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After the Fall:

The Costs, Causes & Consequences of Unplanned Downtime

Vanson Bourne and ServiceMax, a GE Digital company

GE Digital

ServiceMax
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Contents

Foreword 3

Summary of Key Findings 3

Introduction: The Digital Back Foot 4

A Common and Costly Problem 5

Identifying Root Causes 6

Getting To Zero: Drivers for Zero Unplanned Downtime 7

High Levels of Asset Estate Ignorance & Poor Levels of Insight 9

Modern Prevention – A Critical Part of the Digital Journey 10

Progressing the Digital Industrial Journey 11

Conclusion 13

Research Methodology & Scope 13

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 organisations 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 organisation'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.

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.

Summary of Key Findings

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

- On average, respondents' organisations have experienced two episodes of unplanned downtime over the past three years
- 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 organisations $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%)
- 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
- 88% believe that their organisation could improve when it comes to preventing downtime in general

Organisations 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 organisation's board, with 20% who say it's the number one priority
- 81% believe that digital tools can eliminate unplanned downtime
- Around half of respondents' organisations are planning to invest in digital tools such as a digital twin (55%) and artificial intelligence (50%) within the next three years

- 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
- Similar proportions report that they do not have total awareness of when their organisation's assets are scheduled in for maintenance (71%) or when they are due to be upgraded (69%)
- The machine requesting help by itself is the most commonly (49%) reported capability seen as being useful with regard to managing and maintaining assets
- Only 18% of those surveyed believe that their organisation is exactly where they need to be, and ahead of their competitors on their digital industrial journey
- More than seven in ten (71%) respondents admit that their organisation needs help on their digital transformation journey, fearing that they will not be successful if they try to do it themselves

Introduction: The Digital Back Foot

The management of assets is an ongoing and never-ending struggle for organisations. There are so many different facets and features to successfully maintaining an asset estate that organisations 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 organisations 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 organisations 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 organisations are doing to combat their asset performance and downtime issues, and whether digital tools could provide the answers.

A Common and Costly Problem

Currently unplanned downtime remains an unsolved conundrum, but it is certainly one worth solving. More than eight in ten (82%) surveyed organisations have been impacted by at least one unplanned outage involving their machinery/assets over past three years, but on average, organisations 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' organisations 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.

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 organisations that have been affected by downtime over the last three years, and this is also reflected in the wider organisational 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%).

Impacts of unplanned downtime

Figure 1: "What were the impacts to your organisation as a result of the unplanned downtime?" *asked to respondents whose organisation has experienced unplanned downtime over the past three years (490)*

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 organisation'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 organisation 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 organisation 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 organisation 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 organisation. Only 10% of respondents believe that there is no room for improvement in their organisation 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 organisations 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 organisations about to turn over a new leaf?

Getting To Zero: Drivers for Zero Unplanned Downtime

The first step in solving a problem is recognising that there is one. Over eight in ten (85%) respondents are willing to admit that their organisation 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.

Number one boardroom priorities

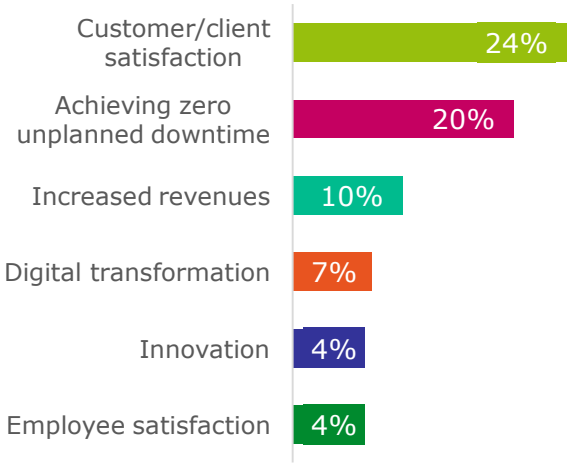


Figure 2: *Analysis showing the percentage of respondents who report that the above areas are the number one priority for their organisation's board, asked to all respondents (600)*

On a further positive note, achieving zero unplanned downtime is the number one priority for the board at 20% of respondents' organisations, 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?

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 organisations 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' organisations 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.

