

## Automated Governance: An Integrated Microsoft Application for Enhanced Management Processes

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### Abstract

Automated Governance, a tool designed to automate management processes, integrating several interfaces within a Microsoft application environment was successfully developed in reliability and asset management at Paragominas Mining in Brazil. Utilizing resources such as Microsoft Teams, SharePoint, Power Apps, Power Automate, and Power BI, this innovative approach leverages advanced technology to expedite and enhance workflows. The primary challenges addressed in this work include data quality and integration, human interference in automation, audience targeting, and information security. In response to these challenges, components of Automated Governance were developed, encompassing strategic and reconnection actions, management of strategic and tactical Key Performance Indicators (KPI), and the creation of numerous reports in Power BI. Additionally, databases were modelled and integrated, automations were established for repetitive tasks, and a low-code application was developed to assist in routine management and support activities of a company adhering to International Organization for Standardization (ISO) standards. Upon completion, all interfaces and components were consolidated into an application, centralizing all reports, applications, normative and guiding documents within a Power BI web interface. This provides real-time information for the decision-making process of the reliability and asset management team, as well as users from other areas.

The effectiveness of Automated Governance was demonstrated through audience analysis of the main reports and the frequency of tool usage by the reliability management team and client areas, where dozens of daily accesses per report were recorded, totalling thousands of monthly application accesses. The tool's use by the management team proved cost-effective, freeing up 10 to 20 % of technical labour to analyse relevant information, proactively identify failures and their solutions, and enable assertive decision-making regarding the company's assets.

**Keywords:** Automated governance, Data quality and integration, Audience targeting, Enterprise digitalization.

### 1. Introduction

Hydro is a global company, with more than 35 000 employees, spread across operations in 40 countries. Our businesses are divided into bauxite, alumina, energy, primary metal, rolled products and extruded solutions. Bauxite and alumina represent the first two links in the aluminium value chain and the work on Automated Governance applied to Reliability and Asset Management was developed at Paragominas Mining, one of the largest bauxite mines in the world, currently certified for ISO 9001, 14001, 55001 and Aluminium Stewardship Initiative (ASI). Located in the city of Paragominas, in the State of Pará, all processed products are sent by

pipeline to Alunorte (a bauxite-to-alumina transformation plant, the largest alumina refinery in the world, located in Barcarena, in the same State).



**Figure 1. Bauxite extraction operation at Paragominas: strip and stack mining process.**

Automated governance is a concept that combines governance practices with technology to optimize and standardize activities and workflows [1]. This can increase the efficiency, transparency, and security of governance processes. IBM [2] describes it as the use of technology to perform tasks where human input is minimized. This includes some enterprise applications, such as business process automation (BPA), and system-to-system integration automation. An automated management system streamlines operations, reduces errors, and saves time by efficiently handling repetitive tasks, provides real-time data analysis, improving decision-making and productivity.

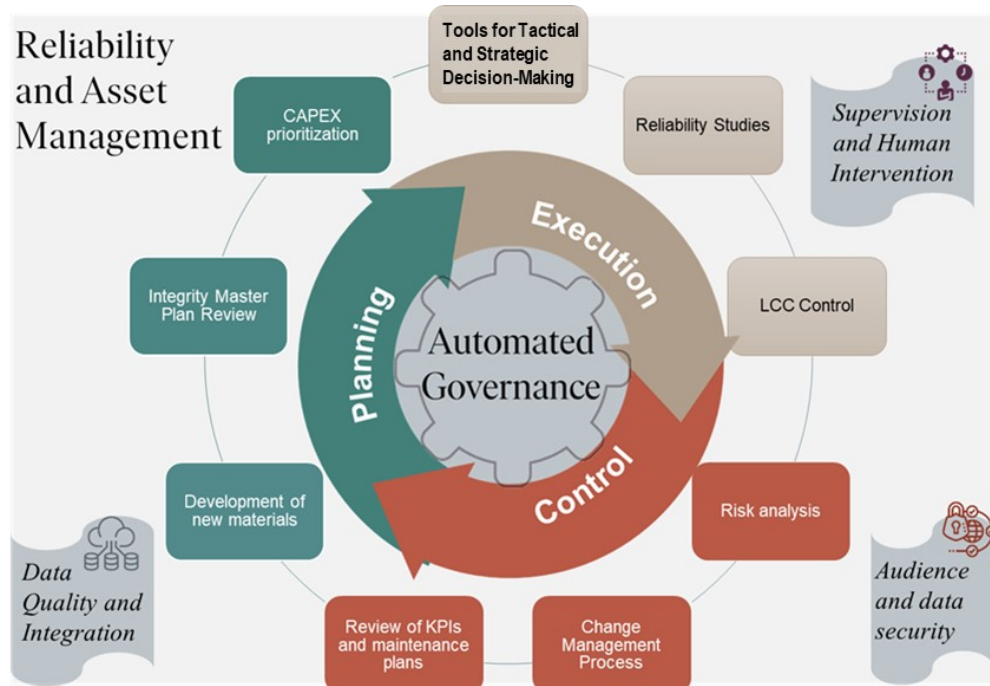
In BPA, the use of technology to streamline repetitive tasks and processes in an organization covers the use of software, robots, and other tools to automate manual tasks, speed up processes and improve the efficiency and accuracy of activities [3].

