

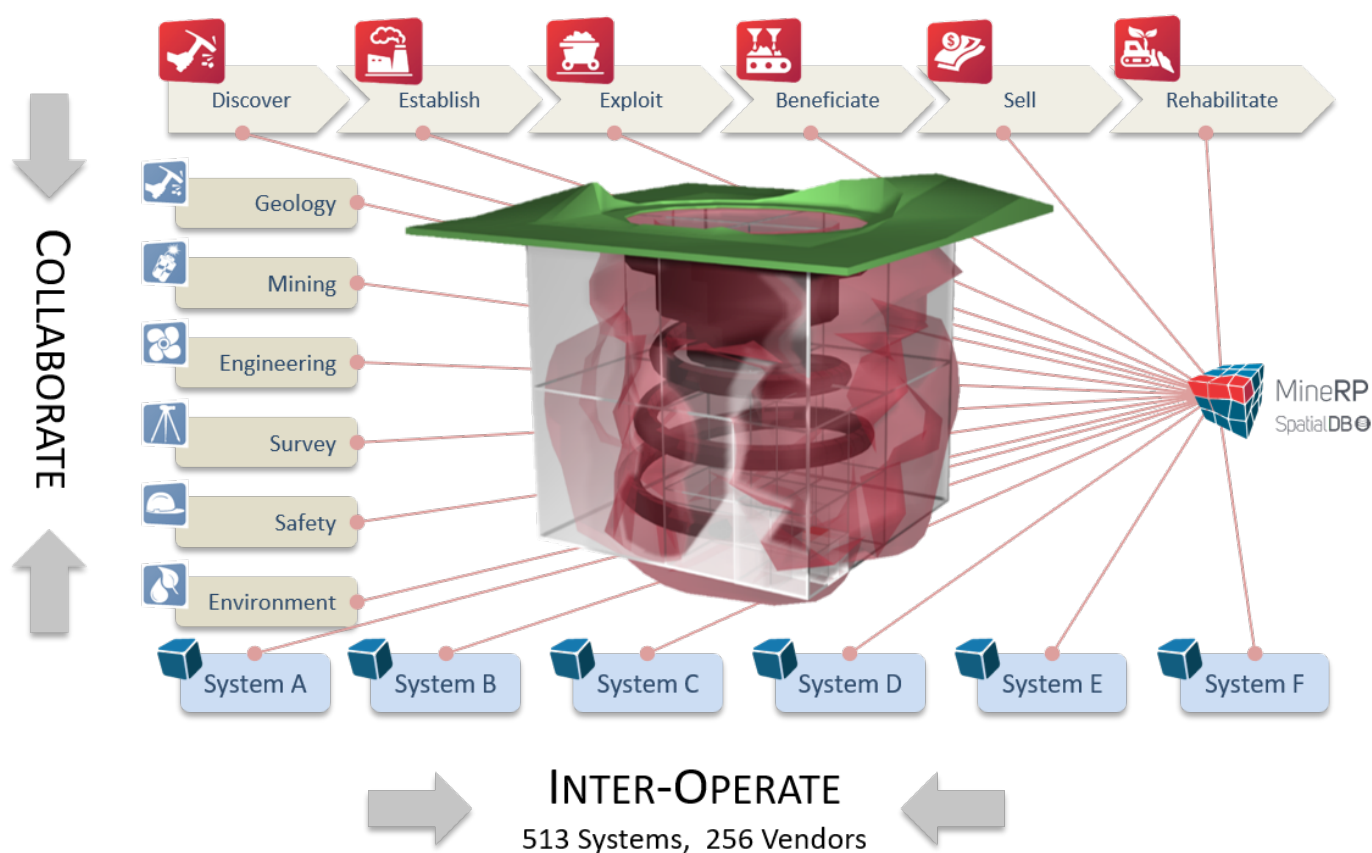
# Integrated Mine Planning



## Point of View

# Industry Setting and Problem

**Integrated mine planning** seeks firstly to understand the potential value of an ore-body. The aim is to extract its maximum value by applying the best mine design and extraction schedule to the most up-to-date interpretation of all mine technical system (MTS) data. It entails alignment to the strategic objectives of the business and considers all mine technical aspects impacting that objective .



**The most robust strategic plan drives the optimised business plan.** Business objectives are often expressed as NPV, Life of Mine or Cash Flow.

**Production planning** intersects all data domains in the company in ensuring that “TODAY is the first day of the rest of your life of mine”.

