



EDGE COMPUTING INDEX: **FROM EDGE TO ENTERPRISE**

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INTRODUCTION

About Futurum Research

Futurum Research provides research, insights and analysis to the market that help tie leading and emerging technology solutions to strategic business needs. The purpose behind each of our reports is to help business executives and decision-makers gain a better understanding of the

technologies driving digital transformation, connect the dots between the practical business requirements of digital transformation and the forces that impact employees, customers, markets and experiences, and take appropriate action regarding critical digital transformation opportunities.

Welcome to Futurum's 2018 Edge Computing Index

In late H2 2017, Futurum surveyed over 500 North American companies ranging from 500 to 50,000 employees, and asked them to share their thoughts about Edge Computing in 2018 and beyond. We were interested primarily in identifying attitudes towards Edge Computing, adoption and deployment data, investment intent, and any trends and friction points of note. All respondents in the survey exert influence on Edge Computing investment decisions. This report outlines our study's findings. For the purposes of our study, we defined edge computing thus: "Unlike Cloud Computing, which depends

on data centers and communication bandwidth to process and analyze data, Edge Computing keeps processing and analysis near the edge of a network, where the data was initially collected." Also for the purposes of our study, Edge Computing (a category of Fog Computing that focuses on processing and analysis at the network node level), though not specifically mentioned in our survey, should be viewed as a de facto element of Fog Computing.

For a detailed demographic breakdown of our respondents' professional roles, see Appendix A.



Executive Summary

- Nearly **73%** of respondents signal that **their company has either implemented or is in the process of implementing an edge computing strategy**. Of the 27% that have not, 41% are actively evaluating the use of edge Computing for data collection, processing, and analytics.
- **93.3%** of respondents **intend to invest in edge computing in the next 12 months**. Only 5.6% of respondents intend to wait until a year from now to begin investing in edge computing, and 1.6% have no current plans to invest in edge computing.
- Nearly **72%** of respondents believe that their edge strategy is either **critically or very important to improve business processes and productivity**.
- Nearly **64%** of respondents are focused on **combining edge computing and data center analytics**. 15.6% aim to keep edge computing and data center analytics separate, and 20.5% are not sure whether to combine them or keep them separate.
- Over **50%** of respondents agree that **improved application performance and real-time analytics/data streaming** are the **two most important benefits** of edge computing.

2018 Edge Computing Index: 4 Key Statistics About Edge Computing



73%

The number of companies in the process of implementing, or having already implemented an edge computing strategy.



93.3%

The number of companies intending to invest in edge computing in the next 12 months.



72%

Organizations believing that their edge strategy is either critically or very important to improve business processes and productivity.



