Mineral Resources - The role of the independent Competent or Qualified Person

srk consulting

General Background

Concepts:

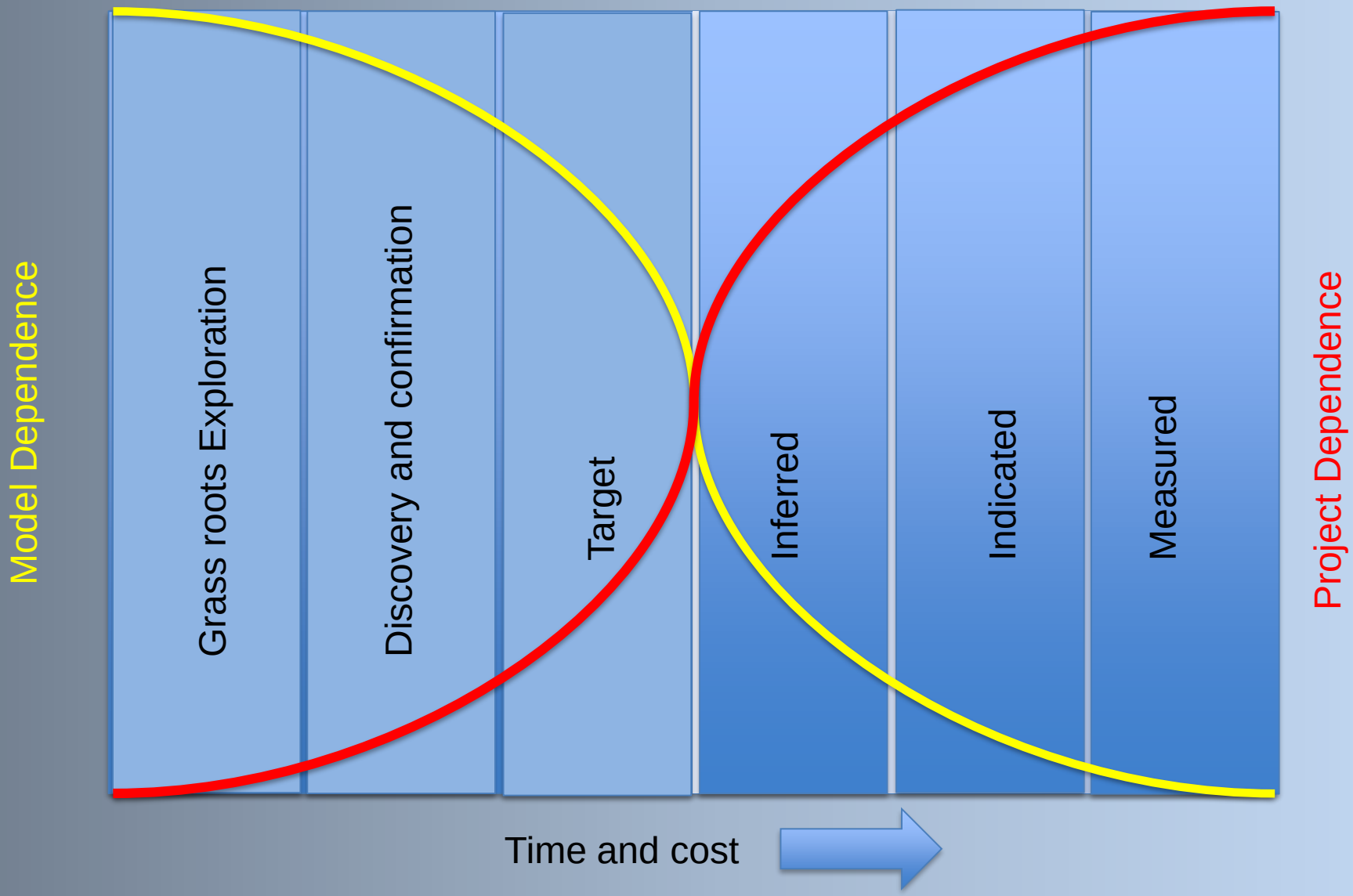
- Natural abundance depends on geological environment.
- Different rock types different background levels of elements
- Geochemical Province
- Ore District
- Anomalous Abundance
- An Ore: Economic definition, a natural commodity that can be extracted and sold for a profit.

