$399

RELIABILITY CONNECT®
Powered by Mobius Institute

THE KEYS TO RELIABILITY IMPROVEMENT SUCCESS

RESEARCH REPORT

FIRST EDITION

INTRODUCTION

JASON TRANTER

CEO and Founder of Mobius Institute

In the Spring of 2020, RELIABILITY CONNECT® collected more than 1,000 survey responses from maintenance and reliability professionals from all regions of the world. The survey data provides a rich benchmarking resource and underscores some important success factors for reliability programs. This report presents common approaches and the keys to reliability success by drawing comparison between programs with different maintenance cost performance levels.

The survey results show how reliability programs are viewed from those inside the companies.

Since the study is global and backed by one thousand responses, it provides qualitative details about the structure and practices that are most used.

The survey also gathered key performance metrics, such as: maintenance cost as a percentage of replacement asset value, percentage of reactive work and asset availability. The survey collected data on these metrics using ranges that are useful for segregating and comparing performance groups. The comparisons highlight the vital role that culture, leadership, and technology play in achieving program success. The comparisons also highlight that there is a consensus on the critical success factors among those who have achieved success and those who are just getting started. This quote from a respondent summarizes that consensus:

> *"The vision of reliability engineering should be driven by a skilled team, that has the desire and will to improve reliability; thereby reducing plant equipment failure and downtime, which if not met will in turn increase maintenance costs and lower production levels significantly."*

Most importantly, the survey validates that Group 1 (top performers) employ the proactive maintenance model, characterized by strong predictive practices, planning and scheduling and a culture of reliability. On the other hand, Group 2 is made up of survey respondents that reported higher maintenance costs, more safety incidents, and less planning and scheduling as a part of their reliability programs.

I am very pleased with the results and am confident that the findings and data in this and subsequent reports will help you on your continuous improvement path to greater asset reliability!

KEY FINDINGS

A Practitioners with disciplined maintenance practices achieved the best results.

B Programs with a strong proactive culture achieved the best results.

C Planning and scheduling is directly connected to program success.

D Executives are much more likely to know their key performance metrics.

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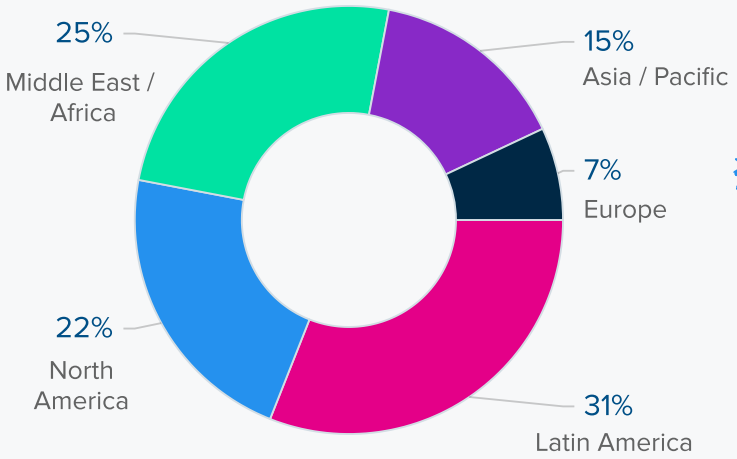
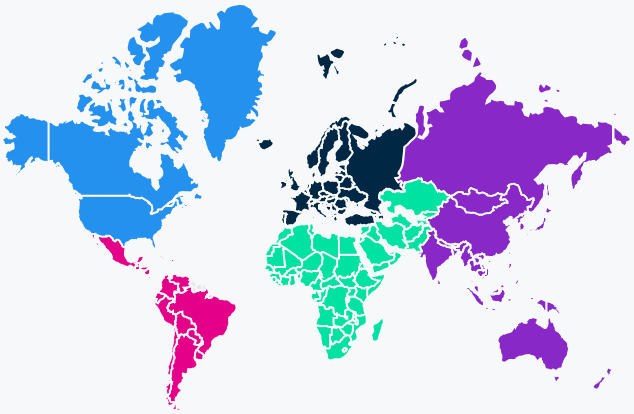
SURVEY DEMOGRAPHICS

1,000+ responses were collected from participants from all across the world, ranging from mid-level engineers to C-level executives.

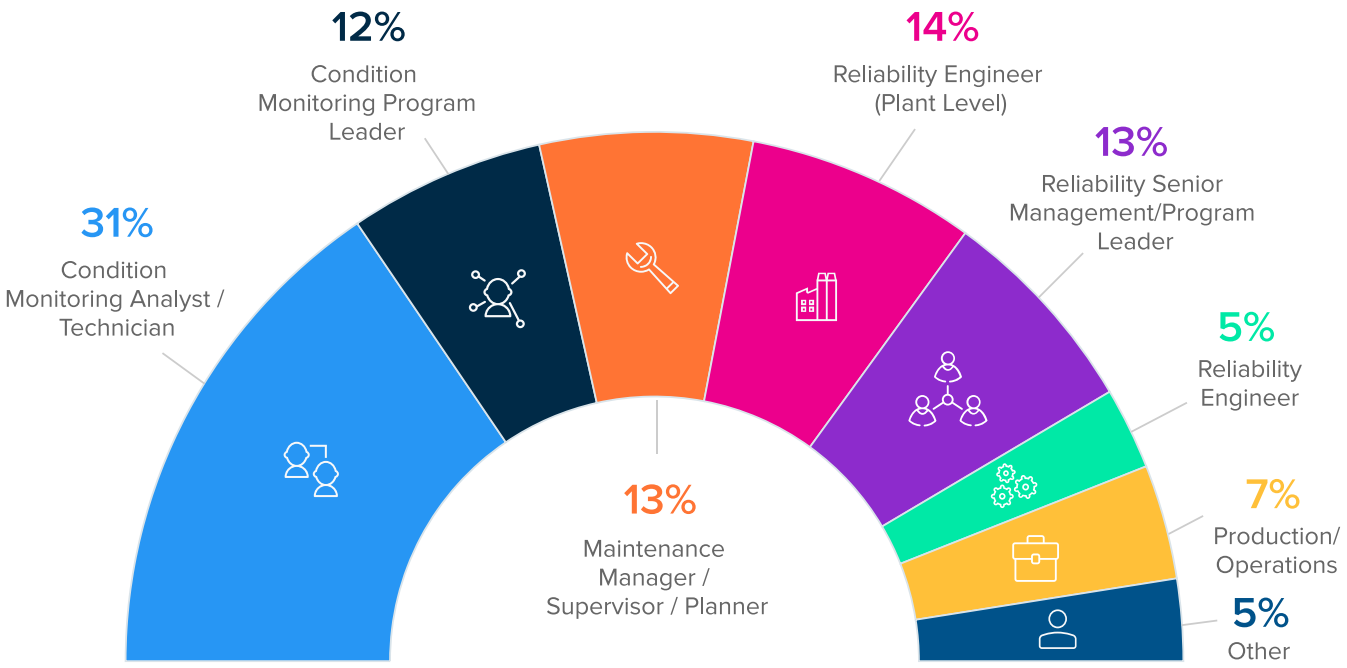
Practitioner responses: 89%
Service Provider responses: 11%

