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Mining Interoperability Index

Executive Summary

Since its beginning, the mining industry has been dedicated to obtaining metals and minerals from the earth for their use in multiple forms. Reinventing the essence of such a primordial task for thousands of years does not make much sense; However, with technological advances, the mining industry can begin its digital transformation based on three strategic emphases of the industry:

- Operational excellence
- Safety
- Environmental Protection

The advance of technology allows not only to extract the products from the mines with greater efficiency, but also to have greater control of the operations inside and outside the mine, while integrating multiple suppliers and distributors from within the sector. Likewise, technology and processes allow one to manage the resources and machinery that are used, keeping them in optimal conditions and providing safety to workers.

There are innumerable activities that depend on technology, and the ways it helps to improve processes, establish work policies, and interact continuously with personnel both inside and outside the mines, thanks to the systems the technology supports. However, it is always possible to take the advances a step further; in this case, allowing all these elements to interact with each other to improve the efficiency and effectiveness of the business.

That is why IDC, with the support of CORFO, developed the interoperability model for the mining industry in Chile, which includes a holistic methodology, since it considers both the mining companies and the technology, services and suppliers for the industry.

What does interoperability mean for the mining industry?

It is the capability of the interfaces of a system to work completely in sync with other products or systems beyond the original system to access and share information they possess without any restriction.

The ability of Information and Communication Technologies (ICT), together with the business processes they support to exchange information and knowledge, allowing systems and organizations to collaborate.

Basic elements of mining interoperability model

Given advances in digital technologies and communication, it is increasingly important to improve operational efficiency, where interoperability plays an important role in the development of the mining industry.

To make a transition to interoperable operations, barriers and challenges have emerged where the lack of standardization stands out.

The lack of integration of different systems and applications, databases that limit the interconnection processes, and legacy systems based on monolithic environments are some examples of problems that lead to a high cost for companies.

Based on studies performed by IDC in 2016, they reveal important information about mining companies regarding interoperability as follows:

- 55% of mining companies are only in an IT/OT integration phase.
- Security is one of the main restrictions for IT/OT integration.
- Senior managers lack experience about IT/OT issues, and/or simply do not provide support for these initiatives.
- Operational excellence would be one of the main promoters of companies to achieve IT/OT integration.
- Less than 5% of companies have a connection to operations greater than 90%.
- Only half of respondents said to have on average 50% of mining operations connected to the corporate network.

Given the above, there arises the need for a maturity model of interoperability aligned with best international practices that considers aspects of current digital transformation. It is also necessary to have tools that allow an initial assessment of the situation of mining companies and business partners from its current status regarding interoperability. This report is the first online tool that allows you to have an initial diagnosis of the current situation of interoperability for your solutions or processes.

Based on interviewed companies, the information received was analyzed both quantitatively and qualitatively, in order to deliver a series of recommendations on ways to improve your interoperability capabilities.

Methodology

The self-assessment tool to determine the level of maturity of the interoperability in your company is made from a system based on IDC's interoperability analysis model. Additionally, to obtain reference information, 7 interviews were conducted with mining companies in Chile and 9 interviews with technology, services and input suppliers for the mining industry in Chile.

The analysis of the answers starts from a comparison through a rigorous benchmarking process, based on a research platform developed for IDC end-users in Chile.

The result of this evaluation is based on data you provided through your answers to each of the questions in the self-assessment tool. Subsequently, a benchmarking process was applied considering the responses of the IDC interviews and information about the mining industry in other geographies of the world.

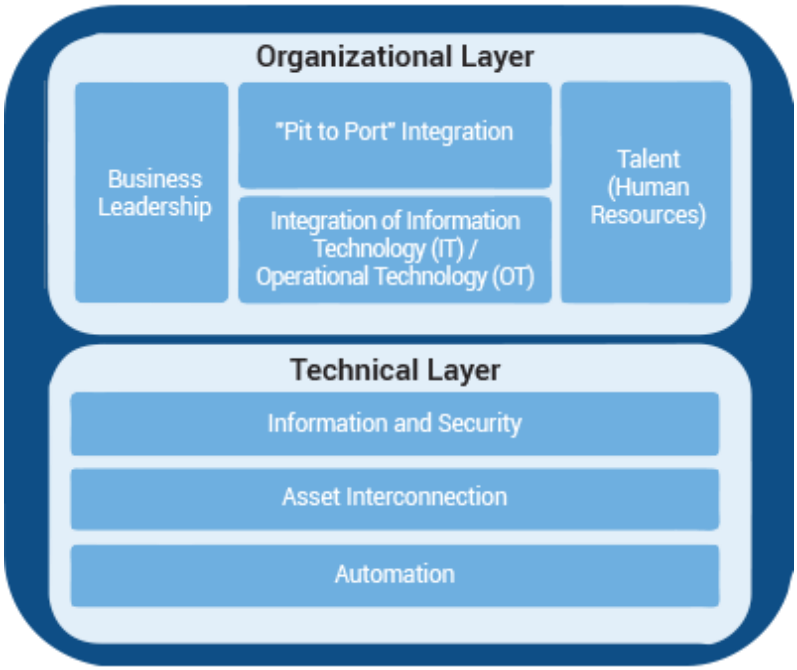
The self-assessment tool offers your company an initial idea of the current state of the interoperability platform in your organization and its impact on related processes, delving into issues such as organizational and technical processes and the subdivisions associated with these two major elements of the model of interoperability developed by IDC (see figure 1).

