HARMONY RISK MANAGEMENT

Save Lives, Save Mines

HARMONY™

FOREWORD

To the reader of this guide,

I am passionate about instilling a pro-active safety culture which is built on hope, trust and respect – the psychological contract that ensures that all employees safely return home after every shift.

One key part of a progressive safety culture, is superior Risk Management. As Chief Operating Officer of Harmony SA since 2016, I have been privileged to be part of revolutionising and modernising Risk Management across the company.

This guide was put together, to map the journey and progress on Harmony Risk Management (HRM) and it is aimed at documenting the key innovations and initiatives we have embarked on as part of our journey towards Zero Harm. It should serve as a reflection piece, coaching tool, and learning and development material. Leaders, managers and employees will benefit from this guide in that it brings together the various elements of HRM and packages it in a way that it can be used to guide our safety behaviour as leaders i.e. how we "show up" as leaders. It sets out what we aim to achieve, it shares some successes and aims to motivate us to continue our relentless focus to stop Significant Unwanted Events (SUEs) such as loss-of-life incidents in Harmony.

Often we are so occupied with daily tasks that we do not take a moment to step back and look at what we have accomplished. The exemplary work done by our HRM team and operations, is testimony to the commitment towards safety excellence. I therefore extend my sincerest gratitude to all who contributed to this positive change brought about in Harmony.

I encourage all of you, to join me, and take Risk Management in Harmony to an even higher level. This guide is your ticket to be able to do that and to lead and inspire your teams to meaningful change. Safety is a direct reflection on our collective leadership - let's lead with a deep sense of care for our employees, and make our mines the safest in the world. I know we can, and we will.

You are always welcome to share your suggestions and ideas on how to further develop and grow HRM in Harmony.

Warmest regards

Beyers

Dedicated to each person who has lost their life in the mining industry

Special Acknowledgement to the Harmony Leadership Team, with specific mention to Beyers Nel and Thomas van den Berg for their drive to make Harmony Risk Management synonymous with Industry Best Practice

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SECTION 1

INTRODUCTION TO HARMONY RISK MANAGEMENT

How do we value human life? Do we care, or do we genuinely care? Genuine care should be a value embedded in our day-to-day existence. The HRM process was nurtured by people who altered their lives and attitude to espouse this care. The reason you get up in the morning should be with purpose. Purpose guides life decisions and influences behaviour.

"The optimist sees the opportunity in every difficulty." – Winston Churchill

This quote is well and truly relevant to the HRM team. Every team member's dedication, genuine care, and optimism to persist every day in taking the difficult and changing it into an opportunity to create a safe mining environment for all.

The purpose of this guide is to share knowledge, experience, best practices and give guidance by subject matter experts to comply with Harmony practices and, more importantly, to save lives. By staying true to the principles in the guide, we will achieve our goal of a safe, productive environment.
It is an honour to be leading a team of passionate and dedicated people who has the vision to achieve a common goal.

Paul Joubert

SECTION 1

INTRODUCTION TO HARMONY RISK MANAGEMENT

Overview

With 70 years in the industry, Harmony is an experienced emerging market gold miner and the largest gold producer in South Africa. We are also a significant operator of gold tailings retreatment facilities. Harmony's business activities cover the entire gold mining value chain – from exploring prospects, conducting feasibility studies and developing, buying, and operating mines through to closing and rehabilitating mines at the end of their productive lives.

In South Africa, our nine underground operations are located within the world-renowned Witwatersrand Basin – one in the Klerksdorp goldfield, two in the West Rand and six in the Free State southern portion of the Witwatersrand Basin. In addition, we have an open pit mine on the Kraaipan Greenstone Belt and several surface treatment operations.

In Papua New Guinea, Hidden Valley is an open-pit gold and silver mine. Our significant copper-gold portfolio includes a 50% stake in the Wafi-Golpu project in the Morobe Province through a 50/50 joint venture with Newcrest Mining Limited (Newcrest).

The Harmony Strategy produces safe, profitable ounces and improves margins through responsible stewardship, operational excellence, and effective capital allocation. This is underpinned by the Harmony mission and vision to increase margins while producing profitable and safe ounces. The mission is based on four strategic pillars: operational excellence, cash certainty, effective capital allocation and responsible stewardship.

These strategic pillars will create the foundation to develop an Organization with Mature Leadership. Everyone lives the Harmony values with high levels of engagement within the workforce, ensuring consistent alignment for the entire Harmony Team from top to bottom. Once these are embedded within Harmony, we will achieve and maintain a Proactive culture with continuous improvement driving every action we embark on into the future.

In addition to the strategic pillars, Harmony prescribes to the following value system areas.

To support the Strategy, Vision and Mission with Safety being a non-negotiable aspect of our Business. The tenets of our Safety and health policy are to focus on:

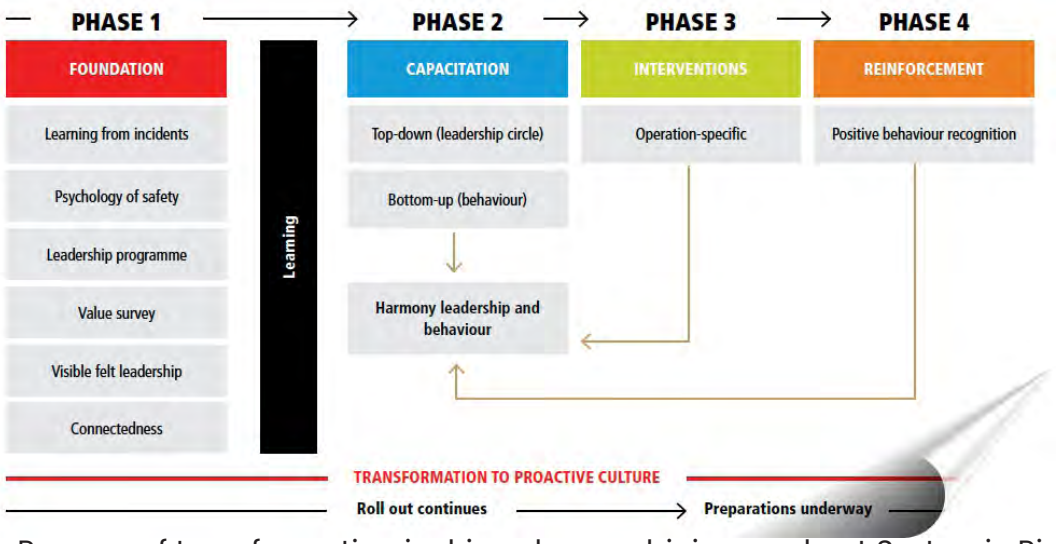
- Ensuring that leadership at all levels leads by example and creates an enabling environment for driving continuous improvement in safety performance
- Ensuring that high-risk safety and health exposures are managed through focused strategies with risk management as the bedrock support this multifaceted and cooperative approach.

This process is being rolled out in four phases and consists of an integrated system with a Systemic and Humanistic Approach to ensure safe working areas.

Risk Management Strategy

Our approach to Safety encompasses critical control management, preparedness, prevention and the monitoring, review and analysis of relevant Safety and Health indicators. Three years ago, we began implementing a group-wide risk management strategy for Safety across South Africa and Papua New Guinea. This strategy addresses specific causes of loss of life and incidents and improves our Safety in general; Harmony has embarked on a process to create and embed a 'proactive' safety culture. The process involves identifying, assessing and controlling all threats that could cause harm to our employees. Increasingly, it is based on real-time data, particularly leading indicators, to support proactive risk management initiatives and aid safe, profitable production. It also aims to embed a behaviour change for Safety to be far more engaged and proactive. All relevant stakeholders.

The Journey to Create and Embed a Proactive Safety Culture



The Process of transformation is driven by combining a robust Systemic Risk Management approach towards accomplishing a zero harm environment with a Humanistic element, which aligns the Behaviours (Hearts and Minds) of Leadership and employees to the Strategy of Proactive Culture and continuous risk assessment in every task and aspect of work. This strategy is being rolled out in phases to systematically embed risk management in our operational culture and the behaviour of all employees.

While modernising our systems and processes has been pivotal to improving safety performance, our risk management strategy would be largely ineffective without the human behaviour element.

Safe by Accident? - Taking the Luck out of Safety

(Safe by Accident, J.L. Agnew and A.C. Daniels, 2011: Performance Management Publications)

Beyers Nel: Chief Operating Officer introduced Harmony to the Safe by Accident Philosophy after reading the book and realising its impact in the mining industries drive towards "Zero Loss of Life". Safe by Accident provides the framework for the idea that HRM processes and the platforms created are exceptional in their approach for transforming this organisation into one with a Proactive Culture. But the baton that HRM hands over to the Operations need to be taken and their Leadership must keep us in the lead to win the race for Zero Harm every day and for our employees and our mines to Live Longer.

The drive for Transformation being approached from both a systemic and a Scientific behavioural approach is required to facilitate successful transformation within Harmony. Safe by Accident introduces us to the idea of Practice vs Principle. Meaning that implementing safety systems is a great idea (Principle), but is just implementing a safety system good enough? Will this idea on its own prevent incidents and accidents? Or do we also, and more importantly, need to create a safe culture based on people's behaviours (Practice) to have adequate safety management. ***"Behaviour analysis is the foundation of all good behaviour-based safety processes"*- Safe by Accident.**

HRM processes and the platforms created are exceptional in their approach for transforming this organisation into one with a Proactive Culture

Consider the Optical Character Recognition (OCR) system implemented within Harmony. (The OCR system uses *checklists completed on paper converted into digitised and actionable data*, then available in real-time for analysis.) The principle behind the OCR system is a great concept, but if people do not use the system (behaviour/ practice),or do not provide accurate information, how effective is the system?

Behaviour analysis takes us on a journey to understand why some of these "negative behaviours" are present in our workplaces and how to manage and change that into "positive behaviours". In any company, safety must make its way from the Top-down and not the other way around. The application of behaviour analysis can improve safety leadership and this, in turn, will have a positive impact on frontline safe work practices.

Organisations must apply behavioural science to everyone and not just certain persons, tasks, or positions. Behavioural Science will avoid people falling into the trap of being bias towards their work, e.g. A mine manager instructs an engineer to perform a specific task, based on how he (mine manager) perceives the job to be completed even though both parties know it will be unsafe.

Furthermore, we need to look at science vs technology; we are in the 21st century, after all, with all this fantastic technology that is readily available at any given time.

So why would we need to apply behavioural science when we have all this technology around us? The technology uses the best information available at that time to solve problems, and it looks for an immediate application; however, in an ever-evolving world, technology is still incomplete, e.g. Harmony's Optical Character Recognition (OCR) system scans for specific criteria in a document to populate a completed form, but verifiers (people/behaviour) are still required in certain circumstances to give assurance to the accuracy and correctness of the scanned document.

"The rate of behaviour can be increased or decreased based on the consequences involved. There are three ways to increase the rate of behaviour – Positive and negative reinforcement and recovery."

- Positive reinforcement can have positive and negative effects. For example, yelling at a person for a safety offence may increase that behaviour (if the offender enjoys the attention). Therefore, yelling could be classified as positive reinforcement. However, the consequence of the yelling could increase the unsafe behaviour.
- Negative reinforcement, on the other hand, can also increase the rate of behaviour. Negative reinforcement can be summed up quite easily. First, it could simply be behaviour that is aimed at avoidance of punishment for unsafe actions. Secondly, it could be due to fear of repercussions (Employees will only follow safe practices because they don't want to get into trouble, so they do not see the personal value in working safely). Lastly, it could affect the workforce involvement in safety-related campaigns, practices, meetings, etc.

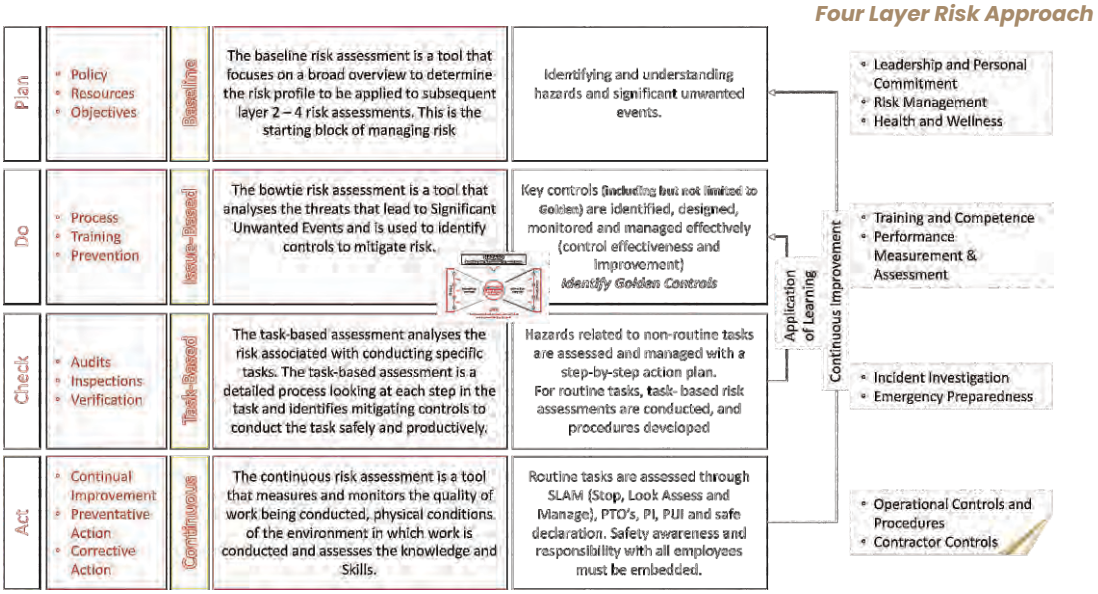
- Recovery is the final cause of increases in the rate of behaviour. Simply put, people disciplined for safety offences only behave safely when a supervisor or manager is present and continue with the unsafe acts when the 'authority figure' leaves.

A more in-depth discussion of the "Safe by Accident?" Book has been added as an Annexure.

Harmony Risk Management Approach

The Harmony approach to risk management relies on the continuous monitoring and reporting of risk and related mitigation procedures and when appropriate, their revision. These activities are embedded in our day-to-day activities and processes at an operational level and in our governance structures at a group policy level. As its starting point, the risk-based approach has our business strategy and related strategic objectives as its framework, and similarly, its opportunities. Therefore, identifying and understanding those factors that can limit our ability to deliver on our plan is vital – and conversely, those factors that present opportunities – will enable us to achieve our goal.

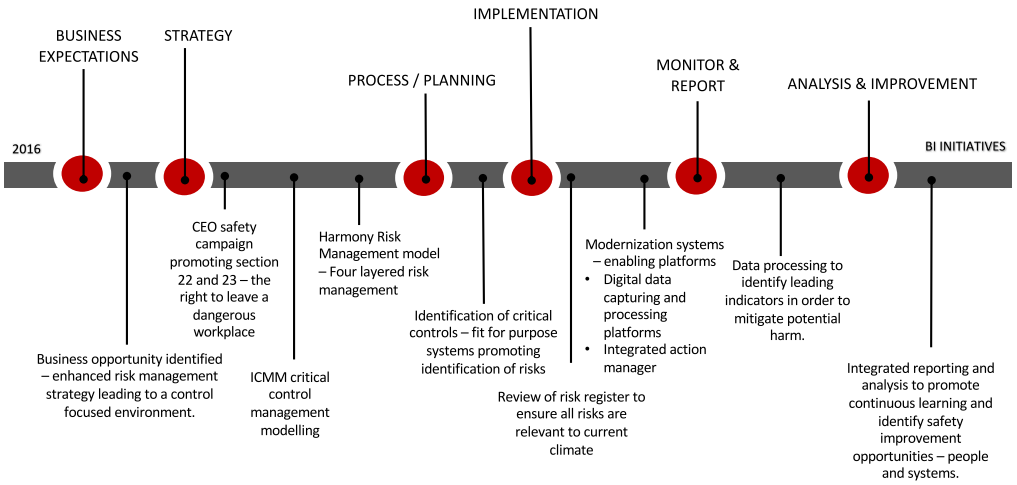
The Four-Layer Risk Management Approach underpins the framework of the system.



The Four-Layer Risk Management Approach consists of a detailed Risk Management Model with tools provided at every layer to ensure Accurate and Reliable Data at all levels of work.

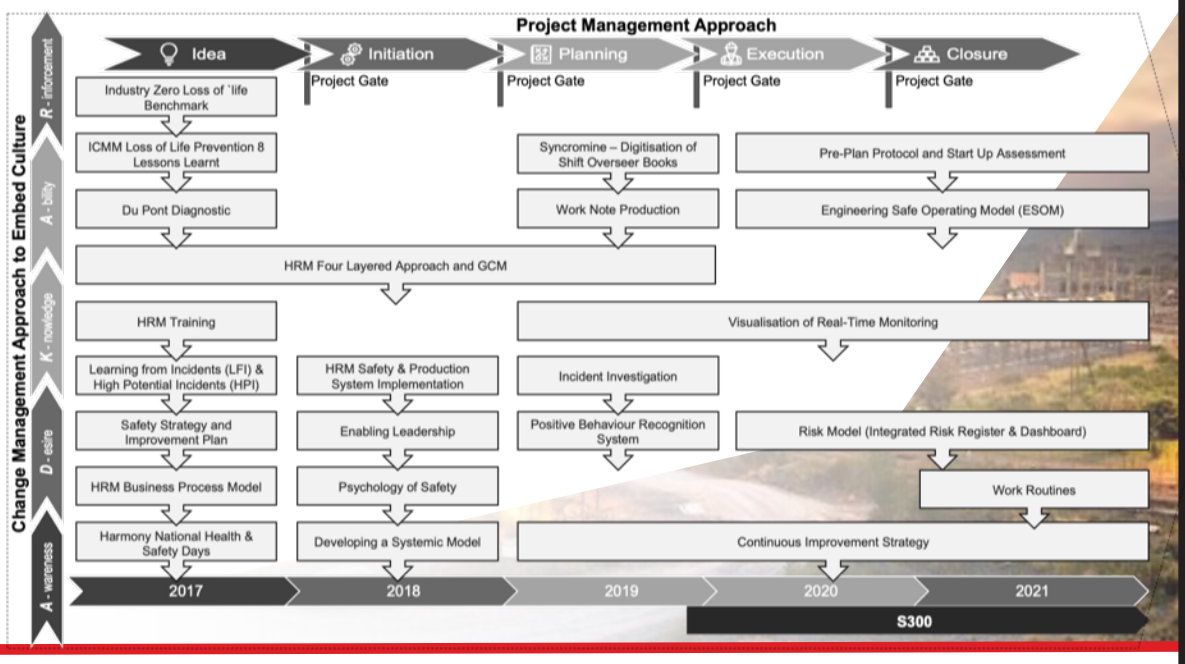
Starting the Journey - 2016 - 2021

The HRM Journey started in 2016 and is a continuous movement towards Harmony being the leaders in building a Zero Harm Mine which is profitable and sustainable within a Dynamic Mining Industry.



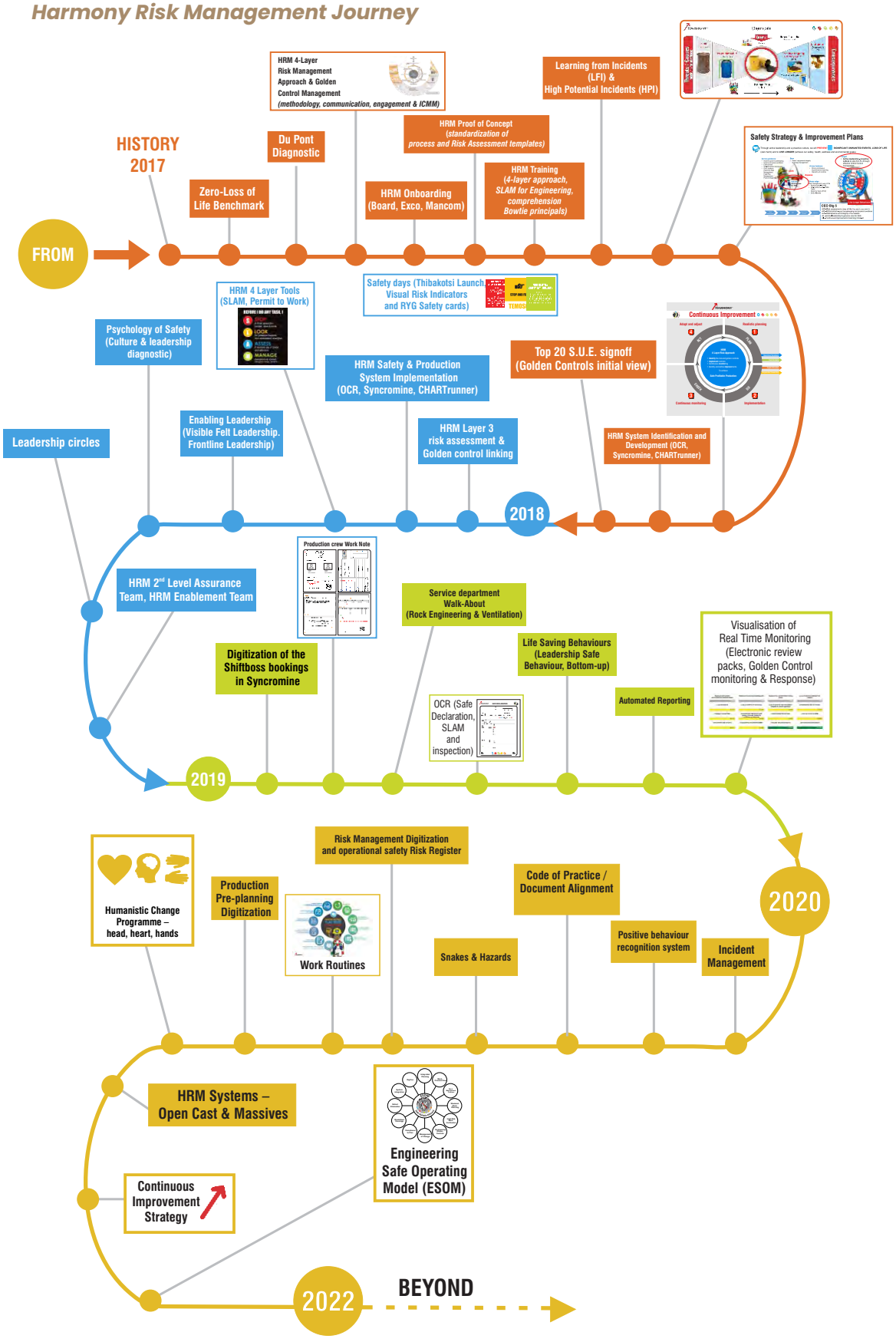
It is essential to understand that all the HRM processes are integrated into a system that uses a structured approach to Project Management, ensuring each aspect is incorporated into the Harmony policies, Procedures, and rules of Business. In addition, the significant scale of the change regarding systems and concepts also requires a robust Change Management approach to provide the necessary assistance to the people to adapt, adjust and adopt the new way of doing things in Harmony. The framework provides the structure for the document below and will ensure that the concepts are discussed in this context.

Harmony Risk Management Integrated Framework



The story of HRM and its milestones is depicted below, with a more detailed description making up the body of this document.

Harmony Risk Management Journey



SECTION 2

INDUSTRY ZERO
LOSS OF LIFE BENCHMARK

The Miner in the HRM team!!! I am passionate about mining and take great pride in working in the HRM team.

"Teamwork makes the dreamwork" is a phrase you've probably heard, but sometimes it's elusive. If you've ever worked in a team that really clicks, you'll know how true it is. The HRM team are a high functioning team that achieve incredible results – not just incrementally better, but perhaps 10x those of an average team. But more than that, a great team is a pleasure to work with. In fact, work becomes motivating, fun and incredibly rewarding when you're surrounded by a dream-team.

The HRM team specializes in risk management and new technology and legacy systems integration and have demonstrated over the last four years that this can be achieved .
" Planned work is safe work " is one of our slogans which is close to my heart, this ensure that all work are properly planned and that the outcome is safe production.

Please remember that The most important thing coming out of the Mine is the Miner.

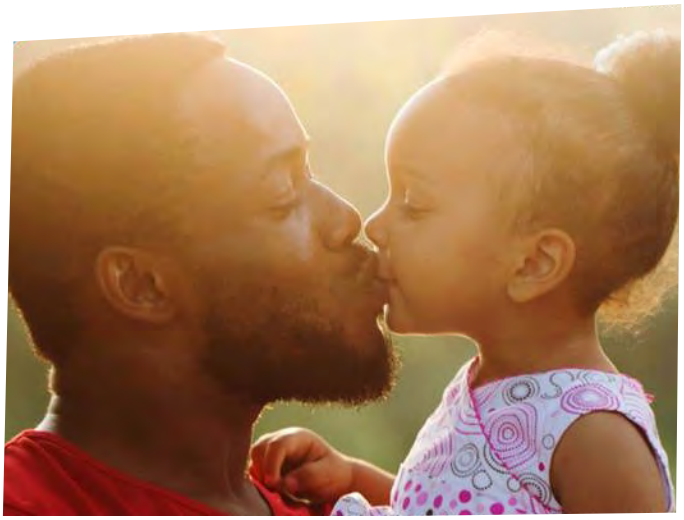
Chris Janse van Rensburg

SECTION 2

INDUSTRY ZERO LOSS OF LIFE BENCHMARK

In 2016 the mining industry and Harmony committed to a Zero-Loss of Life Benchmark. As a highly industrialised industry, deep-level mining employees are exposed to a magnitude of hazards that have the potential to cause harm. What is critical is to learn from the past to achieve a zero-harm; what do we know, how can we change it, and if we cannot change it, how do we manage it?

The International Council on Mining and Metals (ICMM) published a Loss of life Prevention document with insights and learnings from ICMM members and mining houses to support the Zero-Loss of Life Benchmark. The paper focuses on lessons learnt across the industry. This publication encompasses the cultural, organisational and engineering lessons learnt.



A strategic decision was taken that the Harmony Risk Management strategy incorporates some of these categories to ensure best practice. The first step taken in this journey towards achieving the benchmark is redefining what safety means to Harmony.

The next step was the Harmony Risk Management initiation of the Live Longer Strategy. This was launched in the Live Longer Campaign. This drive is to save lives and save mines.

Harmony Gold embarked on a journey of Live Longer, focussing on the following:

- Diagnostic carried out by Du Pont to identify shortfalls within our Risk Management system
- Develop a Risk Management strategy to be adopted across the organisation
- Identify a systemic approach to support the strategy
- Develop a people centered culture of zero harm

Du Pont (External Independent Auditors) Diagnostic

The Harmony Risk Management strategy was further informed by the diagnostic audit carried out by Du Pont. To improve, we first had to look inward to understand what needs to change. In 2016 Du Pont conducted a diagnostic audit at our operations, metallurgy and mining. The audit looked at areas that will dramatically impact the Risk Management system.

The audit inclusions assessed Harmony's operational risk management system. Du Pont found that Harmony was a reactive organization, responding to risks after the consequence had occurred. Du Pont can categorize the consequence as one or more of the following:

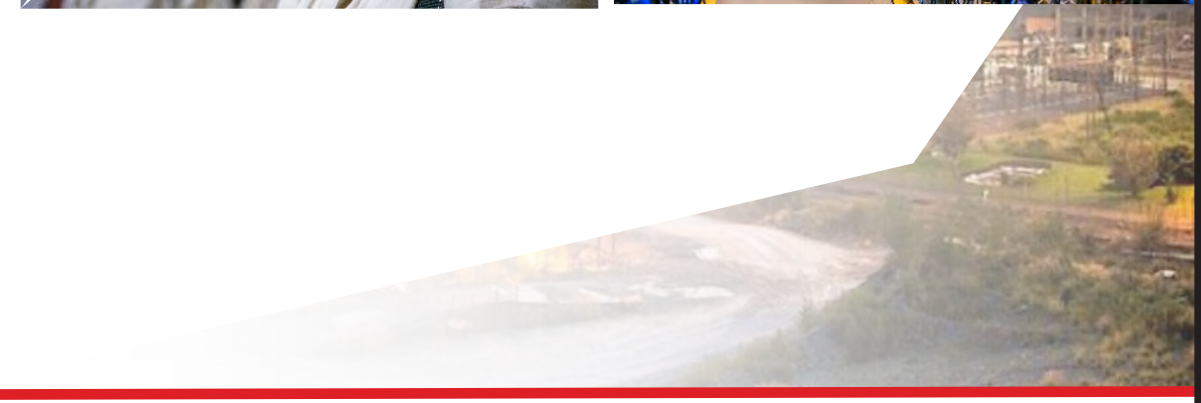
- Social
- Financial
- Reputational
- Safety
- Production loss
- Damage to equipment and/or infrastructure

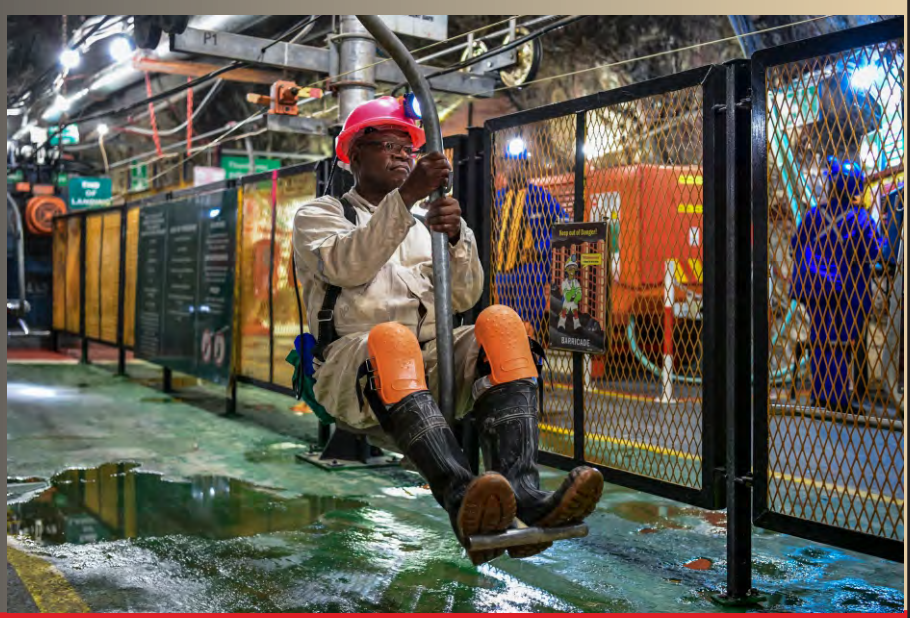
Within Harmony, there was desire and commitment to be proactive; The tools and processes supporting proactive risk management were limited and had to be developed accordingly.

