

INTEGRATED PRODUCTION INFORMATION

Standardising mining information to
achieve the production of safe, profitable
platinum



CONTENTS

AUGUST 2015

- 03 Foreword**
Project FastForward
- 04 Message from the CEO**
Unlocking safe, profitable platinum production
- 05 Message from the Executive Head of Mining**
Becoming the best miners in history...
- 06 Message from the Head of Mining**
Gearing the business for safe, profitable platinum
- 08 Business planning**
Macro view: Evaluating the options
- 10 Minerals resources management**
Integrating MRM tools for short- and long-term planning
- 12 Survey graphics**
MRM Systems and Business Process Mapping
'The art of understanding'
- 16 Survey graphics**
MRM, survey graphics and the digital plan:
Towards full spatial graphics
- 20 Spatial Data Integration**
MineRP
- 22 Half-level optimisation**
Optimising the underground value chain
- 23 Human Resources**
Standardising HR terminology, rules and reporting
- 26 Performance management**
Integrating safety, labour and production statistics into a Production
Monitoring Solution (PMS)
- 26 Performance management**
Corporate reporting
- 30 Safe efficiency production incentive**
Cultivating a safety mindset which allows teams to determine their
bonuses
- 32 Information Management**
Developing software on new hardware to deliver information timeously
and reliably
- 34 Integrated Production Information**
IPI Project Management and Operational Readiness
- 36 Change Management**
Change Management – A continuous process
- 36 Future Fastforward**
The future
- 38 Conclusion**
The foundation for safe, profitable platinum has been laid

FOREWORD – PROJECTFAST FORWARD

GORDON SMITH, EXECUTIVE HEAD: TECHNICAL

Modernisation of the South African mining industry is crucial to global competitiveness. Central to this is the identification, development and adoption of technologies and working practices that integrate across functions.

Project FastForward is one example of this type of collaboration and innovation.

With industry margins being squeezed on all fronts, we must embrace new technologies and innovate if we want to find more productive, efficient and sustainable ways of extracting value from the minerals we mine. We simply can't rely on incremental changes that perpetuate past practice or a business-as-usual philosophy to get us out of this predicament.

Major innovation is exactly what our industry needs to solve its critical challenges. In fact, mining needs to leap forward 20 years in the next five... For us at Amplats, that involves moving away from the past conventional ways of planning, from labour intensive underground mining, with its high demands for people,



energy and expensive infrastructure, to a modern way of mining.

Project FastForward provides an integrated set of modern planning tools and software platforms that make mine planning and management more efficient.

It is the first of many bold steps we are to take to modernise our business.

“

**PROJECT FAST FORWARD
PROVIDES AN INTEGRATED SET
OF MODERN PLANNING TOOLS
AND INTEGRATED SOFTWARE
SYSTEMS...**

”

UNLOCKING SAFE, PROFITABLE PLATINUM PRODUCTION

CHRIS GRIFFITH, CHIEF EXECUTIVE OFFICER

The ultimate objective of Platinum is to produce safe, profitable platinum. To achieve this objective, we have to grow beyond the fragmented approach which unfortunately still exists in our business – and Project FastForward has laid the foundation to achieve this objective by giving management and, more importantly, front-line supervisors, immediate and accurate production information.

For our Mining personnel, FastForward gives the assurance that each individual's performance is measured and rewarded. The Safe Efficiency Production Incentive is easy to understand and it allows each team to plan production in accordance with a predetermined bonus structure.

Ultimately, FastForward makes it possible to efficiently manage individual workplaces, proactively and transparently – making it easier to achieve our goal of producing safe, profitable platinum.



ULTIMATELY, FASTFORWARD MAKES IT POSSIBLE TO EFFICIENTLY **MANAGE INDIVIDUAL WORKPLACES, PROACTIVELY AND TRANSPARENTLY** – MAKING IT EASIER TO ACHIEVE OUR GOAL OF PRODUCING SAFE, **PROFITABLE PLATINUM.**



BECOMING THE BEST MINERS IN HISTORY...

PIETER LOUW, EXECUTIVE HEAD OF MINING



Through FastForward we are passing the power back to where it belongs – the frontline, enabling all Mining people to work together as one, large team, but based on each individual's input.

This puts the production of safe, profitable platinum within our reach. May we all reap the benefits of this transparent and essentially simple system.

My dream is that we become the best miners in history – and Project FastForward gives us the means to achieve that distinction.

“

MY DREAM IS THAT WE BECOME THE BEST MINERS IN HISTORY – AND PROJECT FASTFORWARD GIVES US THE MEANS TO ACHIEVE THAT DISTINCTION.

”

GEARING THE BUSINESS FOR SAFE, SUSTAINABLE SUCCESS

FRIK FOURIE, HEAD OF MINING

THE CHALLENGE

Optimise production and costs, safely – that was my brief when I joined Platinum in 2010.

Delivering on these key performance indicators (KPIs) requires accurate and uniform information from across the mining value chain – “one version of the truth” and it can only be achieved through excellence in planning.

Unfortunately, information on which to base planning decisions was not available in a uniform format, not always available in real time and scattered in isolated silos, (some 42 databases) both within and across disciplines and operations.

THE SOLUTION

The recommendation was to develop an integrated system in which information could be captured and from which variances to rules would be automatically highlighted to enable quick and accurate reaction to production challenges. The team’s aim was to fix the problem at source.

By developing an information system which would display the wide-ranging information in a single dashboard, underpinned by disciplined criteria that are well defined:

- job-key number,
- activity number,
- gang number,
- cost centre, and
- workplace 3D number.

“

PLATINUM IS DETERMINED TO ACHIEVE ZERO HARM, NOT ONLY BECAUSE THE WORKFORCE DESERVES TO WORK IN A SAFE ENVIRONMENT, BUT ALSO BECAUSE SAFETY ULTIMATELY OPTIMISES PRODUCTION AND SAVES MONEY, CREATING EXPANSION AND JOBS FOR OUR CHILDREN.

”



THE OBJECTIVE

We set out to develop a fast, accurate and high-quality system for miners, by miners. We had to compare apples with apples.

Information from a wide range of applications would feed into a software package called Production Monitoring System (PMS). PMS would, per workplace:

- **report** business achievements according to the three main levers in mining production – face length, face advance and blast frequency;
- **link a crew** to a workplace (the so-called golden thread in efficiency) and match crew manning with team job requirements which are based on the business-plan blue-print for skills requirements instead of worker numbers;
- **calculate** the safe efficiency production incentive (SEPI) bonus; and
- **update** the three-dimensional survey graphics for short-term and the CADSmine programme for longer-term planning and eventually set up the platform for spatial interaction of all the systems.

Safety would weigh heavily in all equations. For instance, one lost-time injury would penalise a team's bonus by 30%. Platinum is determined to achieve Zero Harm, not only because the workforce deserves to work in a safe environment, but also because safety ultimately optimises production and saves money, creating expansion and jobs for our children.



Frik Fourie, Head of Mining

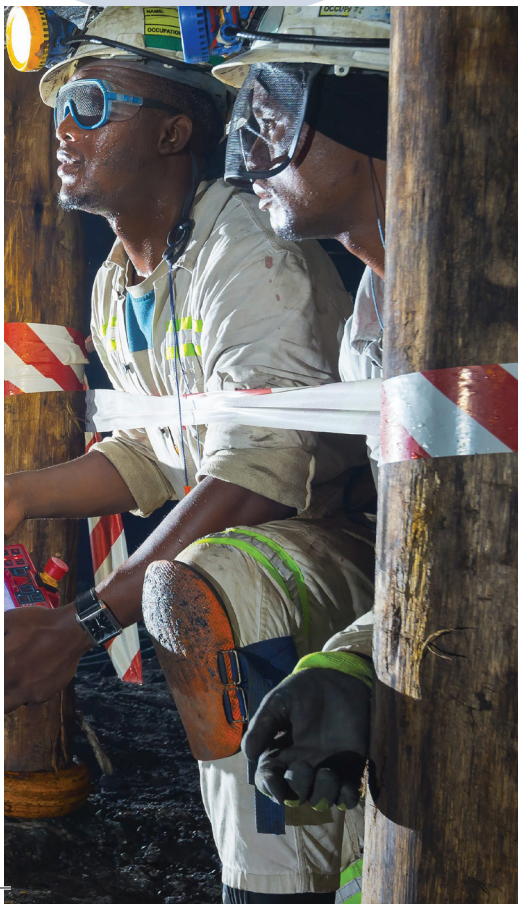
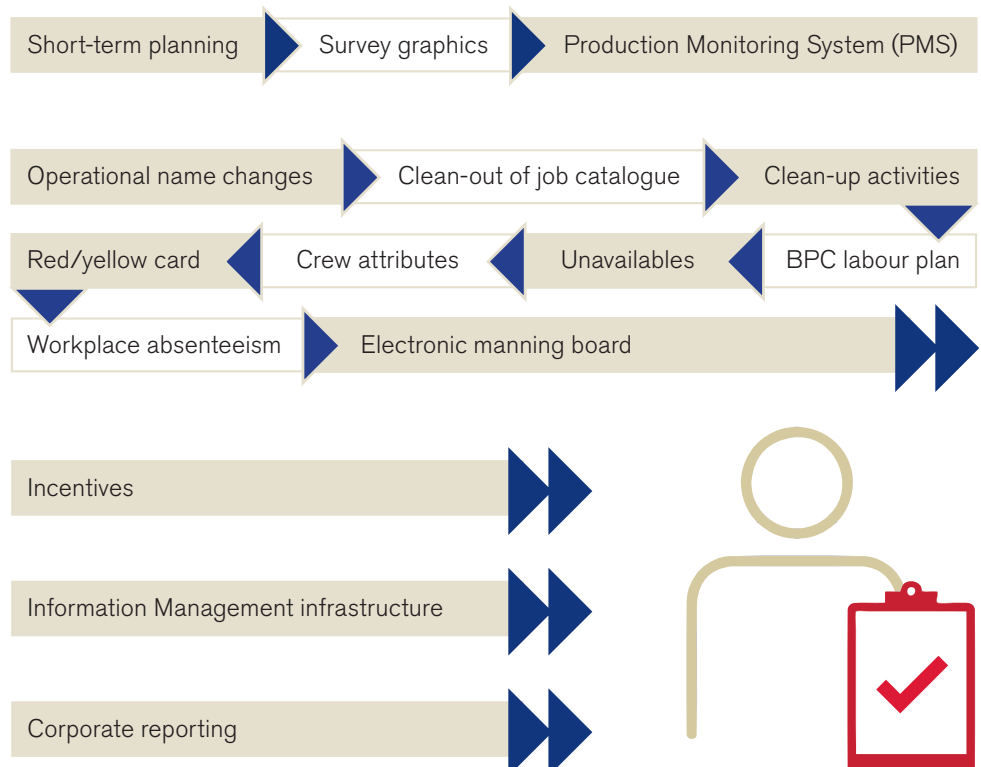
THE OUTCOME

The envisaged product required information from several systems as well as sound, fast and interactive hardware/software bases.

This review sketches the Platinum journey towards laying a sound foundation for mining management decisions which would optimise costs and production safely, by:

- **planning** to achieve efficient and safe production management through half-level optimisation;
- **integrating** mineral resources management tools (MRM) for short- and long-term planning;
- **standardising** human resources terminology, rules and reporting;
- **coordinating** performance management through a Production Monitoring Solution which shows mining progress down to the lowest production level, with the top five performances and top five challenges highlighted to ensure efficient and effective decision-making;
- **incorporating** the SEPI system which allows teams to determine their bonuses;
- **developing** software and hardware to compute and deliver information timeously and reliably; and
- **crew performance** gets measured on a crew-ranking report.

FASTFORWARD PROJECTS



MACRO VIEW: EVALUATING THE OPTIONS



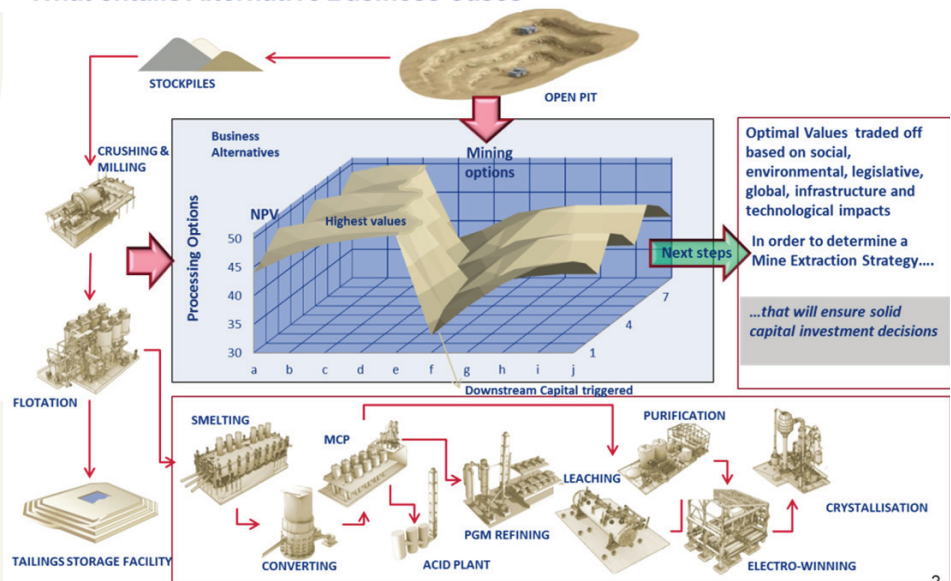
Andrew Smith,
Manager: Mineral Resource
Management

The business planning process is an integrated process incorporating all aspects of the business, from exploration to marketing, and is a cyclical process running from January to December every year.

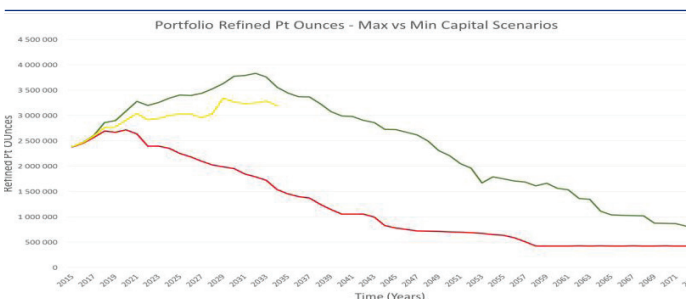
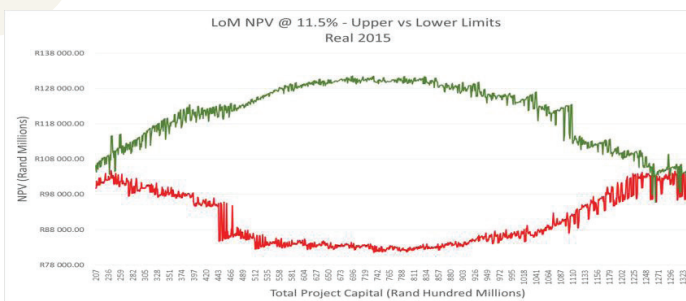
The process starts with a Mine Extraction Strategy (MES), undertaken by multi-disciplinary teams including mining engineers, projects, planning and mine teams. In this step, various options for production profiles are evaluated to find the best option for a mine or region within the portfolio of Anglo American Platinum. These options consider a variety of mining options, conventional or mechanised, as well as access methods, shafts or declines, to find the most viable option. In conjunction with this, half-level optimisation studies are done to optimise the current production.

The individual mine profiles are then combined using an enhanced portfolio modelling tool which takes into account the fixed and variable costs for all of the smelting, refining and allocated costs to model the portfolio options for the Company.

What entails Alternative Business Cases



Using project ranking, the various portfolios are constructed to create the best value options. The Capital Review Committee provides guidance on the portfolio, based on the market and capital constraints, and narrows down the options into a set of portfolio options which guides the strategic direction of the Company for the following cycle.



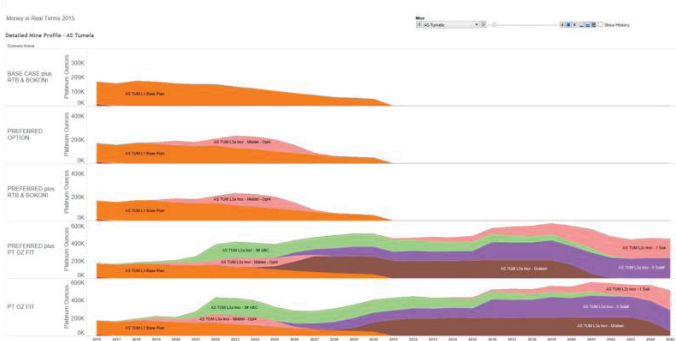
PORTFOLIO OPTIMISATION



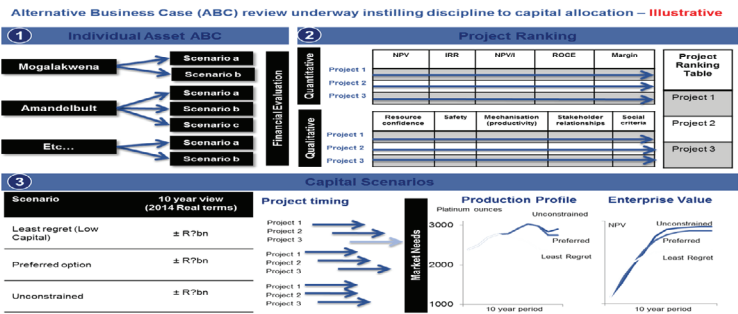


This results in a set of options for each mine which are then presented to the Executive Committee (EXCO) for consideration.

PORTFOLIO OPTIMISATION



Capital allocation – to transition the portfolio



EXCO then provides feedback on the strategic directive after the Strategic Committee (STRATCO) meeting in March. The profiles are then aligned to the strategic directive and issued to the mines as guidance for use in the development of the life-of-mine plans for that year.

Using the electronic environment, the mines then plan the first three years in detail, which is the budget. In this process the mines apply the benchmarks for production rates which are realistic, achievable and support safe production.