**Long planning cycle times** create undue time lag between mine site planning and portfolio reporting. This both precludes alternative plans and erodes investor confidence.

# Shortcomings of Current Approaches to Integrated Planning

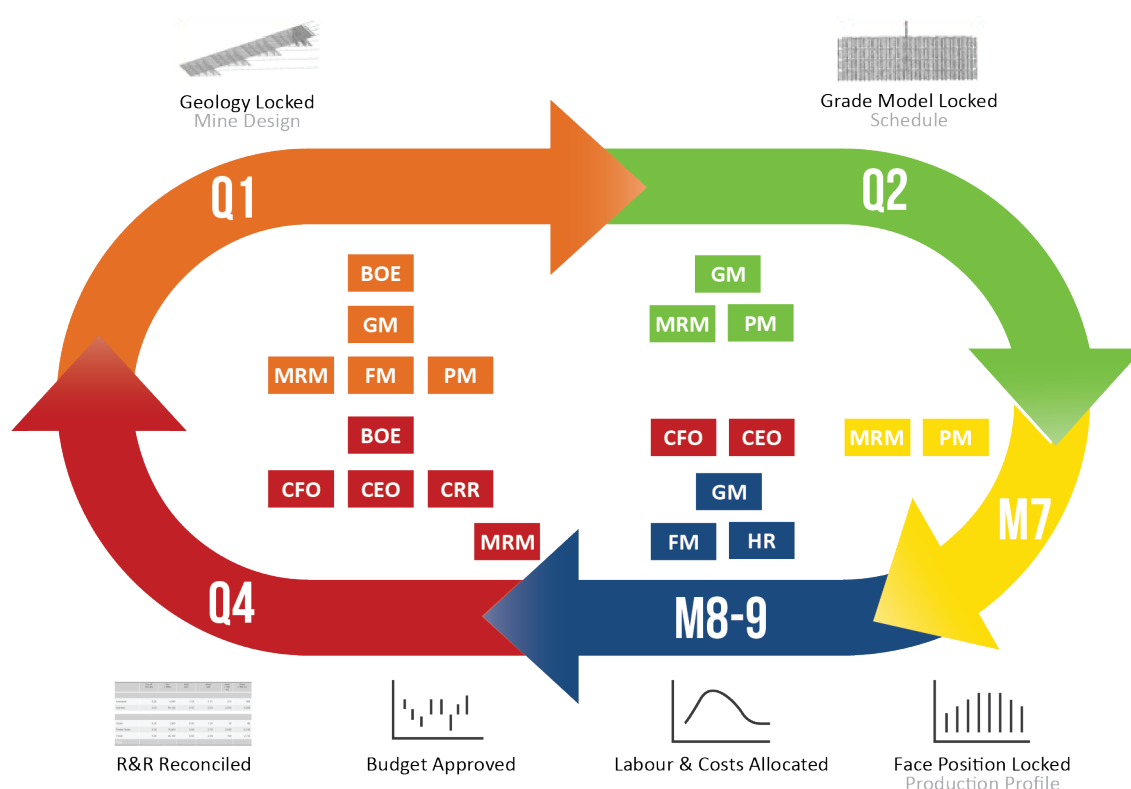
**Most mines have separate mine designs, sequences and schedules for each level of planning.** These are driven by the changes in the granularity, focus and objectives. In some cases, different software solutions are used for different levels.

**Files are shared via manual version control.** Using files means poor information governance and severely limited auditability and adds latency to the data flow and entire planning cycle.

**A silo view of mining is enforced** in a world of fragmented, expert systems. Each has its own scientific purpose but time consuming data exchanges lose key intelligence. Disparate data sources constrain the ability to create an enterprise view of plans and forecasts.

**Long planning cycles** result in a single plan, limited options and often no optimization. All based on a single unit cost and view of the future.

**Little or no Integration of technical and financial planning.** It's well known that miners have discrete technical and financial planning processes. Failing to integrate planned mining activities with planned financial, supply chain and budgetary processes delivers unpredictable budgets and unreliable control environments.



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# MineRP's Approach to Integrated Mine Planning

**Not all Integration Platforms are born equal!** You are being trapped if your mining technical service provider prides themselves on the integration of data only from their own applications. Mature integration platforms should not only integrate data sets from the same vendor, but also any other third party data; even from competing providers. This leaves you with the choice of expert tools to suit your business.

