Sibanye-Stillwater Gold Segment

Entry Examination & Making Safe

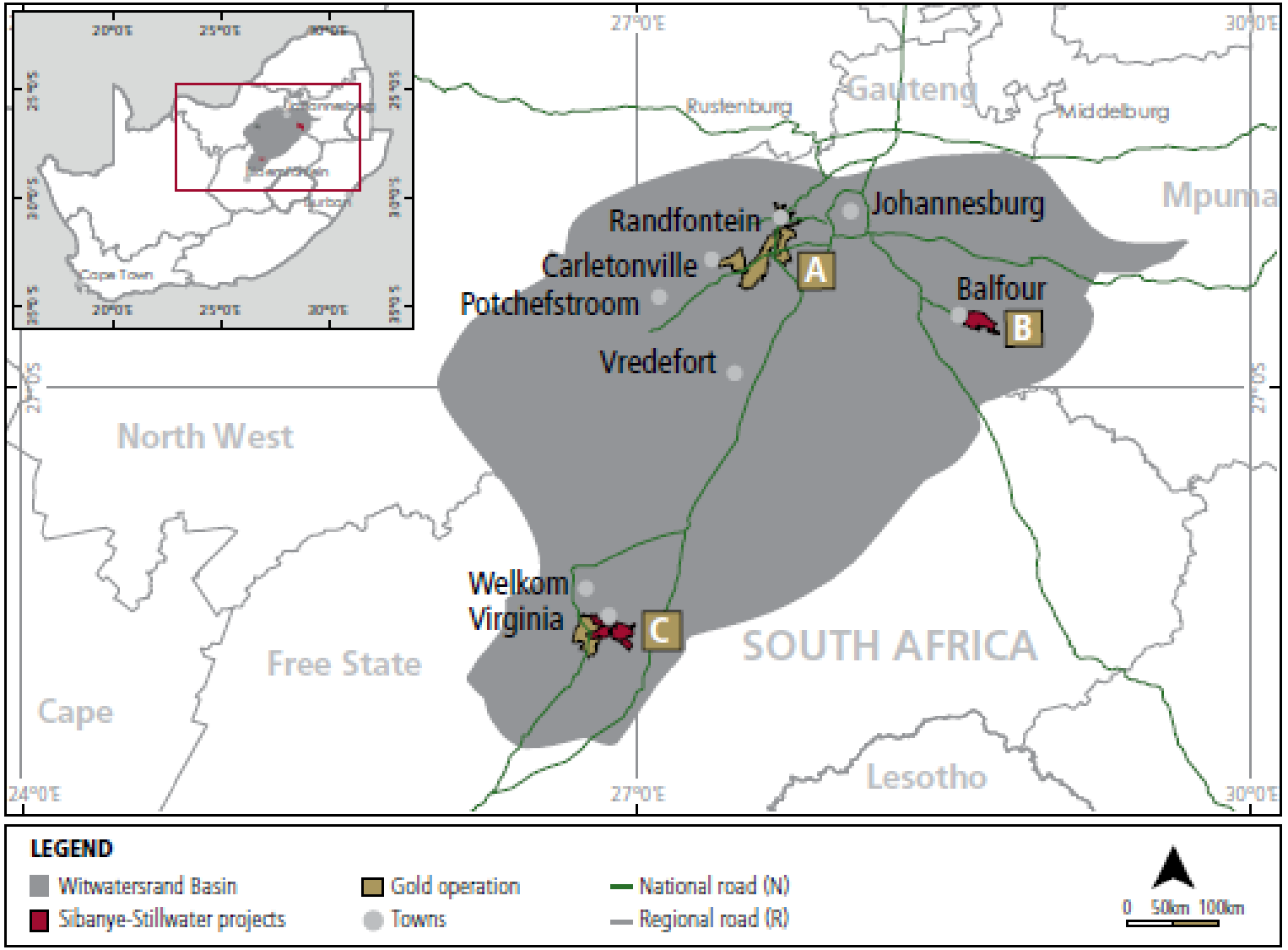
Johan Crafford

14 May 2022

For Discussion

- Introduction
- Falls of Ground Injury Trends / Analysis
- Injury Investigation Finding Analysis
- Case Study
- Questions

Our Business



Our Business

ENABLING ENVIRONMENT

Aim to maintain a safe working environment with equipment, tools and material that enable sustainable safe production

EMPOWERED PEOPLE

Continue to train people to apply relevant standards and procedures to work safely while working and living with COVID-19

FIT-FOR-PURPOSE SYSTEMS

Subscribing to international best practice principles and integrated systems with a view to certification in the longer term

