

## Digital Transformation Applied to Bauxite and Alumina Business System – BABS 4.0

Juliana Soares de Sousa<sup>1</sup>, Israel Oliveira Rocha<sup>2</sup> and Rodrigo Martins de Castro<sup>3</sup>

1. Quality Analyst

2. Quality Specialist

3. Management System Manager

Mineração Paragominas SA, Paragominas, Brasil

juliana.sousa@hydro.com

### Abstract



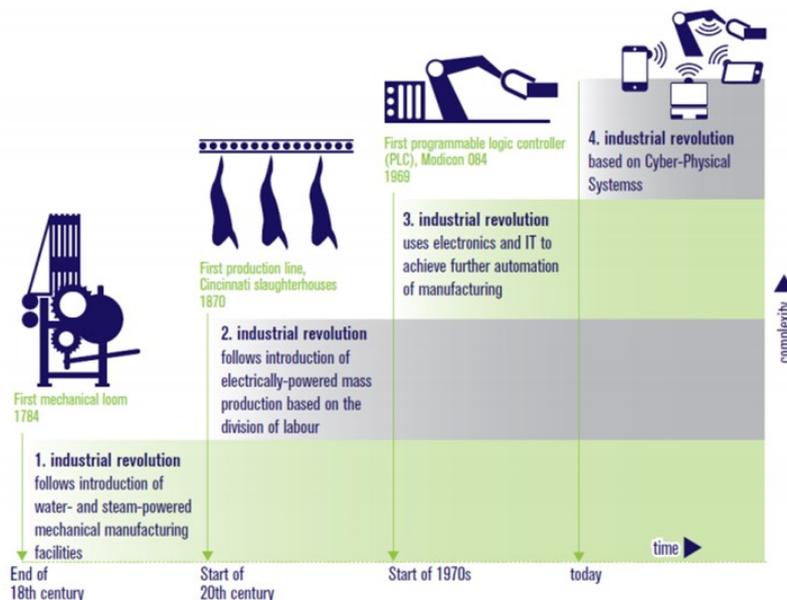
The Bauxite and Alumina Business System (BABS) is implemented in Norsk Hydro mining and refinery units in Brazil. The system has five principles: Standardized Work Processes, Defined Customer and Suppliers Relations, Optimized Flow, Dedicated Times, and Visible Leadership. In view of the various benefits derived from Digital Transformation, an opportunity was identified to incorporate new technologies into quality management processes, maximizing productivity, improving working conditions and product quality. Through the A3 thinking methodology, an analysis of the initial condition was carried out and a complete restructuring of management system governance was proposed, adopting Industry 4.0 tools in routine management. The work implementation was divided in four stages: proof-of-concept development, pilot project, capacity-building and site-wide implementation. All solutions were developed with Office 365® features, eliminating paper usage and ensuring up-to-date information in real-time for all system users.

**Keywords:** digital transformation, quality 4.0, BABS.

### 1. Introduction

There is an intense digital transformation taking place in industry, marked as the threshold of a new revolution: the fourth industrial revolution, or industry 4.0 [1]. This new revolution was preceded by three previous ones: the first industrial revolution, which introduced the use of coal as a source of energy, thus boosting steam engines and transforming manual work into automation, at the end of the eighteenth century; the second industrial revolution, which used electricity to deploy large-scale production lines in the early twentieth century; and the third industrial revolution, which sophisticated the products and the means of production at a low cost with the insertion of electronic systems and the programmable logic controller, CLP, in the early 1970s [2], [3].

The three industrial revolutions cited above were leveraged by technological milestones (the steam engine, the division of labor in the production lines and the CLP). Industry 4.0, on the other hand, is being fostered by the Internet, since it enables the connection between machines and humans through cyber-physical systems (CPS) [2].



**Figure 1. The four stages of the Industrial Revolution.**

Industry 4.0 includes several technologies, such as: Internet of Things (IoT), Machine Learning, analytics, machine-to-machine (M2M) and cloud computing (Cloud), in addition to the aforementioned CLP.

Despite the constant technological advance incorporated into production processes and the complexity of the fourth industrial revolution in progress, it is still common to correlate the word “industry” to factories or high chimneys expelling smoke. Changing this mental model is one of the great challenges for companies, which need to pay attention to the digital transformation trends driving industry 4.0 and all it has to offer, under the risk of being marginalized in the market [3].

But at what cost should this technological escalation take place? Which guiding base for something complex and still unknown by professionals should be adopted, aiming to firm the positioning of the company in this scenario of profound technological innovation?

The World Economic Forum recommends the following three steps, that compose the driving force behind digital transformation (Figure 2) [4].

As an opportunity for improvement in this process of digital transformation it can be mentioned the insertion of tools and software that improve the user experience, aiming at the customization of digital forms, through the convergence to a mobile platform (apps development), using specific developed tools for this purpose.

Communication between teams for information security can be tailored through the use of applications such as MS Teams and HUB, specifically targeted at corporate teams management. It would rule out the need to use android / OS applications out of the company's IT control reach.

Finally, it should be noted that the application of industry 4.0, within the scope of the management system, is already a reality, in which Hydro seeks pioneering.

## 5. References

1. H. Foidl and M. Felderer, Research challenges of industry 4.0 for quality management. 4th International Conference, *ERP Future 2015*, Munich, Germany, November 16-17, 2016.
2. M. Brettel, M. Friederichsen, N. Keller, M. Rosenberg, How virtualization, decentralization and network building change the manufacturing landscape: an industry 4.0 perspective. *International Scholarly and Scientific Research & Innovation*, V.8, 2014.
3. LNS Research. Quality 4.0 impact and strategy handbook – Getting digitally connected to transform quality management. 201
4. World Economic Forum. *Future Scenarios and Implications for the Industry*. 2018. Available at: <https://www.weforum.org/reports/future-scenarios-and-implications-for-the-industry>: Accessed on: 27th July, 2018.
5. K. Durward, Sobek II. Understanding A3 Thinking: A Critical Component of Toyota's PDCA Management System. CRC Press, 2009.
6. John Shook, Gerenciando para o Aprendizado. Usando o processo de gestão A3 para resolver problemas, promover alinhamento, orientar e liderar. São Paulo. *Lean Institute Brasil*, 2008.