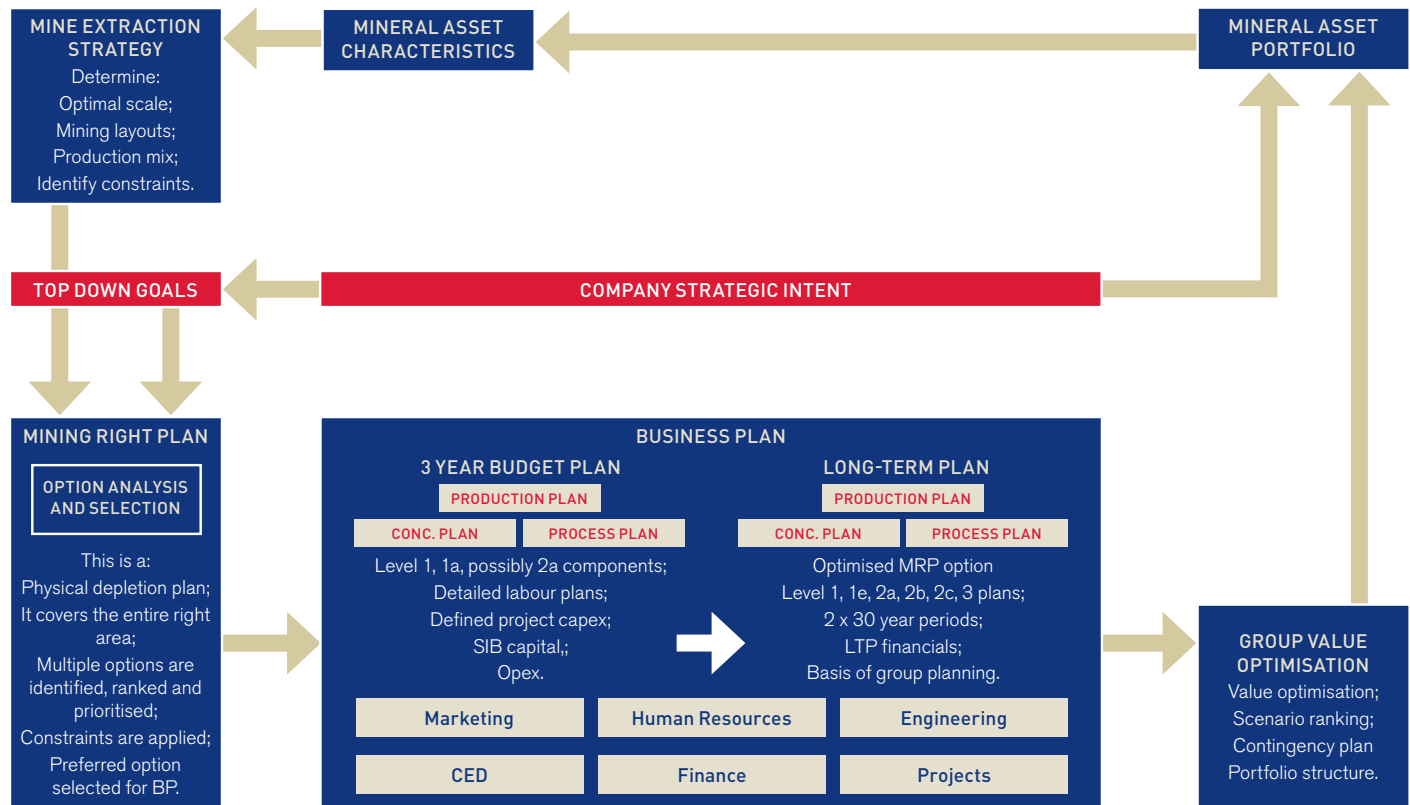
This is also aligned to the monthly planning process as defined later in this document. As the planning of the budget period continues, the plan is resourced from Human Resources (HR) and then costed to complete the budget. Once completed, the mines continue to plan to the boundaries of the current mining (level 1) and projects in execution (level 1E). At the same time the Projects Division completes the planning following the Anglo Projects Way for all of the level-2 scenarios (2a - feasibility studies, 2b – pre-feasibility studies and 2c – concept studies) aligned

to the current benchmarks for safe mining applicable to the current operations.

These profiles of level 1 to level 3 are then combined to produce a life-of-mine profile aligned to the strategic directive of the Company for each mine.

These profiles are then consolidated to produce an Anglo American Platinum profile. Once completed, the results of the planning process are used to define the resources and reserves to be declared to the market at the end of each year.

MACRO VIEW: EVALUATING OPTIONS – THE BUSINESS PLANNING PROCESS



INTEGRATING MRM TOOLS FOR SHORT- AND LONG-TERM PLANNING

Planning is a critical component of mineral resources management (MRM), starting at green-fields mine design and extending right down to daily planning at mine-overseer and crew levels – with planning inputs that include estimated resources and labour, infrastructure and equipment required.

Planning is done on MineRP CADSmine, a software programme that shows geological maps with mineral content, structure and mine designs. During the planning process, production and labour-team scrolls for all mine overseers are simultaneously populated. Once the scheduling has been completed and evaluated, the information is uploaded to the different systems, including PMS and BPC.

The compilation of the annual life-of-mine plan is time-consuming and there is seldom time to subject the life-of-mine base case to more than one or two iterations before the deadline. Optimisation occurred by luck rather than by design. Frequently the final plan was arrived at by tweaking numbers in spreadsheets – not backed up by scheduled extraction plans. At the same time of completing an annual life-of-mine plan, other short-term plans were being compiled for monthly and latest estimate plans.

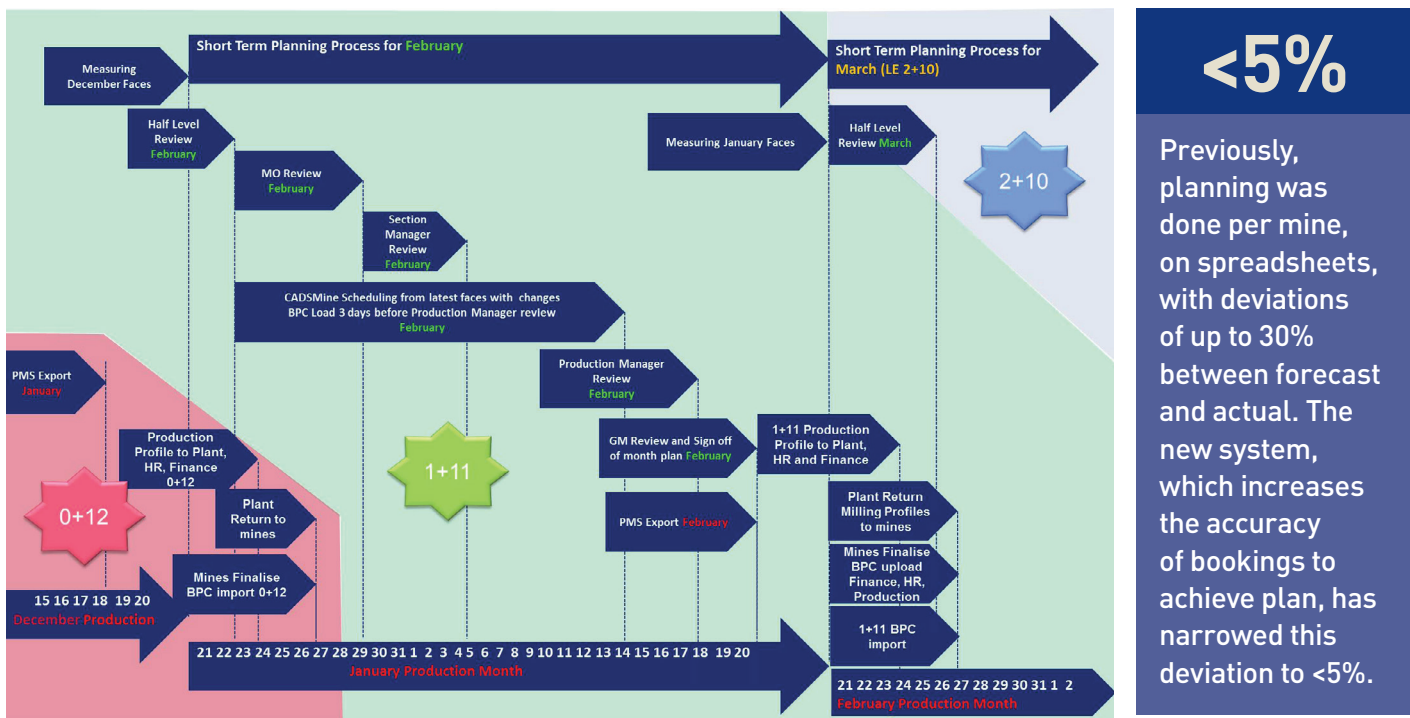
By changing the approach of doing the life-of-mine planning on a set of frozen data once a year, the rolling-plan process advocates the update of mine designs as and when they happen, with an associated schedule completed for the life-of-mine.

The annual budget and life-of mine plans would in essence just be a copy of the rolling plan, if and when it is required.

The new planning methodology is a rolling plan process, delivering a life-of-mine plan monthly, which gives due consideration to labour, safety and production requirements. Previously, planning was done per mine, on spreadsheets, with deviations of up to 30% between forecast and actual. The new system, which increases the accuracy of bookings to achieve plan, has narrowed this deviation to <5%.

Planning is reviewed monthly at a section meeting, attended by all service departments. Section reports are elevated to production level, where the overall plan for the section is reviewed, amended if required and signed off for submission to the general manager.

At general-manager level, business plan is compared against budget and critical deviations and high-risk areas are reviewed.



PLANNING ADDS TO SAFE AND SUSTAINABLE MINING BY OFFERING:

- Automated business processes through the Survey Measurement Graphics solution, which facilitates accurate representation of mining outlines on plans according to set legal requirements, defines excavations graphically and integrates with the ore-reserve module to deplete the ore-reserve blocks with the excavated area.
- A reduction in complexity through the determination of ore reserves from the MineRP CADSmine system. Ore reserves can be reconciled on a monthly basis, while indicating areas that are falling behind in opening up required reserves.
- Improved decision-making through the management of data to support one version of the truth:

PEOPLE

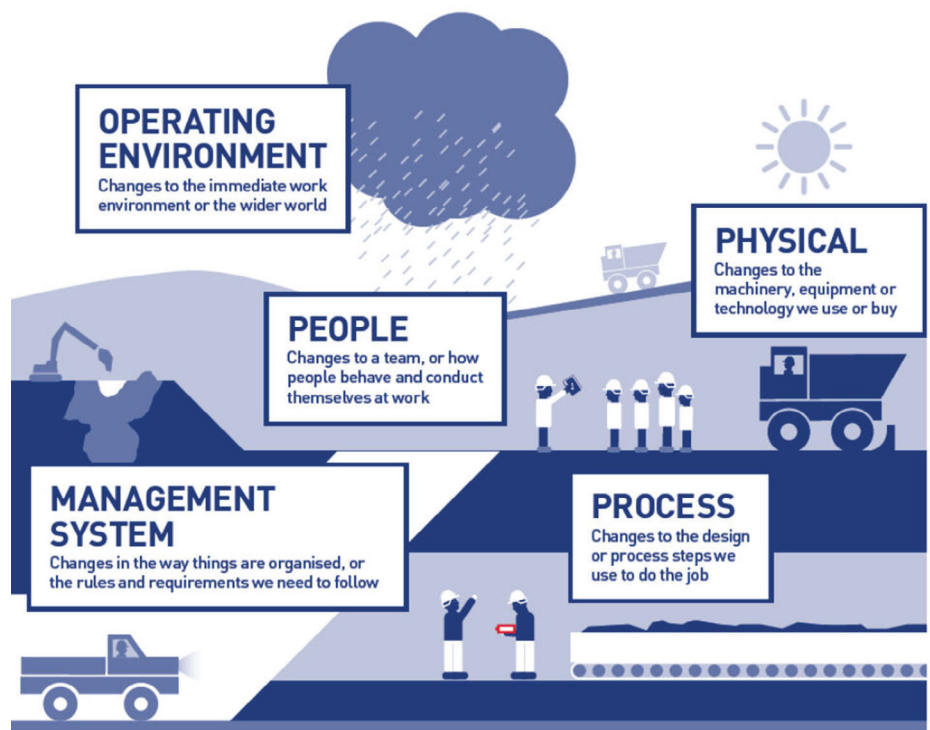
No matter how well thought-out the strategy is, if you do not have or consider the culture in your organisation to support that strategy, it will not come to fruition. You can have all the technology and processes in the world, if you do not have the people supporting the aforementioned processes you will not reach operational efficiency.

The Planning Department was exposed to changes in operating environment,

physical, people, management system and process over the past couple of years. It is important to develop an understanding of the five main types of change and how they impact on the people of the organisation.

The change brought about by technology, management systems and process was aimed at improving the working conditions of the personnel in the planning department.

THE 5 TYPES OF CHANGE TO WATCH FOR:



The rolling plan process is aimed at delivering an updated plan based on the latest available information. The old annual business-plan process delivered a budget plan in June and two months later the annual life-of-mine plan. The budget and life of mine plans were often disconnected due to business decisions that were taken in the period between the budget deadline and completion of life-of-mine plans.

The rolling plan process aims at delivering the budget and life-of-mine plans at the same time, enabling the management of data to support one version of the truth. The manual update of spreadsheet files is largely replaced by automatic upload of the planning data into the business plan consolidation (BPC) system.

TEAM MEMBERS: Nico Nel (team leader), Dion Hanekom, Koos van der Merwe, Hilton Ross and Grant Scott.

MRM SYSTEMS AND BUSINESS PROCESS MAPPING

'THE ART OF UNDERSTANDING'



Donovan Andersen,
Manager: Survey & MRM Systems

THE MRM SYSTEMS TEAM – **Front Line:** Isak Roets, Dawn Botha, Tania Wolmarans, Gerhard Coetzee, Gerrit Marais.
– **Back Room:** Anita Jacobs, Marelize Balt and the MRM System Specialists.

PEOPLE, PROCESS AND PRODUCT

In MRM Systems the philosophy remains simple: We are 'Business-led and IT-enabled' and our mantra is to implement 'Products in support of our process in support of our people'.

Our objective function is to reduce cost, complexity and the number of applications in use, while increasing integration, productivity and system stability.

Successful and trustworthy operational reporting can only be achieved through the strength of the MRM systems, system development, the integrity of operational data, the users skillset, knowledge and the dependability of our systems architecture and hierarchy, as depicted in the diagram below. When there is harmony between these environments, achieving objectives of data integration, data quality, system enhancement and Infrastructure stability can be relatively easy.

Bringing about any change in an organisation as large as Anglo America Platinum from a systems perspective is most definitely under-rated. 'If I had known then what I know now...'



Significant challenges raised their heads on numerous occasions – probably the most daunting challenge is the change-management aspect, having to deal with the people and take them along. The transformation is never easy, but once you have achieved it, the gratification makes it worthwhile.

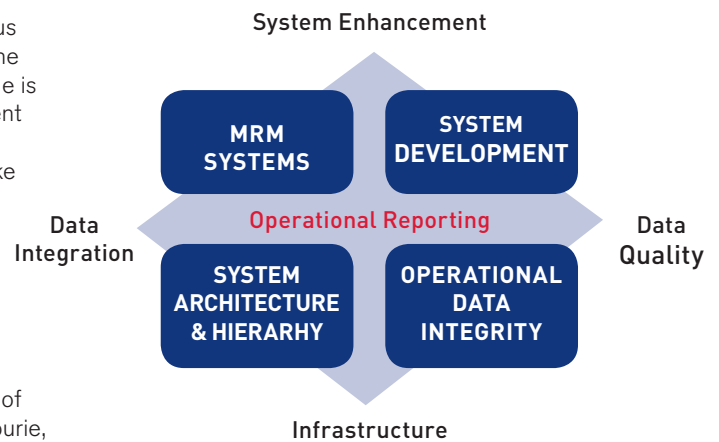
Under the sponsorship of Head of Mining, Frik Fourie, and the auspices of the MRM Systems department, many projects were controlled to provide for the foundation of the spatial outcome of the FFWD project.

The entire FFWD Project had five specific focal points. The first was to address the infrastructure, MRM systems entrenchment, HR-specific applications including the establishment of the 'single-source' philosophy, planning and production monitoring and establishing a bonus system called the Safe Efficient Production Incentive (SEPI).

The spatial vision took hold and latched on to the FFWD initiative as it was deemed to be a natural extension to the objectives of FFWD and would facilitate an entirely new way of decision making. A fully informed decision maker having all the facts from all disciplines on one singular platform in graphic format... well, 'a picture is worth a thousand words'!

Notably the biggest hurdle to this was a poor IT network infrastructure that would not support the demands the technology or data would make on it.

OUR EXPANDED AREAS OF INFLUENCE AND IMPACT



This initiated numerous IM projects under the infrastructure banner and was managed by Rikus Prinsloo. The successful LAN project with the 10-gig backbone installation was shortly followed by the server-split project, WAN upgrade and the conversion from 32- to 64-bit processing.

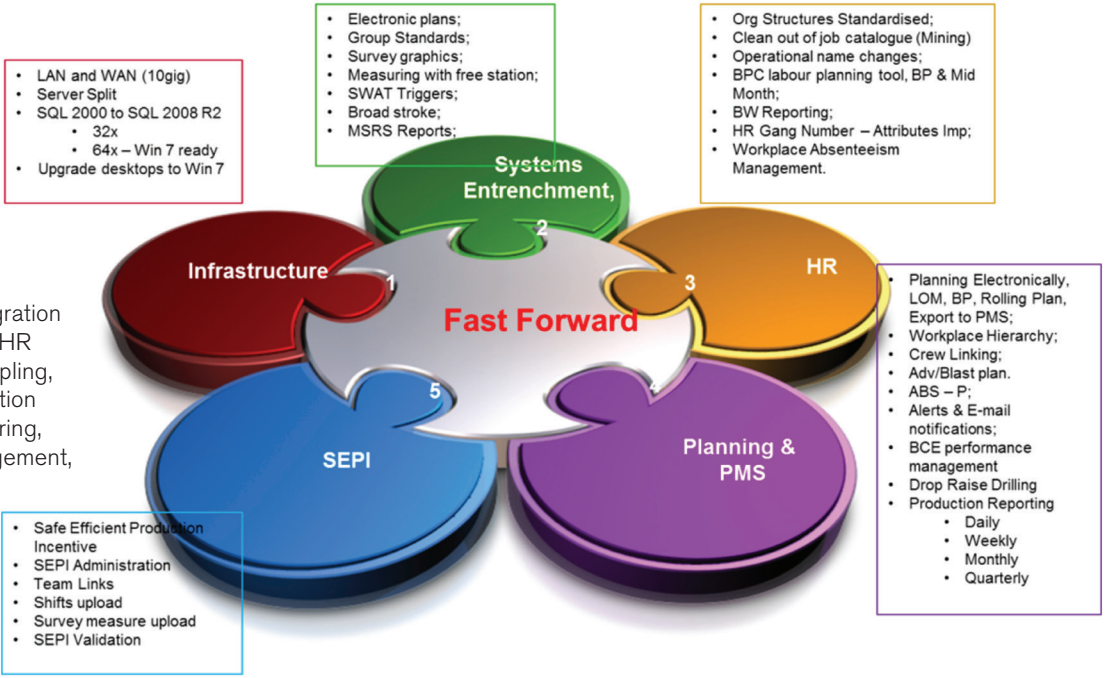
A proof of concept was approved and vendors were selected to reflect on their ability to provide a spatial solution, ESRI and MineRP being the initial primary contenders.

