Using deep learning to analyse satellite imagery for the development of a data driven solution for mining operations.

SANSA 2019 Earth Observation Challenge
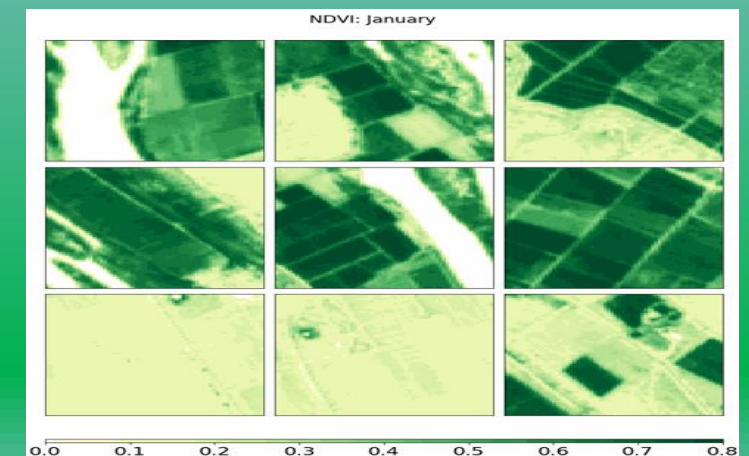
REAKGONA CONSULTING
Blessing Magabane

Theodore Gaelejwe

Aron Langa

NDVI: January

THE PROBLEM

- Our intention is to assist mining operations in monitoring and mitigating their environmental impact through the use of satellite imagery. We want to help mining operations to comply to environmental standards, regulation and compliance. We will achieve this by apply artificial intelligence to detect any changes in the environment and surroundings. Some of the things we will be looking at is the vegetation health, water usage, dust and mining equipment.

- As a value add to our services is the prediction of commodity prices particularly platinum and associated group metals. We will achieve by detecting truck movements in and out of the mining operation and the amount of extracted mineral deposit per day. We will quantify the extracted mineral deposit to a cubic volume. For larger volume + higher truck movement equates to higher demand. For larger volume + slower truck movement equates to lower demand. For smaller volume + slower truck movement equates to lower demand.

