain deposit types are Measured Resources and Proven Reserves applicable?
- Are Measured Mineral Resources overrated by financial institutions? When is Indicated enough? (M&I and P&P are often lumped together anyway).
- Who is making the RPEE calls, the geologists, the engineers (mining, metallurgy, and geotech), or a larger team? Who should be making that call?
- Should we get rid of single person sign off and move to a matrix model?
- Do we need more focus on Formal Competent Person accreditation and training (exams)?
- What does “economic” really mean? (Inferred and its implications to LoM’s and valuation)?
- Should mandatory, quantitative, risk assessments be a requirement for Mineral Resources to be declared?

Open floor

Thank You