Governance is a structure with practices, standards and processes that govern the company to achieve objectives [4]. With automated management, this practice is elevated and ensures that the rules are followed in all processes managed by the area, including users and members of other areas who interact with the tools and/or management structures created to meet demands. from the company.

In summary, automated governance allows organizations to standardize and automate their activities and workflows, increasing the efficiency, transparency, and security of governance processes. Mining asset reliability refers to the ability of an asset (such as equipment, machines, systems, etc.) to perform its expected function consistently and effectively [5]. This is crucial to the efficient and safe operation of a mining operation. and involve several aspects, including:

- A) **Equipment Performance:** Equipment reliability is essential to ensure the mine operates efficiently and safely. This may involve regularly maintaining equipment, using advanced technologies to monitor equipment performance, and implementing safe work practices.
- B) **Asset Management:** Effective asset management is a decisive factor in the performance of mining operations. This may involve adequate planning to ensure the smooth performance of operations at the mine, as well as making effective decisions about the use of available assets.
- C) **Asset Security and Integrity:** Asset security and integrity refers to the ability of an asset to perform the function required of it effectively and efficiently, while protecting health, safety, and the environment.

Figure 2 shows the interaction of Automated Governance in reliability and asset management in mining operation.



**Figure 2. Interaction of reliability and asset management with automated governance.**

The objectives of this work were taken from management's strategic A3, and are as follows:

1. Create a reliability engineering and asset management structure following the best practices to be applied in the Mining, Processing and Transport of Bauxite;
2. Establish governance based on standards and good practices for the physical assets of bauxite mining, processing and transportation.

Strategic A3 is a type of A3 format report that is typically used for long-term planning and strategy development, focusing on the company's long-term business plan [6]. It follows the same Plan-Do-Check-Act (PDCA) cycle as other types of A3 reports. Strategic A3 must show some analysis of the benefits of the idea and recommend how the implementation will proceed, with schedules and milestones. As implementation begins, the effectiveness of the strategy is assessed, and a follow-up plan is developed to ensure working conditions are sustainable [7]. It is a powerful tool for aligning an organization's strategic objectives with its operational activities and for communicating these objectives and activities across the organization.

## 2. Methodology

In development of reliability management and asset management, priority was given to optimized management using digital resources, such as Microsoft Power BI, Power Automate, Power Apps, Sharepoint and Teams, which can bring together a series of interesting resources under the same platform, beyond the mere publication of panels for viewing.

Challenges affecting automated management implementation [8] were considered:

### 2.1 Data Quality and Integration

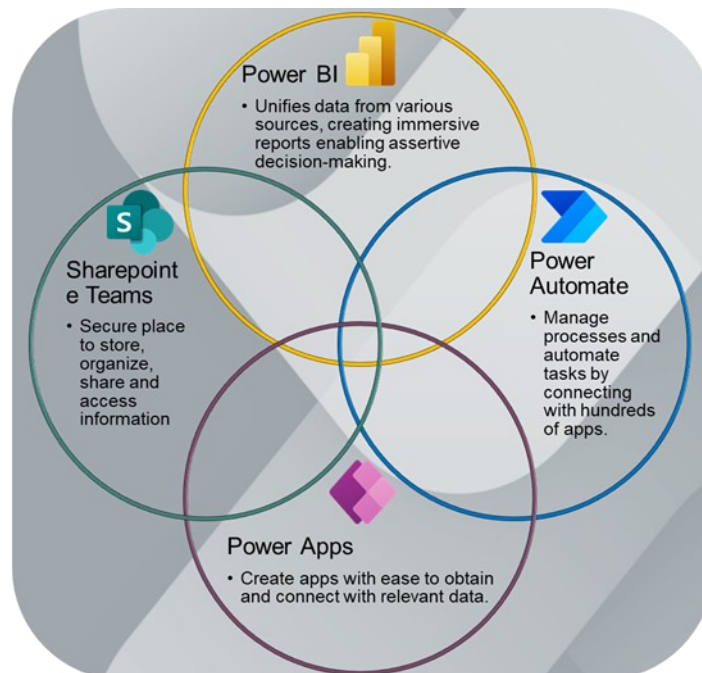
One of the main challenges of automated governance is ensuring data quality and integration. This includes ensuring data is accurate, complete, and consistent across different systems and sources. Without high-quality data, automated governance systems are not effective in detecting and resolving issues related to reliability and asset management.

