

Integrated planning in metals & mining

How can CEOs find opportunities for new performance boost?

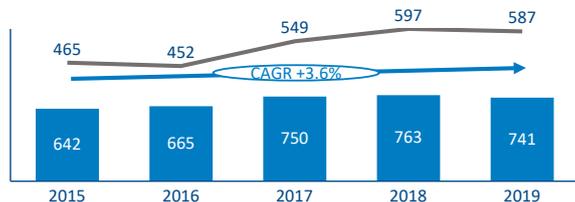


Over the past decade, heavily invested projects from metals, mining, and other industrial companies have transformed and optimized functional processes – standardizing operations within ERP systems and enriching systems with data through modern digital tools. Such key functional area optimization produced solid economic benefits. Opportunities for more value remain via optimal interfaces between different functions that, locally optimized, are still siloed and do not provide substantial productivity improvement. This area of integrated planning requires a cross-functional approach that involves finding consensus between naturally conflicting interests of various functions toward increasing the marginality and sustainability of the entire business. It calls for deep involvement, attention, and time from the CEO and C-suite. Integrated planning provides enhanced processes, improved organizational structures, and optimal IT instruments to permanently find optimums and tune the value chain in a rolling mode from mine to client, helping the CEO and executives make tasks fully operational. Those who adopt integrated planning will win in this new stage of productivity and competitiveness race in the coming years.

Low productivity growth in time of high prices

Over the past five years (excluding the global pandemic), metals & mining companies' revenues have increased substantially due to strong growth of demand and price (see figure below). However, the real productivity growth rate (i.e., productivity as revenue per employee, excluding market price factor) has not grown much. Overall, industry leaders have seen growth of only 3%-4% per year.

Productivity growth rate of the largest metals & mining companies



Source: Thomson Reuters, company reports; Arthur D. Little analysis

Functional silos as source of opportunity

In our experience, silo thinking and narrow-minded priority setting are key drivers for inefficiencies and weak productivity. During our recent implementation of a large-scale transformation project for one of the biggest integrated mining and metallurgical groups, its CEO, a physicist by education, offered his take in terms of physics:

“The sum of optimums of individual functions is not equal to total overall optimum. For example, traditionally our mining segment used to produce as much ore concentrate as possible. But now I sometimes have

to ask them to slow down if it is better for us as a group to buy cheaper concentrate on the market that gives better final margin. Our traders used to sell our products at the highest price on spot market, but now we continuously analyze not only product cost, but total cost of multimodal logistic and can sell cheaper with less logistic cost if it is more profitable. We need smart end-to-end planning.”

While planning maturity has been on the rise within the metals & mining industry over the last decade, major players still face several cross-functional balancing needs (see figure below):

Integrated planning levels and areas

Planning levels

Strategic Group
 Midterm Group, departments
 Annual Group, departments, functions
 Operational Subsidiary, plant, shop



Source: Arthur D. Little analysis

- Finance is always keenly interested in minimizing the cost of plant maintenance and stock of spare parts, raw materials, and semifinished goods, while production would like to prove maximum production asset reliability and output, which requires substantial investment in maintenance, spare parts, and stocks in production.

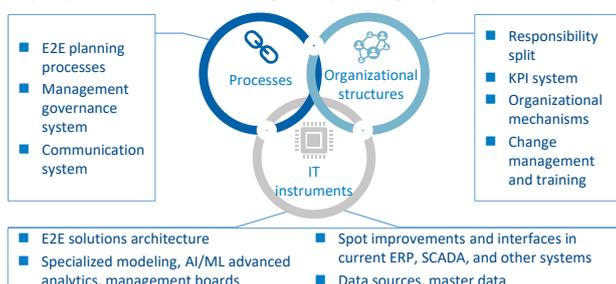
- Procurement is interested in long-term, static demand planning in order to cumulate large-volume orders, obtain maximum discounts, and guarantee in-time delivery. This naturally conflicts with production's interest for fast, flexible delivery of everything as soon it is needed.
- Sales naturally focuses on client needs and tries to quickly reflect market demand changes in production orders, leading to high volatility in production and thus contradicting the aim of stable, harmonized production.
- There tends to be friction between organizational levels and geographies when higher-level plans conflict with capabilities to perform at the lower level, causing substantial plan/fact discrepancies/falsehoods that ultimately disrupt shareholders' and investors' trust.
- Another area of conflict emerges when central supply network planning does not consider the natural production constraints that arise within local production planning due to tradeoffs between granularity/speed of higher-level planning and details/accuracy of lower-level planning.
- Often a company runs a plant or facility at a certain utilization rate even if that is not the highest option in marginal contribution terms for the whole company.

