

After the Fall

The Costs, Causes & Consequences of Unplanned Downtime

ServiceMax, a PTC Technology





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Foreword

Businesses have always had to tolerate periods of unplanned downtime, leaving companies scrambling to identify the problem, address it as quickly as possible, and then get equipment back up and running. Historically, companies have just had to endure the pain, and try and stay on top of equipment maintenance and service requirements in the hope they can minimise such instances.

But as asset equipment estates continue to proliferate, it's becoming increasingly harder to monitor and address downtime. And as digital transformation sweeps across organizations and customer expectations continue to rise, businesses simply can't afford to be on the back foot.

With numerous equipment assets based either in plants or remotely on customer premises, downtime today means so much more than customer inconvenience. It directly impacts productivity, throughput, profitability and customer attrition.

It's a costly problem that's getting more expensive over time. Back in 2014, Aberdeen estimated the cost of unplanned downtime across all businesses to be \$164,000 an hour. By 2016, that figure had skyrocketed by 60% to \$260,000 an hour.

One of the reasons we decided to commission research into this area is because closing this downtime gap is a fundamental step in an organization's digital maturity, and a core part of their transformation journey. The shift to outcome-based business models, equipment assets becoming more sophisticated and connected, and of course, the pervasive and increasing reliance on machines, are all adding to the pressure to avoid outages. Mitigating downtime is a critical, strategic priority in the digital age.



Cost of Unplanned Downtime

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Thankfully, technology has finally caught up to address the problem. This study gives a global insight into where businesses are investing, their attitudes toward specific digital tools, as well as some unexpected insights into the future potential lessons machines have in managing our own human health.

Introduction: The Digital Back Foot

The management of assets is an ongoing and never-ending struggle for organizations. There are so many different facets and features to successfully maintaining an asset estate that organizations can never take their eye off the ball. One slip-up can cause a potentially catastrophic disaster, or at the very least an episode of unplanned downtime costing vast sums of money and negative brand implications.

For these very reasons it is an absolute necessity for organizations to nullify the problems that they are experiencing. Thus far this has been easier said than done. There is such a raft of potential causes of unplanned downtime that it is almost like needing eyes in the back of your head to solve the problems that arise. Unfortunately, the current approach that organizations are using is possibly part of the problem – with the rapid advancements in technology, a proactive approach is likely to be needed if assets are to be kept up and running and unplanned downtime avoided.

Realistically, the solution needs to be part of a long-term plan and not a short-term fix or companies will continually keep finding themselves on the back foot. More importantly, it is something that can be fixed. In this paper we explore how much of a problem unplanned downtime really is, what organizations are doing to combat their asset performance and downtime issues, and whether digital tools could provide the answers.

Summary of Key Findings

The implications and causes of unplanned downtime are varied and wide-reaching

Hardware (45%) and software (39%) failures/malfunctions are commonly reported causes of unplanned downtime, but user error was also to blame in 19% of episodes

According to the Aberdeen report "Maintaining Virtual System Uptime in Today's Transforming IT Infrastructure" released in February 2016, one hour of unplanned downtime costs organizations \$260,000, on average

Key impacts of unplanned outages include not being able to deliver services to customers (45%) and losing production time on a critical asset (37%)

On average, respondents' organizations have experienced two episodes of unplanned downtime over the past three years

88% believe that their organization could improve when it comes to preventing downtime in general

Organizations are doing their best to solve the issue of downtime, and are planning investment in digital tools to help them along the way

Approaching three quarters (70%) report that achieving zero unplanned downtime is a very high priority for their organization's board, with 20% who say it's the number one priority

Around half of respondents' organizations are planning to invest in digital tools such as a digital twin (55%) and artificial intelligence (50%) within the next three years

81% believe that digital tools can eliminate unplanned downtime

Drivers for this planned investment include the fear of unplanned downtime (42%) and the costs associated with downtime (35%)

There is plenty of room for improvement with regard to asset estate awareness, and the digital industrial journey is not an easy one to navigate

75% of respondents concede that there are gaps in their awareness with regard to when assets are due to be replaced

The machine requesting help by itself is the most commonly (49%) reported capability seen as being useful with regard to managing and maintaining assets

Similar proportions report that they do not have total awareness of when their organization's assets are scheduled in for maintenance (71%) or when they are due to be upgraded (69%)

More than seven in ten (71%) respondents admit that their organization needs help on their digital transformation journey, fearing that they will not be successful if they try to do it themselves

Only 18% of those surveyed believe that their organization is exactly where they need to be, and ahead of their competitors on their digital industrial journey