At the count-out a pilot project was initiated at Thembelani Mine with Gerhard Coetzee as project manager. As the project progressed, more aspects were being identified that were not visible at the start of the project. These included the review and revision business process that further required the development of training programmes and material for our people.

MineRP PARTNERSHIP

While other vendors have contributed to the development of singular product deliverables, the primary partnership for the overall FFWD project initiative was with MineRP.

The MineRP MRM system is designed to cater for the integration of applications and data from HR crew allocation, planning, sampling, grade control, monthly production monitoring, production measuring, evaluation, ore-reserve management, surveying and bonus determination. These products mostly are reaching the end of their effective life span and are due for upgrade soon as we replace the legacy systems.



OUR APPLICATION ROADMAP

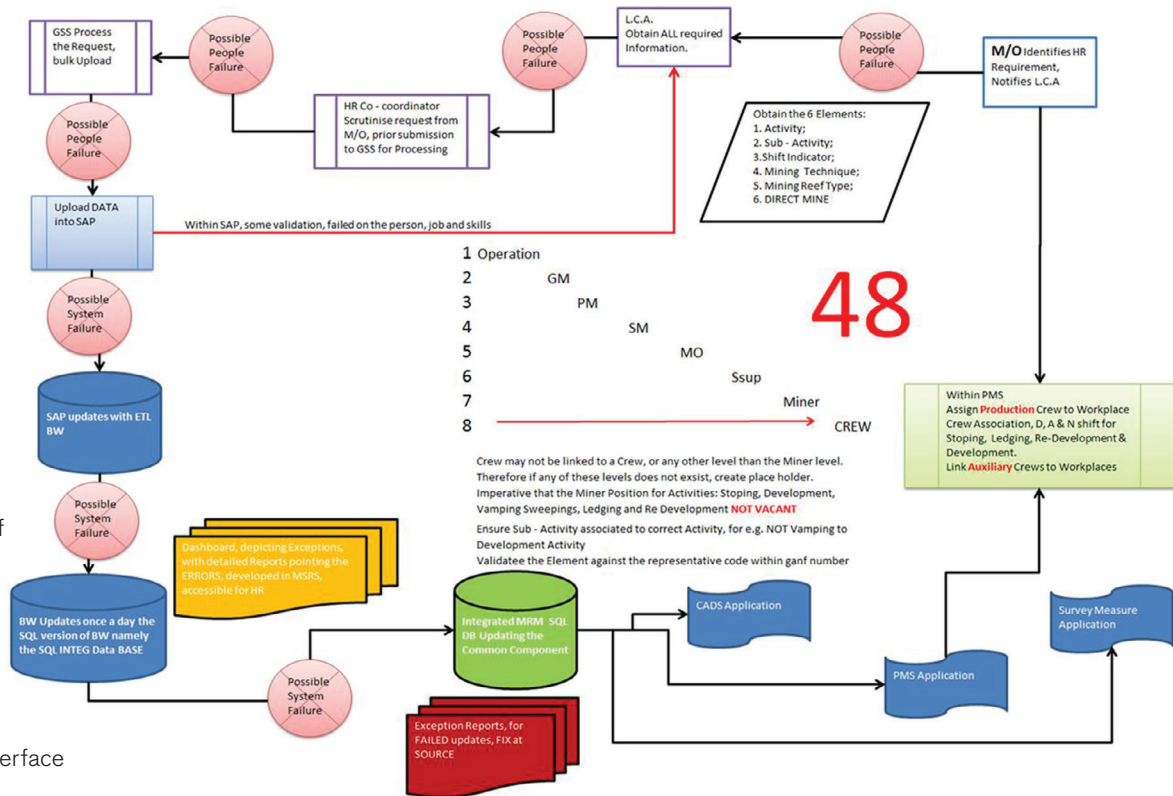


However, in doing so, it is necessary to review the impact of any change in product on the business process and the demands on re-training of our people. Our vendor partnership with MineRP has proposed an application roadmap with set implementation points for product replacements. What is envisaged for the Company in the near future is a fully revised product architecture that can integrate comprehensively, internally and externally, to its own platform.

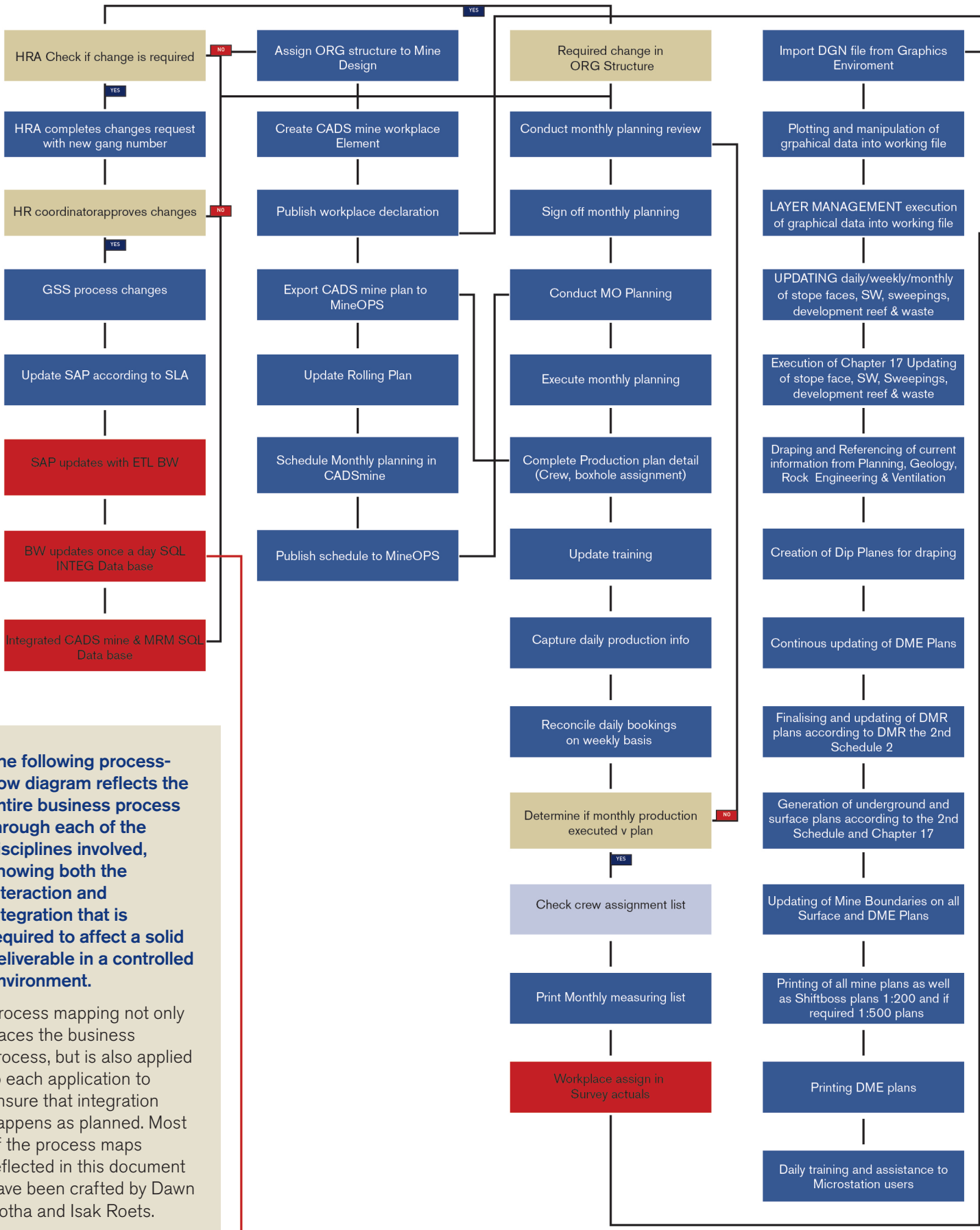
BUSINESS-PROCESS FLOWS

Fundamentally every aspect of the project work that was done with in the FFWD initiative had to be tested for its fit within the business process and for the function that it was to fulfil.

The process flow below reflects the objective function of ensuring system stability by the MRM system specialists and the potential areas of monitoring for systemic/human interface errors.



Human Resources Planning Production Draughting



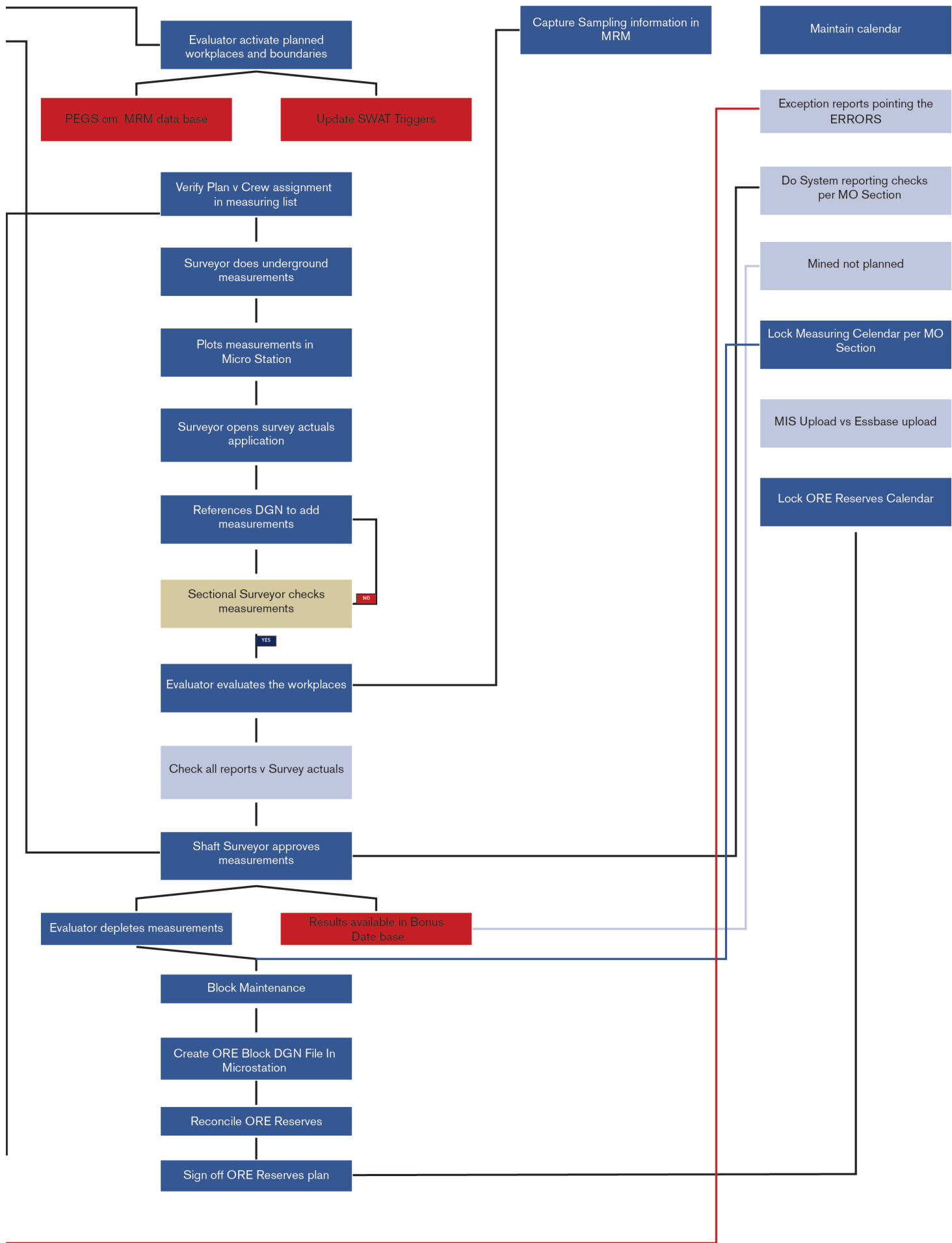
The following process-flow diagram reflects the entire business process through each of the disciplines involved, showing both the interaction and integration that is required to affect a solid deliverable in a controlled environment.

Process mapping not only traces the business process, but is also applied to each application to ensure that integration happens as planned. Most of the process maps reflected in this document have been crafted by Dawn Botha and Isak Roets.

Survey

Geology

MRM Administrator



SURVEY GRAPHICS AND THE DIGITAL PLAN: TOWARDS FULL SPATIAL GRAPHICS



Donovan Andersen,
Manager: Survey & MRM Systems

MRM SURVEY GRAPHICS

The implementation of Survey Graphics in the MRM system, under the project management of Dawn Botha, was to convert from a 'paper' to a fully graphic environment. The previous method of capturing the survey measuring results was to reflect the measurements (tapes, ties and offsets) on hardcopy manual plans, determine the area by means of a plinimeter, writing the production results onto a data-entry sheet and then subsequently entering the data into the MRM survey actuals application.

The implementation of survey graphics meant exchanging the paper plan for a computer screen and exchanging the pen for a mouse.

The measured excavation was captured directly onto the graphic platform and the production quantities (area, volume, tons and ounces) were automated into the system.

Other benefits of survey graphics include:

- No more manual plining on stope sheets required (increased labour efficiency);
- No dual capturing of survey measurements by data capturers (less room for error);
- All measurement data taken from a graphics environment, not from stope sheets;
- No digitising of survey measurement polygons required – approved polygons are saved as DGN files for referencing and copying into Cadsmine (improved accuracy of outlines);
- Latest face positions are available immediately and can be used within the spatial project to enable other users to view underground workings;
- Face positions cannot be altered once status has been approved (an audit trail allows for recording any changes) – this aspect is imperative for the integrity required for the payment of bonuses based on production achievements; and
- Automatic depletion of ore reserves graphically – a graphical representation of the ore reserve status is available once all measurements have been depleted against ore reserve blocks.

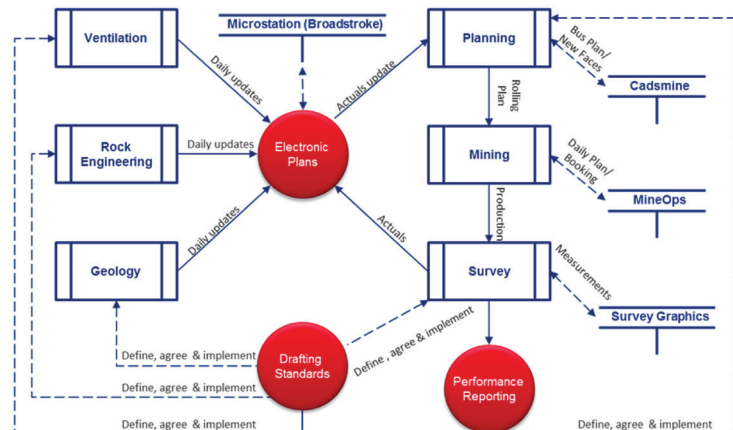
ELECTRONIC PLANS

FFWD implementation impacted various functions, such as HR, Mining, MRM (inclusive of Planning, Survey, Rock Engineering, Ventilation and Geology), Safety and Finance with the bonus systems.

The Executive Head of Mining, Pieter Louw, instructed all operations to be on electronic plans from the beginning of 2013. Not all operations were fully compliant with this instruction, which impaired system performance.

Establishing electronic plans requires full compliance to set standards. The context was designed and communicated as reflected below.

ELECTRONIC PLANS CONTEXT DIAGRAM



Based on Pieter's instruction and the new way of work introduced from FFWD, a project of system entrenchment was initiated (right hardware, software, training, processes and data quality) to optimally support the new operating model.

The objectives of the systems entrenchment project were to assist primary operations to use systems optimally, specifically related to:

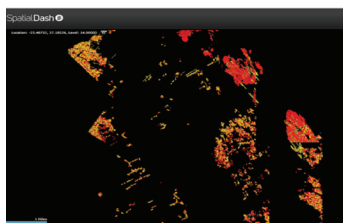
- Electronic capturing of data in the electronic environment;
- Work according to the signed-off standards; resulting in
- Quality data as an outcome, as quality data will be available in this environment. This is a precursor for ensuring correct spatial representation.

This outcome will contribute to improved decision-making processes and informed business decisions, as a result of the spatial display of integrated discipline data. Proper analysis can be performed on data to optimise aspects of production, safety and operational excellence in the supporting disciplines.

System entrenchment formed the basis for spatial project implementation. Issues inhibiting operations to comply with the requirement and ability to perform in the new operating model were identified and rectified in collaboration with the operation. The project team supported the operations in addressing these issues.

The issues encountered typically fell into the following areas:

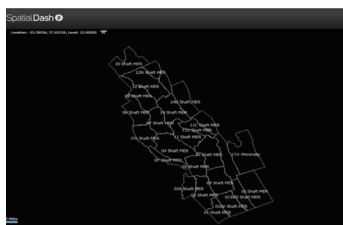
- Confirming which standards should be adhered to,
- Alignment to standards (including the cleaning of data),
- Confirming roles and responsibilities,
- Training- and skills-related issues,
- Resolving technical issues, and
- Monitoring data quality.