THE SOLUTION
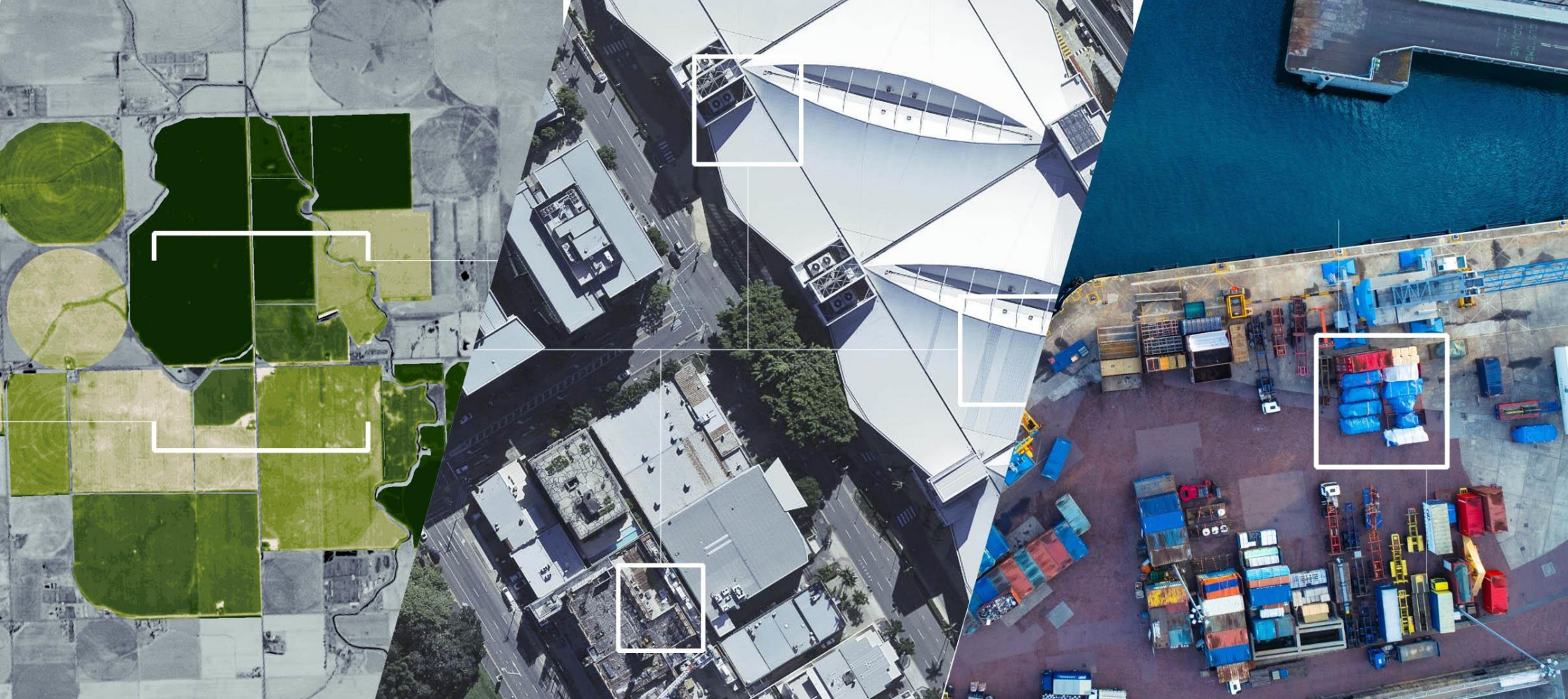
THE SOLUTION

- Our solution in three points:
  - AI powered.
  - Recommendation.
  - Classification + Reporting.

- Our solution is an AI powered platform that uses both open source and cloud based technology. It analyses satellite imagery using neural networks and other image processing techniques. Our solution is unique in the sense that it is the state of the art it combines satellite imagery and drone images to offer an end to end solutions to mining operations. The magic lies within the neural networks we have built very deep neural to take advantage of GPU. Our solution will open a new window/pipeline of information to mine management the end users of our product, we will provide weekly reports to give a different view of what is happening within their mining operation which will in turn assist in decision.