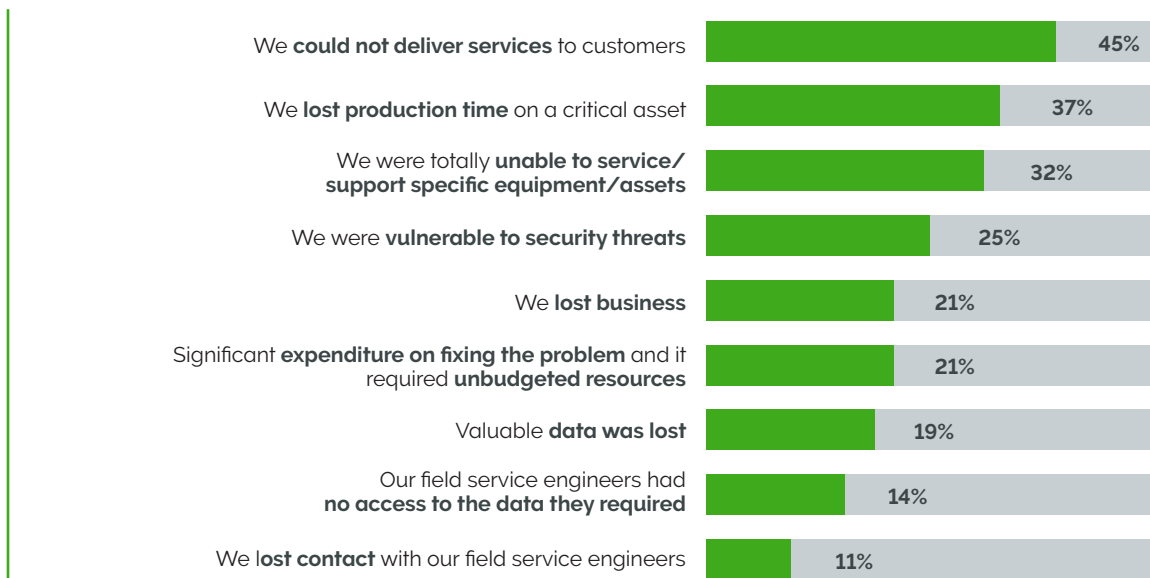
A Common & Costly Problem

Currently unplanned downtime remains an unsolved conundrum, but it is certainly one worth solving. More than eight in ten (82%) surveyed organizations have been impacted by at least one unplanned outage involving their machinery/assets over past three years, but on average, organizations have experienced two episodes during this period. The impacts are both costly and varied, and in some of the surveyed sectors could have seriously dangerous consequences.

It would be wrong to only focus on the financial impacts of such episodes, but the figures are astounding, difficult to ignore and anything other than sustainable. According to figures held by ServiceMax, from the Aberdeen report named "Maintaining Virtual System Uptime in Today's Transforming IT Infrastructure" released in February 2016, the average cost of unplanned downtime is \$260,000, per hour. This number becomes even more eye-watering considering the length of time these outages last – on average, the episodes of unplanned downtime experienced by respondents' organizations over the past three years lasted for four hours. This equates to \$1,040,000 for one downtime outage, on average. But, it was not necessarily just one outage – two episodes have been experienced, on average, meaning this cost can be doubled to \$2,080,000 over the past three years.

Figure 1

IMPACTS OF UNPLANNED DOWNTIME



"What were the impacts to your organization as a result of the unplanned downtime?" asked to respondents whose organization has experienced unplanned downtime over the past three years (490)

And as if the financial consequences aren't concerning enough, there are plenty of issues that stretch further than money. Production/productivity (59%), IT (59%), and customer service (59%) are the most commonly impacted areas in organizations that have been affected by downtime over the last three years, and this is also reflected in the wider organizational impacts. Approaching half (45%) cite not being able to deliver services to customers, while slightly fewer lost production time on a critical asset (37%) or were totally unable to service or support specific equipment and assets (32%).

While these factors all undoubtedly contribute to financial losses, brand image also now comes under threat. Downtime outages must be prevented, if only for the sake of the customer. Almost a quarter (24%) of respondents report that customer/client satisfaction is the number one priority for their organization's board, with a further 48% citing it as a high priority. Common sense suggests that customer loyalty will wane if outages continue to occur. This seems to be understood by respondents, with large proportions (47-59%) across the surveyed sectors believing that their organization would lose the trust of their customers if they were to suffer a high-profile incident. Just as dramatically, if not more so, around one in ten (8-14%) believe that their organization would never recover and ultimately cease to exist from a high-profile disaster.

Unplanned downtime is occurring too frequently to be swept under the carpet – the obvious detrimental financial impacts, coupled with the short and long-term brand implications are key ingredients in a recipe for disaster, all resulting from an event that can be prevented. So what is causing downtime?

Identifying Root Causes

It is fair to say that there are plenty of potential causes of unplanned downtime. For respondents whose organization has experienced an outage in last three years, 45% report that a hardware failure or malfunction played a role in this, while 39% cite a software failure or malfunction. These are not the only concerns though – overload (30%), user error (19%), a security breach (14%), and humidity (11%) have all played their part at some point showing that there are many bases to be covered. Fortunately, in most cases the use of the appropriate tools makes these avoidable.