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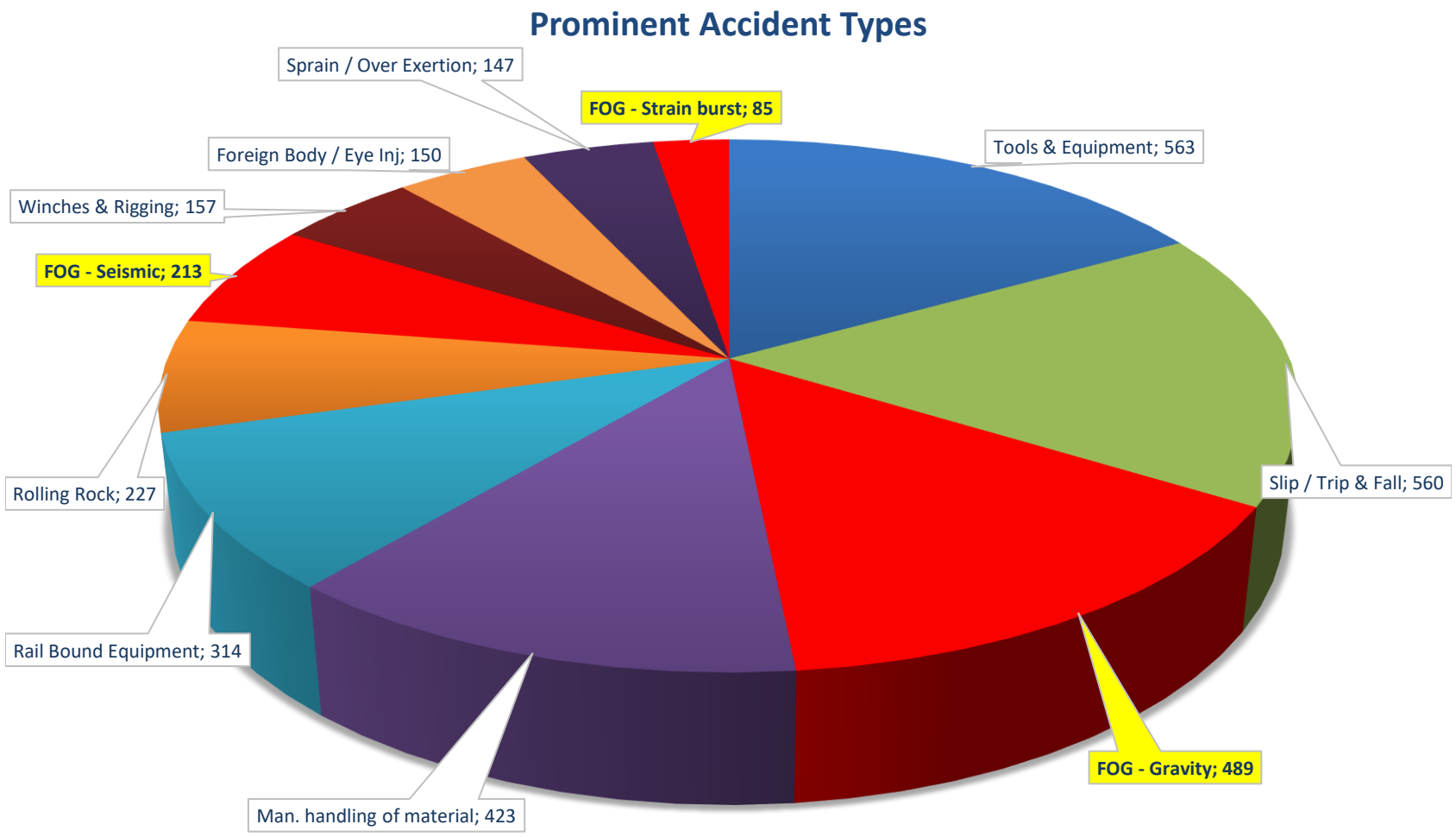
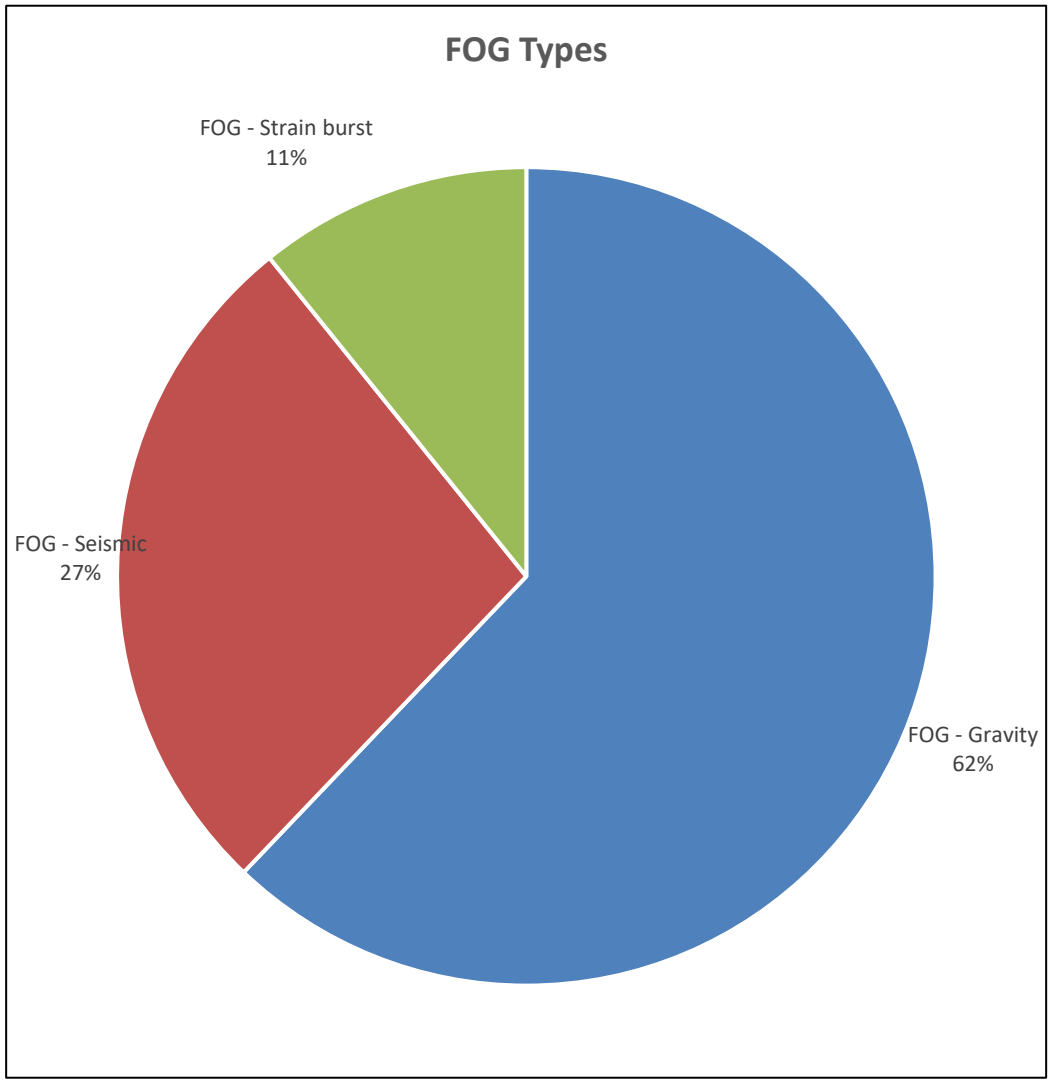
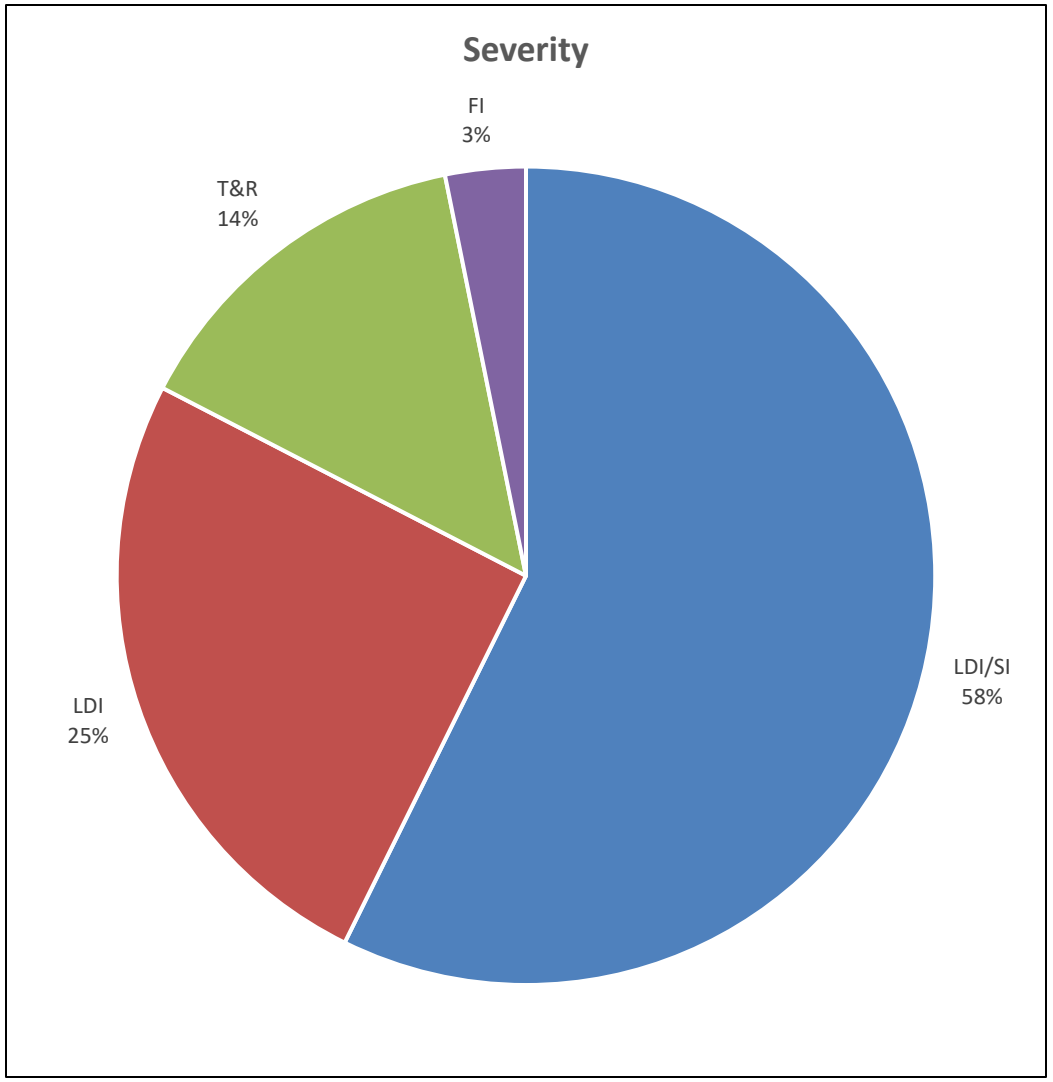
Injuries (2016 – Apr 2021)