Where in the World do You Work?

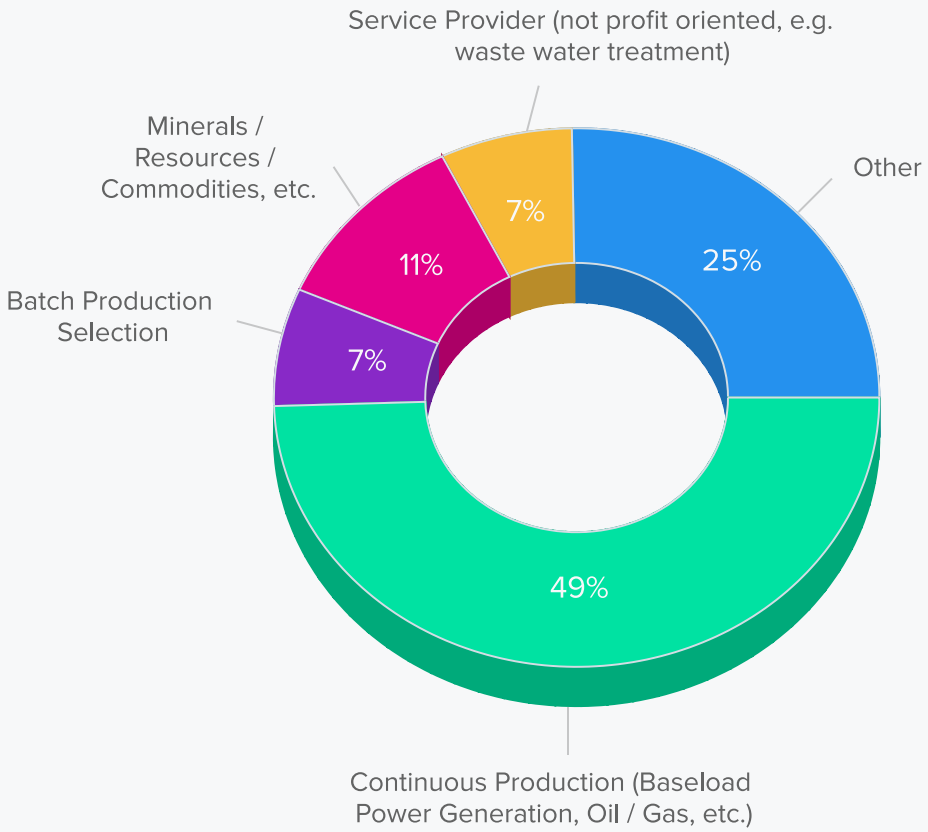




What is Your Role Within Your Company?



What Type of Business Operation Do You Have?



What is Your Company's Ownership Structure?

52% Privately owned
27% Public company (Listed on stock exchange)
10% Government / municipality (e.g. waste water)
7% Co-operative (e.g. owned by a group of farmers)
4% All others

PROGRAM PERFORMANCE RESULTS

This section presents three key performance indicators from the survey: Maintenance Cost as a Percentage of Replacement Asset Value, Asset Availability, and Reactive Maintenance Share of Maintenance Work. Having a low maintenance cost KPI does not guarantee that a program is capable of achieving other upper quartile performance characteristics. Group 1 respondent's maintenance costs are typically less than 5% of replacement asset value while availability is typically greater than 95%.

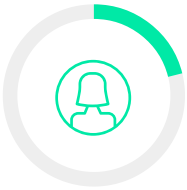
Some programs may cut maintenance costs and see their downtime and reactive maintenance increase. Indeed, the data shows that slightly more than half of the respondents who report first or second quartile maintenance costs, have third and fourth quartile availability. These programs need to spend more on maintenance that is focused on improving availability! As availability improves, the need to spend money on maintenance will decrease.

It is also worth noting that 52% of respondents did not know their maintenance cost performance and 23% did not know their asset availability. This being said, measurement of performance is a critical factor in driving improvement.

How Did Your Reliability Program Get Started?

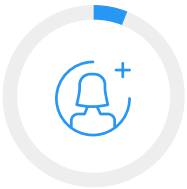
46%

Developed and led completely in-house (optionally with external training)



21%

Led by our personnel with some assistance from consultants



6%

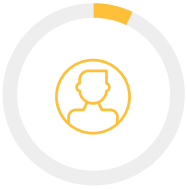
Led by our personnel with significant assistance from consultants

