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ASSET MANAGEMENT AND THE DIGITAL TRANSITION: MAKING SENSE OF IT ALL

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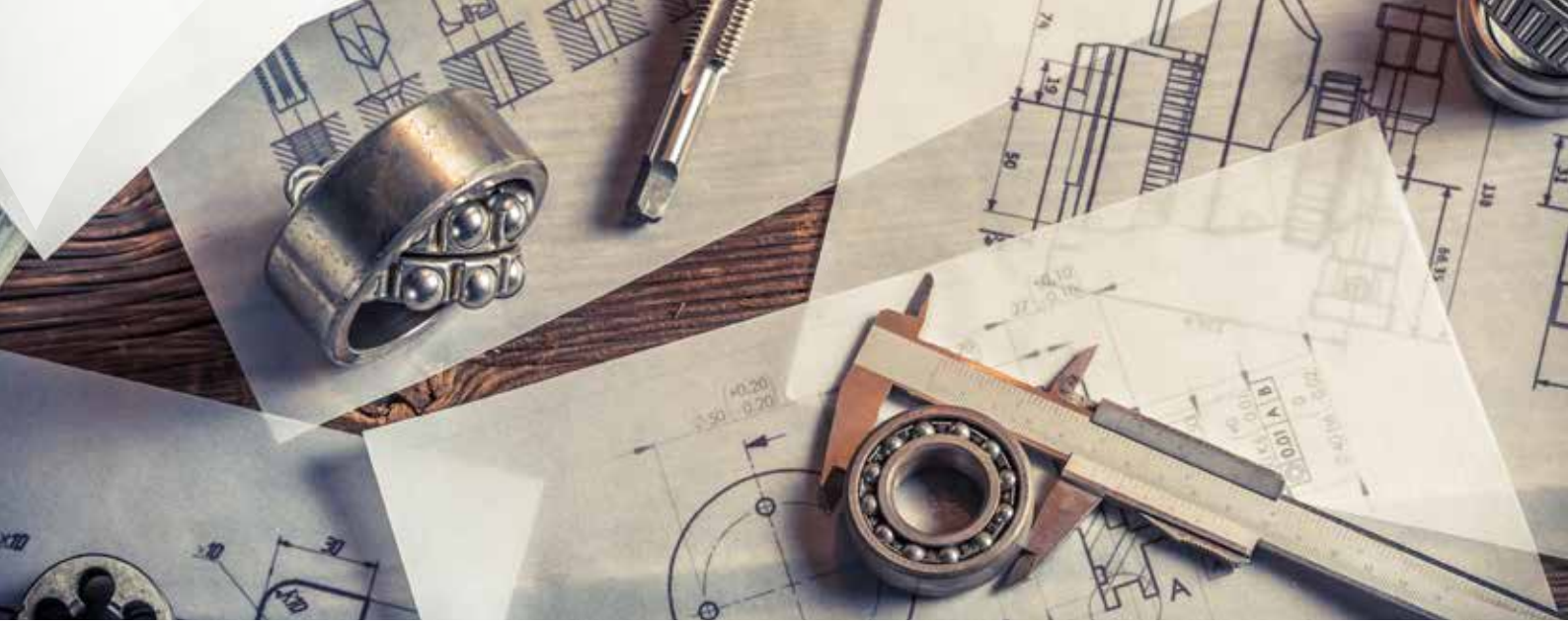
Whether you work for a transport company, an energy supplier, a large industrial group, or an SME, industrial asset management can significantly improve your company's competitiveness.

The digital transition offers huge opportunities for industrial assets: predictive maintenance, computer vision, remote diagnostics, connected objects, low-frequency networks, and more. By connecting industrial assets and those making interventions, digital solutions can accelerate information exchanges and increase companies' performance. But you have to know how to profit from what they offer. The complexity no longer lies in knowing whether a digital solution exists, but rather in assessing its contribution in terms of real value, and the factors in its successful implementation.

Asset management and digital transition: making sense of it for the transport sector.