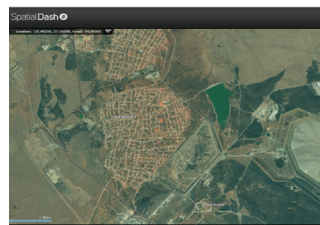
Survey



Planning



Geological

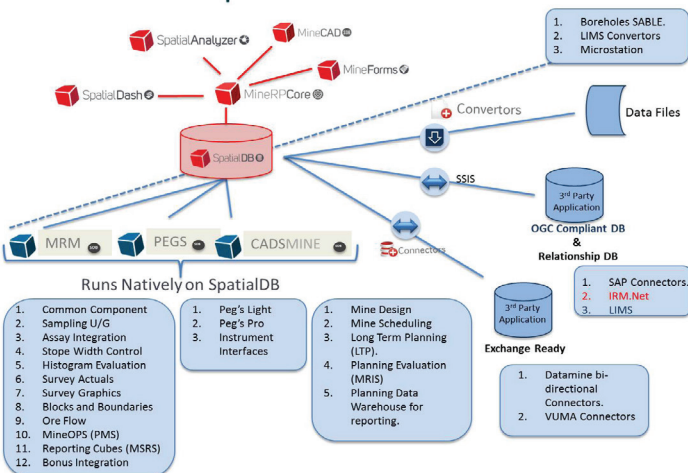


GIS – Tile Services

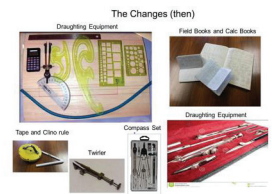
Strict adherence to standard processes was found to be the source for data accuracy in the electronic plans. Each of the disciplines of survey, geology, planning, rock engineering, ventilation and safety had to ensure data integrity through the establishment of data stewards.

Once all data was standardised and aligned, placing the data in a single platform but presented in layers within the Spatial canvas ala Google Maps was easy. Each of the MRM disciplines' data culminated into various KPIs and these are referenced to the 'address' by workplace ID or coordinates. (x,y,z).

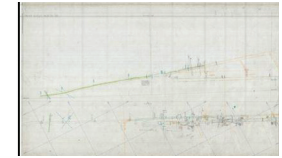
Fast Forward Spatial Solution



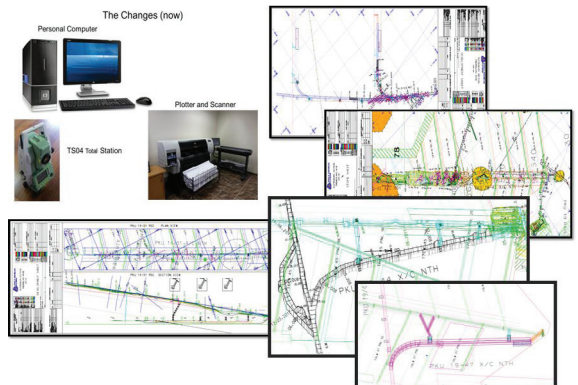
To achieve this may sound simple, but effectively we had to take the data sourced from more than 40 systems and other data sources and link them into the spatial database. This was akin to teaching 40 different nationalities to speak English.



Having achieved this enabled the organisation to transform the discipline outputs of survey from this:



...to a fully electronic foundation for the spatial endeavour.



PROCESS

The successful implementation of survey graphics resulted in an innovative change in the way that the mine surveyors captured and reflected their measurements within the digital environment. The old method of measuring by means of tapes was replaced with the new 'Freestation' method of measuring that enabled accurate determination of the excavation and reduced the exposure of the surveyor and his team to the hazards of the workforce. Although the adoption of this new method of measuring across the organisation was slow, it introduced an improvement in the accuracy of determining quantities and volumes of excavations that are now accepted without question by the mining discipline. Technology is now also a friend, as the platform that has been established can accommodate the next generation of survey with 3D laser scanning.

The natural progression of the survey graphics environment was to drive towards achieving a full digital planning environment with the ability for designing and scheduling the mine on a continuous and rolling basis. This has now been achieved as a result of the ability to review historical data for integrity and ensuring the accurate representation of the underground excavations in three-dimensional space (x,y,z).

Ensuring the standardisation of the graphics environment across the entire organisation has required the development of a book of standards for each of the disciplines that require representing detail in the graphic environment.

Business processes have significantly changed in many areas, such as the geological mapping process, which could take up to a month from when the task was done underground to when it is authorised on a plan, now takes an afternoon. Completing a geological section sheet would take an entire day when done manually. It now takes a few minutes.

PEOPLE

Implementation of the spatial environment brought with it numerous issues pertaining to people. Their resistance to accepting change and the view that they were being replaced were some of the very real fears that were uncovered in the change-management project that was initiated.

Gerrit Marais was appointed as the change-management agent, with the daunting task of managing the people transformation. A large portion of the success of the change management was as a result of the individual one-on-one training that was required in places.

In many ways, the spatial environment has brought about a new way of delivering what was always done, but it has brought about a pride in the quality of work, as errors are readily notable.

Further the inter-dependence of each discipline on the data quality of the other has broken down or is in the process of breaking down interdepartmental silos. People are talking to each other!

THE IMPLEMENTATION OF SPATIAL

A dream arose to have a visual display of integrated data (SpatialDash) to assist management and line management in their effort to live by the ethos of Zero Harm, with enhanced production and increased efficiency of the mining operation with accurate data.



Gerhard Coetzee,
Project Manager

This journey has started with a readiness assessment of the below-mentioned principles that are the foundation to allow an integrated visual data display:

Our journey started in December 2013 in building a proof of concept at Thembelani Mine, which consists of 23 identified KPIs that covers the MRM (Survey, Rock Engineering, Ventilation, Planning and Geology) and Production Departments. Early results allowed us to expand our imagination, because a picture displays a thousand words and criteria have been developed to display a picture that can be used for better decision-making. We also realised that for quality decisions to be made accurate, data is needed to be checked on a daily basis.

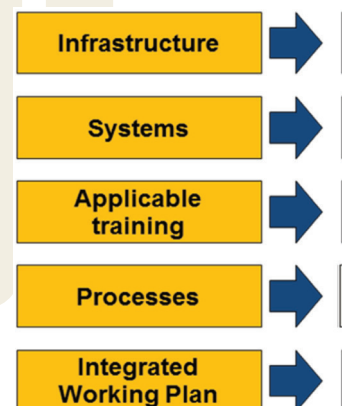
This will allow a 24-hour turnaround time to access data input and accuracy.

Our proof of concept, with a few enhancements of the KPIs, has escalated into a working solution and allowed for a phase 1 "Standard" roll-out. Our roll-out to the identified mines started in August 2014. The Standard roll-out consisted of a three-week programme per operation where standards (as per signed off MRM discipline) is used to ensure that data display for all the operations are the same and there is a standard definition of the version of the truth feeding from the same source systems.

The focus during this implementation period was mainly on the MRM disciplines, to ensure that accurate electronic data can be transformed into visual data by incorporating the approved draughting standards for identified disciplines. This allows the MRM and Production Departments to evaluate integrated data and to make informed decisions based on evaluating data from the source systems such as Microstation, MRM, Cadsmine and Pegs Lite to mention a few.

A picture displays a thousand words and many new ideas have been captured at all the rolled-out operations. These ideas need to be evaluated to enhance decision-making by expanding the KPIs.

Our implementation was concluded by the end of March 2015. The focus was to ensure that the MRM Department could evaluate their data for accuracy, and exposing the Production Department (section and production managers and mine overseers) to use this data for safe and efficient mining.



This journey has just begun, the “*picture is a thousand words*” is the beginning of moving from reporting to integrated planning between MRM and Production Departments for the long-term benefit of the group.

REAL BENEFITS

Real benefits are being experienced within MRM, Production, HR and Management.

MRM

Technology

- Improved system performance (MRM server split, upgrade to SQL 2008 R2 with 32 bit);
- Standardised and upgraded the LAN to 10 gig backbone;
- Upgraded MRM DBs to 64-bit enabling spatial environment: and
- LAN optimisation, de-bottlenecking of the switches and upgraded per operation the LAN to 1 gig for MRM and Mining (highly efficient systems).

Processes

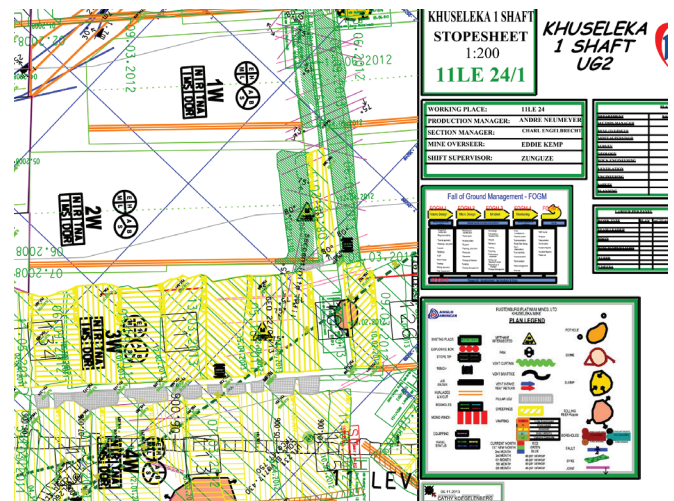
- Improved systemic processes and system enforced standards (book of standards); and
- Data is safer in the electronic environment.

Outcomes

- Easier-to-do QA/QC on the plans (i.e. plotting standards, mappings in the right planes, sections, etc);
- Facilitates risk assessments by merging all MRM data sets, i.e. designs and schedules, in one view (one version of the truth);
- Integration and synergies of data sets is possible and quicker;
- Live plans are readily available to stakeholders; and
- Accuracy and quality.

Production

- Replacement of the Daycall systems;
- Root-cause analysis on production losses (lost blasts);
- Short interval control – monitoring and reporting of
- Standardised production performance reporting;
- One-stop shop for the production MO for accessing all relevant data from a single dashboard (front-line empowered); and
- An integrated solution providing information from production planning, short interval control, survey measurements, finance, HR to bonuses (full system integration across disciplines).



A digital stopesheet from Khuseleka Mine reflecting a UG2 stope

HR

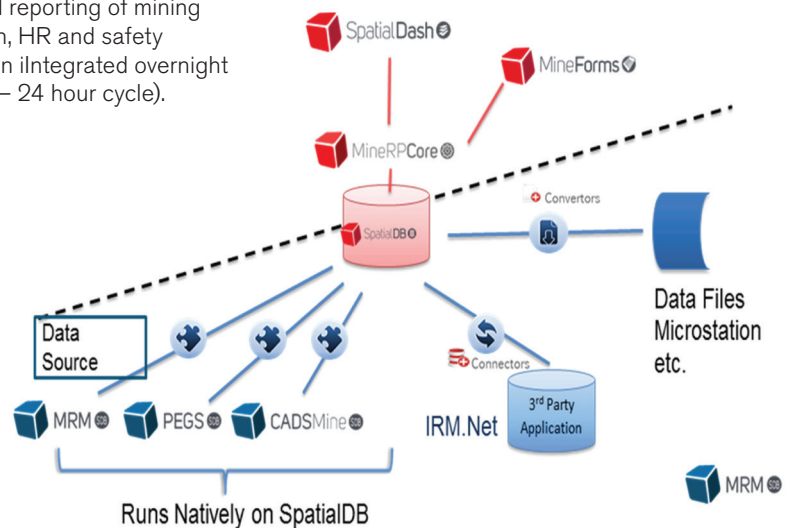
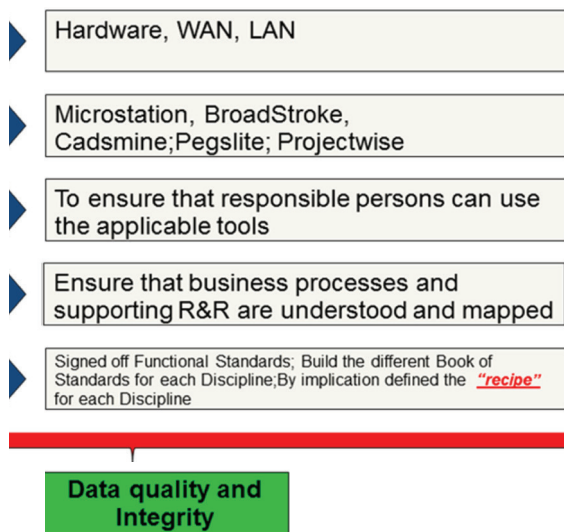
- Standardised production bonuses;
- Unavailable reporting, managing the workforce;
- Absent-without-permission reduction; and
- Bonus paid within five working days.

Management

- Standardisation of business processes across all disciplines;
- Standardised group standards, within a best-practise library;
- Standardisation of the mining bonus across own mines;
- Standardisation of system master data (disciplined platform – key drivers); and
- Integrated reporting of mining production, HR and safety information (integrated overnight reporting – 24 hour cycle).

Other benefits of the establishment of a full three-dimensional graphic environment include:

- Appreciation and understanding of the mining layout when viewed in 3D, which becomes very useful for problem-solving. An example of this is the ore-pass collapse at Tumela Mine and the resolution thereof.
- Ascertaining the middling between reefs and also when using footwall development from the Merensky to access the UG2 reef.
- Can be used for ventilation modelling of FW development when mining from Merensky to UG2 reef.
- Removal of barriers to cooperation between disciplines as underground workings will be graphically available to other disciplines. This interaction further results in improved analysis and decision-making.



TEAM MEMBERS: Isak Roets, Dawn Botha, Gerrit Marais, Renier Pretorius, Jaco Maartins, Johan Boucher, Retha Haremse, Hanalie Robinson, Pieter Kruger.

SPATIAL DATA INTEGRATION

Integrating the various mining technical systems into the integrated performance-management system was achieved through the advanced implementation of the MineRP Spatial Enterprise Integration Platform.

Initially focusing on 20 spatial production indicators, the solution quickly evolved to encompass more than 80 backdrops, KPIs and perspectives. Over and above the final performance management outcomes, an immediate value for the MRM departments was that it enabled them to visually see problems and incompleteness in their source data. Since data is automatically uploaded daily, information quality and integrity could immediately be addressed.

A phased implementation approach saw all the affected mine technical source systems data first integrated into the spatial platform at Thembelani, and then deployed to other sites. In addition to the perspective focusing on mining production, various perspectives were developed for other audiences.

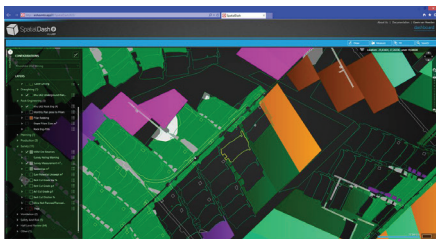
The intent was to deliver a platform facilitating a spatially integrated view on the latest key mining performance indicators relevant to each stakeholder's daily operational management needs. Performance areas included draughting, geology, rock engineering, planning, survey and mining information.

Over and above reporting and visualising existing data, the solution further enabled several new spatial indicators that automatically highlight difficult-to-find conditions or difficult or impossible to manage, using fragmented mine technical systems and paper plans. As an example, these include the capability to highlight planned mining activities close to low-angle faults and stability pillars. Developing many of these advanced production indicators was done with the valuable input, assistance and contributions from Gawie van Heerden and his team at Thembelani.

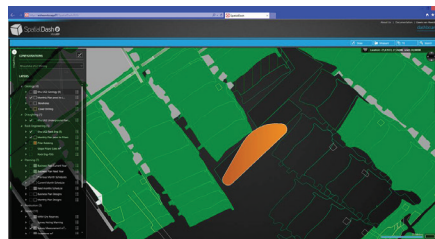
Over and above the application of the integration platform for daily production-decision support based on accurate and timeous information, the solutions is also used during mining reviews and planning sessions as well as for easy reference and investigation by senior management.

As demonstrated in the solution diagram, the MineRP spatial integration platform used as foundation for the production

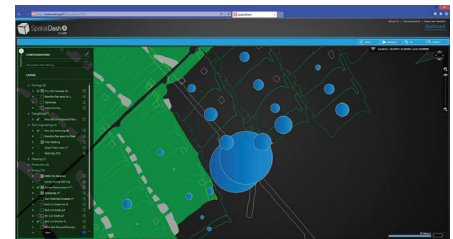
EXAMPLES OF THE KPIS DEVELOPED FOR VISUALISATION IN SPATIALDASH:



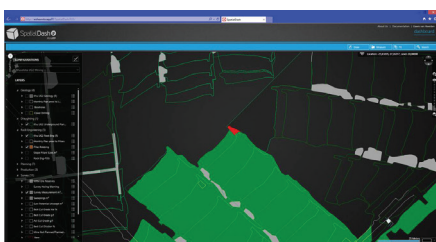
Data clean-up to be done. Pillars blocked as IMS – need to be fixed.



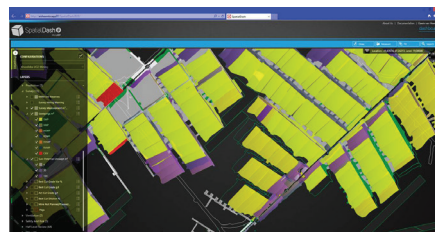
Planning in close proximity of pillars.



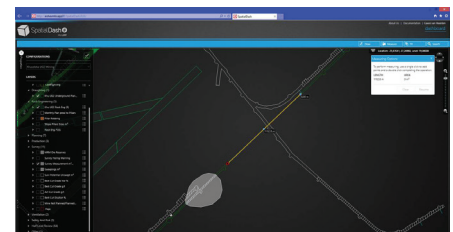
Survey measurements taken.



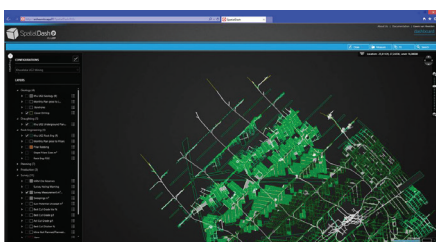
Pillar robbing.



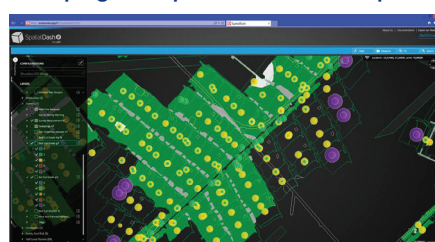
Potential unswept m² indicated in variations of purple, depending on volume (m²). Other sweepings completed indicated as per ledged.



Measured Raise holing distance.



Cover drilling – indicates which ends are in cover.