VALUE PROPOSITION

- Traditional GIS method to analyse satellite imagery are based on physical science(geography) methods, we are offering a solution that utilizes the power of machine learning and neural networks. To improve our analysis we will use cloud computing to take advantage of the power of GPU. Using disruptive technology to offer useful insights is a game changer. The use of drones to monitor and detect anomalies is another advantage we have to our closet competitors. Combing all the above mentioned we have an end to end solution that gives mine management a well rounded view of their mining operation. The whole solution is automated.
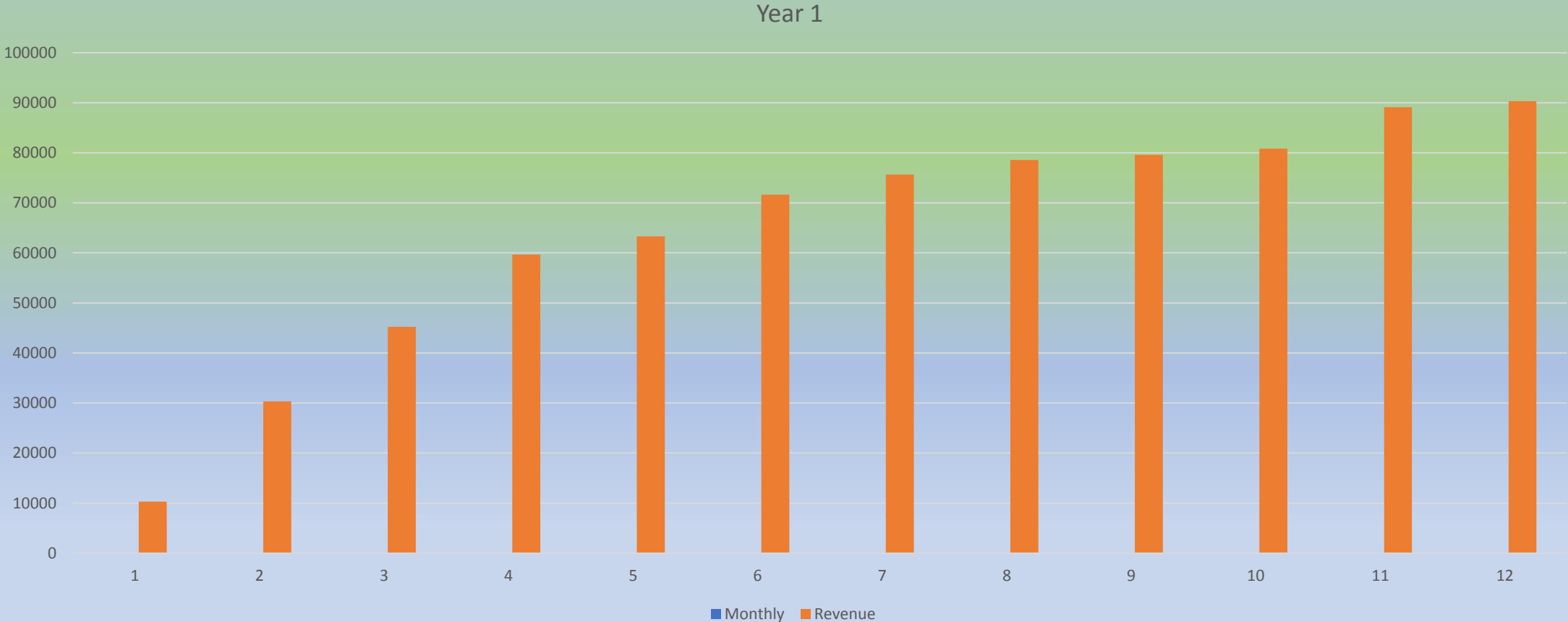
TOTAL MARKET SIZE & OPPORTUNITY

- Our market is Southern Africa we realise that the is a lot of mining operation in this region that can use our services. But a subsection we have identified as a starting point is Limpopo and North west due to the number of platinum mines in both provinces. As we scale up we will look at the rest of SADC region.

- To the acquire mining clients we have to build a relationship with Mineral Council South Africa and mining management. We haven't established those relationships yet. Our strategy is to approach MCSA and mining management.
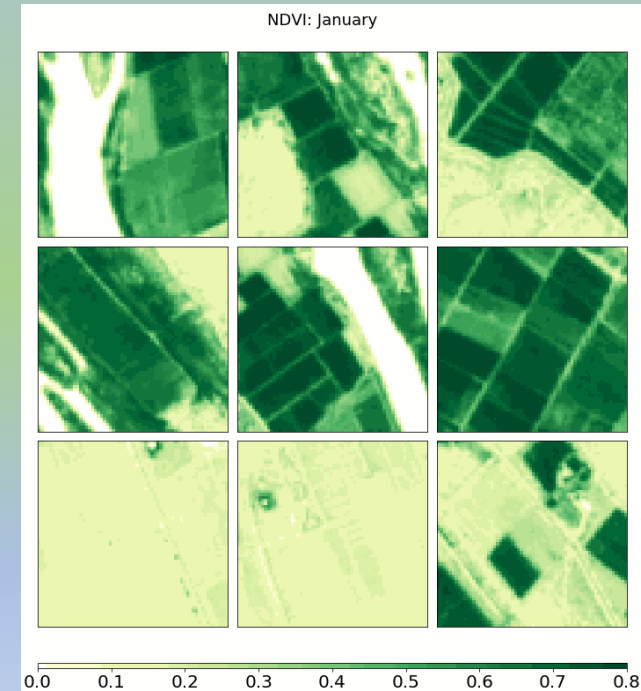
TOTAL ADDRESSABLE MARKET

For now we quantified the market size in terms of the number of mines in our targeted area. We are looking at 3 mines as a start. In the Sekhukhune district alone there is 36 mines that mine chrome and platinum. The whole province there is an estimated 100 mines in operation. The opportunities are there and the market is huge. Our solution will help in reducing environmental impact in those areas and the surrounding communities.