Ambitious capital investment plans face substantial limitations in execution due to lack of integration with procurement, supplier management, and logistic plans that use standard annual-cycle planning routines. While many organizations address some of these balancing needs, they are often performed in isolation, driven by a technical perspective. Many companies lack an integrated end-to-end (E2E) perspective. Furthermore, the need to change the people culture toward a more collaborative way of planning is often insufficiently addressed.

Integrated planning as a solution

An integrated planning implementation project helps resolve natural conflicts and derive solutions through detailed root-cause analysis and the identification of a potential improvement hypothesis, while structuring processes around the company's value stream with links to related functions. Such a project will foster enhanced processes, improve organizational structures, and define optimal IT instruments (see figure below). A new,

Key improvement areas in integrated planning implementation



Source: Arthur D. Little analysis

collaborative form of peoples' behavior must be implemented in parallel with process, organizational, and IT changes.

Next, we describe three case studies from different types of companies in the metals & mining industry and examine their specific integrated planning approaches that can be applied by other companies' CEOs.

Case 1 – Large metallurgical holding company

The first case describes a holding company with several geographically distributed mining and smelting assets at a high level of technological maturity. Historically, every function and asset followed its own poorly integrated optimization and digitalization program, resulting in a complex set of various systems when it comes to planning on different horizons for different functions. This caused:

- Poor execution of strategic plans due to a weak cascading effect to the operational level, leading to loss of ROI.
- Revenue opportunities lost due to high complexity, duration of planning process, and inability to consider market changes in a timely manner.
- Unstable content in smelter feed and excessive technology costs as plans of mines and metallurgy are not harmonized.
- Mid-term production decisions that often do not consider economic factors in full and are mainly technology-driven.
- Penalties for delays in environmental investment projects because they did not align to plans of operational functions.
- Service functions (i.e., logistics, procurement, warehousing, plant maintenance) do not see full, transparent orders portfolio across mid- to long-term horizons, generating excessive costs in permanent ad hoc readjustments.
- Low planning quality, resulting in low trust of plans' data at all levels, including shareholders.

To resolve these inadequacies, the company began a complex integrated planning project that included:

- Shifting agenda of integrated planning up to CEO level and establishing integrated planning center of excellence.
- Implementing process of regular rolling rescheduling and reconciliation of operational plans with financial plans.
- Introducing mechanisms for analysis and scenario modeling of production decisions of entire company.
- Developing system of drivers that link strategic business scenarios with operational plans.
- Expanding IT instruments to balance various functions and blocks (e.g., smelting and mining).
- Creating a unified data system and synchronizing models used by various functions and blocks.

- Establishing a management system for the consolidated balance of the company’s resources, considering peak demand and logistics constraints.
- Updating IT landscape based on new requirements to planning systems and data sources.
- Massive training and enhanced communications for managers and employees as well as business games to test consensus finding and collaboration scenarios.

The project is proving planning process transparency for key decision makers and substantially improving the management quality under unstable conditions.

Case 2 – Vertically integrated metals & mining holding company

The second case involves a vertically integrated metals & mining holding company, a subsidiary of one of the world’s largest resource conglomerates, with assets located extremely remotely from main consumers and ports. The company set out to improve the effectiveness of its logistics system. The system related to inbound logistics (i.e., transportation of ore and metal concentrates from own and suppliers’ mines to the smelting plant) and outbound logistics (i.e., transportation of metals from plant to customers worldwide). The initial phase assessed that greatest effects are derived from collaborative planning between different functions/levels. At the center of the value map sat production, with sales and procurement on the wings connecting the company with clients/suppliers through supply chain management (SCM) in multimodal logistics that included modes of truck, rail (i.e., wagons and containers), sea, terminals, or row materials, as well as finished goods at the plant and in five ports.