4%

Primarily driven by consultants

15%

We have not started our reliability program



8%

Other

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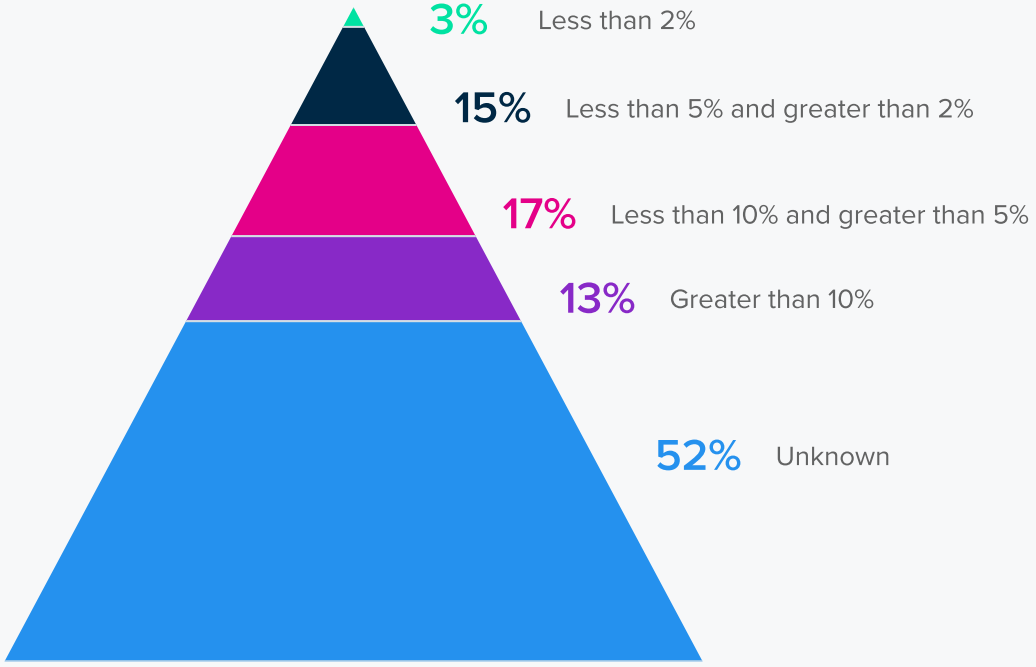
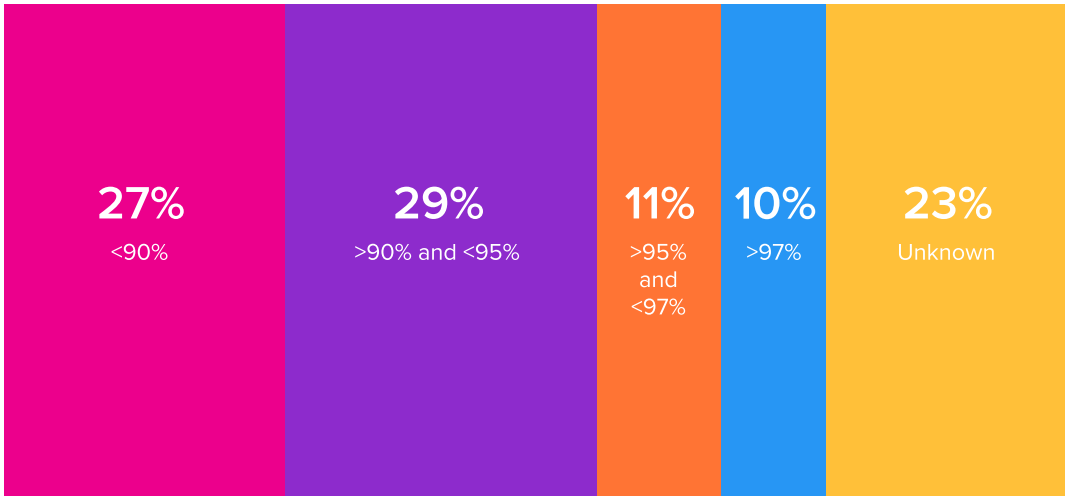
"Group 1 survey participants tended to report much stronger cultural foundations. These programs were also more likely to be self-led."
Contributing Author: Will Goetz, MOBIUS CONNECT

What is Your Maintenance Cost as a Percentage of Replacement Asset Value (RAV)?



What is Your Asset Availability?



How Much Reactive Maintenance Do You Experience?

9% said greater than 80% of maintenance is reactive

13% said greater than 60% and less than 80% of maintenance is reactive

18% said greater than 40% and less than 60% of maintenance is reactive

20% said greater than 20% and less than 40% of maintenance is reactive

18% said greater than 5% and less than 20% of maintenance is reactive

9% Unplanned failure of assets under our asset strategy (PMs and CBM) are rare

3% Unknown

I-care™

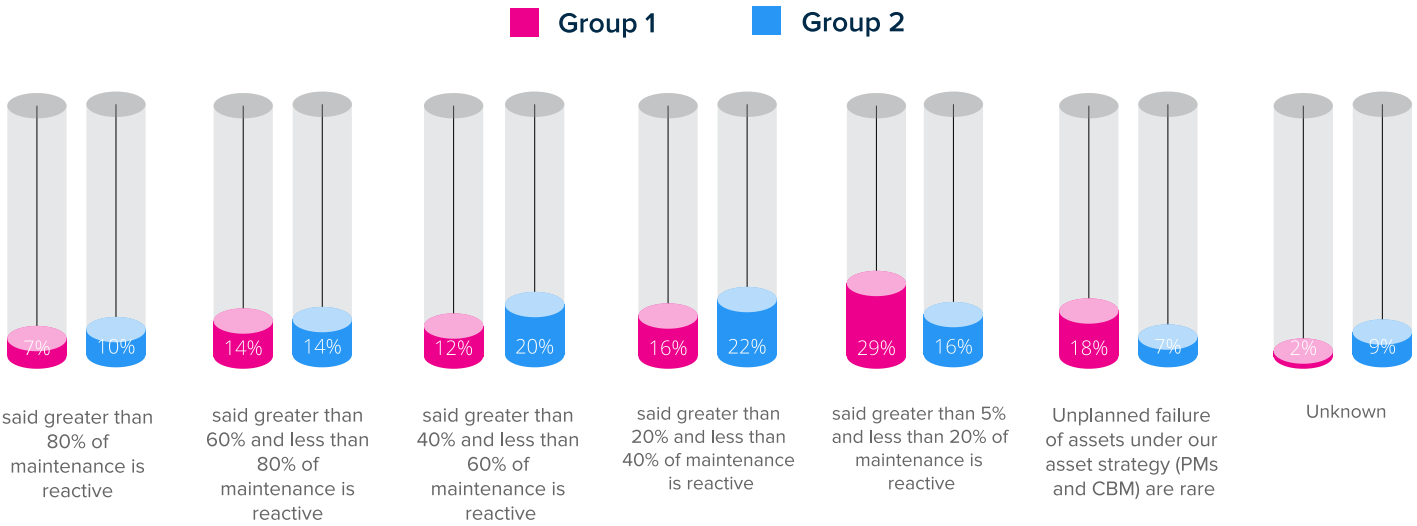
"The challenge that organizations face today when it comes to their reliability-driven maintenance approach is not the technically-driven content, but linking the right competencies to the right assignments.

