



MineRP

Mining Business as Process

Open Group EA Forum

Mike Woodhall



THE OPEN GROUP
EXPLORATION, MINING,
METALS & MINERALS FORUM

27 Feb 2019





Contents

SOME FUNDAMENTALS

OPEN GROUP EMMM™ PROCESS MODEL

MineRP PROTOCOLS

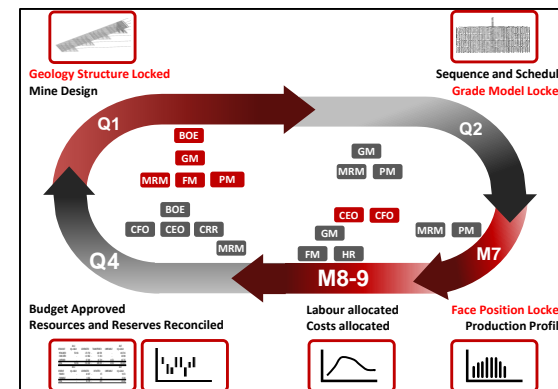
CAPABILITY MODEL & WRAP UP

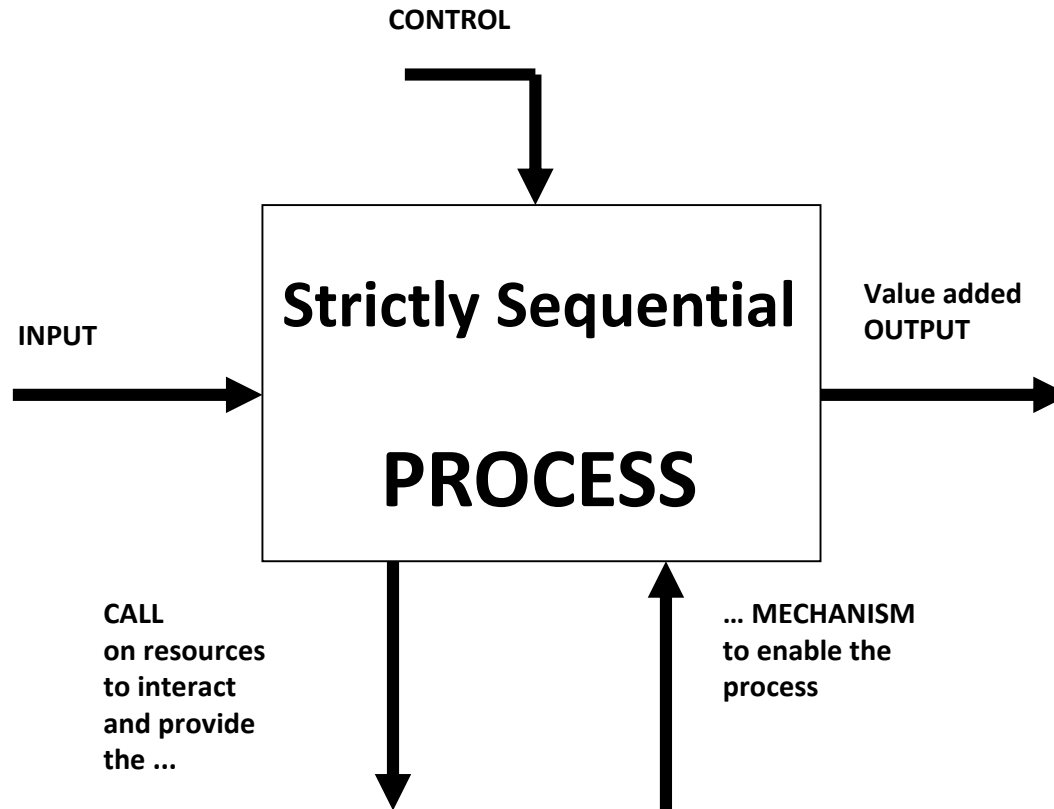


Why Mining Standards



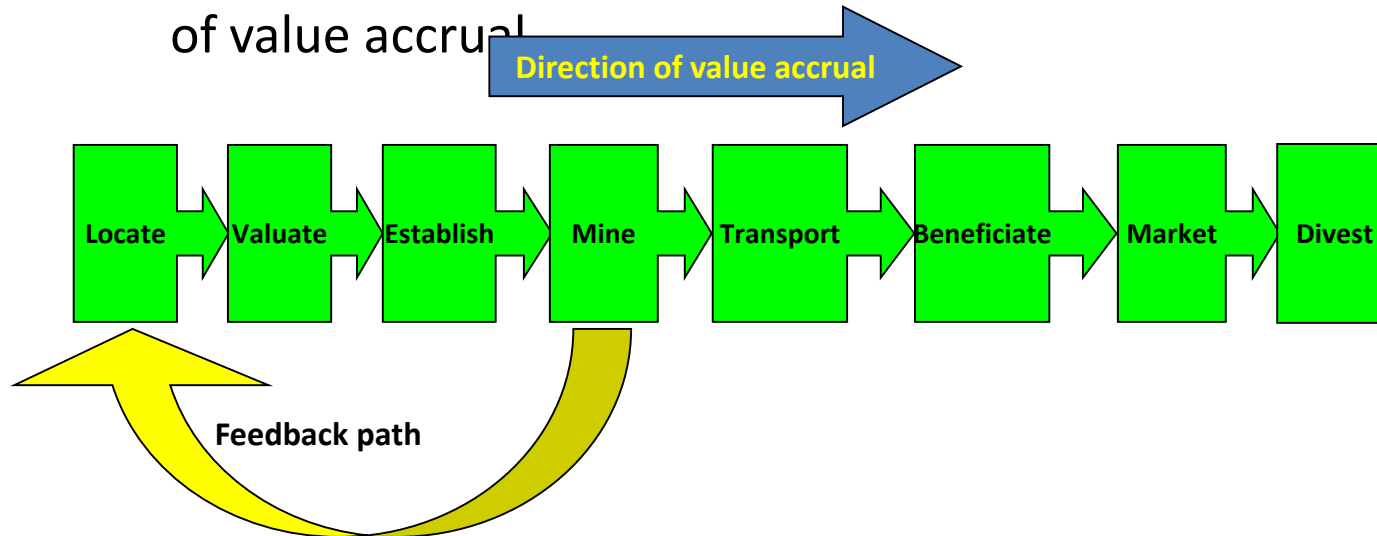
- Understanding mining as process to:
 - Overcome silo thinking for integrated planning and control
 - Define the processes locked away inside Software
 - Manage change to processes during digital transformation
 - Underpin innovation and outlast business cycles
- Visibility to:
 - MineRP, clients, partners for a consistent view of mining
 - Clarify the business information context (core and support processes; MTS & ERP)
 - Enable brand ambassadors to sing our song
- Across the mining enterprise means:
 - **A need for genuine enterprise models**
 - Amalgamating disparate data sources and bridging the MTS/ERP divide
 - Acknowledging different mining methods need different information
- **Repeatability** – avoid bespoke implementation, support digital orchestration, facilitate reporting
- **Scale** – single mine to global portfolio, millisecond mining to life of mine