There is room for improvement regarding preventing downtime in general"

According to the majority (88%) of respondents

However, they will not be avoidable unless improvements are made across the organization. Only 10% of respondents believe that there is no room for improvement in their organization with regard to preventing downtime in general, which is unsurprising considering the regularity with which it occurs. Similarly, one in ten (10%) report no room for improvement in proactively preventing problems with assets. Add to this the 44% who believe there is quite a lot or huge room for improvement in this area, and the question of whether organizations are placing enough focus on eliminating downtime should be asked.

To prevent downtime, you must be able to effectively manage and maintain your assets. At present, this is not happening as readily as it should be, but are organizations about to turn over a new leaf?

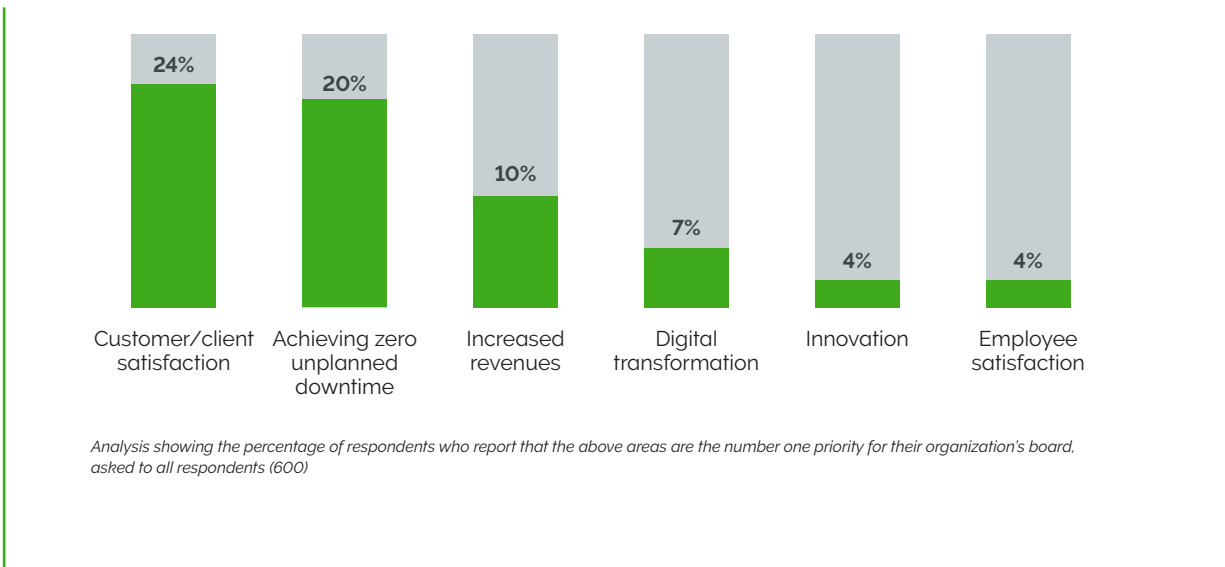
Getting To Zero: Drivers for Zero Unplanned Downtime

The first step in solving a problem is recognizing that there is one. Over eight in ten (85%) respondents are willing to admit that their organization could improve its effectiveness when it comes to asset management. In addition, over two in five (43%) believe that there is quite a lot or huge room for improvement when it comes to preventing downtime in general. A step in the right direction.

On a further positive note, achieving zero unplanned downtime is the number one priority for the board at 20% of respondents' organizations, and a high priority for 50%. Despite all of the other issues, concerns and challenges that boards are dealing with, for one in five, the most important of all of these is how to achieve zero unplanned downtime. It seems enough is enough for board members. They have been stung by unplanned outages too many times now and the risks of not taking action are too great to be ignored. But how do you solve a problem like unplanned downtime?

Figure 2

NUMBER ONE BOARDROOM PRIORITIES



Well, digital tools could go some way to assisting with the problem. The majority (81%) agree that digital tools can actually eliminate unplanned downtime, showing the potentially huge benefit that investment in such tools could have. The umbrella of digital tools is vast though. According to our respondents, the technology known as digital twin could provide a genuine saving grace – of respondents from organizations that have experienced unplanned downtime over the past three years, 92% believe that it is at least a possibility that the use of a digital twin with predictive maintenance capabilities would have prevented the unplanned outage in question. Digital tools are the obvious solution, but digital twin is the real game changer.

And it appears that the potential benefits of a digital twin, and digital tools generally are being acknowledged with plans being put into place to combat downtime. The proportions of respondents' organizations that have already invested in technologies such as machine learning (31%), mobility tools (31%), IoT platforms (26%), artificial intelligence (AI) (20%) and digital twin (18%) are not that overwhelming. However, the promising aspect is that around half are planning to invest in these technologies within the next three years, with 55% reporting that this is the case for digital twin.

