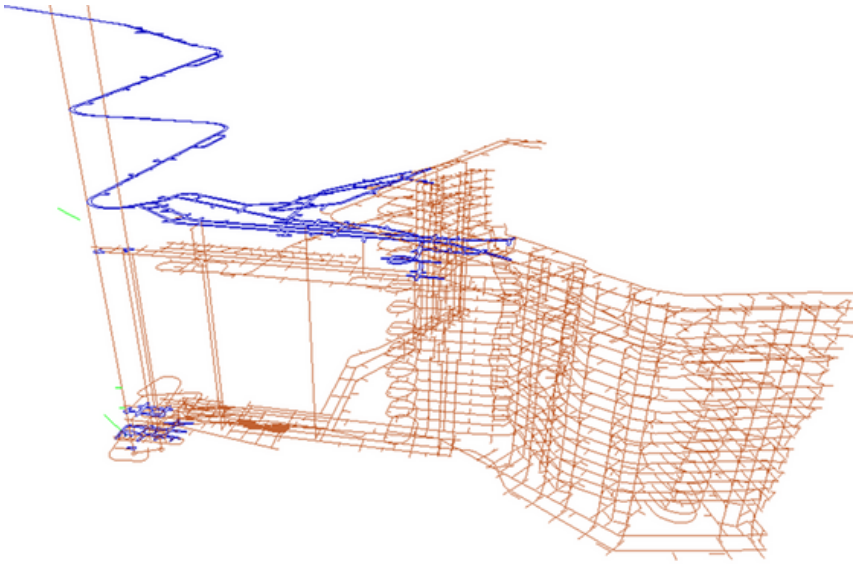
Capability Statement

Simulation and Decision Support

At VBKOM we evaluate the options and scenarios for optimal decision making. Project and operational situations typically present multiple potential options and decision alternatives, each with varying degrees of probability, associated risk or potential success.

Decision modelling and discreet simulation enables you to visually map out, quantify and evaluate potential future outcomes without the risk of actually making the wrong decision. Our team of experts can support your projects with:

- Problem Formulation and Decision-sequencing
- Scenario/Options Development and -Facilitation
- Discreet event and process simulation with integrated 3D visualisation
- Probabilistic Branching and Scheduling Options Modelling
- Decision Tree Analysis
- Expected Value Analysis
- Capital Estimation and Sensitivity Determination