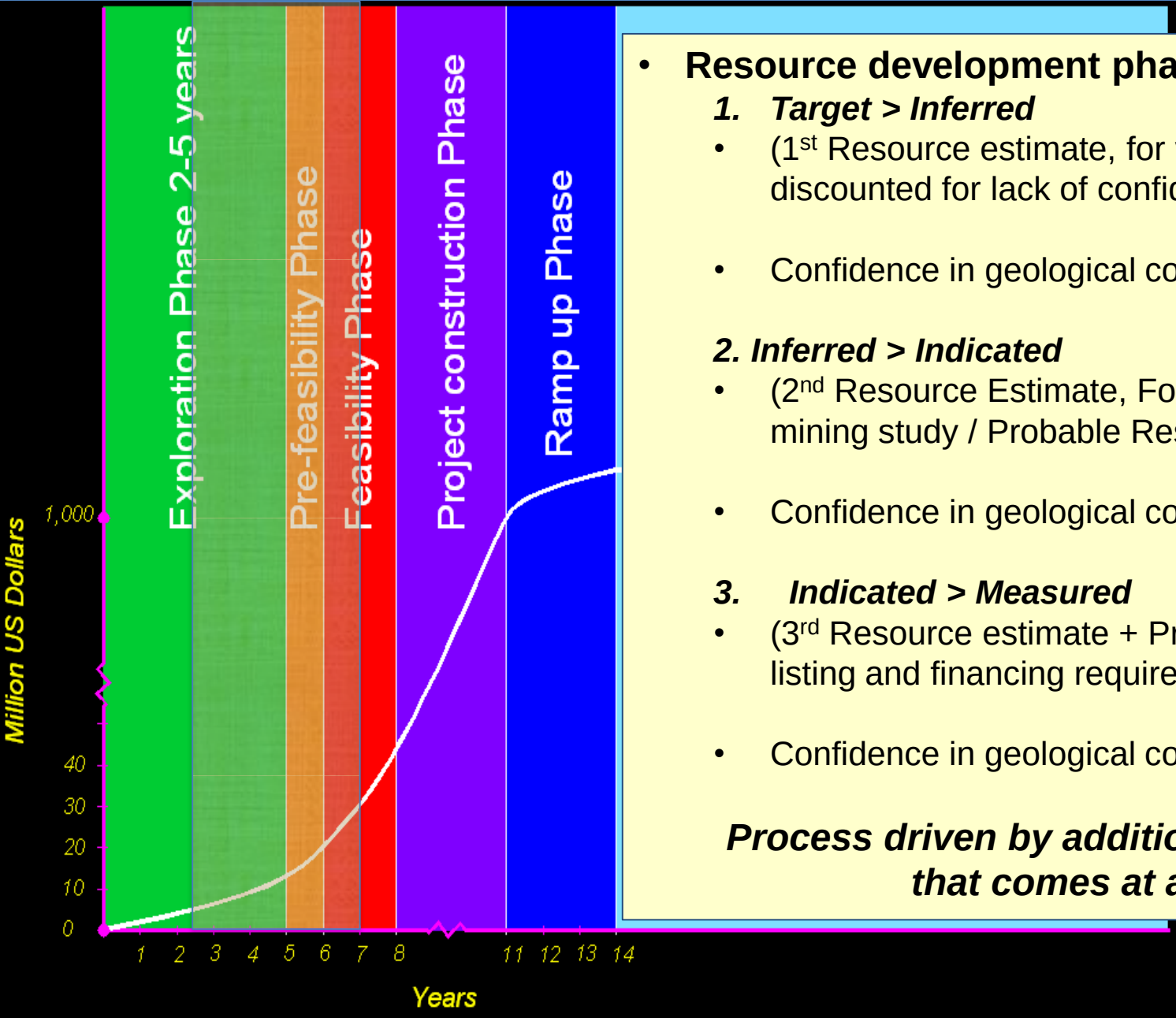
The SAMREC Code :

- Nil
- Nil
- Nil
- Nil
- Exploration Target
- A Resource / Reasonable prospect for eventual economic extraction.

Definition of Resource

A ‘Mineral Resource’ is a concentration or occurrence of material of **economic** interest in or on the earth’s crust in such **form, quality and quantity** that there are reasonable and realistic prospects for eventual economic extraction. The **location, quantity, grade**, continuity and other geological characteristics of a Mineral Resource are known, **or estimated from specific geological evidence, sampling and knowledge interpreted from an appropriately constrained and portrayed geological model**. Mineral Resources are subdivided, and must be so reported, in order of increasing confidence in respect of geo-scientific evidence, into **Inferred, Indicated or Measured** categories.


Model Dependence
Grass roots Exploration
Discovery and confirmation
Target
Inferred
Indicated
Measured
Project Dependence
Time and cost



- **Resource development phases:**
  1. ***Target > Inferred***
     - (1st Resource estimate, for valuation purposes discounted for lack of confidence)
     - Confidence in geological continuity ~ > 50%
  2. ***Inferred > Indicated***
     - (2nd Resource Estimate, For initial and final mining study / Probable Reserve statement)
     - Confidence in geological continuity ~ 65 - 75%
  3. ***Indicated > Measured***
     - (3rd Resource estimate + Proven Reserves for listing and financing requirements)
     - Confidence in geological continuity ~ 80 - 95%

Process driven by additional information that comes at a cost

srk consulting

Quality Assurance/Quality Control (QA/QC)

- Quality Assurance means:
    - “All of those planned or systematic actions necessary to provide adequate confidence in the data collection and estimation process”,
- Quality Control means:
    - “the systems and mechanisms put in place to provide the Quality Assurance. The four steps of quality control include; setting standards; appraising conformance; acting when necessary and planning for improvements”.