In the Sekhukhune area alone we estimated we can make more than a half million Rands in consultation fees, in the first year. As we capture more mining operations across the province we estimate we will make more than million yearly on consultation fees in the next 3 years. In the next 5 years as we increase our market share in the SADC area we estimate to get more 5 million in revenue yearly.
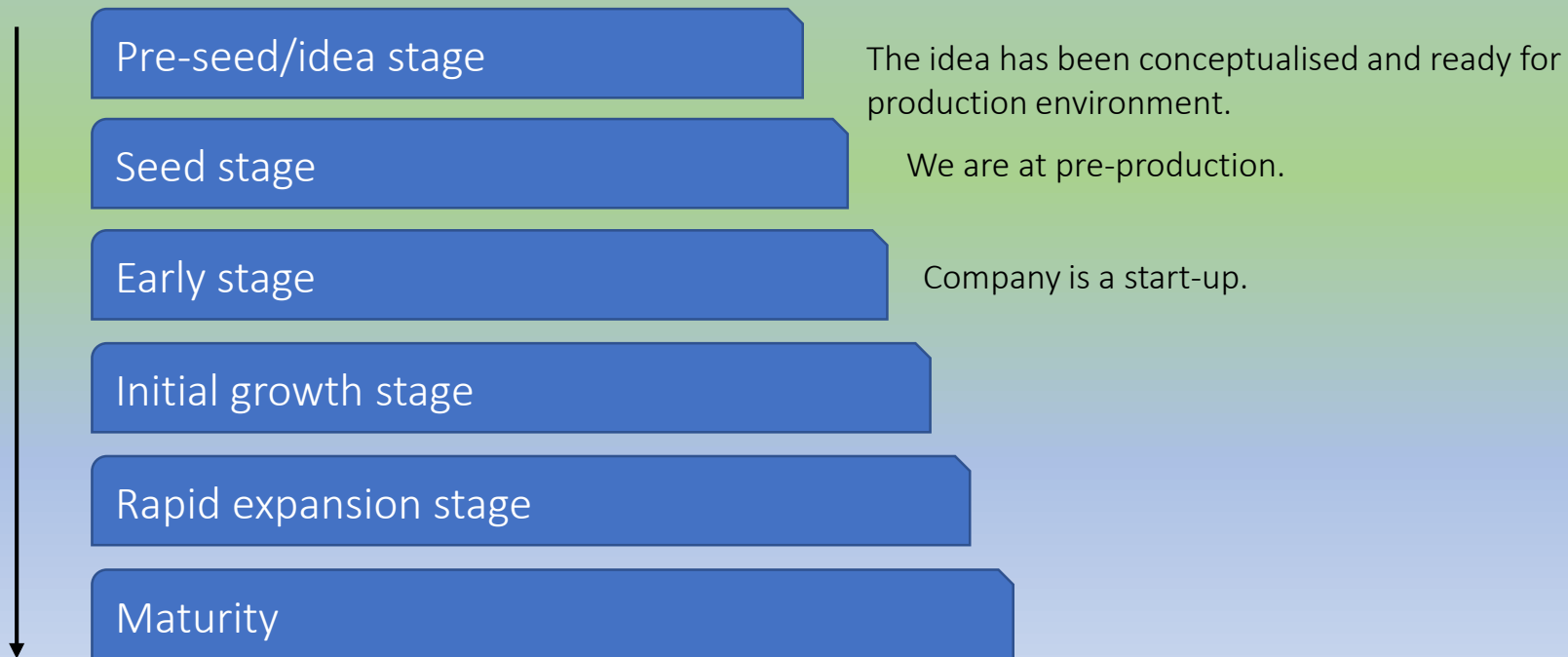
TOTAL ADDRESSABLE MARKET

Year 1

100000											
90000											
80000											
70000											
60000											
50000											
40000											
30000											
20000											
10000											
0											
1	2	3	4	5	6	7	8	9	10	11	12

■ Monthly   ■ Revenue

SUBSECTION ADDRESSABLE MARKET

Mining operations in the Limpopo.