A report by IBM [2] stated that poor data quality can cost companies an average of 12.9 million USD per year. Therefore, it is essential to create tools that guarantee data quality to minimize the negative impact associated with poor data quality, enabling improved decision making, developing new business strategies, or optimizing existing ones.

Data integration is the process of combining information from different sources into a single system [3]. This process involves transforming and combining this information into a unified format that can be easily accessed and used by the entire organization.

The following tools were used to create a model to support the use of digital tools that make up automated governance.

- **Sharepoint:** Microsoft SharePoint is a web-based platform used to share files and information. It is designed for teams and provides collaboration features such as project management, messaging, and shared document storage. SharePoint can commonly be used as a simple database, using the lists feature.
- **Microsoft Teams:** Microsoft Teams is a team collaboration application developed by Microsoft as part of the Microsoft 365 family of products. It offers workspace chat and video conferencing, file storage, and integration of proprietary and third-party applications.
- **Power Automate:** Microsoft Power Automate is a versatile automation platform that integrates with hundreds of applications and services. Capable of automating data flow processes, integrating platforms to converge data into information for decision making.
- **Power BI:** Juliana [19] is a business analysis solution (business intelligence) that allows connection to data from different sources, its treatment and arrangement of data in highly visual reports. It is possible to share the generated reports or embed them in an application or website. Power BI was used as a connection tool with client areas, through the creation of dynamic interfaces that show in real time the behavior of data released on previously presented platforms.
- **Power apps:** Power Apps is a set of applications, services, and connectors, as well as a data platform that provides a rapid application development environment for creating custom apps for your business needs.



**Figure 3. Definitions and interactions between Microsoft collaboration and automation applications.**

## 2.2 Supervision and Human Intervention

Another challenge is balancing the role of automation with human oversight and intervention. Although automated governance systems aim to improve efficiency and reduce errors, they do not always consider all relevant factors. Balancing automation with human oversight and intervention in automated governance refers to the delicate balance that must be maintained between the use of automated systems and the necessary human oversight in the governance process. Automated governance systems, such as those used in data management or decision-making processes, can significantly increase efficiency and accuracy. However, they also present challenges, such as the potential for errors or biases in automated processes, the need for human understanding and interpretation of results, and the ethical considerations of using automated systems.

Human oversight and intervention are crucial to ensuring these systems operate correctly and ethically. Humans can provide the necessary context, the unique insights that automated systems may not have. They can also intervene when automated systems make errors or when unexpected situations arise. However, too much human intervention can slow down processes and introduce human errors. Therefore, a balance must be struck between automation and human oversight to ensure the benefits of both are maximized.

This balance can be achieved through strategies such as defining clear roles and responsibilities for humans and automated systems, implementing robust checks and balances, and providing adequate training and support for human overseers. It is also important to continually monitor and adjust the balance as technologies evolve and new challenges emerge. All reports that use automation and task automation flows created within Automated Governance are reviewed periodically by a trained human technician, with the aim of achieving maximum efficiency. Figure 4 below shows an example of this activity automation.