Falls of Ground – 20% of total injuries for this period

FOG Analysis





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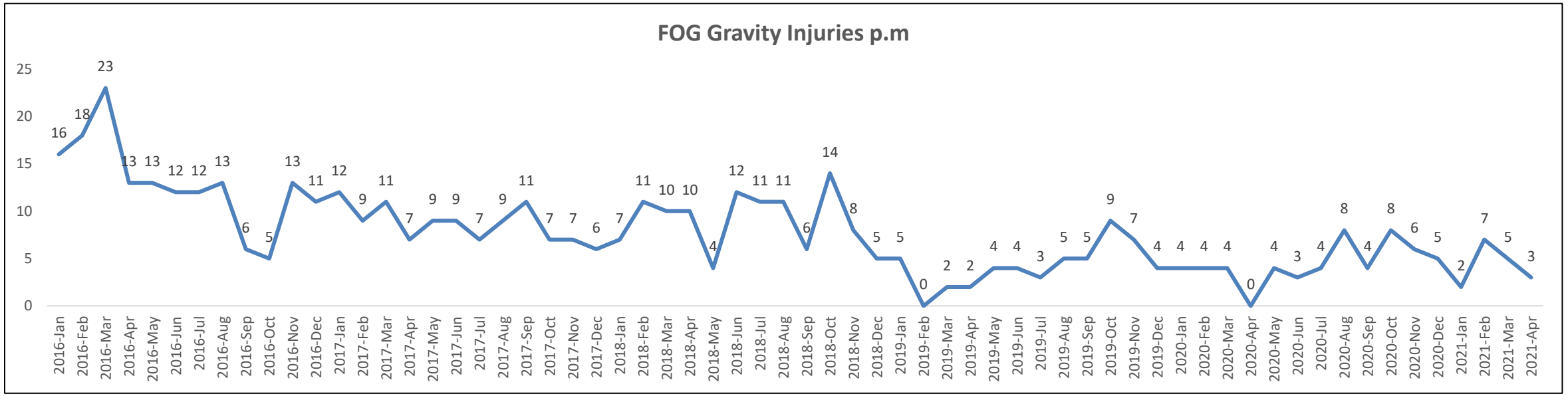

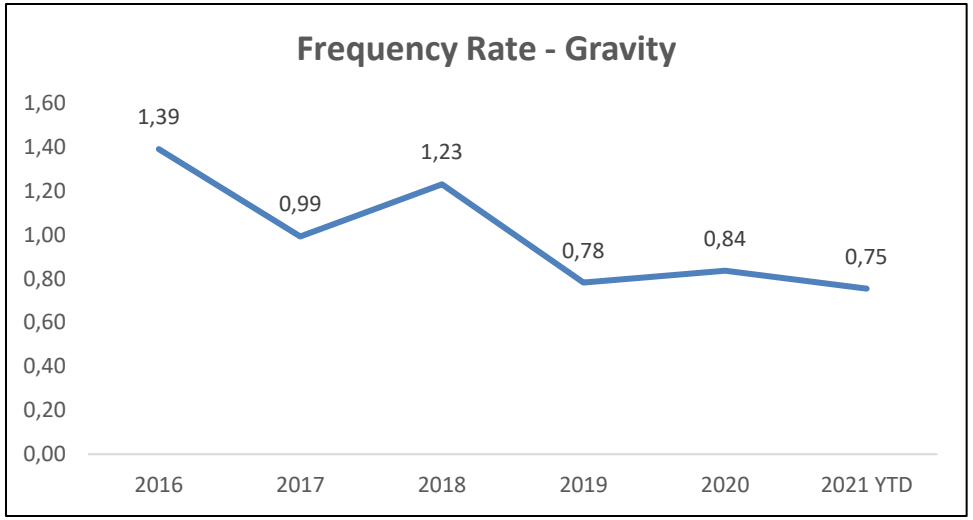

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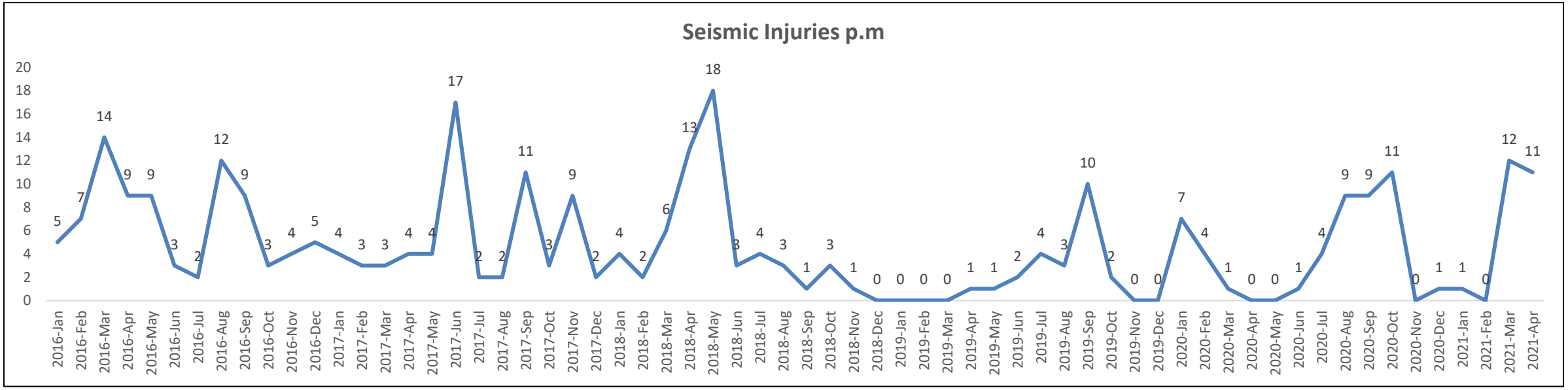