"Digital tools can eliminate unplanned downtime"

According to 81% of respondents

Technology investment

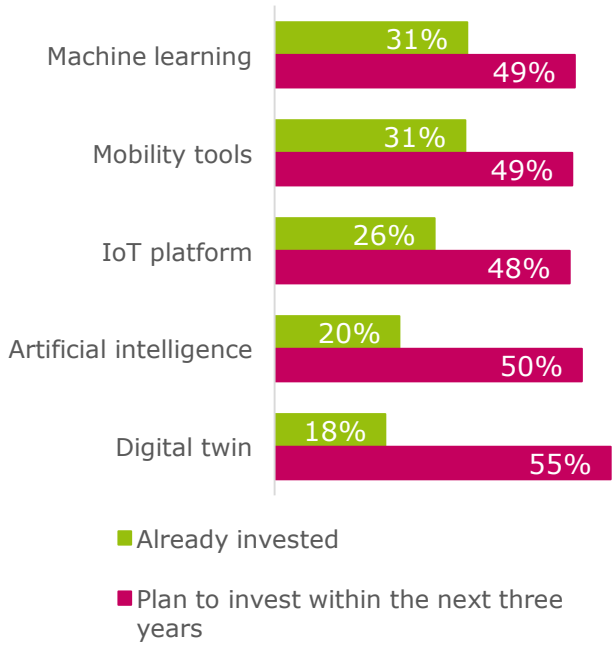


Figure 3: *Analysis showing the percentage of respondents who report that their organisation has already invested or plans to invest within the next three years in the above technologies, asked to all respondents (600)*

Looking beyond this though, the theme of avoiding unplanned downtime resurfaces. It is clearly front of mind for organisations, with more than four in ten (42%) respondents whose organisation 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 utilised 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.

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 organisations away from a reactive approach and more towards a proactive approach.

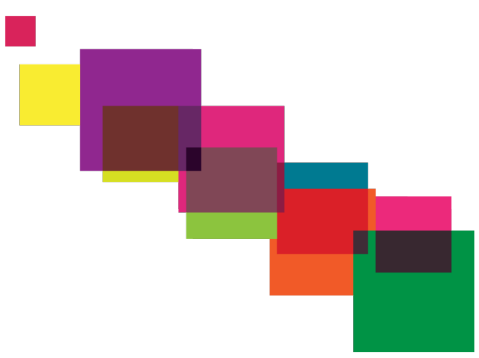
Not only can investment in these types of digital tools change the approach that organisations take to asset management, but they could have wider reaching benefits as well. For respondents whose organisation has already invested in or is planning to invest in digital technologies, over half (52%) report 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.

High Levels of Asset Estate Ignorance & Poor Levels of Insight

The asset estate of an organisation 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 organisation'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 organisations 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 organisations 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 organisation'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 organisations 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 organisations four hours to resolve the issue(s) when unplanned outages have occurred over the past three years.



Performance indicators

Figure 4: "Where do you believe that your organisation is in regard to the following performance indicators?" *not showing "Don't know" responses, asked to all respondents (600)*

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 organisations 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 organisation in just over two years' time, on average.

It appears that organisations 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.

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. Organisations 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 organisation 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 utilise 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 organisations 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.

"The machine requesting help by itself would be useful for managing and maintaining our assets"