64%

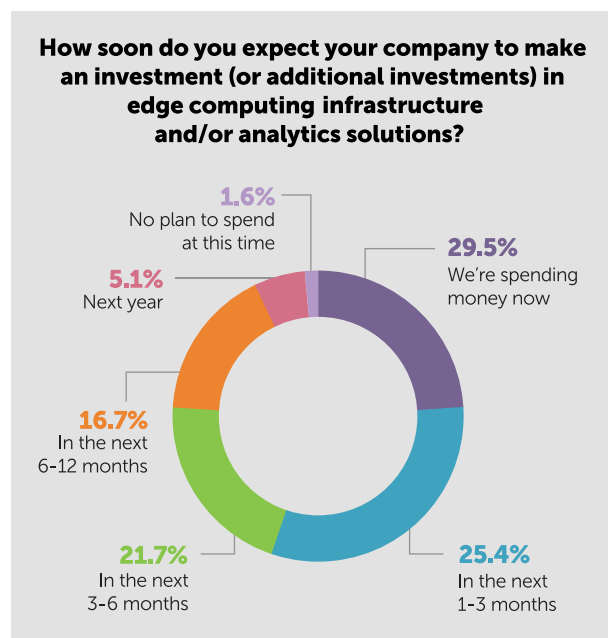
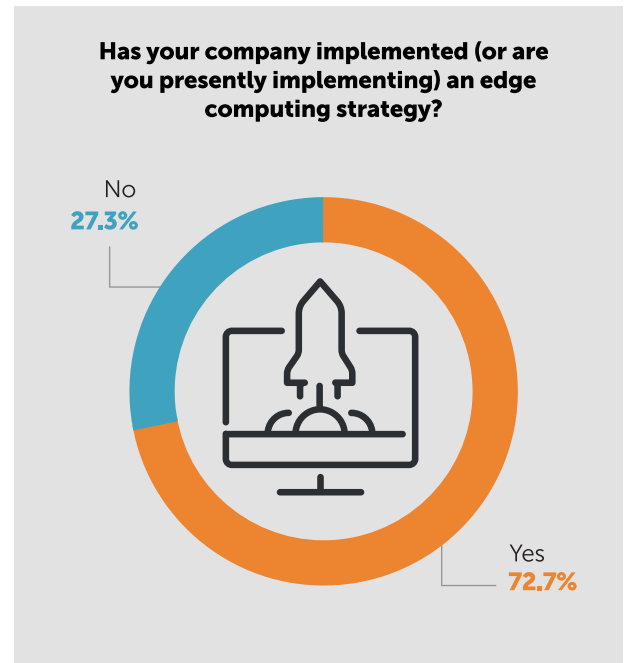
Companies already combining edge computing and data center analytics.

Attitudes towards Edge Computing investments

We identified several key trends in surveyed companies' attitudes towards Edge Computing investments. The most significant was that nearly 72.7% had either already begun implementing Edge Computing strategies, or were in the process of doing so. In addition, 93.3% were planning to invest in Edge Computing in the next 12 months.

The breakdown was as follows:

- Investing money now: 29.5%
- Investing in the next 3 months: 25.4%
- Investing in the next 3-6 months: 21.7%
- Investing in the next 6-12 months: 16.7%

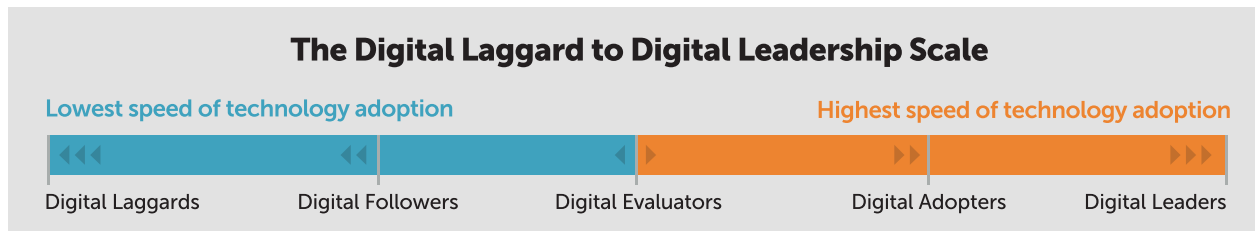


Of the 27.3% that responded that they have not yet invested in Edge Computing, nearly half (41%) are actively evaluating the use of edge Computing for data collection, processing and analytics. Although we have no clear indication as to whether or not a significant proportion of these 41% of respondents will ultimately invest in Edge, we expect that their decision to invest is unlikely to be in the next 6 months. We caution that their eventual investments in Edge Computing may be 6 or more months away. Based on feedback from the group of companies signaling plans to invest in Edge Computing, only 5.6% of respondents stated that they intend to wait until a year from now to begin investing in edge computing. We believe that the majority of the 41% of companies currently evaluating the possibility of future investments in Edge Computing will ultimately fall into this timeframe category. Based on our study, only 1.6% of surveyed companies signaled no interest in investing in edge computing.

