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OPERATIONS & MAINTENANCE  
CONFERENCE IN THE ARAB COUNTRIES

# Digital Transformation in Maintenance & Asset Management

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Chairman of Project 25DX . Global Forum on Maintenance and Asset Management

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# Digital Transformation in Maintenance & Asset Management

**Project 25 DX** Working Group

Chairman: Prof. Adolfo Crespo Márquez (EFNMS)

Leader: Zensuke Matsuda (JIPM).





# The Global Forum on Maintenance and Asset Management



The Global Forum on Maintenance and Asset Management (GFMAM) has been established with the aim of collaboratively sharing advancements, knowledge, and standards in maintenance and asset management. The enduring objectives of the GFMAM are to:

- Bring together, promote, and strengthen the maintenance and asset management community worldwide.
- Support the establishment and development of associations or institutions whose aims are maintenance and/or asset management focused.
- Facilitate the exchange and alignment of maintenance and asset management knowledge and practices.
- Raise the credibility of member organizations by raising the profile of the Global Forum

More on the Global Forum on Maintenance and Asset Management (GFMAM) can be found on- line at [www.gfmam.org](http://www.gfmam.org)

# The Project 25 DX Document

This document aims to examine the impact of digital transformation on maintenance and asset management in industrial and infrastructural contexts.

It highlights the ongoing relevance of basic principles in these fields during the digital era. The document is designed to offer practical guidance, addressing community questions.

The concerns and recommendations come from a survey conducted with GFMAM member organizations, aligning with actual community concerns and interests.