As a mature, integrated planning platform, MineRP Planner addresses governance and embeds company specific workflow. This includes approval processes and version management for such as:

- geological structure models
- grade block models
- survey and volumetric data
- mine designs
- integrated schedules across technical and non-technical domains

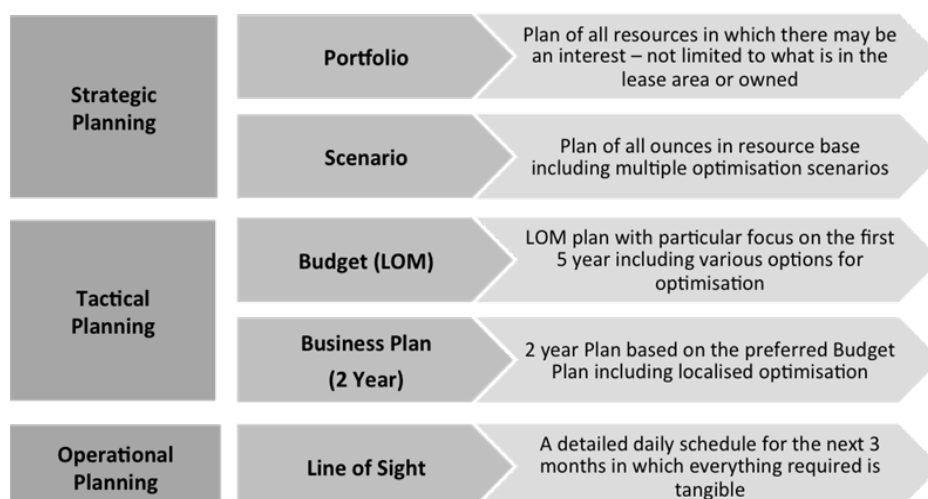
With all relevant data to hand, MineRP Planner allows “what-if” tests on all the intermediate versions of geology, grade, mine design, etc. before final decisions are made. Mines should have unfettered access to integrated data sets to swiftly develop and evaluate many alternate plans across all time horizons and all levels of planning.

MineRP uniquely allows planning teams to use rule-based tools attuned to their own mining method. These tools allow for the rapid generation of parametric, mine design options in a fraction of the time of traditional CAD-first approaches.

Across the horizons of strategic, tactical and operational planning, integrated mine planning should be unified with integrated business planning. This implies a level of integration between the MTS platform and ERP platforms that is adequate to the task of providing a “money version of the mine”.

## Integrating Planning Levels

reflect discrete levels of work. Plans need to address specific objectives about the view of the future. The Planning Level affects the Planning Horizon of the plan as well as prescribing the level of granularity or detail of a plan.





# Continuous, Integrated Mine Planning

**Integrated Planning Horizons** are the periods of time an organisation will look into the future when preparing different plans. The horizon of the Portfolio plan could extend far beyond the company's current Life of Mine (LOM) plan whilst the Line of Sight plan may only span a three-month horizon. The impact of missing a deadline in the short-term plan is much more severe than that of a LOM plan. A missed deadline in the operational plan will almost always affect the month's production. With the LOM plan, various options can be considered to mitigate the impact of a missed deadline.

Integrated Planning goes well beyond the integrated underlying technical data sets. It also implies a continuous planning process, where each subsequent plan (strategic to tactical to operational, and any versions) is simply a refined expression of the whole plan.

A good way to express this would be to say that my next shift's plan should only be the next shift of my life of mine plan. We refer to this as **continuous integrated planning**.

Continuous planning implies there exists only a single version of the mine plan, because the planning horizons, levels and background data are all integrated.

An important feature of MineRP Planner is the ability to traverse horizons and levels when assessing the impact of changes in any given horizon detail.