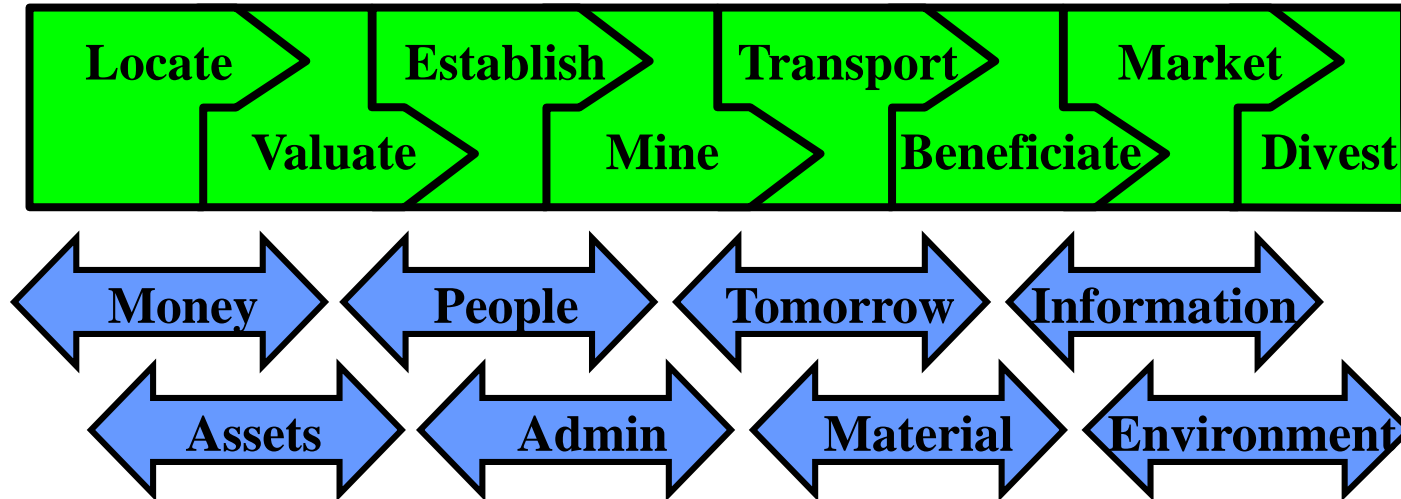


- Value chain

- A sequential series of steps descriptive of a business venture that establishes the trend of value accrual

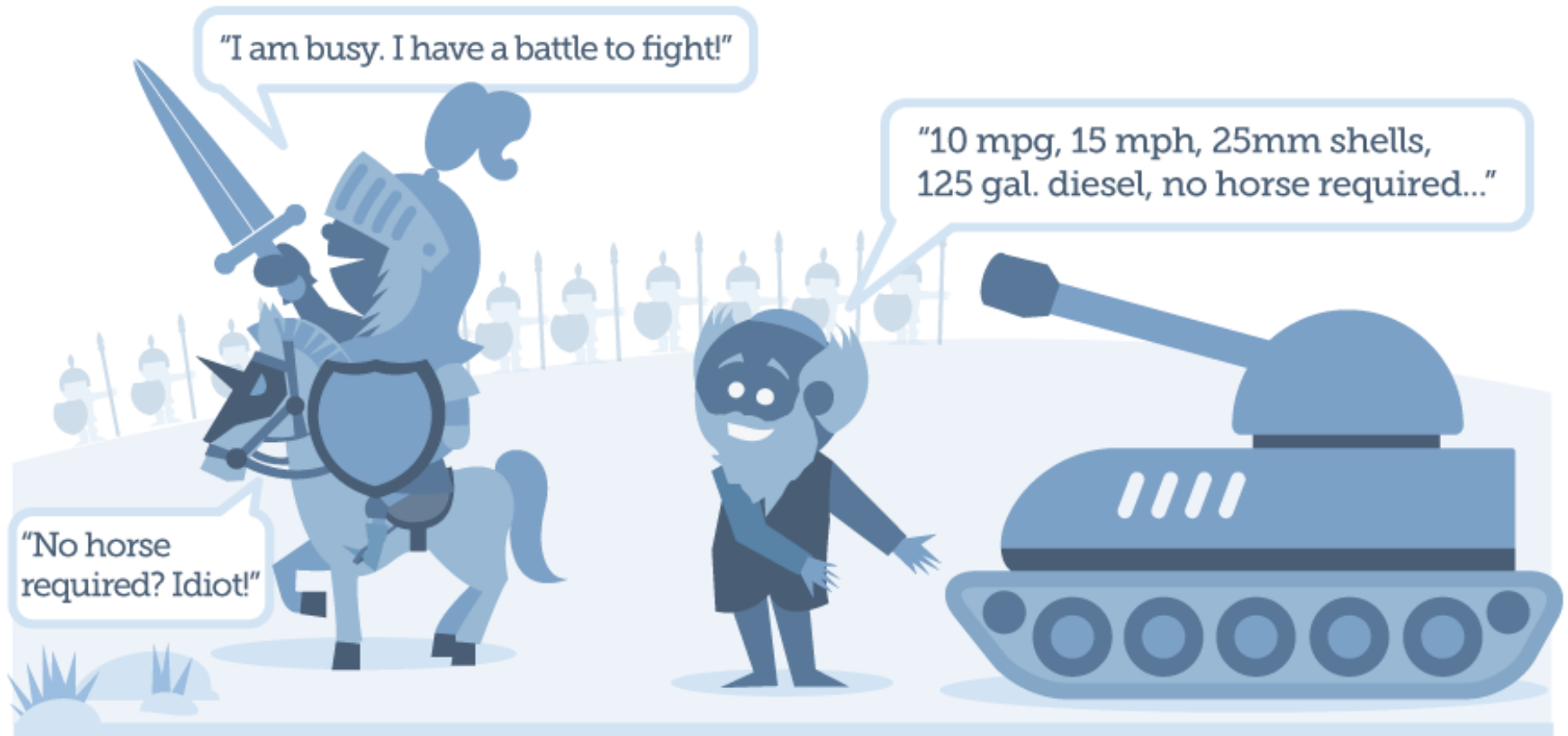


A Mining Value Chain (circa 2003)



Core Processes – convert orebodies to profits and clean up when done
Support Processes – common to any business
Two Information Domains – Mining Technical (MTS) & Commercial (ERP)

Understand mining in order to change it



A large yellow mining truck is the central focus, positioned on a gravel path. In the background, a complex industrial structure with conveyor belts and metal frameworks is visible under a blue sky with scattered clouds.

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- The Open Group
 - open, vendor-neutral IT standards and certifications critical to the enterprise
 - enables an independent platform for collaboration
- Gartner Mining: 2007 proposed an industry collaboration around a common mining operating model
- Drawing on experience in the telecoms industry, resulted in the establishment of EMMMv
- Two years of monthly debate across three continents between mining company and software vendor professionals from geology to metallurgy
- Business Process Model detail (L0-L2 is generic)
 - L0 Enterprise
 - L1 Value Chain
 - L2 Process
- L3 Sub-process detail is mining method specific
- L4 Task detail is client specific
- L5 is a process enabled developer conversation for software code

EMMMv first deliverables



Exploration and Mining Business Process Reference Model

Version 1.01



Comments are welcome. Please contact ospecs@opengroup.org.