Company Growth And Investment Stage

Pre-seed/idea stage

The idea has been conceptualised and ready for production environment.

Seed stage

We are at pre-production.

Early stage

Company is a start-up.

Initial growth stage

Rapid expansion stage

Maturity

OUR BUSINESS MODEL

- We are a high tech start –up that does consulting using artificial intelligence. We essentially solve social and business problems by deploying machine learning, big data and optimization. Our business model for mining operation + satellite imagery is providing data intelligence and reporting. We will issue reports weekly to give an overview of mining operations. We will partner with Maxar formerly known as DigitalGlobe, + GoogleEarth + SANSA to supply satellite imagery. We will capture our value through consultation fees. That we will be our source of revenue.

- Our business is scalable as we acquire more clients in the addressable market we expect growth.

OUR COMPETITORS AND ADVANTAGE

- Our solution is cloud based meaning it is scalable as the volume and size of images increases we can handle them. The solution is also automated leaving little room for error. The market we are serving is underserved the huge opportunities there.

OUR TEAM

Blessing Magabane – Data Scientist

- Bachelor of Science – Physics and Computational & Applied Mathematics.

- Bachelor of Science with Honour - Computational & Applied Mathematics and Mathematics (ongoing).

- 2 years of experience in data analytics.

- Worked on a mining project.

Aron Langa – Data Analyst

- Bachelor of Science - Computational & Applied Mathematics and Mathematics.

- Bachelor of Science with Honour - Computational & Applied Mathematics and Mathematics.

- 2 years of experience as a Data analyst.

Theodore Gaelejwe – Data Scientist

- Bachelor of Science - Computational &A pplied Mathematics and Mathematics.

- Bachelor of Science with Honour - Computational & Applied Mathematics and Mathematics.

- Master of Science – E Science (ongoing)

TRACK RECORD

- Health care solution that predicts the number of patients visiting a hospital or clinic using machine learning. We are in talks with the department of health and SITA to implement the solution the only thing holding us back is legal.

- Won numerous data science hackathons. We recently built a solution to classify photos into different categories.

- Analysis of satellite imagery from a sentinel satellite for crop detection. We were able to build an algorithm that classifies crops into different categories from a near infrared images.

- We have the domain skills.

FUNDING NEEDS (The Ask)