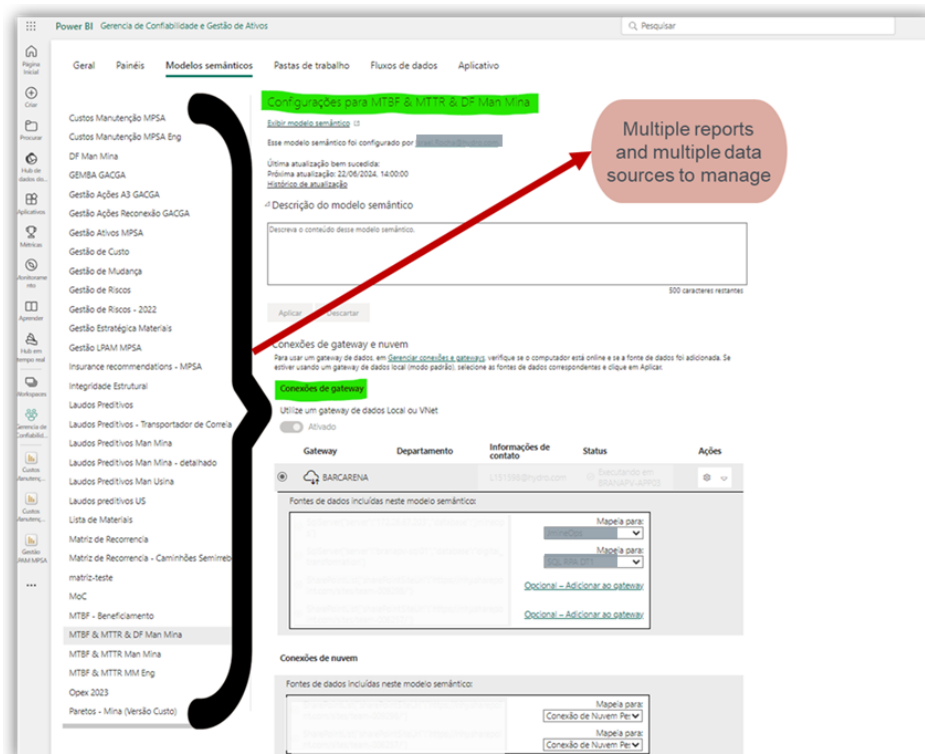


Figure 4. Example of reports and their data sources with automatic updates.

### 2.3 Audience Targeting and Data Security

It is also important to direct the consumption of data, aiming to make better use of the information processed. As shown in Figure 5, nine different data sources were integrated, with several tables of data that were often unrelated to each other (and a few million lines of data).

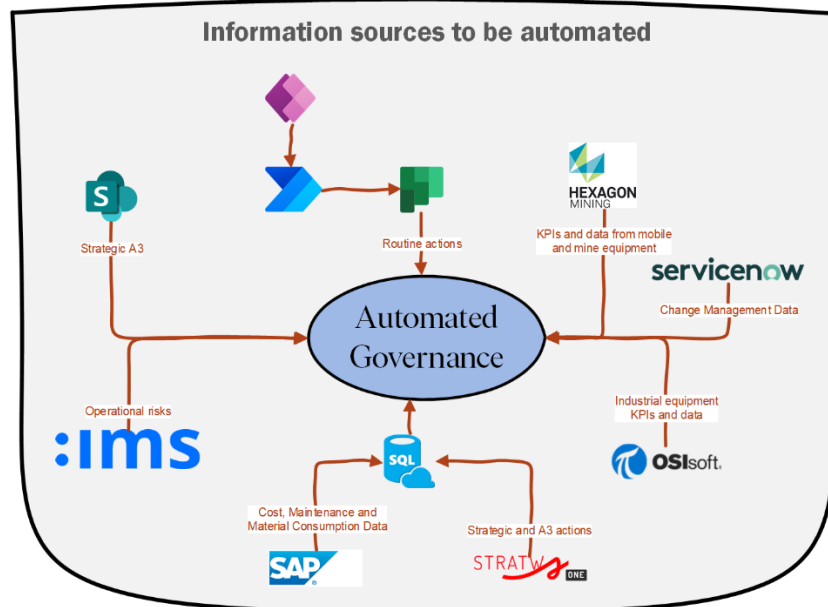
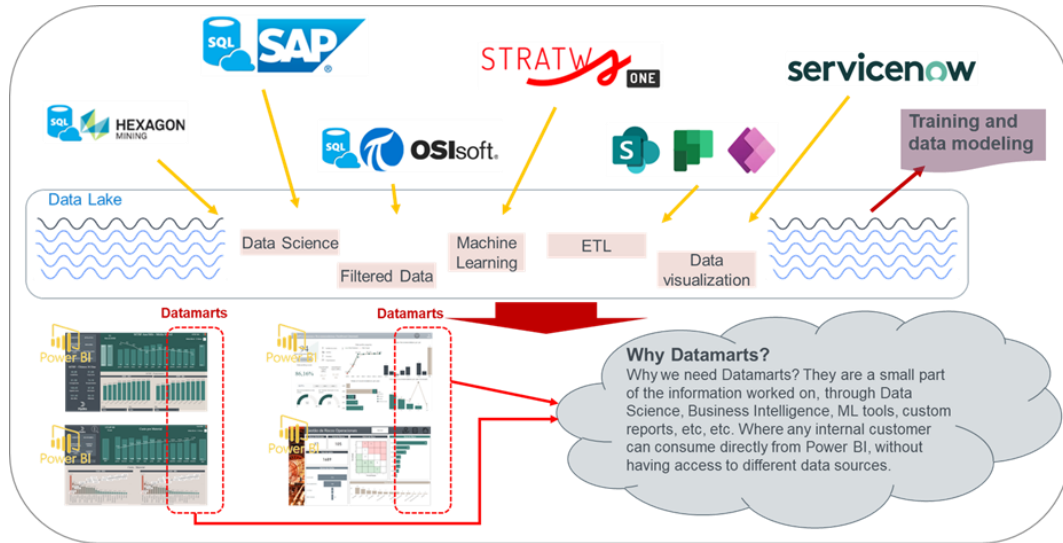


Figure 5. Data sources used by management, and their descriptions.