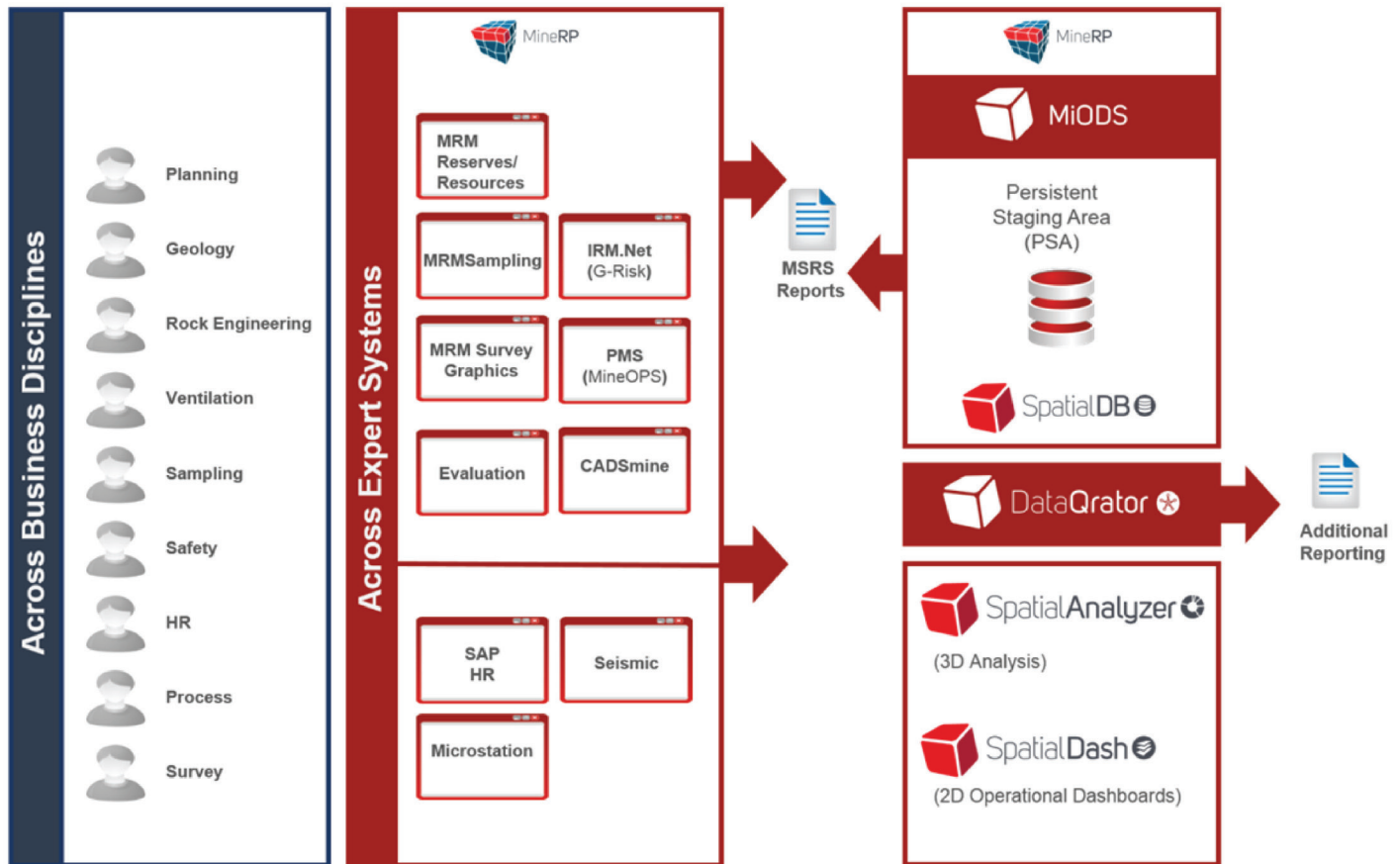


Slope observations, best-cut grade vs actual-cut grade. Colour indicating grade variance.



- MineRP

INTEGRATED ENTERPRISE SPATIAL MINING SOLUTION



management system brings together data from various mining technical systems (MTSs). The process of integration goes beyond traditional data warehousing by amalgamating all MTS data into a centrally managed, spatially indexed operational data store. This spatial amalgamation of MTS data enables 3D mining data analysis, 2D spatial operational dashboards as well as more traditional operational and analytical business intelligence reporting.

MineRP staff were involved at several levels during the FFWD project, both on-site at various Anglo American Platinum operations, as well as in the back-office addressing solution migration and implementation issues.

STAFF INVOLVED WERE:

MineRP – PMS (MineOPS) Team:

On-site:

- Johan van Rooyen
- Freddie Bezuidenhout
- Johan Bouwer
- Hannelie Robinson
- Retha Harmse
- Chris Grobler
- Pieter Kruger

Back office:

- Neels Oberholtzer
- Alex Osinska
- Lientjie van der Walt
- Lorraine Pietersen
- Andre Ackerman
- Hulisane Siale
- Naresh Sewpersadh
- Sidney Mogotlane
- Shaun Amber

MineRP – Spatial Team:

On-site:

- Renier Pretorius
- Jaco Maartins
- Johan Bouwer
- Retha Harmse
- Hannelie Robinson
- Pieter Kruger

Back office:

- Dawie de Wet
- Andre Ackerman
- Hulisane Siale
- Naresh Sewpersadh
- Sidney Mogotlane
- Shaun Amber
- Jacques Engelbrecht

OPTIMISING THE UNDERGROUND VALUE CHAIN

Ore extraction is the result of an interdependent value chain comprising:

- **development** (creating access to the reef);
- **ledging** (creating a safe distance between the access and the stope);
- **equipping** the workplace with infrastructure and tools to safeguard people and optimise extraction;
- **stopping and sweeping** (penetrating, crushing and removing the ore);
- **vamping**; and
- **logistics**.

TEAM MEMBERS:

Braam van Zyl, William Taylor, Logan Niar and Andrew Smith.

In this value chain the production is determined by the weakest link in the chain. For example, if it takes 30 months to develop and 24 months to stope a block, the time lag creates a potential six-month hold-up during which stoping teams are idle or have to be redeployed.

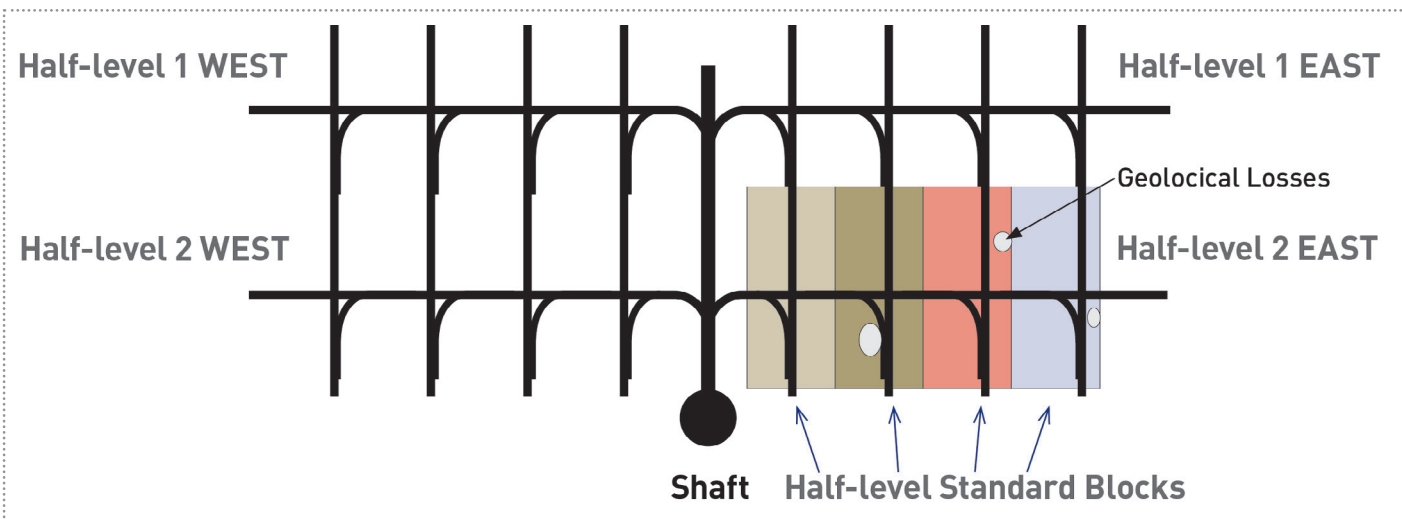
Half-level optimisation is a process which aims to balance all elements in the value chain in order to achieve optimum output. For instance, the back length of a block, which is typically 180m, could be extended to balance the 24-month stoping period with the 30 months it takes to develop the next block. However, this needs to be planned literally months in advance when ore access is being planned.

Other factors which should also be planned for include geological losses because of voids in the ore body, which could be up to 16% of the ore body in a block.

This “balancing act” also applies to equipping, by ensuring that services and infrastructure such as ventilation, compressed air and water match the changes in the value chain – as do downstream elements of the mining process, such as the volume of the main tip buffer, the distance the ore has to be trammed and the holding capacity of the timber bay. In all, there are 38 value drivers in the half-level optimisation.

The value of half-level optimisation is that it is more effective to plan around maximising elements in the value chain than opening up a new half-level to achieve targeted shaft output.

Project FastForward has established guidelines to achieve half-level optimisation by addressing the entire value chain through planning, implementation, monitoring and review.



The area containing all the mining processes to the sides of the apex is a half-level. A half-level is the smallest, self-contained production unit in underground mining. Platinum has up to 160 active half-levels at any given moment.

STANDARDISING HR TERMINOLOGY, RULES AND REPORTING

Enhance the way in which labour planning is performed – that was the overarching assignment of the Human Resources (HR) FastForward team.

The logic was simple: safe, profitable production hinges on labour planning – and effective planning requires standardised, real-time information from across Platinum. However, the task was complex. Faced with a multitude of designations across operations and discipline-dedicated systems providing scatterings of planning-related information, the team started off by performing an in-depth analysis of business practices.

The team found various challenges, mostly related to inefficient or non-existent inter-systems communications. It had to integrate labour- with production-reporting systems as well as the new incentive system and facilitate communication between software such as SAP, MRM, PMS and BW so that information would be fed from a single system. The logical choice was SAP, already installed and operational across mines, as the source system for the organisational and employee master data.

To achieve this, sub-teams were tasked with standardising the processes around:

- labour planning,
- workplace attendance,
- labour reporting,
- organisational management,
- master-data management, and
- system enhancement and integration.



LABOUR PLANNING

The labour-planning team, headed by Henk Steyn, set out to provide a planning and budgeting solution which would:

- save time in terms of the planning process, save cost through implementing the best possible labour planning processes and provide improved data integrity to ultimately improve decision-making in the organisation;
- ensure that reporting is done more effectively, on trusted sets of numbers, to allow users to have more time for analysis and decision-making;
- provide a central repository of data specific to the HR budgeting process;
- provide work-flow capability; and
- provide security around data capturing and submission.

“When we reviewed the current labour-planning practices, it became clear that labour-planning guidelines and rules were not governed by a system in the planning process,” says Henk.

“HR planning was performed in Microsoft Excel spreadsheets which were restricted to the various operations. It was a non-standardised process that had an adverse impact on labour efficiencies and cost. The consolidation of the siloed data was a complicated and time-consuming task, which often led to inaccuracies and rework.”

The problem was solved by developing labour-planning blue-prints for mining, which were cascaded to on-mine

services to set the standard for labour-planning practices through a tool that would facilitate the planning process.

The tool would:

- embed the newly developed labour-planning blue-prints;
- have a user-friendly interface;
- enhance governance; and
- consolidate and report on labour plans.

The SAP Business-Planning and Consolidation (BPC) module was selected as the labour-planning tool. Its design could facilitate all aspects of the team vision and the specific planning requirements – and it uses Excel as user interface, which minimised the need for user training.

By October 2013, an annual labour-planning module had been implemented at all own mines, and at all but one mine, the entire annual planning cycle had been completed on the BPC system (Mogalakwena Mine in progress). At this stage, the mid-month planning module, which is a key tool in accurate bonus calculations, is being rolled out.

Pending resource availability, it is planned to extend the original scope and to incorporate the total labour plan including all Mines, Process Division, Functional Centres and Corporate on BPC.

The value of using SAP BPC will add additional value when Finance starts using the SAP Financial Reporting module from 2014 onwards.

WORKPLACE ABSENTEEISM MANAGEMENT

Automated absenteeism management was the key objective of the workplace absenteeism team led by Natasha Reddy (Platinum IM). Absenteeism includes sick leave, unapproved absenteeism and so-called short shifts, when employees exit an operation before completing their full shift.

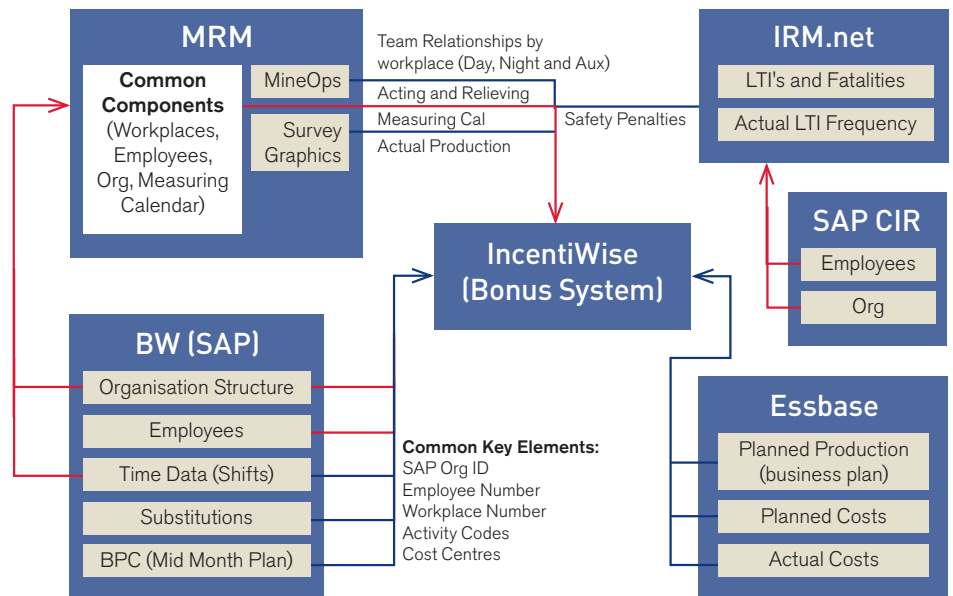
“We based the automation on the rules of the Platinum Behavioural Code, which would enforce shift-related disciplinary processes if employees, amongst others, exit a mining operation on their first shift subsequent to an absence without permission, a not-at-workplace or a short shift,” says Natasha.

By automating this process, unavailable labour would be reduced from 18.5% to the budgeted 15.5% a year. The focus was on unavailable labour due to unpaid leave, absent without permission, not at workplace, sick leave and short shifts which collectively, accounted for 6.1% of the unavailable labour figure.

Workplace absenteeism management, which will be implemented on the SAP 409 and Time and Attendance modules, will increase absenteeism management control by enforcing the absenteeism behavioural code and achieving accurate absenteeism reporting.

ORGANISATIONAL AND MASTER-DATA MANAGEMENT

In the past, HR had based labour planning on MTS production parameters, which tended to cause a misalignment between planned production and labour requirements and capabilities.



Anri Lategan, who assisted Sandy Venter to successfully implement this sub-project in the HR domain, says this misalignment, which could typically cause management to expect a 320m² stoping team to achieve 500m², was aggravated by:

- non-compliance with standardised processes;
- HR silos driven by functional instead of business-unit goals;
- non-standardised processes at operations which were lacking in governance.

“The result was that we had to work with reports that contained different versions of the truth,” says Anri.

The team started off by defining and implementing the correct organisational structures, which would:

- ensure accuracy of reporting;
- support the business in terms of its strategic objectives;

- resource the production budget accurately;
- place the right person at the right place at the right time to perform the right job;
- achieve accurate salary and incentive payments;
- enable decision-making at management level;
- ensure activity-based costing; and
- stipulate the required qualifications per occupation.

“Last, but not least, by implementing the correct structure, management would be able to identify and rectify labour deficits for its long- and short-term planning.”