- Building and maintaining the platform the support we need is R201 632.15

- Breakdown of the R201 632.15

  - Drone fleet X5 , R 25 125.23

  - Google Cloud Platform R 20 500.25

  - Machine Learning services R 23 215.12

  - Apache Spark Insight HD R 18 232.62

  - Storage (300 GB) R 35 000.25

  - Maintaining for months (Pay as you use) R 22 362.32

  - Virtual Machines R 31 500.25

  - Container Registry (Kubernetes) R 20 262.36

- Owner's equity – R35 503.23

201 632.15

Raised
R35 503.23

$
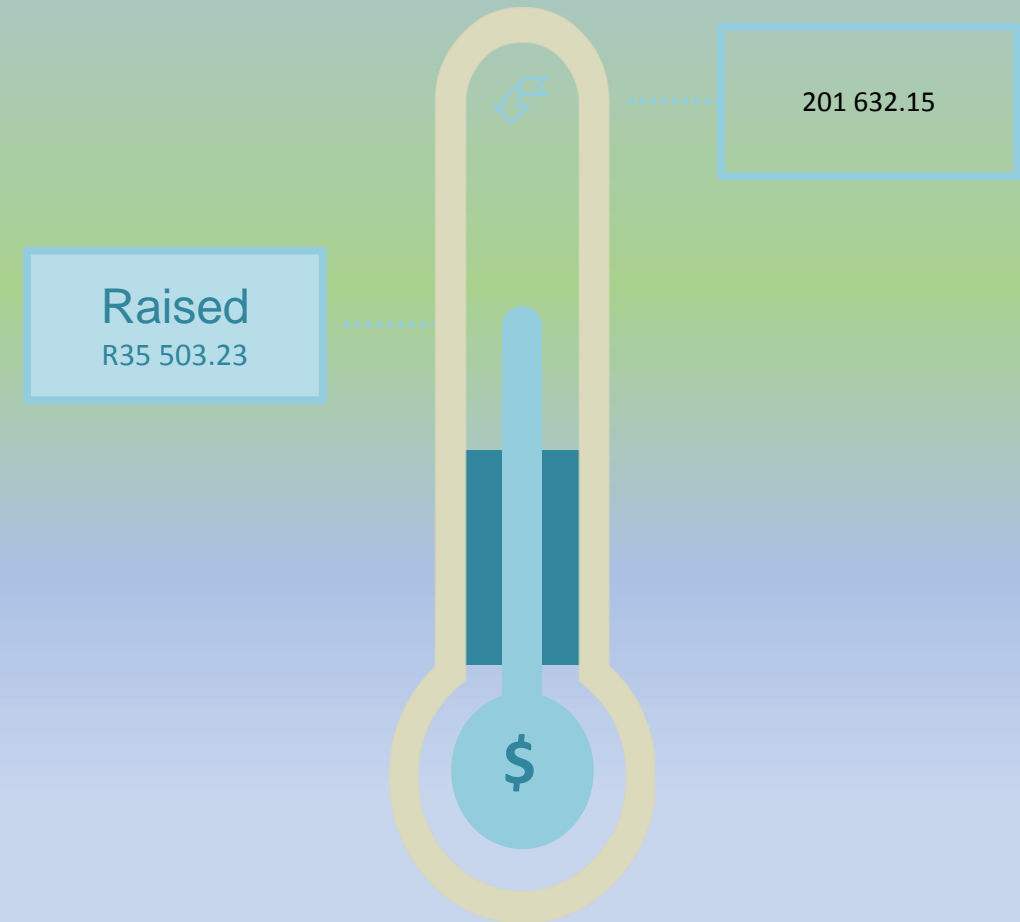
CONTACT INFO
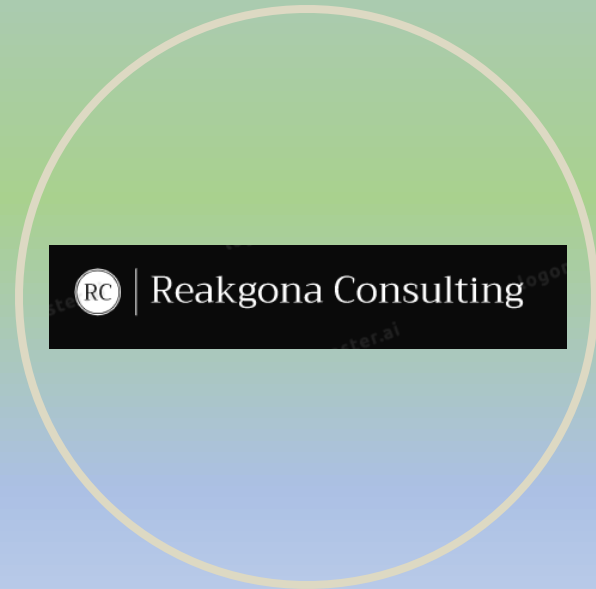
facebook.com/reakgonaconsulting

twitter.com/reakgonaconsulting

reakgonaconsulting@outlook.com

(082) 693-9211

Reakgona Consulting

Supported By