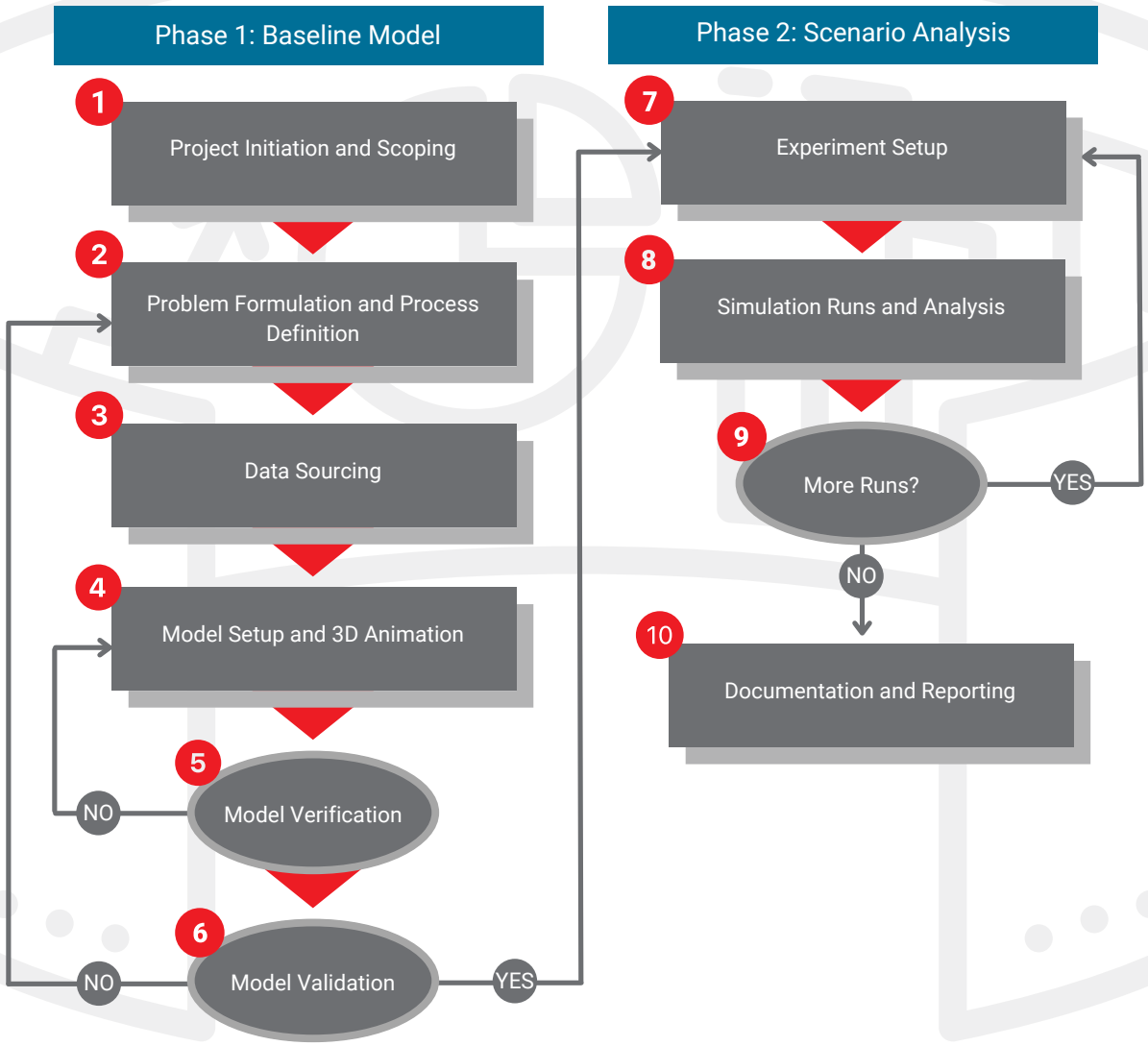
Simulation Methodology

Simulation is the process of modeling existing and future systems, and by so doing, being able to observe behaviours and test various scenarios. VBKOM uses Simio for simulation purposes. Simio is an abbreviation for Simulation with intelligent objects, these Intelligent Objects provide Simio with the means to model situations accurately.

Simio
Forward Thinking

Models are built by adding objects, each object with its own processing logic to complete a certain task or process. The different objects are connected with link objects, which in turn have their own logic, to channel or route the flow of objects (resource, vehicles, material etc.) through the model. All the objects are completely customisable and are setup to represent the processes most accurately.

VBKOM follows a specific process to develop simulation models for its clients. The simulation development method has been refined to the following graphical representation:



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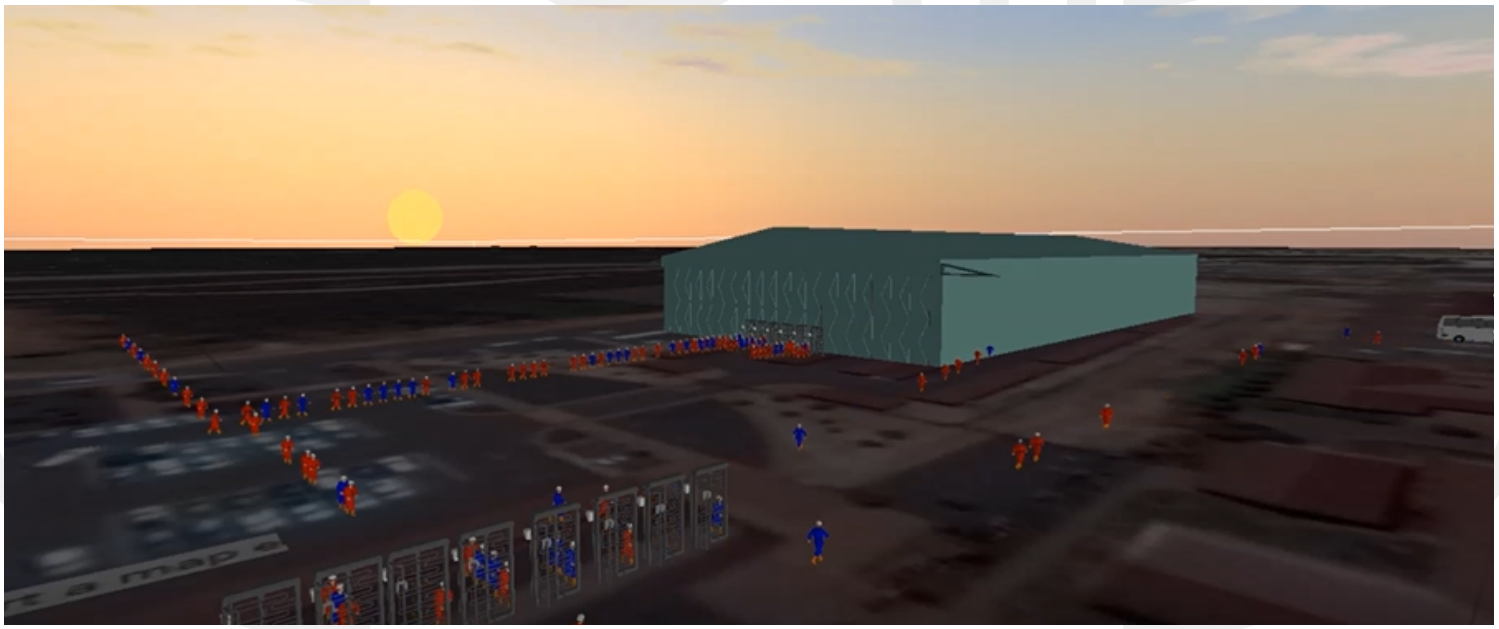
Phase 1 is aimed at establishing an accurate simulation base model to ensure that all requirements and specification are catered for in the model. The approval of the simulation model will be performed through the validation of the simulation model against actual or benchmark data. Validating the simulation model will ensure that the model can deliver credible results when looking at possible scenarios.

Phase 2 focuses on setting up the scenarios to test in the validated simulation model. The results will be analysed and documented thereafter.
The detailed steps to meet the desired deliverables are as follows:

- Project Initiation & Scoping. This step is aimed at confirmation of client expectations and stakeholder introduction. Reporting output requirements and the simulation project schedule is also finalised in this session.
- Problem Formulation and Process Definition. A process definition for the mining activities with input parameters, throughput tempo's and equipment availability percentages obtained from the received documentation will be compiled as well as all process assumptions documented.
- Data Sourcing. The process definition will be presented to a client representative for verification, additional input and signoff. Timestudies and benchmarking will be conducted to provide the necessary input information for the simulation where operational data is not available.
- Model Setup. Build a model in Simio according to the process definition.
- Model Verification. Verify that the model simulates actual activities correctly.
- Model Validation. Validate the model outputs with a client representative.
- Experiment Setup. Define required scenarios with client team member inputs and setup experiments in Simio.
- Simulation Runs and Analysis. Run various scenario simulations and compile defined output reports in Microsoft Excel or Microsoft PowerBI. More Runs. Setup and run additional scenarios as needed to complete the analysis.
- Documentation and Reporting. Compile simulation results report and present it to the client.



Logistics Studies

Logistics can be defined as the detailed organisation and implementation of a complex operation. In mining, it is the activity of organising the movement of people, equipment and material.

VBKOM understands the importance of a logistics strategy of mining operations that should enable production-level development. In most cases, a detailed logistics study is required to define a logistics strategy for current and future projects in mining operations.

Our Approach to Logistics studies and simulation

- Benchmark current logistics and efficiencies and deliver a report on the findings.
- Perform a study to confirm the logistics related to the movement of equipment, people, and materials to determine current as well as future steady-state requirements.
- Construct models from collected data for simulation of logistical options.
- Simulate various options related to a client's requirement.
- Deliver an integrated Logistics Strategy for current and future operations, as well as recommendations and an implementation plan aligned with operational readiness criteria and stakeholder requirements.