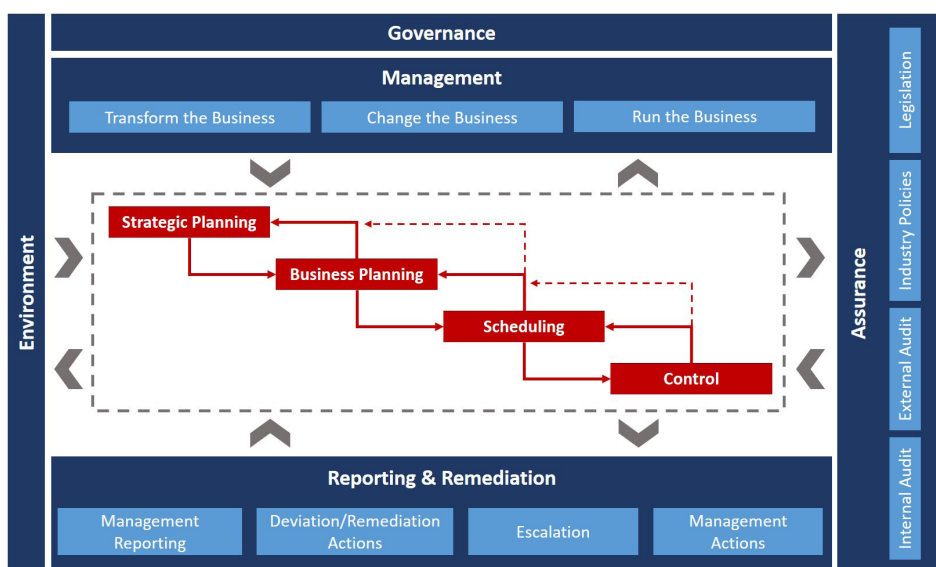
*The diagram below shows the natural future-directed flow of the planning process. A continuous planning paradigm implies knowing the impact of operational plan realities on the tactical business plan, or life of mine plan. Mining companies can now find the best solution to an immediate problem while staying aligned to strategic objectives and investor promises.*



# Benefits and Proof Points

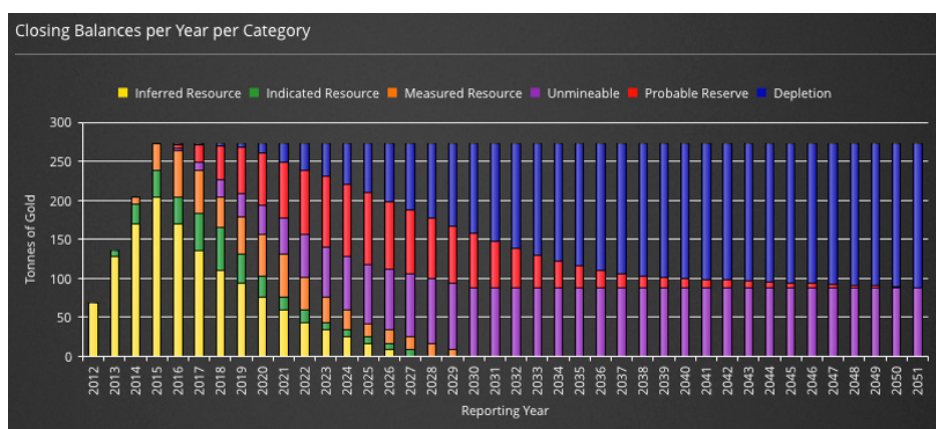
**Comparing multiple options in a single planning cycle** helps to better understand and manage risk. Accurate, dynamic forecasting on real figures and not planned averages and aggregate grades prepares the business to respond to change. It also enables transparent communication on a range of outcomes and valuations to create investor confidence.

**Re-Planning is done only when required.** This may be initiated by changing conditions or deviations to plan, in response to changing external conditions. It is enabled by feedback between levels of planning and referral back to strategy. The integrated nature of the planning means the business plan, based on a robust strategy, is the one being executed.



// With continuous integrated planning, today is the first day of the rest of my Life of Mine! //

**On-demand view of R&R** at an enterprise level enables testing of CAPEX profiles and analyses of external factors to manage capital spend and cost of generated Reserve. Annual cost of R&R compilation and reconciliation is reduced.