From Laggards to Leaders: Gauging the Maturity of Attitudes towards Edge Computing

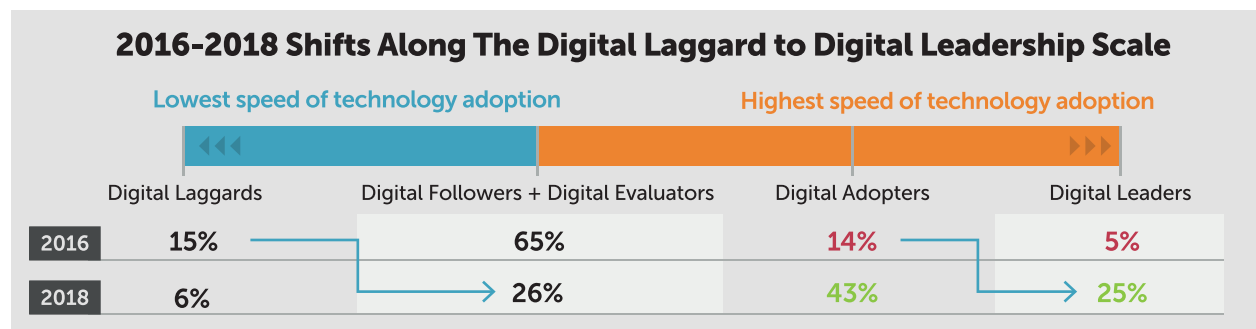
Typically, technology adoption by businesses (SMB and enterprise combined) in 2018 can be predictably broken down into five core categories of adopters and non-adopters: Digital Laggards, Digital Followers, Digital Evaluators, Digital Adopters, and Digital Leaders. To quickly understand how the scale works, Laggards represent the most technology-

averse end of the spectrum, while Digital Leaders represent the most aggressive early adopters of new technologies. Followers, Evaluators, and Adopters make up the middle of the technology adoption curve, with Followers and Evaluators generally being slow to invest in new technologies, and Adopters being less than 12 months behind Digital Leaders.



In 2018, laggards amount to roughly 6%* of businesses (compared to 15% in 2016**). Followers and Evaluators combined amount to roughly 26%* (compared to a roughly 65% in 2016**). Digital Adopters amount to 43%* (compared to only 14%

in 2016**). Finally, Digital Leaders amount to 25%* (compared to only 5% in 2016**). What we saw through 2017 and into 2018 was an aggressive shift towards prioritizing technology adoption compared to 2016.



When we overlay the results of the 2018 Edge Computing Index study with that general technology

adoption data, what we find is that Edge Computing investments seem to fall ahead of the general average:

- The 72.7% of respondents already investing in Edge Computing are 4.7 points ahead of the 68% of companies composed of Leaders and Adopters.
- The 27.3% group of companies not yet investing in Edge Computing is only slightly larger than the general 26% of followers and evaluators.
- The 1.6% group of respondents with no plans to invest in Edge Computing falls 4.4% behind the 6% of companies qualifying as Laggards.

* Newman, D., & Blanchard, O. (2018). 2018 Digital Transformation Index. Futurum Research.

** Dell Technologies, Vanson Bourne. (2016) Embracing a Digital Future: Transforming to Leap Ahead. Dell Technologies.

We interpret both the smaller proportion of digital laggards and the slightly higher proportion of technology adopters of Edge Computing (compared to average technology adoption numbers) as a net positive for Edge Computing's prospects, as it suggests a higher-than-average sense of value from companies both in the enterprise and in the SMB space, relative to the average of other technology investments. We are also encouraged by the fact that 76.6% of businesses surveyed are either investing in Edge Computing already or planning to invest in Edge Computing in the next 6 months, and 93.3% plan to invest in the next 12 months.