UNDERSTANDING THE ISSUES IN INDUSTRIAL ASSET MANAGEMENT

THE NEW CHALLENGES FOR INDUSTRIAL ASSET MANAGERS

Pick up your luggage at the airport, take the metro, make your connection—and arrive on time, stress free... The ideal journey is simple, smooth, comfortable, and inexpensive. But this is the ideal journey.

Although prospects are good for traditional transport companies—increasing passenger journeys and moves toward more responsible and cost-effective modes of transport—they are having to face two new realities. On the one hand, aging networks, infrastructures that are expensive to maintain, and rolling stock that has to be renewed - especially against a backdrop of energy transition and the advent of new technologies. And, on the other, the progressive opening up of transport networks to competition, and passengers who are ever-more demanding, in terms of smooth running and value-added services.

Add to this the rise of a new form of competition: alternative modes of transport (car sharing, car clubs, chauffeur-driven tours, etc.). Players such as BlaBlaCar, Uber and Drivy are shaking up the traditional value chain and progressively gaining market share.

SPOTLIGHT ON THE MARKET

En 2015, Guillaume Pepy announced in Les Echos that BlaBlaCar already represented more than 5% of the number of trips sold by SNCF Voyages.[1]

For a transport system operator, these new challenges are all the more important because they are facing a paradigm shift. In the past, a large transport infrastructure network was synonymous with economic prosperity. Any new entrant would immediately face imposing barriers to entry. Yet, digital transition and market opening are breaking down these barriers. A network of industrial infrastructures, previously considered a major asset, is no longer enough— it is the performance of this network that has become the determining factor. Growing awareness of the costs of network failures and the increasing complexity of industrial equipment are driving transport network operators to rethink their **"asset management"** strategies.

WHAT EXACTLY IS ASSET MANAGEMENT?

While the term asset management is often associated with managing financial assets, and generating wealth through investments, it's also about physical assets. A company's assets represent both its equipment and real estate: buildings, networks (for example, rails and overhead power lines), equipment (car fleets, trains), etc.

The IFRAMI (French Institute of Industrial Asset Management and Infrastructure) defines asset management as a process involving the balancing of costs, risks and opportunities, which also offers the benefit of better asset performance. The ISO 55001 standard provides a practical framework to implement an asset management policy. It can also provide a competitive advantage when responding to calls for tenders in certain countries. The standard helps companies to structure their asset management activities by using the following concepts:

- **return on investment,**
- **monetization of industrial risk,**
- **the use and performance of assets,**
- **asset life cycles.**

The company's management defines and implements the asset management policy which is based on the asset's life cycle.[2]

1- *https://www.lesechos.fr/18/06/2015/LesEchos/21961-052-ECH_la-course-de-vitesse-de-blablacar.htm*
2- *https://www.youtube.com/watch?v=4AYa6C94HGk*

THE ASSET LIFE CYCLE APPROACH

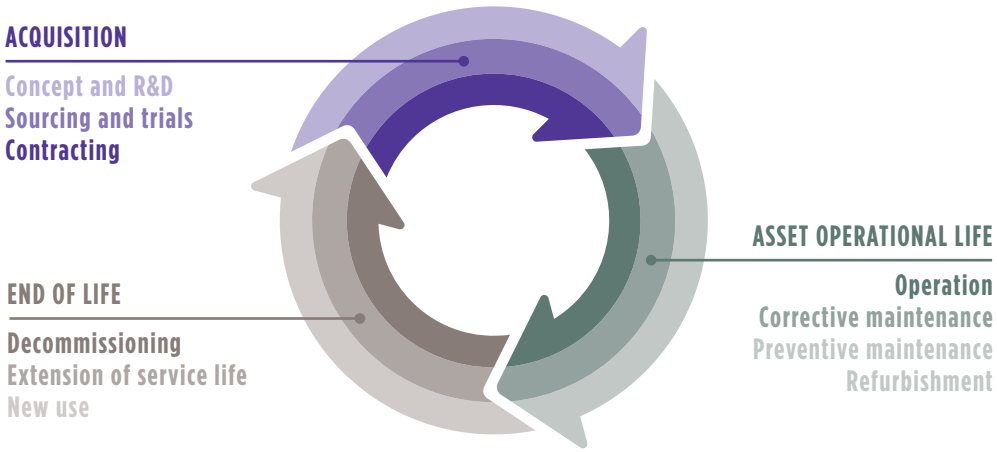
The life cycle of an asset is divided into three major stages:

/ **acquisition,**

/ **operational life,**

/ **decommissioning or end of life.**

AN ASSET'S LIFE CYCLE



ACQUISITION

The first step is the company's acquisition of the asset. A defined medium and long-term asset strategy allows asset managers to determine future infrastructure and equipment needs, according to the company's strategic objectives. The asset strategy is broken down into one or more master plans, which are, in turn, underpinned by investment plans spanning several years.

The idea of the **maintainability of an asset,** for example, is a fundamental factor which is assessed during the acquisition phase. It covers questions like:

/ **What is the availability of spare parts?**

/ **What guarantees does the manufacturer offer?**

/ **What skills are needed to carry out maintenance activities?**

/ **How easy is it to access critical equipment?**

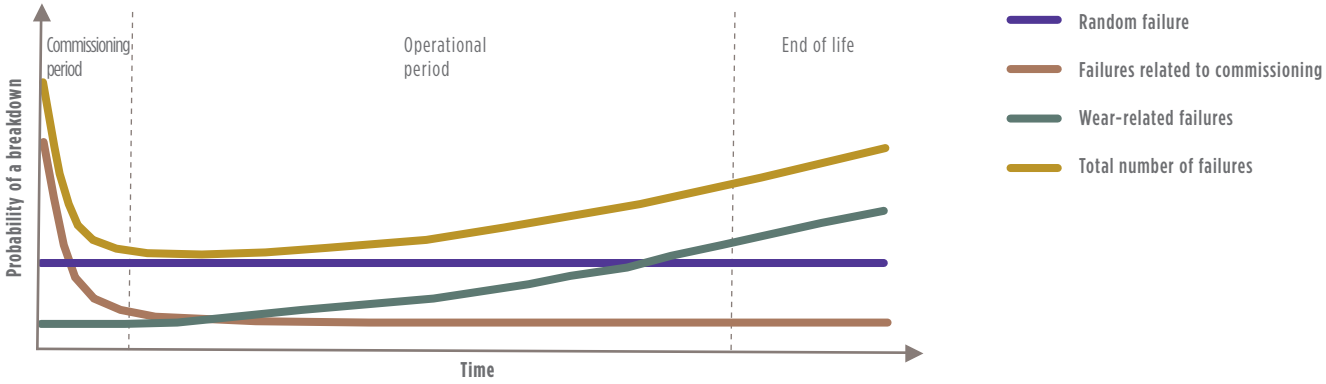
The assets are placed on a theoretical curve that shows the probability of breakdowns throughout the asset life cycle. This curve, known as the "Bathtub Curve", is the sum of three types of breakdown[3]:

/ **Random failures, independent of equipment age,**

/ **Failures related to the commissioning of equipment, which are frequent at first, but decrease over time,**

/ **Failures related to equipment wear, which are few at first, but increase exponentially over time.**

THE BATHTUB CURVE



3- *https://ori-nuxeo.univ-lille1.fr/nuxeo/site/esupversions/25892abd-a2bf-4efc-b4e3-8db478c2b1f5*

THE LIFE OF AN ASSET

Asset managers provide the infrastructure and/or equipment that meets their customer's needs—i.e. the operator's needs. It is essential that maintenance and operational activities are coordinated despite the planning challenges and difficult-to-reconcile production targets. Those involved in operations and maintenance operate on different time horizons and must juggle the conflicts this generates (for example, real-time traffic management compared with taking equipment out of service for maintenance, which can result in it being unavailable for days or weeks at a time).

SPOTLIGHT ON THE MARKET

The average age of the EasyJet fleet is limited to three to four years, something that reduces the likelihood of failures occurring due to the natural aging of its fleet. It's a highly robust strategy: optimizing the use of the aircraft—the asset—by reducing transfer times on the ground, and optimizing maintenance interventions.[4]

Asset managers have to address three fundamental challenges: safety, availability, and cost of ownership.