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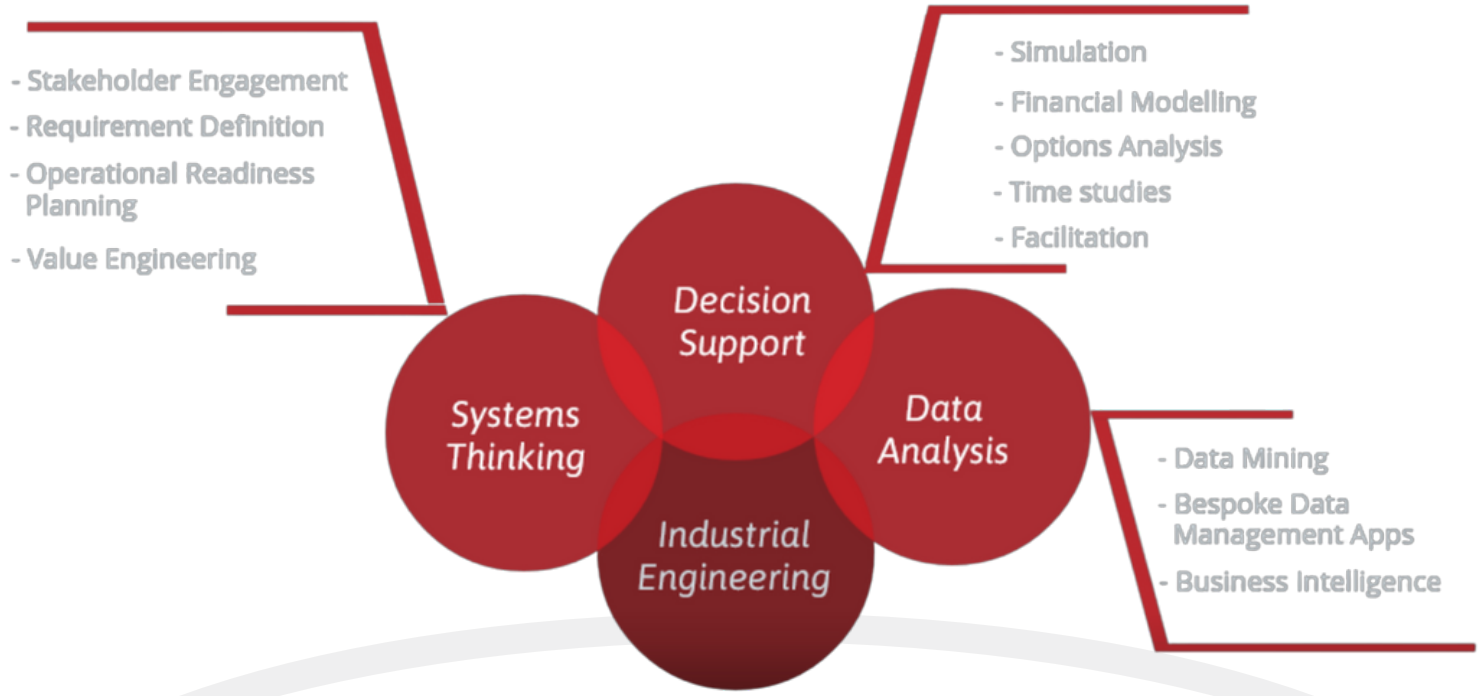
Future Logistics Considerations

The following are required to capture future logistics requirements and recommend actions to support a comprehensive logistics strategy.

- **Equipment:**
  - Confirmation of the current Life of Mine plan and production schedules, intended equipment sizing, movement into and out of the operational areas
  - Confirmation of haul routes for materials, ore and waste in line with the existing plans and outcomes of the logistics study
  - Confirmation of interim and steady-state logistics requirements including mining, production, secondary equipment and vehicle movements underground as well as alignment with replacement schedules, spares requirements, refueling cycles and- maintenance schedules
- **People:**
  - Confirmation of current and future people movement per shift, including access control, transportation, waiting times and expected efficiencies at steady state.
  - Time studies of current people movement, the travel time during lifts, on foot and transported to various areas or levels
  - Confirmation of logistics requirements for permitting offices, waiting places, rescue chambers, offices, interim and steady state phases
- **Material:**
  - Confirmation and detailing of future materials movement strategy for the mine.
  - Diesel storage and refueling requirements for operations and confirmation of legal requirements
  - Explosives handling and storage requirements, movement to and from storage to production sites and confirmation of legal requirements
  - Store capacities and requirements for steady state requirements during construction
  - Any other materials storage requirements
  - Generators or sub-stations requiring bund walls or fencing etc.