Definitions

Mining Interoperability Model

Below is the Mining Interoperability Model developed by IDC and the associated definitions.

Figure 1. Mining Interoperability Model



Organizational interoperability

This is the collaborative capacity of the entities, aimed at obtaining mutually agreed upon achievements related to the services they provide. It is important to specify the business rules, processes, participants and the information that is created and consumed.

Table 1. Definitions of organizational interoperability levels

Dimension	Definition	Sub-dimensions
Business Leadership.	Using new interoperability technologies and business models, managers point to an interdependent interaction between these elements.	• Awareness of the ecosystem • Transformation of the business model • Organizational alignment • Financial appeasement
Talent (Human Resources)	It covers the evolution in which businesses intend to achieve their interoperability objectives through the recruitment, allocation and integration of internal resources (partial and full-time employees) and external resources (contractors, associates and freelancers).	• Talent management • Source of talent
Integration "Pit to Port"	Ability to integrate the operation as a point-to-port system and from the distributor to the client, covering the value chain of the mining business.	• Process integration • Organizational integration
Integration of Information Technology (IT) / Operational Technology (OT)	IT and OT must be able to integrate through data management, property, hierarchies and systems.	• Integrated governance • Collaborative structures

Technical interoperability

This is the dimension of interoperability related to the relationship between IT systems and services, including aspects such as interconnection, data and services integration, information presentation, accessibility and security. It also involves the automatic and reusable interpretation of applications which were not included in its creation.

Table 2. Definitions of technical interoperability levels

Dimension	Definition	Sub-dimensions
Information and Security	The data must be consistent and accessible in a secure way via a platform and presented in a format suitable for interoperability requirements. Data and operations must be totally interdependent - one depends on the other.	• Architecture of information exchanged • Security of Information exchanged • Standardization of information exchanged
Asset Interconnection	The assets (equipment, components, personal computers and applications) must be connected intelligently, allowing them to interact with each other. The interconnection must be based on standards for presentation, collection, exchange, transformation, transportation and definition.	• Technical interconnection • Development / standard adoption
Automation	It is the automation of equipment (trucks, drills and trains, and other robotic elements) and processes (physical operation, and business).	• Automation of operational processes • Business process automation

Table 3. Definitions of the maturity levels of the interoperability model

Maturity levels of the interoperability				
 Initial	 Occasional	 Repeatable	 Managed	 Optimized
The components of the interoperability model are disconnected, barely aligned with the strategies of the interoperability model, and without a clear focus on the objectives of the company.	They have basic interoperability capabilities, allowing the company to start developing and learning in the field of interoperability; however, these are isolated and non-repeatable projects.	The objectives of the interoperability model are aligned to the company in the short term, including real experiences, without the potential for disruptions. Standardization and repetition of processes.	The discipline of administration of interoperability activities in an integrated manner allows for the delivery of continuous experiences in related activities.	The company insists on using the components of the interoperability model in an advanced manner, as well as the latest technologies and best practices. Continuous improvement is an essential part of the business philosophy.

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ABOUT IDC

International Data Corporation (IDC) is the world's leading market intelligence firm, consulting services, and events for the Information Technology, Telecommunications and Consumer Technology markets.

With more than 1,100 analysts around the world, IDC provides global, regional and local expertise on trends and opportunities in technology and industry in 110 countries.

IDC's analysis and knowledge helps IT professionals, business executives and the investment community make informed decisions about technology and reach key business objectives.

Founded in 1964, IDC is a subsidiary of IDG, the leading technology, research and events media company.

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