In order to do this, it is important to think beyond 'just filling in the position'. It's about finding the right balance between the job that needs to be done and the right competencies.

Whether the final result is a manual action or a step towards a more digital, data-driven industry 4.0 solution, a thorough knowledge of asset failure modes and how to solve them is the key to success. We know from experience that deep industry domain knowledge is a distinguishing factor in this"

Thought Leader: Pieter van Camp, I-care Group

How Much Reactive Maintenance Do You Experience?



said greater than 80% of maintenance is reactive

said greater than 60% and less than 80% of maintenance is reactive

said greater than 40% and less than 60% of maintenance is reactive

said greater than 20% and less than 40% of maintenance is reactive

said greater than 5% and less than 20% of maintenance is reactive

Unplanned failure of assets under our asset strategy (PMs and CBM) are rare

Unknown

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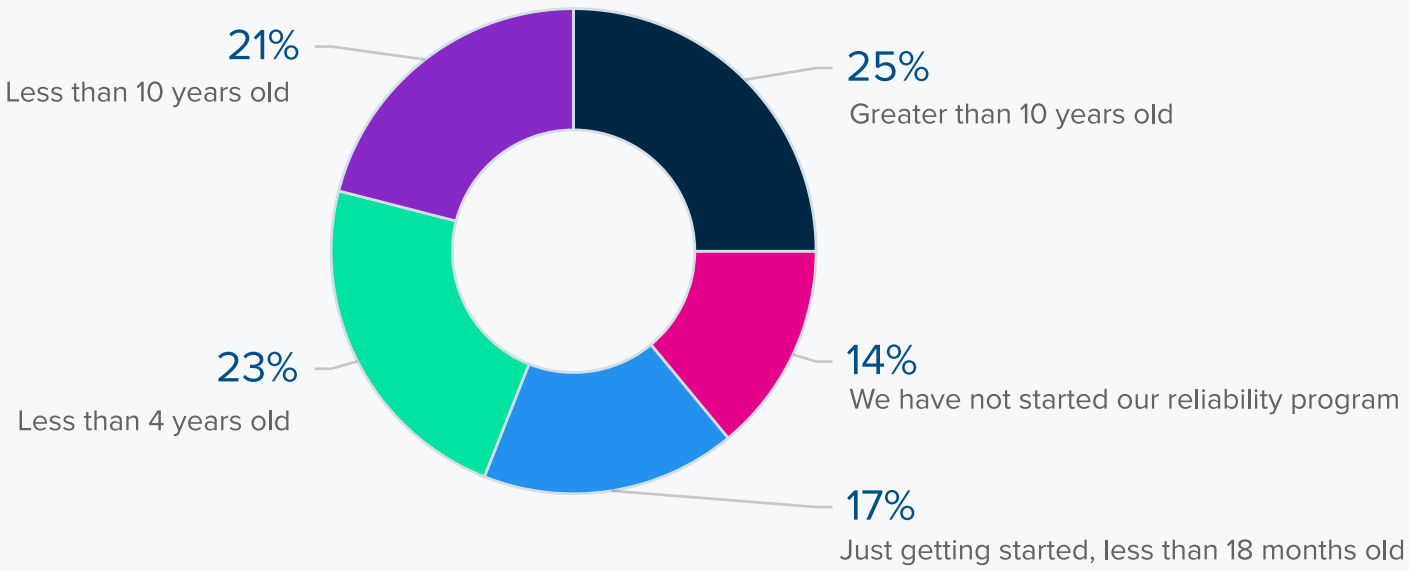
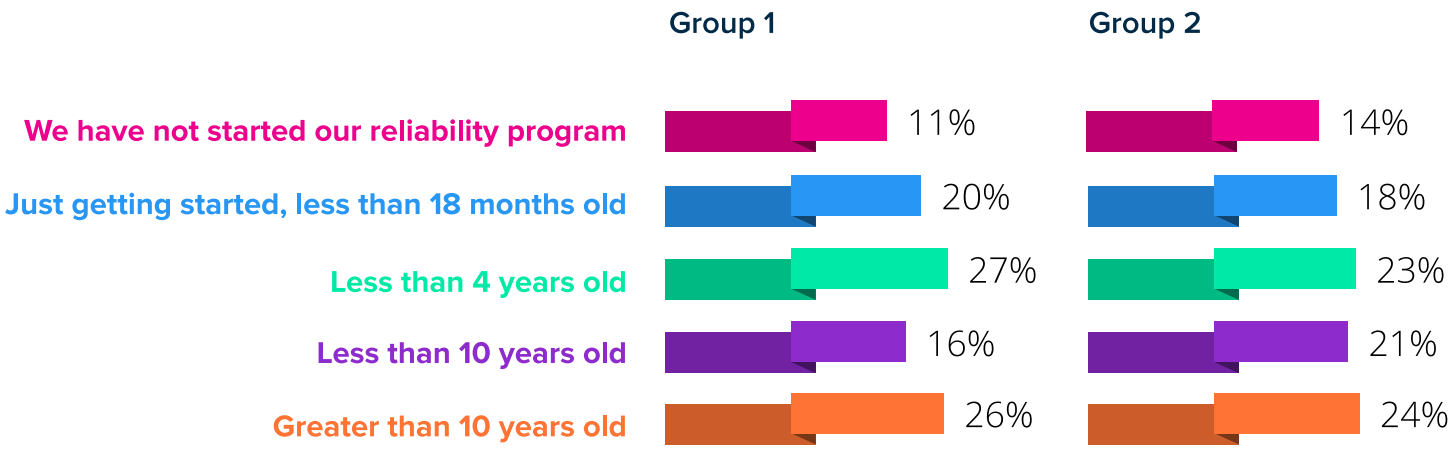
"Forty-seven percent of respondents in the Top group reported reactive maintenance percentages less than 20%. More than half of Top group respondents still had high levels of reactive maintenance. These programs should identify the value of lost availability and develop a business case to invest in proactive maintenance that targets latent problems and prevents unexpected failures."

