Valuation of an Advanced Stage Project

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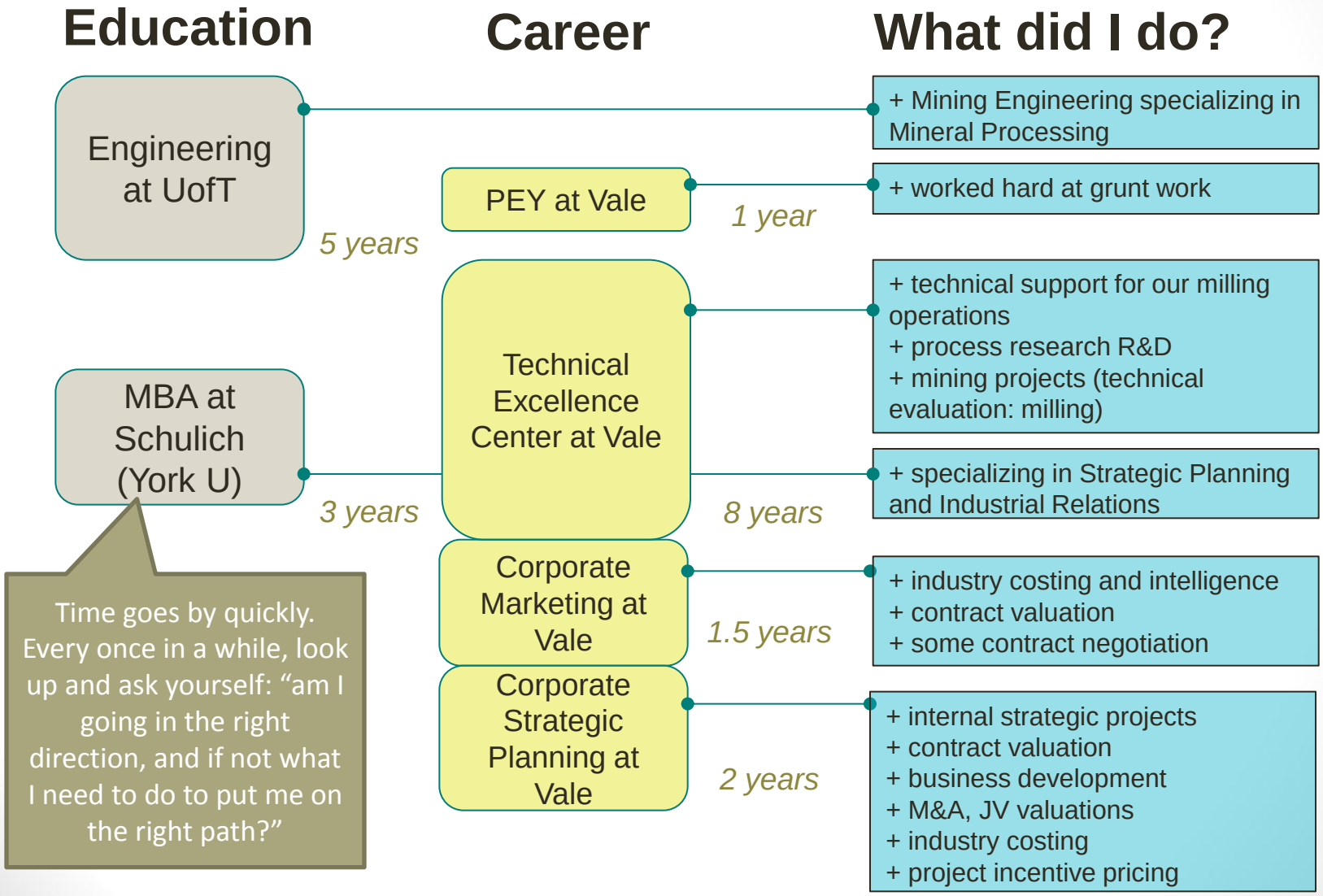
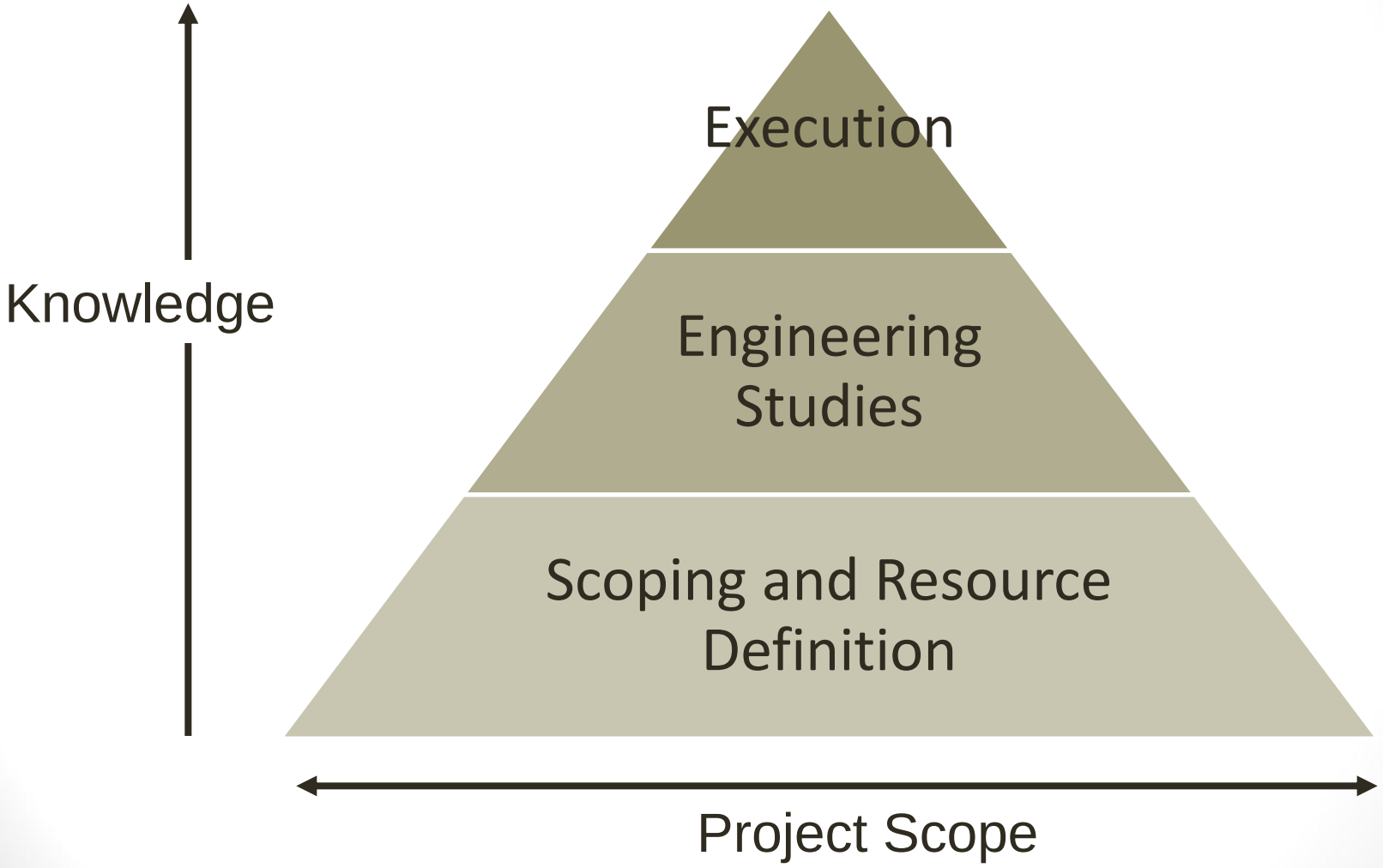
Vale Base Metals