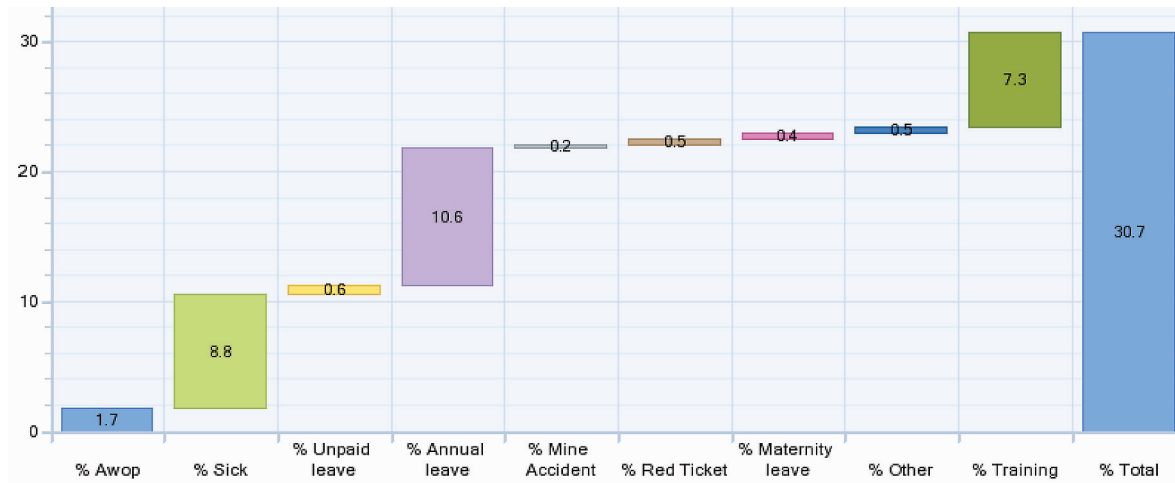
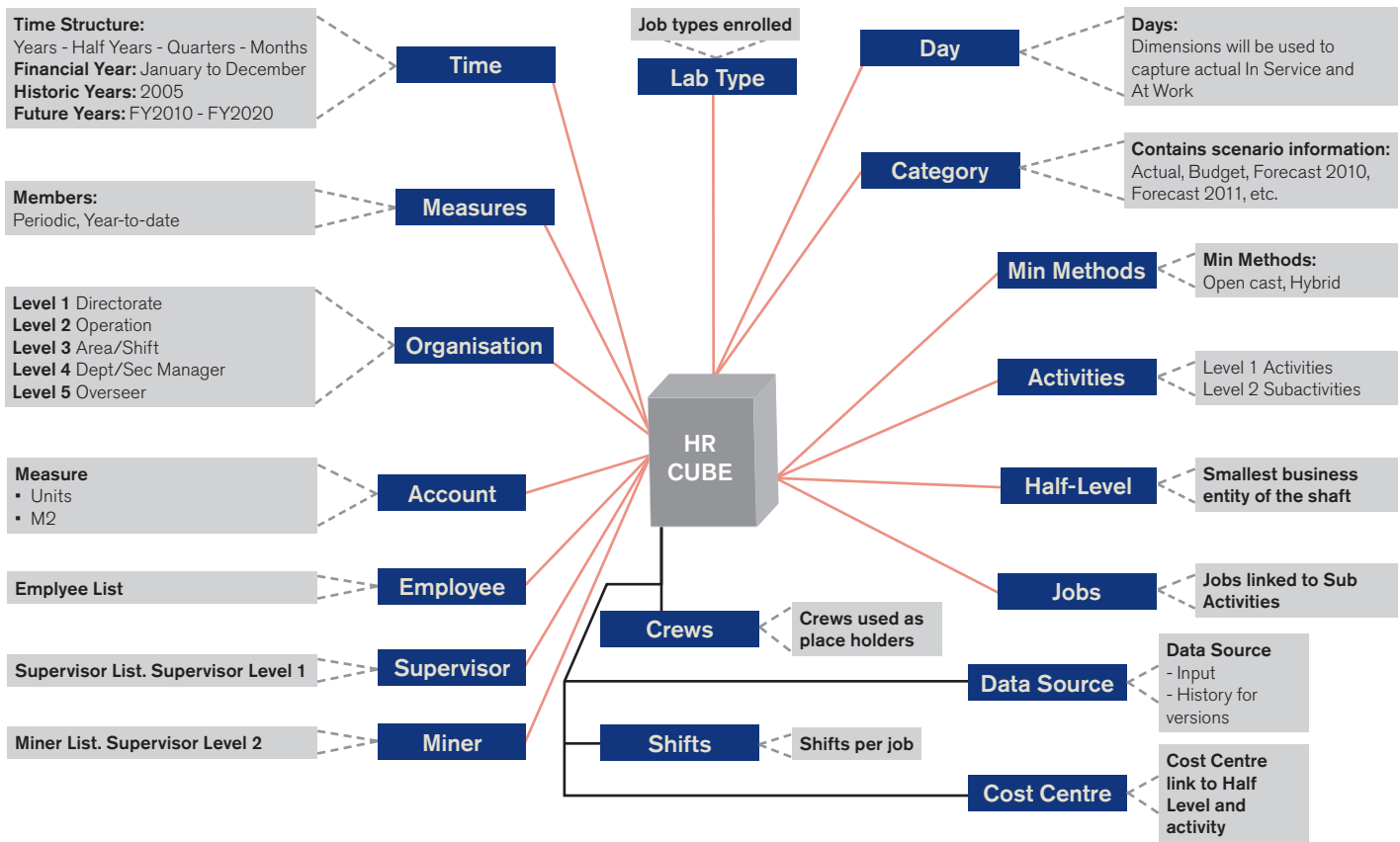
This was no easy job. All relevant HR policies and procedures had to be reviewed, the organisational convention policy had to be updated and a multitude of issues in organisational structures had to be addressed, such as:

- incorrect activities and sub-activities;
- potential delimits of organisational units and positions;
- management and supervisory vacancies;
- duplicate holders;
- misplaced labour;
- naming-convention compliance; and
- reports to relationships.

In addition, the team:

- re-aligned HR business rules based on dependencies from third-party systems;
- revised the manning template according to Platinum labour-planning principles;
- audited the status of organisational structures at all operations;





Example of an unavailables waterfall graph

- implemented an enhanced SAP upload tool with validation pre-submission and SAP validation;
- implemented enhanced exception-reporting tools;
- implemented SAP Team Elements, which catered for different attributes that describe the Organisational Unit in order for third-party systems to correctly identify the relevant organisational units in their mapping to the workplaces and associated production bookings – and

- eventually lead into the correct allocation of bonus payments based on efficiencies per team in the Safe Efficiency Production Incentive (SEPI) system;
- cleaned up the job catalogue by renaming and reallocating jobs; and
- implemented new, standardised activity and sub-activity codes.

Collectively, the HR team achieved the standardisation of HR-related data, business rules and HR policies and

procedures across the business unit – laying the foundation for effective and realistic labour planning and the management of actual labour in the SAP HR module.

TEAM MEMBERS:

Sandy Venter, Anri Lategan, Henk Steyn, Susan Heyneke, Rowland Payne, Louis Siemans, Chris Kern and Natasha Reddy.

INTEGRATING SAFETY, LABOUR AND PRODUCTION STATISTICS INTO A PRODUCTION MONITORING SOLUTION

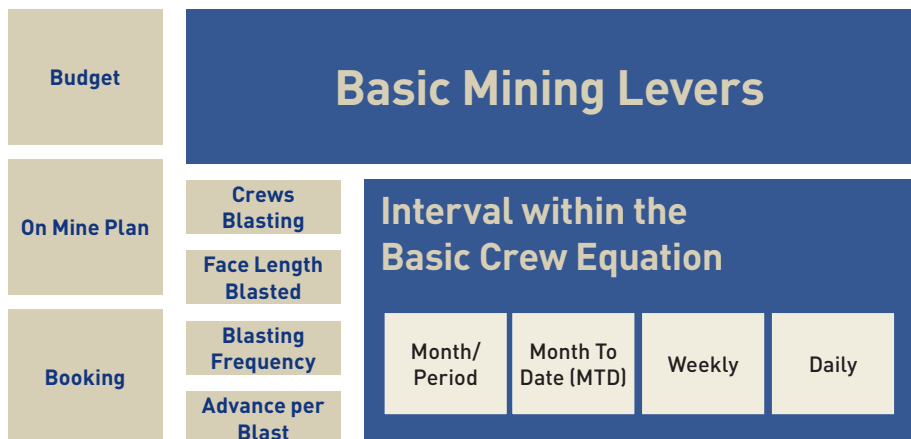
The Production Monitoring Solution (PMS) is an integrated performance management system which tracks production inefficiencies and enables root-cause analysis on potential production losses. It allows for standardised reporting at operational level – and it is fully integrated with mining resource management data, including calendar, workplaces and organisational structure.

PMS – which replaced Daycall, a system suffering from lack of information and standardisation across operations – has the added advantage that it acts as a portal to access other functional reports, such as Safety, HR and Finance.

PMS is designed to manage the Basic Crew Equation namely, number of crews blasting, face length blasted, advance per blast and blasting frequency on a **daily, weekly, monthly** basis.



PERFORMANCE MANAGEMENT BCE



REPORTS

PMS automatically generates standard daily reports analysing the TOP five reasons in production losses. BCE report per period per Mine Overseer depicting deviations from Plan, enable reactive actions.

Inclusive a ABS-P report which reflects the standard safety hazard classifications, "A" is SAFE, "B" indicates a certain safety hazard and a "S" indicating severe safety hazard per day per workplace and if the workplace hazard classification has degradation, improved or remained static for the past 7 shifts. The incorporation of this standardised system makes it possible to embed safety classifications in the

performance management process – including safety threats such as voids or holes indicated in CADSmine.

"PMS achieves excellence in performance management, from the business plan to monthly and daily production planning, by working from uniform, standardised information," says team leader Isak Roets.

"PMS constitutes a change in mining approach. It forces a re-orientation to focus on safety and efficiency – and it places accountability at the right level. It lays the foundation for sound business achievements into the future," says Isak.



PMS ACHIEVES EXCELLENCE IN PERFORMANCE MANAGEMENT, FROM THE BUSINESS PLAN TO MONTHLY AND DAILY PRODUCTION PLANNING, BY WORKING FROM UNIFORM, STANDARDISED INFORMATION.



TEAM MEMBERS:

Isak Roets (team leader), Gerhard Moller, Tanya Wolmarans, William Taylor, Nico Nel, Dion Hanekom, Johan van Rooyen; Johan Boucher; Hannelie Robinson; Freddy Bezuidenhout and Neels Oberholzer (MineRP).

Standard production reports accessible through PMS include:

- production overview;
- dailystope;
- daily development;
 - BCE per Mine Overseer;
 - BCE summary per GM
 - Crew Linking
- monthly development detail;
- tramming;
- dynamic plan;
- lock plan;
- month-end reconciliation;
- planning audit;
- cover drilling;
- holing warnings;
- lost-production analysis;
- lost-blast analysis;
- worst daily performers;
- worst monthly performers;
- top five losses;
- drop-raise drilling monthly production;
- safety reports; and
- the safe efficiency production bonus

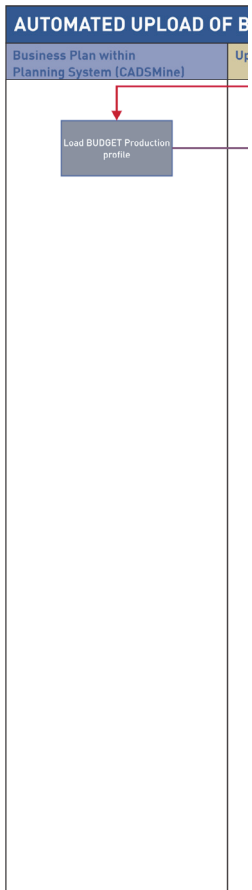
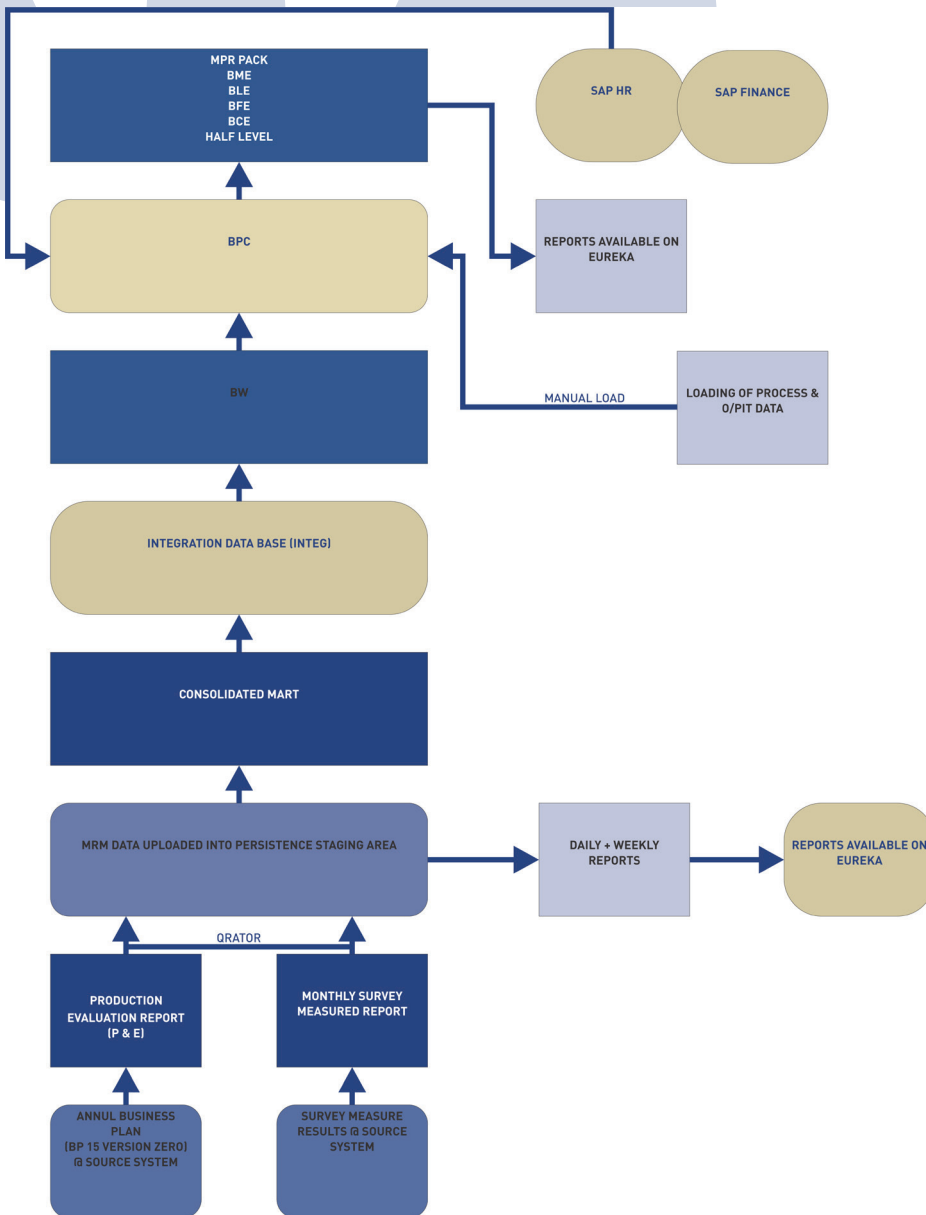


CORPORATE REPORTING

Discipline-integrated reporting is achieved by uploading daily, weekly, monthly and quarterly performance-management data through the Qrator (data dictionary) into a consolidated Mart for production reporting, via the same upload into Essbase replacement BPC.

This allows performance-management data to be presented on a daily GM summary report and crews blasting report supported with a crew-ranking report, accessible from the Mining Portal (see diagrams).

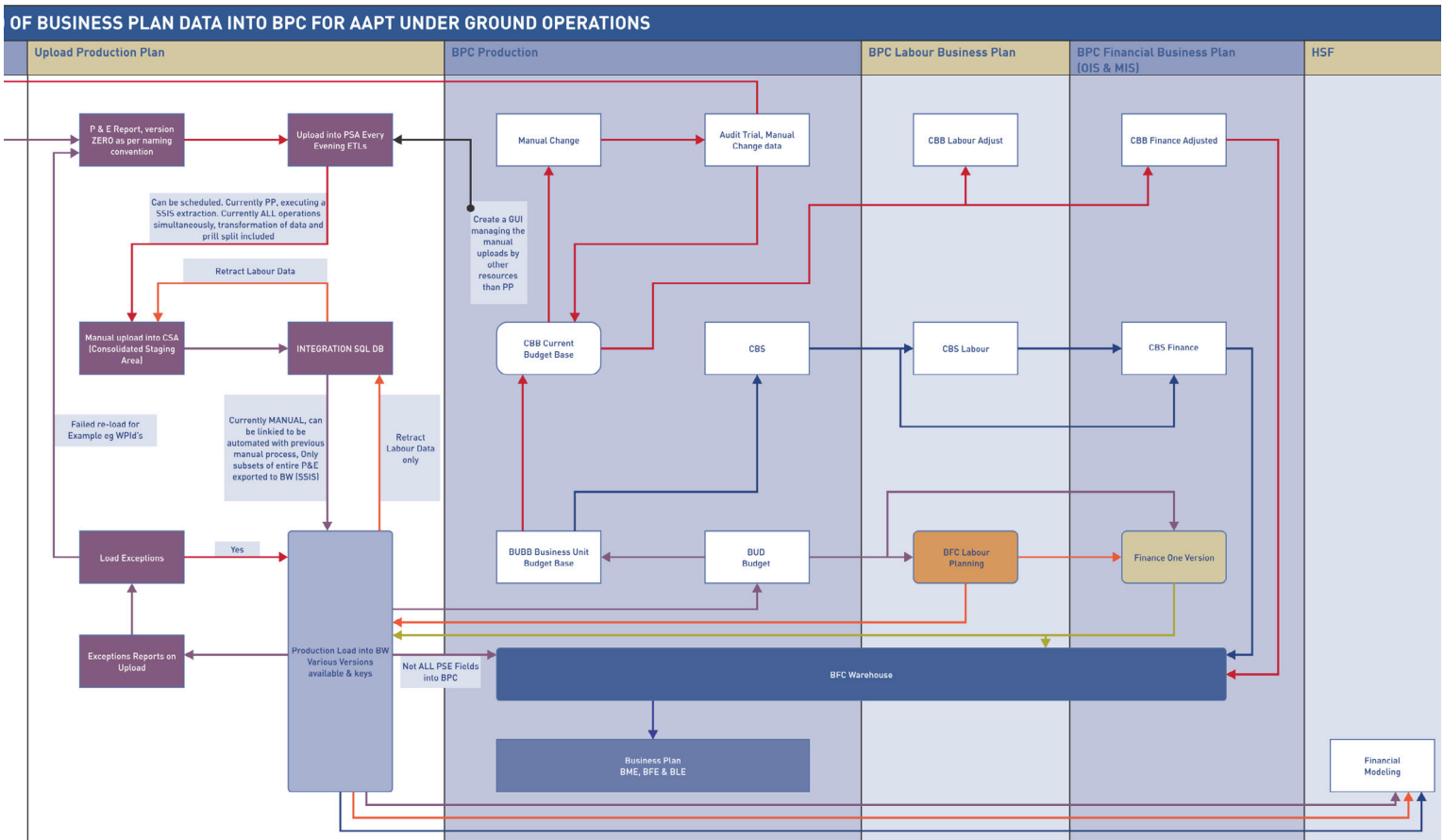
BPC BUSINESS PLAN, LE & SURVEY MEASURE



Reports can be accessed from the Mining Portal.



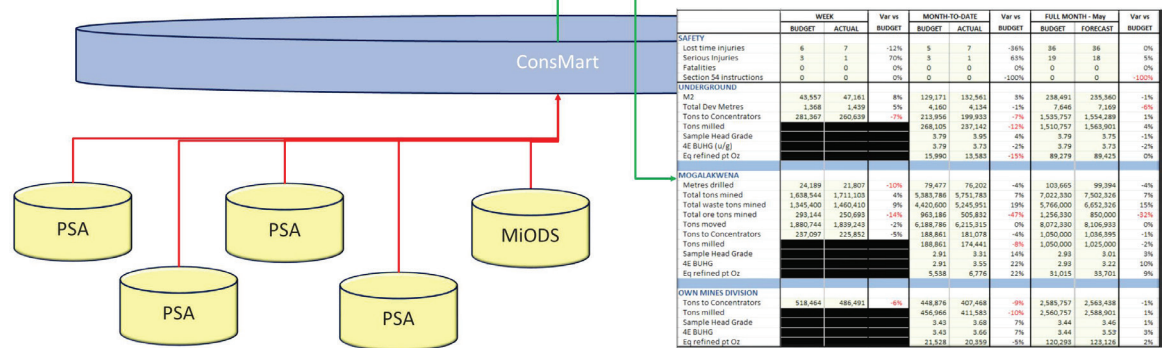
Example of the crew-blasting report.