Discover: The process by which an exploration target and/or a mineral resource is articulated and defined for acquisition purposes. The process includes: evaluation of grade and tonnes, pre-feasibility phase, examining the production options, and acquisition of the necessary rights.

At a strategic level: the exploration strategy and associated activities to find new deposits. At a tactical level: focus on the evaluation of existing mineral deposits. At an operational level: day-to-day enhancement of the level of confidence in the geological model.

Establish: All the activities necessary to create a mining environment (the full infrastructure). At a strategic level: creating the mine, beneficiation plant, environment, supporting facilities & communities, plus financing. At a tactical level: ensuring mid-term continuity and viability of the mining operation. Typically funded by capital expenditure; e.g., sinking a new shaft, opening and building of extensions to an existing mine. At an operational level: creation of further access to the ore body with all the associated supporting engineering infrastructure. Funded by operational fund (oper).

Exploit: For a given mine type, rock type, and mining method, this process includes the breaking and removal of rock. Rock is a generic term to describe all types of mineral resource host material. It also includes the transport of the broken rock and waste from working place to plant and/or stockpile.

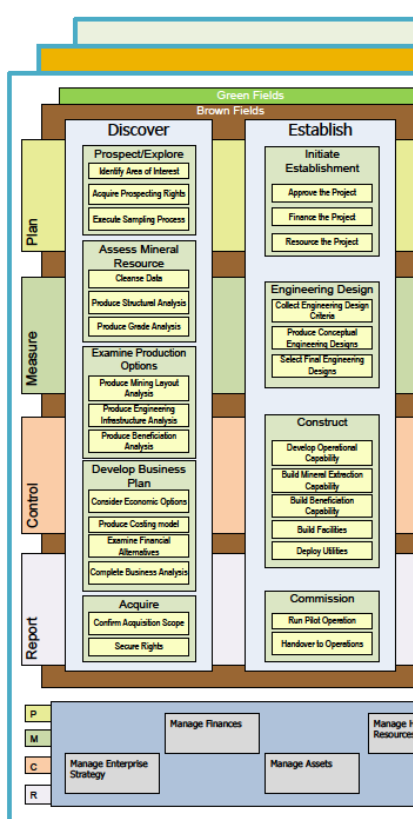
Beneficiate: This process focuses on the processing of ores for the purpose of:


- Regulating the size of a desired product, removing unwanted constituents, and improving the quality, purity, or assay grade of a desired product.
- Concentration or other preparation of ore for smelting by, for example, sintering, flotation, or magnetic separation and improvement of the grade of ores by milling, flotation, selective gravity concentration, or other processes.

Sell: This process focuses on dealing with customers in order to dispose of the product and attain revenue. This process also includes product marketing.

Rehabilitate: This process focuses on returning the mining site to a desired 'improved' state concurrently with or after the primary mining and associated activities.

Planning for rehabilitation is now a key deliverable of any exploration or mining plan and must generally be approved before any exploration or mining starts can be undertaken.





EXPLORATION, MINING, METALS & MINERALS VERTICAL

The

Exploration and Mining Business Reference Model

March

2010

Getting started with the Exploration and Mining business reference model positions the reader in terms of the first reference model of the group existing within the Exploration, Mining, Metals and Minerals vertical.

Concepts and Principles

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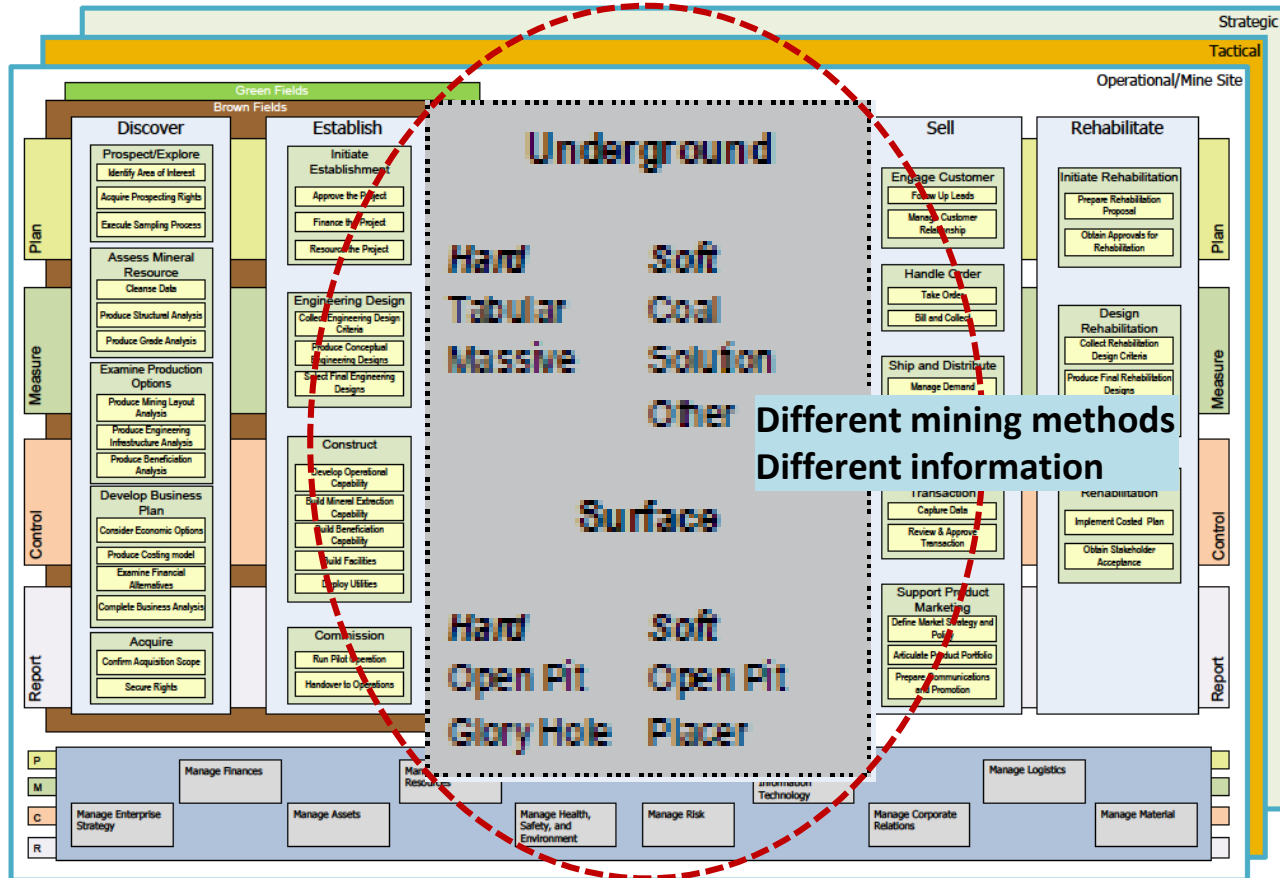
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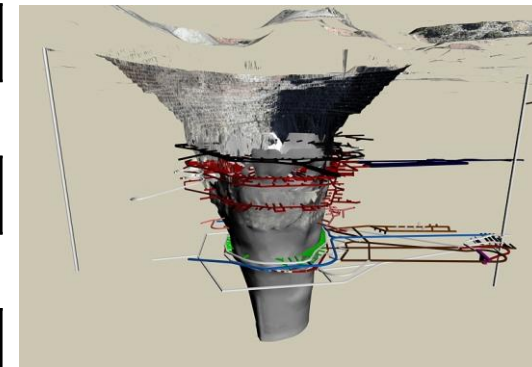
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Mining Landscape of the EMMM™ Model