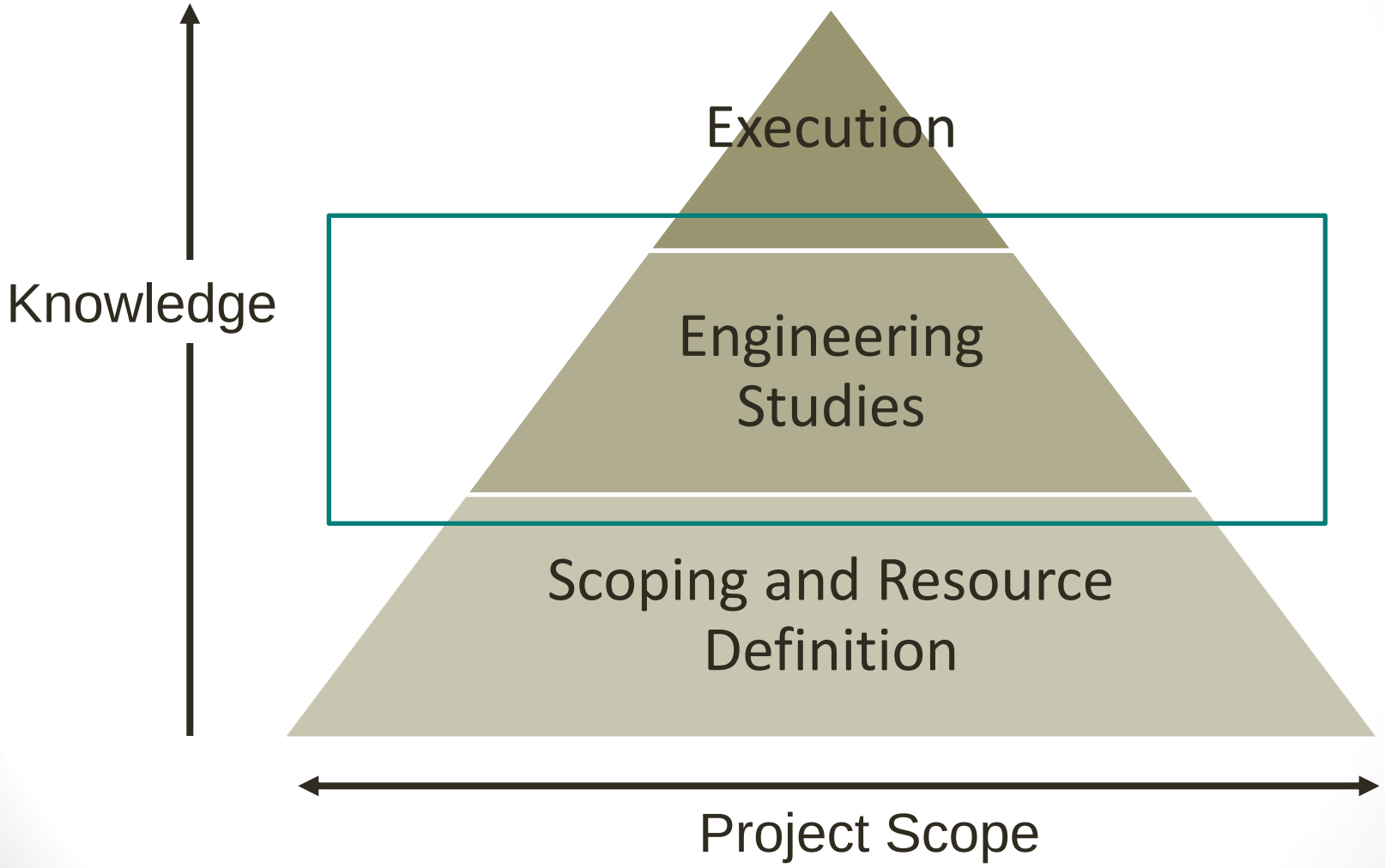
About me…


Education
Career
What did I do?
Engineering at UofT
5 years
+ Mining Engineering specializing in Mineral Processing
PEY at Vale
1 year
+ worked hard at grunt work
MBA at Schulich (York U)
3 years
Technical Excellence Center at Vale
8 years
+ technical support for our milling operations
+ process research R&D
+ mining projects (technical evaluation: milling)
+ specializing in Strategic Planning and Industrial Relations
Corporate Marketing at Vale
1.5 years
+ industry costing and intelligence
+ contract valuation
+ some contract negotiation
Corporate Strategic Planning at Vale
2 years
+ internal strategic projects
+ contract valuation
+ business development
+ M&A, JV valuations
+ industry costing
+ project incentive pricing
Time goes by quickly. Every once in a while, look up and ask yourself: "am I going in the right direction, and if not what I need to do to put me on the right path?"

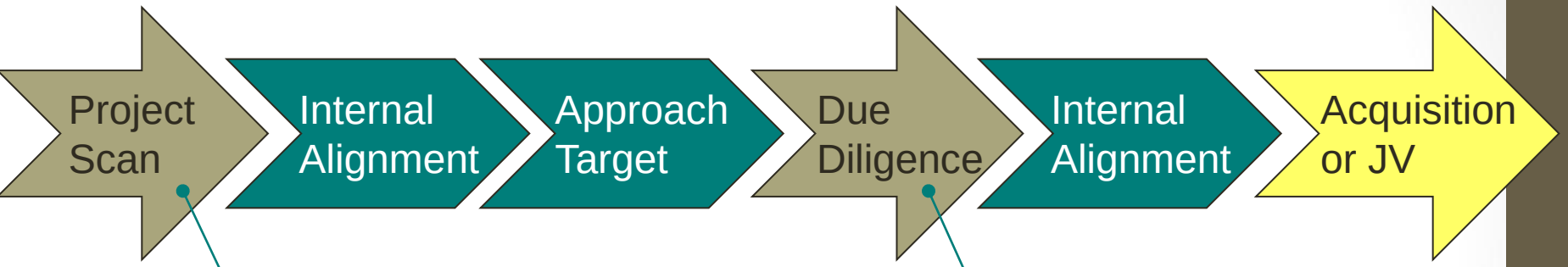
What is an Advanced Stage Project?



What is an Advanced Stage Project?