Mobility tools and IoT platforms are crucial for successful field service management and asset performance management, which are key elements for preventing downtime. In addition, more advanced technologies such as AI and digital twin can play a direct role in preventing problems from occurring with assets – knowledge or insight into a problem before it occurs can only be positive and helps to move organizations away from a reactive approach and more towards a proactive approach.

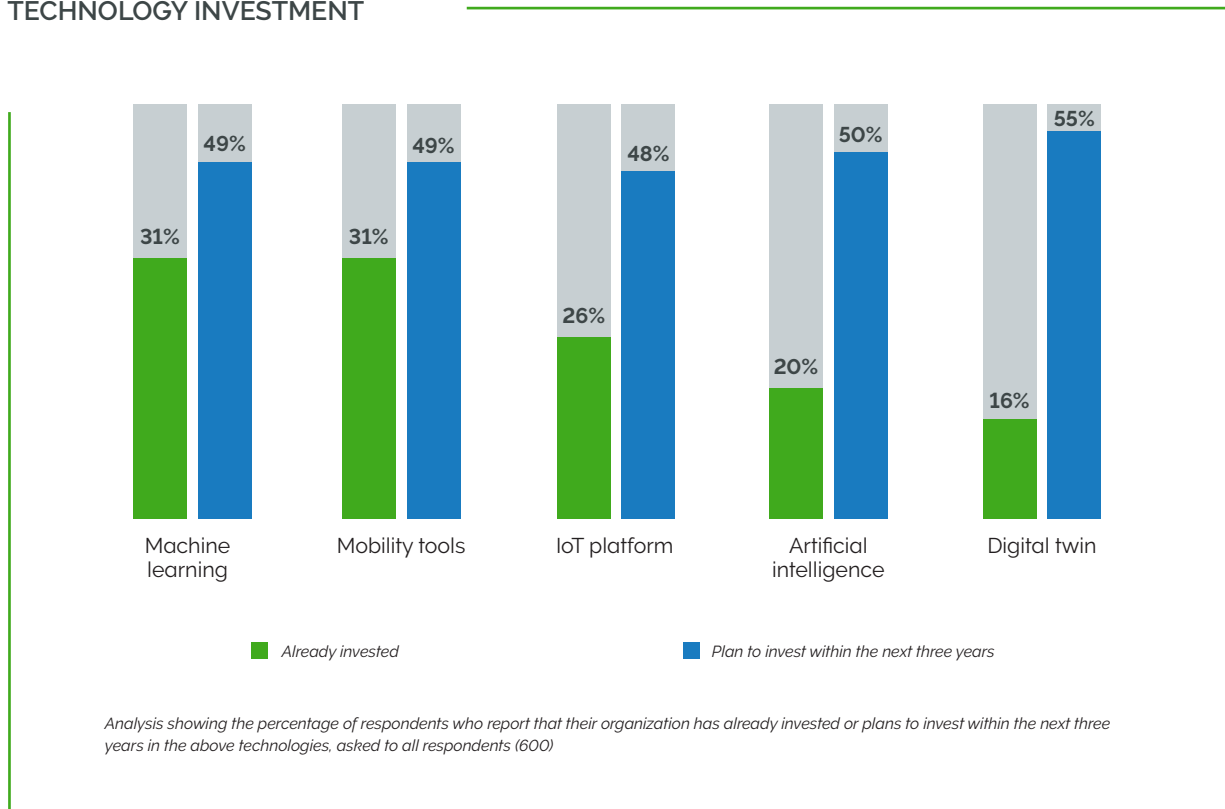
Not only can investment in these types of digital tools change the approach that organizations take to asset management, but they could have wider reaching benefits as well. For respondents whose organization has already invested in or is planning to invest in digital technologies, over half (52%) report that gaining a competitive advantage is a main driver behind this. Further to this, 41% cite increased revenues/profitability as a driver, while 29% focus on the possibility of increasing productivity.

Looking beyond this though, the theme of avoiding unplanned downtime resurfaces. It is clearly front of mind for organizations, with more than four in ten (42%) respondents whose organization has already invested or is planning to invest in digital technologies believing that the fear of unplanned downtime is a key driver behind investment. A similar proportion (35%) cite the costs associated with unplanned downtime as a main driver – understandably so considering the vast sums of money previously mentioned.

However, these digital tools do not only have their useful applications in the workplace, but can be utilized in wider society as well. Three quarters (75%) of those surveyed agree that within the next three years the technology for monitoring asset performance will be better than the technology for monitoring human health. Technology advancements provide an endless raft of possibilities, some of which are already leading the way when it comes to keeping humans fit and healthy.

Figure 3

TECHNOLOGY INVESTMENT





High Levels of Asset Estate Ignorance & Poor Levels of Insight

The asset estate of an organization is crucial to manage and maintain effectively to prevent downtime, and currently it looks like this is more of a struggle than it needs to be. Only around three in ten surveyed decision makers report that they have total awareness of when their organization's assets are due to be upgraded (31%) or when they are scheduled in for maintenance (29%). Fewer still (25%) have total awareness over when assets are due to be replaced, leaving organizations in a precarious position.