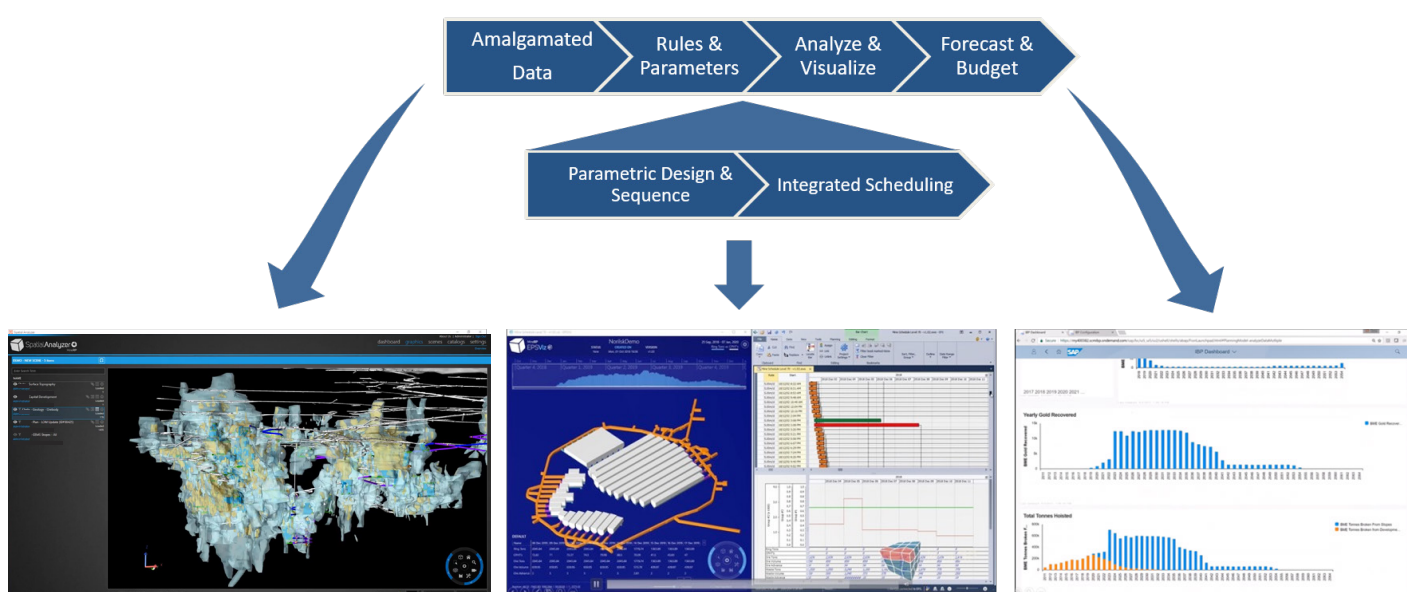
// Maintaining point to point interfaces could be eight to ten times the purchase price of individual application licenses //

**An enterprise knowledge base** from intact original data is the basis for best practice in information management and governance. It will support a digital transformation strategy on the back of a simplified systems landscape. Note: the cost of maintaining point to point interfaces is eight to ten times the purchase price of individual application licenses.

# Critical Success Factors

A robust integration platform implementing standards for centralized data providing one version of the truth for consistent planning, control, reporting and analysis. Discipline silos aligning with each other because data sets are made visible.

## Integrated Mine Planning



**Continuous planning** responding to events and current execution transforming the calendar driven planning cycle.

**Proper integration** enabling one design and sequence for which the schedule can simply be adjusted for each planning level, with minimal design details added where necessary.

**Integrated Mine Planning** fully unified with integrated financial planning in order to create seamless business plans from technical mine plans.

**Parametric Planning Capabilities** enabling rapid generation of design and schedule alternatives for evaluation and assessment of strategic fit.

**Integrated Optimization Engines** providing the capability to harness the best of artificial intelligence and advanced analytics on the generation and assessment of plan alternatives.

**Digital Orchestration** capabilities to keep technical, financial and control domains synchronised as different plans are created and adopted.

# Audience Roles and Objectives



**Head of  
R&R**

The **Head of R&R** puts strategic thrusts in context. The rate of conversion of a portfolio's Resource to Reserve has two purposes: It should optimise capital expenditure and maintain a fit-for-purpose level of Reserve. Unfortunately, portfolio views are often little more than loose collections of technical expert , data sets and reporting (e.g. compliance to plan) requires cumbersome merging of data. An inability to simulate the impact of production drivers on R&R and lack of business risk metrics often results from inappropriate timing and levels of operational intervention. A backward looking view drives reactive responses. A forward looking view drives proactive responses and improved effectiveness.

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**Technical  
Services  
Manager**

The **Technical Services Manager** has limited time to align plans with corporate strategy, and needs multiple planning scenarios to do so - if these can be generated rapidly. Furthermore, when the view on reserve availability is only backward looking, it is exceedingly difficult to simulate behaviour of the ore body. Together, these issues risk less than optimal capital deployment and there is constant tension between a just-in-case and a just-in-time approach. With the wrong information, mines risk inappropriate responses and even premature remedial action. This is highly disruptive, leading to conflict and interference in operations.

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**CIO**

The **CIO** is called on to implement, adopt and maintain leading technology. This must spread through the organisation to support it's transformation into an integrated, digital mining enterprise. Inadequate or poor integrated deprives the organization of many opportunities for optimization. Analytics and forecasting are difficult and reporting in general is not well managed. This is due to large volumes and variety of data with manual integration procedures and copy-paste processes. All this undermines confidence in the enterprise, potentially reducing the ROI. Integrated information management and planning is a major lever in the hands of the CIO.





# Integrated Mine Planning

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