Mine Type	U/G				
Rock Type	Hard		Soft		
Mining Type	Tabular	Massive	Coal	Other	Solution
Mining Method	Self supported Supported	Self supported Supported Caving	Self supported Supported	Self supported Supported	Frasch Hot water Leaching

SFCE			
Hard		Soft	
Open Pit	Glory Hole	Placer	Open Pit
Single bench Multi bench Quarry		Panning & sluicing Hydraulicking Dredging	Single bench Multi bench Strip Mining



Different Mining Methods have Different Information Requirements



Problem definition depends on your perspective



Solutions need information:

Is it lack of orebody definition?

Is it poor drilling and blasting?

Is it inadequate maintenance?

Or just too small a truck?

Wrong question; wrong solution



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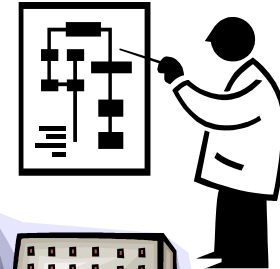
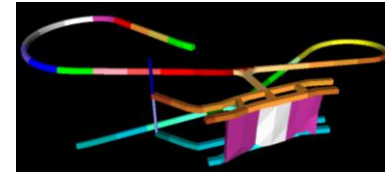
MineRP PROTOCOLS

CAPABILITY MODEL & WRAP UP





- Starts with geological data collection
- Passes through mine design and schedule
- Allows Engineers to provide facilities and utilities
- Enable Metallurgists to treat what miners throw at them
- Ends with a business case, feasibility, budget ...
- **Color code for responsibility**
- Map in relevant offerings

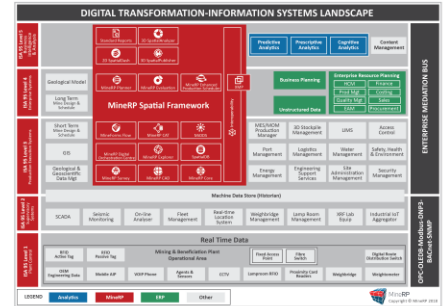
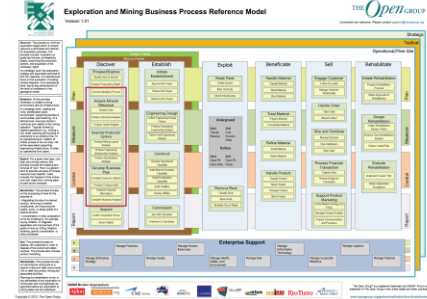
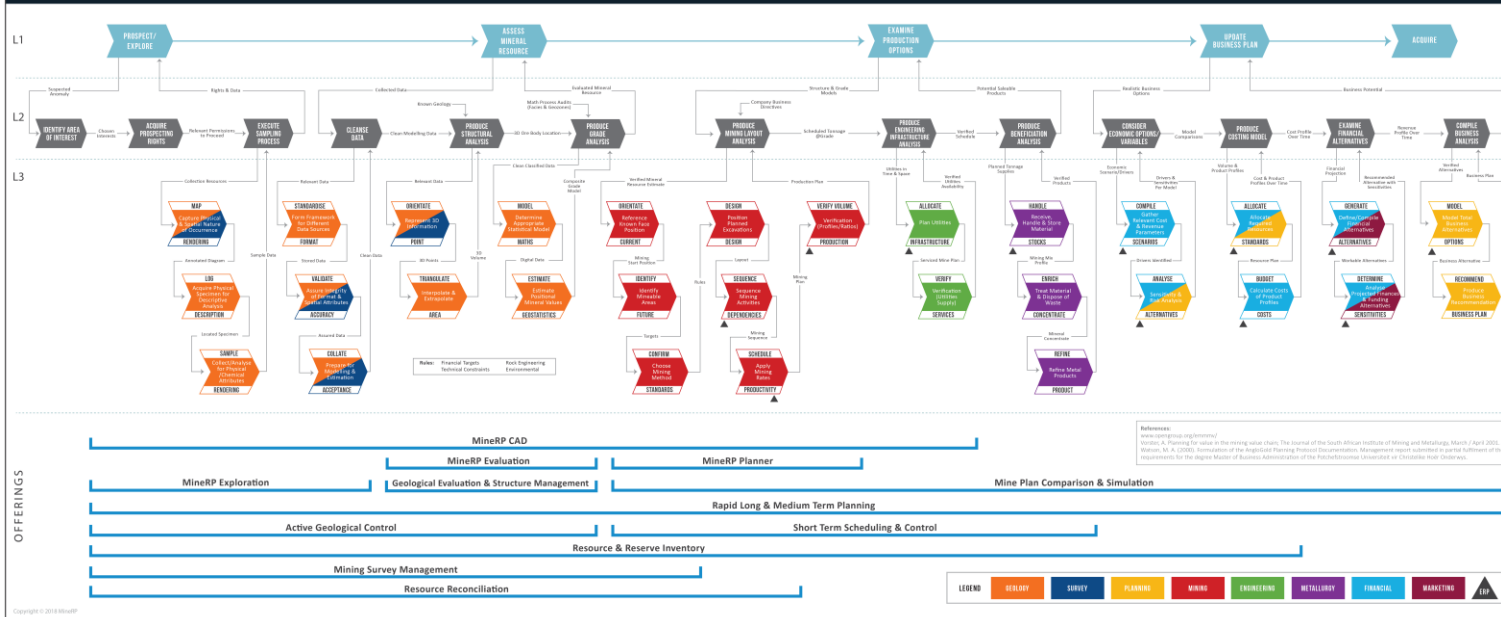


- Risk Management – quantifying risks and consequences of decisions taken
- Human Resources – supplying the needed skills and competencies
- Material Management – supply chain for items used in mining
- Asset Management – infrastructure installation and maintenance
- All play their part in the planning process





MINE PLANNING PROTOCOL & SOLUTIONS MAP





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Exploit: For a given mine type, ore type, and mining method, this process includes the breaking and removal of 'rock'. 'Rock' is a general term to describe all types of mined resource host material. It also includes the transport of the broken rock and waste from working place to plant and/or stockpile.