# Who are the Project Team ?



**David Smallbone  
(IAM)**



**Raymond Hickey  
(IAM)**



**Adolfo Crespo  
Márquez  
(EFNMS):Chairman**



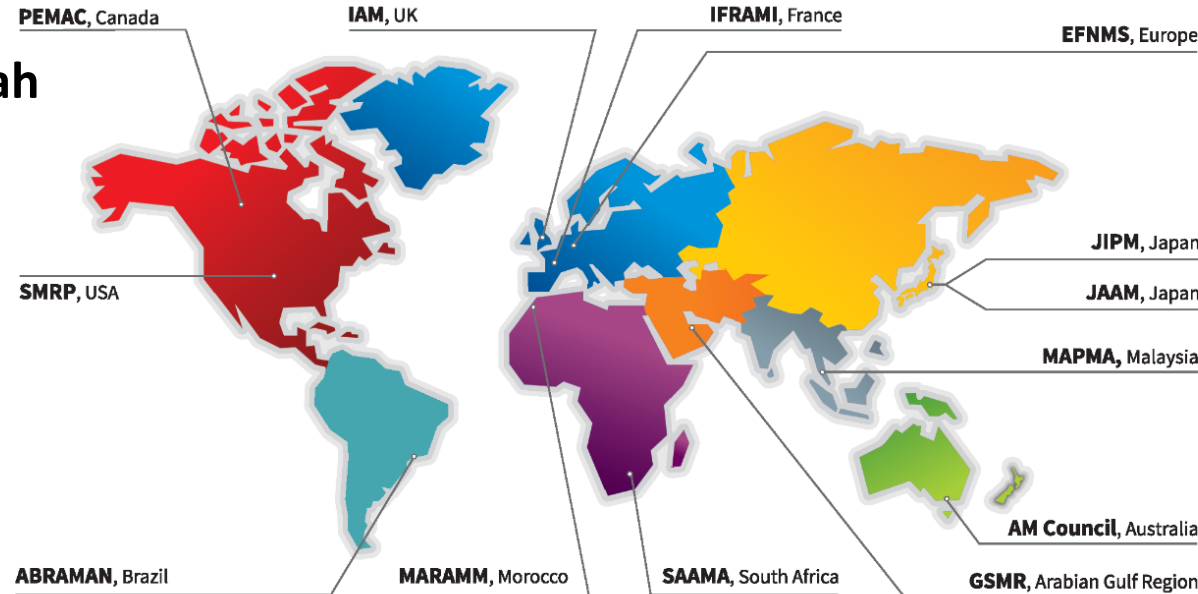
**Dharmen Dhaliah  
(PEMAC)**



**Adolfo Crespo del Castillo  
(EFNMS)**



**Alli Zuashkiani  
(SMRP)**



**Darryl Aberdein  
(SAAMA)**



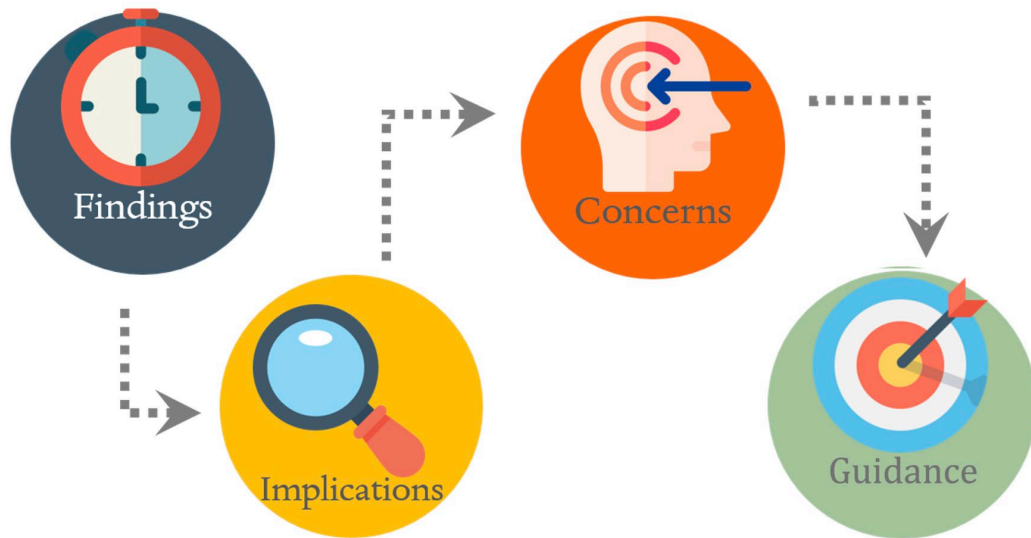
**Mahmood  
Mirza (GSMR)**

**Alex Afshar  
(AMC)**



**Zen: Zensuke Matsuda  
(JIPM) : Leader**

# How was the project developed ?



**Figure 1.** Document structure & guidance generation process

**Findings and implications** are coming out of the: “one point information” (findings) and “Telling the story of sectors” (implications). Information provided by team members contributing their knowledge of the current reality and documenting the implications in sectors that are close to them professionally.

**Concerns and Guidance** are using today’s digital tools to: launch an unprecedented international survey, to capture, process, visualize and analyze the survey data, as well as to provide subsequent and immediate guidance coming out of these analyses (oriented to roles in the organization or to different stages in their maturity).

# The Findings



## Digital Transformation and Advanced Technologies

- Rapid advances in digital technologies, data analytics and artificial intelligence, having the potential to radically transform asset management and maintenance.
- Sensing/data-capture solutions, increasing computational power, and advances in statistical techniques to drive machine learning, enable us to manage complex systems better.

## Maintenance efficiency and Strategies

- Advanced analytics making CBM a very attractive lever for increasing maintenance efficiency.
- Important efficiency gains by moving, in many cases in an aggressive manner, towards CBM.
- Movements to PdM requiring further investments. Monitoring not only components condition but also the condition of the factors that influence them.
- 'Prescriptive Maintenance' (RxM, with 'Rx' symbolizing 'Prescription' and 'M' 'Maintenance'), gaining prominence. RxM leverages the capabilities of data analytics, artificial intelligence, and advanced technologies to dynamically optimize maintenance strategy design.



# The Findings



## **Regulatory Compliance and Change Management**

- Extra effort for CBM/PdM new strategies to align with existing regulatory requirements.

## **Optimization and Automation**

- The entire M&AM value chain needs to be addressed. Monitoring and analytical capabilities are only a first step.
- Resources management now linked to assets status. New techs like 3D scanning & printing, photogrammetry, etc. are gaining ground to support this.
- Roles changing in M&AM, using technology rather than placing people in hazardous situations.

## **The human resources**

- Maintenance professionals more likely to fill important roles if having data science knowledge and know how to use it.
- Human-based knowledge and experience key drivers for the application of AI to predictive/prescriptive maintenance.

## **Servitization and complete lifecycle management**

- Manufacturers, becoming assets owners, paying more attention to the complete life cycle of the assets.



# The Implications



## **Policy Implications**

- Legal as an enabling mechanism can safeguard the Digital investment.
- New methodology for procuring services related to data and digital technologies for infrastructure.
- New commercial risk model for digital projects in the organization.
- Utilizing and enhancing data and digital technologies in asset management decision-making.

## **Business Implications**

- New business models.
- New management implications over the asset lifecycle.

## **Technical Implications and Challenges**

- Changing the way maintenance activities, by type, are performed.
- New end-to-end technologies for digital maintenance management.
- Many challenges in the adoption of the digital technologies