This poor visibility into the asset estate must be rectified if there is any hope of achieving the goal of zero unplanned downtime. A more holistic approach is required, meaning that levels of awareness over individual aspects of the asset estate from those responsible and those involved need to increase. Otherwise organizations can wave goodbye to their objective of eliminating downtime and quite possibly the trust of their customers and clients as a result.

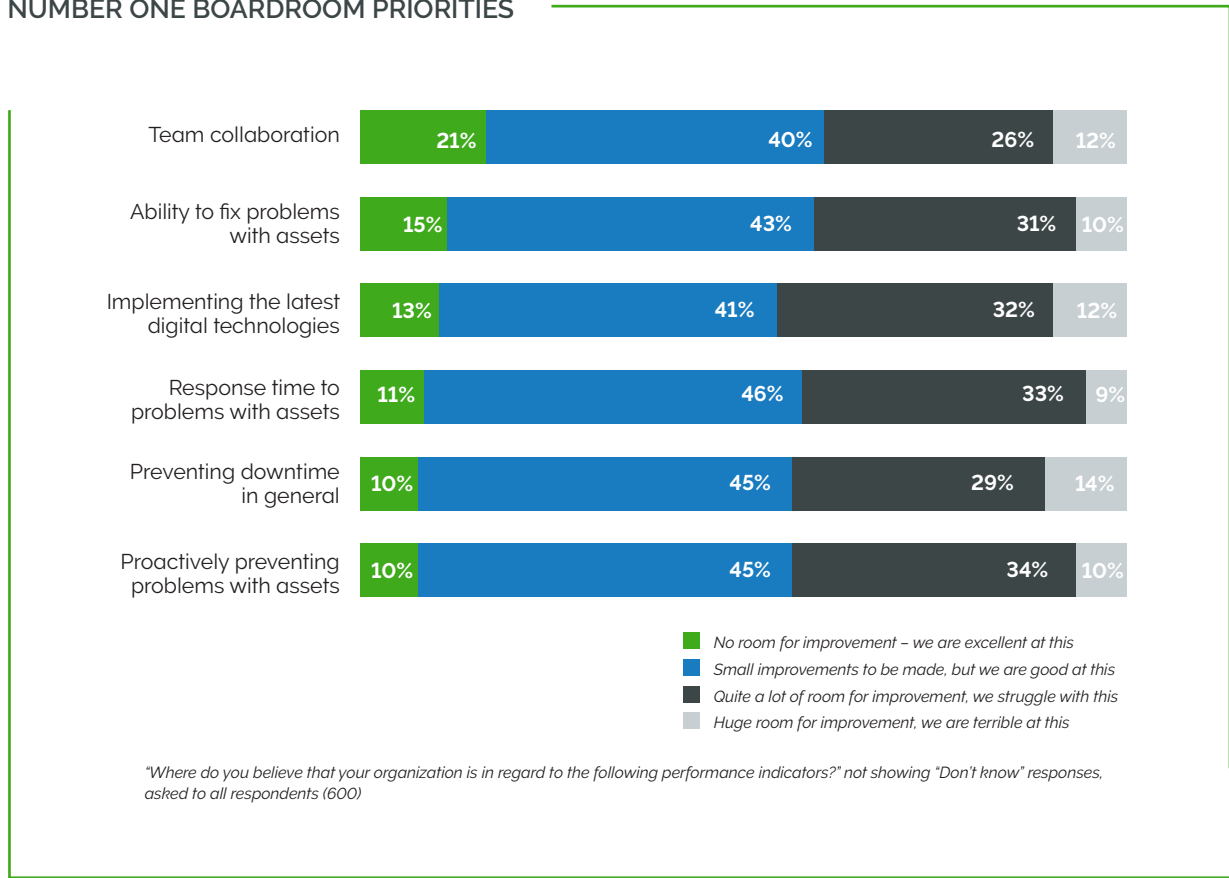
And the problems surrounding assets do not end at less than perfect levels of awareness. Under two in ten (15%) report that there is no room for improvement when it comes to their organization's ability to fix problems with assets, while approaching treble this (41%) believe that there is quite a lot or huge room for improvement in this area. So not only do organizations lack visibility into when problems might arise they also struggle when these problems do arise to correct them quickly and efficiently – this would explain why, on average, it took organizations four hours to resolve the issue(s) when unplanned outages have occurred over the past three years.

However, yet again, there is light at the end of the tunnel. The problems are being acknowledged and investment is on the way. Less than a third of organizations have already invested in field service management software (32%) or asset performance management software (30%) which could explain the issues outlined, but, around half are planning to invest in these technologies within the next three years (50% and 51% respectively).

Similarly to the aforementioned digital technologies, this investment is not one dimensional, with respondents predicting that field service management will become a primary revenue driver for their organization in just over two years' time, on average.

It appears that organizations are really beginning to understand that investment is required if they are to improve asset visibility, help themselves in their fight against downtime, and drive revenue.