Diagnostic Inclusions

The Du Pont assessment team was tasked to conduct a safety assessment following increased incidents at Harmony's South African operations. Du Pont was tasked to conduct a holistic evaluation of a sample set of deep-level mining and metallurgical operations. The assessments were structured to cover three dimensions.

- Culture, leadership, and Governance
- Recognizing and mitigating risks
- Management of continuous improvement





SECTION 3

CRITICAL CONTROL MANAGEMENT STRATEGY

Since joining Harmony in 2018 and being part of the HRM team from the start I have always felt supported. As a team we can lean on each other and trust each other, we help each other grow.

I am a firm believer in the critical requirement for innovation, innovation is imperative to achieve continuous improvement and achieving our goal of S300.

This team is the most innovative group of people I have ever had the pleasure of working with. There is no limit, if we can dream it we can do it.

I am passionate about Risk Management and believe whole heartedly that what we do as a team has made a difference and will continue to create change.

Kristin janse van Rensburg

SECTION 3

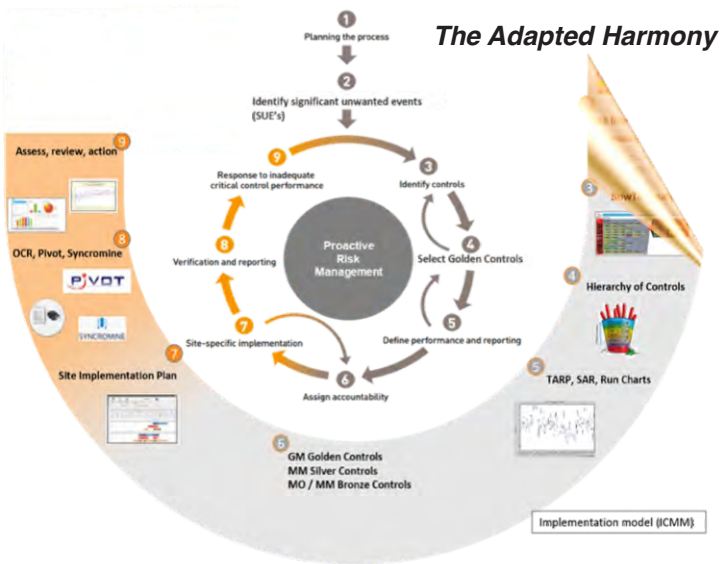
CRITICAL CONTROL MANAGEMENT STRATEGY

It was evident from the diagnostic audit findings that a clearly defined and targeted work management strategy had to be developed and implemented within Harmony. The first step was to engage with Harmony role players in a direct and impactful manner that would speak to their heads and their hearts. Live Longer was the first step in the Harmony risk management change strategy. Everyone within Harmony drove the campaign. The objective was to address the practice of allowing sub-standard conditions and allowing work to continue without the required controls.

"I Live Longer, my company Lives Longer, I go home to my family after work, I have a livelihood."

In conjunction with Live Longer, Harmony adopted a 4- layer Risk Management as the Risk Management strategy.

The Adapted Harmony ICMM Process



The ICMM principle was adopted and adapted to support the 4-Layer Risk Management strategy. This process was implemented at all Harmony operations and forms part of the 4-Layer Risk Management process base. Harmony Gold's primary objective is to prevent Significant Unwanted Events that lead to loss of lives and major losses. The 4-Layer Risk Management process identifies Significant Unwanted Events (S.U.E.) and the Critical Controls that must be in place and effective in preventing the Significant Unwanted Events.

SECTION 4

SAFETY STRATEGY AND IMPROVEMENT PLAN

The members of the HRM team feed off the shared desire to eliminate harm in the workplace.

Working among individuals with a common goal not only fills me with a sense of belonging, but also awakens a feeling of pride.

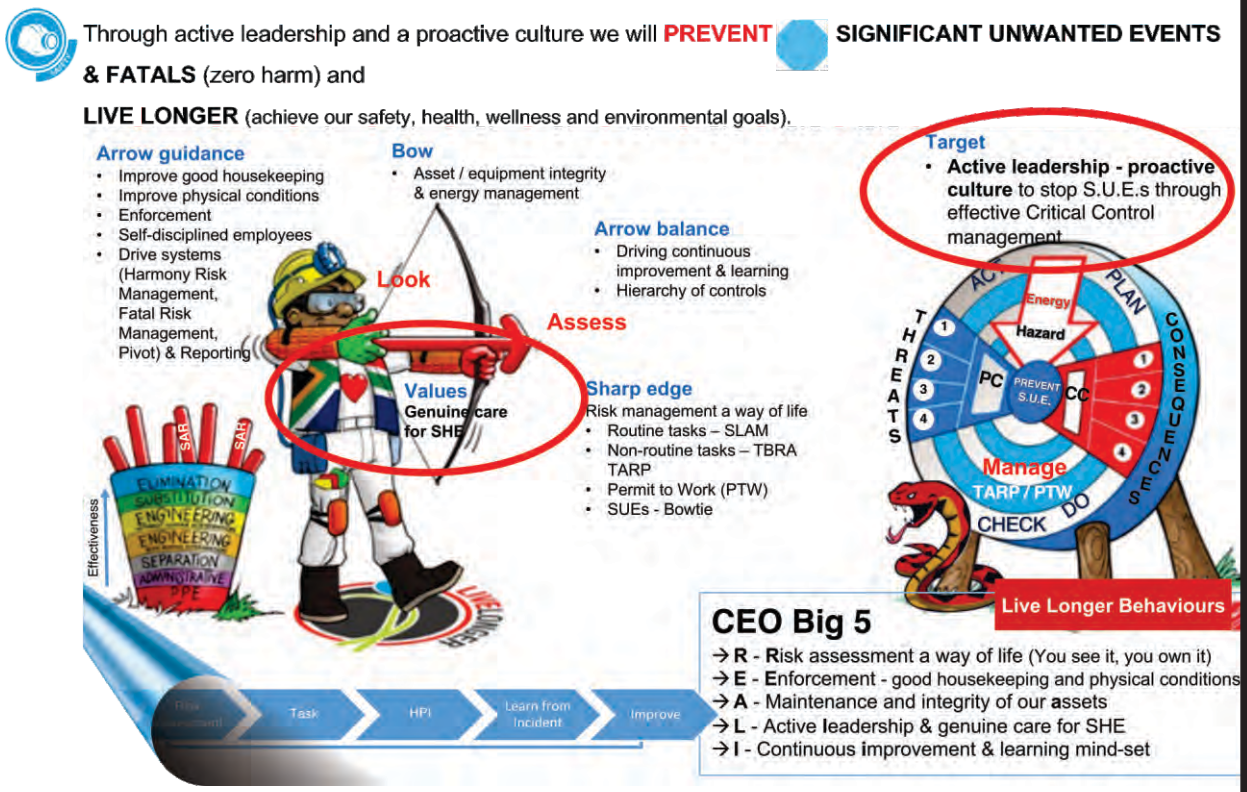
After many a year in the mining industry I have finally found my home away from home.

Maxie Wilkens

SECTION 4

SAFETY STRATEGY AND IMPROVEMENT PLAN

The Harmony Risk Management journey commenced in 2018 when Harmony embarked on benchmarking best in class safety practices in the mining industry. Based on these practices, it was decided to implement a four-Layer Risk management approach, underpinned and supported by what is now known as the Harmony Safety Strategy.

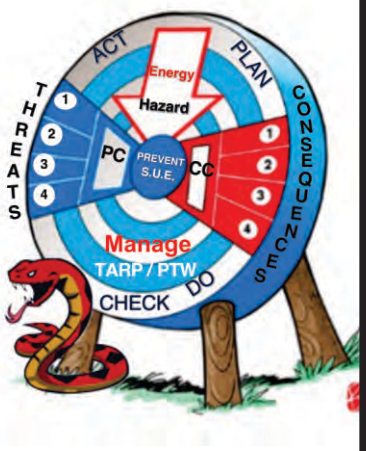


The ethos of the Harmony risk management strategy conveys the message that through active leadership and proactive culture, we will prevent Significant Unwanted Events and Loss of Lives (zero harm) and Live Longer (achieve our safety, health, wellness and environmental goals).

The main objectives are clear:

- Create energy towards proactive management of our risks
- Create a culture of continuous learning and care;
- Build in-house capacity and capability to make this more than an "initiative."

The representation of the Harmony safety strategy is encapsulated in a simple and easy to understand illustration:



The target is clear – **prevent Significant Unwanted Events (S.U.E's)**. The way that we will achieve this is through active leadership and implementing critical control management. The bowtie represents critical Control Management on the target. The bowtie forces us to understand the golden controls that will prevent a significant unwanted event that might be lurking in unseen places, much like a snake waiting to deliver a strike.

It is important to note that the bow and arrow convey the concept of "energy". We need to manage the energy associated with the different hazards. The sharp edge of the arrow represents **RISK MANAGEMENT.** Risk management is a way of life in Harmony – before we commence with any task, we **STOP, LOOK, ASSESS** and **MANAGE** (SLAM).

The quiver of arrows symbolises the **"hierarchy of control"**, and each arrow refers to control effectiveness. Is the control survivable? Is the control available? Is the control reliable? – this is also referred to as SAR. The balance of the arrow represents our focus on **"learning from incidents"** and continuous improvement. Without proper "guidance", an arrow will never hit its target.

Similarly, we need appropriate enablement systems, self-disciplined employees, good housekeeping and physical conditions to achieve our goal to prevent **S.U.E's**.

Finally, the bow also reminds us of the importance of optimally managing our assets and equipment.

In our safety strategy, we must never forget our most important asset, people.

The Harmony Safety mascot, Thibakotsi, represents every Harmony employee and serves as a constant reminder of the role we need to play to **"prevent accidents**" – which is also the meaning of the name Thibakotsi. The heart of Thibakotsi reminds us of genuine care for ourselves and our colleagues. It is essential to understand that the most critical link in safety is the 30cm between the head to the heart. It is the shift from

"I follow the rules because I have to" to "I follow the rules because I want to".

Thibakotsi is also wearing his PPE and has his **RED, YELLOW** and **GREEN** cards in his pocket to indicate safe or unsafe behaviour.

The safety strategy comprises of five key focus areas, also better known as the CEO big 5:

- Risk Management – risk assessment should be a way of life.
- Asset Management – maintenance and integrity of our assets.
- Enforcement – self-disciplined employees and enablement systems.
- Improvement – continuous improvement and learning mindset.
- Leadership and Culture – active leadership and genuine care for safety, health and the environment.

The journey of Harmony Risk Management has to become a way of life, where we integrate the HRM with all of our operational processes to produce safe, profitable production to save mines and save lives.

SECTION 5

THE FOUR LAYER RISK MANAGEMENT STRATEGY

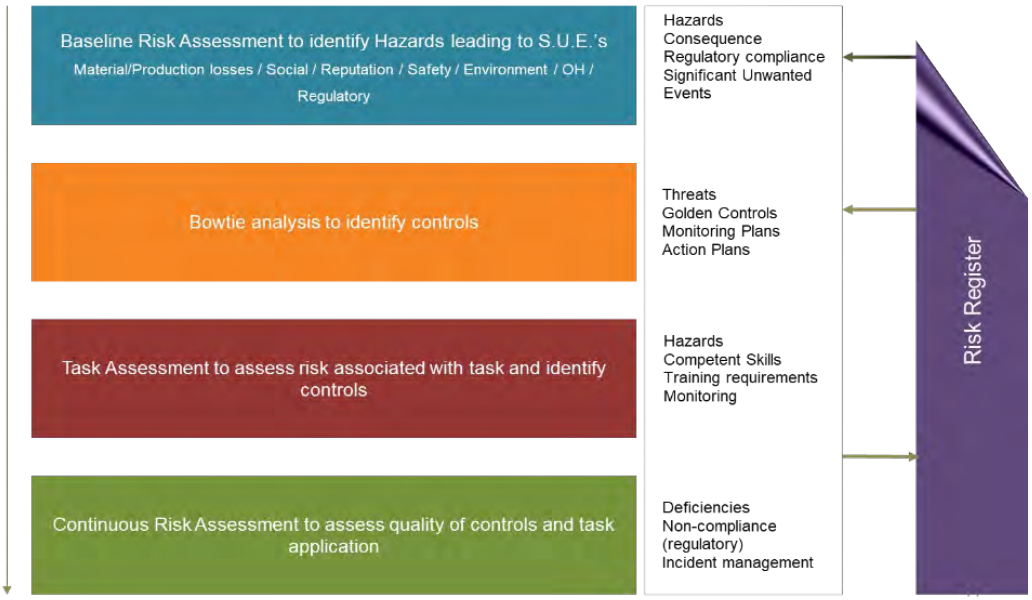
I am happy from the inside out, and from the outside in, when we can do something with an amazing team to save jobs and lives.

Koos de Swardt

SECTION 5

THE FOUR LAYER RISK STRATEGY

The 4-Layer Risk Management strategy is deeply embedded in the business process. The layered approach enables the identification of risk in the business processes and identifying, implementing and continuously monitoring the mitigating critical controls.



Baseline Risk Assessment

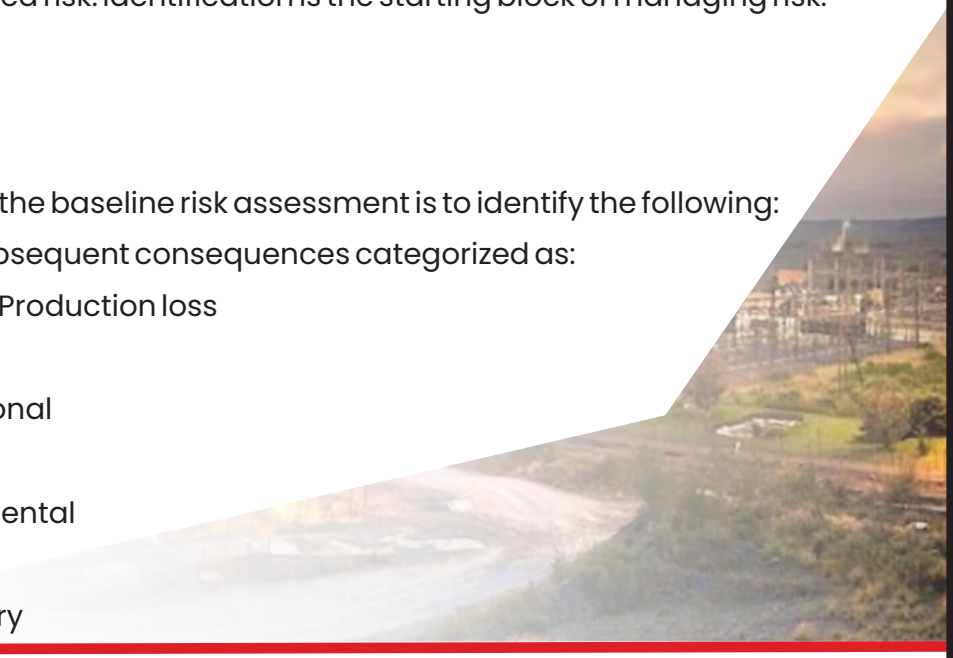
Purpose

To look across the entire organization or operation, identify the potential hazards and Significant Unwanted Events and understand the associated risk. Identification is the starting block of managing risk.

Outcome

The outcome of the baseline risk assessment is to identify the following:

- Risks and subsequent consequences categorized as:
  - Material/Production loss
  - Social
  - Reputational
  - Safety
  - Environmental
  - OH
  - Regulatory



- Energies and hazards leading to unwanted events
- Significant Unwanted Events related to a process, discipline, activity
- Initial existing controls in place to mitigate the risks

The baseline risk assessment is done once at the start of an operation or new process and updated as follows:

- In the event of a significant loss (loss of life or major infrastructure damage)
- New process at the operation
- New area at the operation
- New legislative requirement
- After two years have lapsed

The baseline owner is the General Manager of the operation; the Safety Department tracks the requirement for review.

Issue Based Risk Assessment / Bowtie Analysis

Purpose

The Bowtie risk assessment is a tool that analyses the threats that lead to Significant Unwanted Events and is used to identify controls to mitigate risk.

Outcome

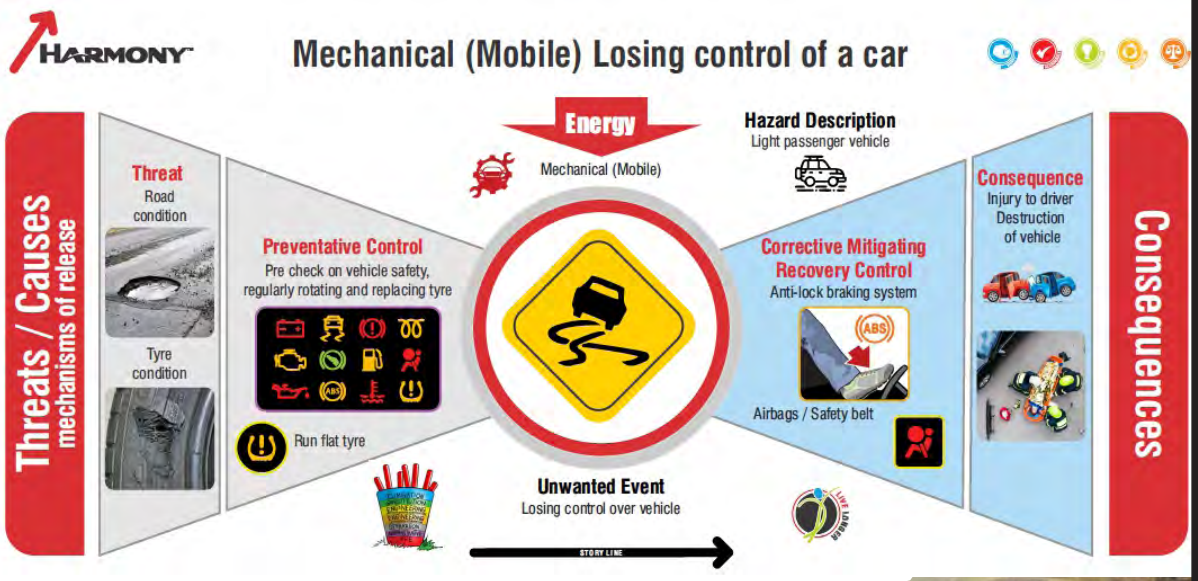
The outcome of the baseline risk assessment is to identify the following: Threats leading to energy interacting with the hazard causing the Significant Unwanted Event

- Consequences should the Significant Unwanted Event occur
- Preventative controls to mitigate the Significant unwanted event
- Corrective controls to minimize or eliminate the consequence should the Significant Unwanted Event occur.

The primary outcome of the Bowtie analysis is the identification of Golden Controls and their application. As a part of the foundation of the Harmony Safety strategy, golden control management is integral to the Harmony Risk Management process. It focuses on identifying the critical controls to prevent catastrophic events that could lead to a loss of life.

Frequency

The Bowtie analysis is conducted once the Baseline risk assessment has been completed and the Significant Unwanted Events have been identified. The investigator performs additional analysis on the occurrence or identification of a major threat or when a new control is identified. Golden controls are reviewed when it is evident that their efficacy is no longer consistent with the required control responses.



The primary outcome of the Bowtie analysis is to identify the golden controls and ensure effective monitoring and reporting plans are identified and actioned.

Task Assessment

Purpose

The task-based assessment is a tool that analyses the risk associated with conducting specific tasks. The task-based assessment is a detailed process that looks at each step in performing the task and identifies mitigating controls to complete the task safely and productively.

Outcome

The outcome of the task-based assessment is to identify the following:

- Regulatory governance of the task
- Competent skills required to perform the task
- Step by step detail of how to perform the task
- Step level risk analysis and identifying mitigating controls
- Task documents to ensure that all aspects of the task (e.g. training, coaching, assessments) are relevant and the most recent version.

Task documents include:

- Training guidelines
- Procedures
- Risk assessments
- Continuous assessments (PTO/PI/PUI)

Frequency

The Bowtie analysis is conducted once the Baseline risk assessment has been completed and the Significant Unwanted Events have been identified. The investigator performs additional analysis on the occurrence or identification of a major threat or when a new control is identified. Golden controls are reviewed when it is evident that their efficacy is no longer consistent with the required control responses.

Continuous Risk Assessment

Purpose

The continuous risk assessment is a tool that measures and monitors the quality of work being conducted, physical conditions of the environment in which work is undertaken and assesses the continued competency of the persons conducting work.

Outcome

The outcome of the continuous risk assessment is to monitor and measure the following:

- Regulatory compliance
- Specified work conducted to standard
- Group compliance
- Competency of persons performing tasks
- Physical conditions of the environment in which work is conducted

The primary outcome is the measuring of Golden Controls that mitigate Significant Unwanted Events (SUE's) and their subsequent consequences.


TBL812

SECTION 6

CRITICAL CONTROL MANAGEMENT

Harmony Risk Management is a proud Harmony product, by Harmony, for Harmony. With the values so deeply entrenched in our everyday work, one cannot help but feel CONNECTED and a true sense of ACHIEVEMENT.

With HRM, nothing is ever too much, too complex, too big or too bold. Driven with purpose for true care and heart-felt leadership, striving to make a difference in every Harmonite's life and ensuring everyone can spend time with their loved ones, that is the true goal and purpose of the HRM team. Team work truly makes the dream work.

Senator Cory Brooker quoted an African saying when he said "If you want to go fast, go alone; but if you want to go far, go together".

Dwaine Botha

SECTION 6
CRITICAL CONTROL MANAGEMENT

Harmony's critical control management system identifies potential significant unwanted events and mitigating controls. Within the Harmony critical control management system, critical controls are categorized into three categories:

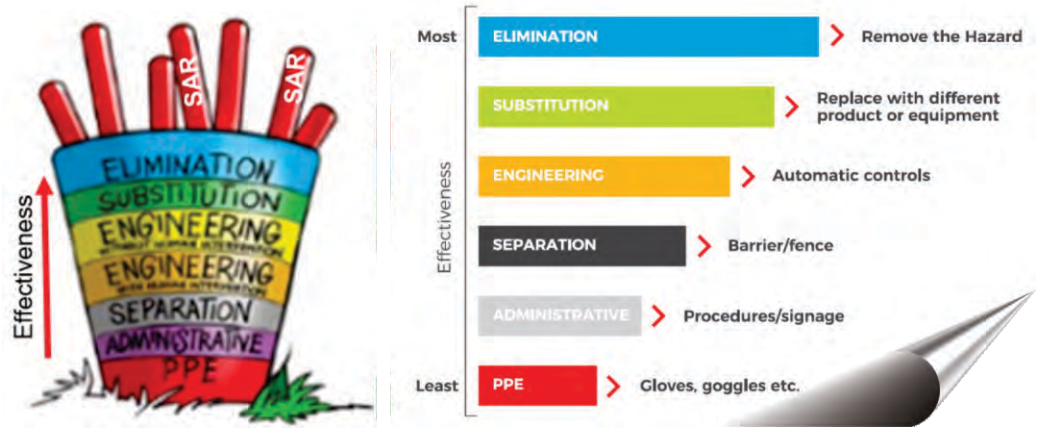
- Golden controls
- Silver controls
- Bronze controls

Each control type has a response and management and supervisory accountability specification. For example, golden controls are the accountability of senior management, i.e. General Manager, Senior Engineer. Silver controls are the accountability of Mine and Mining Managers, Shaft Engineers, Metallurgists. Bronze controls are the accountability of Line Management, Mine Overseer, Forman.

By saying that the controls are the accountability of various levels, the Operational Management will delegate the responsibility according to the operations hazard management process. Operational supervisors will ultimately be assigned the responsibility of taking action to repair, replace, put in place when a control failure occurs.

When a golden control is not in place or not working effectively, it is too dangerous to continue. The absence of the Golden Control is the crucial factor to critical control management; different operational levels understand golden controls in different terminology; golden control, NoGo, non-negotiable.

Controls are classified according to the effectiveness of the control and the survivability, availability, reliability (S.A.R. rating).



HRM Training - Risk Management Training

Risk Management training and engagement is a critical part of embedding the strategy. Initial training on its own will not allow for sustainability. Harmony understands the crucial need for continuous training and engagement and the positive impact it has on sustainability.

Harmony Risk management has incorporated risk management training for all levels focusing on tools and processes to ensure all Harmony employees are equipped to manage risk in their area of responsibility. The Functional and critical task inventories measure individual exposure of employees to the Significant Unwanted Events. Once the critical tasks are identified, additional risk is assessed using the Task-Based Risk Assessment procedure.

Using the Task-Based Procedures makes it possible to identify procedures that are not in place and develop them as per the Risks identified. These Task-Based Procedures are the framework for the Planned task observations (PTO's) and the training for the Tasks is aligned to these PTO's. the alignment is part of the Four-layer approach and ensures that Individual tasks are incorporated and aligned to Risk Management System and the training is identified for each task.

SECTION 7

HARMONY RISK MANAGEMENT BUSINESS PROCESS MODEL

The HRM team is not just a team to me ,it is a family, a family caring not only for each other but for others, others being each and every Harmonite and the well and safe being of all.

To me ,it is being part of this family that I value and that decisions made within this HRM family is made with passion, dedication and togetherness with one mission in mind. The mission is to take each Harmonite home safely after each shift and keeping Harmonites in secure work environments.

I personally appreciate and feel the "CARING FOR ALL" value within the team.

Paul Du Plessis

SECTION 7

HARMONY RISK MANAGEMENT BUSINESS PROCESS MODEL

After introducing a formalized 4-layer risk management process, Harmony focused efforts on defining the specified process model to be adopted. The model was based on the Deming circle of Plan, Do, Check, Act (PDCA). The Process Model is the framework to improve efficiencies, improve incident management and reduce variation to strive towards operational excellence continuously.

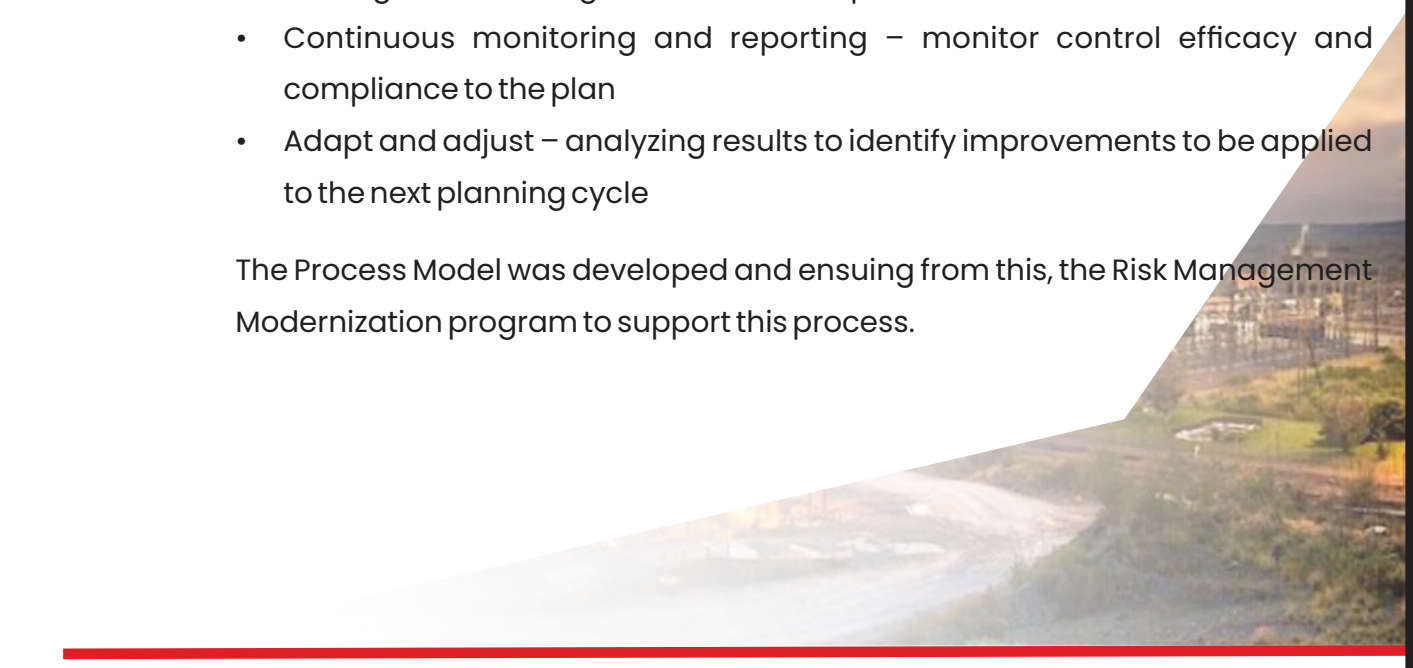
A holistic risk-based approach is required to identify all hazards and risks before the commencement of work to eradicate uncontrolled events.