We caution that these figures do not indicate that Edge Computing strategies, investments in Edge

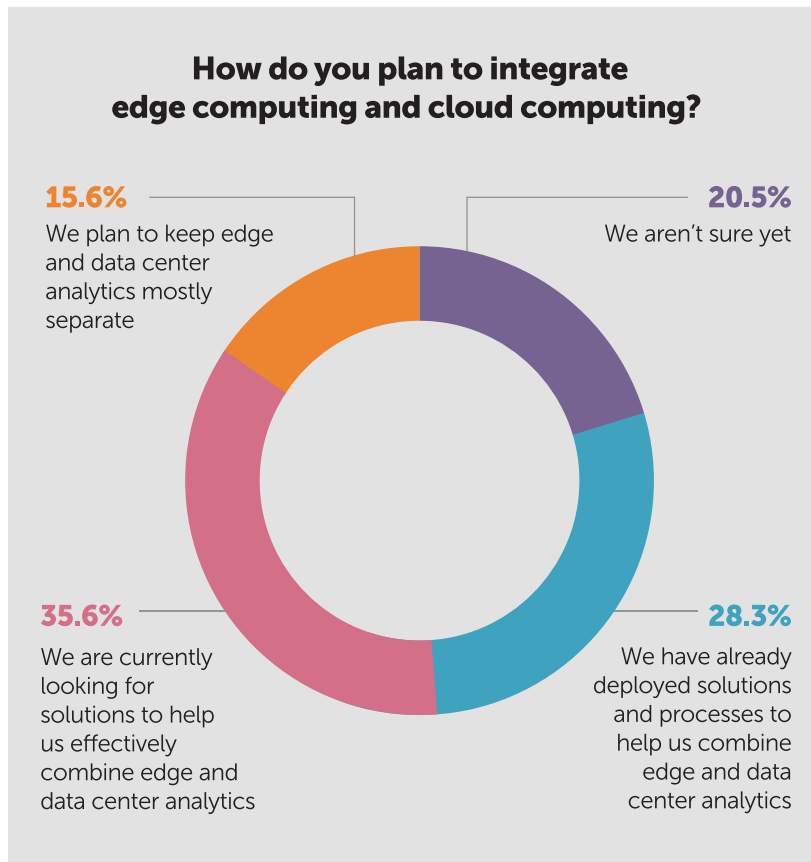
Computing, or deployments of Edge Computing technologies have reached a mature stage. What they indicate is that most businesses both understand and accept the value proposition of Edge Computing, particularly against other technology investments and digitization initiatives (like Cloud Computing, the IoT, and business automation). We also note that the eagerness of 93.3% of businesses to invest in Edge Computing in the next 12 months does not speak to the size of their investment. This suggests that Edge Computing providers should focus their partnership and business development efforts in the next 12 months on helping these companies fine-tune their Edge Computing integration, deployment and planning with an eye towards the next 36-48 months.



Edge and Cloud Computing: Integration or Segregation?

When asked how they plan to combine Edge Computing and Cloud Computing specific to data center applications, 28.3% of surveyed businesses indicate that they have already deployed solutions and processes to do so. (We note that this number outperforms the aforementioned 25% ratio of Digital Leaders.) 35.6% of surveyed businesses indicate that they are currently looking for solutions to help them combine Edge and Cloud Computing. This amounts to 63.9% of businesses. While it may be tempting to set that 63.9% figure against the 68% of combined Leaders and Adopters, it is important to note that of the businesses surveyed, 15.6%

leaned towards keeping their Edge Computing and Data Center analytics mostly separate. This tendency should not be mistaken for slow adoption or an absence of leadership. The decision to keep Cloud and Edge separate can often be a purely tactical one – driven by, among other considerations, concerns about data and system security, as well as a focus on compartmentalized operations. Edge computing applications in IoT-heavy manufacturing environments (IIoT), for instance, are likely to be kept separate from many Cloud computing applications, even for companies falling into the technology adoption leadership quadrant.