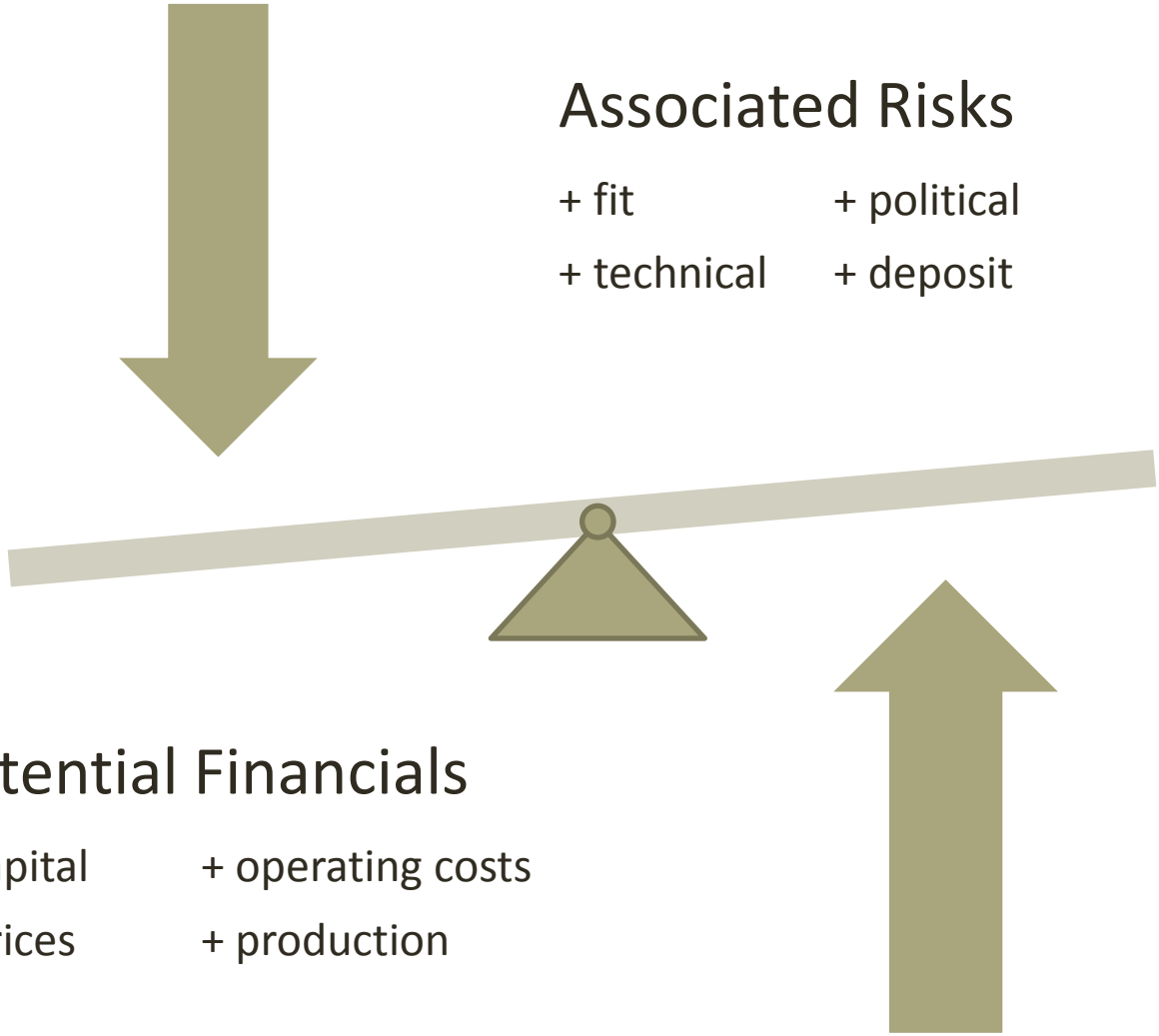
There are two phases in project valuation. A Project Scan and a Project Due Diligence.



+ a benchmarking, risk and economic analysis of the project
+ based on publicly available information, but not necessarily free information
+ small internal team
+ objective is to identify a target for acquisition or partnership and highlight risks/opportunities for further consideration

+ a very detailed analysis of the project (geology, mining, processing, marketing, legal, logistics, HR, etc.)
+ always is a large internal multidisciplinary team of experts