# How was the survey analysed ?



Data Capture



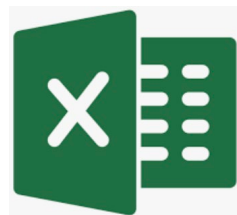
Google Forms



Data Preparation



Excel



Data segmentation, grouping and visualization



RAPIDMINER



Data Analysis



ChatGPT



# Represented sector and roles

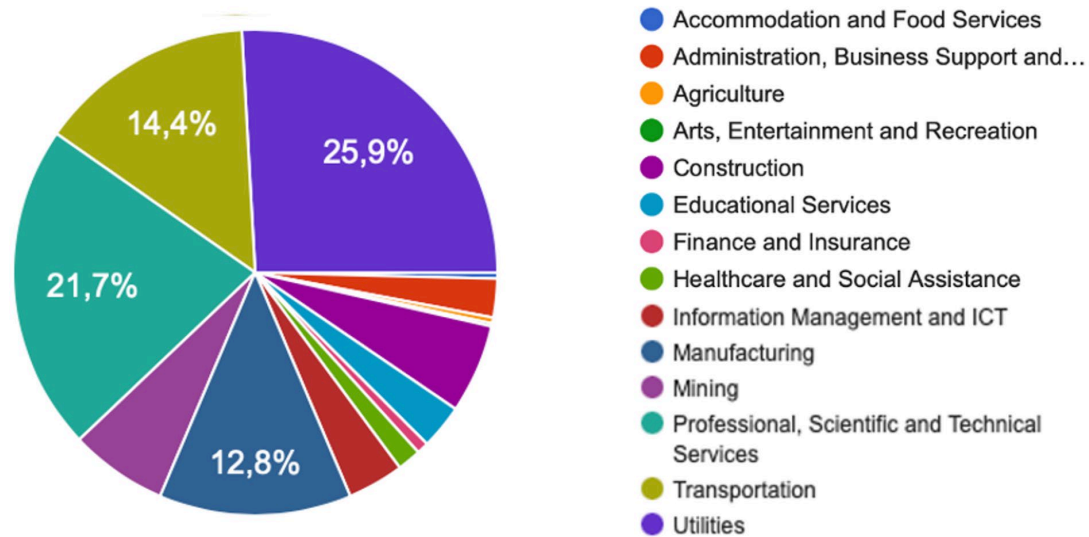


Figure 6. Survey respondents by Sector of activity.

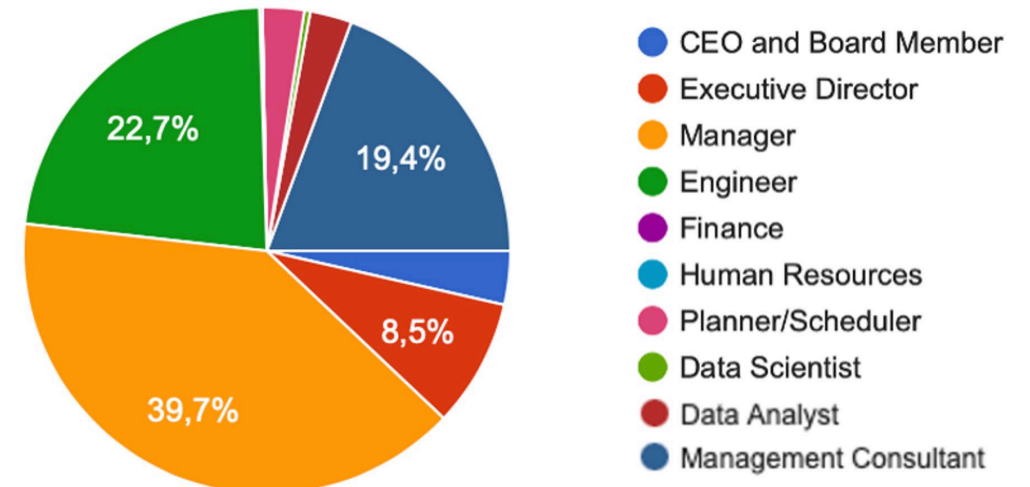


Figure 7. Survey respondents by role in the organization

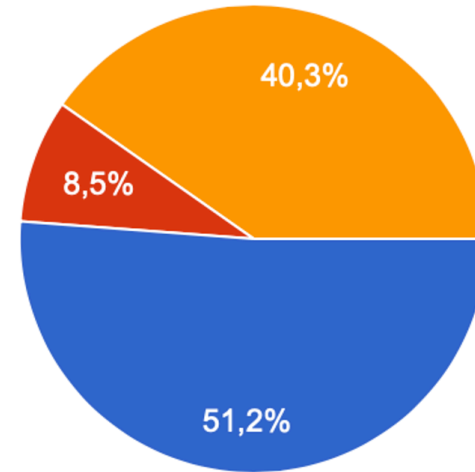
# Leadership alignment & tools



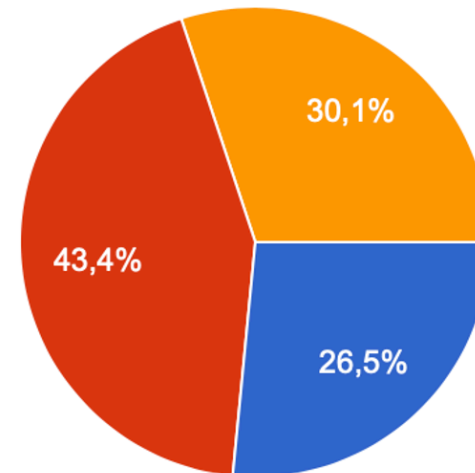
- Yes
- No
- Maybe

To drive successful initiatives, addressing hesitations through **effective communication and showcasing tangible benefits** is crucial.

Organizations should prioritize **adopting robust tools, KPIs, and frameworks to effectively evaluate and communicate the financial benefits** of their digital transformation efforts.