An Industrial Engineering Approach



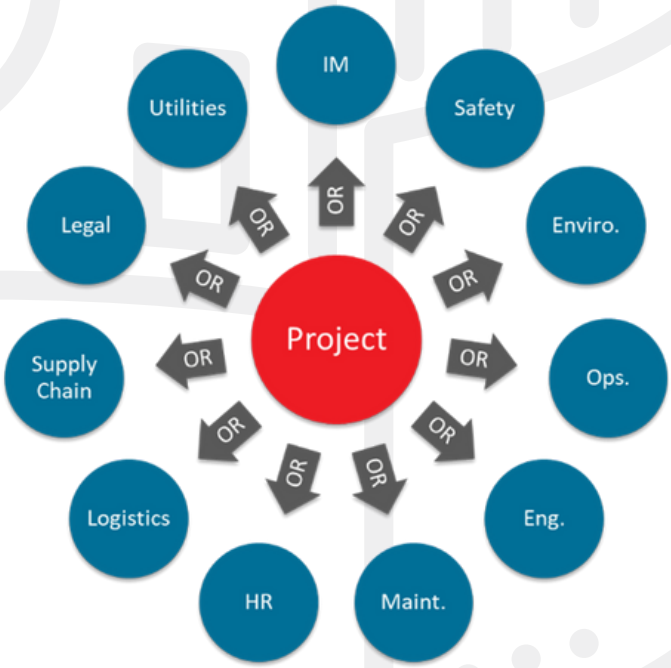
Decision Support

At VBKOM we believe all decisions must be based on the throughput, risk and NPV criteria and we have the necessary toolkits available that can be tailored to evaluate these criteria depending on the project complexity and time available for making the decision.

Systems Thinking

All projects have multiple stakeholders as illustrated in the figure (right). We find that in capital intensive projects the engineering stakeholders and deliverables are however prioritised and the other stakeholders that may introduce fatal flaws in the project are neglected.

We believe that Operational Readiness (OR) is a key discipline that must be employed to ensure that all stakeholder requirements are understood, and that engineering designs are evaluated to be fit-for-purpose.



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Data Analysis

We have found numerous clients that have implemented extensive generic reporting systems, but they became white elephants due to being too complex, too difficult to maintain and update, or too expensive to maintain and update.

In other instances, the client does not really know where all their data sources are and what the performance measures are.

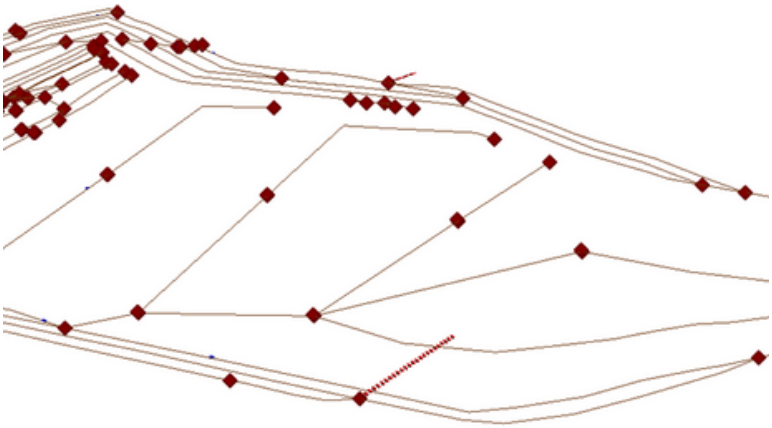
As industrial engineers, it is part of our standard skillset to map out processes and understand the required measures and how to effectively gather data at the right process points in order to enable efficient reporting. We also align our reporting to the systems the client already has and do not enforce new processes and systems unless really necessary.

VBKOM's Industry Experience

Our footprint stretches across the African continent, and we have extensive simulation and logistics studies experience.