The model focuses on eradicating uncontrolled events that have a high potential of causing incidents and preventing production. A holistic risk-based approach is required to identify all hazards and risks before the commencement of work to eradicate uncontrolled events. The process ensures that comprehensive task training and assessment are conducted, and deficiencies are identified and corrected, where reasonably practical, before and during the commencement of work.

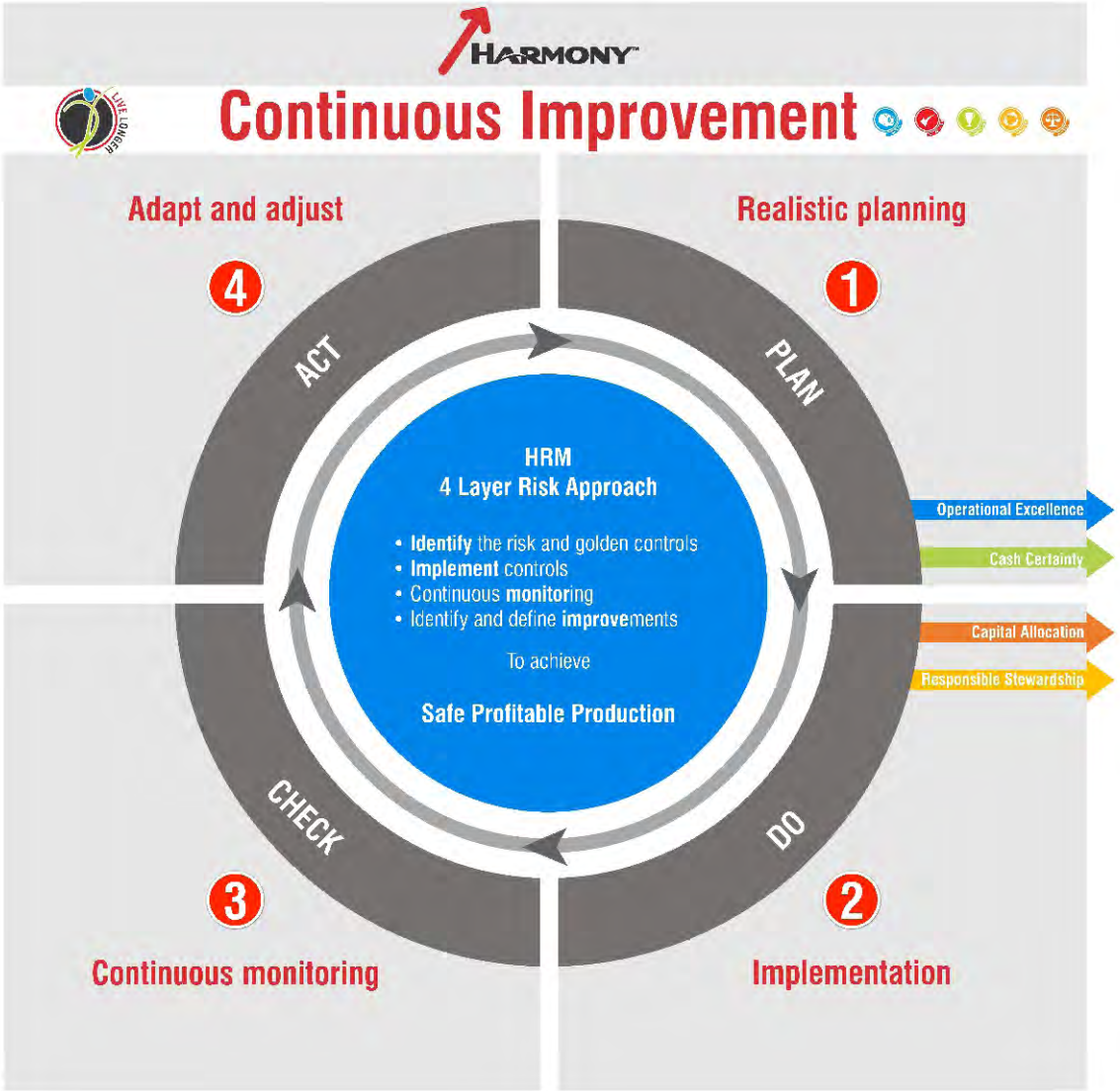
The model focuses on the following:

- Realistic planning - ensuring that we plan work and mitigate the risks identified
- Implementation – implementing the plan and applying the risk management strategies to ensure safe production
- Continuous monitoring and reporting – monitor control efficacy and compliance to the plan
- Adapt and adjust – analyzing results to identify improvements to be applied to the next planning cycle

The Process Model was developed and ensuing from this, the Risk Management Modernization program to support this process.



Harmony Risk Management Business Model



I only recently joined this Team and what a privilege and honour it is to be part of this family who leads by example and lives Harmony's values making the difference every day to achieve operational excellence.

I'm proud to be part of this family who cares enough to do whatever it takes to ensure that every Harmonite goes home safely after each shift having the opportunity to spend time with their loved ones and to give back to their communities. I can't thank Paul enough for this life changing opportunity to be part of this exceptional team

Clement le Gras

SECTION 8

DEVELOPING A SYSTEMIC MODEL - PRODUCTION

Great to be part of a well-integrated, high-performance team that passionately drives toward zero harm.

I see my role as one of the "Bomb Squad" impact players improving engineering risk management the Engineering Safe Operating Model.

Jacques Fourie

SECTION 8
DEVELOPING A SYSTEMIC MODEL - PRODUCTION

It was clear that a contributing factor to the reactive nature of decisions within the workplace was the lack of critical information to make proactive decisions. This lack of critical information led to the assessment of the current available systems; what is available and what is required to support the Harmony risk management strategy?

The assessment identified critical areas that required improvement by developing a digital platform. The platform consists of the following systems being embedded into the Harmony Short-Medium and Long-Term Risk Management:

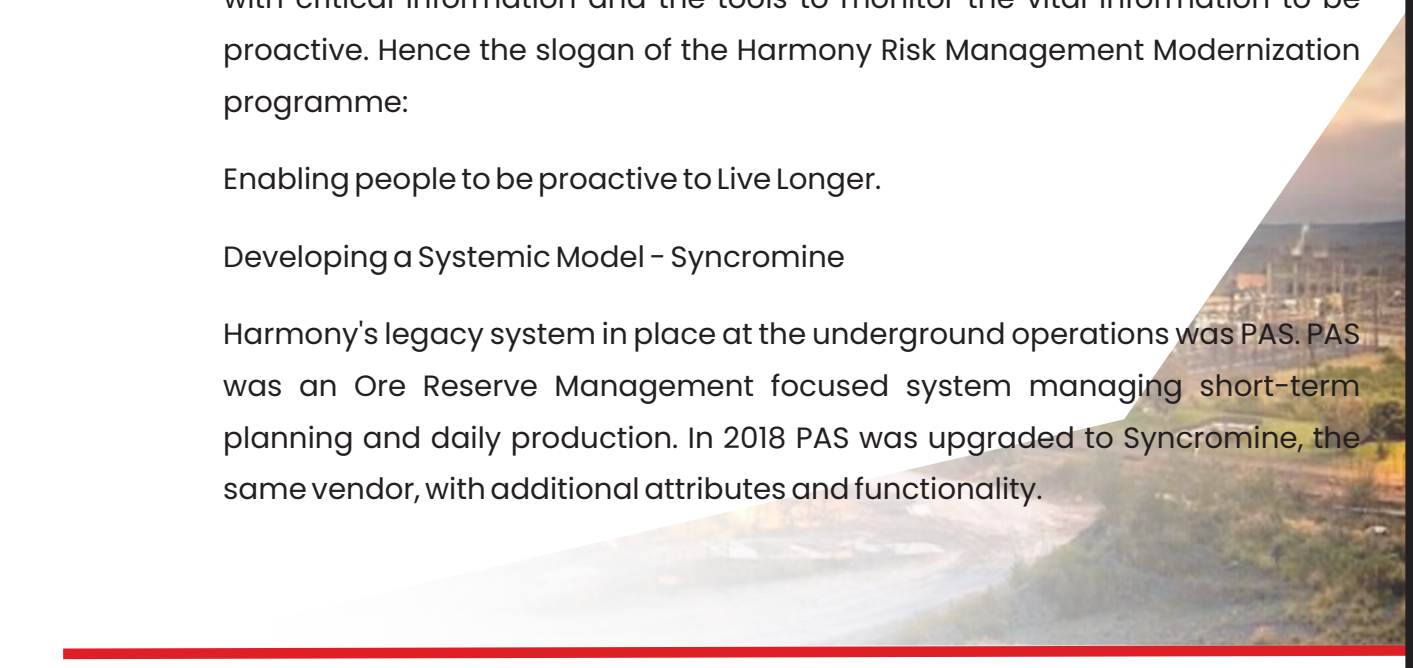
- Production planning, booking and reporting – PAS upgrade to Syncromine
- Supporting services (Rock Engineering, Ventilation) audit data - Moving Ventilation and Rock Engineering legal inspections into Syncromine
- Continuous risk assessment and control monitoring and reporting platforms to measure the efficacy of controls and compliance to standards – OCR Scanning
- Action management in all areas; not only Occupational Health and Safety – Integrated Action Manager
- Measuring key processing indicators overtime against the required performance – Automated Reporting & CHARTrunner

To be proactive, Harmony needs to provide decision-makers and employees with critical information and the tools to monitor the vital information to be proactive. Hence the slogan of the Harmony Risk Management Modernization programme:

Enabling people to be proactive to Live Longer.

Developing a Systemic Model - Syncromine

Harmony's legacy system in place at the underground operations was PAS. PAS was an Ore Reserve Management focused system managing short-term planning and daily production. In 2018 PAS was upgraded to Syncromine, the same vendor, with additional attributes and functionality.



The vision was to plan and monitor risks within the production environment and focus on achieving production targets safely.

Syncromine incorporated multi-disciplinary requirements to provide a holistic approach to tracking safe production. Part in parcel of this was:

- Ore Reserve Management short-term planning
- Production daily bookings, including issues limiting or hindering safe production (lost blasts and problems)
- Rock Engineering weekly walkabouts
- Ventilation weekly walkabouts
- Seismic data interface
- Daily planned production work notes to provide crews with critical information regarding the workplace being mined

Developing a Systemic Model - Planning

Deep Level mining is an environment where every person needs to know what work needs to be done, when that work must be done and to what standard that work must be done. The accountability and consequences of not complying with standards must be clear and must be applied consistently. In a high-risk environment, such as mining, not working to standard could result in significant loss and even loss of life.

Planning Process Long term (Budget Planning)

Introduction

To be proactive, Harmony needs to provide decision-makers and employees with critical information and tools. "Within the Mining framework, the business plan process to set strategy is incorporated into various time frames and managerial routines. This practice is executed as per the rules set by the business and over different planning periods.

"To be proactive, Harmony needs to provide decision-makers and employees with critical information and tools."

The annual Business plan, which plays a crucial role within the Business Process, will be the primary focal point; this plan is created annually by the Operation using an 18 months' production-minimum window and is, in most cases, reviewed every six months (Rolling Plan).

The plan is established using the current environment as guidance and taking certain business assumptions and 'top–down' goals into consideration during the process.

Accountable management role holders schedule defined managerial routines and service providers to review and scrutinize the plan until the confidence levels in the achievability of the plan the business expectations are met or, if not achievable, reviewed. Vital to this is the recognition of all risks that may play a role in not achieving the required outcomes.

There is a range of objectives with regards to the setting of the Annual Business plan and the 30-month reviewing period.

- Forecast production outcomes such as:
  - Gold Output (Au)
  - Unit Output (M & M2)
  - Mining Sequence
  - Set Budget overviews, i.e. Labour and economic value
- Establishing a baseline with regards to production expectations and ensuring a measuring point at any given time
- Reviewing the feasibility of the business expectations contrasted with business capability
- Setting clear and transparent business expectations for all the business role holders ensuring that what, when and why are incorporated into their key performance measures
- Ensuring that the plan creation is within the business capability guideline such as service, labour and equipment capability

The Business Plan requires the input of all disciplines so that all factors that may impact the execution thereof, such as mine design and service capability, are addressed and incorporated into the mining sequence. Considering historical information is critical to ensuring that the plan is always within acceptable confidence parameters. Unless a design, strategy, resourcing, or management change is made, the assumption that a 'step-up' in achieving additional output expectations will not be feasible.

Setting the Business Plan

Setting the Business Plan is an annually scheduled task on all the operations. However, it should be noted that should an extensive alteration on business occur before or post the scheduled review date, which has a high impact on the current Business plan, the operations will need to review the plan. The review ensures the plan remains closely aligned to the actual environment or the amended business expectations.

Contributing factors may include:

- Au Grade changes
- Au Selling Price
- Major FOG
- Geological Structure Changes
- Budget Changes
- Design, resourcing, or strategy changes

Setting the Business Plan calendar has several prerequisite requirements that need to be determined before the Operational Management calendar is set; these prerequisites include:

- Which disciplines will be required to assist with the planning, i.e. Ore Reserve Management, Mine Overseer, Mine & Mining Managers, Rock Engineers, Geologists, Engineering, Costing & Finance, Human Resources with discipline integration such as Stoping, Development and Equipping?

- Any other resource deemed necessary should also participate in process.
- A planning layout of 1:1000 scale (spreadsheet & Mine Plan)
- Information for the plan
- Deadline for completion by Management
- Top-down objectives
- Time studies regarding the discipline combined review, 1:1000 plan creation, plan input to legacy, management review of various scenario options and where necessary the revision and then the actual sign-off.
- Executive target dates

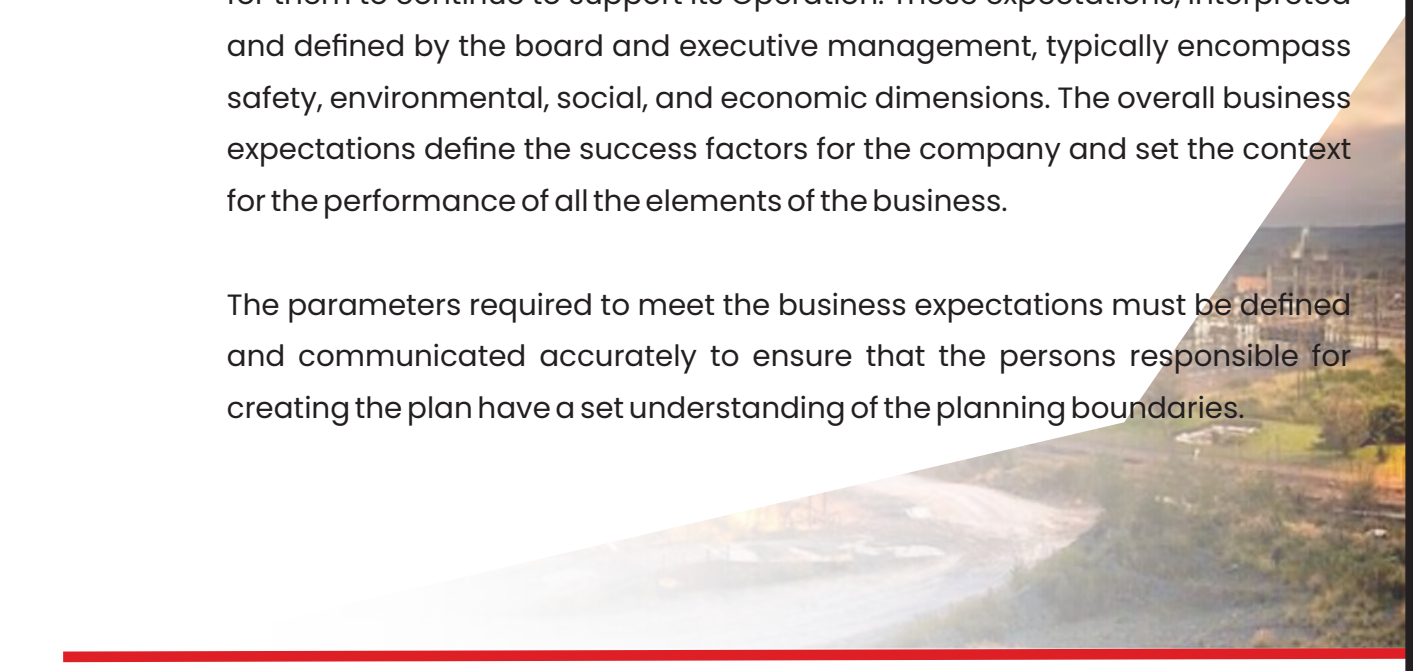
Once all of the above and any additional business requirements have been established, documented and socialized with the various role holders, the actual calendar may be set. The calendar, once signed off by Accountable Managers, is implemented and scheduled accordingly.

Creating the business plan

Each of the tasks allocated in the Business Plan Schedule has key activities and expectations associated with them. Therefore, it is of the utmost importance that each of these activities is executed correctly, and the correct resources are assigned to participate in the planning.

The stakeholders in a business (shareholders, employees, community, and government) collectively define the expectations that the business must meet for them to continue to support its Operation. These expectations, interpreted and defined by the board and executive management, typically encompass safety, environmental, social, and economic dimensions. The overall business expectations define the success factors for the company and set the context for the performance of all the elements of the business.

The parameters required to meet the business expectations must be defined and communicated accurately to ensure that the persons responsible for creating the plan have a set understanding of the planning boundaries.



These parameters should include:

- Output parameters such as M, M2 & Au
- Labour and resources parameters
- Minable Face length flexibility prerequisites
- Minable Grade profiles
- Mining strategy
- Services limitations

Creating the Business Plan - 1: 1000

The actual planning of the 1:1000 plan is the accountability of the Mine Overseer / Mine & Mining Manager (unless otherwise structured by the operations), the Mine Overseer / Mine & Mining Manager will require guidance and specific sets of information from various role holders to ensure that the planning integrity is appropriate, included in this should be:

Mine & Mining Manager

- Clarifying the required business objectives
- Ensuring that all external and internal influences are defined and taken into consideration
- Ensuring that the quality of the planning meets the business expectations
- Making clear all elements that affect the production planning, such as the development and set-up phase that influences the ledging and stoping planning
- Ensuring that the combination of all the sections meets the business expectations

Geologist

- Ensure that the geological influences are correctly portrayed on the plan, which should include faults, dykes, reef intersections and reef rolls and any other entities that are deemed applicable
- Assist the Mine Overseer / Mine & Mining Manager with understanding how to read and approach the various formations and structures

Rock Engineer

- The Rock Engineer plays a crucial role in the planning process specifically the actual planning design. The Operational Management should set the

Mining strategy within specific guidelines and rules, all of which influence the sequencing of events and methodologies in which work is executed.

- The planning should include pillars, leads, and lags, ledging methods, mine design and all other business requirements within the planning rules to ensure that a realistic plan is set.
- Seismicity
- Services – Costing, HR, Engineering, Ventilation & Safety
- The services component is critical to ensure a multi-disciplinary understanding is reached with regards to all the capabilities and constraints such as:
  - Equipment availability
  - Labour availability
  - Critical risks
  - Service availability, i.e., ventilation, compressed air, water, and temperatures
  - Tramming capacity
  - Standard rates

Mine & Mining Manager

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    - Equipment availability
    - Labour availability
    - Critical risks
    - Service availability, i.e., ventilation, compressed air, water, and temperatures
    - Tramming capacity
    - Standard rates

- The Mine Overseer / Mine & Mining Manager should ensure the plan is scheduled to have enough time and resources to execute the task.
- The Shift Overseers are a crucial resource for the Mine Overseer/ Mine & Mining Manager to acquire a clear understanding of the environmental and any other external factors that could influence the execution of the plan.

Historical information must be used when making key decisions such as:

- Average planned face advance
- Average face and end advance per month
- Labour requirements
- Service requirements
- Set-up performance
- Task durations
- Crew performances
- Expenditure
- Schedule compliance
- Operating Master Schedule Compliance
- Lost blast Analysis

Planning Scrutiny Review

The purpose of the Planning Scrutiny Review is to ensure that all the accountable role holders, including the management team, review the proposed Production Strategy, aligning all service, support, and production strategies. The integrated approach ensures that a credible, accurate and achievable plan with a high confidence level is developed. All risks, resource requirements and specific strategies are agreed upon, documented, and planned to ensure the execution of the plan is aligned to them. The Budget & performance reviews are discussed, ensuring alignment, and then signed off in the session by the accountable role holders.

Short Term Planning

Planning is one of the essential tasks in the Operation and involves management, production, and service departments working together towards a common goal, namely, to achieve Operational Excellence.

"Planned Work is Safe Work"

The Monthly Planning Wheel

Developing a Systemic Model - Pre-Plan Protocol and Start Up Assessment

Introduction

Monthly Planning is an integral part of the "day to day" operation of a shaft. Monthly Planning is the "recap" and "rectify" tool in any Mine manager's toolbox of ways to manage their Operation in terms of Risk, Grade, Volume, and profitability. Proper planning and execution will ensure that production targets are met and that the Operation remains profitable and all Risks are identified and actioned.

Service departments must play a proactive role during all planning processes, adding value and eventually ensuring that all risks are identified and mitigated before the plan is executed. Quality planning, with the necessary information from all disciplines, eliminates unnecessary work and confusion.

This Month or Execution (Pre-Planning) Plan is then checked against the Medium Term 6-month plan and the 12-month Business plan.

Pre-Plan Protocol Module (Syncromine)

Purpose

The Pre-Plan protocol provides a tool where Role-players from all disciplines can plan, replacing numerous manual desktop systems. Each facet of the work is planned in a multi-disciplinary planning system for Safety, Work Standards, Resources, Infrastructure, and the Current Environment. Everything is consolidated in one System, which allows risks to be identified, and the necessary mitigating factors or processes are put into place. They are continually measured to ensure their effectiveness is maintained.

The Pre-Plan protocol also provides a platform in which the quality of the work is consistently measured and if it does not comply, is automatically flagged for corrective action. All the Planning is on the System. All the relevant routines ensure that everything is completed in a timeous manner to allow the opportunity to consider all risks, scenarios, and plan for them.

Automating this process will improve the efficiency of pre-planning by pre-populating applicable data related to a planned workplace. Automation also allows for automated action management and approval tracking, thus improving the risk assessment process within pre-planning and ensuring

Additionally, it is a legal requirement that detailed minutes are distributed to employees and filed for review at any stage. The Syncromine Pre-plan Protocol generates reports on all the consolidated and provides these legal requirements with an Audit trail for the database-driven process.

Outcome

The outcome of the pre-plan protocol is to:

- Provide an Automated Pre-planning process, including Safety, Rock Engineering, Ventilation, Geology, Survey, Sampling and Mining (Eng.) departments.
- Provide Automated reporting; A detailed pre-plan report generated from the pre-planning protocol.
- Save Additional documents in the pre-plan protocol module.
- An Action manager integration to track workplace actions identified through various sources and incorporate them in the plan (Integrated Action Manager).
- All Recommendations from multi-disciplinary sources are also captured with a start and end date for action; Syncromine will display the recommendations on the shift boss booking screen for acknowledgement and on the work note layout. (The roll-out of this functionality will follow the pre-plan protocol roll-out)
- To integrate information from the Legacy systems to ensure all parameters and requirements are met for the workplace plan to be approved. This process assists the departments by eliminating the duplication of effort required to recaptured existing data from inputs systems.
- All Post Pre-Plan changes will follow the pre-plan process whereby all departments need to capture all relevant information (Actions, recommendations, comments, etc.) and authorised workplace. This process will ensure that all changes are captured, and all risks are mitigated during the execution process.

Assessment (IBRA Risk Assessment)

Purpose

Harmony has undertaken to automate the Start-up Risk Assessment process required for monthly short-term production planning. The process is automated through a Start-up Risk Assessment module. All working places are required, according to Harmony Standard, to complete a start-up risk assessment. The Start-up is not limited to new working places but also requires working places standing for an extended period.

The outcome of the Start-up Risk Assessment (IBRA Risk Assessment) is to:

- Automate the Startup process, including Safety, Rock Engineering, Ventilation, Geology, Survey, Sampling and Mining (Eng.) departments.
- Automated reporting of detailed startup reports generated from the pre-planning protocol per department and comprehensive report.
- The System also allows for additional documents, actions, and photos to be added to the Risk Assessment and saved in the pre-plan protocol module.
- An Action manager integration to track workplace actions identified through various sources and incorporate them in the plan(Integrated Action Manager).
- All Recommendations from multi-disciplinary sources are also to be captured with a start and end date for action; Syncromine will display the recommendations on the shift boss booking screen for acknowledgement and on the work note layout. (The roll-out of this functionality will follow the pre-plan protocol roll-out)

Developing a Systemic Model - Booking Process for the Shift Boss (Syncromine)

Purpose

Harmony has adopted the process for all production shift bosses to capture their daily activities in Syncromine. For this process to be successful, it is of utmost importance that shift bosses appointed, and accountable for production workplaces capture daily activity, support

distances, sweeping distances, stoping width, temperature, workplace visit, not visited or unsafe. The Shift Boss must also view all actions and honest recommendations (booking screen) daily. Furthermore, shift bosses must ensure that they are booking data against the correct working places mining. The reason for ensuring accurate bookings is to avoid reporting on Mined Not Planned working places.

The outcome of the Start-up Risk Assessment (IBRA Risk Assessment) is to:

- Automate the Startup process, including Safety, Rock Engineering, Ventilation, Geology, Survey, Sampling and Mining (Eng.) departments.
- Automated reporting of detailed startup reports generated from the pre-planning protocol per department and comprehensive report.
- The System also allows for additional documents, actions, and photos to be added to the Risk Assessment and saved in the pre-plan protocol module.
- An Action manager integration to track workplace actions identified through various sources and incorporate them in the plan(Integrated Action Manager).

The purpose of the shift boss bookings module is the following:

- Capturing all planned activities will give the shift boss the ability to book activities that have been raised against the workplace cycles or “Plathond”. These can include the following, sweepings, support, cycle mining, workplace stopped, training etc.
- Lost Blast can also be booked through this process. The Shift Boss can identify and capture the reason for a Lost Blast for the day. The lost blast reasons are shared in the MO daily reports.
- Once a week, the shift bosses are required to captured additional information's regarding water management and pumps available in the panel. Of crucial importance is the monthly reconciliation between planned and actual and forecast production information. Operations must ensure that the shift boss booking is aligned with company rules that allow for 5% under or over-booking daily production results.
- Action manager tracks workplace actions identified through the integrated action manager. The integrated Action Manager also includes actions from Pivot. The Shift Boss acknowledges recommendations through the booking screen. Unless there is such an acknowledgement, the system will not allow the Shift Boss to book that day's production.

SECTION 9

DEVELOPING A SYSTEMIC MODEL WORK NOTE PRODUCTION

The whole mining industry has become a family to me, and I am extremely privileged and proud that my job is to keep my family safe.