**Figure 10.** Board and senior leaders' appetite.



- Yes
- No
- Maybe

**Figure 11.** The answers concerning the existence of tools and metrics to justify DX.  
WWW.GFMAM.ORG

# What are the barriers identified?

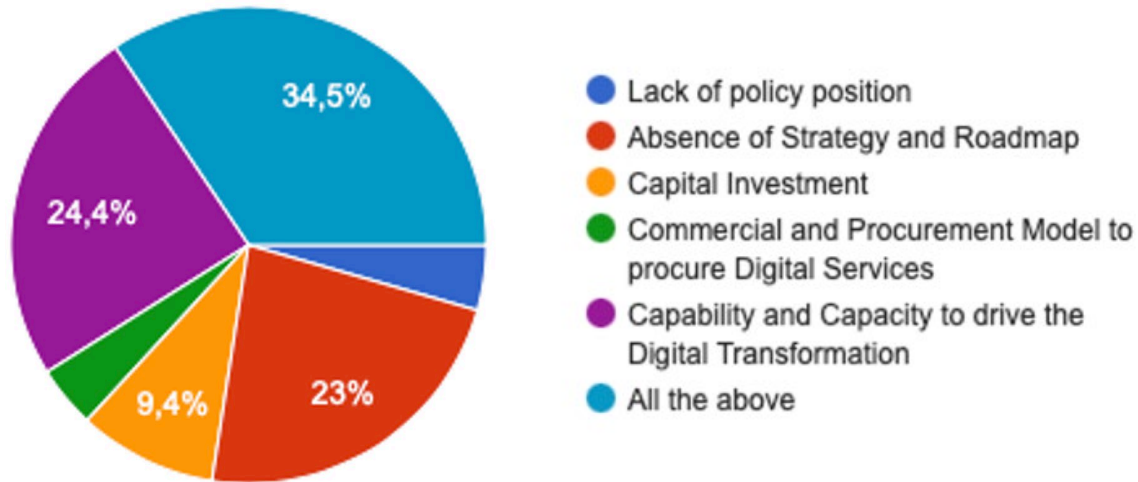
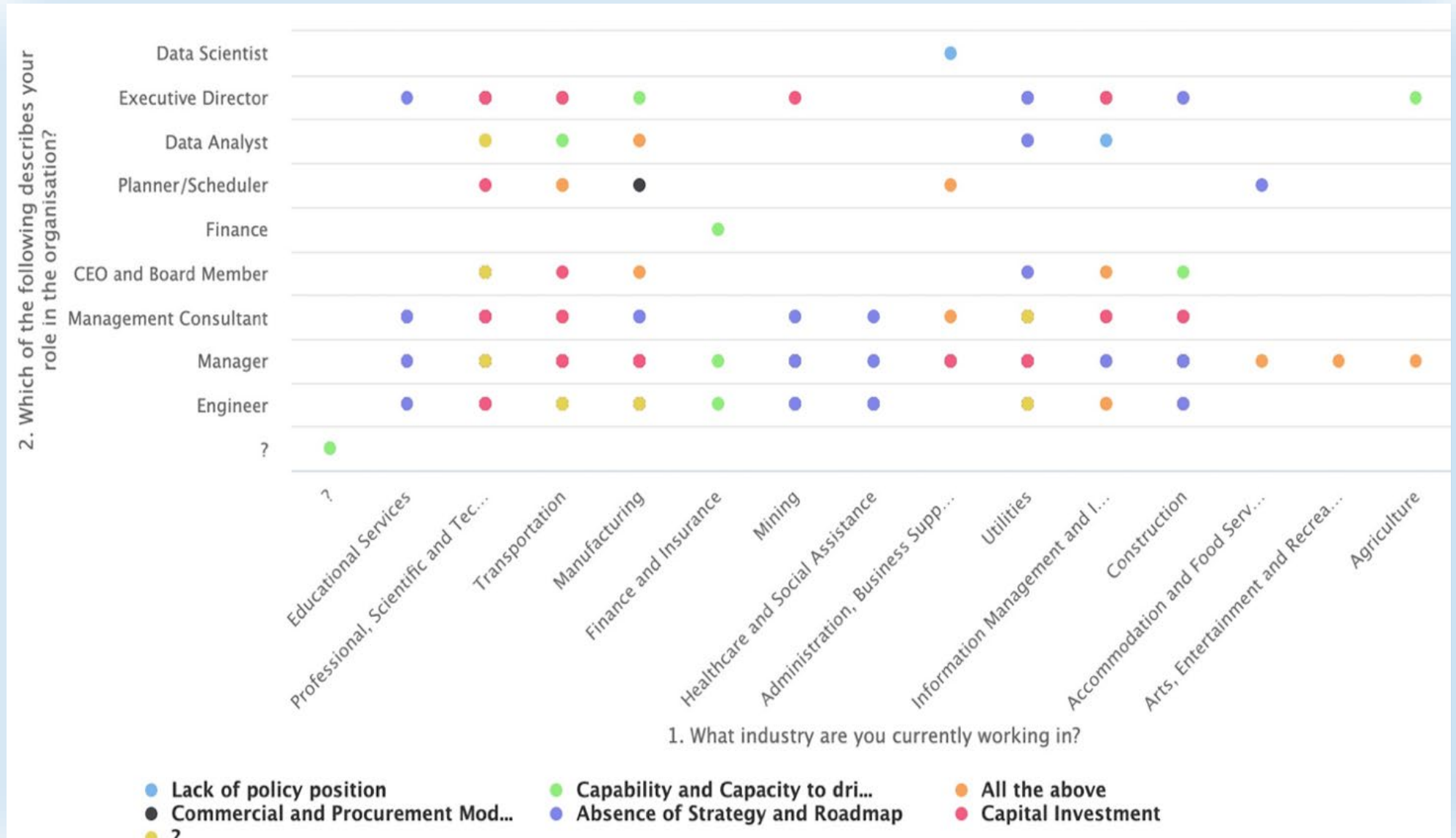


Figure 9. Barriers identified by respondents.