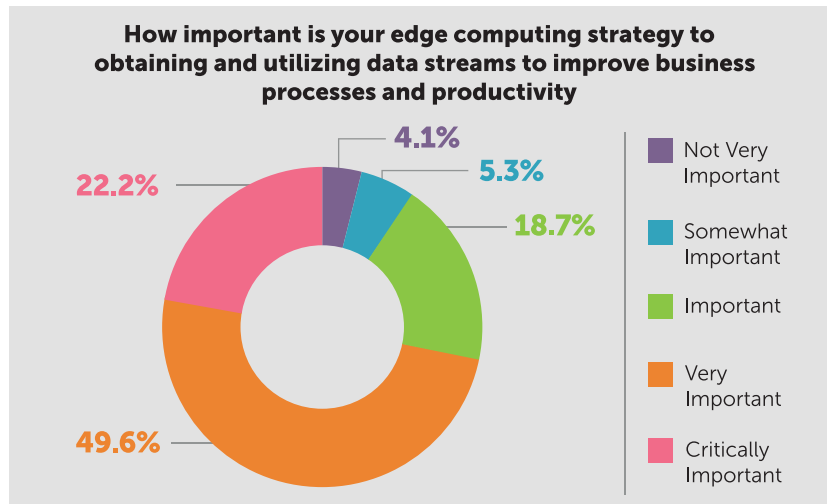


We feel that the 15.6% of businesses indicating a need to keep Edge and Cloud Computing applications separate constitute a niche in Edge Computing adoption, and that Edge Computing providers should treat them as such. The types of one-size-fits-all solutions generally offered to the >63.9% of companies looking to combine Edge and Cloud computing solutions may not adequately serve this business category.

Also important to note is the 20.5% of companies still unsure of whether or not their Edge and Cloud Computing ecosystems should be integrated. This identifies an immediate opportunity for Edge Computing providers to help roughly one in five businesses decide where and how to invest and deploy Edge Computing solutions in the next 12 to 24 months.

Shifting Attitudes Towards the Importance of Edge Computing

When asked how important their Edge Computing strategy is to obtaining and utilizing data streams to improve business processes and productivity, 90.5% of companies surveyed signaled some degree of importance. 71.8% indicated that Edge computing was either critically or very important, with the remaining 18.7% feeling that it was only somewhat important. Only 5.3% of companies consider Edge Computing only minimally important, while 4.1% consider it not important.



These numbers support our suggestion that the healthy pace of investments in Edge Computing, particularly when weighed against the average adoption rates of other Digital Transformation technologies, is driven by a clear understanding of Edge Computing's material value to the business. Seeing 22.2% of companies consider Edge Computing as critically important is an especially positive sign of the health and potential of Edge Computing, particularly as companies are signaling an increased interest in IoT and IIoT investments in the next 3 to 7 years (leading into a) the commercialization of 5G beginning in 2019, and b) the technology adoption benchmark date of 2025).

Moreover, the 49.6% of companies qualifying Edge Computing as "very important" suggests the high likelihood of an impending shift towards "critical-