+ may include external consultants
+ typically will have access to project internal information, site visits
+ objective is to understand the risks of the project, go through a thorough economic valuation and options analysis

Project Scan is about asking a lot of questions…



Associated Risks

+ fit
+ technical
+ political
+ deposit

Potential Financials

+ capital
+ prices
+ operating costs
+ production

The key is to distill down to 3 or 4 factors that really drive the decision

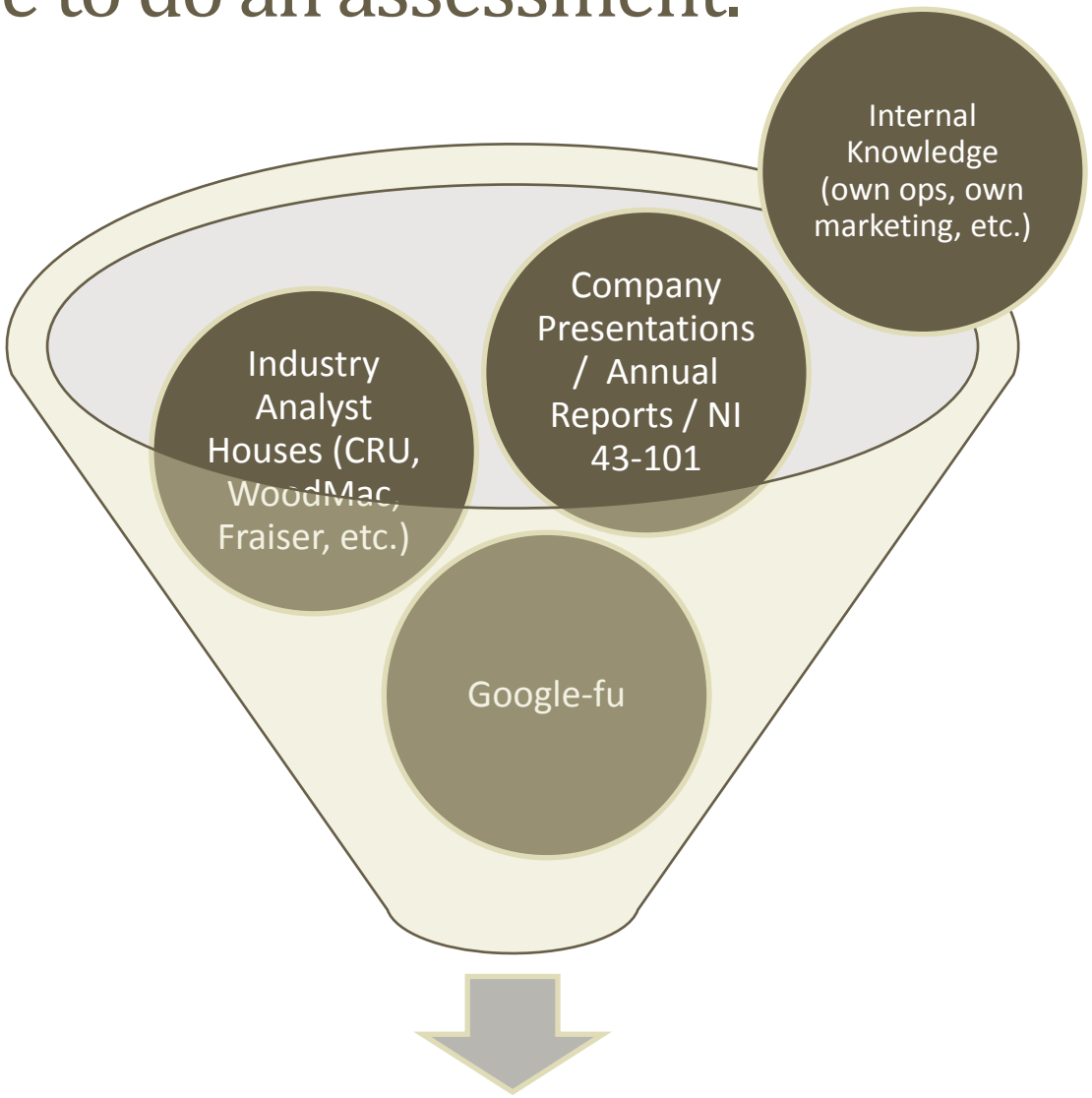
…the answers form the basis for recommendation