Contributing Author: Will Goetz, MOBIUS CONNECT

What is the Age of Your Program?



What is the Age of Your Program?



How Important are the Following Factors in Your Reliability Program?

"In this case, the survey respondents in both groups were aligned in their beliefs about the main drivers of their programs. Downtime reduction and safety incident reduction were identified as the two top drivers by both groups, while waste reduction and meeting the requirements of insurance providers were not seen as top drivers."

Contributing Author: Will Goetz, MOBIUS CONNECT

Downtime Reduction

73% Said Very Important

Safety Incident Reduction

69% Said Very Important

Improving Performance (OEE, Production Output, etc.)

64% Said Very Important

Asset Life Extension

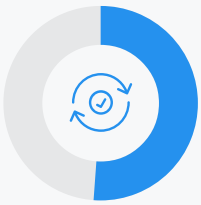
63% Said Very Important

Maintenance Cost Reduction

61% Said Very Important

Environmental Incident Reduction

59% Said Very Important



Quality Improvement

51% Said Very Important

Meeting the Requirements of the Regulators

43% Said Very Important

Meeting the Requirements of the Insurance Providers

33% Said Very Important

Waste Reduction

32% Said Very Important

"The data clearly shows the link between understanding asset condition and reliability improvement. Electric motors are the work horses of industry. Understanding their current condition and the myriad of factors that degrade that condition is knowledge that is pivotal for any reliability program. No matter which of these factors drive your reliability program, electrical testing will provide the data required to achieve success."

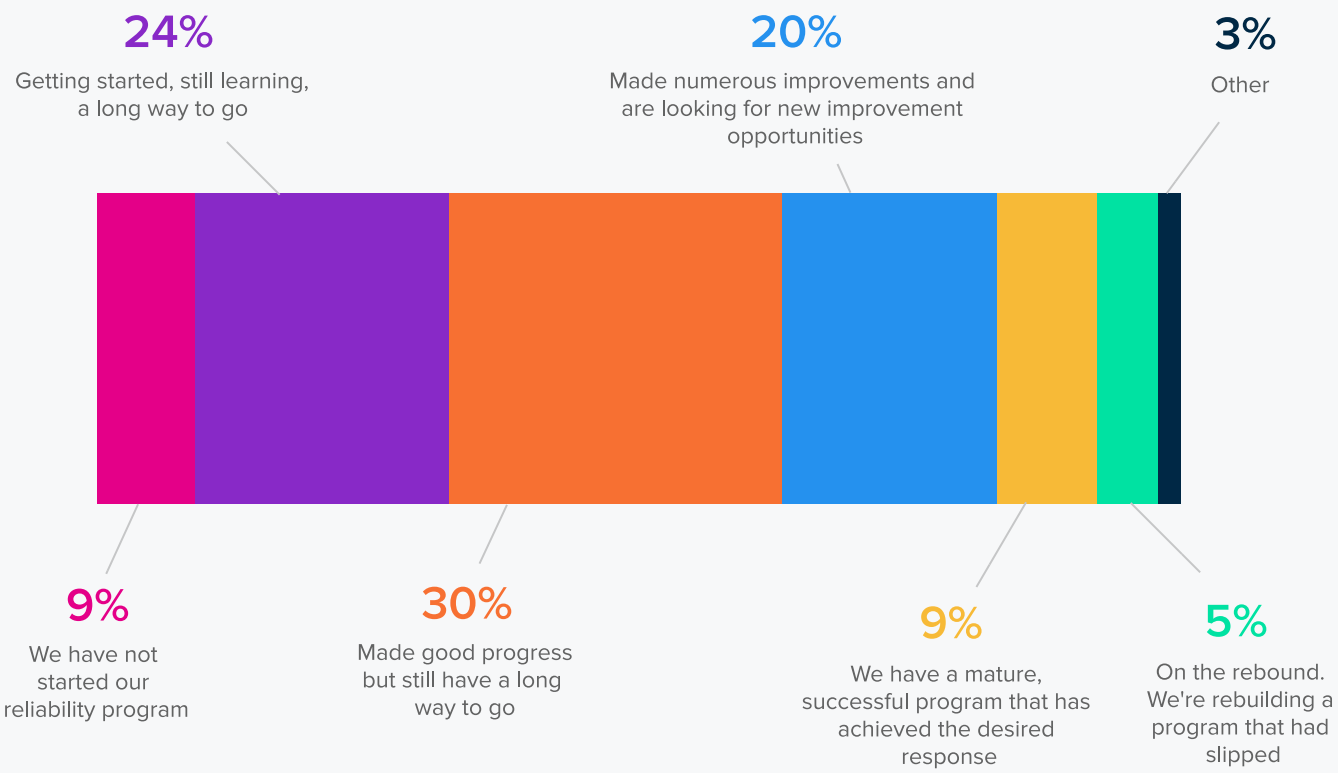
Thought Leader: Drew Norman, Megger Baker Instruments

WHAT DOES MAINTENANCE COST PERFORMANCE TELL US ABOUT THE KEYS TO SUCCESS

This section segments the practitioner survey data into two groups, according to the respondents selection of a maintenance cost as a percentage of replacement value performance level. Those reporting maintenance costs of less than 5% of RAV were grouped in the "Top" category. The remaining respondents are grouped in the "Bottom" category.