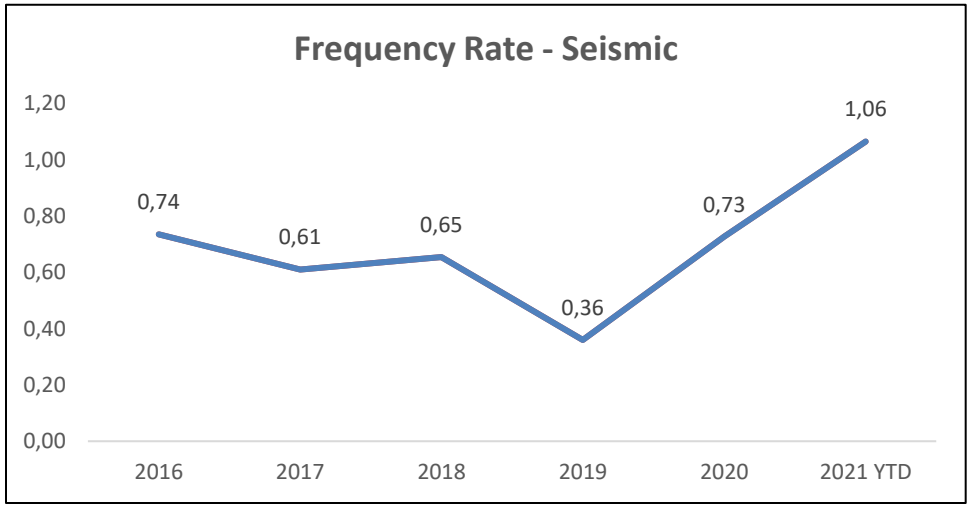

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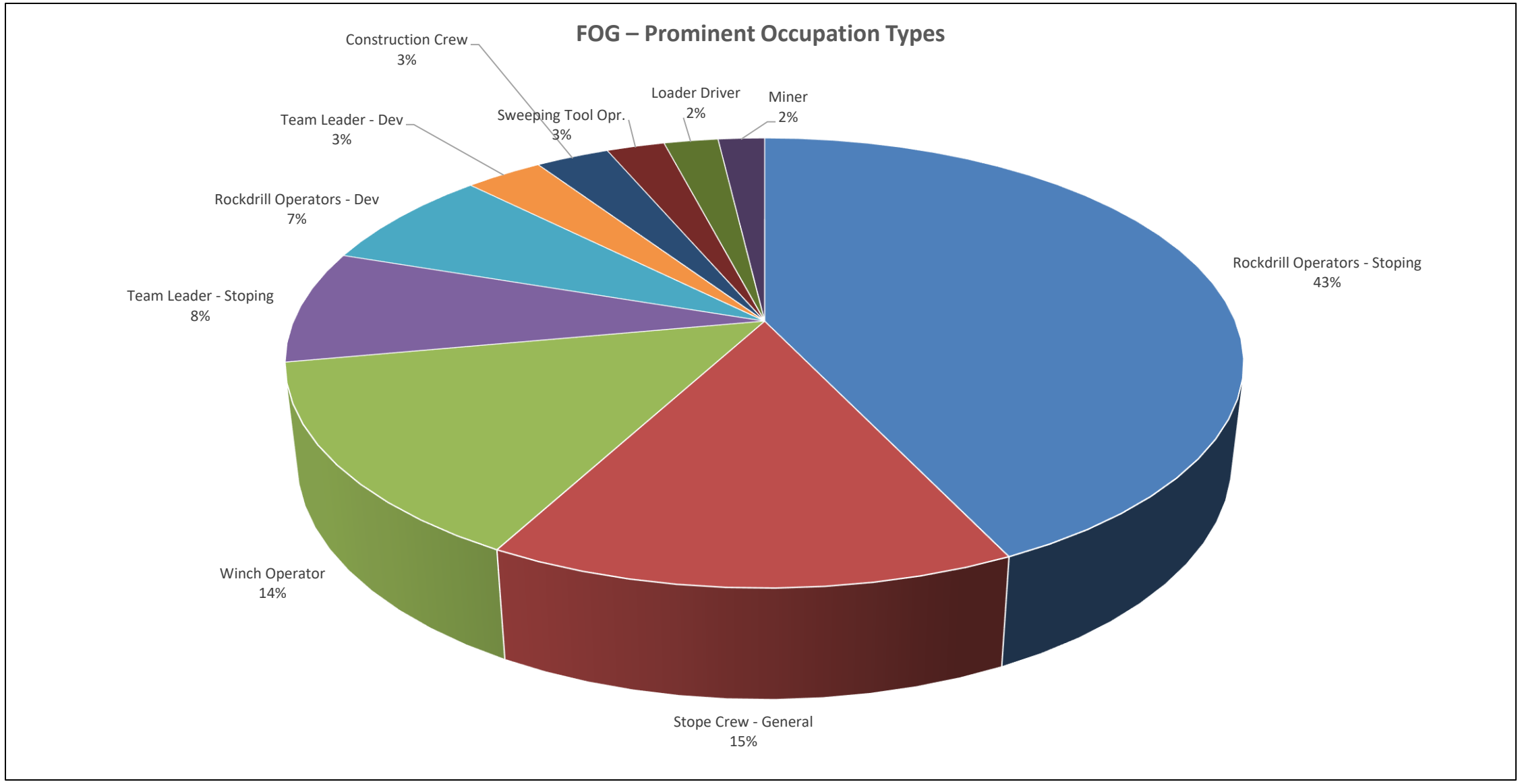
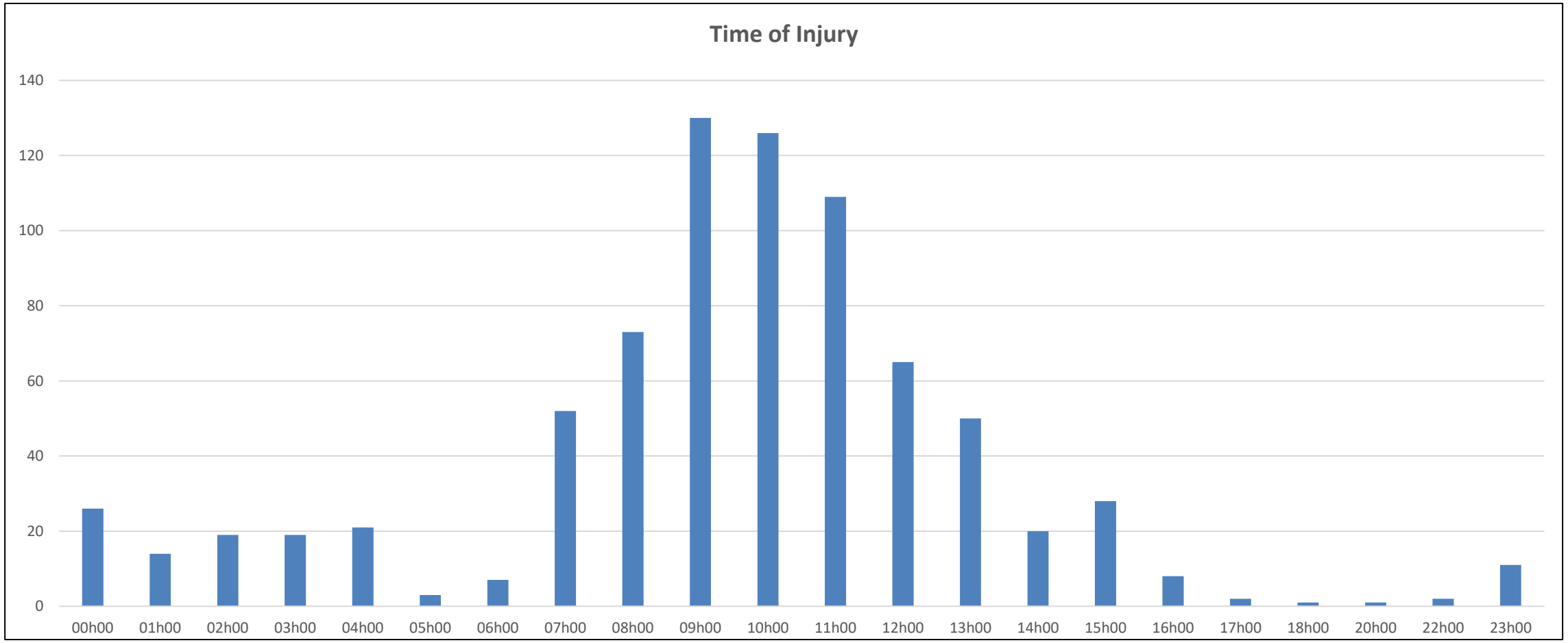


Dedicated Stoping Environment = 69% / Development = 10%

FOG Analysis



15% (incl. from 22h00)
Cleaning

17%
Re-entry

77%
Support / Drilling

7%
Charge up / Prep.