- 1. Comprehensive Approach (34.5%):** Prioritize and address various obstacles with a targeted strategy involving policy, resources, and stakeholder engagement.
- 2. Digital Transformation Capacity (24.4%):** Invest in internal capabilities through training, upskilling, and fostering an innovative culture.
- 3. Lack of Strategy and Roadmap (23%):** Develop a clear digital transformation strategy, including goal definition, asset assessment, and a roadmap with steps and timelines.

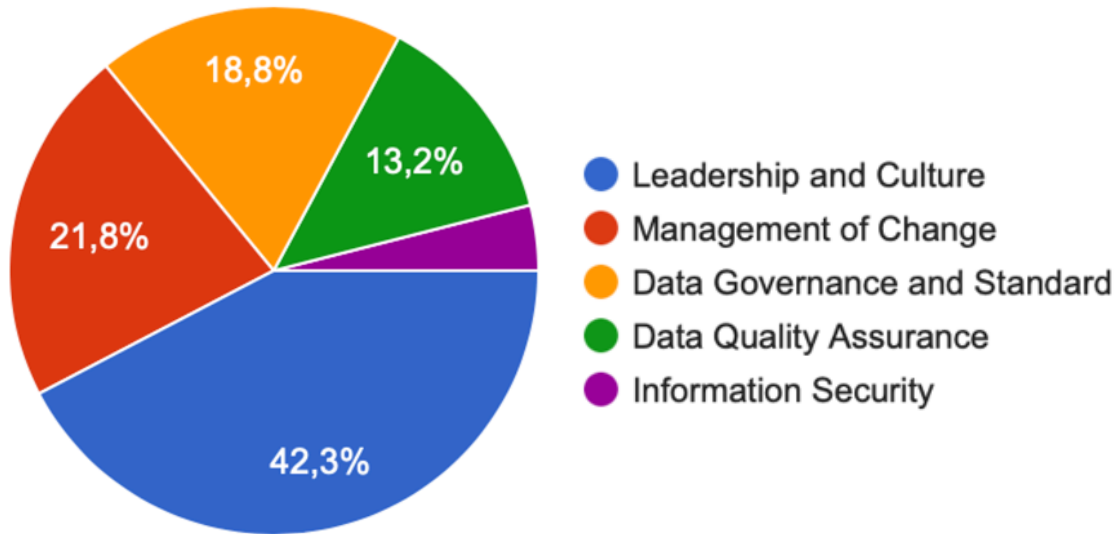
# Sector Analysis



# Insights per sector:

- **Transportation Sector:**  
*Barrier:* "Capital investment" is the main challenge.  
*Insight:* Address financial constraints, explore funding, and prioritize high-return projects.
- **Educational Services, Mining, Healthcare Sectors:**  
*Barrier:* "Absence of roadmap" hinders digital transformation.  
*Insight:* Clear direction needed; comprehensive roadmaps align stakeholders.
- **Arts, Entertainment, Recreation, Agriculture, Accommodation/Food Services Sectors:**  
*Barrier:* Diverse barriers indicate unique challenges.  
*Insight:* Holistic strategies required—address financial, planning, resource, and cultural aspects.  
Collaborate, share best practices, learn from other industries.