Beneficiate: This process focuses on the processing of ores for the purpose of:

- Regulating the size of a desired product, removing unwanted constituents, and improving the quality, purity, or assay grade of a desired product.
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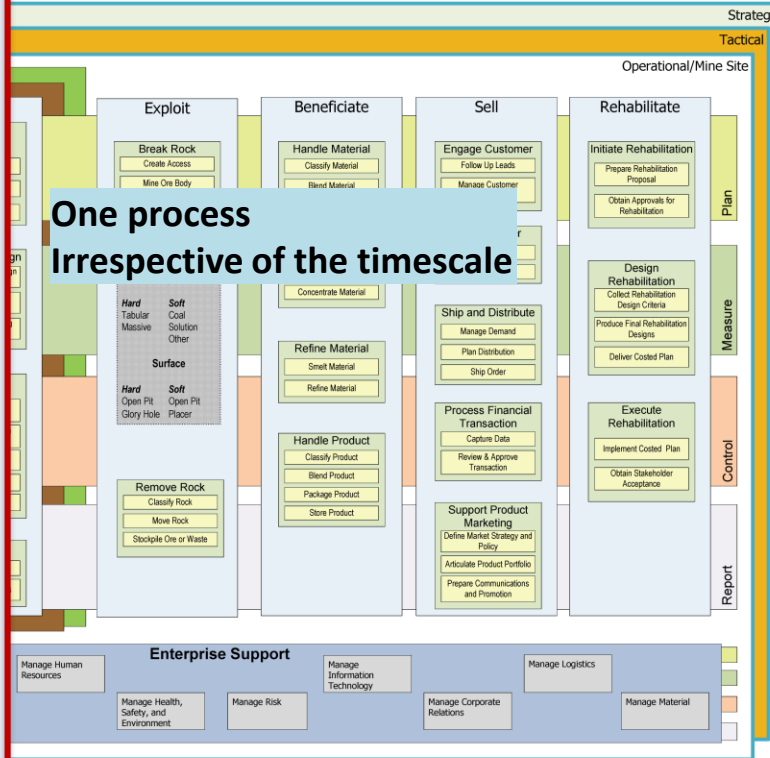
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- Execute Sampling Process
- Assess Mineral Resource
- Cleanse Data
- Produce Structural Analysis
- Produce Grade Analysis
- Examine Production Options
- Produce Mining Layout Analysis
- Produce Engineering Infrastructure Analysis
- Produce Beneficiation Analysis
- Develop Business Plan
- Consider Economic Options
- Produce Costing model
- Examine Financial Alternatives
- Complete Business Analysis

Process Reference Model



Comments are welcome. Please contact ogspeca@opengroup.org.

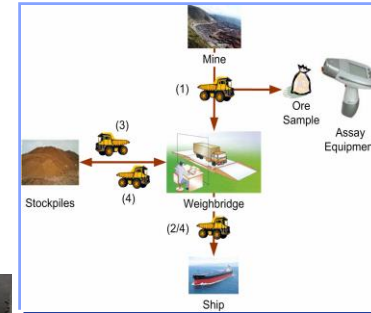


- From breaking rock to getting product to the customer



- Could be as easy as:

- Washing coal followed by a conveyor belt ride to the power station furnace
- Quarrying granite and cutting kitchen countertops for the local market



- Could be as complex as:

- On site blending manganese to contractual specifications followed by a train ride to the port and embarking on a sea voyage half way round the world
- Crush, grind, concentrate, refine and smelt multiple base and precious metals for multiple global customers

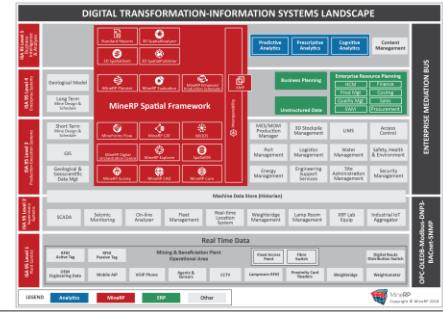
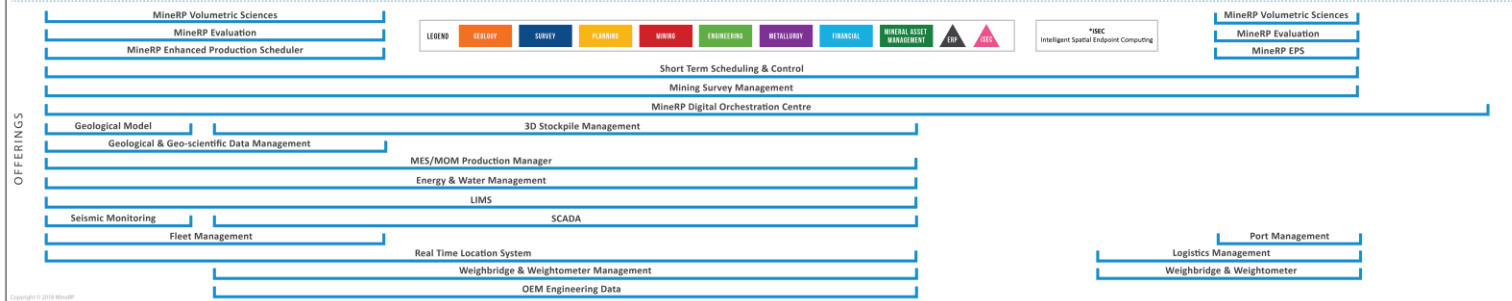
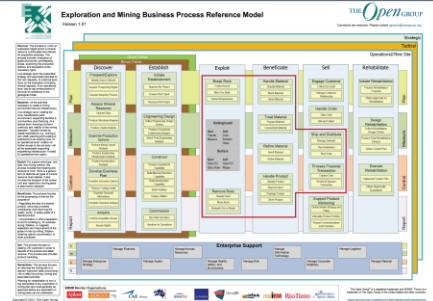
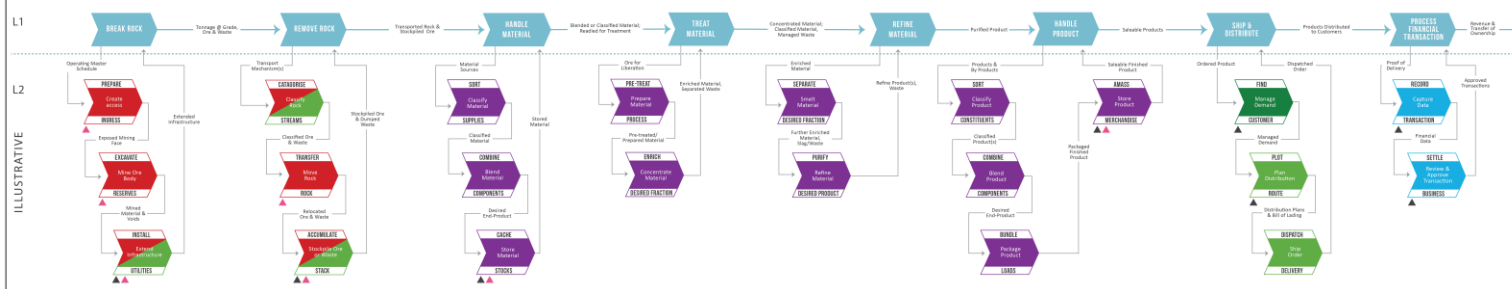


- Iterative mining, metallurgical and logistical processes of materials handling and treatment





MINING EXECUTION PROTOCOL & SOLUTIONS MAP



EMMM red lines for execution



Exploration and Mining Business Process Reference Model

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Establish: All the necessary to create environment (the firm) at a strategic level, mine, beneficiation environment, support communities, plus tactical level: ensure continuity and viable operation. Typical: capital expenditure, new shaft, planning extensions to an existing mine, further access to it, all the associated engineering, infrastructure, operational functions.