Figure 4
NUMBER ONE BOARDROOM PRIORITIES



Modern Prevention – A Critical Part of the Digital Journey

The successful management and maintenance of the asset estate is, without a doubt, crucial to the effective running of a business. Organizations need to find a method or a technology that can support them with such a complex task, and there are several features seen as being useful in regard to this.

Almost half (49%) of respondents believe that the machine requesting help by itself would be useful to their organization regarding managing and maintaining their assets. In addition, more than four in ten cite various other capabilities such as field service engineers being able to utilize historical data about an asset (45%) and the ability to upload or download information from the device or asset (41%). Being able to predict failures using predictive maintenance is also a desirable capability reported by 40% of those surveyed. This range of features shows that organizations are currently struggling with the management and maintenance of their assets, and they are screaming out for a solution to the issues that they experience.

Digital twin technology has the potential to solve so many of the problems that organizations experience regarding their assets because it contains all of the aforementioned capabilities regarded as useful. Not only that, but digital twin is considered as something of a savior in another related area as well. Just under eight in ten (79%) of those surveyed believe that using a digital twin would help drive their organization towards their goal of eliminating unplanned downtime – a positive side effect of successfully managing and maintaining the asset estate.

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Using a digital twin would help drive my organization towards our goal of eliminating unplanned downtime”

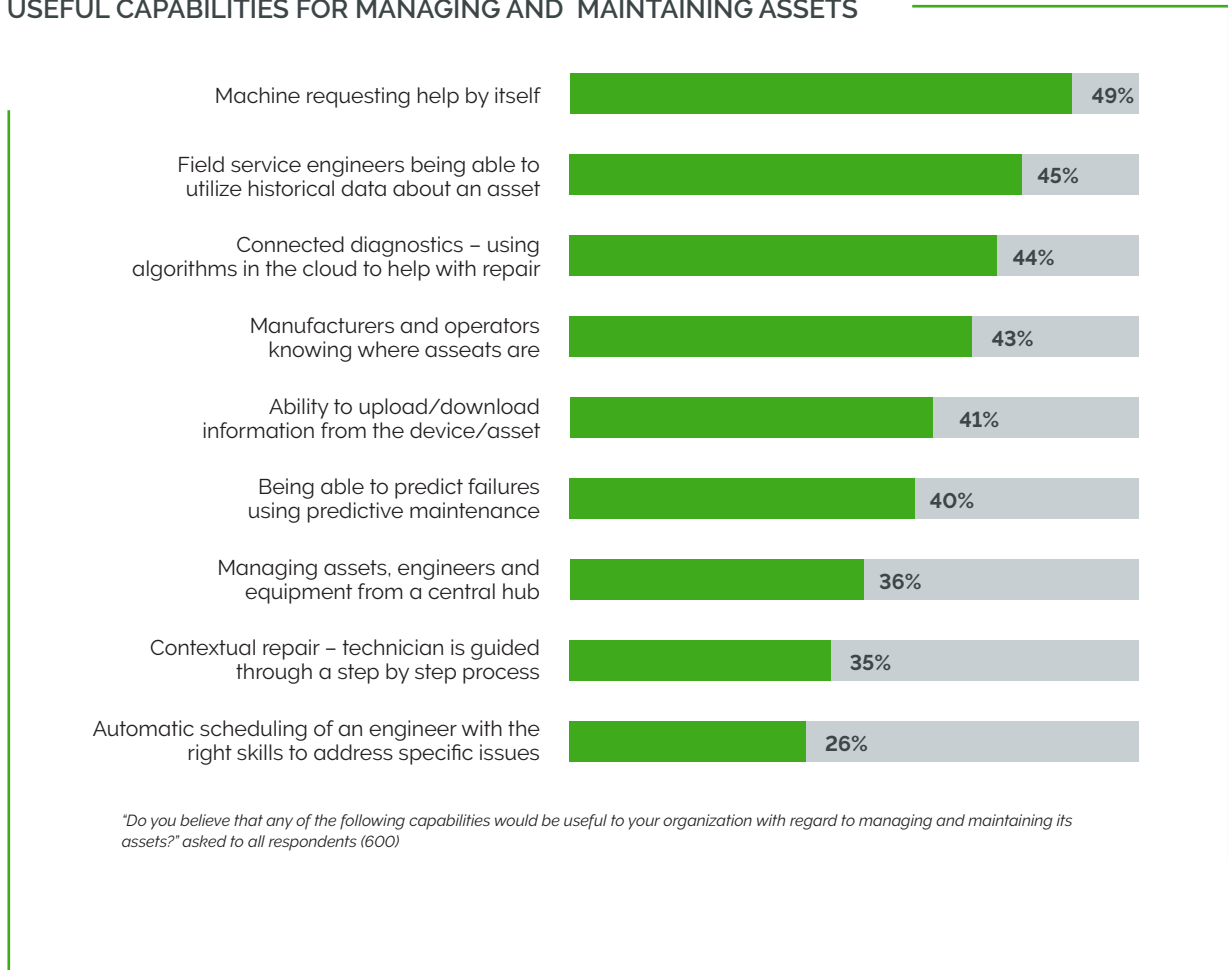
Agree 79% of surveyed decision makers

Furthermore, a digital twin with predictive maintenance capabilities is the type of technology second most commonly (45%) thought of as being able to prevent high profile incidents - just behind AI (47%). All of this combined together demonstrates that digital twin technology has too many benefits to ignore – effectively managing and maintaining the asset estate, eliminating downtime, and preventing a high profile incident are all intrinsically linked high priority areas for organizations. The solution is available, it is time to utilize it.