# Sustaining Org DX Efforts

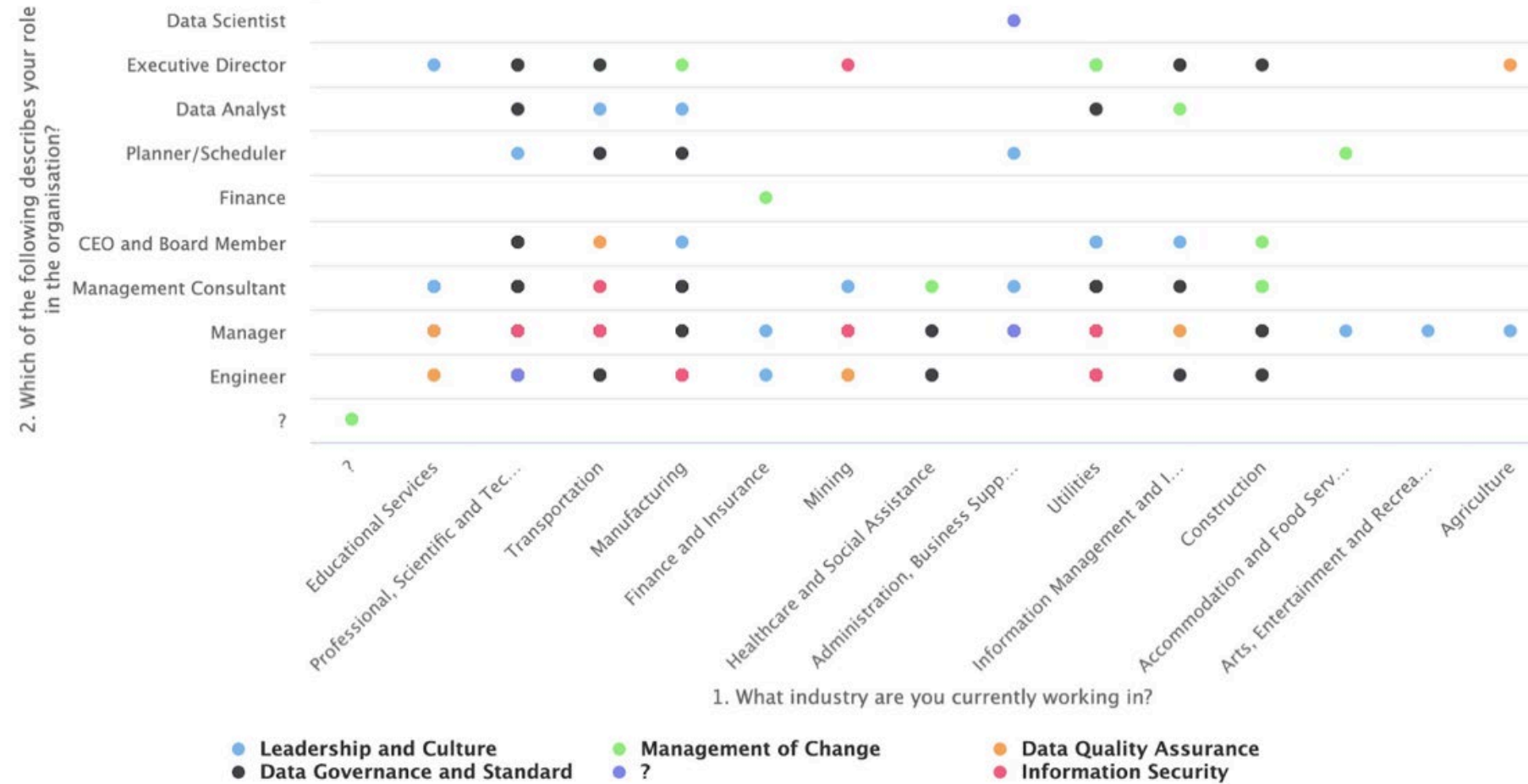


**Figure 12.** The biggest opportunity to sustain DX.

Key findings to ensure the longevity of digital transformation efforts:

- The significance of **navigating organizational shifts**.
- The importance of **structured data practices**.
- The crucial role of **accurate and reliable data**.





In sectors such as **utilities, manufacturing, transportation, and construction**, managers and engineers consider information security and data governance crucial.

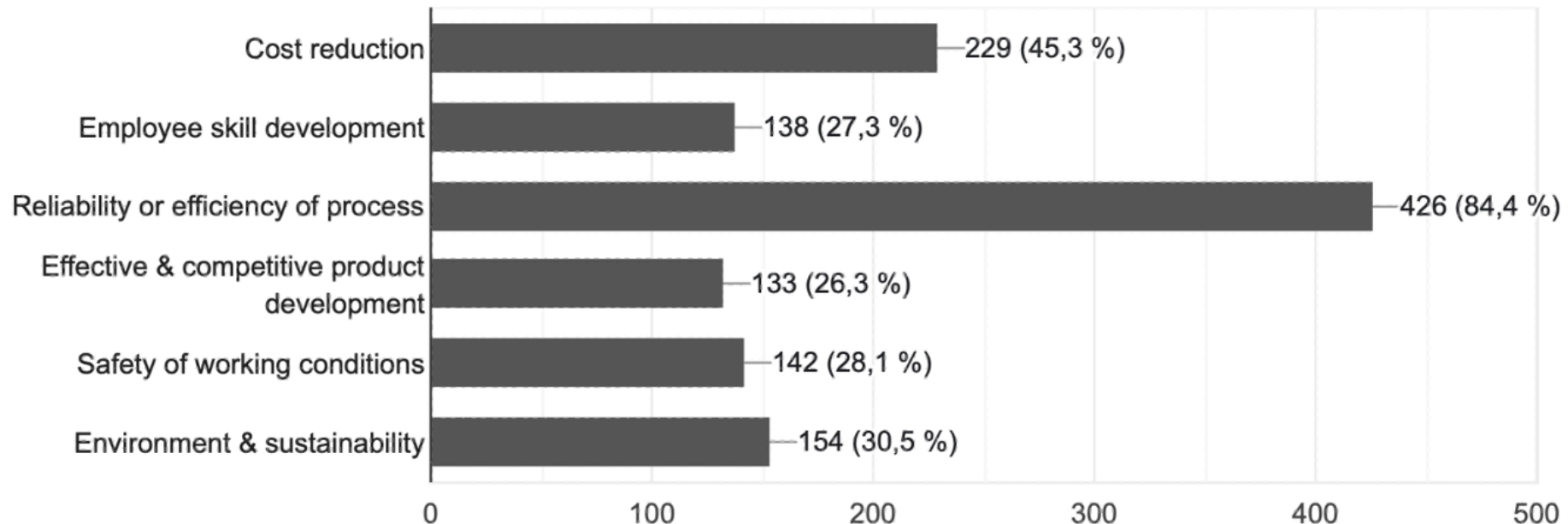
These sectors typically deal with large volumes of sensitive data, complex systems, and regulatory requirements

**Figure 21.** Most common opinion regarding opportunities to sustain DX, found per role and sector.

# DX as a solution to...what problems?



DX perceived as a tool to **enhance the reliability, efficiency and cost of processes**, more than their industrial safety, environmental context or the employee skill development.