Audience targeting is a feature that helps the most relevant content reach the right audiences [10]. By enabling audience targeting, specific content will be prioritized for specific audiences through SharePoint web parts, page libraries, and navigation links. This is especially useful in a company with many employees and dozens of managers and supervisors who interact with each other, as in the case of Paragominas Mining.

An efficient way to target audiences for data consumption is the use of data marts. A data mart is a data storage system that contains information specific to an organization's business unit which contains a small, selected portion of data that the company stores in a database system, or several [11]. Companies use a data mart to analyze department-specific information more efficiently. It provides summary data that key stakeholders can use to quickly gain insights and make informed decisions. In short, a data mart is a simple form of database focused on a single subject or line of business. It provides a simplified, targeted view of data, meeting specific reporting and analysis needs. Figure 6 shows how this concept applies to Automated Governance, where it is possible to highlight several data inputs, all of which undergo treatment, modeling and even creation of visualization and application of personalized filters, to then make the processed data available to the user, adding value and transforming data into information or even knowledge about the processes.



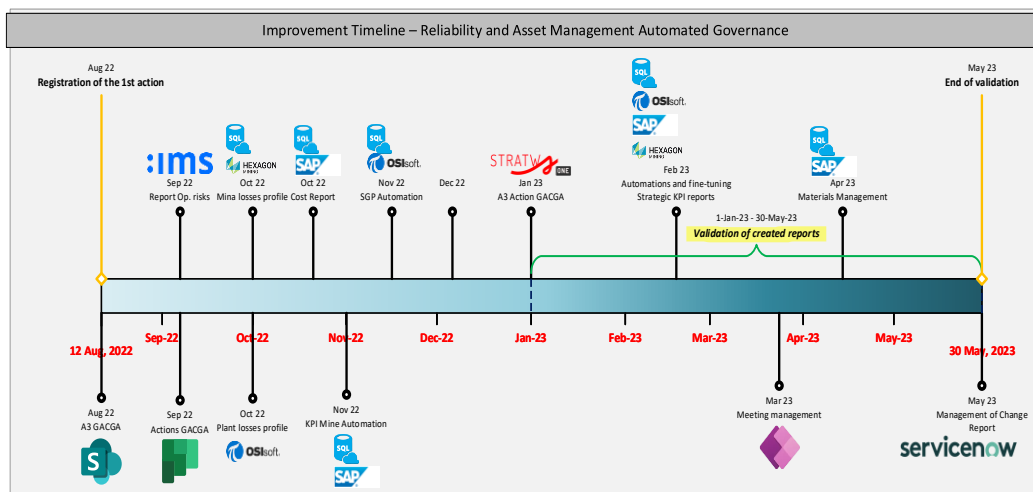
**Figure 6. Application of datamart in Automated Governance.**

Data security is the practice of protecting digital information against unauthorized access, distortion, or theft throughout its entire lifecycle [8]. This includes the physical security of hardware and storage devices to administrative and access controls, as well as the logical security of software applications [2]. Good data security practices include data protection techniques such as data encryption, key management, data editing, data subsetting, and data masking, as well as privileged user access controls, auditing, and monitoring.

### 3. Results

#### 3.1 Digital Governance and its Automated Management

Figure 7 shows the maturation of digital governance, until the transformation to automated management, which supports the team at different moments in our routine. The most important milestone in this process occurred in mid-2022, when the creation of reliability management and asset management, and took shape and matured, and until more recently incorporating the entire governance of the Change Management process. However, there are several phases of incorporating data into automated governance, and each step was important for the tool to be useful for the reliability management team.



**Figure 7. Automated Governance implementation schedule.**

Currently the application supports weekly and monthly strategic meetings. With optimized management of all management pillars, all in one place, one gains agility and practicality when querying data, whether for team members or internal management clients.

In a single environment, one can access strategic information (for meetings), tactical and intelligence information (to serve as a basis for dedicated team meetings or problem solving), and specific management, such as the change management process and structural integrity.