What we want to know?	Why do we want to know this?
How does the project fit with our strategy?	+ our own motivation for going ahead with acquisition or partnership
Who are the owners?	+ what would be their motivation for selling? Or entering into partnership? + are they a junior/major? what is their financial health?
Where is the project?	+ potential synergies with existing operations + government policy towards mining + local attitude towards mining + regional stability
What are they mining?	+ resource size and grade of deposit – is this deposit the right size for investment? + how does the deposit compare to its peers? + by-product value?
How are they mining?	+ surface or underground? + geological considerations + deposit complexity
What is the capital cost?	+ what is their capital and installed capacity? + capital intensity ($/t installed capacity) + how is the project executed? (phased approach?) + how does the capital investment compare to recent executed projects? + what is their schedule? (how many years to build?)
What is the production?	+ what is their Life of Mine? + what is the production profile? + what are the final products?

How are they bringing metal to market?	+ what is the processing route? is this new technology?
	+ what are the key assumptions?
	  + metal recoveries? What is this based on?
	  + market conditions? (sale of intermediates, such as concentrate); realized metal values?

What are the operating costs?	+ how do the operating costs compare to regional and global peers? + what are the key cost drivers?
What is the project NPV and IRR?	+ what are the project economics? Net present value (NPV)? Internal Rate of Return (IRR)? + what is the project incentive price? + what are the key economic sensitivities? + how does the project compare to internal benchmarks? recently executed projects?

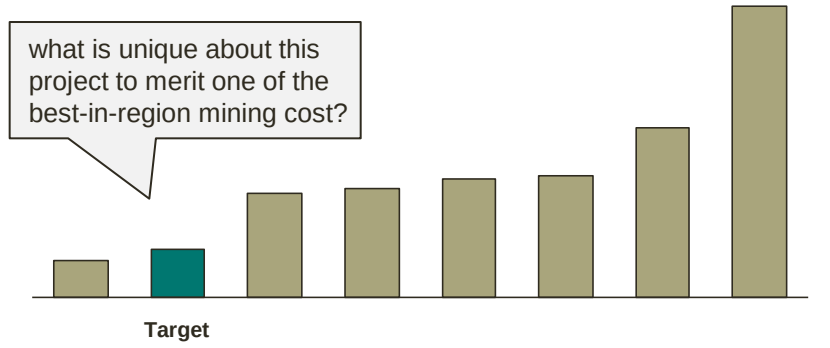
As an Advanced Stage Project, a lot of information is available to do an assessment.



Analytics

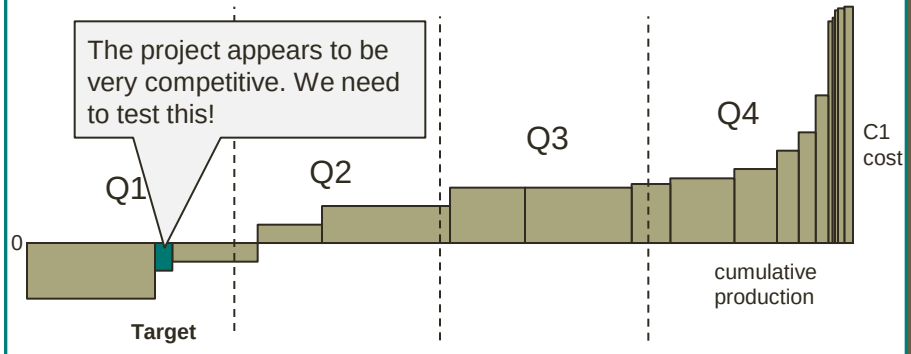
Benchmarking is a critical exercise simply because anything about the future is based on assumptions.