Report 49% of respondents

Useful capabilities for managing and maintaining assets

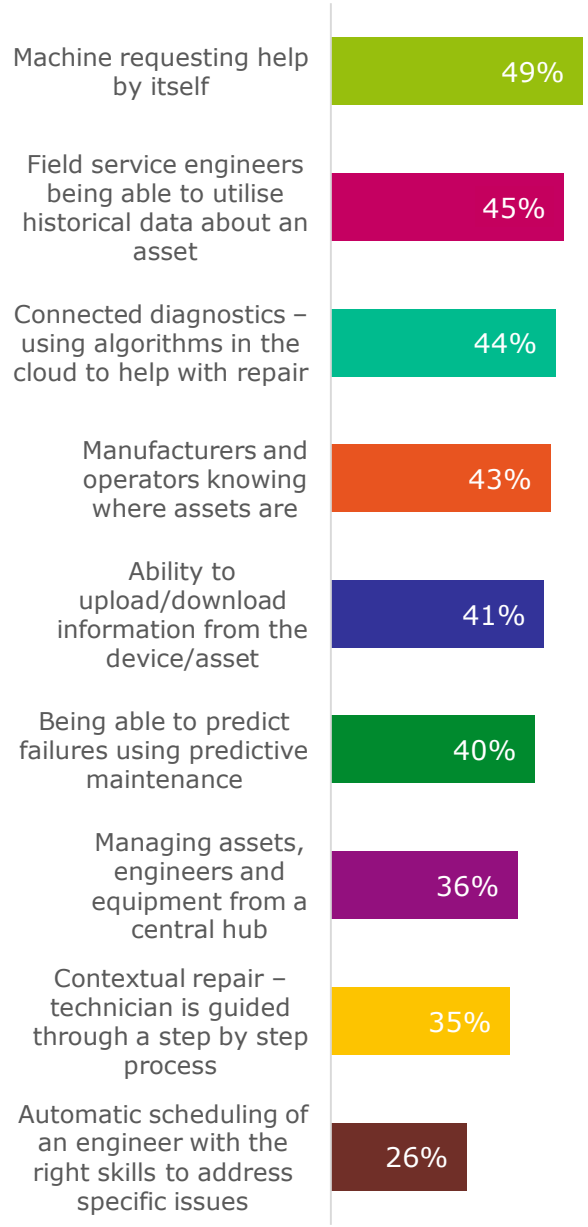


Figure 5: "Do you believe that any of the following capabilities would be useful to your organisation with regard to managing and maintaining its assets?" *asked to all respondents (600)*

Digital twin technology has the potential to solve so many of the problems that organisations 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 saviour 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 organisation towards their goal of eliminating unplanned downtime – a positive side effect of successfully managing and maintaining the asset estate.

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 organisations. The solution is available, it is time to utilise 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.

"Using a digital twin would help drive my organisation towards our goal of eliminating unplanned downtime"

Agree 79% of surveyed decision makers

Progressing the Digital Industrial Journey

The asset estate and the downtime battle are not the only issues that organisations 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 organisation 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 organisations 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 organisation, and a slightly smaller proportion (52%) believe the same about innovation. Organisations are clearly recognising 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 organisations in prioritising digital industrial transformation include optimising processes (47%), better utilisation of the data that they collect in order to help improve organisation-wide performance (43%), and increasing revenues (48%). The prioritisation 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.

External drivers of digital industrial transformation

Figure 6: "What do you believe are the main external drivers of digital industrial transformation in your organisation?" *asked to all respondents (600)*

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 organisation wide connectivity (34%). 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 organisations, if it isn't already, and they must begin to realise that other organisations 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 organisation 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 organisation 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 organisations. It is a process that must be undertaken in order to modernise processes and keep pace with competitors, but it is also a process that if carried out incorrectly could see some organisations fall by the wayside.

"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

Conclusion

Unplanned downtime and asset performance management are problems that have caused a great deal of operational and financial pain to organisations 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 organisations 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.

Organisations 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 organisation, 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 organisations to eliminate unplanned downtime.

Research Methodology & Scope

ServiceMax, a GE Digital company, 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 organisation were interviewed from July to October 2017. All respondents came from organisations 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' organisations regarding their asset estate
- How organisations are getting on in terms of their digital industrial journey

GE Digital

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From GE Digital

About ServiceMax:

ServiceMax, from GE Digital, leads the global industry of field service management software – an estimated $25 billion market worldwide. The company creates solutions for the 20 million people globally who install, maintain, and repair machines across dozens of industries as the leading provider of complete end-to-end mobile and cloud-based technology for the sector.

About GE:

GE (NYSE: GE) is the world's Digital Industrial Company, transforming industry with software-de ned machines and solutions that are connected, responsive, and predictive. GE is organized around a global exchange of knowledge, the "GE Store," through which each business shares and accesses the same technology, markets, structure, and intellect. Each invention further fuels innovation and application across our industrial sectors. With people, services, technology and scale, GE delivers better outcomes for customers by speaking the language of industry.

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