Safety is the priority issue—and the consequences of erratic maintenance can be dramatic. We can all recall examples of fatal accidents whose cause has been a simple breakdown, a leak, or a system that failed to respond. Safety issues are part of daily life for industrial players, and they are at the heart of any asset management strategy.

Availability must be assured for the proper operation of assets. Assets represent investments too; their economic returns are directly linked to their levels of utilization. For example, the daily cost of an unused Boeing 787 Dreamliner is about US$1 million.[5]

Cost of ownership includes maintenance, upgrading, and reuse costs. Based on their knowledge of the condition of assets, asset managers develop investment master plans and maintenance policies. They also deal with operational issues, such as the productivity of maintenance operations, reductions in the cost of works, and the outsourcing of parts of their activities. For example, if maintaining certain equipment requires a high level of expertise, subcontracting may be a better choice.

END OF LIFE AND DECOMMISSIONING

It is difficult to abandon a gas platform in the North Sea or store thousands of decommissioned diesel buses … The costs of dismantling, storage or environmental impact are among the factors that asset managers, and more broadly, a company's leaders, must anticipate.

Numerous scenarios then arise:

- Extend the asset's life. This has been the approach, for example, with EDF's "Grand Carénage" program, which aims to extend the 40 to 60-year lifetime of a portion of the 58 reactors it operates and maintains.
- Give the asset a second life. Some offshore platforms, for example, are recycled as artificial reefs in "rig to reef programs", to foster the growth of fauna and flora and facilitate areas for fishing.
- Decommission it, or more bluntly, scrap it, in accordance with environmental standards, and requirements to conserve natural resources and clean up the site.

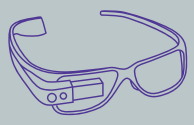
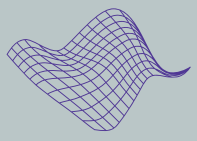
A combination of economic and technical management, asset management balances the worlds of both **finance** and **operations.** From acquisition to the end of life, an asset manager guarantees the performance of an asset, manages its profitability, and ensures it is maintained in an operational condition while meeting the relevant safety requirements and standards. In carrying out these activities, asset managers can benefit from the considerable benefits offered by the **digital transition.**

4- *http://corporate.easyjet.com/~/media/Files/E/Easyjet/pdf/investors/results-centre/2017/easyjet-h1-2017-results-presentation.pdf*
http://stafftravel.easyjet.com/FR/Organiser/index.html
5- *http://www.usinenouvelle.com/article/boeing-787-immobilises-un-cout-deja-exorbitant-pour-les-compagnies-aeriennes.N191237*

HARNESSING THE DIGITAL TRANSITION FOR ASSET MANAGEMENT: OPPORTUNITIES AND PREREQUISITES

Despite the issues discussed above, the digital transition has also opened up new opportunities for industrial players. Technologies have "enhanced" operations and maintenance activities: dynamic flow mapping, 3D scanning, and predictive maintenance now make it possible to better understand, monitor, and maintain, industrial assets.