Reference to Stoping Cycle

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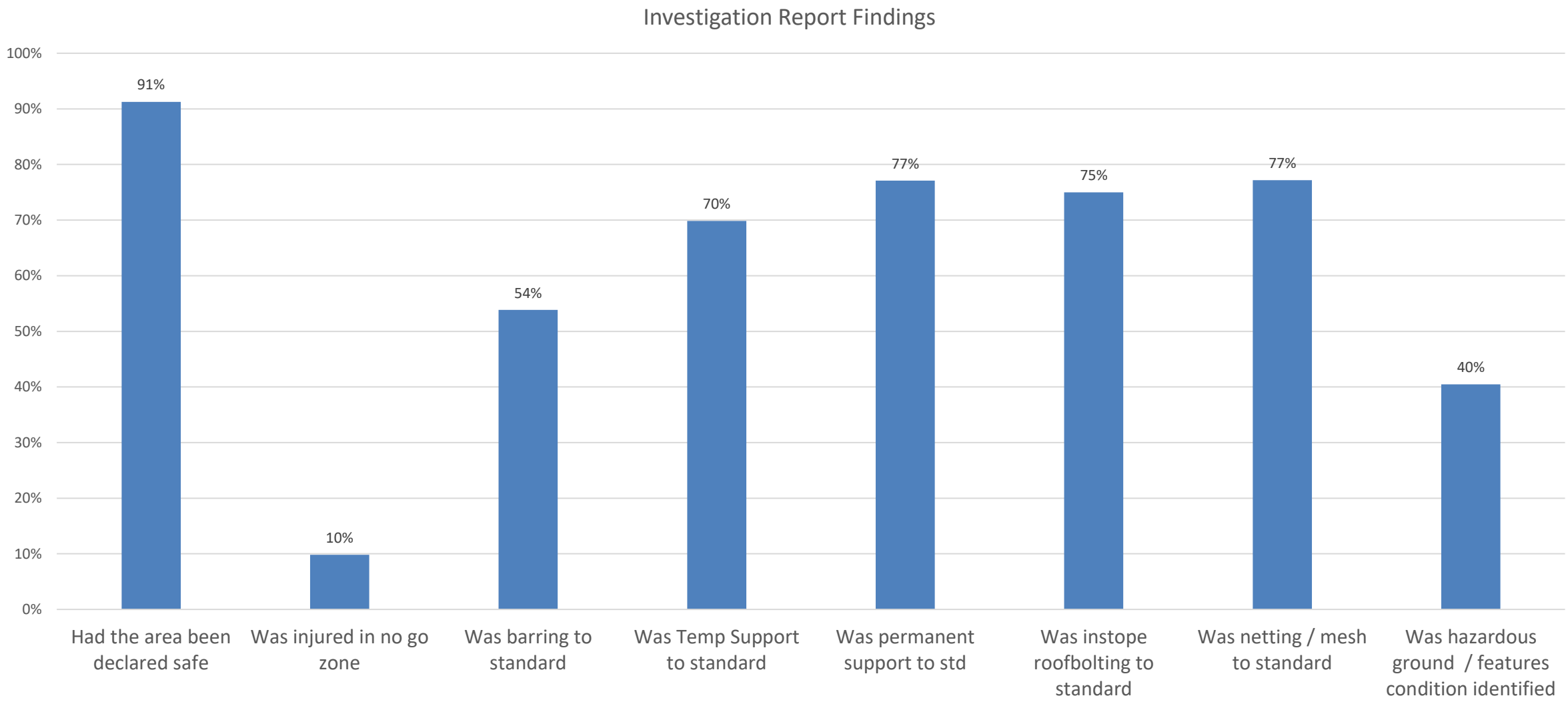
Investigation Report Analysis



Immediate causes related to re-entry & making safe

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Our Goal – Prevention through Learnings

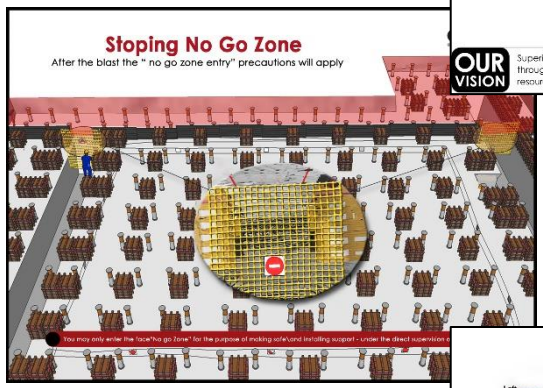
EVERY worker deserves to go home safely, daily - but *sometimes* accidents or incidents happen that we need to investigate to ascertain the:

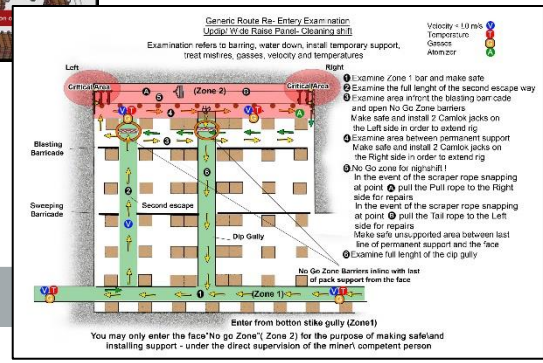
- Why?
- How?
- When?
- What can we do to prevent a similar occurrence in the future?

To accomplish this, we would like to share the process we follow to ensure that re-occurrence is eliminated.

Tools of Training

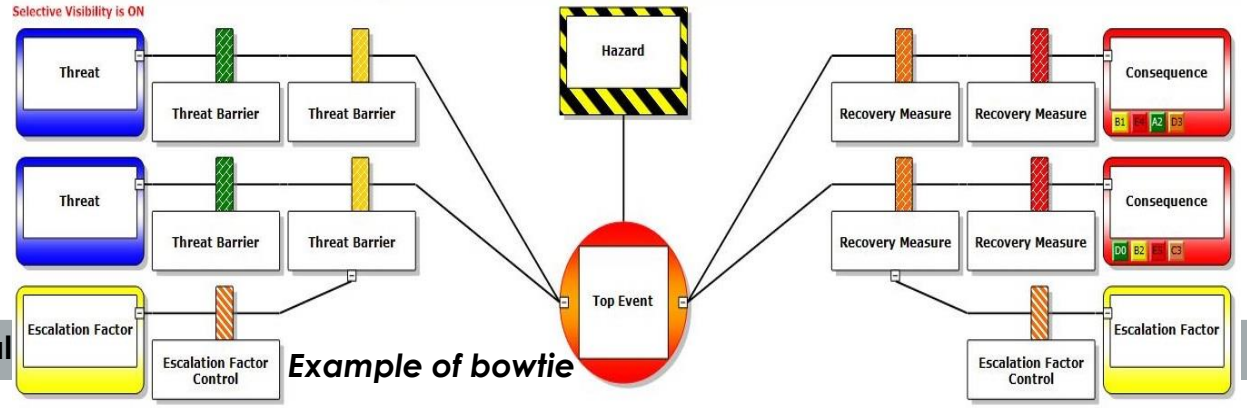
- Every worker is trained and declared competent, fit and healthy to do their job at Sibanye Stillwater by the Training Center. (Commitment, Enabling)
- Tools and equipment are available at every working place to ensure that the right procedure can be followed. (Enabling)
- Standards, Procedures and Guidelines are discussed during training e.g. MOSH Early entry examination to prevent falls of ground incidents or accidents.
- In-house training is given underground by various services departments as well as PTO's being done by the line of supervision.
- Communication and visual standards are distributed and discussed at all working places. These are also discussed during Risk assessments.
- Safety promotions are re-energized and driven from the crush to the face.