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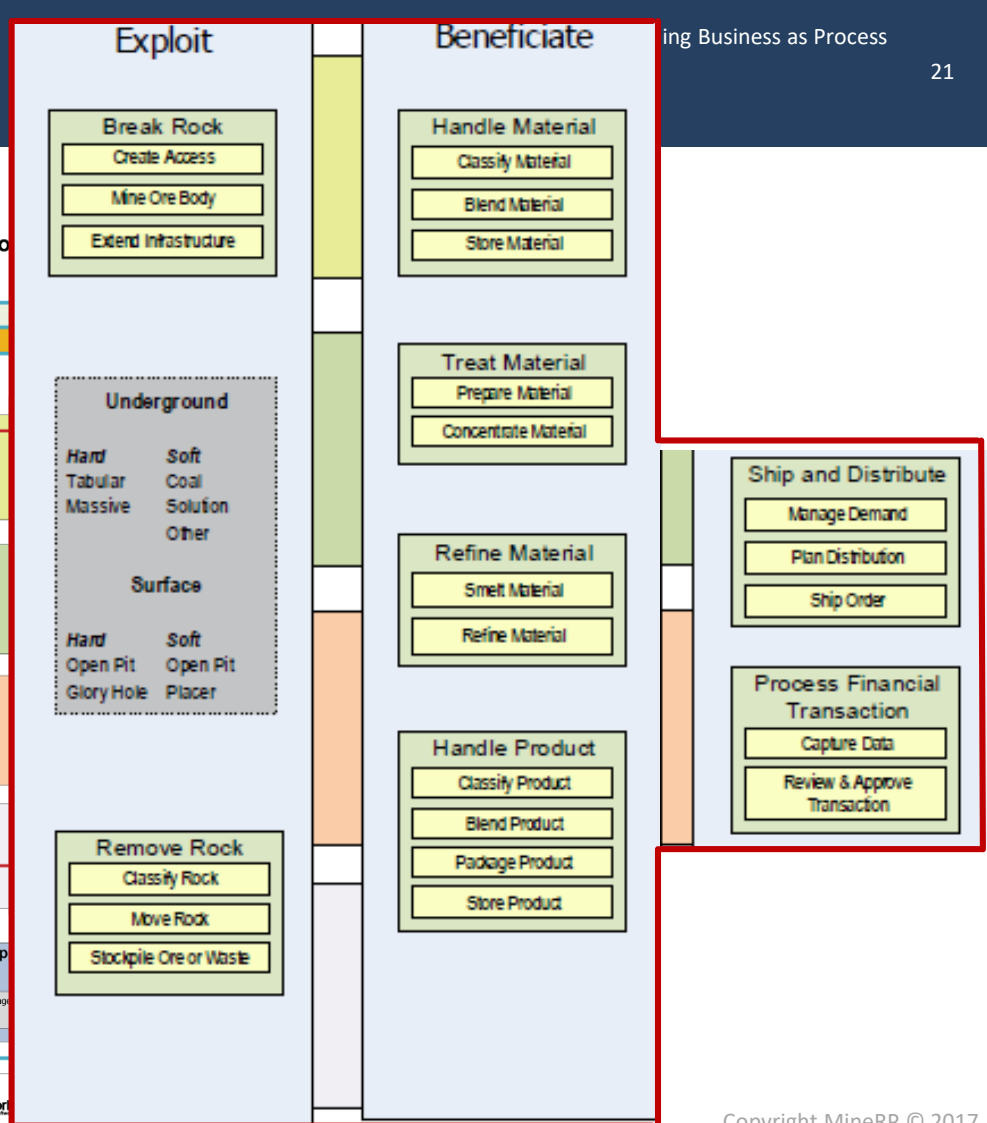
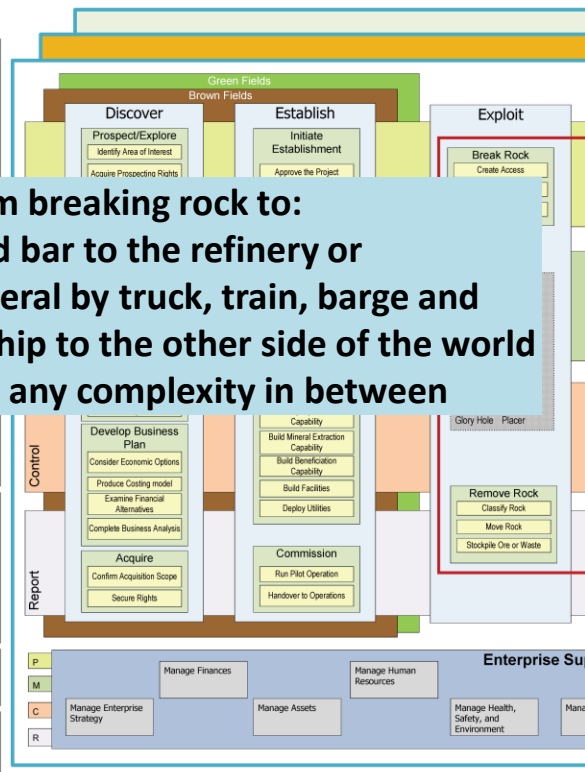
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**From breaking rock to:
Gold bar to the refinery or
Mineral by truck, train, barge and
ship to the other side of the world
And any complexity in between**