EXAMPLES OF USE CASES

	PREDICTIVE MAINTENANCE	MONITORING	REMOTE SUPPORT	THE 3D SCAN
PRINCIPLES	Changes in asset functioning are predicted as a result of statistical models developed from the analysis of historic data Supervisory data can also be used for advance detection of the signs of weakness that signal an impending breakdown. This technology allows: • A prediction of medium and long-term maintenance requirements, • The optimization of equipment's operational life by planning its replacement before it becomes defective.	The LORA communication network is a low-speed network that allows exchanges of information between connected objects. Its defining feature is that it can operate periodically, when activated, to send or receive information. This technology allows: • The power consumption of sensors connected to the network to be considerably reduced, • An increase of several years in the lifespan of connected assets.[7]	Virtual information and graphics are created by the operator and superimposed on the glass of a screen with specific areas highlighted and real-time communication with the operator. This technology allows: • More intuitive interactions between on-site and support personnel, • Savings in time spent on site, • Better quality interventions.	Here, laser scanning is used to create a three-dimensional point cloud. The points are generated by the impact of the laser on the surface, allowing users to: • Update drawings of a work area by providing measurements of dimensions and angles, • Rapidly identify deformations on a surface
ILLUSTRATIONS	Rolls-Royce draws on data gathered from the use of aircraft engines to determine the maintenance operations that will need to be carried out.[6] 	Colas employs this type of network to manage parking spaces by using sensors installed on the ground.[8] 	Naval Group uses augmented reality glasses for the remote maintenance of warships.[9] 	Air France Industrie carries out 3D scans of the external surfaces of aircraft to quickly identify the impacts of hail.[10] 
LIMITATIONS/PREREQUISITES	• Usable data is needed to put in place the statistical model, • The skills and organizational structure must be in place to make proper use of the data.	• A continuous, non-joinable network, • Limited performance in terms of speed, • Requires a combination of networks and extensive data synchronization to be able to process information usefully.	• Requires a good connection with support staff • Changes in work practices that will need a change management process.	• Specialist resources are needed to make use of this technology, • Equipment investment costs.

While many use cases exist, some of which are very appealing, they require companies to have **full command of their data.**

6- *https://www.rolls-royce.com/about/our-technology/enabling-technologies/engine-health-management.aspx*
7- *http://www.frandroid.com/telecom/313396_lora-futur-reseau-objets-connectes*
8- *https://www.dmic.fr/lora.html*
9- *http://www.usinenouvelle.com/article/laissez-vous-teleporter.N384527*
10- *http://www.afiklmem.com/AFIKLMEM/fr/g_page_standard/MRO_lab_Innovations/3D_Scanning.html*

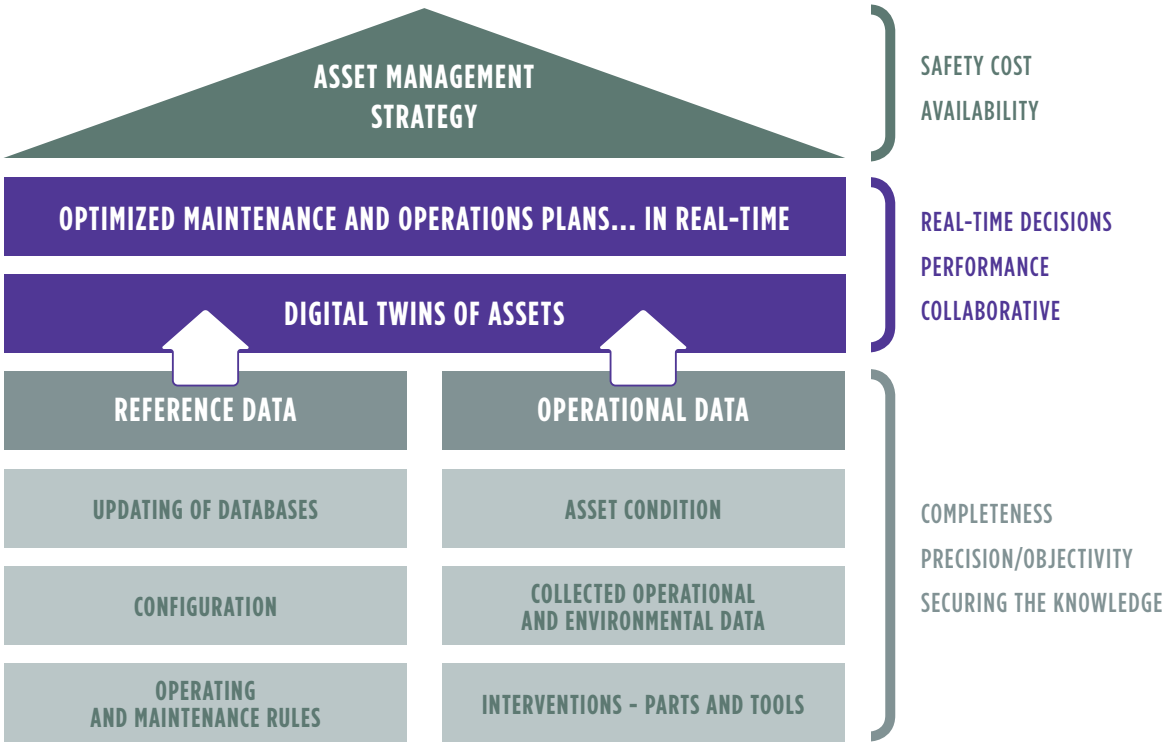
DATA, AN ESSENTIAL RESOURCE FOR ASSET MANAGEMENT