The CIM Best Practice in estimation document

- **The current practice is to relate QA/QC only to the quality of the chemical analyses of the samples.**
- ***It should be a feature of all aspects considered in defining the resource and the collection of the samples.***
- ***It should be applied to all measurements required for Resources and Reserves estimation*.**
- ***It is reliant on the opinion of the Competent Person***

Aspects considered in terms of QAQC include:

- The geographical location (survey)
- Measurement (trenches, drill holes, channel samples)
- The geological context (logging)
- Measurements of density
- Sample preparation
- Sample analysis
- Database Management
- Interpretation of the geological model

Validation of historic information:

All aspects related to QAQC

- Often non-compliance issues
- Need for twin drilling and/or re-sampling of (10-20%)
- Sample analysis at accredited laboratory:
  - Including: Duplicates, Blanks and CRMs
- Statistical comparison / Competent Persons discretion
- Acceptability or rejection of historic information and then assess the classification of the Resources accordingly.

Classification criteria for Mineral Resources

- Accuracy of surveys including down hole surveys
- Confidence in sampling:
  - were appropriate procedures applied,
  - diamond drilling are contacts sharp
  - RC (only know the contact within a sample, but not precisely
  - Core or sample recovery / sample representativeness
- Quality of analytical results (demonstrated by the QAQC) (Including Density)
- Confidence I the geological model (i.e. model or data dependent, does it honour all the data, or are there data we cant honour, does the mineralisation show good continuity between drill holes, or is the model very disrupted by faults, dykes, folds do we understand these). Do have excellent confirmed continuity (i.e. Bushveld Chrome seams) or is this uncertain.
- Does the geostatistical analysis show good or poor structures in the semi-variograms (i.e. we can fit a semi-variogram model, does it match the data well, or does the experimental semi-variogram not show a robust structure)
- Quality of the estimates (measured by Kriging statistics such as Slope of Regression, Kriging Efficiency, Search pass, number of samples use in the estimate)
- Validation results (does the estimate reflect the data well locally, and/or globally)
- Competent Persons opinion based on relevant experience.

The Competent Person

The company acting through its Board of Directors is responsible for any Public Report on:

- Exploration Targets,
- Exploration Results,
- Mineral Resources or Ore Reserves.

Any such report must be based on, and fairly reflect, the information and supporting documentation prepared by a Competent Person.

A company issuing a Public Report shall disclose:

- the name(s) of the Competent Person(s),
- his/her qualifications, professional affiliations and relevant experience.
- state whether the Competent Person is a full-time employee of the company, and, if not,
- name the Competent Person's employer.
- The Competent Person’s written approval is required for his contribution to the report.

- For SAMREC a ‘Competent Person’ is a person who is registered with SACNASP, ECSA or PLATO, or is a Member or Fellow of the SAIMM, the GSSA or a Recognised Overseas Professional Organisation (RPO). The Competent Person must comply with the provisions of the relevant promulgated Acts.

- SAMREC, JORC and NI 43-101 recognise membership of specific Professional Organizations outside their respective national jurisdictions.

These organisations:

- Are self-regulatory organisations of professionals in the mining and/or exploration industry;

- Admit members primarily on the basis of their academic qualifications and experience;

- Require compliance with the professional standards of competence and ethics established by the organisation;

- Have disciplinary powers, including the power to suspend or expel a member.

RPO's for SAMREC

AIG - Australian Institute of Geoscientists
Association of Professional Engineers and Geoscientists of British Columbia
Association of Professional Engineers and Geoscientists of New Brunswick
Association of Professional Engineers and Geoscientists of Newfoundland and Labrador
Association of Professional Engineers and Geoscientists of Nova Scotia
Association of Professional Engineers and Geoscientists of Saskatchewan
Association of Professional Engineers and Geoscientists of the N.W.T and Nunavut
Association of Professional Engineers andGeoscientists of the Province of Manitoba
Association of Professional Engineers of Ontario
Association of Professionals in Engineering and Geoscience in Alberta
AusIMM - Australasian Institute of Mining and Metallurgy
Australian Institute of Geoscientists
Canadian Council of Professional Geoscientists
Canadian Institute of Mining, Metallurgy and Petroleum, Canada
CCPG - Canadian Council of Professional Geoscientists
Comision Calificadora le Competencias en Recoursos y Reservas Mineras
Comision Minera (Chile)
EFG - European Federation of Geologists