To manage this complex environment, the project elaborated:

- New planning and execution of SCM processes focused on regular revision/consolidation of sales, production, procurement, and logistic plans, along with non-stop shipments’ and transport units’ tracing due to efficiency evaluation of entire route and across-the-board chain.
- New organizational structure for the new SCM processes and job descriptions for the new roles in SCM and interfacing departments – both at assets level and headquarters – to fulfill new processes (see figure below).

Process integration among different planning levels



Source: Arthur D. Little analysis

- Structure of information required for regular control (including status model for shipment tracking) and current and perspective data sources for this information.
- Functional requirements of new IT tools needed and development of target IT architecture.
- KPIs for all participants of process to foster motivation.
- Training and communication sessions for employees.
- Info dashboards for management and employees.

The project help build the foundation for systematic findings and implementation of most profitable decision making across different assets and locations of the business.

Case 3 – Metallurgical enterprise, full technology cycle

Finally, another relevant case centers on a metallurgical enterprise with a full technology cycle. The company, in the dynamic growth stage, manufactures ingots, forgings, and rings for high-quality, demanding consumers in aircraft and nuclear industries. Its key goal is to increase output to meet growing market demand and unlock the potential of new production assets recently installed, while not operating at planned capacity due to lack of integrated planning. To face these challenges, the company needed to:

- Reduce customer order processing cycle.
- Reduce duration of production cycle.
- Increase level of synchronization between production stages (redistributions) and strengthen integration of manufacturing function with sales and procurement.

To solve this set of tasks, integrated production planning has been developed and implemented, including:

- Changes to sales planning; for example, long revised agreements of customer requests by sales and technological departments for subsequent inclusion in the plan were optimized and automated by a digital solution integrated with the ERP system.
- A unified cross-functional planning system, where all plans of main functional blocks (i.e., finance, sales, production, supply, maintenance) were synchronized with each other at operational and annual levels, and every shift production task was synchronized with the operational production plan.
- Shifting to “pushing” planning for most popular products made it possible to use preliminary formed stock of semi-finished products, significantly reducing production times and increasing customer satisfaction.
- Shifting to “pulling” planning for ring rolling solved the problem of production of unclaimed products, since all materials in later processing would be produced according to client’s order.

- Management of decision support system (i.e., scenario modeling).
- Automated model of blending of different metals in the smelter ensured optimal balance between ERP and metallurgy, considering all constraints.
- System of cross-functional meetings for agreeing, updating, and monitoring implementation of plans, as well as system of analytical reporting to control executive discipline and progress in implementing plans.
- Revision of roles of functional units involved in planning process along with KPIs to ensure clear separation of responsibilities and sustainability of implemented changes.
- New functional requirements for data management, ERP, and SCADA systems.

The introduction of a new system of integrated planning allowed the company to reduce the duration of its production cycle and ensured an increase in EBITDA by more than 20%.

Conclusion – Benefits and effects

Integrated planning allows CEOs and C-suites of metals, mining, and other industrial companies with well-optimized business functions and solid ERP, SCADA, and digital systems already in place to build on their foundation to a new level of effectiveness. Our experience shows that savings are significant and would provide potential benefits (not cumulative and partially correlative) of up to:

- 10%-15% increase in productivity; 5%-10% increase in revenue.
- 2%-5% increase in sales orders margin.
- 10%-20% frozen capital release.
- 10%-20% logistic costs saving.
- 5%-10% increase in OEE (overall equipment effectiveness).

Beyond direct economic benefits, integrated planning transforms companies to become more collaborative, transparent, and sustainable – with common targets across the business. Every leader in the organization will have the opportunity to receive streamlined collaboration with allies in other segments of the value chain and, in effect, achieve related additional benefits. To achieve this, it is necessary to shift integrated planning to the CEO's agenda and ramp up a new wave of optimization using above mentioned approaches and instruments.

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Arthur D. Little

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