Tiaan de Bruin

SECTION 9

DEVELOPING A SYSTEMIC MODEL – WORK NOTE PRODUCTION

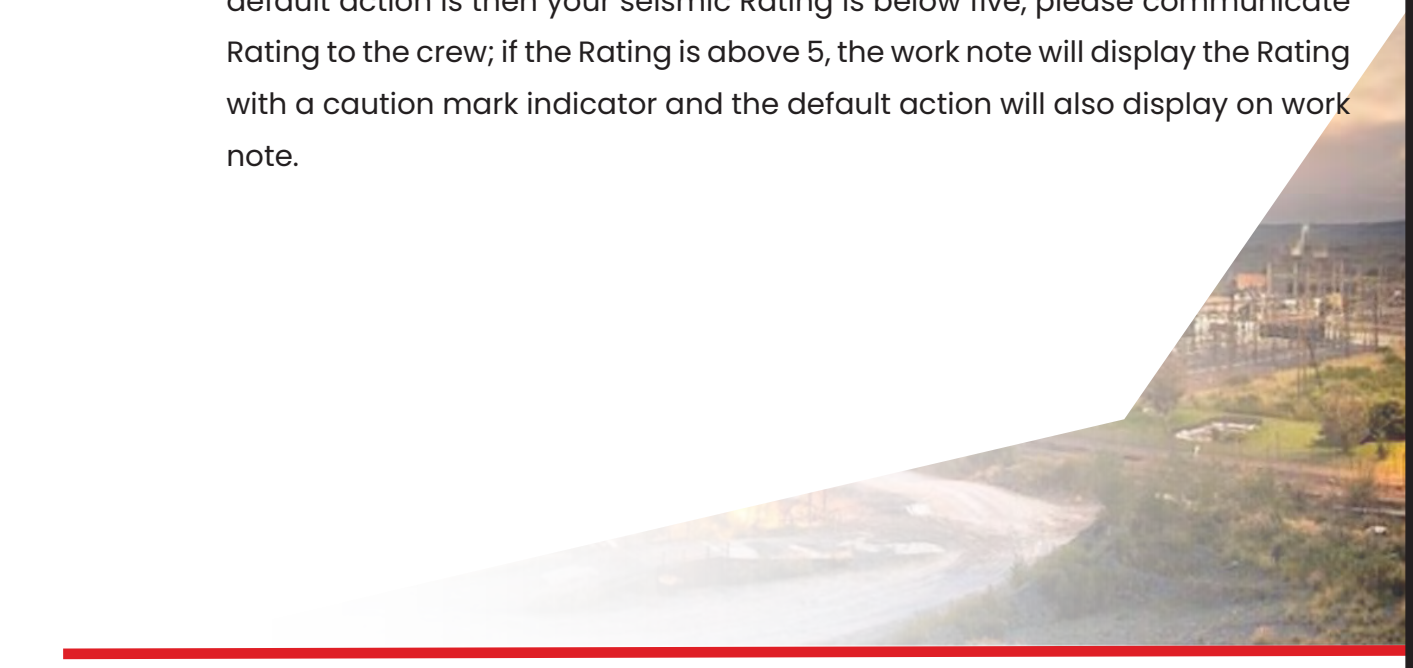
Introduction (Syncromine)

The work note is a tool developed by Harmony Risk Management to ensure that all critical information and golden controls are flagged and reported to the underground crew daily. The work note is an output of various modules and tools where essential information is sources or captured, and data is then shared through the work note. Information is collected and updated as soon as it is captured and various other platforms and systems and are then displayed on the work not.

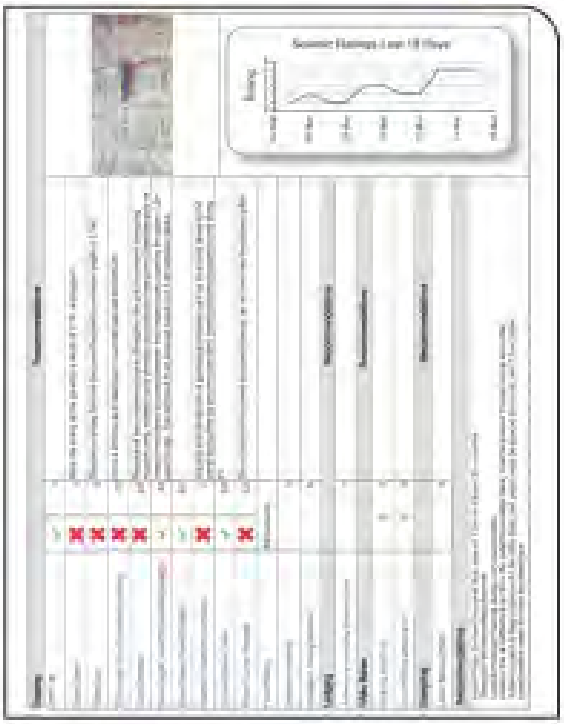
The work note is like a "Weather Report" for the underground production crews, whereby they will receive operational information critical to them before entering the workplace. The work note will start the journey of building a culture of being proactive.

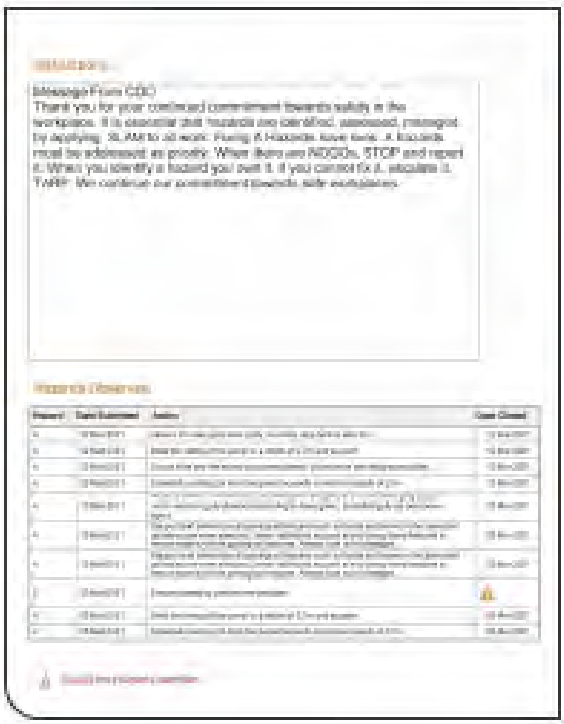
These work notes will be printed at a set time each morning and afternoon before the shift after the latest seismic data is populated. The work notes will be collected at various points or call centre rooms. The work note module in Syncromine can print certain documents, including OCR Checklists, with the work note.

The critical information required daily on the work note is the Seismic Rating; it is updated daily with frequent interfaces from IMS to Syncromine (Work Notes) to ensure it stays current. If the working place rating is below 5, the work notes default action is then your seismic Rating is below five, please communicate Rating to the crew; if the Rating is above 5, the work note will display the Rating with a caution mark indicator and the default action will also display on work note.



MINERS WORK NOTE





What is the Purpose of a Seismic Checklist?

The seismic checklist is a ground control monitoring audit that identifies the potential hazards by checking critical items such as: The workplace, section, date, Shift Boss, Miner, and team member details and with a checklist that involves:

- Travelling, Escape Ways and Raise.
- Gullies and Stope Face
- Stope Panel and Siding
- Strike Gully
- Faults, Dykes and Brows
- Emergency response.

Rock Engineering can make recommendations on the seismic checklist. The Seismic checklist is then signed off and handed back after completion underground for scanning.

When the seismic Rating for a workplace is 6, the work note will communicate the instruction and default action to ensure the crew is aware they cannot enter the workplace and must wait for further instructions from their supervisors.

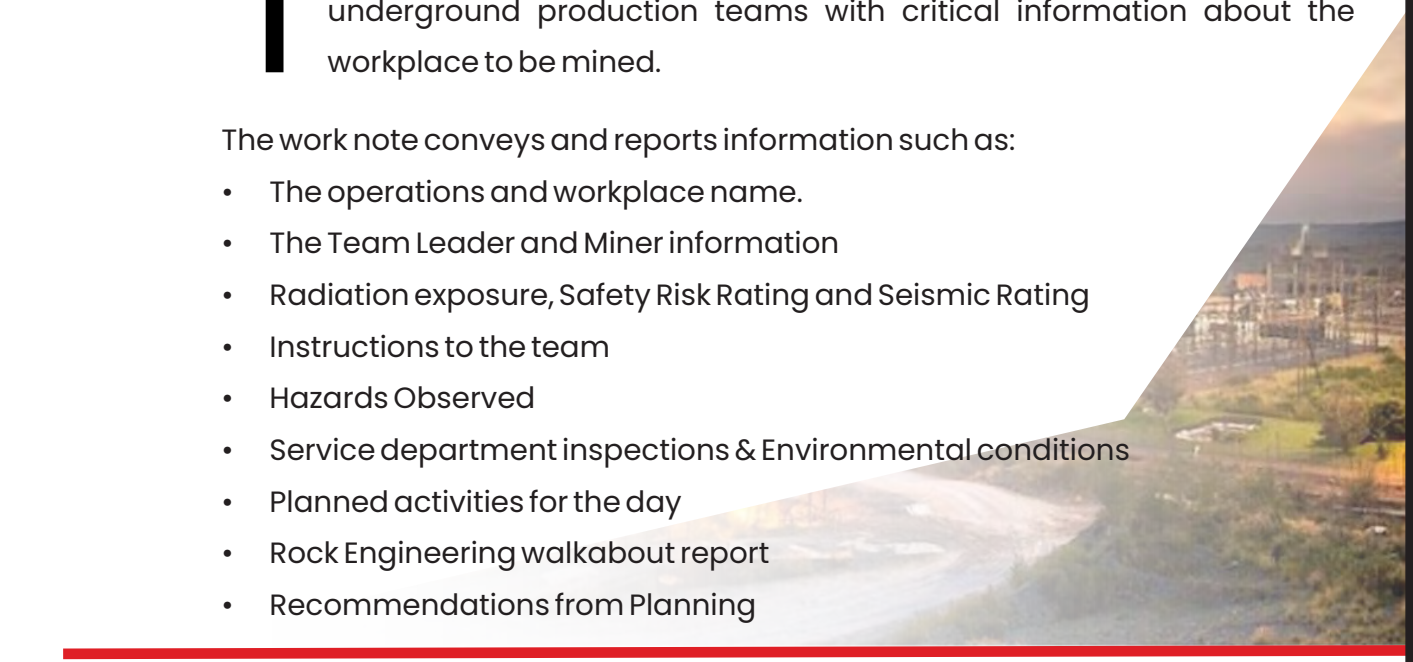
The work note and the attached documents must be returned daily to the call centre and scanned for reporting.

What is the Purpose of the Work Note?

The work note is a document that is printed daily and provides the underground production teams with critical information about the workplace to be mined.

The work note conveys and reports information such as:

- The operations and workplace name.
- The Team Leader and Miner information
- Radiation exposure, Safety Risk Rating and Seismic Rating
- Instructions to the team
- Hazards Observed
- Service department inspections & Environmental conditions
- Planned activities for the day
- Rock Engineering walkabout report
- Recommendations from Planning




P&H

SECTION 10

GOLDEN CONTROL MANAGEMENT

It is a unique gift to do what you love every day, but I have the opportunity to do this with the Harmony Risk Management Team. But being part of the HRM team is not just about enjoying what I do; I am also part of a team fighting to save lives and livelihoods every day. What more could anyone ask for?

Michele Strauss

SECTION 10

GOLDEN CONTROL MANAGEMENT

Golden Control Management through the 4-Layer Risk Management Approach

Golden control management is an approach whereby we identify the Significant Unwanted Event, identify the golden controls that mitigate the unwanted event and implement monitoring and reporting and action plans for each golden control to ensure continued control efficacy. The outcome of the process is to identify potential risks that can cause harm or loss proactively.

The 4-Layer Risk Management approach comprises of the following:

- Layer 1 Baseline Risk Assessment
- Layer 2 Issue Based Risk Assessment & Bowtie Analysis
- Layer 3 Task Assessment
- Layer 4 Continuous Risk Assessment

Harmony has implemented multiple platforms to monitor continued compliance to working standards and safe working conditions.

These platforms include and are not limited to:

- Optical Character Recognition (OCR)
- Pivot Safety Officer Inspections
- Syncromine Planning and Booking
- Syncromine Rock Engineering Inspections
- Syncromine Ventilation Inspections
- dMS Engineering system

Optical Character Recognition (OCR)

The OCR platform is a direct output of the Risk Management System.

What is OCR?

Optical Character Recognition referred to as OCR is a SQL driven system that captures inspection data to a database using QR technology. QR code is a type of barcode that can be read easily by a digital device, and which stores information as a series of pixels in a square-shaped grid.

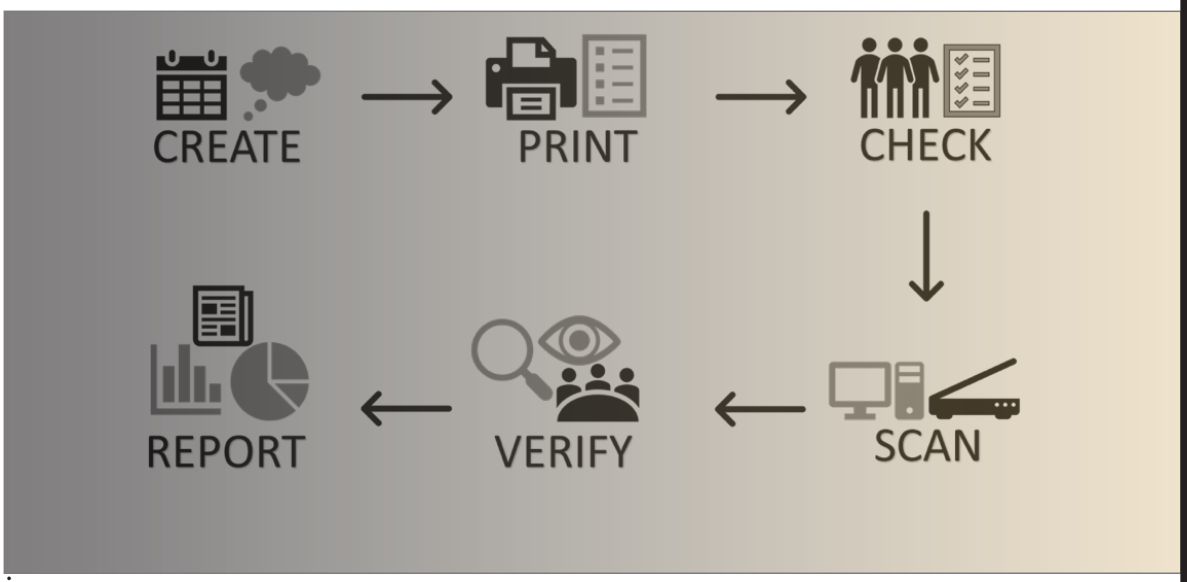
All deficiencies identified through the OCR process are managed through the Integrated Action Manager (add section).

The OCR covers a multitude of inspection and form types including but not limited to:

- Planned Task Observation – observing employees conducting tasks to ensure continued competency and correct application of processes
- Planned Inspection – inspect the work environment and ensure conditions and installations are to standard
- Pre-Use Inspections – inspections on equipment and machinery prior to use to ensure safe operation
- Surveys
- Behaviour Observations

Forms are created with each checking item accessed for Golden Control monitoring and reporting and linked to continuously monitor the controls

OCR Process



The OCR process is as follows:

- Content compiled by operation including hazard type, default action to be taken and controls
- Operation prints the form through the OCR scheduling tool
- Form gets completed at the workplace
- Form is scanned though the dedicated OCR Scanner
- Data is verified and committed to the database
- Verified data is reported on

Safe Declaration OCR Form

HARMONY

SAFE DECLARATION

Harmony Safe Declaration (Free State Region)

Division Code:

Mine Overseer Section:

Date: D D M M Y Y Y Y

Workplace Name:

Workplace ID:

Competent A Person Industry Number:

Shift: Morning Afternoon Night Process Type: Stoping Development Other

GO No Hazard NO GO No Entry GO BUT Action Required

AREA / ITEM	GO	STOP	FIX	ACTION TAKEN TO FIX	GO	STOP	TIME
Zone 1. Waiting Place up to last line of permanent support							
Waiting Place							
Travel ways and access ways, including centre gully and strike gullies up to the last line of support							
Zone 2. Last line of permanent support to the face							
Claw							
Ventilation							
Temporary with / cent							
Support							
Temporary distance from face							
Permanent distance from face							
Holing distance / direction							
Rails	Yes / No						
Winches							
Other 1							
Other 2							
Other 3							
Hand / Dyke							
Pipes							
Missing Support							
Blocky ground							
Fall of ground							

Refer to TARP on Page 5 & 6

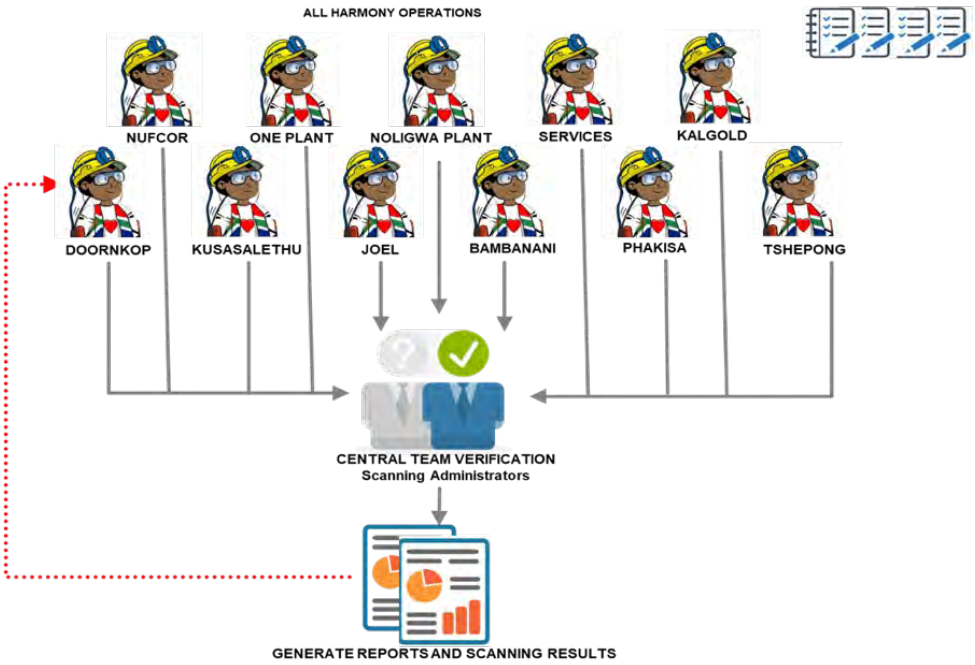
SAFE	TIME	RESPONSIBLE PERSON	NAME	SIGNATURE
		Safety Representative		
		Competent A or Person in Charge		
		Miner		
Available		Visitors		

NAME	SIGNATURE	NAME	SIGNATURE

QX-05102021-10054

All forms are scanned through a scanner and verified by a central department. All data verified is reported on and available for analysis.

Verifying OCR Data

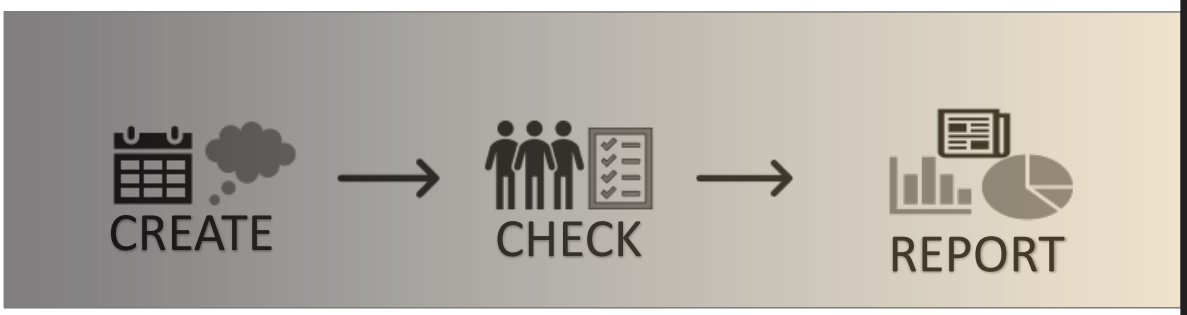


Benefits of OCR

- *Measure golden / critical control effectiveness*
- *Capturing of scanned results (Not just a paper exercise)*
- *Formalized electronic filing system; organize and report on results from inspections*
- *Identify areas of improvement*
- *Linking back to Syncromine and other systems*
- *Closing loop on deviations (via action manager)*
- *Creating proactive environment*

OCR allows for data to be collected and proactive action to be taken when deficiencies are identified. All processes available on OCR are available on a Mobile application.

Mobile Process



Integrated Action Manager

The Integrated Action Manager process is embedded within Harmony. The Action manager ensures due diligence at Operational Level within Harmony. The Action Manager ensures that any deviation from normal process and task execution is addressed and follow up action taken. Deviations are driven from a systemic, systematic or process perspective. A software application is used for digitising and to provide a formalized record of the actions taken. The integrated action manager is a sub-module within the Syncromine application software.

In both the mining and engineering environment, for line and senior management to make informed decisions from a risk and safety perspective, they are dependent on information obtained from routine and ad hoc inspections on:

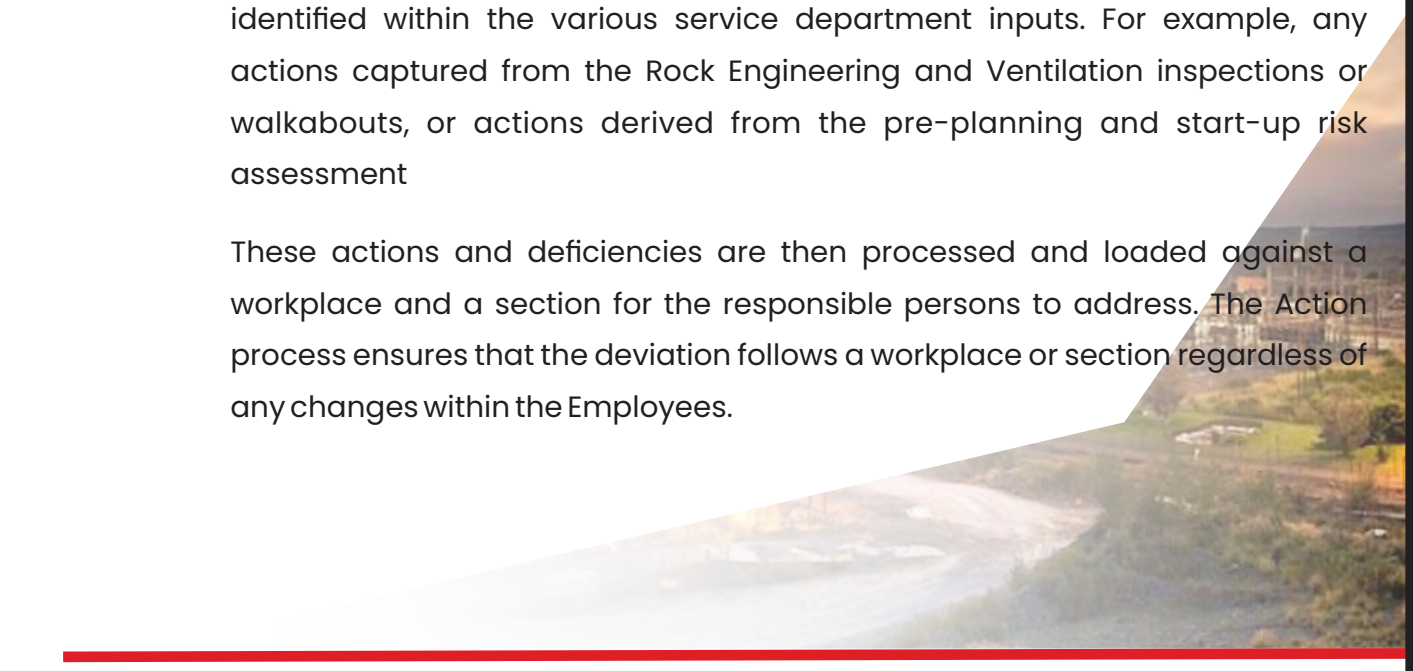
- Physical environment
- Employee competency
- Asset integrity and equipment status

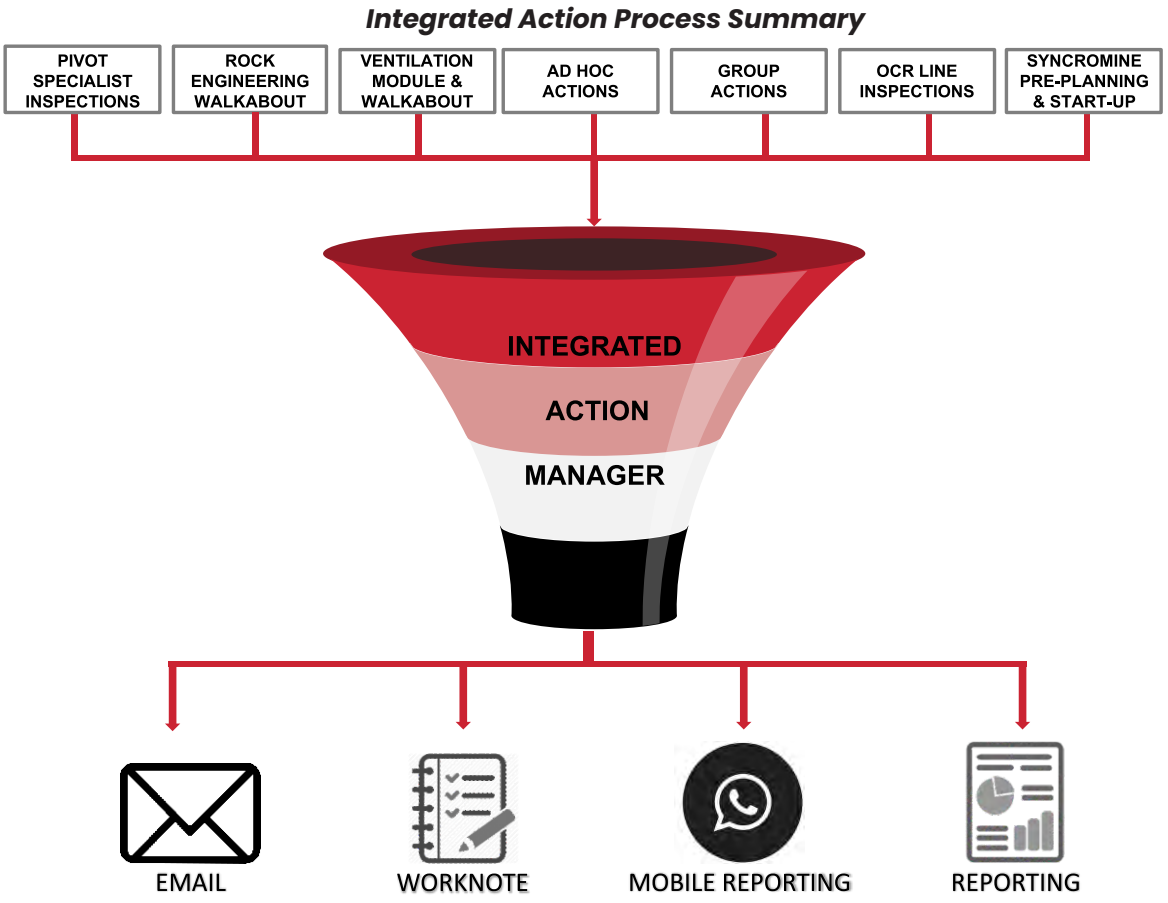
The Action manager ensures due diligence at Operational Level within Harmony.

With the Syncromine Optical Character Recognition (OCR) module, inspections have been converted into OCR scannable documents. After completing these OCR inspections, they are scanned using the dedicated OCR scanner and processed within the system. Any deficiency reported feeds into the Integrated Action Manager for further handling.

The Integrated Action Manager also captures any actions or deviations identified within the various service department inputs. For example, any actions captured from the Rock Engineering and Ventilation inspections or walkabouts, or actions derived from the pre-planning and start-up risk assessment

These actions and deficiencies are then processed and loaded against a workplace and a section for the responsible persons to address. The Action process ensures that the deviation follows a workplace or section regardless of any changes within the Employees.





Steps and checking items in the inspection are also assigned a hazard classification, which dictates the timeframe for responsible persons to respond to these actions. Classifications include:

- A – 24 hours to rectify
- B – 5 days to rectify
- C – 7 days to rectify
- M – management actions where the timeframe is specified by the person reporting the action

Addressing and Closing Actions

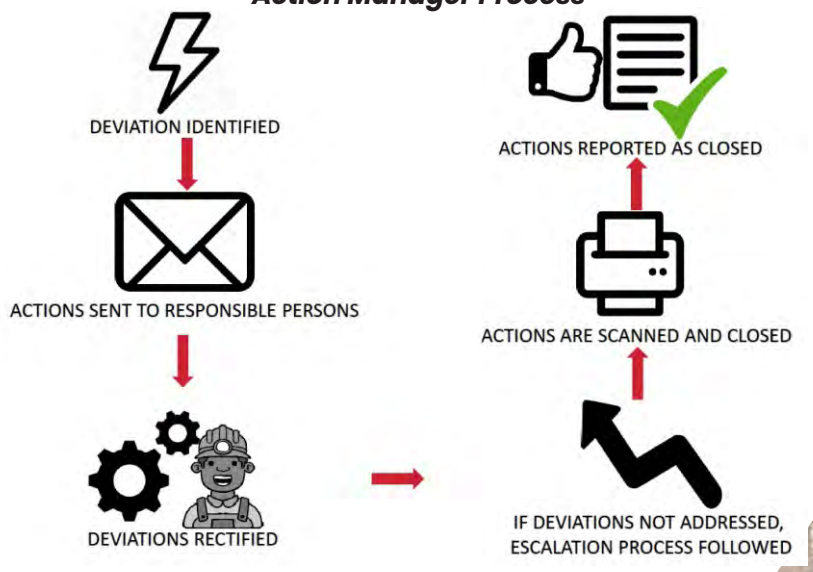
The system will send an Action Manager document to the responsible person via email once actions are identified. This document will contain all the detail of the deviation, including:

- *Section*
- *Workplace*
- *Task or inspection conducted*
- *Date inspection*
- *Date required*
- *Days overdue*
- *Reported by*
- *Step or checking item*
- *Action required*
- *Hazard classification (A, B, C or M)*

The signed off action is an acknowledgement that the responsible person has addressed the action. It is essential to have these actions signed individually as this serves to trigger the system to process and close out the actions.