Daily data aggregated to Corporate for the weekly Company reports.



The same mechanism is used to upload the annual business plan, latest outlook, life-of-mine plans and the monthly survey measured production plans.



The diagram, right, depicts the business plan data process flow diagram.

Example of the Crew Ranking Report.

Example of the GM daily report:

CULTIVATING A SAFETY MINDSET WHICH ALLOWS TEAMS TO DETERMINE THEIR BONUSES

Pivotal to the target of safe, profitable platinum is an appropriate incentive scheme.

The team that developed the safe efficiency productive incentive (SEPI) wanted the benefit to drive the Platinum business principles and strategic values. The incentive had to be standardised across all own mines, it had to improve safety, productivity and efficiency, its calculation had to be automated and payment had to be effected in the shortest possible time – and the system had to be transparent right down to crew level.

With the Production Monitoring Solution (PMS) these objectives were possible. Business processes, planning and labour practices and structures have been standardised.

SEPI was designed to achieve:

- improved efficiency, which drives safety and productivity, increases equipment lifespan and reduces maintenance;
- reduced absenteeism;
- reduced sick leave; and
- the elimination of non-policy incentive payments.

The system was run from one database, which:

- facilitated audit compliance and governance;
- provided management analysis and reporting; and
- made it possible to forecast incentive payments.

The incentive was based on industry-standard benchmarks such as 16m² stoping and 4m development and the remuneration on the business model of one-third to the employee performing above the benchmark, one-third to the company and one-third to shareholders.

Thus, in theory, if a team achieved benchmark and did the work of three additional people, they would receive an additional salary. The incentive included support and engineering services. This concept of self-funding was entrenched by making the incentive



calculation tables available to all teams, which means that they not only track their progress towards extra earnings, but they can plan what they would like their remuneration to be.

To counter the danger of unsafe work in the pursuit of increased production, a lost-time injury will slash a bonus by 30%. Values were entrenched by imposing penalties for misconduct (20% of incentive) and absent without permission (20%).

People who are on sick leave with a doctor's note and absent with permission would simply lose the applicable pro rata part of their incentive.

"We believe that the introduction of SEPI contributed to the improved safety at Platinum own mines during the first half of 2013," says team leader Paul Duba (Platinum IM). In the first half of 2013 the lost-time injury frequency rate decreased by 24% to 1,04 compared with 2012 – and included a 100-day fatality-free period.



30%

TO COUNTER THE DANGER OF UNSAFE WORK IN THE PURSUIT OF INCREASED PRODUCTION, A LOST-TIME INJURY WILL SLASH A BONUS BY 30%.

IDSET

IS

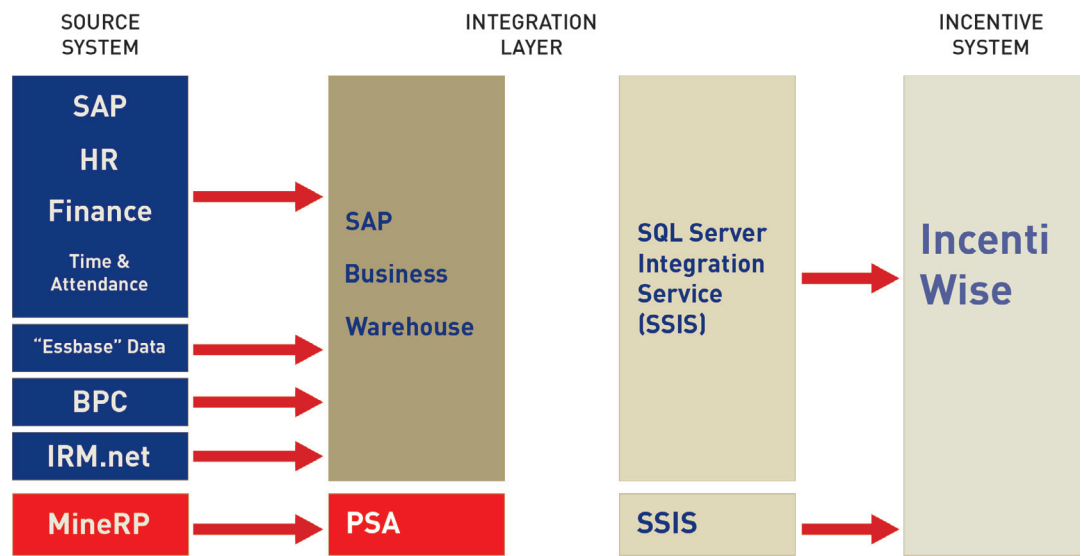


Paul Duba, Project Manager, SEPI

TEAM MEMBERS:

Paul Duba, Henry Trevorrow and Gerhard Moller (left), Gerrit Marais, Vic van der Walt, Uys Killian, Jaco Maartens, Simon Grimbeek and Andra Ladeira.

FASTFORWARD PROJECTS



OTTO



THE PERFORMANCE AND BONUS PROCESS

WORK DONE	SALARY EARNED	BONUS MERITED
Worked, but only performed at under 18m ² per person 	✓	None
Completed two loads of wood, performed at 36m ² per person 	✓	33% of salary
Completed three loads of wood, performed at 54m ² per person 	✓	66% of salary

DEVELOPING SOFTWARE ON NEW HARDWARE TO DELIVER INFORMATION TIMEOUSLY AND RELIABLY

World-class hardware infrastructure has been installed with centralised hosting facilities for consolidated databases for timeous and accurate production statistics onto tablet dashboards.

When Project FastForward was initiated, eight own mines were struggling with congested mining technical systems fed from shared servers over a very limited wireless local area network (LAN). Peak-time bottle-necks during measuring and planning stages were especially frustrating.

An Information Management (IM) project to upgrade the hardware infrastructure was initiated when FastForward launched. At the time, the data had been split per operation, but the databases were still housed on one server per area.

The project affected all aspects of mine planning and mineral resources management systems – hardware, software, databases and user interfaces:

SERVER UPGRADES

To resolve response-time challenges, five server sets were installed at the Rustenburg operations, two sets at Amandelbult operations and one set at Union Mine, with major upgrades to the local area network back-bones and access areas.

This was a massive project with strict timelines and required server downtime which would disrupt planning and production systems, including reporting.

The change-over involved, amongst others, the upgrade to 64-bit capability of applications such as:

- CADSmine, a graphical software programme, with modules used for mine planning, design and scheduling;
- MRM, also a graphical application with various modules for mineral resources management by departments such as Survey, Ventilation, Rock Engineering and Geology and integrated with CADSmine;

- SEPI, the employee bonus remuneration system, drawing data from both above applications; and
- Windows Reporting Services, Windows server operating system and SQL databases.

A nine-day downtime window was negotiated during a challenging time when operations were making losses and Rustenburg operations had to cope with the effects of labour unrest.

The teams worked around the clock, on a tight schedule, in sequential steps, each of which had to be completed before moving to the next. The change-over was complicated by the fact that interim servers had to be used because of a delivery delay from an overseas supplier.

The result is state-of-the-art server farms, with blade servers and SAN storage units, resulting in numerous virtualised, sustainable servers fully supported and maintained with sufficient capacity for future expansion. This best practice configuration has been so successful that it has been accepted as the blue-print design for future IM projects.

The change-over yielded immediate benefits:

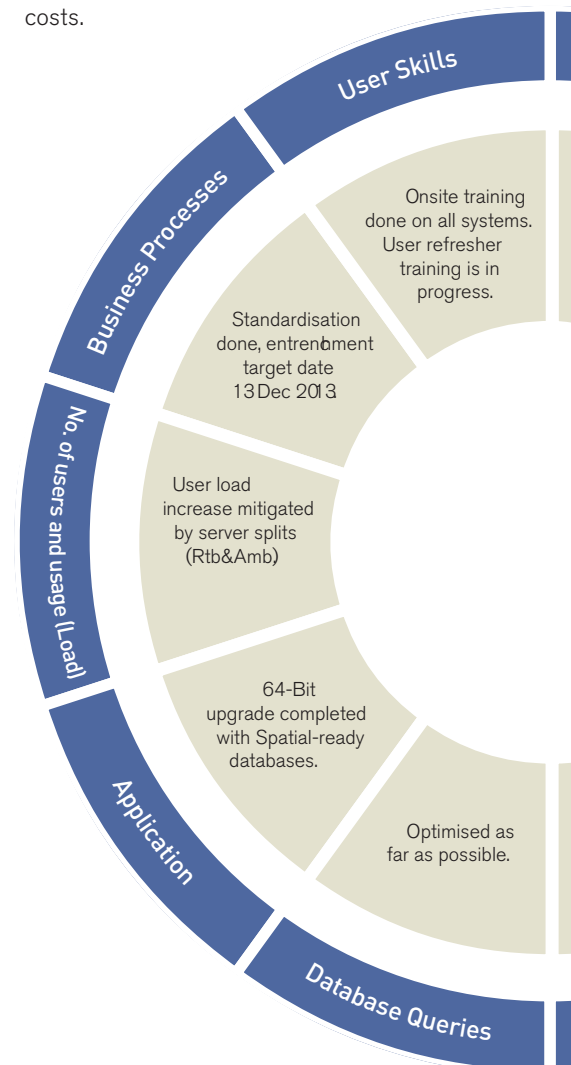
- improved processing speed;
- minimal user lock-outs during peak processing periods;
- faster report generation;
- less user frustration; and
- licence cost savings by using Windows Server standard in place of Enterprise edition.

LAN OPTIMISATION

The blade configurations were virtualised in the three regions and were linked to high-speed LANs, using optic fibre

ring-topology backbones operating at 10 gigabits per second – comparable to the capacity used to channel coverage of the 2010 FIFA World Cup to viewers across the globe.

At all installations, the links to the backbone were upgraded to optic fibre and switches and other hardware were standardised to ensure optimum performance and availability and to save on maintenance costs. Future savings can be achieved by linking the operations' telephones to the backbones to save on Telkom line rental and call costs.

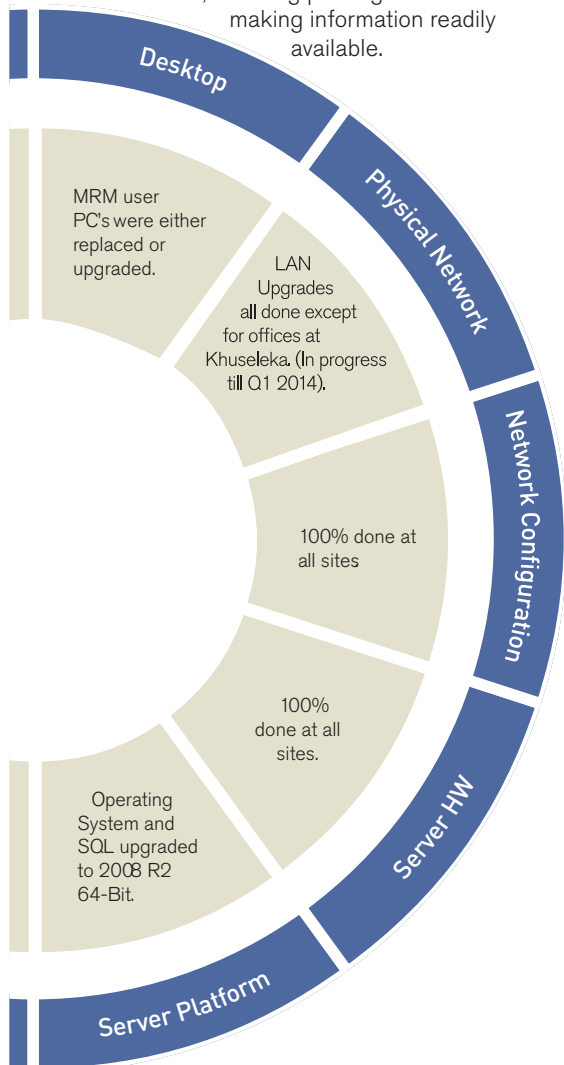
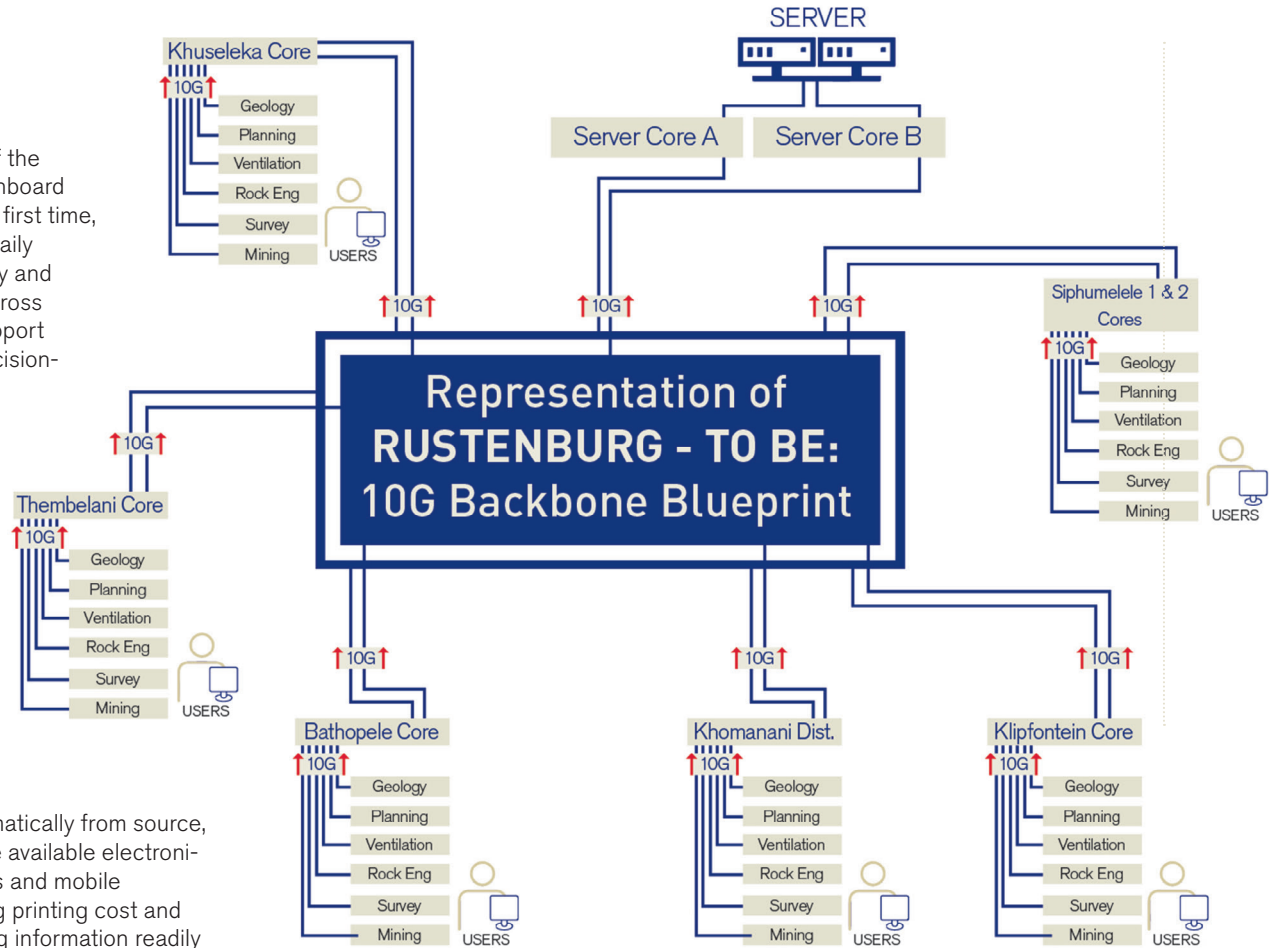


PROJECT OUTCOME

The end-result of the upgrade is a dashboard providing, for the first time, comprehensive daily production, safety and labour reports across operations to support management decision-making (PMS).

The reports are presented visually with drill-down capability, which allows users to identify problem areas with a few clicks.

Generated automatically from source, these reports are available electronically on desktops and mobile devices, reducing printing cost and making information readily available.



Server upgrade projects:

Rikus Prinsloo (Programme Manager), Linda Mafuleka, Nico Roberts, Gregg Botha, Johan Malan, Johan Jonker and MineRP at the own mines namely Rustenburg Mines with Donovan Andersen, Andrew Smith and Dion Hanekom (Management), Union Mine with Pier de Vries and Janet Hobkirk (Management) and Amandelbult Mines with Corne Strydom, Luc Vermeulen and Harm Steenkamp (Management).

LAN upgrade projects:

Gerrit du Plessis (programme Manager), Ryan Gover, Nico Roberts, Johan Malan, André Kleyhans, Gavin Hird (Hewlett-Packard), Cor van Niekerk, Riaan Botha (Interconnect Systems), Adam Prinsloo, Paul Barnard (IM) Marinda Steenkamp (ISM), Pier de Vries, Janet Hobkirk, Hestie de Wit, Gorge Santos, Willem Lensley, Jens Kernick, David Norval (Management), Llewellyn Miller, Amandelbult region, Pierre Janse van Vuuren (BTSA), Harm Steenkamp, Luc Vermeulen (Management), Nico van Niekerk, Rustenburg and Ryan Gover, Union Mine

IPI PROJECT MANAGEMENT AND OPERATIONAL READINESS

OPTIMISING THE PROJECT MANAGEMENT DISCIPLINE, GOVERNANCE AND ACCEPTANCE

In May 2104 the Amplats Exco decided to conclude the substantial amount of work done by FFWD, which was aimed at supporting and improving underground mining business processes. The decision was to focus on a structured FFWD system entrenchment and close-out at each operation. This was to be done under the guidance of the Platinum Review Office with Pierre Malan as implementation leader and project manager. Head of Mining continued to align and integrate the various functions.

The actions that followed included:

- rebranding FFWD to Integrated Production Information (IPI);
- consolidation of initiatives into the newly formed project;
- completion of the spatial project (MRM);
- coordination of remaining MRM initiatives; and
- finalisation of BPC and manning interface requirements.