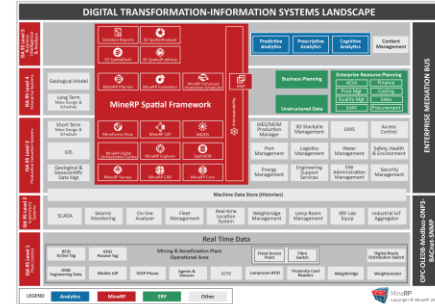
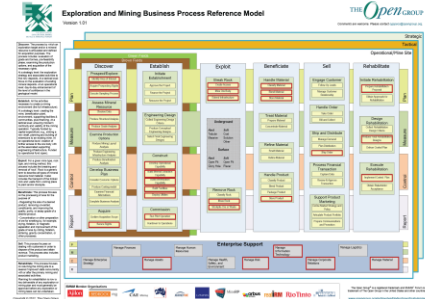
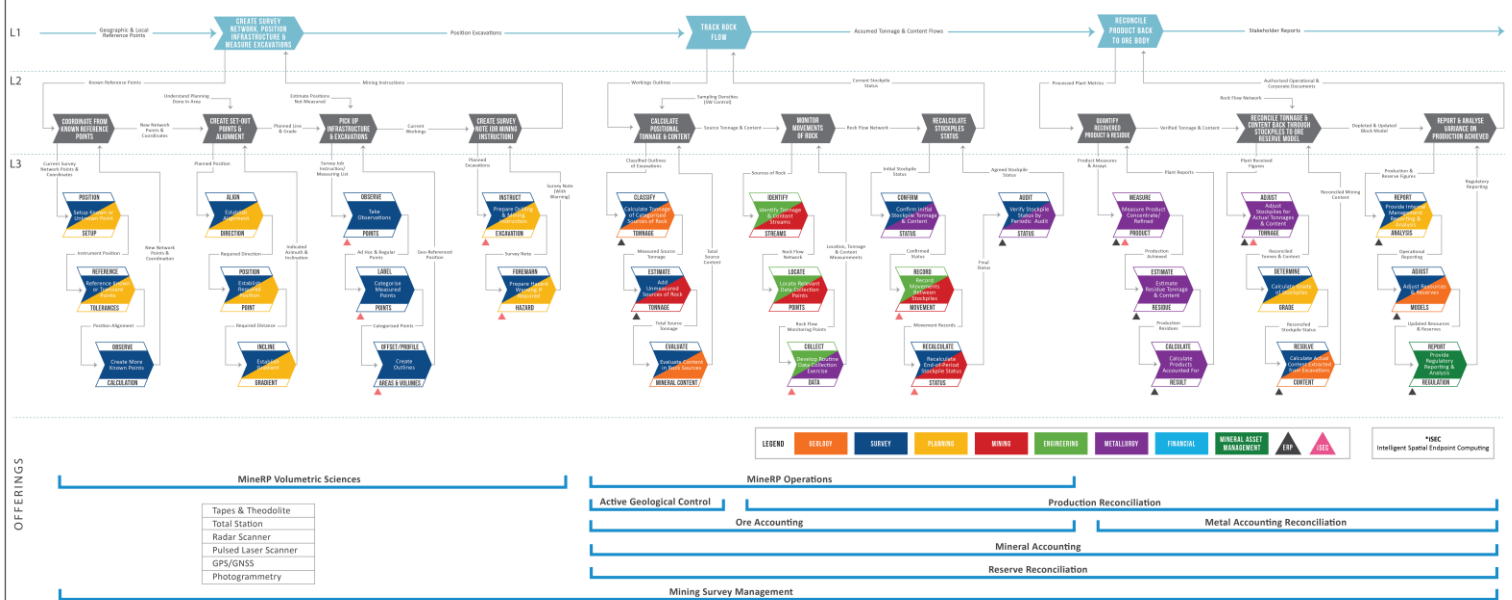


- An information flow built with process mapping logic
- More formally, Survey Network & Measurement, Rock Flow and Reconciliation
 - To reconcile product from the plant back to the orebody
 - Track rock flow during the production period
 - For location, tonnage and content
 - With 3D survey technologies and relevant weighing and sampling data collection points
- Not a single business process but an integrated information flow across a timeframe of choice
- If you collect the data ... then you can reconcile (whoever's responsibility it is)





SURVEY & RECONCILIATION PROTOCOL & SOLUTIONS MAP



EMMM red lines for survey & reconciliation



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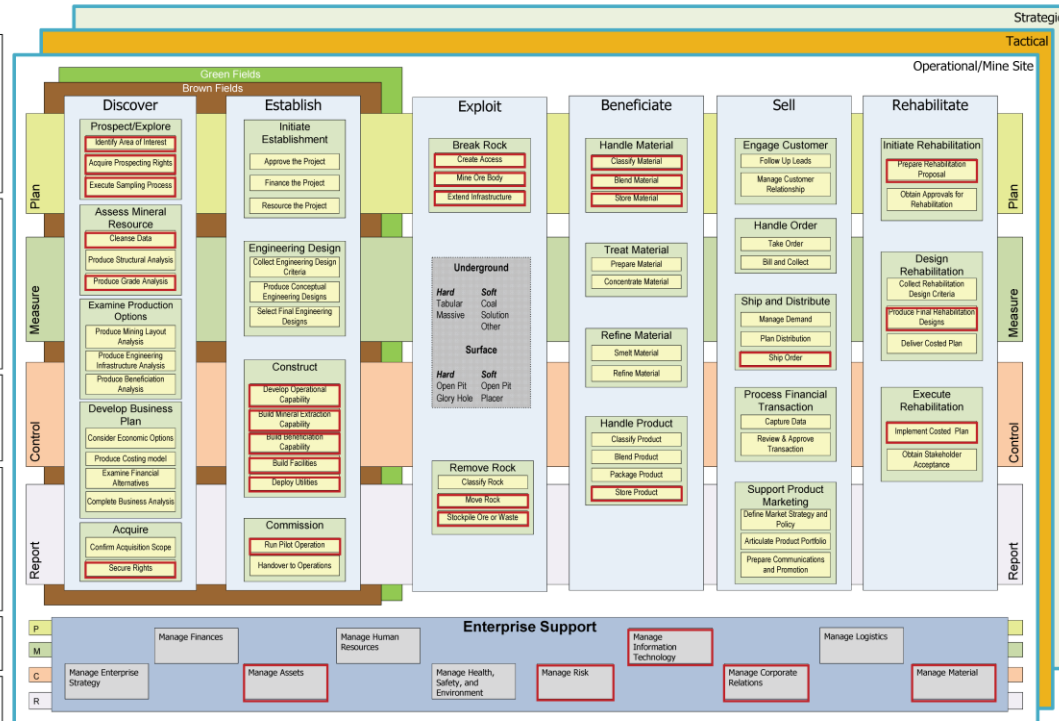
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Since the Survey discipline is the custodian of much of the data ...

We now know where a Surveyor fits the mining business ...

... at least in South Africa!