When documents are completed, they are scanned back using the OCR

Action Manager Process



scanner. The application will then process the document and close out the action in the system. Should an action not be signed off and scanned back, the action will remain open until such time a signature is placed in the appropriate block and scanned back.

Escalation

Escalation factors have also been incorporated into the integrated action manager. Escalation allows actions and deviations that have not been addressed to be brought under the attention of supervisors and management to ensure action takes place. Currently, five levels of escalation have been brought into the application, allowing action escalation to five different levels. Escalation is also based on the hazard classification of an item. For example, if an A hazard is not addressed within 24 hours, it will be escalated to the first level. After another 24 hours, if still not managed, level 2 will be notified.

ESCALATION FACTORS BUILT IN IF NO ACTION IS TAKEN

ACTION IS LOGGED WITH REQUIRED DATE TO A RESPONSIBLE PERSON E.G. SECTION FOREMAN TO ADDRESS

LEVEL 1: NO ACTION TAKEN, ESCALATE TO NEXT LEVEL E.G. ESCALATED TO SAFETY OFFICER / CHIEF SAFETY OFFICER

LEVEL 2: IF ACTION IS STILL NOT ADDRESSED, ESCALATE AGAIN E.G. ESCALATED TO ENGINEER

LEVEL 3: FINAL STAGE OF ESCALATION IF ACTION HAS NOT BEEN CLOSED E.G. ESCALATED TO PLANT MANAGER

SECTION 11

DEVELOPING A SYSTEMIC MODEL VISUALISATION OF REAL TIME MONITORING AND REPORTING

It does not matter if you have been part of the Harmony Risk Management team for years or only for a few months, these extraordinary people take you and make you part of their family. Looking back at the groundbreaking work that they have accomplished and the strategy for the future, I am proud to say that I am part of this winning team.

I want to close with a quote from Andrew Carnegie:

Teamwork is the ability to work together toward a common vision. The ability to direct individual accomplishments toward organizational objectives. It is the fuel that allows common people to attain uncommon results.

Anne-Marie du Plessis

SECTION 11

DEVELOPING A SYSTEMIC MODEL

VISUALISATION OF REAL TIME MONITORING AND REPORTING

Reporting for Harmony Risk Management

The Reporting function forms an essential part of the Harmony Risk Management process. Reporting provides us with the opportunity to assess and check how processes are performing, identify areas of possible improvement and determine which processes are working well. In addition, reporting from a Harmony Risk Management point of view is very dynamic, meaning that as new processes and systems are developed and put in place, reporting will follow to provide accurate and sensible information for line- and senior management to make informed decisions that will support safe, profitable production.

> *"HRM reporting will provide accurate and sensible information for line supervision and senior management to make informed decisions to support safe, profitable production."*

Harmony Risk Management reports are carefully crafted and generated to suit operational needs and incorporate information obtained from various HRM systems and processes. These reports are often designed in the form of an interactive dashboard and as a static report disseminated on predetermined intervals, including daily, weekly, monthly, or quarterly.

Reports are also provided to various levels within the organization; for example, daily safe declaration reports are sent to responsible line management, including shift- and mine overseers, while weekly and monthly reports are sent to operational management committees and the executive committee.

The reports' layout is structured so that a summary view of essential pertinent information is displayed on the first page of the report, with detail of the first page following in the rest of the report.

Chartrunner – Data Analysis

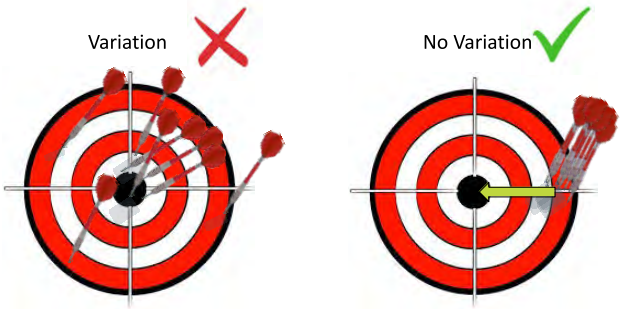
We can improve and optimise organisational performance by measuring our processes, securing a sustainable future for ourselves and our families. An integral part of reporting is analysing performance to establish the quality of the process over time. The analysis is then reported to Operations to assist in addressing gaps or concerns within their processes.

HRM provides analysis using Chart Runner, which uses analytical tools, including Control charts and Capability Histograms.

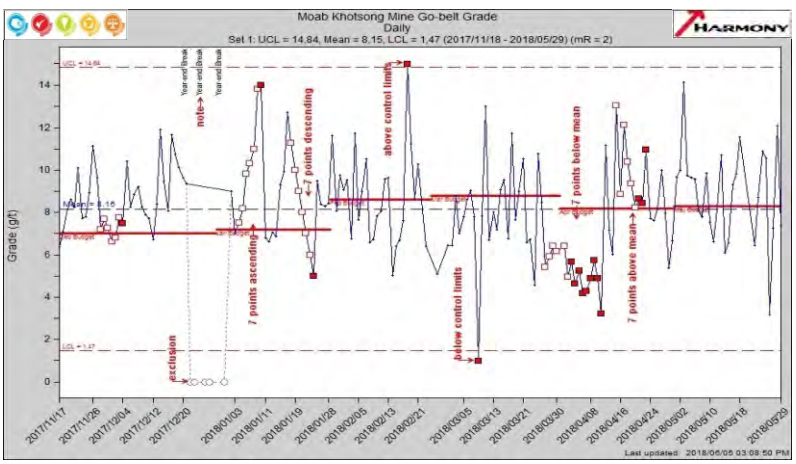
Control charts are used to monitor quality routinely. A control chart is an analytical tool that indicates the amount of variation in a process. Thus, it shows us if a process is behaving consistently over time.

Variation is undesirable because it creates uncertainty in our ability to produce the desired outcome.

Professional results demand consistency – the goal is to produce a product or service in a predictable and repeatable manner by getting the variation in our inputs under control.



Operations may expect some variation (within limits). Limited variation may occur, requiring some repairs or rework, but it is manageable. Too much variation, however, and the work cannot be executed to a consistent standard, resulting in loss of lives or operations. Therefore, a control chart is needed to assess if the information is statistically stable, and should special reasons exist, data from the will be changing.



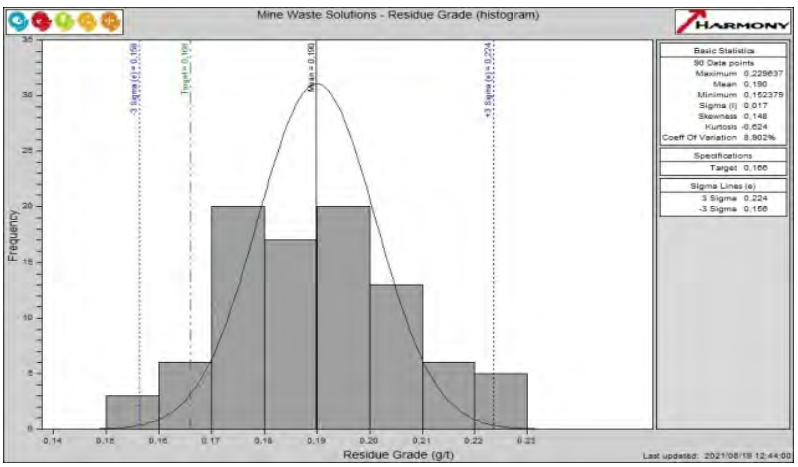
Control Chart with Annotated Variations

Annotations play an essential role in the reporting process, and therefore the accountable people should provide these timeously. Variations can most commonly deliver improvement opportunities through changes to:

- The design of the process, the strategy adopted to maintain and operate the process,
- The execution of work,
- The quality of resources used in the process.

Capability analysis is a set of calculations used to assess whether a system is statistically able to meet a set of specifications or requirements. Specifications or requirements are the numerical values within which the system is expected to operate: the minimum and maximum acceptable values. All methods of capability analysis require that the data is statistically stable, with no special causes of variation present. If capability analysis is performed, it will show approximately what happened in the past but cannot predict capability in the future. It will provide only a snapshot of the process at best. If, however, a system is stable, capability analysis shows not only the ability of the system in the past but also, if the system remains stable, predicts the system's future performance.

The Capability Histogram indicates whether the process is capable of meeting the expectations set by Management.



Capability Histogram with Basic Statistical Data

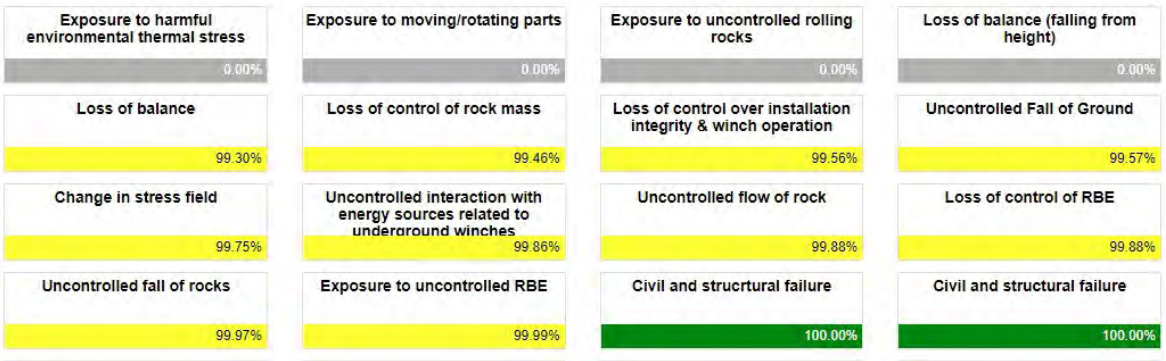
The bars represent the frequency at which each number occurs. The histogram shows basic information about the data centre location (mean), the width of spread, and the distribution shape. Specification limits indicate the amount of variation that is acceptable in the process and is set by Management.

Golden Control Dashboard

As part of the Harmony Risk Management and Safety Strategy, golden control monitoring and reporting are critical. To complete the process of plan, do, check, and act on the golden control monitoring and reporting and compliance, a dashboard has been designed within an interactive tool used within Harmony to provide management with a platform for active monitoring of golden control performance.

The functionality of these dashboards includes an extensive filter where an overall view and status can be observed or drilled down to such a level where the golden control monitoring of a workplace can be scrutinized. In addition, filters per operation, Region or Mine Overseer Section is also available. After filters have been selected, the tool carefully selects all of the information within the set parameters and displays this on the front page of the dashboard.

Golden Control Dashboard



This initial view provides us with a compliance rating of the golden controls linked to a specific Significant Unwanted Event (S.U.E.). This compliance is calculated by the number of golden control failures/found to be sub-standard versus the number of times this golden control has been checked or tested.

To ease interpretation, each S.U.E. is colour coded, depending on their compliance, in RED., YELLOW or GREEN. They are also included in GREY.

RED. – a golden control has been checked and found to be sub-standard with total compliance of below 60%

YELLOW – golden control compliance corresponding to the S.U.E. has compliance of between70% - 99%.

GREEN – a golden control has compliance of 100%.

GREY – according to the defined monitoring plan in the bowtie of the S.U.E., it was expected for the golden control to be checked during the set period, but this has not taken place yet.

Delving further into detail of the golden control compliance will display further detail regarding the inspections, including the source from which this golden control is monitored, i.e. OCR or Pivot, the amount of times the effectiveness has been checked, the number of times the golden control has failed or is sub-standard, as well as the number of actions that are still open and have to be addressed.

The Operation can also obtain detail regarding these actions by drilling down on the golden control. The report will provide info on the Operation, the workplace, the task being performed, the step that has failed, and the default that The Accountable Role Player should try to rectify the deficiency. A link is also supplied to the source document, which will recall the scanned checklist.

Repetitive Deficiency Dashboard

A dashboard has been designed to indicate any A-hazards that have been identified in a particular workplace and indicate which workplaces are continuously identifying A-hazards that suggest that there are areas for improvement on a specific task or process.

The interactive repetitive deficiency dashboard is also available on the business intelligence platform and functions in the same manner as the golden control dashboard, with filters to be set before results will be displayed. These filters include repetitives per Regional General Manager, Senior Engineering Manager, Region, Operation or Discipline.

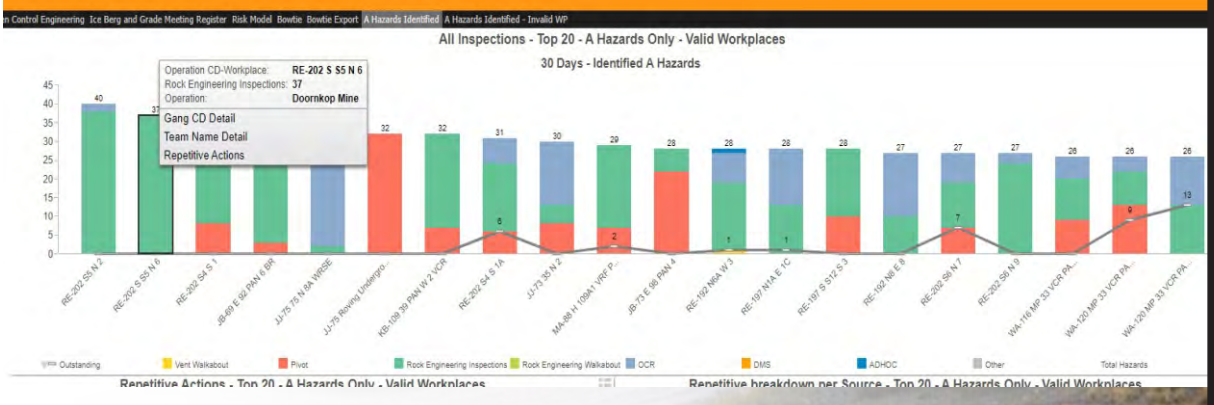
Additional filters for display are:

- Most a-hazards identified
- Most repetitive a-hazards
- Information per workplace
- Information per gang
- Information per team name

Repetitive deficiencies indicate potential quality and behaviour issues that must be addressed by supervisors.

All of the above are available for the last 30, 60, 90 or 120 days.

Repetitive Dashboard



The dashboard displays the number of repetitive or identified A-hazards per workplace, section, or crew in a stacked-bar graph. A line graph on top of the bars indicates the number of outstanding actions. These actions were identified using various methods of monitoring and reporting.

The sources of the actions include:

- Ventilation walkabouts
- Pivot safety actions
- Rock engineering strata inspections
- Rock engineering walkabouts
- OCR inspections and checklists
- dMS inspections (Engineering Planned Maintenance)
- Ad Hoc action manager actions.

The report also provides additional information, including the operation name, the gang, crew or workplace details, and the option to view the repetitive deficiencies or actions. When viewing the detail of deficiencies, the report will display more information on which steps have failed, how many times they have failed, and the source where the action originated from.

SECTION 12

RISK MODEL
INTEGRATED RISK REGISTER
AND DASHBOARD

Working in a safe and controlled workplace is everyone's fundamental right. Being part of the team that develops a strategic and sustainable safety model is a privilege and a honor.

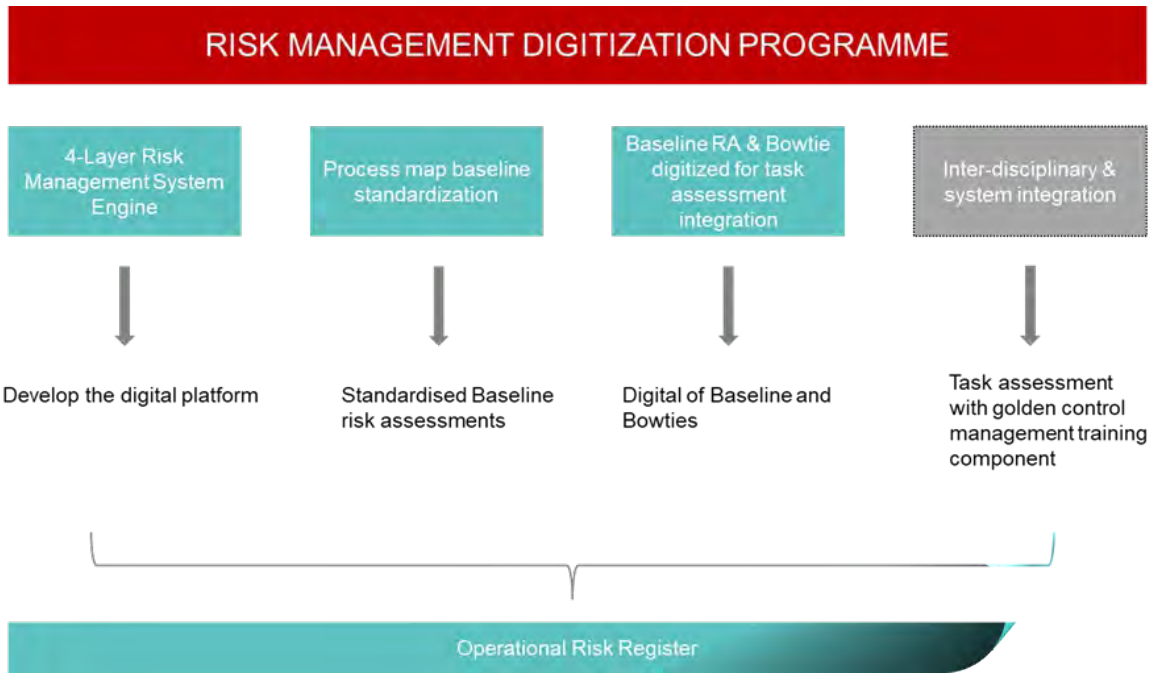
Julius Lawrence

SECTION 12

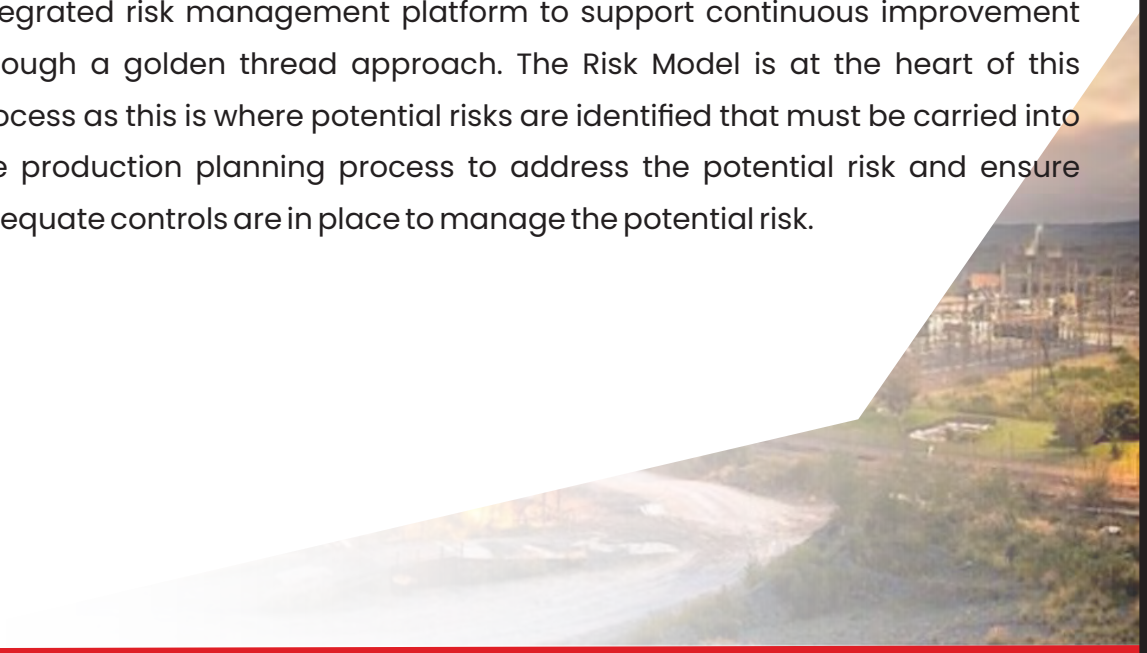
RISK MODEL – INTEGRATED RISK REGISTER AND DASHBOARD

Harmony embarked on a digitization journey to support our proactive risk management approach. The purpose of digitization is to have information available for analysis and decision making.

The Risk Model digitizes the baseline risk assessment, issue base risk assessment and bowtie analysis, task assessment and allows for integration into the continuous risk assessment platforms, discussed later in this document.



The Risk Model Platform is Syncromine. The objective is to achieve an integrated risk management platform to support continuous improvement through a golden thread approach. The Risk Model is at the heart of this process as this is where potential risks are identified that must be carried into the production planning process to address the potential risk and ensure adequate controls are in place to manage the potential risk.

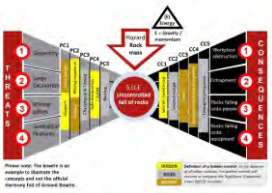


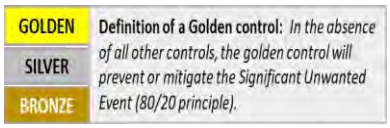
The four-Layer approach incorporates different tools at the different levels of work within operations. These tools ensure the focus of the control addresses the correct Unwanted event.

The programme is being implemented in phases:

- Phase 1 – System development
- Phase 2 – Baseline reformatting, Bowtie alignment to baseline and digitization
- Phase 3 – Task assessment alignment to training

Target: Active leadership & proactive culture to stop S.U.E.'s through effective Critical Control Management





4 LAYERS OF CBRM	KEY OUTPUT	FURTHER OUTPUT	NEGATIVES	POSITIVES	CONTROL FOCUS	TOOLS
1. Baseline risk assessment	Top 20 S.U.E.'s	40 Golden Controls	Risk profile is still the same, nothing changed	Better understanding of major hazards and significant unwanted events		Baseline SUE Report
2. Issue-based risk assessment	Golden controls linked to control effectiveness (SAR)	• Monitoring Plan per control • Response plan		Risk profile is being reduced → control improvements		IBRA; Bowtie, FMECA
3. Task-based risk assessment	Method statement linked to key behaviours and controls	Work notes • Syncromine • Pre-planning protocol • TARP	• System • Paperwork • Structure	Step-by-step Work notes Audit process		TBRA, MIs, Procedures, Lesson Plans
4. Continuous risk assessment	Authorised and safe work • SLAM / PTW • Safe declaration • Pre-use inspection	Behaviour change (Go/No Go) VFL Visualisation of golden controls Self-audit	• System • Just a tick box	• Mindset change • Proactive • PDCA cycle designed into work		SLAM, Safe Declaration, Check lists

SECTION 13

CONTINUOUS IMPROVEMENT STRATEGY

Knowing that with my input to the HRM team we can and potentially are saving lives of our fellow Harmonites is a humbling experience which gives me a great sense of fulfilment. HRM epitomises the fact that there's no I in TEAM and that a collaborative approach leads to the finest results.

Glen Anderson

SECTION 13

CONTINUOUS IMPROVEMENT STRATEGY

Learning from Incidents (LFI) & High Potential Incidents (HPI)

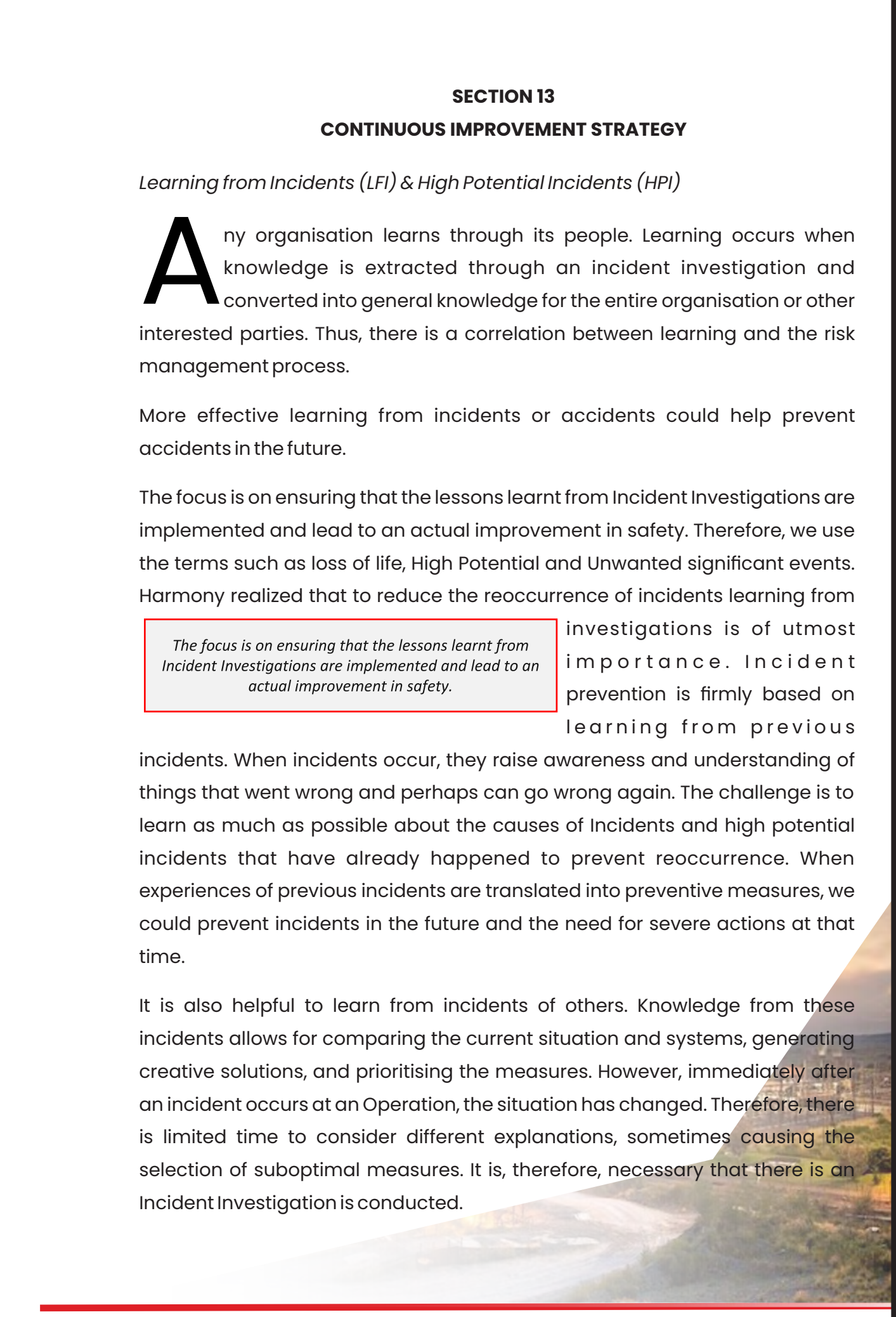
Any organisation learns through its people. Learning occurs when knowledge is extracted through an incident investigation and converted into general knowledge for the entire organisation or other interested parties. Thus, there is a correlation between learning and the risk management process.

More effective learning from incidents or accidents could help prevent accidents in the future.

The focus is on ensuring that the lessons learnt from Incident Investigations are implemented and lead to an actual improvement in safety. Therefore, we use the terms such as loss of life, High Potential and Unwanted significant events. Harmony realized that to reduce the reoccurrence of incidents learning from investigations is of utmost importance. Incident prevention is firmly based on learning from previous incidents. When incidents occur, they raise awareness and understanding of things that went wrong and perhaps can go wrong again. The challenge is to learn as much as possible about the causes of Incidents and high potential incidents that have already happened to prevent reoccurrence. When experiences of previous incidents are translated into preventive measures, we could prevent incidents in the future and the need for severe actions at that time.

The focus is on ensuring that the lessons learnt from Incident Investigations are implemented and lead to an actual improvement in safety.

It is also helpful to learn from incidents of others. Knowledge from these incidents allows for comparing the current situation and systems, generating creative solutions, and prioritising the measures. However, immediately after an incident occurs at an Operation, the situation has changed. Therefore, there is limited time to consider different explanations, sometimes causing the selection of suboptimal measures. It is, therefore, necessary that there is an Incident Investigation is conducted.