The pillars of the proactive maintenance model are clearly demonstrated by Group 1. Downtime, waste reduction, environmental incident and safety incident reduction are significantly stronger drivers in Group 1 respondents. All aspects of the proactive model have higher characterization as 'Strong'. Condition monitoring, planning & scheduling, condition-based maintenance and RCFA clearly stand out to as keys to successful programs.

How Would You Describe the State of Your Program?



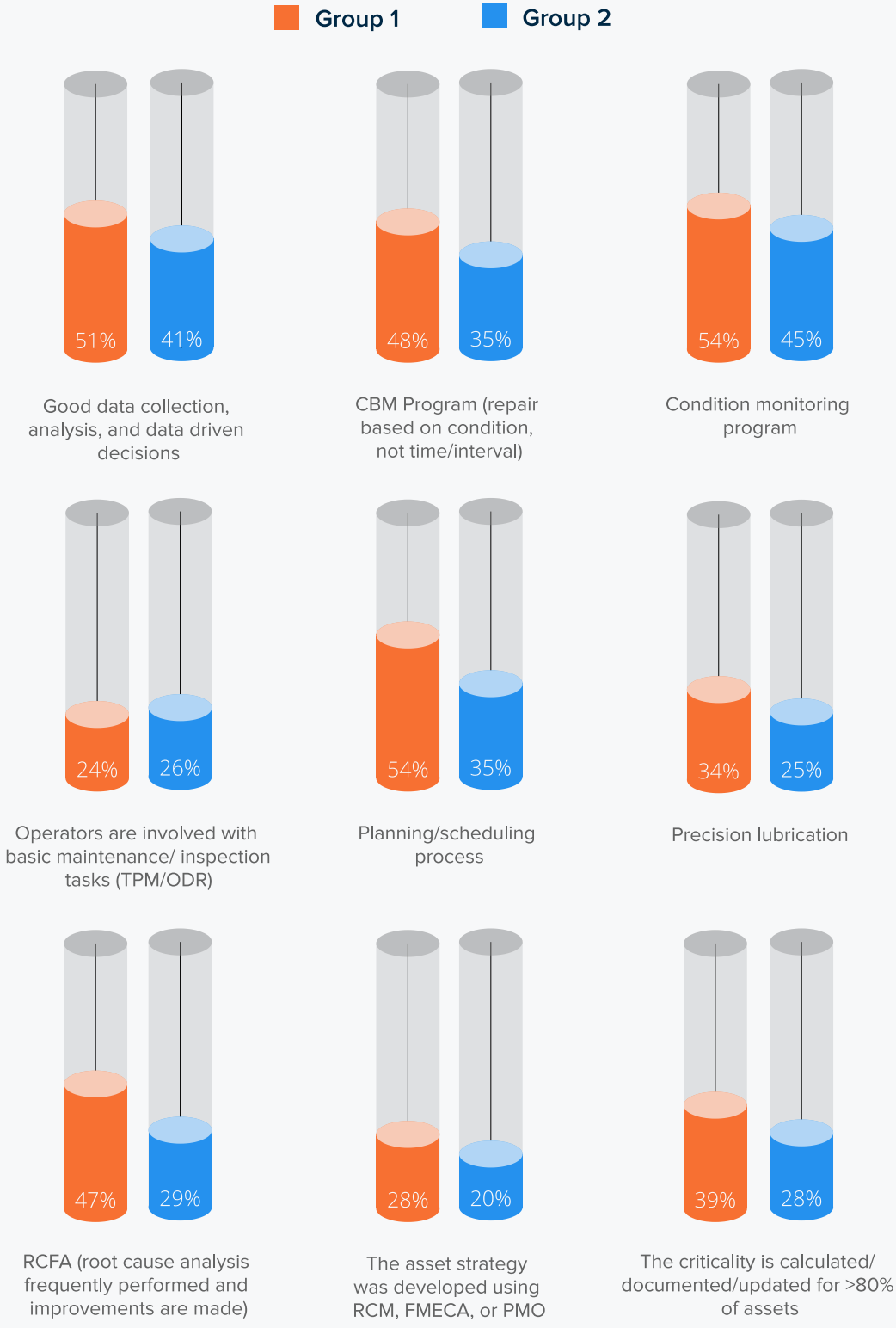
AVT RELIABILITY ...it's in our DNA

MACHINE SENTRY®

"As we enter the third industrial revolution, a better understanding of the drivers of improved reliability combined with the power of digital technology opens opportunities only dreamed of in the past. Turning data in to action will be the key to success for any company's reliability improvement program."

Thought Leader: Frederic Thomas, AVT Reliability®

What is the Current State of Your Program?



AVT RELIABILITY ...it's in our DNA

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"Reliability, as any common objective, requires leadership commitment to be achieved. Great strategies can only be effective if supported by the right culture and executed by empowered and well-trained personnel."