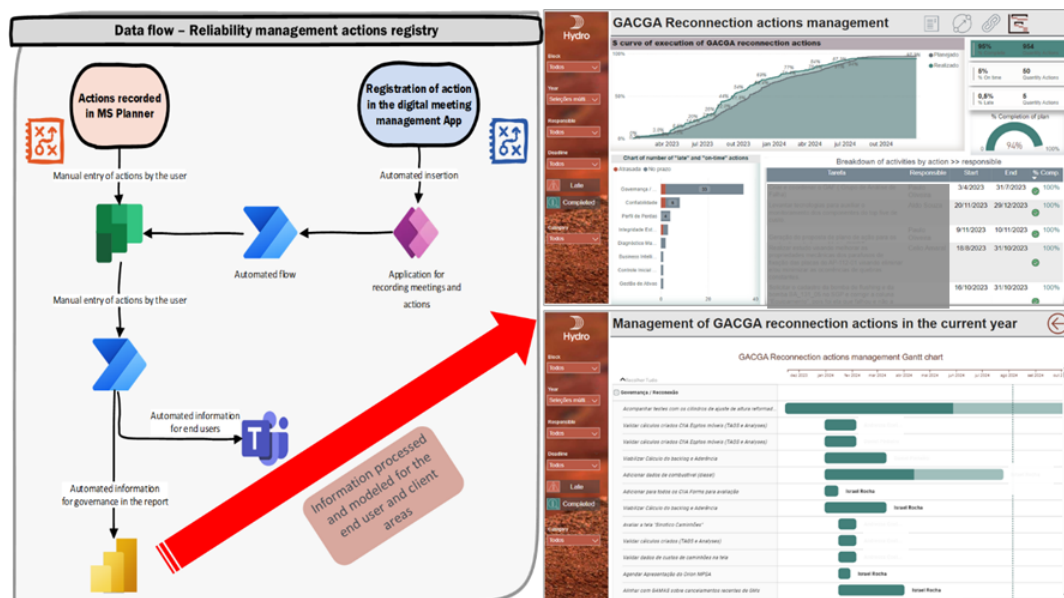
As a product of this work, three major subsystems and three measurable aspects of automated governance are listed in Table 1.

**Table 1. Subsystems and measurable aspects of Automated Governance.**

Governance subsystem	Measurable aspect
Management of A3 actions and reconnection actions	Reliable data and data modeling
Management of strategic maintenance KPIs	Standardization of measures and reports
Tactical-level information management	Agility in decision making

### 3.1.1 Management of A3 Actions and Team Reconnection Actions

With optimized management of the actions of the 4 management pillars, all in one place, one gains agility and practicality in consulting information for team members. Each member can program their day, their week, and even their entire month, depending on how updated the person's actions are. The report quickly informs delayed actions, creates a Gantt chart per user and per management pillar. Update is automatic through native Microsoft connection. Figure 8 shows the automation flow of an application created specifically for this purpose, as well as the report interface in Power BI, fully integrated with this information automation.



**Figure 8. Modeling an automation flow in Power Automate, and reporting in Power BI using mined data.**

### 3.1.2 Management of Strategic Maintenance KPIs

Management of strategic maintenance KPIs is a process that involves the definition, monitoring and analysis of key indicators to evaluate the effectiveness and efficiency of maintenance operations [5]. KPIs are quantifiable metrics that help understand the performance of people, machines, assets, and processes within an organization. For Reliability and Asset management, the following KPIs were considered: mean time between failures (MTBF), mean time to repair (MTTR), total maintenance cost, and adherence to the preventive maintenance plan. The management of these indicators allowed continuous monitoring of goals, and evolution of performance, structure comparative parameters and identification of opportunities for improvement in processes. The efficient management of strategic maintenance KPIs can result in greater productivity, cost reduction, better use of resources and, ultimately an increase in profitability.

Various data sources were modeled, resulting in greater reliability of critical information. Dozens of reports published in Power BI were also created, and this information was made assertively available to the company's stakeholders, engineers, and analysts, using Power BI's audience feature for the web. Several automated extractions were also created at the source of the data, such as SAP, dispatch, and eliminating repetitive and manual work in extractions that required a lot of time for technicians and engineers. This time savings will be highlighted later. Figure 9 below shows a fictitious example of how modeling was created in an Automated Governance environment.