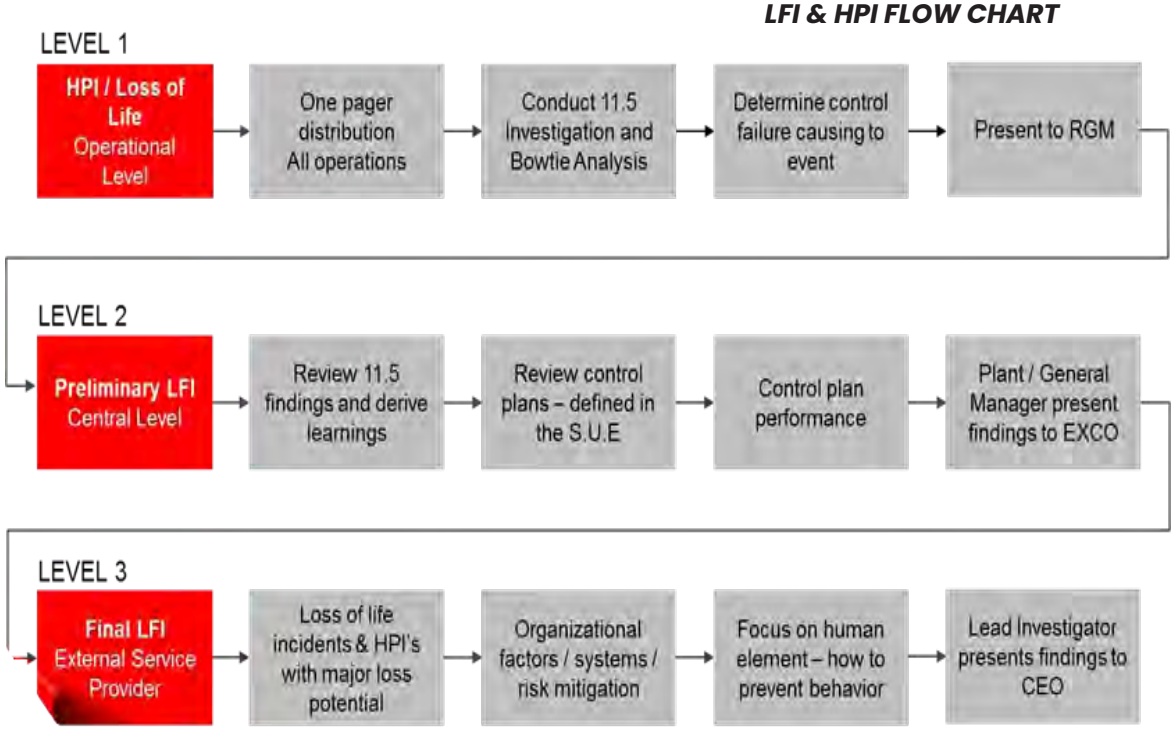
The Operation completes the investigation and analysis of an incident as per the existing Harmony Standards. After this, there is a follow-up step: A Learning from Incident is conducted by a team comprising a Lead Investigator, Subject Matter Expert, HR Leader, Behavioural Analyst, and an independent facilitator. Finally, the group learnings and recommendations are presented to the Chief Executive Officer.

Finally, there must be a dissemination of lessons learnt within the organisation. These lessons are then used as preventive actions. The outcomes of this process are iterative:

- A plan of action is prepared.
- The actions are performed or executed.
- The actions are evaluated.

This process is part of the plan-do-check-act operating model in which HRM operates. Due to the constraints to effective learning from incidents and accidents such as 'fear, blame and anxieties about reputational loss and legal proceedings, the process is enhanced (or alleviated) by the drive towards a proactive culture and Risk Assessment Mindset.

LFI & HPI FLOW CHART



Engineering Safe Operating Model (ESOM)

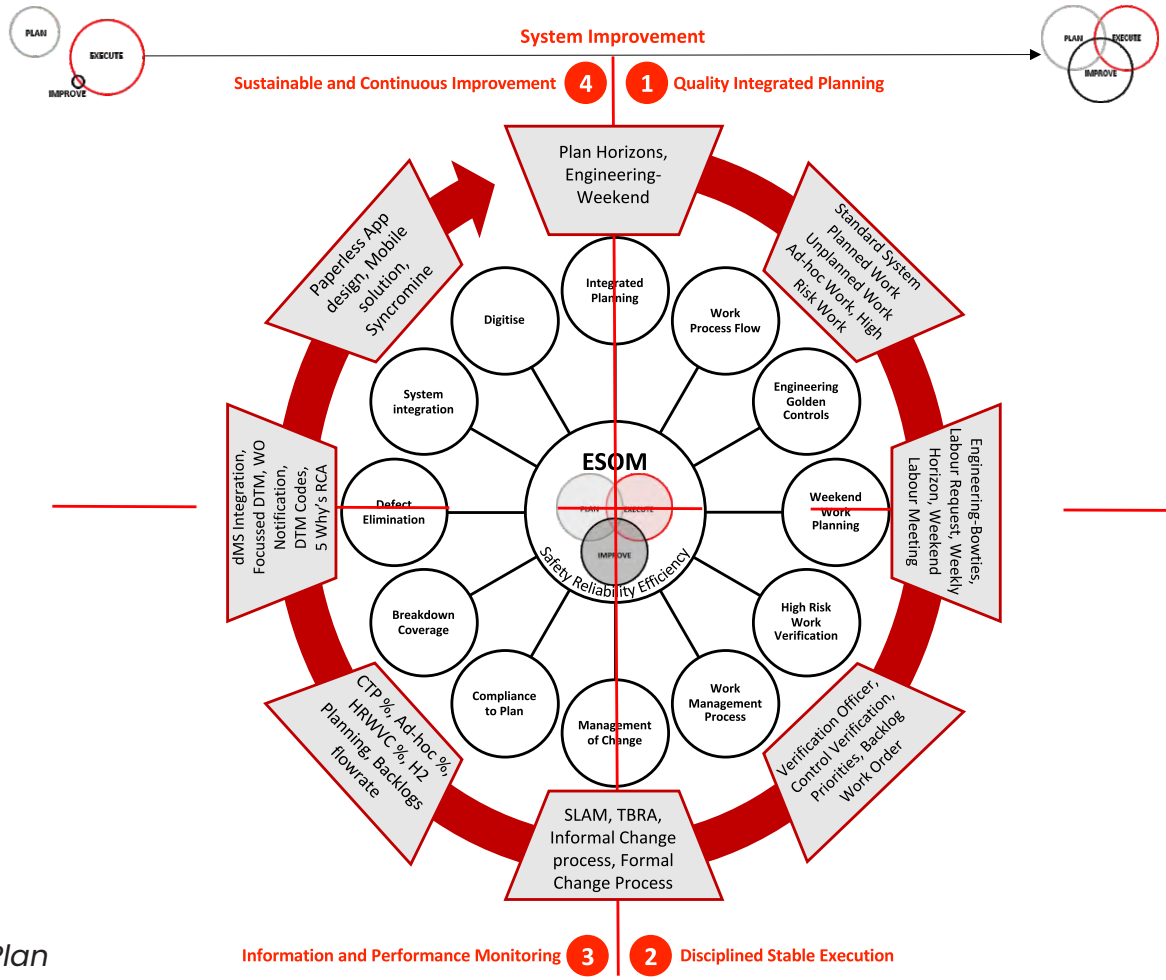
As part of the drive towards a Safe, Profitable Mine, it is essential to address the gaps identified for Engineering Systems and Processes. Engineering is the custodian of Infrastructure; in the same manner, mining is the custodian for Production. Therefore, complete integration between Mining and Engineering is required to achieve their goals successfully. Without synergy in these processes and systems, Harmony will not achieve the strategy.

The ultimate purpose of the Engineering Safe Operating Model (ESOM) Project is to improve safety, risk, and reliability management in the Engineering functions. ESOM creates the foundation and framework to enable Engineering to plan, organise and execute work safely. The goal is to stabilise the system with comprehensive integration; the next milestone is to digitise the system with mobiles applications, facilitating a paperless process.

Harmony used the four-Layer Risk approach to identify gaps in Harmony processes, and The Engineering Safe Operating Model (ESOM) has been developed to address these shortcomings in Engineering. (Analyse and adapt). The main areas of focus are quality planning (pro-active and integrated), safe execution (disciplined and stable) and improvement (Continuous and sustainable). Key elements addressing these focus areas are illustrated in the figure below.

ESOM balances Planning, Execution and improvement and ensures they are part of an integrated approach.

Engineering Safe Operating (ESOM) Model



Plan

It is crucial to integrate Planned Maintenance, Infrastructure Development, Emergency repairs and production support and schedule work proactively as per the required planning horizon to optimise Planning. In addition, Planning quality is further improved through completing detailed Risk Assessments with step-by-step task analysis. And of essential importance is elevated risk-based supervision and permissions. Planning is dynamically managed to ensure that it is continually adjusted as the environment changes and maintain realistic Planning with achievable goals.

Planning is dynamically managed to ensure that it is continually adjusted as the environment changes and maintain realistic Planning with achievable goals.

- Work Process Flow
- Planning horizons
- Pre-Task Risk Assessment (SLAM and TBRA)
- High Risk Work identification
- Weekend Work approval documentation

Do (Execution)

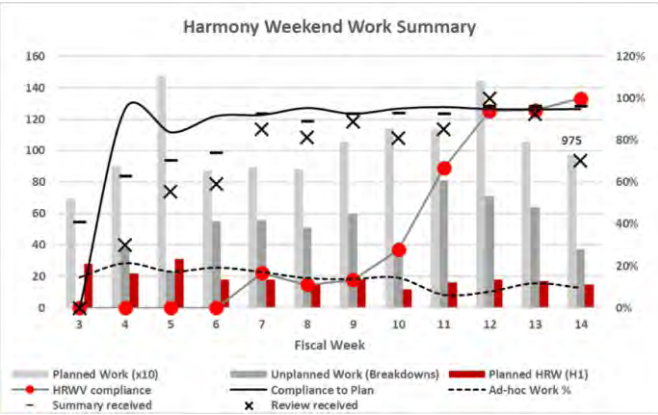
Planning is essential to ensure Ad-hoc and Unplanned Work (Reactive execution) is reduced, and the drive is for Planned Work (Proactive execution). Therefore, a task should only take place once a proper plan with adequate controls is in place. A Realistic and integrated plan allows for Disciplined and stable performance, and all aspects of the system are addressed. High-Risk Work is verified on-site to ensure that critical controls are in place with the appropriate level of assurance.

- High Risk Work Verification
- Continuous Risk Assessment (SLAM and TBRA)
- Compliance to plan
- Golden Control Monitoring Work Orders

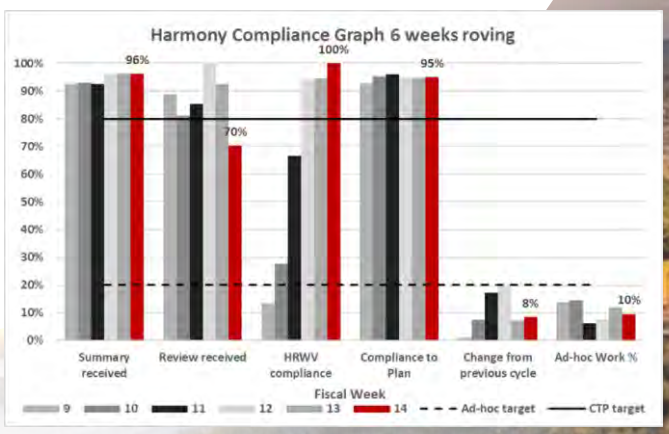
Check (Measurement)

Monitoring both Planned and Unplanned Work execution is critical to understand the level of compliance, to measure the efficiency of the System and the effectiveness of the process.

- Unplanned Work (Breakdown) coverage and Root Cause Analysis
- Weekly report on ESOM metrics



Monitoring & Work Compliance Week End Work Summary



Monitoring & Work Compliance Week End Work Compliance

A consistent Focus on continuous and sustainable improvement and a drive to eliminate defects and substandard work are vital.

Analysing all the data in terms of Execution, planning, and Improvement enables us to continuously improve our processes and maintain the drive toward zero harm with safe, reliable assets.

- Defect Elimination
- System integration
- Digitisation (Mobile solution)

High Risk Work Verification

All engineering tasks are rated according to the residual risk using the Harmony 5x5 Risk Matrix. The Matrix takes the intrinsic and extrinsic risk factors into account and the control effectiveness of the task.

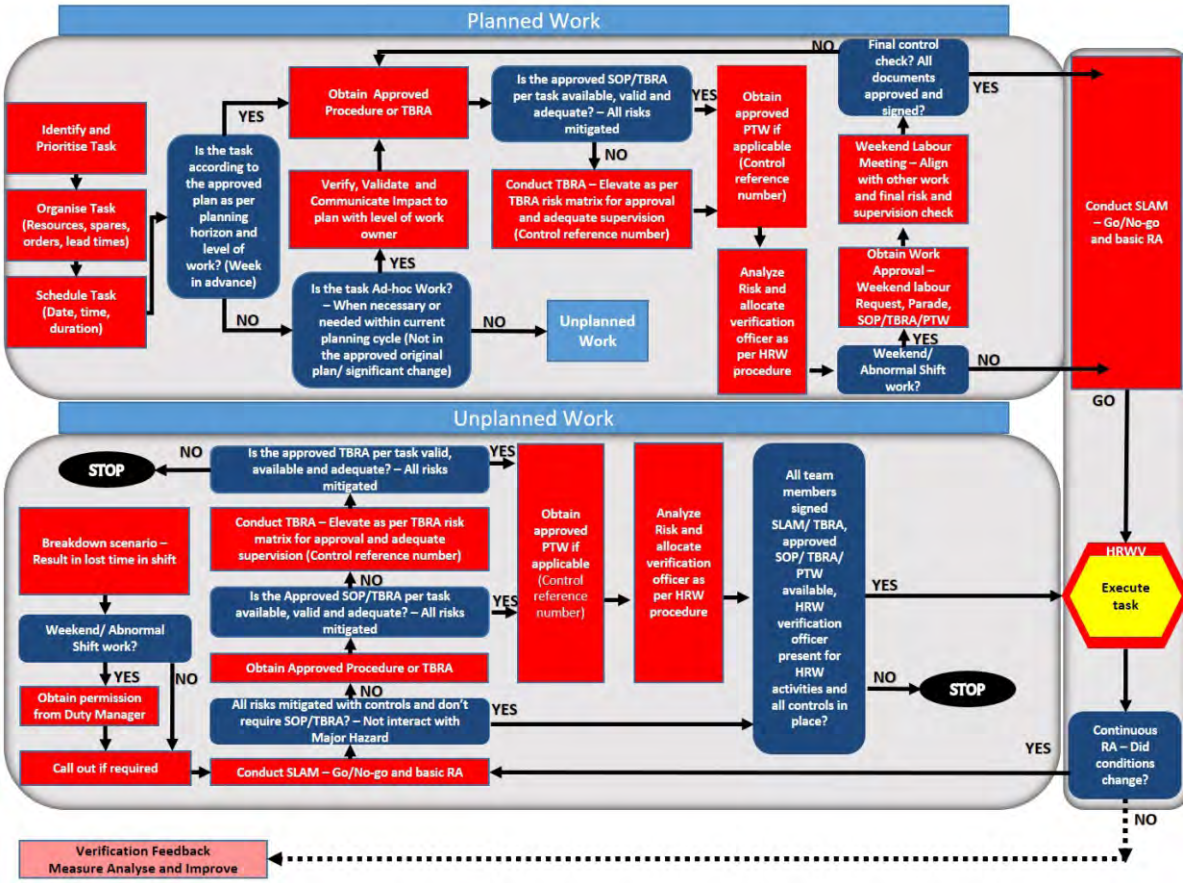
The verification process ensures that High-Risk Work has an adequate level of supervision allocated to each task to ensure that the critical controls are in place and verified on-site with the appropriate level of assurance.

Work Process Flow

The Work Process flow is a road map and a guide for the operation to prepare and plan all tasks before they are executed. The Work Process Flow prompts specific steps and checks to ensure adequate planning, risk mitigation and supervision. The Work Process Flow is critical to align the operations and standardise the process leading up to task execution.

The process clearly distinguishes between planned and unplanned work and how employees must approach each type of work to ensure safe execution and compliance.

Work Process Flow



ESOM ensures that Mining and Engineering are addressed as part of the total HRM Journey to provide a Zero Harm environment where there is no loss of life or livelihood at Harmony.

Work Routines

The HRM journey within Harmony supports the vision of a Safe Profitable Mine by establishing a Risk management strategy to lead Harmony to a control focused environment.

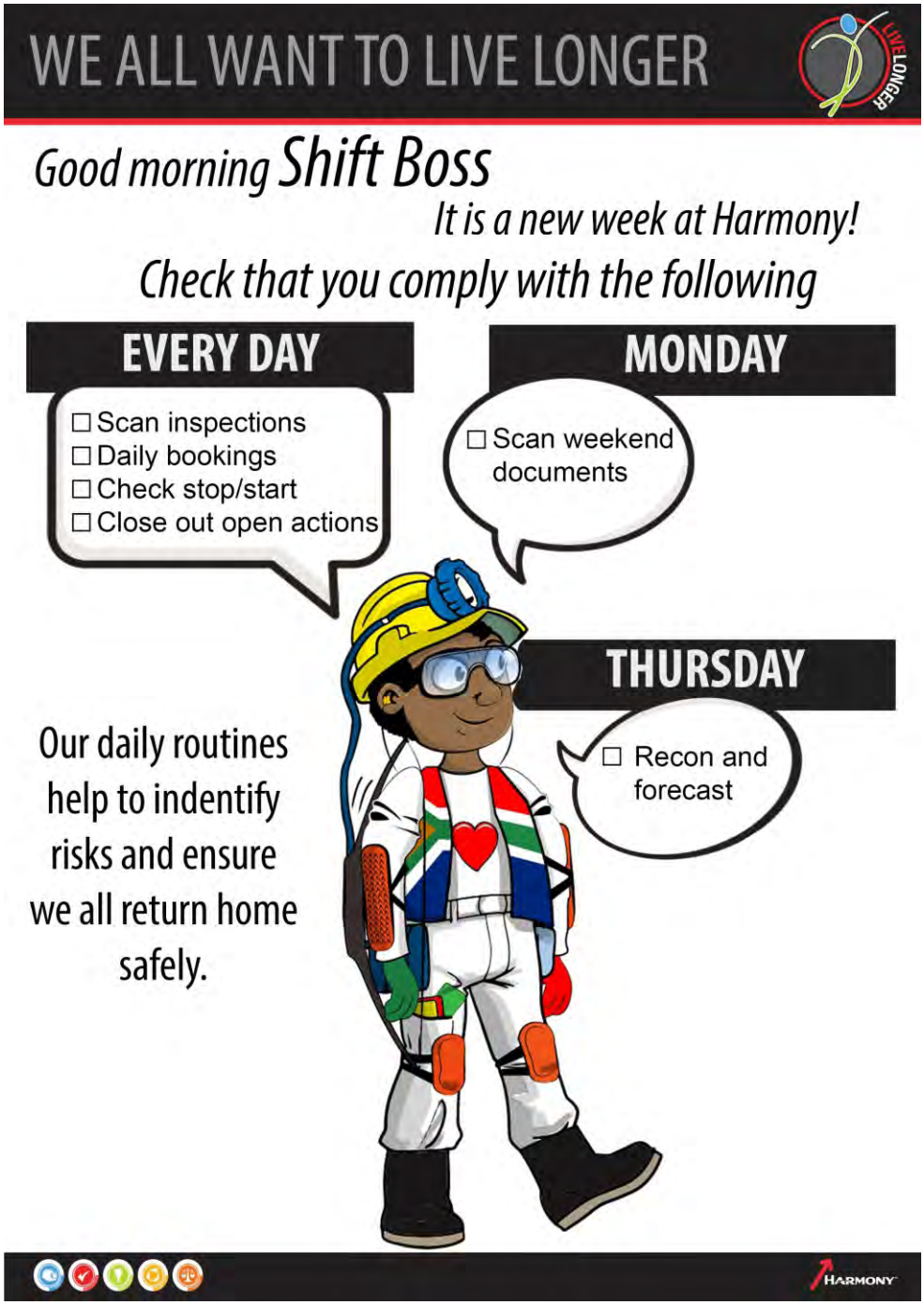
Part of the HRM Strategy is the Definition and Standardisation of Work Routines to ensure Quality work routines. Quality Routines with the right people doing the proper work at the right time will facilitate the drive towards a planning culture that will support Proactive behaviours and allow for the incorporation of the Risk Assessment mindset as a way of life. Quality routines, Planning and proactive behaviours will also enable Continuous Learning to be applied to all aspects of work. Routines are essential to facilitate a culture of Planning and proactive behaviours. Although each operation has routines to meet the Organisational Requirements, these differ across the organisation. Lack of Standardisation and Formalisation could result in critical routines or processes being overlooked or not being managed to standard as part of the current Work Routines.

Quality routines, Planning and proactive behaviours will also enable Continuous Learning to be applied

Routines play a crucial role in establishing acceptable norms and behaviours within the workplace. These same behaviours help mould the company's culture. We are analysing the company's routines to assist in making changes as necessary to improve the culture. One of the critical components to support safe and sustainable production within Harmony is to ensure standardised Work Routines, which are embedded at all levels within the Business. Work routine management must be part of the company's culture and be present in every area of the organisation. In this way, the company will be more prepared to manage change and predict and deliver consistent results.

Most leaders have good intentions to modify their management routines but struggle to put them into practice. Instead, they get caught up in a spiral of day-to-day performance management, either doing process work, reporting or firefighting all problems with the work. Urgent and reactive work results in employees believing they have no time to perform routines that build their own & others and the Business's capabilities.

When documenting & breaking down existing routines, often, they have not been designed with a clear purpose in mind. The routines are also not fully

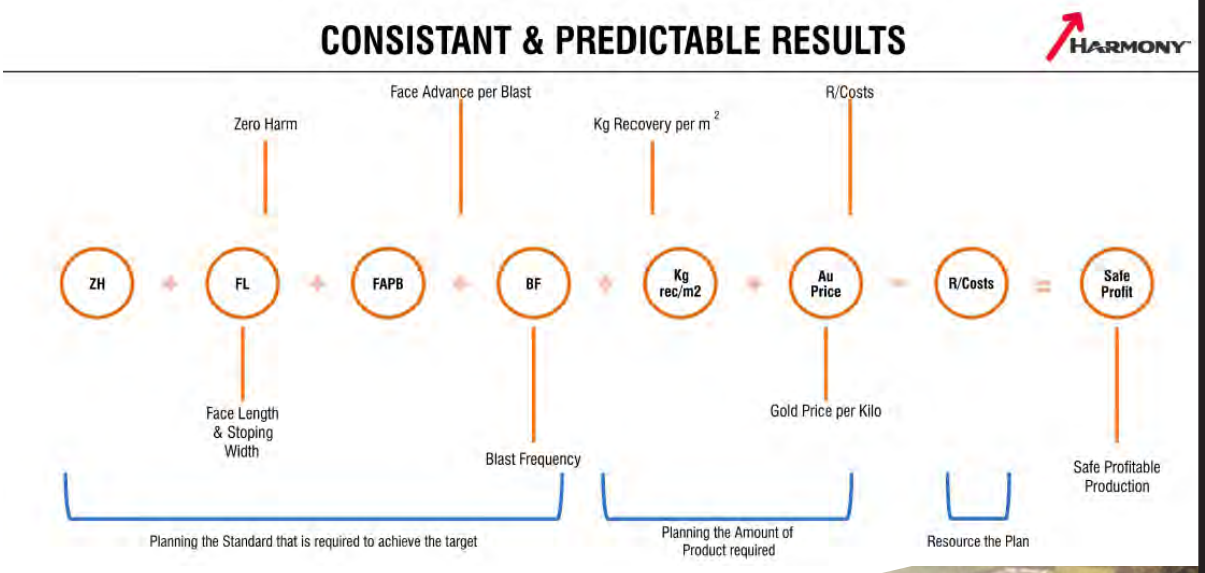


linked/aligned with other management levels in the organisation or other parts of the Business. Management routines are usually developed gradually over time. Routines derived from many reactive and inherited activities create a multi-level misalignment of management focus. These legacy routines can cause a massive amount of "leaderships waste" and incorrect behaviours within an organisation.

Having robust workplace routines allows the organisation to achieve Consistent Results. By creating a system in which the right person adheres to the correct routine at the right time, the organisation will reliably manage and predict the quality of the results. In addition, the proper Routines will engender a culture of planning work and support Pro-Active behaviours in the workplace.

Formalising the Routines aims to understand the critical things that need to be done daily and define routines and responsibilities to assist with job execution. Routine management is a method that systematises work patterns and seeks organisational efficiency through the management of employee's accountability to avoid changes that may, consequently, compromise established quality levels. Of crucial importance to routine management is defining the authority and accountability of each employee in the process, standardising the execution of processes, monitoring, and reporting results through established limits, corrective actions on these results and the continuous improvement of processes.

Structures Routines will lead to Consistent, predictable results in which everyone has Set Accountabilities with the corresponding Authorities and the Business Equation is balanced



Routines structured for value and quality with supporting systems and behaviour is the start of institutionalising required behaviours.

For example, the pre-planning Protocol requires the correct Routines to happen within the required cycle and to the standard necessary to support the system. The outcome will be a Planning routine that enables operations to produce safely and achieve predictable and consistent results.

The Safety Triad provides the role of Routines with regards to safe production in a nutshell.

Person

It allows employees to know what is expected of them, enabling them to apply their skills and knowledge to ensure safe, quality work.

Workplace

It Ensures that the work is planned, the correct resources and equipment are planned, and the workplace standards are specified, with plans in place to maintain the standard and manage challenges identified.

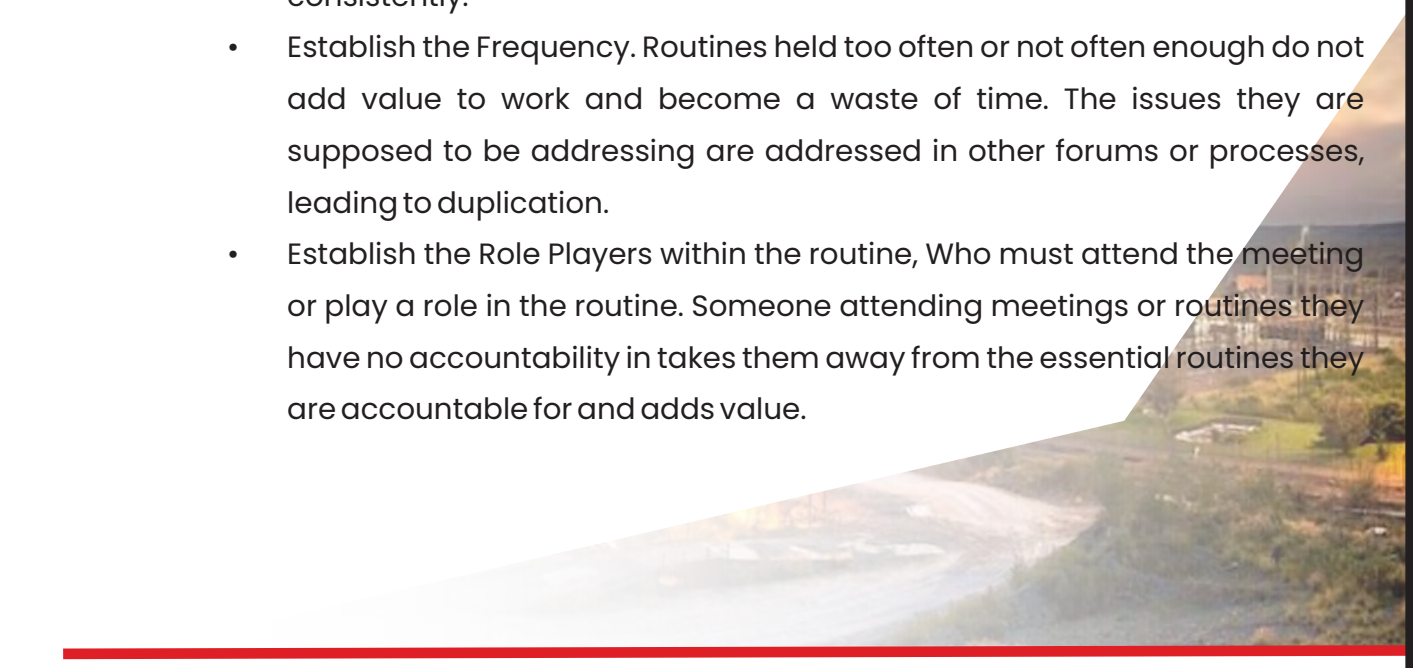
Behaviour

Routines facilitate a culture of planning and proactive behaviours. These Routines play a crucial role in establishing acceptable norms and behaviours within the workplace. These same behaviours help mould the company's culture..

Quality Routines and Defined Accountabilities enhance Planning, which in turn leads to consistent and predictable results. For example, when you can consistently achieve a zero-harm environment and production targets such as Face Length, Stoping width, Face advance per Blast, Blast Frequency and Kg recovered per m2, you will be able to control your costs and be more equipped to leverage or endure changes within the Gold Price.

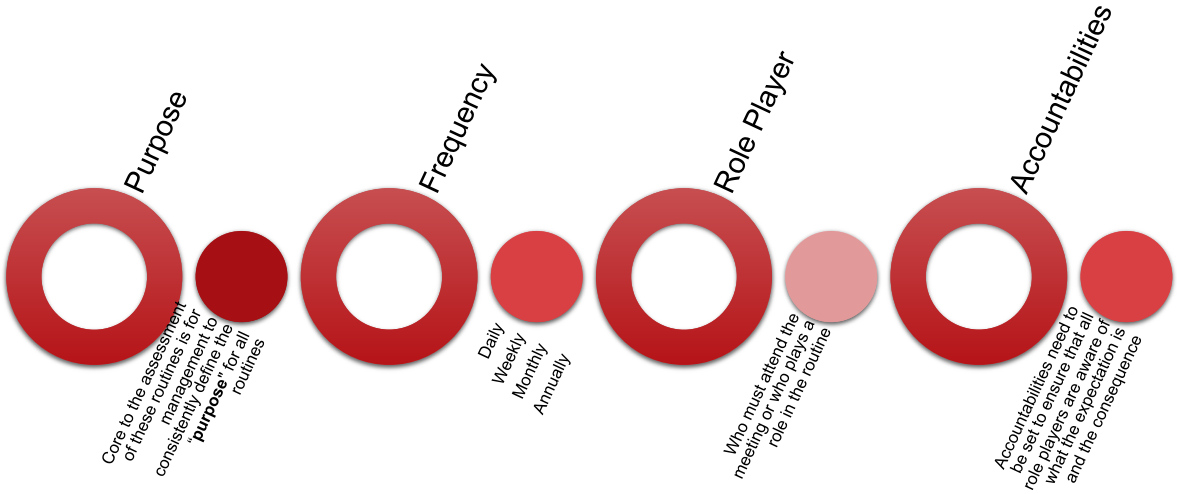
The process to standardise and formalise the Routines

- Identify What is the routine and What are the Tasks in the routine
- Establish what the Purpose of the Routine is. Of crucial importance for Routines is for management to define the "purpose" for all routines consistently.
- Establish the Frequency. Routines held too often or not often enough do not add value to work and become a waste of time. The issues they are supposed to be addressing are addressed in other forums or processes, leading to duplication.
- Establish the Role Players within the routine, Who must attend the meeting or play a role in the routine. Someone attending meetings or routines they have no accountability in takes them away from the essential routines they are accountable for and adds value.