Commodity	Client Name	Project Description	Year
Coal	Exxaro	GGAMS Technical Integration Support	2021
Fluorspar	Vergenoeg Mining Company	Crusher Haul Road Design	2021
Diamonds	De Beers	Venetia Underground Project - Personnel and Material Logistics Strategy	2020
Iron Ore	Kumba Iron Ore	Sishen 2019 OR Support	2020
Iron Ore	Kumba Iron Ore	Kolomela 2019 OR Support	2020
Iron Ore	Kumba Iron Ore	Wash & Screen Plant Automation	2020
Iron Ore	Kumba Iron Ore	Sishen Low Grade Yield Simultation	2020
Manganese	AML	Front-End Loader Congestion Simulation	2019
Coal	Exxaro	Grootegeluk IPCC Simulation Support	2019
Manganese	AML	Mokala & Sitatunga PLS Simulation	2019
Iron Ore	Kumba Iron Ore	Sishen Modular Plant Expansion Project OR Support	2019
Iron Ore	Kumba Iron Ore	Sishen Fatigue Management OR Support	2019
Iron Ore	Kumba Iron Ore	Stacker & Reclaimer Automation	2019
Iron Ore	Kumba Iron Ore	LDV/HME Separation Time Study & OR Support	2019
Manganese	AML	Crusher/Stacker/Feeder Options Simulation	2018
Coal	Manhize Reductions	Logistics Desktop Study	2018
Coal	Fluor	South32 - Dispatch Rider PFS	2018
Iron Ore	Sedgman	Motjoli - Waterkloof Scoping Study	2018
Oil & Gas	Natref	RAM stud on the HF Cloud mitigation system	2017
Iron Ore	Assmang	Khumani Decision Support System	2017
Iron Ore	Kumba Iron Ore	Heuningkranz Equipment Modelling	2016
Iron Ore	Assmang	Khumani Stockpile Management Simulation Phase 2	2016
Iron Ore	Kumba Iron Ore	Kolomela Dispatch Upgrade Project	2016
Iron Ore	Kumba Iron Ore	Sishen Resource Analysis & Strategic Optimisation Phase 1	2015
Iron Ore	Assmang	Khumani Stockpile Management Simulation Phase 1	2015
Gold	QKR Namibia	Navachab Cycle Times	2015
Iron Ore	Kumba Iron Ore	In-pit Crusher Project	2013
Uranium	Rössing Uranium	Life of Mine Truck Cycle Time Study	2012

Our Value Proposition



VBKOM is a provider of innovative business and technical consulting services and solutions for the mining and capital-intensive industries throughout Africa. We challenge ourselves to apply fresh thinking and to utilise our experience and technology in pioneering new ways to deliver forward-thinking solutions.

Due to VBKOM's diverse pool of expertise, we can offer our clients specialised skills within a one-stop-shop culture. Our engineering, risk, and project management capabilities as well as simulation and decision support expertise, make us an ideal partner to the mining, petrochemical, agricultural, and construction industries.

Our focus on long-term client relationships combined with our technical skills ensures that our clients can fully optimise their value chain.

At VBKOM the quality of our work is guided by a simple philosophy – our success is driven only by the success of our clients and the achievement of our professionals. By using cutting-edge technology and the most advanced computer modelling systems on the market our technical expertise comes unrivalled. Our capacity and continuity have earned us the trust of some of the world's most prestigious mineral resource companies. By staying true to our core values; by utilizing our vast project-specific experience and qualifications; along with applying proven world-class methodologies and processes the VBKOM team is a dynamic, flexible and innovative team with a track record standing as solid proof of our competitive edge in our field.

VBKOM employees have been successful in providing solutions of an independent nature to a range of clients in the mining industry. Our consultants have developed a good understanding of the needs and opportunities of both open pit and underground studies and operations and we look forward to adding value to your company. We believe that independent consultants can provide optimal solutions to the Client without any risk of providing a solution with an inherent conflict of interest. The VBKOM strategy is to form part of the owner's team to define and protect the owner's interest within our area of influence and control. VBKOM is committed to adding value to each client through innovative, practical, and trustworthy engineering solutions.

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