There is also a clear positive attitude towards the potential of digital twin technology in the wider world. Just over seven in ten (71%) would like their health services to offer them a 'digital twin' so that they and medical professionals can regulate their health without the need for any invasion. This displays a clear understanding that this type of technology can accurately predict and prevent failures in the workplace, which is something that would clearly benefit human health as well – the possibilities are endless.

Figure 5

USEFUL CAPABILITIES FOR MANAGING AND MAINTAINING ASSETS



Progressing the Digital Industrial Journey

The asset estate and the downtime battle are not the only issues that organizations are contending with. They are also trying to take steps along their digital industrial journey, which is proving difficult for some. Only 18% believe that their organization is exactly where they need to be and ahead of their competitors, and just under eight in ten (79%) report that they are somewhere along their journey. If organizations are to remain relevant in their sector, then they will need to take action.

For this very reason, it is no surprise that 58% of those surveyed cite digital transformation as the number one priority or a high priority for the board at their organization, and a slightly smaller proportion (52%) believe the same about innovation. Organizations are clearly recognizing the need for change and that digital initiatives, including the use of new and innovative technologies, are among the keys to success.

More specific drivers for organizations in prioritizing digital industrial transformation include optimizing processes (47%), better utilization of the data that they collect in order to help improve organization-wide performance (43%), and increasing revenues (48%). The prioritization of digital industrial transformation can also impact upon other high-ranking objectives, and this is evident from the 37% of respondents citing eliminating downtime as an internal driver and the large proportions who report meeting customer expectations (59%) and improving customer experience (52%) as external drivers. The benefits of digital industrial transformation are wide-ranging, and are intrinsically linked with other objectives, illustrating the importance of such changes.

However, these benefits will not be witnessed unless improvements are made across various elements of digital industrial transformation. And it seems that there are a lot of improvements to be made – around four in ten respondents admit that there is quite a lot or huge room for improvement when it comes to areas such as real-time updates (39%) and analytics (39%), while slightly fewer report the same for organization wide connectivity (34%).



We need help on our digital transformation journey as we will not be successful if we try to do it ourselves"

Admit more than seven in ten (71%) respondents

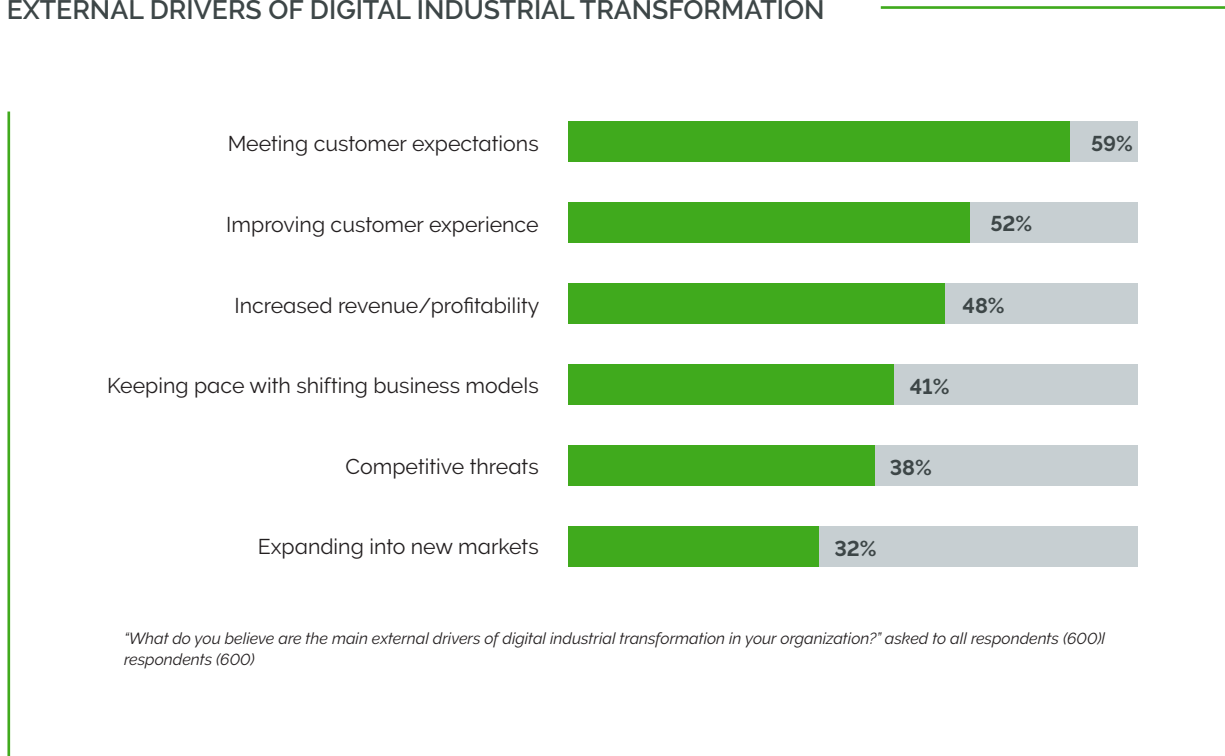
Surely the potential benefits of such transformation must outweigh the fears around security (45%) and disruption to business (30%) cited by respondents as being barriers. This process has to become part of the long term vision for organizations, if it isn't already, and they must begin to realize that other organizations across all sectors are undertaking this process. The harsh reality is that it is a case of keep up or get left behind.