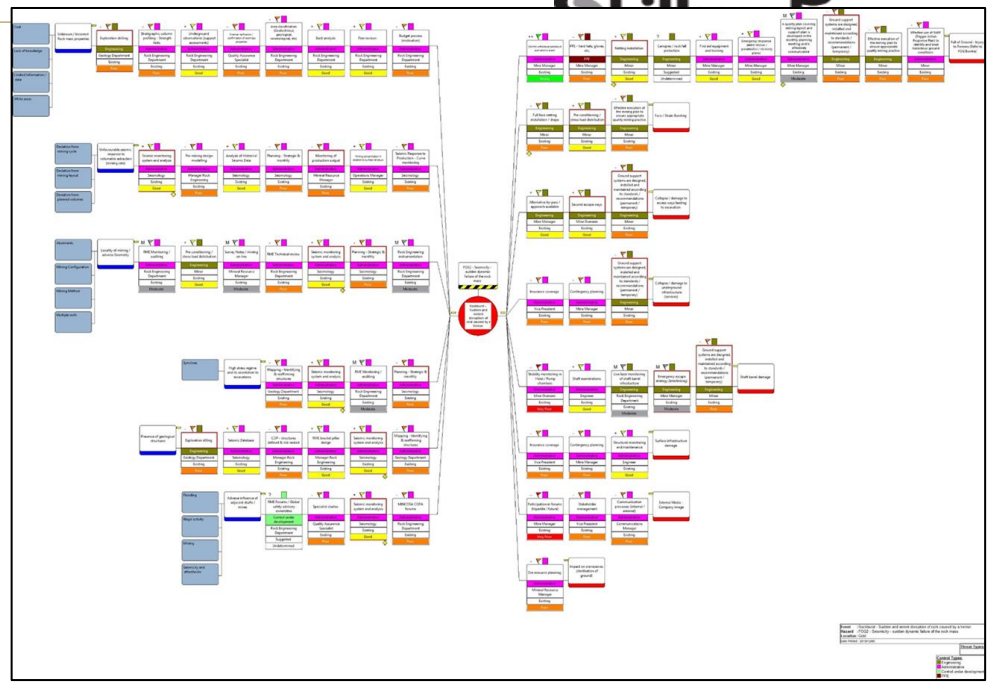


Tools of Prevention & Risk Management

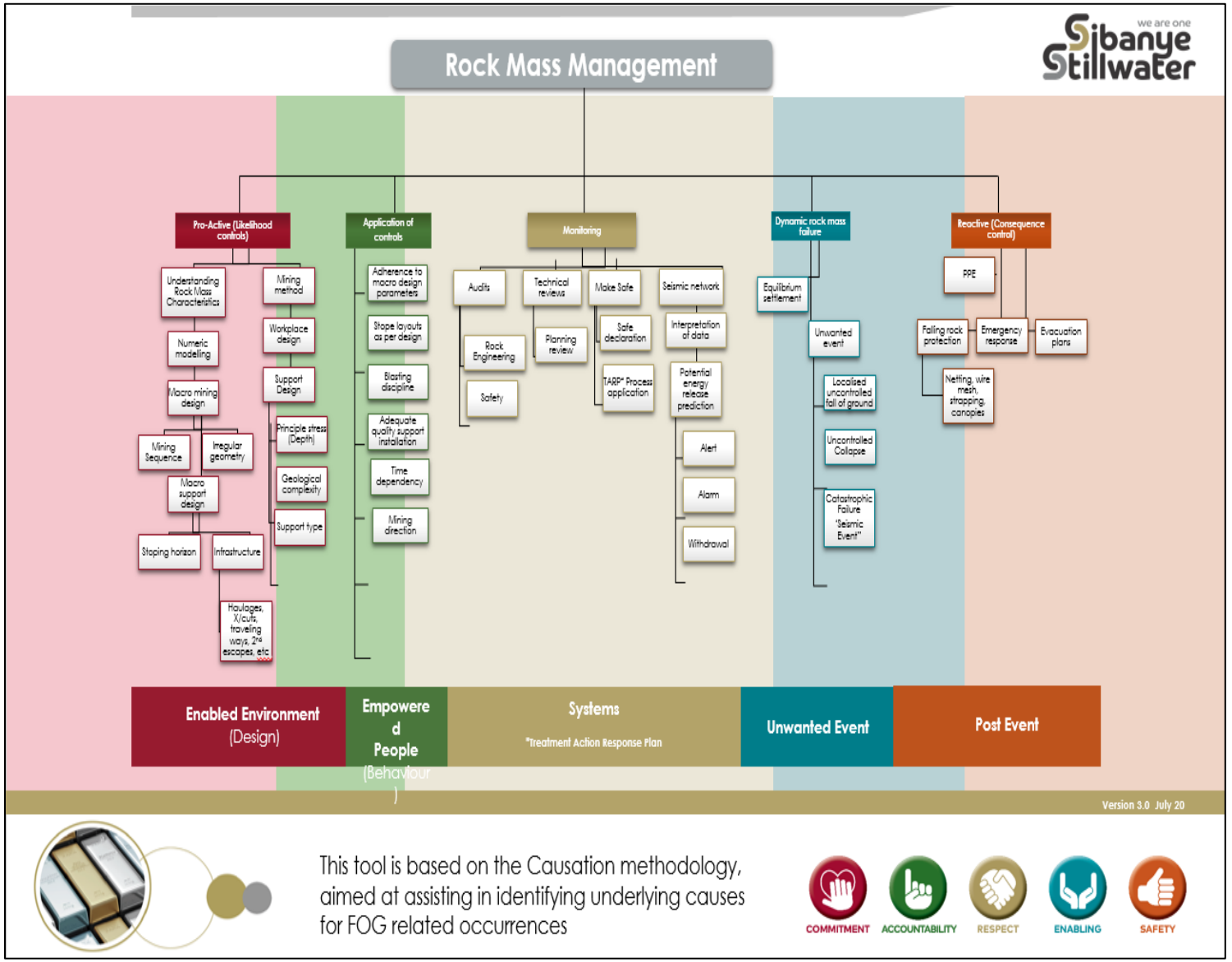
- In addition to different forms of risk assessments performed before any work is conducted, ***bowties*** have been drawn up with input from various stakeholders and experts to identify potential drawbacks in ensuring the safety of every worker.
- It is aligned with the baseline risk management process and provides a framework for identifying *critical* controls and recovery measures post event.(80/20)
- In terms of falls of ground, the bowtie charts have been split between both gravity as well as seismically induced incidents due to the different mechanisms associated with failure.
- The systems to prevent similar accidents and/or incidents are highlighted along with the threats in the relevant bowtie.
- It is a dynamic tool that allows for ongoing modification as knowledge and understanding of the hazard, risk and its impact, changes.