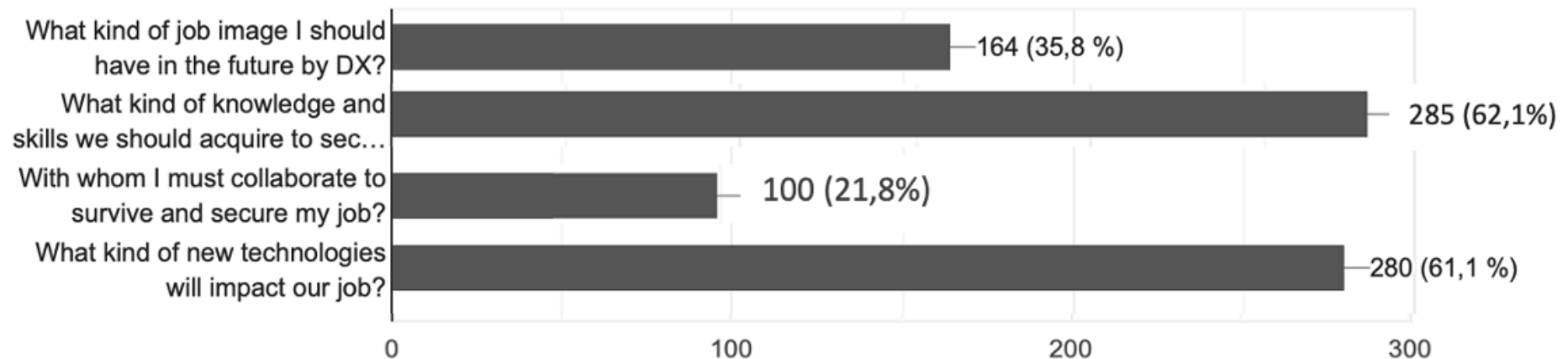
**Figure 13.** The problems that are expected to be solved thanks to DX.

# What professionals want to know

\* Maintenance and Asset Managers



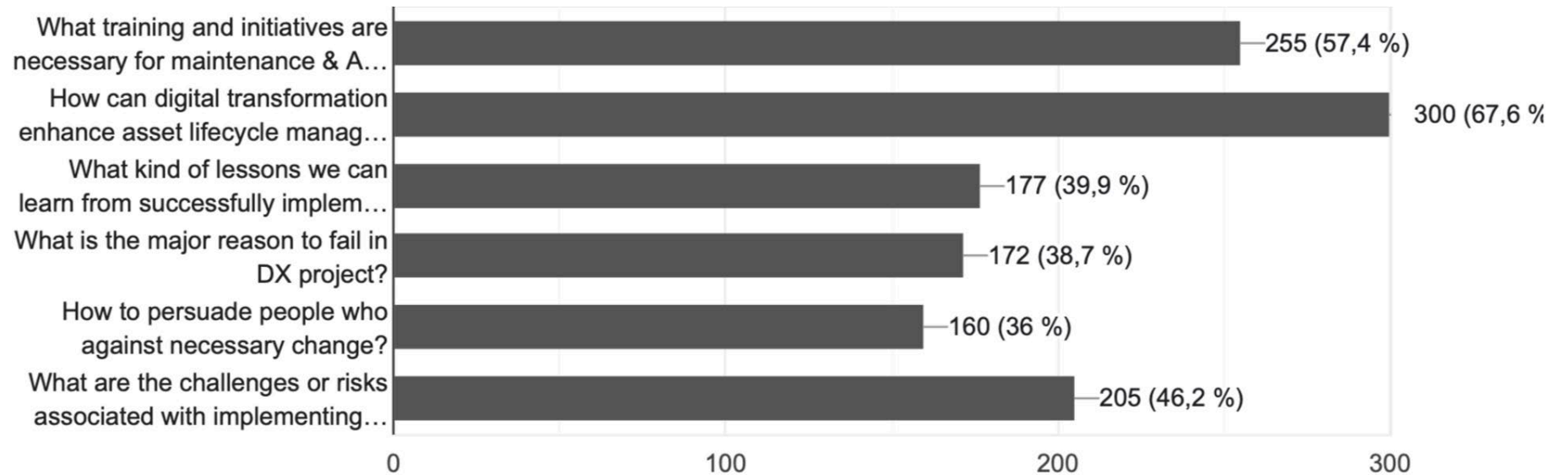
**Competencies to stay relevant and valuable & new technologies impacting M & AM** are crucial aspects compared to future job image or collaboration needs.



**Figure 14.** What M&AM professionals and engineers want to know about DX

# What professionals want to know

\* Business Leaders



**Figure 15.** What business leaders want to know about DX,

Business leaders prioritize **understanding DX's impact on asset lifecycle management** and the **required training for professionals**.