Fortunately, there are plenty of service providers capable of providing support with such a process, and this third-party support is clearly going to be required. More than seven in ten (71%) respondents believe that their organization needs help on their digital transformation journey as they will not be successful if they try to do it themselves. In a similar vein, 88% of those who report that their organization is investing in or planning to invest in digital technologies, believe that they will need to outsource the design and implementation of these technologies.

This demonstrates that the process of digital transformation and the investment in digital technologies that goes hand in hand with it is beyond a tipping point. Without the appropriate support and advice from third party providers, digital transformation could become a real problem for organizations. It is a process that must be undertaken in order to modernize processes and keep pace with competitors, but it is also a process that if carried out incorrectly could see some organizations fall by the wayside.

Figure 6

EXTERNAL DRIVERS OF DIGITAL INDUSTRIAL TRANSFORMATION





Conclusion

Unplanned downtime and asset performance management are problems that have caused a great deal of operational and financial pain to organizations for many years. Managing and maintaining equipment assets is a 24/7 job but a reactive approach is not the answer and does not factor into a digital model of business. This must change and is likely to be a contributing factor to the regularity with which organizations have experienced unplanned downtime over the last three years. If a more predictive, proactive approach were to be taken then these problems would at least be reduced, and might disappear completely. The answer is of course to invest in digital technologies that can assist with the effective management and maintenance of assets and catch potential issues before they become a problem.

Organizations have begun to understand that investment is going to be necessary with many planning to invest over the next three years. Technologies such as a field service management, asset performance management, analytics and digital twin technology can bring a proactive approach to an organization, with the ability to predict failures before they occur and request help before an incident or outage occurs. There is clearly light at the end of the tunnel, and it is getting brighter. Investment in these types of digital tools will empower service teams, help mitigate risk for outcome-based business models, accelerate digital transformation across the business, and ultimately help organizations to eliminate unplanned downtime.

Research Methodology & Scope

ServiceMax commissioned independent market research specialist Vanson Bourne to undertake the research upon which this whitepaper is based. A total of 600 IT and field service decision makers with a responsibility for and involvement in field service management in their organization were interviewed from July to October 2017. All respondents came from organizations with 250 or more employees across the manufacturing, medical, oil and gas, energy and utilities, telecoms, and distribution, logistics and transport sectors, among others. The research included 100 respondents in the UK, 100 in France, 100 in Germany, 150 in the United States, 50 in Turkey, 50 in Saudi Arabia and 50 in the UAE.

The interviews were conducted using online interviewing, all of which were undertaken using a rigorous multi-level screening process to ensure that only suitable candidates were given the opportunity to participate. Unless otherwise indicated, the results discussed are based on the total sample.

The research aimed to identify, assess and investigate the following:

- The consequences and causes of unplanned downtime
- Whether digital technologies can help to prevent unplanned outages, and if they can have a wider impact on society
- Future investment plans for new and innovative digital technologies
- Performance levels of respondents' organizations regarding their asset estate
- How organizations are getting on in terms of their digital industrial journey

About ServiceMax, a PTC Technology

ServiceMax's mission is to help customers keep the world running with asset-centric field service management software. As the recognized leader in this space, ServiceMax's mobile apps and cloud-based software provide a complete view of assets to field service teams. By optimizing field service operations, customers across all industries can better manage the complexities of service, support faster growth and run more profitable, outcome-centric businesses. For more information, visit www.servicemax.com.

About Vanson Bourne

Vanson Bourne is an independent specialist in market research for the technology sector. Our reputation for robust and credible research-based analysis, is founded upon rigorous research principles and our ability to seek the opinions of senior decision makers across technical and business functions, in all business sectors and all major markets. For more information, visit www.vansonbourne.com.



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