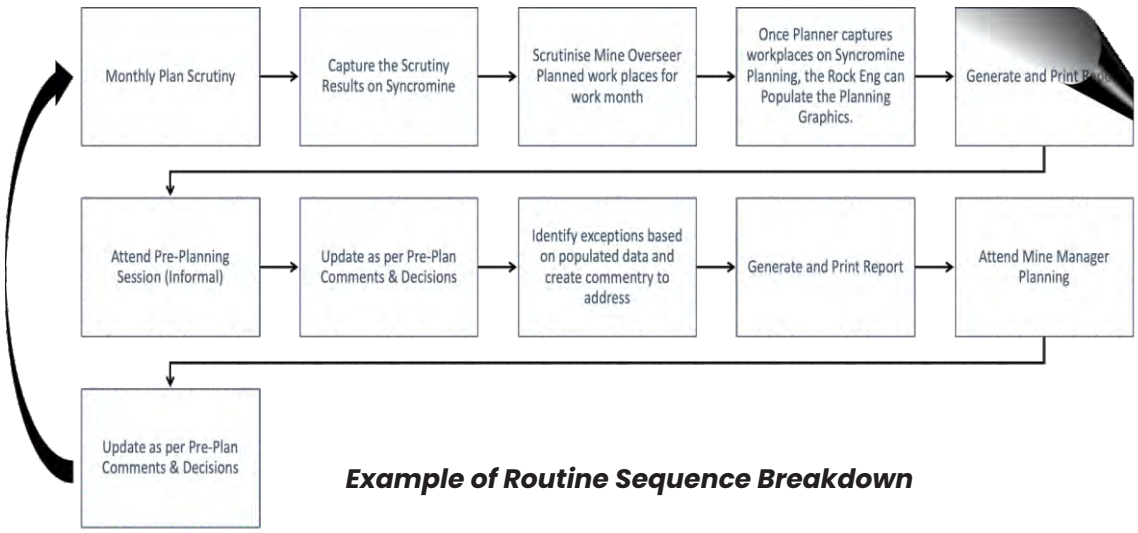
- Accountabilities need to be set to ensure that all role players are aware of the expectation. These accountabilities need to be supported by the proper authorities and resources. And if the accountability is not met, the consequence needs to be understood despite all the resources. Accountability is only successful if you are held to account.

Quality Work Routine Structure



Routines are a movement away from merely understanding my work but integrating my work into the larger plan to achieve the overall outcome.

Task Sequence Breakdown for Rock Engineeering Pre-Plan Preparation



Example of Routine Sequence Breakdown

Enabling Leadership (Front Line Leadership, Visible Felt Leadership)

Visible Felt leadership (VFL) is the management's total actions that lead people at all levels. VFL assists employees to understand and "feel" their leaders' high standards and accept their strong commitment to safety as genuine, caring and respect. As such, Visible Felt Leadership is a vital component of the employee engagement equation – being present for the bottom line while also building a connection that resonates and inspires them to perform to their best.

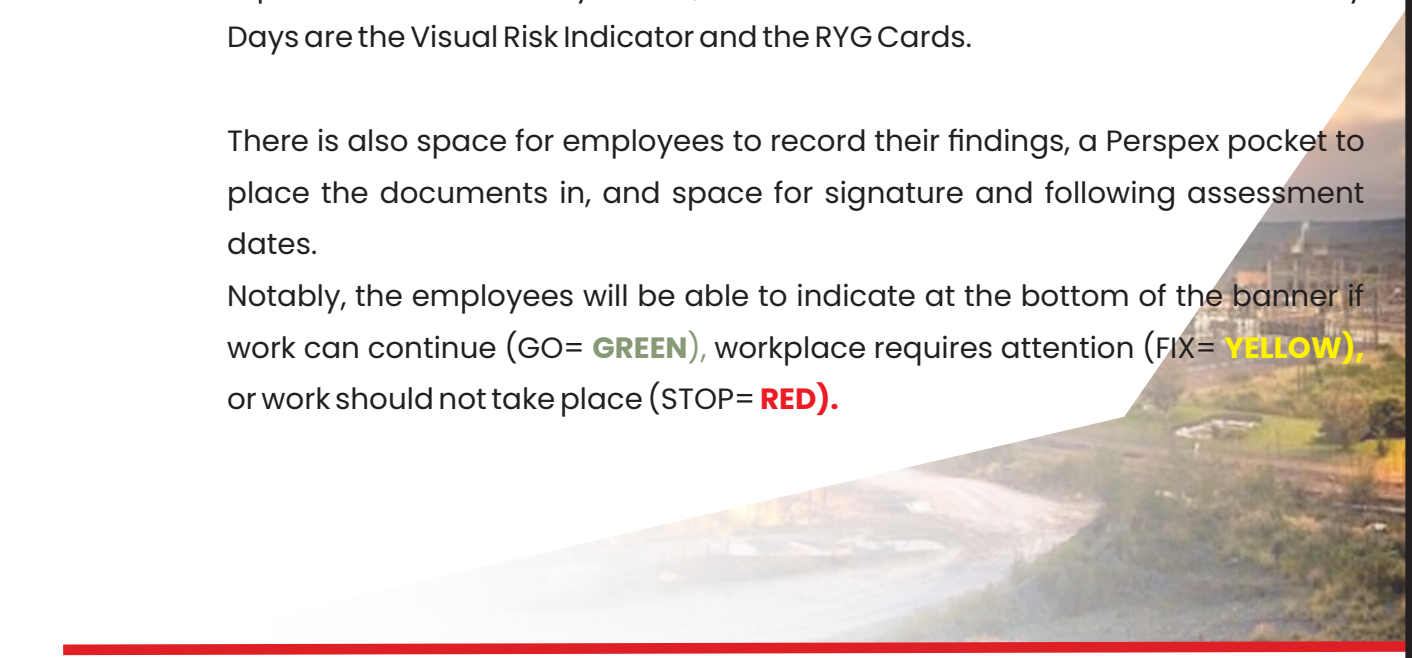
As the figureheads of Operations, leaders must practice Visible Felt Leadership. They need to recognise that the journey to safety excellence either starts at the top or doesn't start at all. Leaders must believe that all injuries are preventable, and they need to demonstrate genuine care for all employees.

Due to this, Harmony has Planned Visible Felt Leadership (VFL) visits by management to workplaces. These visits create a platform for management and employees to discuss the safety challenges of the tasks at hand.

Harmony National Health & Safety Days

The Harmony National Health and Safety Days are an integral part of embed a culture of proactive thinking with a risk assessment being a state of mind. Safety days highlight or create focus on Interventions and topics to make Harmony a Safe, Profitable Mine. Two tools rolled out in Safety Days are the Visual Risk Indicator and the RYG Cards.

There is also space for employees to record their findings, a Perspex pocket to place the documents in, and space for signature and following assessment dates.
Notably, the employees will be able to indicate at the bottom of the banner if work can continue (GO= **GREEN**), workplace requires attention (FIX= **YELLOW**), or work should not take place (STOP= **RED**).



In addition to these, all Harmony employees have **RED,** **YELLOW,** and **GREEN** cards, also known as RYG cards. These cards serve as a handy reference tool that employees can easily keep in their pockets. On these cards, the SLAM principle is explained and explains the Mine Health and Safety Act section 22, 23 and 83 rights.

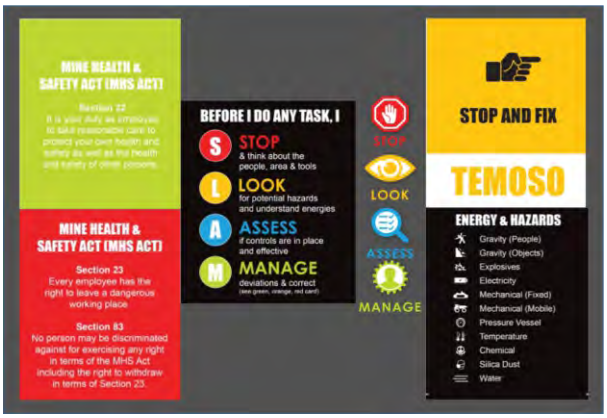
The Mine Health and Safety Act (No. 29 of 1996) aims to protect the health and safety of employees and other persons at mines.

- Section 22 - Employees' duty for health and safety
- Section 23 - Employees' right to leave a dangerous working place
- Section 83 - No discrimination against employees who exercise rights

A list of all the typical energies and hazards we can encounter at the operation also accompanies the RYG cards. Thus, the RYG cards function as the tool the positive behaviour recognition programme utilizes to actively identify employees whose positive behaviour has to be recognized and reinforced.

RYG Cards

When we observe different behaviours, different cards are applied. For example, the **GREEN** card is shown when observing safe-conduct, and work can safely continue. However, when encountering a potentially dangerous situation, the **YELLOW** card is shown. The **YELLOW** card must prompt us to stop, assess potential hazards, manage them, and fix them. If we cannot fix the threat, a **RED** card is shown, and we must stop, barricade off and report the hazard.



S300

The COO and the Executive committee of Harmony Gold initiated S300 in 2020. What drove this was the continued injuries in the underground workings as well as the requirement to achieve our targets. What was required was a strategy to support both safety and production. The Executive committee decided that 300m² is the goal for crews and added the emphasis on safety; S300, Safe 300m² per crew in a production period.

Implement

Harmony instituted tools and processes to support the S300 initiative:

- Syncromine – realistic multi-disciplinary planning and identification of potential risk during planning
- Supporting services to digitally capture inspection findings to monitor workplace conditions
- Visible Felt Leadership to positively engage with employees
- Crew Satisfaction survey for crews to ensure that crews have what they need to work safely

- Monitoring and Reporting platforms and monthly analysis on crew safety and production performance

What is required is that operations plan, continuously monitor and action any issues and non-conformances that arise. Multiple tools have been developed to support this requirement in the form of systems in which to plan production, capture inspection data, monitor the conditions of the workplaces and equipment through planned inspections and monitor the continued competency of employees planned task observations. It is critical that continued / repetitive issues are investigated to understand the root cause and not only address the symptom. Crews are the centre of this initiative. If crews have what they need to mine safely; a workplace equipped to standard, machinery and equipment in good condition, positive engagement by supervisors (open and safe communication) who ensure they understand what is required and the required skillsets; the goal of S300 can be achieved.

Supporting Tools to facilitate S300

As mentioned, multiple tools have been developed to support safe production. Syncromine is Harmony's production planning, booking, and reporting system. Syncromine modules provide a platform in which operations can plan the production workplaces, ensure that start-up risk assessments are conducted to ensure a safe panel and that crews are adequately assigned the required skills to perform the work safely.

Pre-planning ensured that all work is planned, and risk is identified, and this is the starting point to achieve S300. Daily booking functionality within Syncromine ensures that all issues concerning daily production are captured for action and that daily production can be monitored. The Shift boss books daily production and problems within Syncromine to monitor progress towards achieving the plan and proactively address issues; the MO Daily report must be the monitoring and reporting tool.

The weekly crew satisfaction survey was designed to directly support the S300 initiative. The first section of checklist includes content that is critical to safe production; services available (air, water), equipment and winch distances from face, etc. The second section of the checklist is directed to the crew well-being and understanding of what is required. Below an image of the checklist.

SECTION 14

PROJECT GOVERNANCE

What a ride I am on!!! A totally unexpected, unplanned road and journey!! Since joining Harmony I have become very aware of SAFETY in everything I do, I have had to stop and think whereas I normally would have JUST done.

I am now preaching SAFETY to everyone around me and I am constantly reminded by my HRM family when I forget!

I am totally privileged and blessed to be part of the HRM save lives, save mines REALITY CHECK!!

Toulla Hiege

SECTION 14
PROJECT GOVERNANCE

Change Management Approach

Virtually every organisation will, at some point, undergo a transition or change to remain viable and scale. Whether onboarding new employees, growing a department or merging with another company, these changes can significantly impact the trajectory of your business. The role of HRM is to provide a framework to continuously improve Harmony's ability to manage risk within the Company and create a Safe, Profitable Mine.

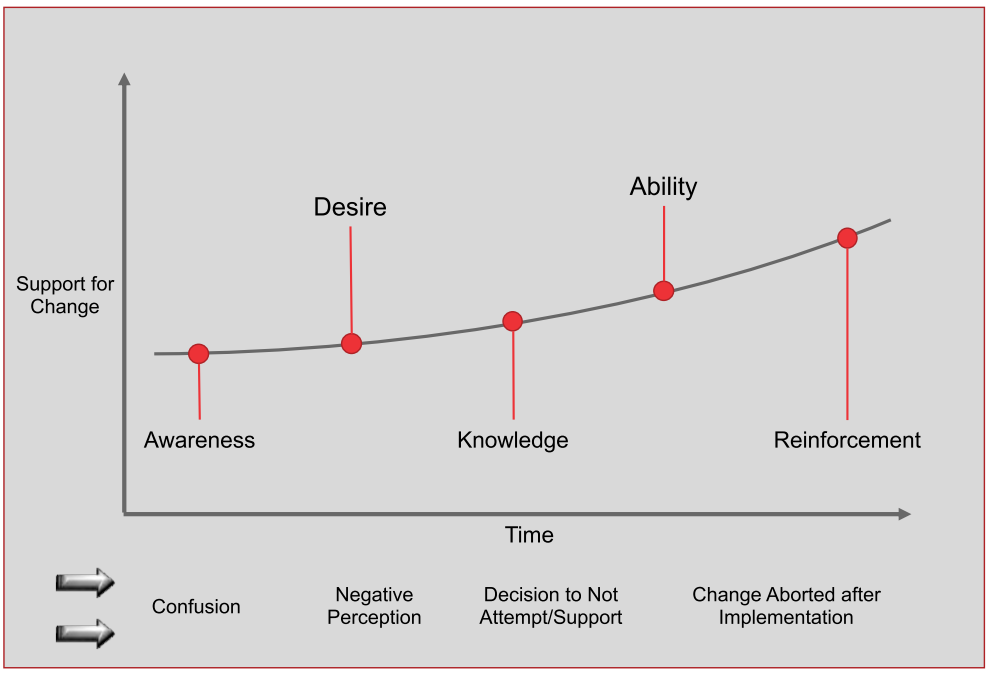
The HRM journey is signified by system development and improved information availability with which to manage risk. Consequently, there is continuous change within the Operational Environment. Although the difference is to improve existing systems and streamline efficiencies, these are changes to how the people within the organisation are used to doing things. The degree to which they change their behaviours and adopt new processes significantly impacts the initiative. Therefore, any change needs to be addressed to ensure that a new way of operating is adopted and embedded within the organisation as the accepted practice.

Organisational change refers broadly to the actions a business takes to change or adjust a significant component of its organisation. The change management approach used by HRM ensures the that employees:

- *are aware of what the strategy is*
- *have the desire to achieve the strategy*
- *have the knowledge to achieve the strategy*
- *have the ability to implement the activities that lead to the strategy*
- *consistently perform activities that reinforce the behaviours required to achieve the strategy*

To manage the change, the ADKAR approach is used. The word "ADKAR" is an acronym for the five outcomes an individual needs to achieve for any change to be successful: Awareness, Desire, Knowledge, Ability and Reinforcement. This powerful model is based on the understanding that organisational change can only happen when individuals change.

The Change Process happens on a continuum where the employee moves over time from Awareness to Reinforcement with risks should these phases not be successfully attained.

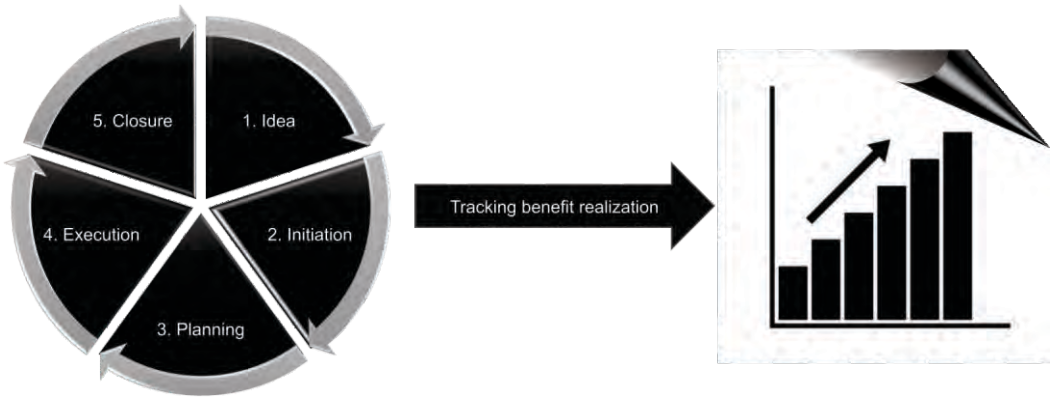


Project Management

To ensure that all the initiatives generated by HRM are rolled out successfully, an efficient Project Planning approach is crucial. Project management is "the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements."

A basic project management lifecycle covers five stages:

1. Idea
2. Initiation
3. Planning
4. Execution
5. Closure



The Project Management process for all these is managed by Project Management Specialists to ensure that company procedures, practices, and operations go right on time, on budget, and in the same way. In addition, PMOs MUST ensure that the projects and programs deliver value through the projects and programs.

Therefore, project management aims to plan and manage a project to complete its listed goals and deliverables successfully. It involves identifying and managing risks, careful resource management, smart budgeting, and clear communication across multiple teams and stakeholders.


NO PPE
WITHOUT
CORRECT
PPE

SECTION 15

SAFE BY ACCIDENT - SUMMARY

I came from an industry where working in the safety department was a very lone position. I stepped into the Harmony Risk Management team and was astonished at the phenomenal way they conduct their day-to-day tasks.

If you are new in the team or you are a part of the furniture, they treat everyone as if they are family. This team has a passion for saving lives and at the same time ensuring the company remains productive.

The HRM team does amazing work in the background and dedicate themselves fully to each and every aspect of the business. I am proud and honoured to be apart of this great team.

Renier Conradie

SECTION 15
SAFE BY ACCIDENT - SUMMARY

Introduction

Safe by Accident introduces us to the idea of Practice vs Principle. Meaning that implementing safety systems is a great idea (Principle), but is just implementing a safety system good enough? Will this idea on its own prevent incidents and accidents? Or do we also, and more importantly, need to create a safe culture based on people's behaviours (Practice) to have adequate safety management.

Part 1 – The Science of Behavior

Chapter 1: ABC Model and the Role of Consequences

In this chapter, the authors emphasise Behavior Analysis as an application to scientifically bring about the positive change in socially significant behaviour. As such, behaviour analysis can be defined as the scientific study of behaviour.

"Behavior analysis is the foundation of all good behaviour-based safety processes"- Safe by Accident.

Consider the OCR system implemented within Harmony Gold. The principle behind the OCR system is a great concept, but if people do not use the system (behaviour/ practice), how effective is the system? Behaviour analysis takes us on a journey to understand why some of these "negative behaviours" are present in our workplaces and how to manage and change that into "positive behaviours".

In any company, safety must make its way from the Top-down and not the other way around. The application of behaviour analysis can improve safety leadership, and this, in turn, will have a positive impact on frontline safe work practices.

Organisations must apply behavioural science to everyone and not just certain persons, tasks or positions. Behavioural; Science will avoid people falling into the trap of being bias towards their work, e.g. A mine manager instructs an engineer to perform a specific task, based on how he (mine manager) perceives the job to be completed even though both parties know it will be unsafe.

Furthermore, we need to look at science vs technology; we are in the 21st century, after all, with all this fantastic technology that is readily available at any given time.

So why would we need to apply behavioural science when we have all this technology around us? The technology uses the best information available at that time to solve problems, and it looks for an immediate application; however, in an ever-evolving world, technology is still incomplete, e.g. Harmony's OCR system scans for specific criteria in a document to populate a completed form, but verifiers (people/behaviour) is still required in certain circumstances to give assurance to the accuracy and correctness of the scanned document.

When we look at behavioural science as the ABC model, whereby A (Antecedents (preceding matters/ influencers)) influences B (Behavior) and is followed by C (Consequences), we quickly realise that the rate of behaviour can be increased or decreased based on the consequences involved.

There are three ways to increase the rate of behaviour – Positive and negative reinforcement and recovery.

Positive reinforcement can have positive and negative effects. For example, yelling at a person for a safety offence may increase that behaviour (if the offender enjoys the attention). Therefore, yelling could be classified as positive reinforcement. However, the consequence of the yelling could increase the unsafe behaviour.

Negative reinforcement, on the other hand, can also increase the rate of behaviour. Negative reinforcement can be summed up quite easily. First, it could simply be behaviour that is aimed at avoidance of punishment for unsafe actions. Secondly, it could be due to fear of repercussions (Employees will only follow safe practices because they don't want to get into trouble, so they do not see the personal value in working safely). Lastly, it could affect the workforce involvement in safety-related campaigns, practices, meetings, etc.

Recovery is the final cause of increases in the rate of behaviour. Simply put, people disciplined for safety offences only behave safely when a supervisor or manager is present and continue with the unsafe acts when the 'authority figure leaves.

Chapter 2: Effective Consequences and the Role of Antecedents

In this chapter, the authors explain the characteristics of practical consequences by looking at behaviour patterns. They determine that every behaviour has multiple consequences that usually is a mixture of positive and negative.

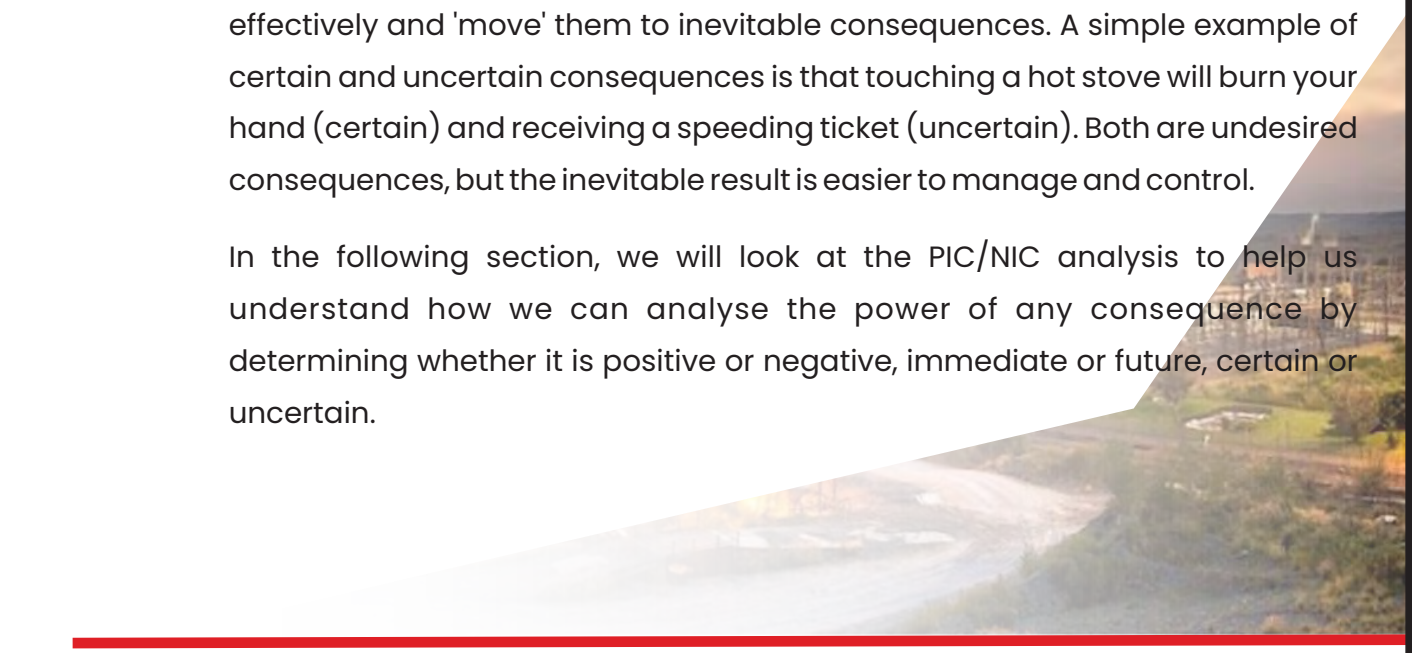
The first step of identifying and managing patterns within an organisation would be to acknowledge that if the favours of at-risk behaviour, then at-risk behaviour will occur; if the design favours the safe behaviour, then the safe behaviour will occur.

People who generally take more risks, irrespective of the dangers, have a greater chance to get hurt, hurt others or cause property damage. If we can analyse consequences accurately, then only can we predict and change behaviour, e.g., Harmony Gold conducted a test on electricians to see how likely they are to take risks (at-risk behaviour), by performing these tests, they have determined who is more likely to be involved in unsafe behaviour and effectively eliminated that at-risk behaviour from the company (applicable only to those persons).

The scenario mentioned above clarifies that assessing a person can identify at-risk behaviour using assessing individuals (where possible). Assessing Behaviour could be done, for instance, at the interview stage or through regular social engagements by leaders (talking to employees).

Consequences can be both certain and uncertain. Uncertain consequences need to receive more time and effort to manage and control the outcome effectively and 'move' them to inevitable consequences. A simple example of certain and uncertain consequences is that touching a hot stove will burn your hand (certain) and receiving a speeding ticket (uncertain). Both are undesired consequences, but the inevitable result is easier to manage and control.

In the following section, we will look at the PIC/NIC analysis to help us understand how we can analyse the power of any consequence by determining whether it is positive or negative, immediate or future, certain or uncertain.



The immediate and certain consequences (positive or negative) are most potent, whilst negative, direct, but uncertain consequences are less powerful.

Let's consider a TMM/ RBE driver/ operator speeding whilst operating the equipment.

Consequences	P/N	I/F	C/U
Get work done faster	P	I	C
Going fast (more fun)	P	I	C
Avoid being teased by other employees for being slow	P	I	C
Stay on schedule	P	I	C
Praise/ bonus for productivity	P	F	C
Getting hurt/ damaging property	N	I	U

P = PositiveN = Negative

I = ImmediateF = Future

C = CertainU = Uncertain

By looking at the above analysis, we see 4x PICs and one for PFC for speeding. In this analysis, there is only one negative, and we determined that it is uncertain (the incident won't necessarily happen), so it is weaker. We can quickly pick up that three of the positive consequences are related to unsafe behaviour, has resulted in better productivity. Thus, working quicker, relates to getting more work done (perception of the employee involved in the unsafe behaviour) even though they put themselves and others at risk.

The same analysis can be used on supervisors (and all levels within the Organisation), and we will quickly determine that supervisors engage in at-risk behaviour (unintentionally) by praising personnel for high productivity without checking if the employee did the work without violating any safety rules (drivers/ operators bridging equipment).

The Organisation must also look at antecedents; mentioned in Chapter 1. These matters could play a crucial role in identifying and addressing at-risk behaviour and implementing effective reinforcers (essentially, tools to create a positive, safe culture). Reinforcers do not mean that every safety violation has to be punished, but more as tools to encourage employees and leaders to develop a safety culture.

We need to focus more on the outcome that we want (achieving a safe culture) instead of what we don't want, and what we want is a safe culture throughout the entire Organisation, so why are we not focusing/ emphasis on that?

PART 2: Seven Safety Practices that Waste Time and Money

Chapter 3: Practice #1: Focusing on Lagging Indicators

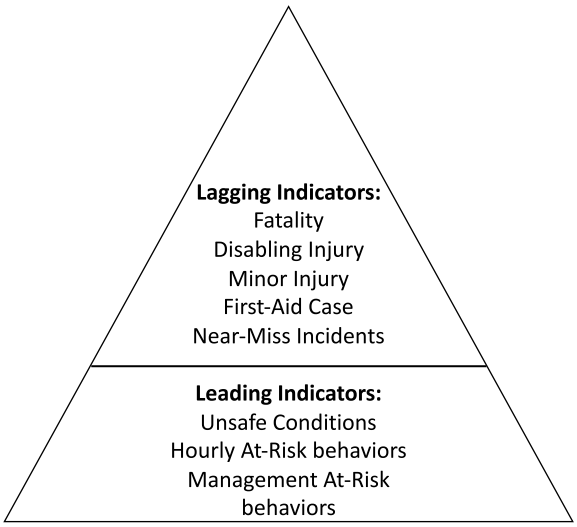
We will now look at lagging and leading indicators. Lagging indicators in safety are measurements such as Incident rates, LTIFR, severity rates, etc. These indicators only give you data after the incident/ accident, meaning that it is reactive. Unfortunately, most organisations' safety is measured reactively, and these do not effectively manage or prevent incidents/ accidents on a day-to-day basis.