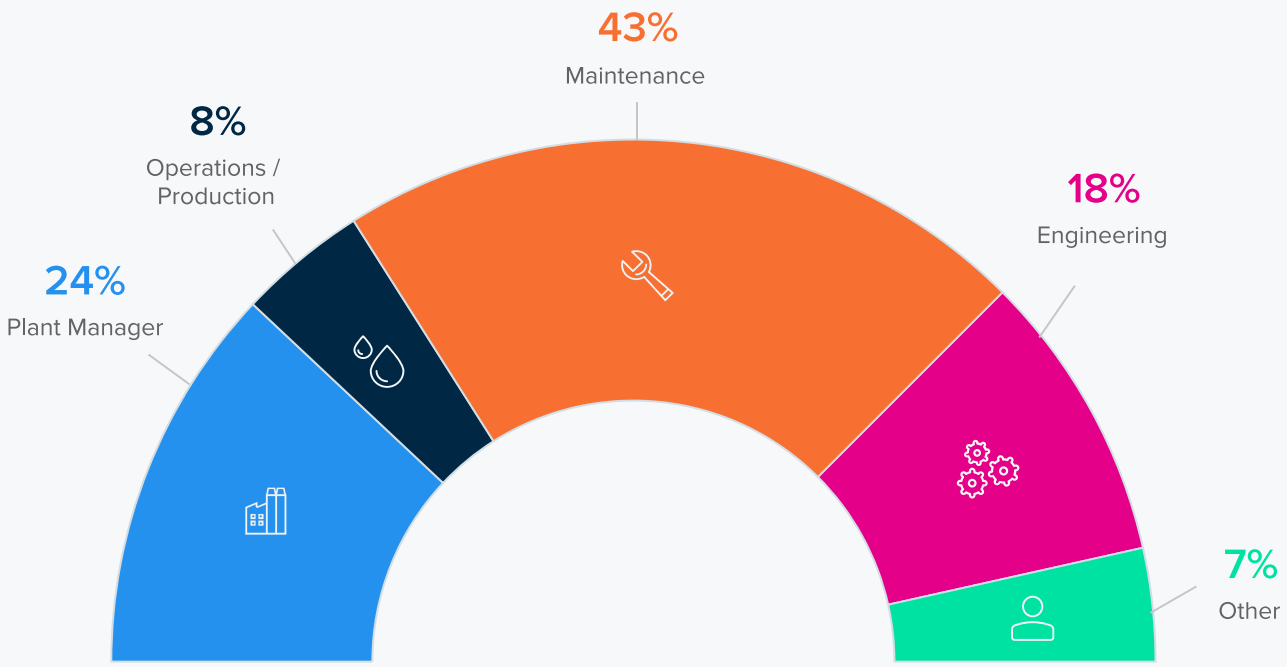
Thought Leader: Geert van Rijswick, Van Geffen

"Reliability should be a common language across all levels and departments..."

JASON TRANTER

CEO and Founder of Mobius Institute

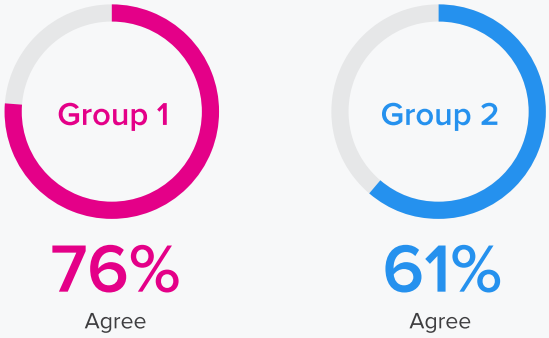
Which Department Does the Reliability Team Report to?



"The majority of survey respondents in both groups report to maintenance. There were slight differences between the two groups here, with Group 2 reporting to operations/production by 5% more than Group 1."

Contributing Author: Will Goetz, MOBIUS CONNECT

Is Reliability a Common Language Across All Departments?



"It is essential that economic benefits of Condition Based Maintenance are highlighted and continuously monitored...Technical KPI's such as Pre-warning and Planning time for the critical production equipment are also important tools when working with continuous improvements. When working on constantly improving the TEEP/OEE it is also important to keep track of and improve the operating condition of machinery.

An efficient approach to this is integrated functionality in the software used for condition monitoring that handles the requirements listed above. Another efficient solution is to have data assessable so it can be used in production and maintenance management software platforms."

Thought Leader: Håkan Hedlund, SPM Instrument

How Would You Assess Your Reliability Culture?

Tell Us About the Involvement of Your Senior Executives and The Business Case for Reliability Improvement

	Group 1	Group 2
Have senior executive support (plant manager and higher)	 39%	 24%
Senior executive actively promotes, reinforces, and drives the program	 28%	 18%
The business case for reliability is known and is reviewed annually	 34%	 22%
Have a "Corporate Sponsor" or a person in a role such as "Corporate Reliability Officer"	 20%	 16%

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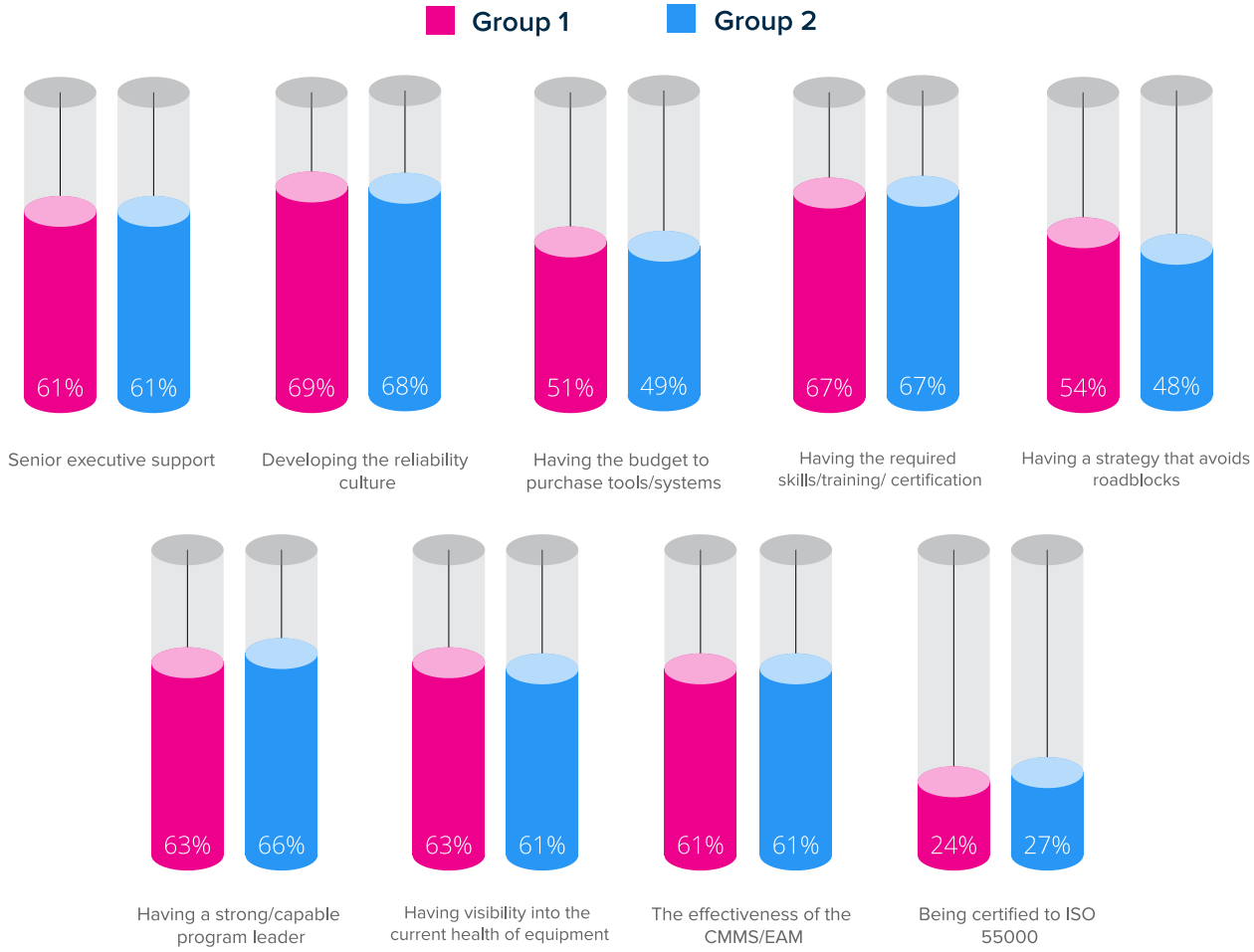
BALANCING - VIBRATION - ONLINE MONITORING - LASER ALIGNMENT - MASTERS OF MACHINE HEALTH