Regional Open Pit Costs with similar Strip Ratios ($/t mat.)

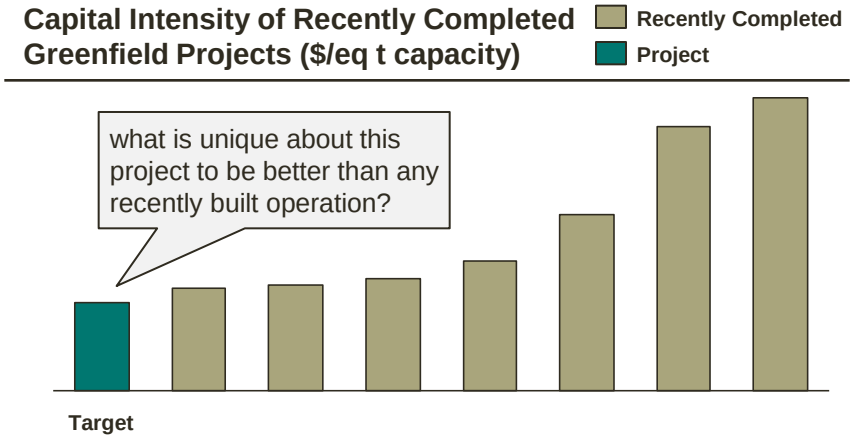


2015 C1 Cash Cost ($/t)

C1 = cash costs less by-product credits



Capital Intensity of Recently Completed Greenfield Projects ($/eq t capacity)



etc…

Comparing the project to existing operations and internal knowledge is an important sanity check, and **will lead us to more questions and further scrutiny**.
Benchmarking provides a platform for economic and risk assessment.

In Summary…

On Career…

- Your career will take you many places, always have fun at what you do
- Every so often, re-evaluate your career: “am I on the right path?”, and don’t forget that the ‘right’ path will change as you learn more
- Take time and be patient, *“build a solid foundation on which to build your house”*

On Project Valuation…

- Advanced stage valuation is about risk and economic gain on a future project;
  - future is uncertain thus benchmarking against existing operations is critical
  - understanding non-tangibles is very important
  - ask questions, ask questions and ask even more questions

What's the difference between a Project Scan and a Project Due Diligence?

a lot more analysis by
a lot more people

How would I put together a final package?

Highlight 2-3 key things about the project in title

Overview of Project

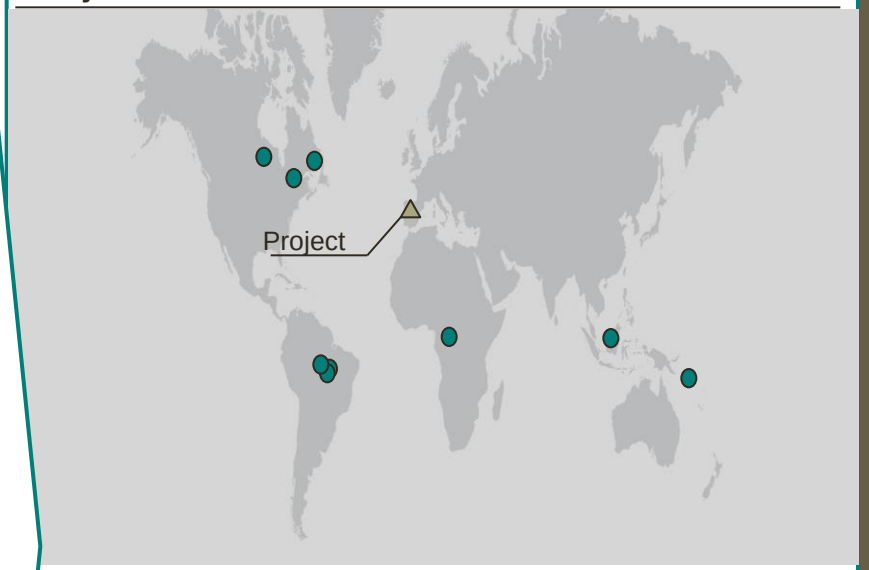
History

Located in…	Country
Discovered in…	1980
Previous owners…	+ numerous
Previous attempts…	+ studied in 1990's
Current owner	+ X company
Current status	+ pre-feasibility

Description

Geology	+ type of deposit (porphyry, etc.)
Key consideration	+ known Cu mining area?
Reserve/Resource	+ 10Mt ore, 1.5% Cu + other metals
Key consideration	+ MRMR classification + LoM
Mining method	+ open pit or underground
Key consideration	+ strip ratio if open pit + depth if underground (access ramp/shaft, how deep) + cost per $/t ore or material
Process route	+ Mill or SXEW or Heap
Key consideration	+ process recoveries + cost per $/t ore or Cu or eq Cu
Capital	+ US$ XYZ M + US$ xyz / t
Key consideration	+ brownfield / greenfield + power plant, grid, port, etc. ?
Production	+ XYZ kt Cu production per year + xyz kt eq Cu production per year
Key consideration	+ start up year 2017

Project Location



Evaluation

NPV (at some discount%) + Vale price deck	US$ XYZM
IRR	XYZ %
NPV (at some discount%) + Analyst price deck	US$ XYZM
IRR	XYZ %