Example of bowtie



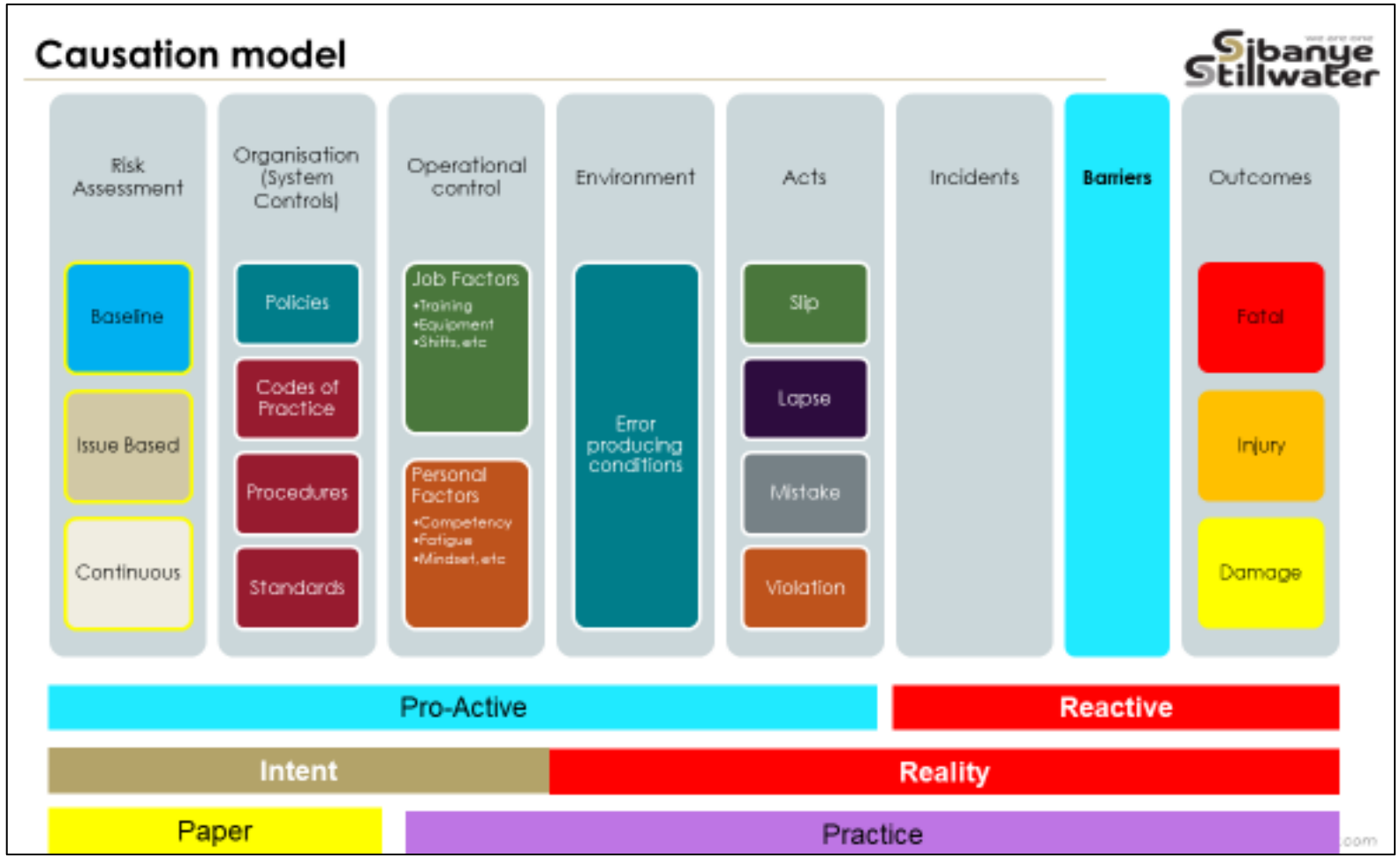
Rock Mass Management Model



- The tool is based on the causation methodology aimed at assisting in identifying causes for FOG related occurrences.

- It is not a silver bullet to prevent accidents but to help us understand the why it happened and to have a process in place to ensure that our people go home safely every day by preventing similar incidents – Khumbul'Ekhaya

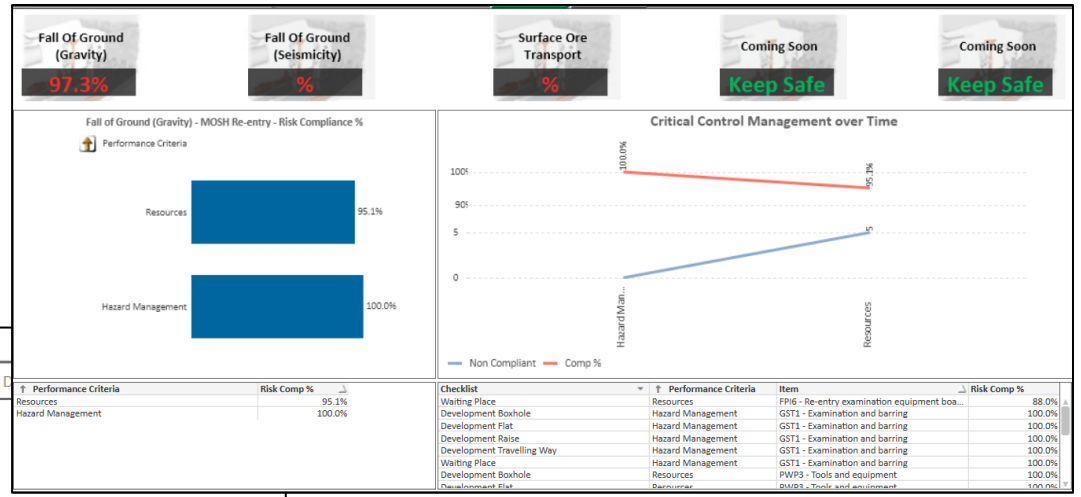
Tools of Causation Management (Guiding tool to prevent repeats)

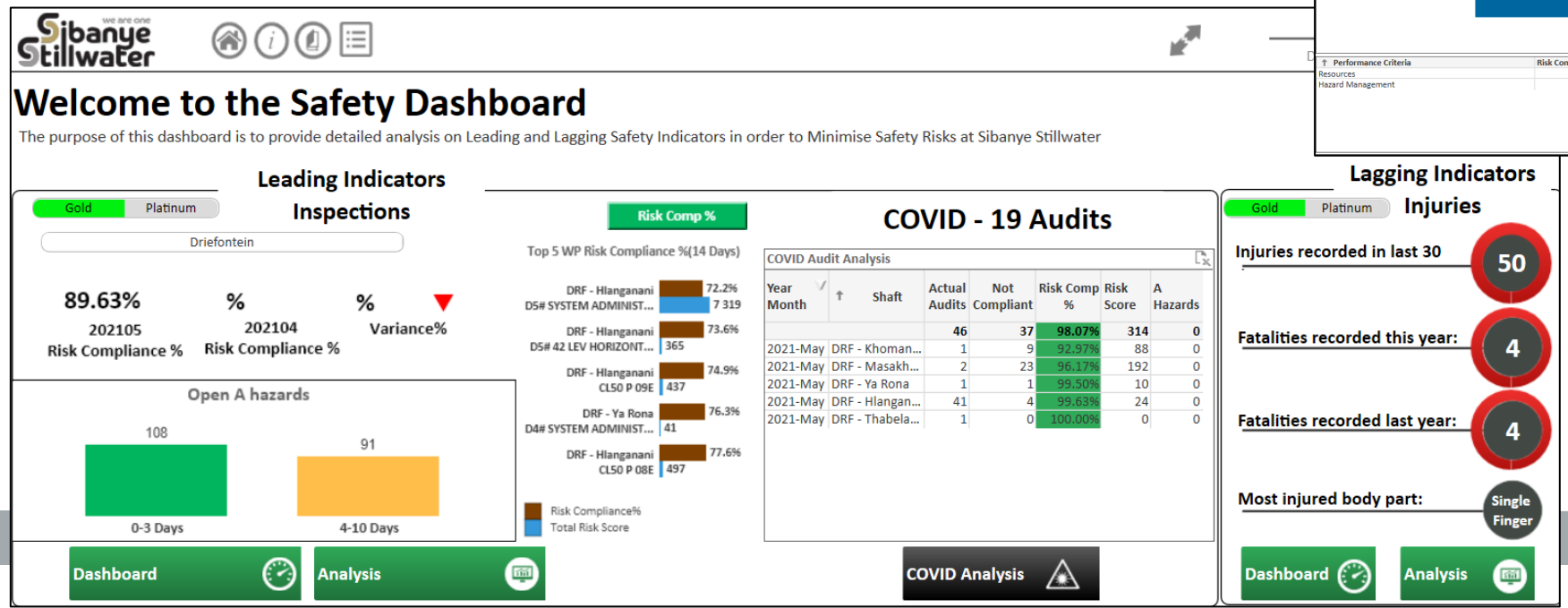


- The crux is to identify every potential failure mechanism truthfully to ensure that re-occurrence is eliminated.
- From the causation model – we need to know ***which*** *control failed and* ***why***. *Then* ***how*** *to strengthen the existing controls and what* ***new*** *control we need to implement to prevent repeats of the incident/accident.*
- The process is enforced to ensure that every potential cause is highlighted and preventative measures put in place.
- If you don't know the "why it happened", you will never be able to implement the "how to prevent it" successfully.