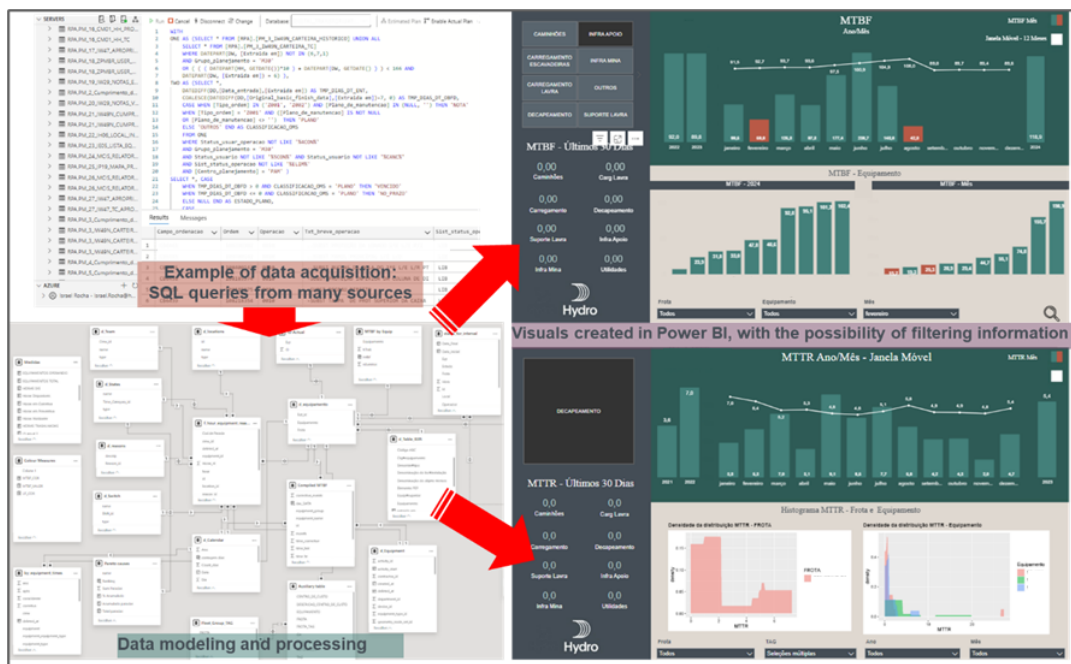


Figure 9. Example of data modeling used for strategic reports.

### 3.1.3 Tactical-level Information Management

It refers to the process of dealing with information and data at an intermediate level within an organization, aimed at employees in the middle of the management pyramid and is represented by leaders, managers, and coordinators of an organization. These professionals act as a bridge between the strategic and operational levels. At this level of management, we work with grouped information, which is generally sourced from operational systems, such as costs and consumption of materials, downtime per equipment, Change Management processes, among others.

In summary, tactical-level information management focuses on providing insights and support for management decision-making using data collected at the operational and strategic levels. With the tool's implementation, significant improvements in information quality were achieved. Data integration, previously extremely challenging, now enables the creation of predictive and machine learning models, more accurate asset reliability models, and more accessible, cost-effective budgets, requiring fewer engineering hours to develop. The automated Governance interface resulted in: (a) reduction in queries via SAP to obtain insights and analyze behaviors at tactical levels. (b) greater reliability of the information consumed and (c) accurate and reliable reliability calculations.

### 3.2 Reliable Data and Data Modeling

Improved efficiency and agility in decision-making processes using dozens of reports created for the most varied micro processes and audiences. Most information updates are online, without the need for human intervention. Greater precision and consistency in data analysis and reports: several automated information extractions, robotic process automation (RPA), were created, which eliminated manual extraction work. Data models were also created correlating different databases, to provide more accurate and credible information.

### 3.3 Standardization of Improvement

Several support documents were created for users to use the tool throughout mining. From simple documents, such as OPL (One Page Lesson), to strategic governance documents, such as board resolutions. These documents are published and available to all users of the unit.

### 3.4 Agility in Decision-making

Aside from reduction in hours spent by engineering team to obtain/extract data, agility in decision making was achieved with new insights and reduced risk of human error and bias in decision making. All reports that make up the created application have a captive audience, and this is evidenced by the audiences of two of the most visited reports in the tool, as shown in Figure 10. This use is also very variable depending on management's strategic agendas.

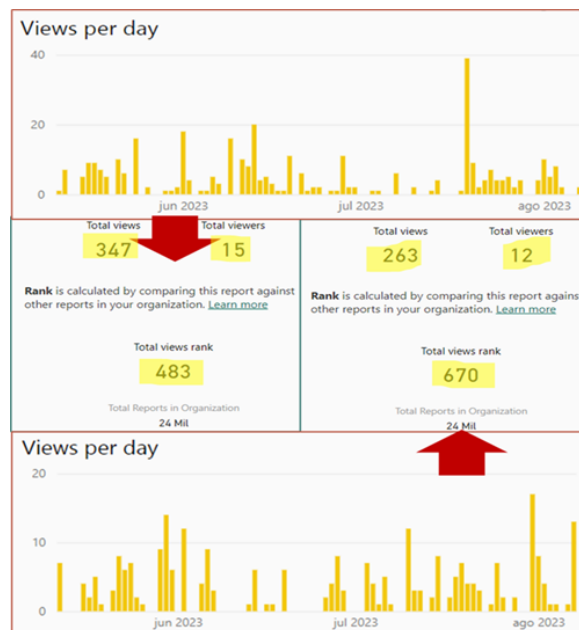


Figure 10. Number of daily views of some tool reports.