Strategic Fit & Recommendation

+

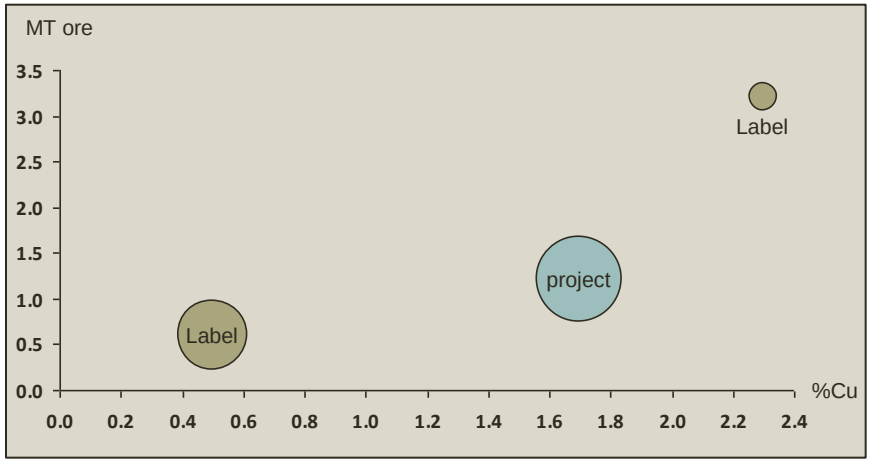
+

+

+

2-3 key conclusions about deposit size, location and cost benchmarking

DEPOSIT SIZE

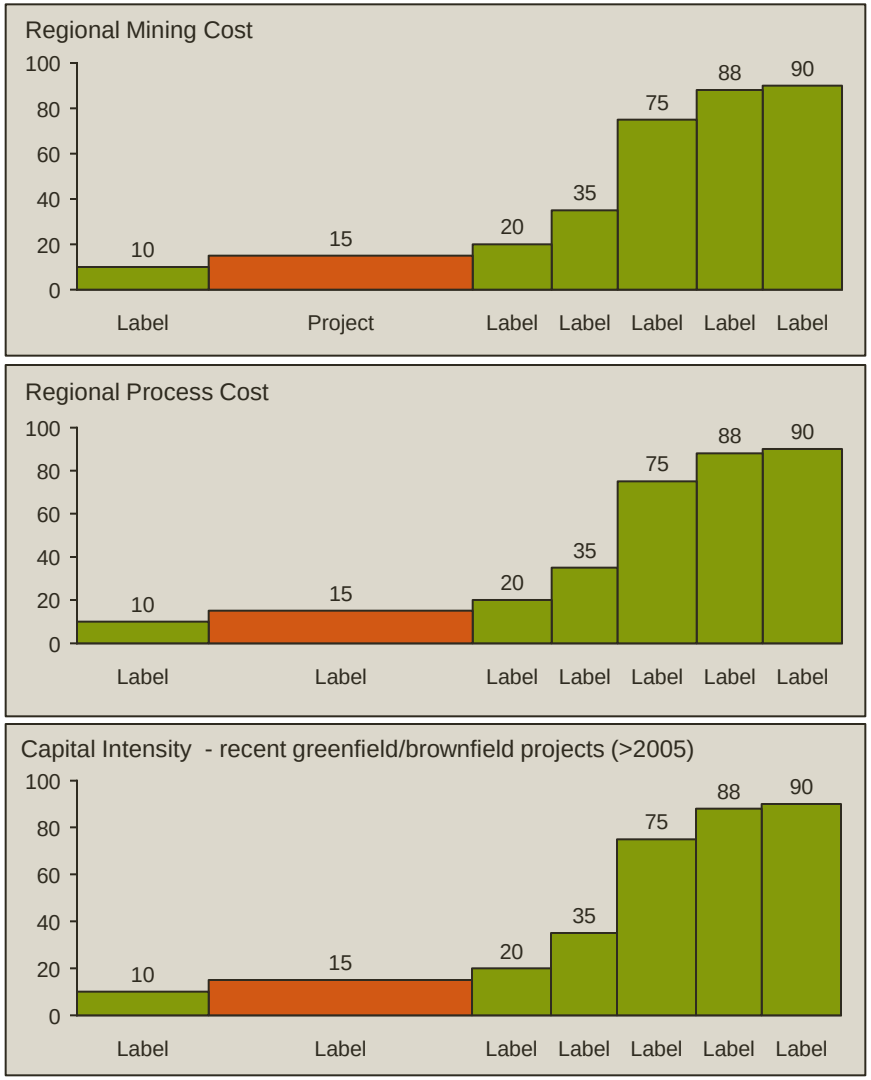


LOCATION ASSESSMENT

Country	XYZ
Uncertainty concerning existing regulation	
Uncertainty concerning environmental regulation	
Legal system	
Taxation regime	
Infrastructure	
Trade barriers	
Political stability	
Level of security	
Availability of labor/skills	