What we need to strive for is the proactive management of safety. Harmony Gold is a prime example of moving to and implementing proactive safety management by motivating employees, especially leaders/ management, to be proactively involved in safety and hold them accountable. The efficacy has been proven based on incident-free shifts, increased production and the drive from senior management down the lines (increasing the general attitude towards working safely).

The authors compare the safety management process to quality within the workplace. Organisations that have high-quality inspections more actively monitor the process. High-quality inspections mean that they know which employees have problems with their equipment or processes; this allows the issue to be contained and corrected immediately (Proactive management of issues).

Leaders/Operations can directly carry over these management applications to the proactive management of safety, e.g. A loco driver conducts a PRE-use inspection on his loco, whilst conducting the inspection, he realises that the brakes don't work as they are meant or designed to, the loco is then taken out of operation and sent for maintenance. If the pre-use was not implemented, that loco driver would not have identified that the brakes are in poor condition and would have caused an accident that may result in severe injuries or, worst-case scenario, multiple loss of life.

The following iceberg illustration below will demonstrate the differences between lagging and leading indicators.



Typical measures such as training, safety meetings, safety management systems, etc. are considered to be proactive; however, on their own, they do not give assurance that the workplace is free of hazards, equipment work as it should and that people are acting/ working in a way that will prevent accidents/ incidents to themselves or others. Typical signs of a reactive approach could include periods of 'silence' around safety followed by a significant influx of activity once there is an incident or Accident or when employees mention that they only hear about safety when a monthly safety meeting was held or after an incident has happened.

Another excellent example of a proactive approach, Harmony Gold has implemented the Thibakotsi and SLAM (Stop, Look, Access, Manage) campaigns, which in itself is the essence and much-needed steps towards achieving a proactive safety culture within their workplace, it is a "way of life". They manage and track A hazards (Priority/ hazards that could cause significant unwanted events) and hold leaders/ senior managers accountable (most senior managers also accept responsibility for safety) against the identified A hazards. Holding Leaders to account ensures that those risks are addressed timeously and with great focus by the relevant people, preventing multiple loss of life incidents/ accidents. A quote from one of the Harmony Risk Management department's team members, Derrick Naidoo, once said, "even if we can save just one life, it is worth it", and with this system, many lives are and will be saved.

Chapter 4: Practice #2: Injury Based Incentive Programs

What are the roles of safety incentives within an organisation? This chapter will look at how incentives are used and the positives and negatives of incentives in safety.

Some may argue that safety incentives are the ultimate way to encourage the workforce to work safely, thus preventing incidents and accidents continually. However, others argue that incentives are not a viable way to motivate safe behaviour. (Harmony uses safety bonusses that have a great impact on safety management).

- Usually, incentives are given to employees based on not having an accident. Since all companies have the goal of zero accidents/ zero harm, it would seem that incentives are a good motivator for achieving that goal. However, employees can achieve incentive goals in the following three ways:
- Employees that work safely earn the incentive through safe behaviour. In this case, the incentives achieve their goal by motivating safe behaviour, which prevents incidents/ accidents.
- Employees engage in at-risk behaviour but are lucky in terms of those behaviours; No incident or Accident happened. In this case, luck is rewarded and not behaviour. No accident could lead to employees thinking that the at-risk behaviour is okay.
- Employees engage in at-risk behaviour where some of those behaviours lead to incidents/ accidents, and to avoid losing the incentive; they do not report the incidents/ accidents. In this case, incentives motivate the non-reporting of incidents.

Many companies will avoid giving safety incentives due to the last point mentioned above, as it proves to be problematic in preventing incidents. However, the second point is also an issue from a behavioural perspective. It is one of the many challenges in safety to convince people that at-risk behaviour will hurt them, even though it has not happened yet.

Earning safety incentives, for instance, as per the 3rd point above, can have negative consequences as the incentive becomes a reinforcer for at-risk behaviour. Therefore, when we use incentives for safe behaviour, we must eliminate injury-based incentives

systems and reward scenario one above by carefully monitoring positive, safe behaviour that doesn't lead to non-reporting of incidents to receive a reward. It is also essential to determine and separate whether employees only like incentives or want them to improve safety (living a safe culture).

We also need to understand that safety incentives are not a quick fix to a 'good' safety system or safety culture/behaviour. Creating a performing safety culture within the whole Organisation is a complex process that will not happen overnight. Therefore, the point of the safety incentive system should rather be to motivate employees to engage in safe behaviours that will prevent incidents/ accidents.

The Organisation should implement a positive reinforcement system in conjunction with an incentive system, but the reinforcement system should be far greater than the incentive system. Finally, the authors made a list of the crucial characteristics of reinforcement systems for safety improvements:

1. **Pinpoint safe behaviours** and ensure that they are directly linked to the intended safe behavioural outputs. When we focus on behaviours that directly impact incidents/ accidents, the reinforcement system is much more likely to succeed.

2. **Analyse your incidents** and near-miss data to identify (1) which safe behaviours might prevent your most common injuries and (2) which safe behaviours might prevent less common but more severe injuries. After determining the 'high-risk' behaviours, we need to validate our analysis by observing those behaviours in the workplace. It is possible that the incident statistics do not accurately pinpoint the most critical behaviours.

3. **Engage people at all levels** of the Organisation with pinpointed safety behaviours. To create an excellent safety culture within the Organisation, everyone should engage in behaviours that prevent incidents. Pinpointing behaviours at mining levels is more manageable. However, it is critical to identify what staff, supervisors, managers and executives can do to directly or indirectly prevent incidents/ accidents. Many people feel that this process is too time-consuming and might not be interested in investing their time into contributing to the reinforcement system ("someone else can or will do it eventually"). However, through years of research and results, has it been proven that the time spent on this is well worth it. For example, Harmony Gold includes senior management and executives in specific preventative measures, such as Bowties, A hazard reports, safety drives and campaigns, etc. These preventative measures put them into a different level of managing safety through safe behaviour and creating a safety culture.

4. **Mix social and tangible reinforcers**. Telling someone “well done" or giving them a thumbs up for every safe behaviour may reduce or eliminate the effectiveness of the reinforcer. The authors note that a blend of social and tangible (with a heavy emphasis on social) is the most effective reinforcer. Various preventative measures that are identified (such as pre-use inspections on locos) can be mentioned and the benefits. This social reinforcement creates a sense of pride in employees when they are engaging in safe behaviour. Social reinforcement also gives them the feeling that they are genuinely helping themselves and others when engaging in safe behaviour.

Chapter 5: Practice #3: Awareness Training

Training is a crucial component of any business, as people and organisations can gain knowledge through training. Employees need to be trained in the use of specific equipment, hazards involved with their tasks, or even simply on documentation such as bowties, risk assessments, safety systems (PIVOT, OCR, Syncromine, etc.) no use in implementing such measures as preventative controls. Still, no one knows how to utilise these systems to their full potential.

Often training is seen as a preventative control in many companies and industries and aims at changing behaviours; training on its own will not prevent incidents/ accidents or change behaviour. There is a human factor connected here, and if we do not act as we were made aware or trained effectively, it has zero impact on the prevention of incidents/ accidents. Something to consider, Dr Cloyd Hyten developed the TRAC model. In short, it shows that training is only one of four major causes of performance issues. However, if we find that training is one of the leading factors in certain employees' behaviour, we need to consider if the training is fluent.

Harmony has done a relatively good job of implanting fluent training and not just awareness, e.g. the HRM department provides training for managers on how to complete bowties. The training enables more senior managers to take an issue and create a new bowtie from scratch and develop that bowtie fully. There is no need for safety officers to spend all their time completing these types of documents and balancing that with their work.

Chapter 6: Practice #4: Safety Signage

There are three main types of signs: Compliance signs indicate non-negotiable entry requirements into a particular area, such as PPE, authorised personnel only, etc. Then there are Information signs – These signs will typically only provide information and are not compliance-related, such as safety meeting dates, training to be held, etc. Lastly, we have inspirational signs.

These are the signs that I would like to focus on as these types of signs will usually motivate employees to strive towards a safe culture rather than safe behaviour solely based on compliance to 'keep the bosses' happy.

Some examples of these signs are; 'Think Safety', 'Safety Starts with You', 'Safety First', etc. In addition, harmony has greatly emphasised a visual safety culture and implanted a 'mascot' called Thibakotsi. Thibakotsi is instrumental in carrying over the correct safety message to everyone and every level within the company and has been proven to adjust the mindset from safety compliance to safe behaviour/ culture.

Thibakotsi is also a clear indication of how safety starts and is driven from the top-down as various levels within the Organisation has had an input into the Thibakotsi message and illustration with a great emphasis on the CEO big five, the live longer journey and SLAM (Stop, Look, Assess, Manage).

Chapter 7: Practice #5: Punishing People Who Make Mistakes

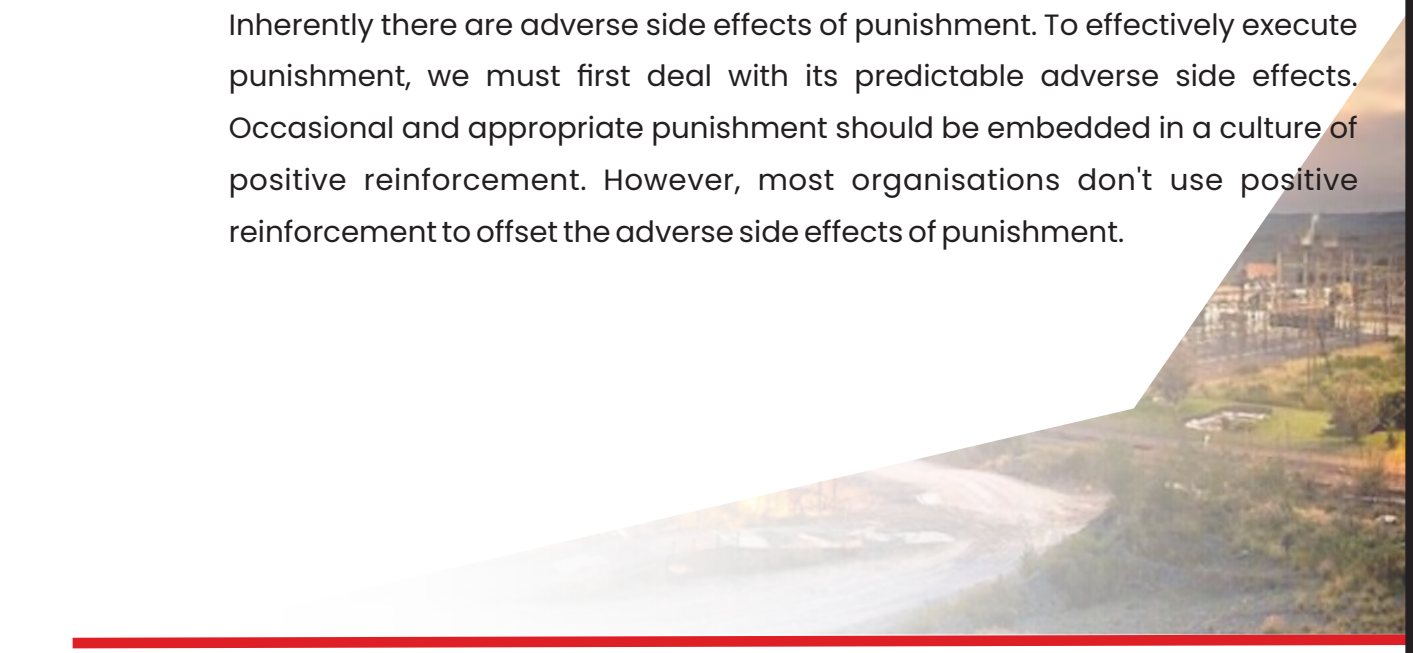
> In this chapter, we will briefly look at how the punishment fits into the workplace and its effect on employees. Firstly, we need to understand the difference between punishment and discipline.

Discipline means instructing a person to follow a particular code of conduct or set of procedures (the person can self-manage/ engage in safe behaviour).

Punishment – is the consequence that follows after behaviour to reduce its frequency and refers to acts intended to reduce the behaviour.

Several variables impact the effectiveness of punishment, and that makes it difficult to use. Punishing things vary from person to person (one person may react to a monetary punishment whilst another may not be bothered by it at all); general punishment actions/ processes are not likely to work.

Inherently there are adverse side effects of punishment. To effectively execute punishment, we must first deal with its predictable adverse side effects. Occasional and appropriate punishment should be embedded in a culture of positive reinforcement. However, most organisations don't use positive reinforcement to offset the adverse side effects of punishment.



The authors list some of the effects that improper punishment can have on employees:

- Low morale
- Lower productivity
- Decreased teamwork
- Decreased volunteerism
- Lower trust
- Desire to retaliate
- Suppressed reporting of incidents, accidents and near misses

All of the above are problematic in the Organisation and can lead to poor safety culture, especially the last one; this again ties in with the incentive system we mentioned in one of the previous chapters. Suppressed/ fear of reporting incidents is a significant concern and will not address at-risk behaviour within the workplace.

Let's look at why companies make use of punishment for safety incidents/ accidents or at-risk behaviour.

1. Punishment provides a sense of doing something.
2. .Using punishment to ensure the employee doesn't do it again
3. .Punishment is used to set an example
4. No other measures or campaigns produced the desired effects
5. Management may sometimes use punishment to demonstrate action to external parties
6. Using punishment when others call for "someone to pay."

Accountability must be a crucial part of any company's safety culture/ system. Harmony Gold has five values that it determined are crucial to the business, and one of them is accountability. Many companies state that accountability is part of their value or safety system, but how can this be measured?

We can look at two types of accountability; Forward-looking accountability and backwards-looking accountability. Backward accountability is about finding someone to blame and punishing them for their actions (reactive actions). Forward-looking accountability, on the other hand, is to acknowledge that the employee made a mistake and the harm that it caused, but it identifies the changes that are required and assigns responsibility for making and implementing those changes (pro-active action);

This is where Harmony Gold shines, as they have placed accountability on every person, but especially senior managers. This method has proven to effectively and quickly identify potential incidents/ accidents and prevent them from happening.

Chapter 8: Practice #6: Misunderstanding Near Misses

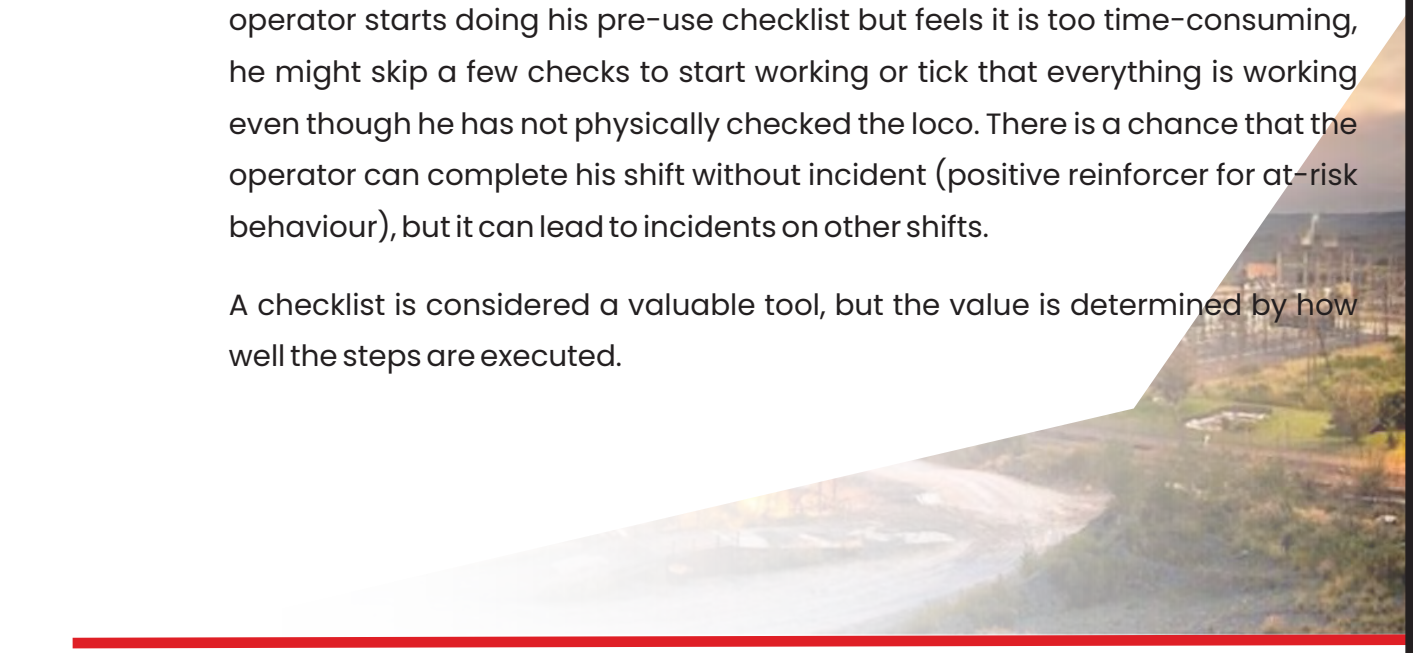
Near misses are classified as incidents that happened, but incidents caused no injuries or damage (it has the potential to do so). So if no injuries or damage occurred, why should they be reported? Is there any value to near misses?

Near misses can be used as valuable information on hazards, training, supervision and high potential incidents. As such, non-reporting of near misses can be a result of poor management and supervisory practices. Near misses should always be considered as a valuable tool to provide data on workplace cultures. We don't necessarily want plenty of near misses, but reporting should be encouraged (can assist in incident prevention); when no near misses are reported, red flags should go up as this can have negative consequences.

What do near misses tell us about behavioural chains? For example, if an experienced employee is involved in a near-miss, the behavioural chain or habit is considered weak. "The integrity of a behaviour chain refers not only to an undivided or unbroken completeness of a performance but also to the tempo or rhythm of the performance as well."

We need to ensure the integrity of a behaviour chain. Longer behaviour chains increase the probability that a step can be left out, or modified, e.g. If a loco operator starts doing his pre-use checklist but feels it is too time-consuming, he might skip a few checks to start working or tick that everything is working even though he has not physically checked the loco. There is a chance that the operator can complete his shift without incident (positive reinforcer for at-risk behaviour), but it can lead to incidents on other shifts.

A checklist is considered a valuable tool, but the value is determined by how well the steps are executed.



Management response to a near miss or near misses is critical when trying to create a safety culture. First, management should be held accountable for near misses as they are usually 'more knowledgeable' on specific procedures or processes, and near misses allows management to identify minor variances in procedures versus actual actions performed, and this also provides them with a great chance to correct the near misses to ensure they are prevented in the future. For example, PTOs can be done on employees to ensure that they are following the correct procedures and completing the task as employees should do it. In addition, management can determine where the lack lies, a training issue, motivation, attitude, etc.

Chapter 9: Practice #7: Thinking that Checklists Change Behavior

Checklists have been proven detrimental in creating and managing safer behaviour and identifying hazards before they occur. On the other hand, checklists can provide precious data to the user and the reader, such as an antecedent (providing instructions on what to do and checklists did the correct order to do it, measurement tools for checking that tasks and a feedback mechanism for the user to see the progress on their inspection as well as to management.

A checklist, however, cannot change behaviour. There have to be consequences of changing behaviour. So we need to combine checklists with consequences to maximise their effect, and Operations can do that by using the following methods:

- Put checks on the checklist that represents behaviour and accomplishments that have been completed correctly and safely.
- Make sure that items on the list are observed apart from the checklist to ensure the quality and safety of the performance.
- Finally, ensure that the use of checklists is paired with positive reinforcement.

Checklists are most effectively implemented when driven by a manager or leader. The process reiterates the sequence needed for specific tasks and how well they are completed.

PART 3: Effective Safety Leadership

Chapter 10: Relationship Development

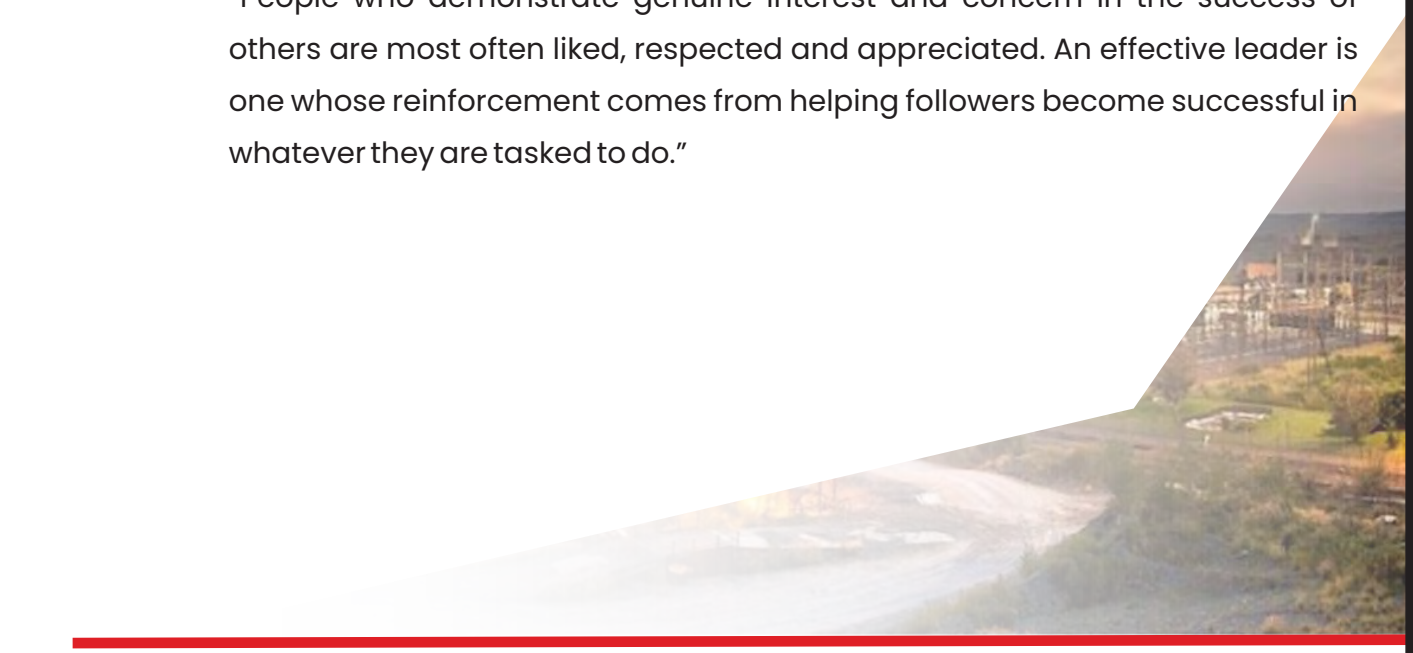
The next part will focus on broader steps that leaders can take to create a high-performing safety culture. The authors have chosen the focus on the following four leaders activities throughout Part 3 and these four activities (pillars of safety leadership) as they represent the most significant opportunities for improvement.

1. Relationship development
2. Using science to understand at-risk behaviour
3. .Maintaining a safe physical environment
4. Creating systems that encourage safe behaviour

Relationships at work are significant in any company as they alter reinforcer effectiveness. In other words, relationships set the context for effective reinforcement will be.

Relationships in the workplace have proven to alter the attitude and behaviour towards safety. Teams generally perform better in safety and production when their Supervisors have good relationships with them. The opposite is also true for bad relationships. Bad relationships lead to weaker overall safety and production performance, and this means that there will be a noticeable decline in attendance of safety meetings and participation in safety campaigns. Less attendance will lead to poor safety behaviour and culture, as mentioned in the previous chapters.

"People who demonstrate genuine interest and concern in the success of others are most often liked, respected and appreciated. An effective leader is one whose reinforcement comes from helping followers become successful in whatever they are tasked to do."



The following list depicts consistencies of ineffective management/ employee relationships and will be listed as behaviours.

- Set clear expectations
- Listen
- Acknowledge good work, not just mistakes/ problems
- Ask questions to understand problems/ issues
- Ask for feedback about your effectiveness and areas for improvement
- Avoid placing blame on people
- Respond fairly to incidents
- Admit when you make mistakes
- Solicit input and opinions from direct reports
- Follow through on commitments
- Stand up for direct reports
- Remove roadblocks to set direct reports
- Provide feedback that helps direct reports improve
- Demonstrate that you trust your direct reports
- Treat direct reports like people, not just employees

Chapter 12: Using Science to Understand At-Risk Behavior: Rare Errors"

The way an organisation handles rare errors is a litmus test for how well leaders understand behaviour as it relates to safety. Rare errors are often approached as individual or group failures, when in fact they are most often a failure of leadership."

Two causes of rare errors are inadequate training and an environment that does not produce enough reinforcers to keep employees focused on the task. (Safe by Accident describes the focus as the employee/s are immune to environmental elements that would tend to distract them).

Many incident investigations conclude that the error was on the employee error was the cause of the incident/ accident when the actual cause was a failure of training. We need to determine whether a safety issue is the result of inadequate training or ineffective consequences. Organisations should be the first line of analysis in an effective safety system.

Next, we will look at the role of consequences in rare errors. We will refer to sleeping on the job as an example to explain. Repetition is not what makes a job dull. Often, when an employee is caught sleeping on the job, it results from poor job design and not personal factors. "Repetition without enforcement will cause even the most vigilant employee to lose their motivation eventually." We need to realise that blaming the employee for losing concentration or attention is most often the wrong conclusion. The loss can stem from a lack of adequate reinforcement from the system or management behaviour.

Increased risk of catastrophic failure

Many organisations don't understand that companies with an excellent safety record are at higher risk for catastrophic failure than those actively working towards improving their safety culture and behaviour. One of the biggest concerns in recent times is complacency. Complacency can accompany a high safety performance standard, resulting in few reinforcers to monitor *behaviour.*

Methods for protecting against the rare error

Knowing the science of behaviour in detail produces solutions to many problems that have plagued organisations for a very long time. For example, companies can implement random score based systems on employees to ensure that they are accurately picking up errors or completing tasks that have been given to them.

Chapter 13: Maintaining a Safe Physical Environment

Creating and maintaining a safe workplace is the ultimate responsibility of any leader in the Organisation, and it is their responsibility to control the hazards associated with physical workplaces.

The most commonly used method for maintaining safe environments is the hierarchy of controls. The best way is to try and control hazards from the top down, starting with elimination and moving down. In most cases, elimination would mean that many businesses will have to close their doors because their sole business is inherently hazardous.

Critical components of a hazard process

Considering the entire science of behaviour, we need to develop some critical components for hazard identification and mitigation. We can do this by the following means:

Make reporting easier. In the case of Harmony Gold, they use an OCR system that effectively renders reporting immediately available. In addition, it provides employees with multiple ways to complete inspections, audits and reports (digital upload/ completion or the standard paper printable checklists).

Make hazard lists publically available (ensure all employees have access to a 'risk register'). Lists of hazards also allow employees and management to pressure the accountable person to close out hazards.

Seek input on a suitable resolution from all stakeholders. Only receiving input from one area may not provide the sufficient controls that are desired to address hazards.

Ensure that when employees report a hazard, they are aware of the progress in addressing the reported hazards. Many employees complain that they reported hazards but never received any feedback. A Lack of feedback could lead to non-reporting of hazards or losing trust in management.

Chapter 14 & 15: Bringing it all Together

What is the mission of safety?

The ultimate goal of safety is to have zero incidents/ accidents and zero harm to employees whilst still being extremely productive and making high profits.

As in many organisations, safety should not be a mission to strive for – a mission aims at achieving a goal and only doing it once. So how is safety the ultimate priority? Safety should be a value, culture and second nature, just as breathing is. Only then will we be able to effectively and with certainty say that we genuinely care about safety and reach the ultimate goal of zero harm.

What exactly is the 'mission' then of safety professionals or departments. The Organisation must fully integrate safety into every process to ensure better quality products and safer and faster production. Harmony has integrated the safety department into every aspect of its business, and the results show. Safety is involved from mining plans until the refined gold is drop off at its final destination.

"Safety does not, or should not, exist in a vacuum. Every Organisation exists to produce a product or service that consumers are willing to buy. If safety doesn't facilitate business, it runs against the natural flow of the Organisation and the safety department will always be in a position of having to push managers and supervisors to view safety as a number one priority when in reality it is not."

The mission of the Organisation and that of all the safety role players should be the same. Otherwise, there will be conflicts in the way of safely producing or providing a service. For example, imagine a company only focused on production and using the safety department purely for legal compliance. Incidents are bound to happen, and the chance for catastrophic failures are significant.

What is a high-performance safety culture?

Safe behaviours should be habitual at all levels within the Organisation, meaning that all employees within the company must behave safely without needing to think about safety all the time. High-performance safety culture shows that safe behaviour is not at a single level. If safe behaviour is not at a stable level, general performance will not be at a stable level. Once safe behaviours are habitual, they will no longer interfere with production but rather increase productivity in employees and in turn, prevent the significant losses associated with incidents and accidents.