"Achieving world-class reliability requires the right mix of ingredients. Achieving it takes a variety of ingredients that can be different based on the organization. Leadership, communication, culture, quality management, precision skills, and condition monitoring are just a few of the recognized elements...but there are many more.

One of only a few elements in the list of ingredients that is consistently present is the correct implementation of the right predictive and prescriptive analytical tools. After all you cannot improve, what you do not measure."

Thought Leaders: Dr. Thierry Erbessd & Dr. M. David Howard, ERBESSD Instruments

What Do You Believe Drives the Success of Your Program?



CONCLUSION

This report validates many keys to success in reliability improvement... Programs that do not currently emphasize any of these keys should plan to add them soon. These keys include:

A Practitioners with disciplined maintenance practices achieved the best results.

B Programs with a strong proactive culture achieved the best results.

C Planning and scheduling is directly connected to program success.

D Executives are much more likely to know their key performance metrics.

Incorporating these keys into your program may include an update of the business case, an expansion of the program charter and expansion of the program team to include additional groups. These are largely “soft” people and organizational actions rather than “hard” technical tactics, but they are clearly vital to success!

This report also provides empirical confirmation that maintenance cost as a percentage of replacement asset value is not a complete indicator of reliability excellence. Indeed, it is an outcome that demonstrates that when high asset reliability is attained, that is attained efficiently. The high proportion of respondents with low maintenance costs and reactive maintenance tendencies or low availability highlights that many survey respondents will have a strong business case to spend more on maintenance.

RESOURCE GUIDE

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AVT Reliability®, headquartered in Warrington, Cheshire, is a market-leading group of plant reliability specialists, which includes Netherlands-based Van Geffen and AVT Sealing Solutions Inc (SSI) in the USA. With more than 40 years' experience helping companies to improve reliability, it offers a full range of products and services for asset management professionals, including vibration and oil analysis, thermography and ultrasound, as well as training in condition-based maintenance, ultrasound, best engineering practice and asset management. AVT Reliability® is held by Rotherham based AES Engineering Ltd.

www.erbessd-instruments.com

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www.icareweb.com

I-care is a leading global service provider specialized in predictive maintenance and reliability. Headquartered in Belgium, I-care advises its industrial clients on their asset health strategies, helps them implement, embed and maintain those strategies and guides them in the transition to Maintenance 4.0. I-care also helps them collect, organize and analyze data worldwide in order to optimize industrial efficiency.

www.megger.com

For over 40 years Megger Baker Instrument has been the leader in insulation test technologies, developing the most innovative test equipment available. Our focus: helping customers find faulty motors prior to failure ensuring less unscheduled downtime, therefore saving money. The result: the most comprehensive predictive maintenance and motor reconditioning tools for our customers.

Megger Baker's online equipment searches for power, torque, overcurrent's, load, efficiency among other problems. It offers a safe connection at the MCC to quickly determine problems within the motor process.

The offline equipment tests for faults within the windings, coils, or leads. It simulates spikes associated with startup, finding problems above operating voltage.This allows time to repair or replace equipment on your schedule not the machinery's.

www.spminstrument.com

SPM Instrument is a global leader in condition monitoring technology. As a full-range supplier, we exclusively develop and market all the technology to measure, analyze, and present condition data from complex machinery. The power of our innovations – including the ultra-efficient and patented HD measurement technology - enables our customers to tap into the potential of the world's most efficient condition monitoring solutions.

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Industrial Press publishes a vast number of essential resources on maintenance & reliability, quality improvement, leadership, asset management, condition based monitoring, root cause failure analysis and related topics in manufacturing and inventory management for students, practitioners, and seasoned professionals.

https://mobiusconnect.com

MOBIUS CONNECT® is the worldwide customizable online knowledge-sharing community and training conferences for condition monitoring and reliability improvement professionals. The MOBIUS CONNECT platform allows visitors to customize their learning pathway through the CBM CONNECT®, RELIABILITY CONNECT®, CBM CONNECT en Español, and RELIABILITY CONNECT en Español educational websites, private regional groups with COMMUNITY CONNECT™ and hands-on training at the CBM + RELIABILITY CONNECT Live Training Conferences.

www.mobiusinstitute.com

Mobius Institute™ is the worldwide provider of Reliability Improvement, Condition Monitoring and Precision Maintenance education to industrial plant managers, reliability engineers, and condition monitoring technicians, allowing plants to be successful in implementing Reliability Improvement programs through delivery of more easily understandable and comprehensive training of Reliability and Vibration Analysis via public, in-plant and online education programs.

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