Knowledge of the asset base is fundamental, and companies must have access to reliable and comprehensive datasets. Two types of data can be distinguished:

- **reference data:** operating rules, equipment functioning and configuration, geographical positions, component parts, etc.
- **operational data** (or transformed data): real-time statuses, rates of availability, maintenance histories, levels of performance, environmental data, etc.

Combining these two data types results in a **digital vision of the asset,** also known as a **"digital twin."**

HARNESSING DATA FOR ASSET MANAGEMENT:



The reference database must be sufficiently clean for the data to be usable. And many companies find that their data has limitations:

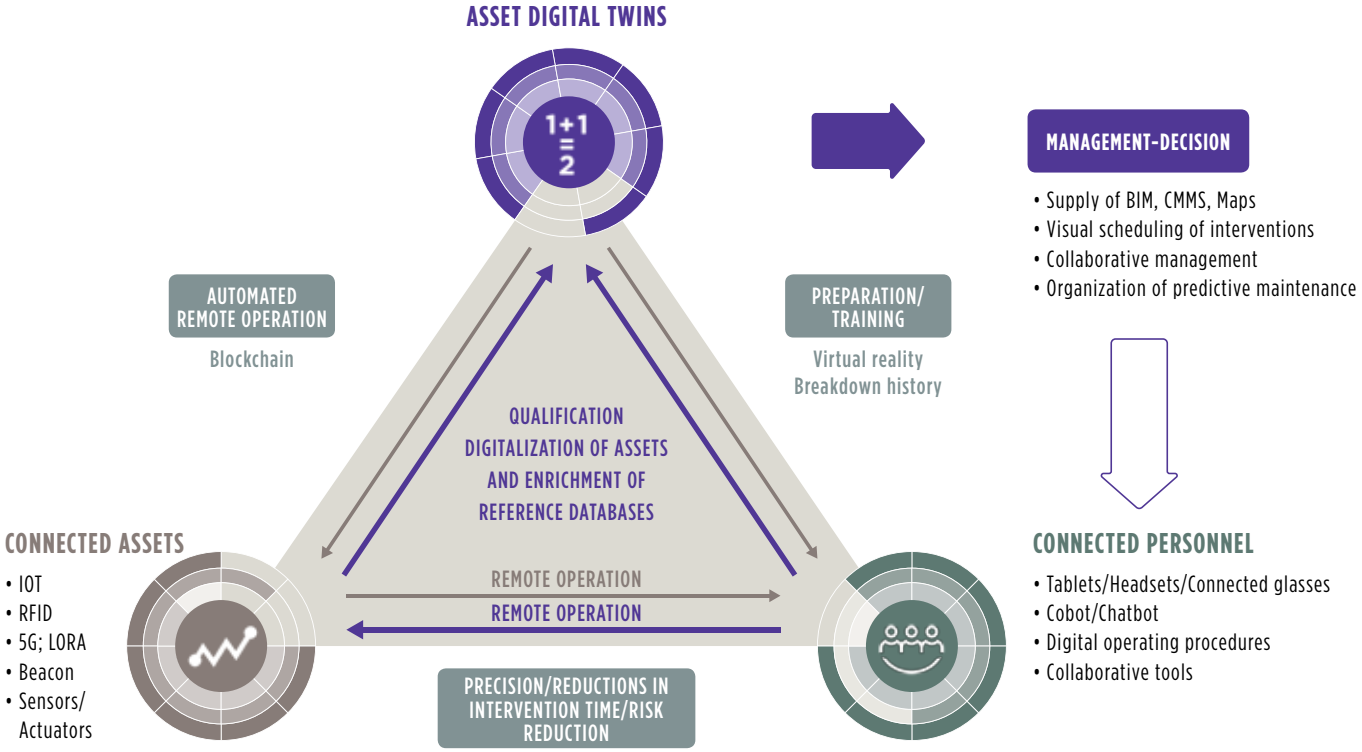
- An absence of historical or properly-structured data,
- The cost of logging and qualifying existing data,
- The cost of updating the reference database,
- The gathering and accumulation of data from operations on the ground (the qualification of breakdowns),
- The technical competencies to exploit the data,
- Data interoperability and the management of its consistency.