# Guidance to Navigate DX in M&AM – Per Maturity & Role



- **At the Level 1:** Asset management practices are ad hoc and driven by individual intuition. There is a lack of formal processes and documentation, and decision-making relies heavily on experience and instinct.

#	Role	Guidance	Rationale
1	Managers & Biz Leaders	Lead the vision and strategy for digital transformation initiatives	Crucial at all levels of maturity to ensure alignment of digital transformation efforts with organizational goals and to drive successful implementation.
4	Managers & Biz Leaders	Provide adequate resources and budget: Cost-benefit analysis.	Necessary at all levels to support digital transformation initiatives and ensure their successful implementation, particularly at higher maturity levels.
7	Engineer & Tech Professionals	Lead implementation and integration of digital tools	Vital at all levels to ensure successful adoption and alignment of digital tools with organizational goals and processes.
10	Area Responsible Professionals	Provide training and skill development	Valuable at all levels to enhance the workforce's digital capabilities and ensure the effective use of digital tools and technologies.
11	Area Responsible Professionals	Promote user adoption and engagement	Important at all levels to ensure their effective utilization and maximize the benefits of digital transformation.



# Guidance to Navigate DX in M&AM – Per Maturity & Role



- **At level 2:** asset management practices start to become more structured, but there is still a high reliance on external support and expertise. Processes and procedures are developed, and there is an increasing recognition of the importance of data and information.

#	Role	Guidance	Rationale
2	Managers & Biz Leaders	Foster strategic partnerships	Becomes increasingly important as asset management maturity improves to access advanced technologies and expertise for optimization.
5	Engineers and Tech Professionals	Stay updated with the latest advancements	Important at all levels to make informed decisions and leverage new opportunities for optimizing asset management and maintenance.
6	Engineers and Tech Professionals	Collaborate across disciplines	Important at all levels to integrate digital tools effectively, share expertise, and ensure a holistic approach to asset management.
8	Engineers and Tech Professionals	Ensure data integrity and quality	Crucial at all levels to support reliable decision-making, compliance, and accuracy in asset management and maintenance data, becoming more critical at higher maturity levels.



# Guidance to Navigate DX in M&AM – Per Maturity & Role



- **At Level 3:** Asset management practices become self-sufficient and internally driven. The organization develops its own capabilities and expertise, and there is a focus on continuous improvement and optimization of asset performance.

#	Role	Guidance	Rationale
3	Managers & Business Leaders	Cultivate a culture of innovation	Becomes more critical at higher maturity levels to drive the adoption of new technologies and best practices for continuous improvement.
9	Area Responsible Professionals	Establish data governance practices and standards	Data governance is essential to maintain consistency and reliability in data, and it becomes more significant as asset management maturity improves to manage complex digital data and systems.
12	Legal Professionals	Stay updated with evolving laws and regulations	Becomes more critical at higher maturity levels to ensure compliance with legal requirements related to digital transformation.
13	Legal Professionals	Provide legal advice and support for digital transformation initiatives	Plays a significant role at higher maturity levels to provide guidance and support in navigating legal aspects and ensuring compliance with regulations during digital transformation.
14	Legal Professionals	Review and negotiate contracts with digital service providers	Essential at higher maturity levels to ensure favorable terms and conditions and align them with the organization's goals.

# Guidance to Navigate DX in M&AM – Per Maturity & Role



- **At Level 4:** Asset management practices are integrated and aligned with the organization's overall strategy. Collaboration and coordination among different departments and stakeholders are emphasized, leading to a holistic and interconnected approach to asset management.

#	Role	Guidance	Rationale
15	Commercial Professionals	Conduct market research for digital service providers	Becomes more important at higher maturity levels to find suitable providers that align with the organization's objectives.
16	Commercial Professionals	Negotiate contracts and agreements with digital service providers	More relevant at higher maturity levels to ensure favorable terms and meet the organization's specific requirements.
17	Commercial Professionals	Monitor and evaluate performance of digital service providers	Monitoring and evaluating the performance of digital service providers becomes important at higher maturity levels to ensure their effectiveness and make informed decisions regarding their continuation.
18	Procurement Professionals	Align procurement and talent acquisition strategies with digital transformation goals	Becomes more crucial at higher maturity levels to optimize the acquisition of digital solutions and talent needed to support the overall transformation.
19	Procurement Professionals	Identify and onboard digital service providers and talented professionals through streamlined processes	More relevant at higher maturity levels to ensure efficient selection and integration of employees and service providers .



- The Project 25 DX of the GFMAM is exploring how digital transformation (DX) landscape in this field is rapidly evolving, presenting various challenges and opportunities.
- Brief overview of the project document content and results in terms of guidelines provided per role (and also per maturity in the GFMAM document) of the organizations.
- Thanks to the survey, by understanding the specific challenges, perspectives, and opportunities within sectors and roles, organizations can chart a strategic path forward.
- Emphasizing leadership & culture, data governance & information security will be key to sustained success in the digital era.
- By implementing the proposed guidelines, organizations can navigate the digital transformation journey and optimize their maintenance and asset management.
- The GFMAM document is expected to be published EARLY 2024.



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