Using the tool, this data is processed, modeled and ready for analysis. But in addition, the insights for most of the KPIs monitored by management are published in Power BI reports, within the Automated Governance application.

### 3.5 Other Benefits Achieved with the Tool

The implemented changes significantly optimized the technical team's time, leading to substantial efficiency improvements, ranging from approximately 10 to 20 % of the time, depending on the individual's routine. The optimized workload reduction translates into an increase in routine value through the analysis of critical data, proactive identification of issues and solutions, and empowerment for confident decision-making regarding company assets. The result of the work is a Power BI application, where all previously covered topics were covered. It is a digital space, which belongs to each member of the reliability team, and where anyone from the company is invited to visit and share our good practices and results. The architecture of this application is shown in Figure 12.

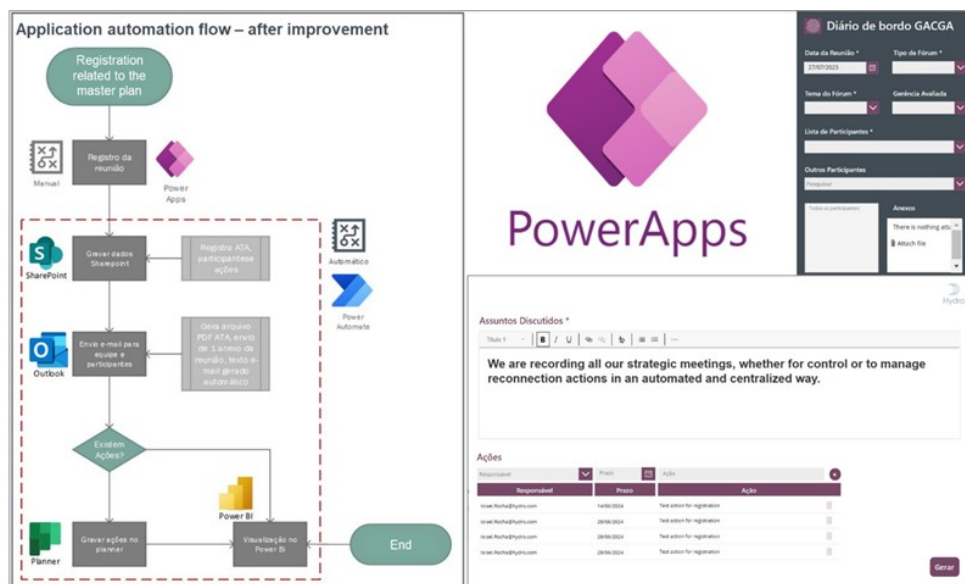


Figure 12. Ecosystem interface in Power BI and visual of an application to manage meetings.

## 4. Conclusions

Developing digital governance tools to support a long-term sustainable competitive advantage is essential to sustaining increasingly competitive businesses. Being able to digitalize the value stream effectively and efficiently is, unquestionably, a source of competitive advantage in current times.

Identifying, creating, and integrating the Automated Governance components most suited to the company's reality requires a deep understanding of all related stakeholders, their needs, and their impact on achieving the expected results. It is also necessary to have a solid understanding and analysis of the technologies offered and their maturity in relation to the company. As with traditional management, developing the necessary capabilities and establishing the appropriate mindset throughout the organization remains a top management problem. As more employees and leaders adopt this new, more digital mindset, efforts to digitalize will be successful, offering important changes in business performance.

The work resulted in an automated governance tool, integrating Power BI reports, process automation, low-code applications, and extensive data modeling, delivering precise, reliable information without straining management's labor resources. This resulted in a considerable reduction in engineering team hours and associated costs in, obtaining data, and creation of new and widely scoped insights for decision making.

It was also found that all work was standardized and shared with members of the entire organization, serving as training and even internal benchmarking. Components of tool utilization such as frequency of use, total security in relation to information sharing and user access to database were observed in this study.

The team will continue to monitor the performance of the developed tool, where a tool satisfaction survey will be made available to measure the degree of satisfaction of team members and users from other areas. Automated governance is the first necessary step in the management of digital tools, resources such as Machine Learning (ML), Artificial Intelligence (AI) and decision-making tools that will be created for asset management, require this to be implemented successfully.

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