The introduction of digital twins and the making of information available to stakeholders (for example, management control, engineering support departments, the supply chain, etc.) facilitate exchanges of information between stakeholders, decision-making, and, ultimately, directly affect operational performance and the availability of the asset base.

Examples of what digital twins can offer:

/ The capturing and securing of knowledge via data gathered from those making interventions, and sensors directly connected to the asset,
/ The consolidation of, and capitalization on, information to support a decision-making IS,
/ The transformation and transmission of information to facilitate maintenance,
/ Remote operations.

MANAGING AND ACCELERATING INFORMATION FLOWS USING DIGITAL



HOW TO SUCCESSFULLY DIGITALIZE YOUR ASSET MANAGEMENT PROCESS

Companies can profit from this revolution according to their **level of maturity** in terms of data management.

To benefit from what's possible, they must adopt an approach that is sufficiently well defined to avoid unwanted surprises. Updating an entire set of reference databases can be extremely costly, while an intermediate solution might be sufficient to achieve the desired objective. Similarly, a predictive maintenance project may prove to be less profitable than expected, especially if the entire reference dataset needs to be restructured first.

Five recommendations, based on feedback from experience, can be used to provide a basic level of confidence in any initiative aimed at digitalizing asset management:

- **Assess the level of maturity** of the organization. How much knowledge is there about the asset base? What is the quality of the reference databases? What is the degree of connectivity between assets and those making interventions? What internal organizational resources and skills are available to process the data? What preliminary digital initiatives should be taken? What does feedback from experience show? Etc.
- **Justify investment on the basis of use;** not vice versa. If the solution is not used, or under-used, the project will not be profitable.It's imperative to identify all the prerequisites required for its use: technical expertise, human factors, etc.
- **Qualify the impact of implementing the solution** (effects on the working environment, acceptability, training, IS, etc.) and think about the change management plan. A project won't succeed without the support of the relevant stakeholders.
- **Implement solutions using a test and learn approach,** with a clearly defined target for return on investment. Put in place milestones with intermediate indicators to test the value generated by the solution at each point, while avoiding the tunnel effect.
- **Select partners carefully.** It's these partners who will, potentially, support the wider roll-out of the solution. Make sure they are robust at the test phase.

There's no doubt that the digital transition offers exceptional opportunities for asset management:

- the fluidity of information exchanges allows greater responsiveness and objectivity in decision-making,
- the connectedness of assets and those making interventions provides opportunities for new use cases and enhances expertise,
- new methods of collecting and exploiting information improve the predictability of asset behavior.

To be beneficial, these opportunities must be integrated into an overall corporate approach—where people are the linchpin. A combination of people and digital solutions is more effective than either carrying out tasks alone. And the way in which business leaders present these developments must encourage stakeholder buy-in, because transformation cannot be achieved unless they too embrace them.

CONCLUSION

What does the future look like for connected maintenance? Should predictive models be widely rolled out? What solutions are available to improve asset connectivity? Which solutions should be deployed first? How does digital improve safety? When transforming operational disciplines, how can obstacles to change be removed?

Asset managers have to face all of these critical questions against a backdrop of a rapidly changing industrial world. Analysis of failures and the experiences of other industries can provide the foresight needed to overcome the obstacles that will inevitably be faced on the road ahead.

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