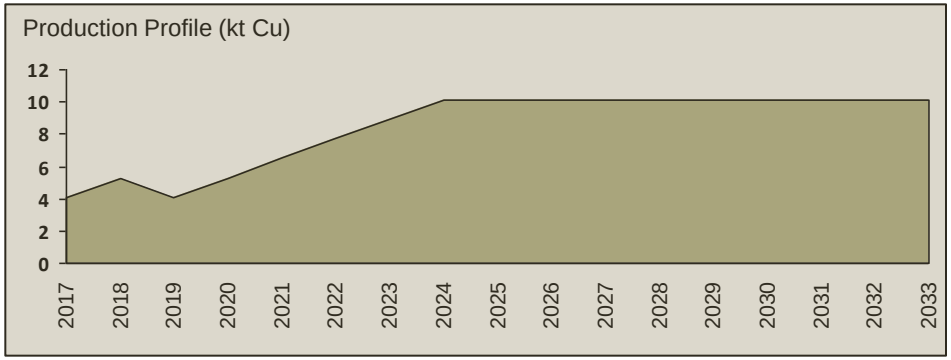
Fraser Institute Annual Survey of Mining Companies showing % of respondents indicating Mild Deterrent + Strong Deterrent to investment

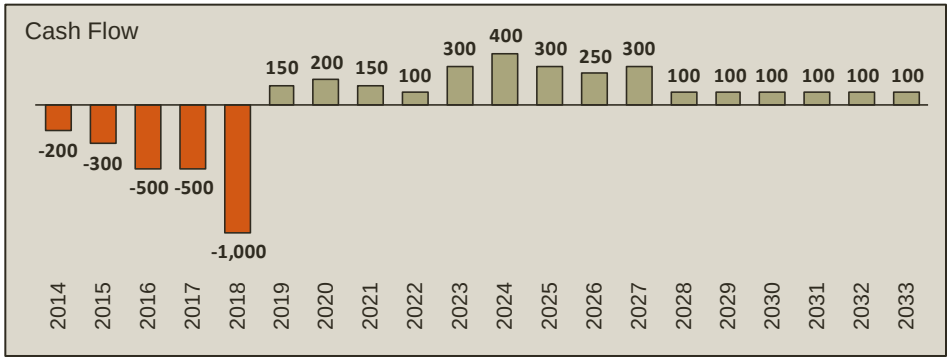
COST BENCHMARKING



State 2 or 3 key things about risk and project value in title

VALUATION





Project Sensitivities (Δ in NPV)

Cu price (+10%)	+USM
By-product price (+10%)	+US$M
Mining Cost (+10%)	-US$M
Process Cost (+10%)	-US$M
Cu Production (+10%)	+US$M
Delay (+2 years)	-US$M
Capital cost (+10%)	-US$M

Project Valuation

NPV (some%) + Vale price deck	US$ XYZM
IRR	XYZ %
NPV (some%) + Analyst price deck	US$ XYZM
IRR	XYZ %

RISK

risk	*consequence*	*mitigation*
product placement		
project delivery		
environmental regulatory changes		
…		

Key take away

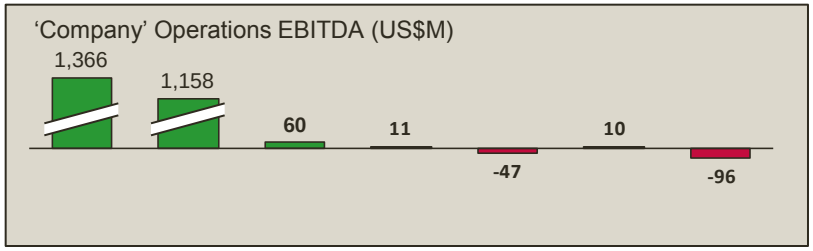
KEY ASSUMPTIONS

3-4 Key conclusions from the strategic fit assessment and recommendation in the title

OWNER

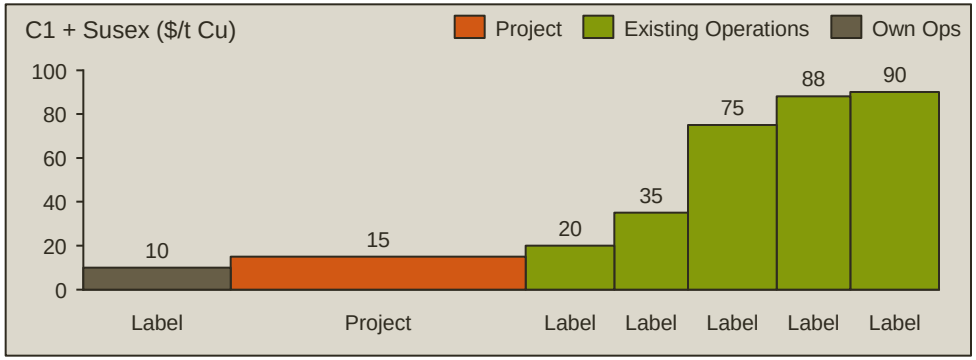
+ XYZ is a company based in Toronto, Canada
  + established in X year
  + are a international diversified company
  + something or other, rather

Metric	2012	2013	2014	2015	2016	2017
EBITDA						
FCF						
Debt						
Cash & Eq.						
CF from Ops						
Capital spend						
Market Cap						
Enterprise Value						
Earnings / Share						



+ some comment about health of company, fit of project/asset, and potential motivation for sale of asset

STRATEGIC FIT OF ASSET



+ central conclusions around
  + potential synergies with the asset?
  + cost position relative to our own
  + deposit size
  + project size
+ should we invest/purchase?

Thank you!