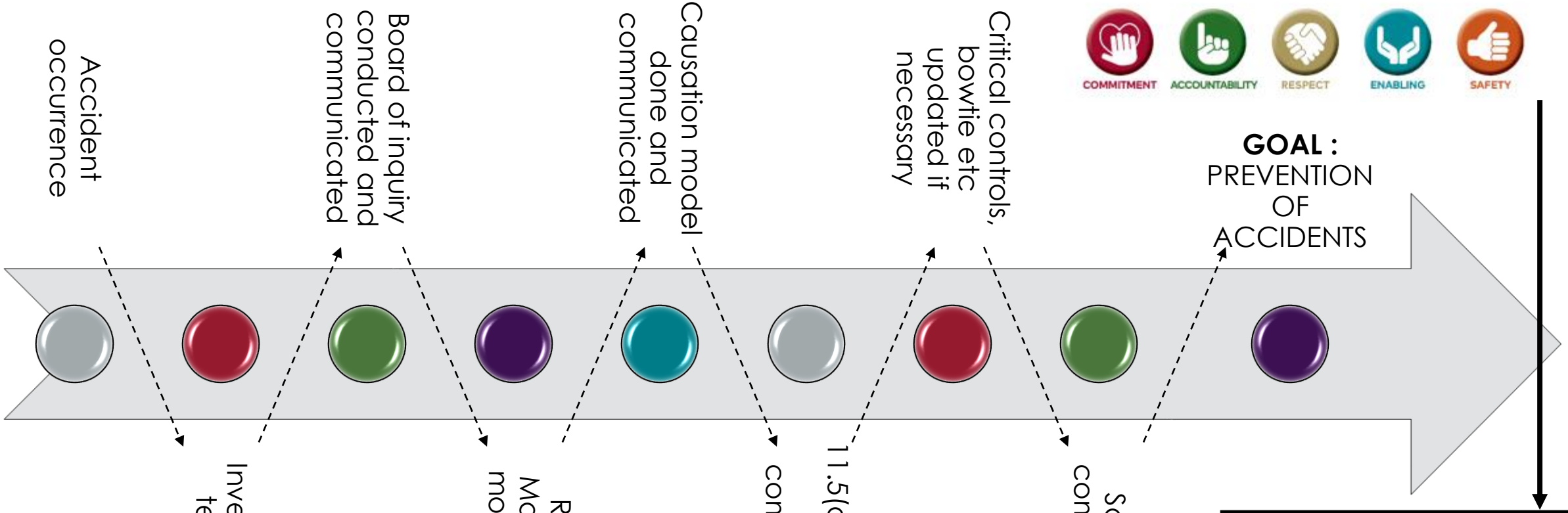
Tools of Analysis

- Different types of analysis methods available with both monitoring (measurable) as well as post accident / incidents causation models including the Rock Mass Management Model.
- Monitoring includes the information obtained by service departments on risk assessments, ad hoc routine or requested visits e.g. TARP requests. This is included in the live system (Syncromine) and displayed on the Qlikview system to indicate areas of concern, open hazards etc.
- Risk assessments are incorporated, analyzed and closed-out.
- Information is available immediately and identifiable.





Typical accident investigation process



Case Study : FOG Gravity

Accident

Brief Description of the Accident:
On 17 February 2021 Mr A the secondary support Team leader, was struck by a gravity fall of ground from the hanging wall whilst busy installing wire mesh across the hanging wall in the intersection of a the reef drive and the traveling way. He sustained laceration right ankle (cuneiform, calcaneus, talus, cuboid, heel)

Date of Accident	17 February 2021
Workplace	Traveling way
Section	52
Current Status	Back to work. Lost 16 days
Photo of the Injured	

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FOG Accident

Observations

Accident scene Working place

- Accumulation of broken ore barred down from the travelling way.
- Some protruding roof bolts at the traveling way and reef drive intersection, due to barring practises.
- Fractured rock due to localized faulting and sill present.
- Overstoping not completed yet. Mining was stopped to complete secondary support first.
- Brow observed at scene of accident and observed to be loose(Post incident). Caused by rock that dislodged from hanging wall
- 5m of mesh being installed when rock dislodged inside the sets.
- Camlock props not installed when rock dislodged.
- 3.0m, 2.4m and 1.2m pinch bar observed at the scene of accident.
- No face plates with pins installed during the wire mesh installation process.
- Start up risk assessment identified fractured and blocky ground conditions due to Faulting with remedial actions to ensure correct barring.

Findings 3

Photographic evidence

Loose rocks next to the tendon roofbolt Wire mesh installation 4

1:200 Plan

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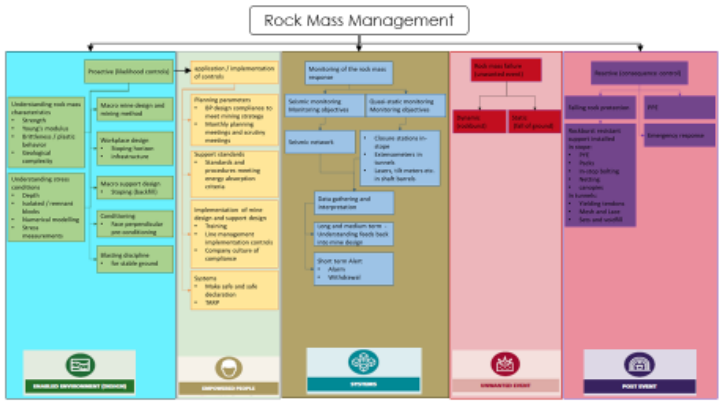
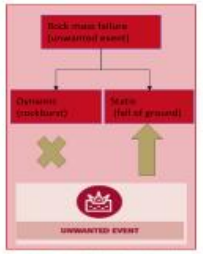
Rock Mass Management Model



Rockmass failure (unwanted event)



Type of failure	Static fall of ground (Gravity)
Failure from	Hangingwall
Location	CL48-09 TW
Area at	Intersection of reef drive and traveling way
Underlying	Blocky conditions aggravated by over-stoping not completed yet. Localized faulting.
Dimensions of fall of ground	*Rock resulting in injury:* 0.3m x 0.4m x 0.23m =0.0276m³ = 75.9 kg
Aggravating factors	• Inadequate barring of loose rock in the hanging wall. • No face plates available to secure mesh to roof bolts. • Ground conditions weakened by localized geology (sill, fault)

What failed?

11.5 Input (Causes, Conditions, Acts)

Basic Cause

- Struck by a fall of ground gravity due to inadequate making safe and barring procedure.

Underlying Causes

- Face plate and pins not available (Not a stock item) for the crew. Standard not communicated to Supervisors and crew during standard adoption phase.
- Start up risk assessment not giving clear remedial actions with regards to the addressing of blocky and fractured ground conditions.
- Inadequate planning and execution in that reef drive hanging wall deteriorated due to overstoping stopped for 4 months and area not supported accordingly.

Sub-Standard Conditions

- Blocky conditions aggravated by local faulting and the presence of a sill.
- Mesh not installed with face plates and pins.

Sub-Standard Acts

- Failure to identify the hazard in that the loose rock was not identified by the Miner and the crew.
- Ledging crew stopped and moved out of workplace prior to installing support in reef drive. Time delay in moving secondary support crew into reef drive area.

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Could the accident have been prevented?

Yes

What failed?

Identification of hazard (human)
Equipment not available (systems)
Timeous planning (systems)

Critical learnings:

Enabling crews with the correct equipment and follow up that it is available.
Refresh, follow up and communicate training material.

Accidents ARE preventable

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QUESTIONS ?