The actions identified and rolled out from June 2014 under IPI included work to address:

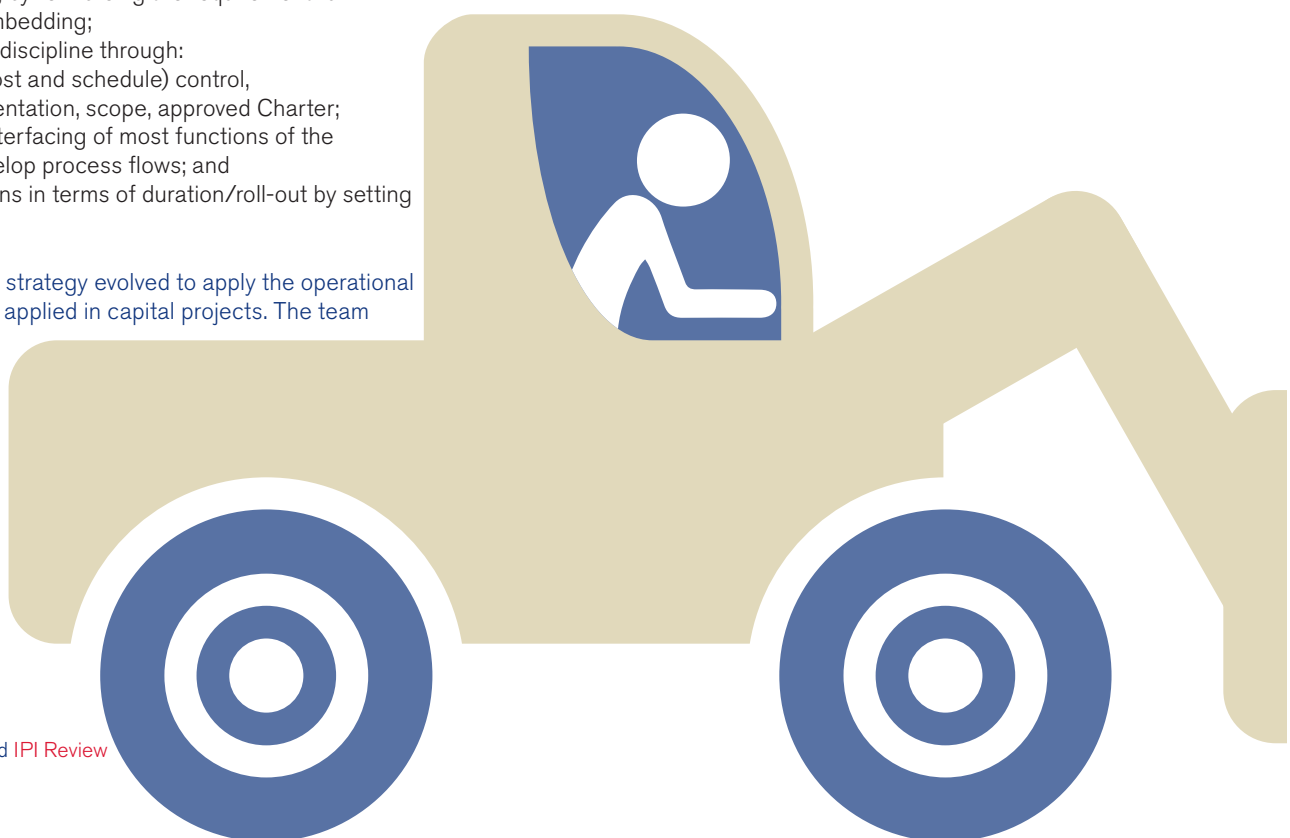
- specific lack of cross-functional integration for both systems (such as BW) and business;
- insufficient “pull” and interaction with end-user/operational GMs;
- change management, by reinforcing the requirement for entrenchment and embedding;
- project-management discipline through:
 - baseline (scope, cost and schedule) control,
 - integration documentation, scope, approved Charter;
- extremely complex interfacing of most functions of the organisation and develop process flows; and
- unrealistic expectations in terms of duration/roll-out by setting a realistic schedule.

From these actions the strategy evolved to apply the operational readiness principles as applied in capital projects. The team started in October 2014 at Tumela Mine and from there rolled out the respective deliverables as follows:

1. **PMS:** Complete review of content, including a “day in the life” assessment of mine overseers.

As a result, the PMS reporting content is being revised to the “white paper” design, to be approved for the Phase 2 update, by Tumela GM, William Taylor.

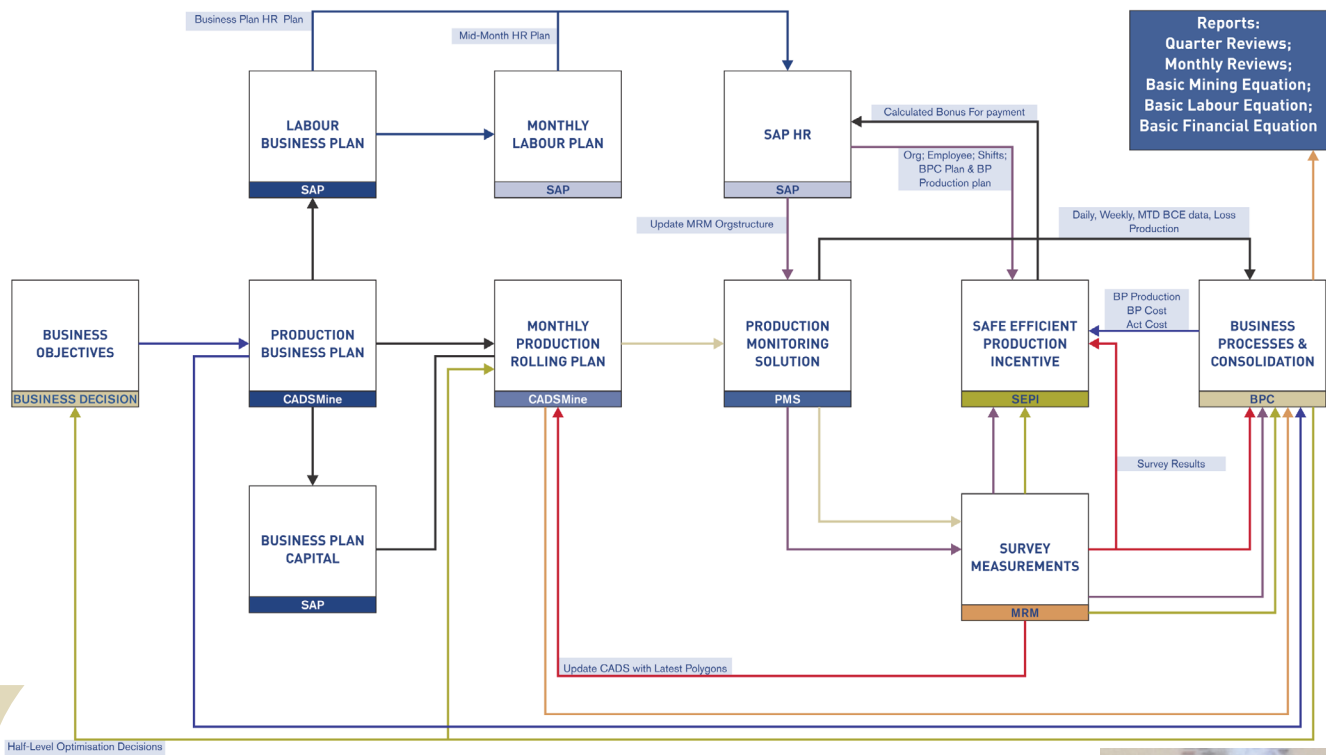
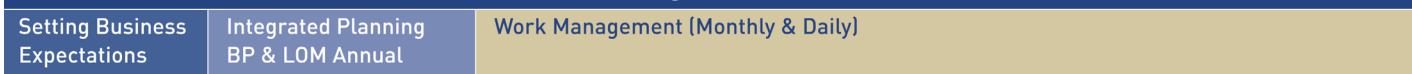
2. **IM Production Reports:** Completion of the daily GM reports:
 - a. The GM daily production report,
 - b. The crews blasting report,
 - c. The crew-ranking report, and
 - d. The weekly (20-pager) and monthly reports, which were being finalised at the time of concluding IPI phase 1. All reports are available to users on Eureka.
3. **Spatial:** IPI close-out report is being finalised – Spatial has been installed and embedded for service department and final production embedding will require phase 2 change management.
4. **SEPI:** Graphs and report completed as per original scope. At time of closing IPI, the BPC interface (mid-month planning Netweaver) was still outstanding and will be included in Phase 2. Other GM-initiated changes will be motivated separately.
5. **HR:** Organisational clean-up status all mines continue in Phase 2 and in Manning for Success (M4S):
6. **Any additional demands,** after June 2015 (ex IPI), have been listed and are to be separately motivated and approved under IPI Phase 2.



THE ORIGINAL VS PLANNED END STATE (KPIs) ARE REFLECTED BELOW:

	KPI MEASURE	ORIGINAL STATE	PLANNED END STATE	STATUS
1. Fast Forward	Close-out Governance	Open	Formally SAP closed	Yes
2. Spatial Implementation	- Installation period - Effective operation	- In progress - User non-acceptance	- Complete Jun 15 - User acceptance	Yes Yes
3. SAP 409/HR INTG	- Reduce turnaround time - Shifts work report	Avg. 72hrs Non integrated	24hrs - Automated integration	Yes Yes
4. Safe Efficient Production Incentives (SEPI)	- Configuration agreement - Efficient operation	- Differing views - System not fully automated - Not all calc in 5 days - No bonus ops reports	- Common view - System automated - All calc in 5 days, fully automated - Bonus ops reports done	Yes Yes Yes In progress
5. IM Production Report Development	- Completeness - Automation - Common acceptance	- In progress - Semi automated - Semi acceptance	- Complete - Fully automated - Full acceptance	Yes Semi auto In progress
6. IPI Operational Readiness	- Systems operation - User acceptance	- Challenged - Limited acceptance	- Efficient - Full acceptance	Practical IF

IPI Business Process Flow Summary



Pierre Malan, Manager Projects

CHANGE MANAGEMENT A CONTINUOUS PROCESS

GERRIT MARAIS, CHANGE AGENT

Change management was started with the first project and is still ongoing. It never ends. As and when one aspect changes, it has a knock-on impact on the next issue and if that knock-on does not happen in a controlled manner, mayhem is a possible outcome.

Change management was applied to every aspect of the products developed during the FFWD project. Each and every project had to cater for training of the users in that specific application.

As an outcome to address this from a systems perspective, MRM Systems has trained and is currently appointing MRM system specialists at every operation. Their function is to ensure system stability within the entire business process that FFWD and Spatial have impacted – from production planning and crew allocations with HR to daily production monitoring up to month-end measuring and bonus payouts with Finance.

The biggest change management initiative was launched during the IPI phase when an overview of every portion of the FFWD initiative was put together. Systems entrenchment had been done before, but it needed that additional once-over.

As a “first in the world”, the spatial project required dedicated change management and therefore the ADKAR methodology

was followed to help drive successful change.

ADKAR is a change-management model which outlines the five building blocks of successful change:

- Awareness of the need for change
- Desire to participate and support the change
- Knowledge on how to change
- Ability to implement required skills and behaviours
- Reinforcement to sustain the change

The objective is to assist all the users from “as is” (paper plans) to “to be” (electronic environment). The “as is” provides a snap shot in time when the plans were printed, whereas the “to be” comprises live data or

daily updated information. The impact is that instead of being dependant on a third party to supply the information, it is now immediately available on computer to the user.

The change strategy was to focus on the change process with the MRM Department as well as the Production Department per operation so as to create sufficient awareness and understanding of the system in order to fully adopt and utilise it effectively.

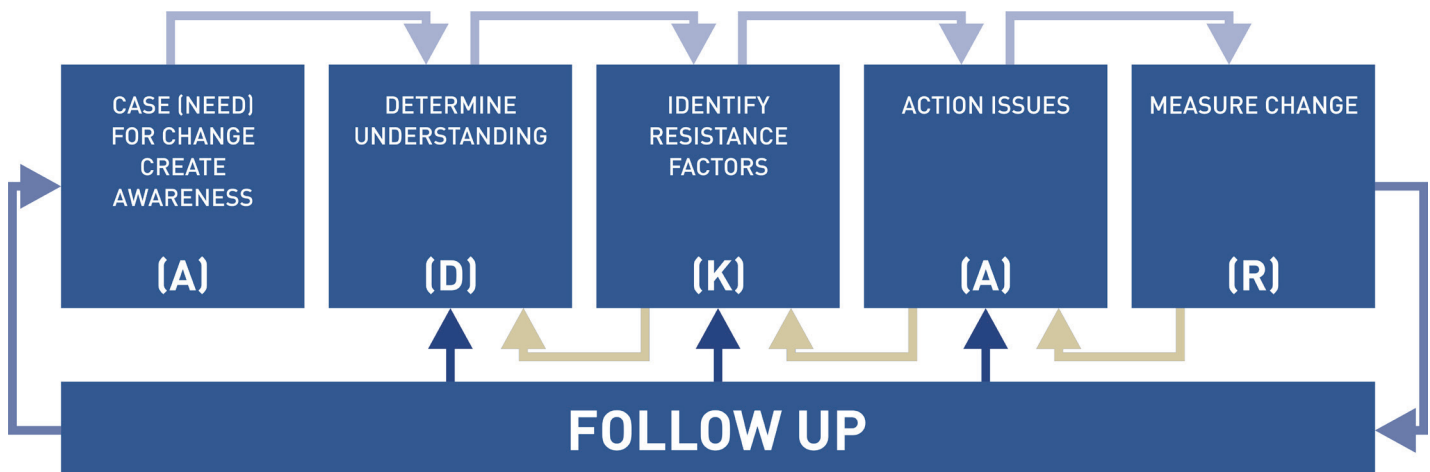
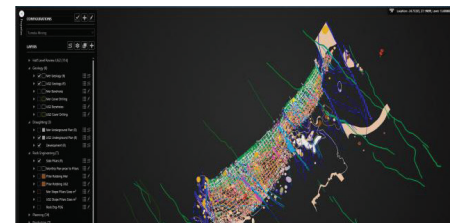
To this end, individual and group sessions were held with all users at all operations to ensure the desired outcomes.



PAPER PLAN



SPATIAL



THE FUTURE

FRIK FOURIE AND DONOVAN ANDERSEN

From the beginning of FFWD, the project has virtually taken on a life of its own. Additional ideas were brought to the table and included under the FFWD umbrella. The result is that FFWD has in some aspects surpassed our expectations, although in others we still have some work to do.

When it comes to developing new products to cater for a changing environment such as the one FFWD addressed, there are no big projects in mind. Changes to existing software have become costly and it is only under extreme circumstances, where need exceeds cost, that capital expenditure for the enhancement of the old legacy system will be allowed.

Spatial has to grow from where it currently finds itself. It has to mature, and the users have a growth path that matches. We need to develop our analytical skills so that we can start asking the right questions of our data. We need to interpret a picture and understand what it depicts so that we can adjust quicker by correcting the long-term plan.

We need to become systems aware as an organisation. It may sound strange, but there is still an "old-man" philosophy about our system management that we cannot remove. We have created the

"single version of the truth" with the way the system has been integrated. However, there are still instances where portable, defensible and dependable data is a critical deliverable which has not been realised quite yet. We need to capture all data at source before we feed it through as defined information.

As for our current software, most of which is starting to reach end of life, there is the anticipation of a roll-out of replacement software that is geared to fit the current, revised infrastructure. The functionality of the new systems will need to be tested and this will take place during 2016. The new functionality get developed with the required deliverables in mind and, on a modern platform such as Windows 7 and 64bit, that will improve speed, flexibility and adaptability, and with a lot less maintenance required.

There are many aspects of the MRM systems that are progressing faster than we can appreciate, but it still means that we can only progress as fast as our own skillsets allow.

So what does the future hold? Bedding down the recent developments, establishing trust in the system and raising the skillsets of our users through the appropriate training of our people! Let us all strive for one version of the truth.

THE FOUNDATION FOR SAFE, PROFITABLE PLATINUM HAS BEEN LAID



“

THE ACCURACY IN OUR PRODUCTION FORECAST INCREASED SIGNIFICANTLY FROM A 30% VARIATION TO LESS THAN 3%, WHICH CREATES A HUGE AMOUNT OF CREDIBILITY FOR THE TEAM.

”

FFWD has delivered on all fronts, notably by creating a disciplined, organised platform that will drive huge value into the future.

The integrated platform makes it possible to draw real-time reports from different systems and compare data stored in the same organisational structure, with all systems using standard DNA.

SAP is a very rigid system and it is for this reason that all the other systems use the SAP organisational structures, which provide the common platform on which to base the integration. All this work made it possible for the spatial project to convert data from various sources in a visible format, with only IRMS.net not being converted as yet.

The frontline supervisor can now react to actual data as it unfolds on a daily basis to make proactive decisions, in real time that can influence safety, productivity and costs.

The biggest challenge is to train everybody to use the system proactively instead of reactively, because the real-time reports give them the information and reduces the manual workload.

The system-disciplined operating method makes it possible to have only one version of the truth, and this will empower frontline supervisors to react responsibly. It will also ensure that our forecasts are accurate and our controls substantially more efficient and effective.

Yes, FastForward demands discipline and proactive integration on the system, but it reduces the workload on re-work significantly, being based on one version of the truth. If the upfront planning and loading is not done properly, it will cause a lot of rework.

The systems on which FastForward is built, provides a platform for the future, based on leading practices in the industry. Dynamic planning monthly is now possible as long as the work is executed according to the strategy on which it was built. The accuracy in our production forecast increased significantly from a 30% variation to less than 3%, which creates a huge amount of credibility for the team.

I thank all the employees and designers for many, many hours of hard work and dedication on this project, but more so for the Anglo American Platinum EXCO support and patience to put this unique system in place.

The new financial model that is being built will benefit from this platform, which already demonstrates the benefit of using an integrated platform. The spatial 4D capability will have significant benefits in the future and need to be developed a lot more as this will give us the leading practice in the future.

Thanks to all and may this project give us safe, profitable platinum for many years to come.

Frik Fourie





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INTEGRATED PRODUCTION INFORMATION REVIEW 2015

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Real Mining. Real People. Real Difference.