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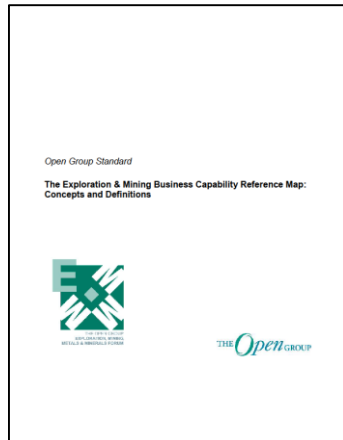
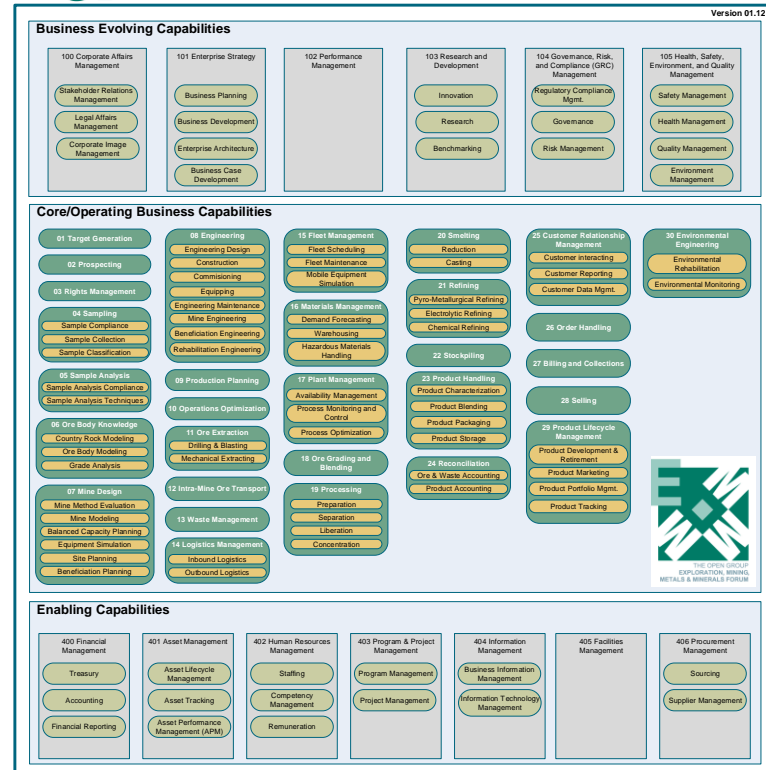


EMMM Capability Model



Business Capability Reference Map:
 This map provides a definition of the reference set of business capabilities that exists in the exploration and mining organization. It enables the organization to analyze its ability to deliver successful business outcomes based on the reference business capabilities.

THE Open GROUP The Exploration and Mining Business Capability Reference Map
 a product of the Exploration and Mining Reference Framework as overseen by The Open Group EMMM Forum

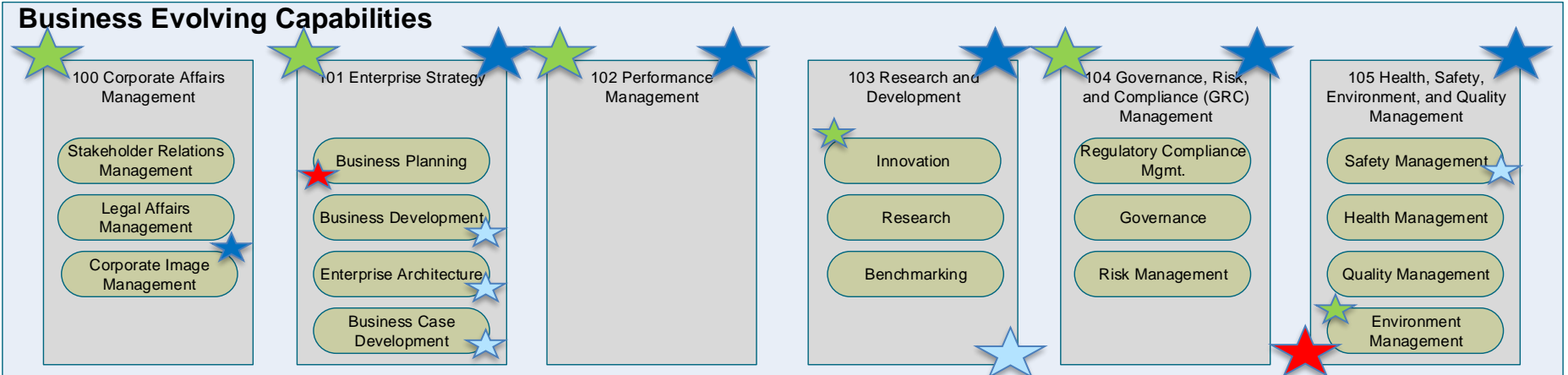


The Exploration, Mining, Metals, and Minerals (EMMM) Forum is an industry forum operating under the auspices of The Open Group. The Forum defines standard reference models for the exploration and mining industry, for all metals and minerals.

The EM Framework defines a reference for concepts within exploration and mining. This Business Capability Reference Map is the second deliverable of the framework.

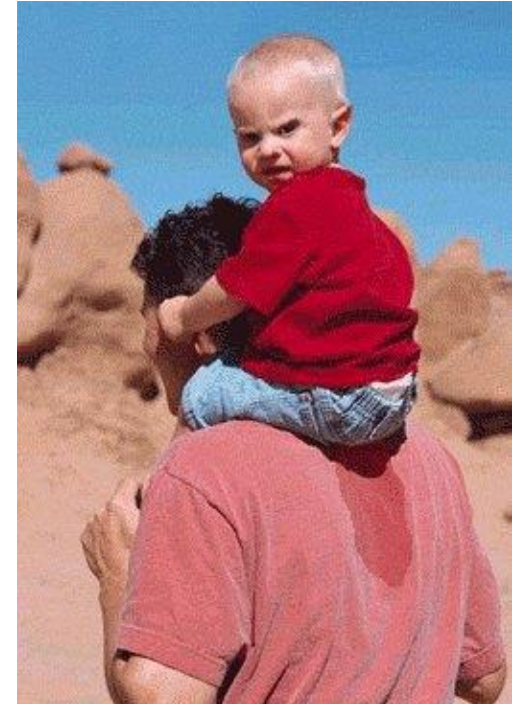
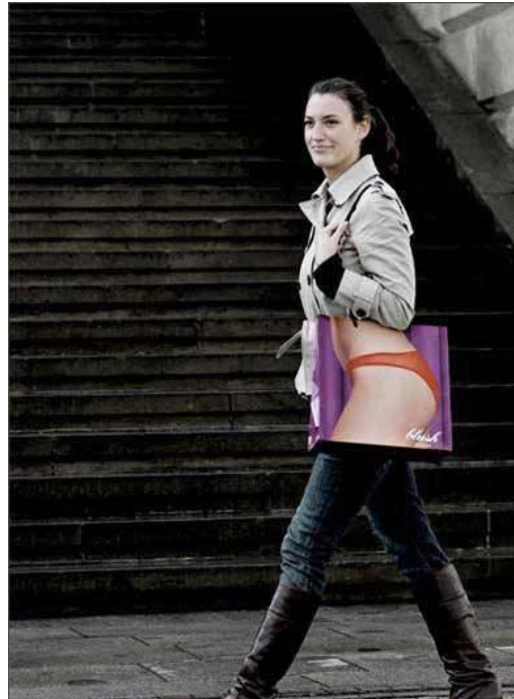
Business Capability: A Business Capability refers to the ability to achieve a specific business outcome encapsulating People, Process, Technology, and Information. It describes what a company is required to do but defines no detail about how to achieve it.





- Partner A
- Partner B
- Partner C
- MineRP

- It's messy but it can be managed!
- Use a model for reference



It's all about the data!



ABOUT US

www.minerp.com



MineRP



Mike Woodhall
Director, Mining
Standards