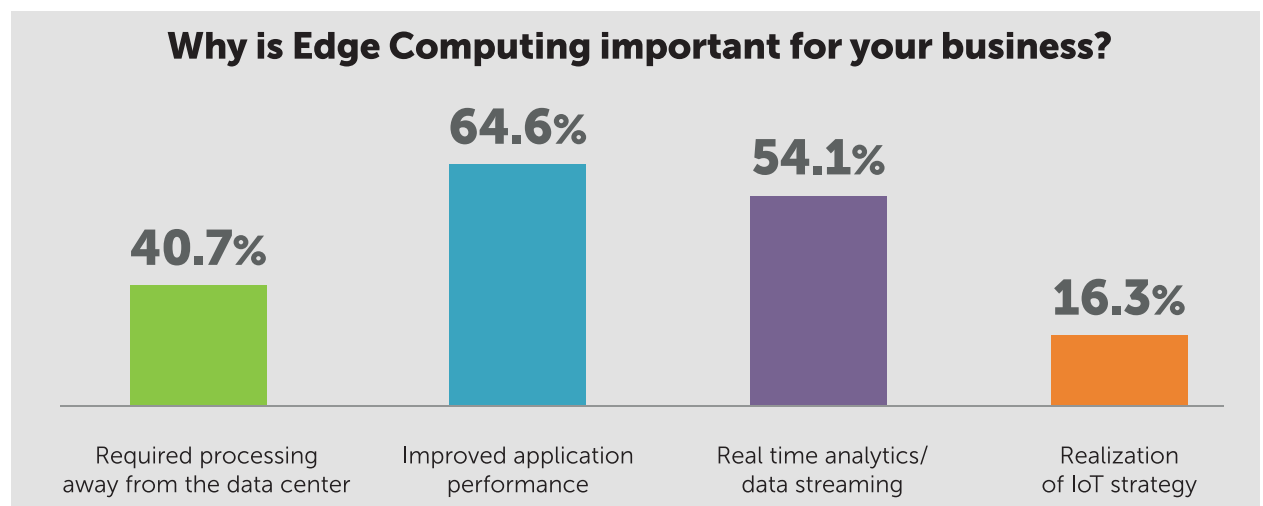
ly important" between 2018 and 2019, similar to the shift from the Digital Adopter quadrant to the Digital Leader quadrant. As companies come to rely more on Edge Computing solutions and reap the benefits of additional investments in Edge Computing over the course of the next 12 months, the degree to which Edge Computing will be seen as being more "mission-critical" should increase. We anticipate that 12 months from now, attitudes from these companies could look closer to 38-47% responding that Edge is "critically important" to their business and 25-34% feeling that Edge is "very important" to their business. We also expect to see most of the 5.3% of "minimally important" responses move into the "somewhat important" quadrant in the next 12 to 18 months, with negligible change in the 4.1% of "not important" responses.



The likelihood of a continuing shift towards Edge Computing's "critical importance" to businesses in the coming years will be driven by a strong sense of the technology's value, and by the acceleration of investments in (and subsequent reliance on) Edge Computing solutions we have already identified in our study. We expect much of this shift to also be driven by the proliferation of IoT and connectivity-related solutions across a full range of industries, from manufacturing and industrial verticals to infrastructure, automotive,

healthcare, retail, and consumer goods sectors.

When asked the top two reasons why Edge Computing is important to their business, 64.6% of companies surveyed listed improving application performance, and 54.4% identified real-time analytics and data streaming as another top choice. Following in third and fourth place, respectively were required processing away from the data center (40.7%) and the realization of an IoT strategy (16.3%).



These results suggest that operational efficiency may currently be the principal driver of Edge Computing adoption and spending, with required processing away from the data center being an important but secondary consideration. With regard to the relatively low score retained by IoT strategy category, we feel that this number will likely increase in the coming years. As companies prioritize spending, however, it is only natural that they focus first on addressing existing challenges: Reducing cost and improving operational efficiency being the top two asks of IT departments*** both in the enterprise and in the SM space, it is no surprise that "Improving Application Performance" and "real-time analytics and streaming" were selected as the top priorities in this survey. Improving data security, though not explicitly a focus of this study, is also top of mind for most businesses today, alongside cost reduction and operational efficiency improvement initiatives. These factors indicate to us

that these results are consistent with data observed in recent digital transformation, technology adoption, and IT prioritization studies* ** ***.

Moreover, as organizations begin to integrate the IoT into their daily operations and data collection ecosystems, we expect operational efficiency and data security improvement initiatives to be applied to the realization of maturing IoT integration strategies. In other words, as IoT adoption matures, the "realization of an IoT strategy" category will simply find itself absorbed into the same operational efficiency and data security improvement initiatives currently favored by businesses.

The fact that 16.3% of businesses already list the realization of their IoT strategy as one of their top 2 Edge Computing priorities is both remarkable and significant, given how new the IoT space is, and how far it yet has to go before reaching full market maturity.

*** Fuze. (2017) Breaking Barriers 2020: How CIOs are shaping the future of work. Fuze.

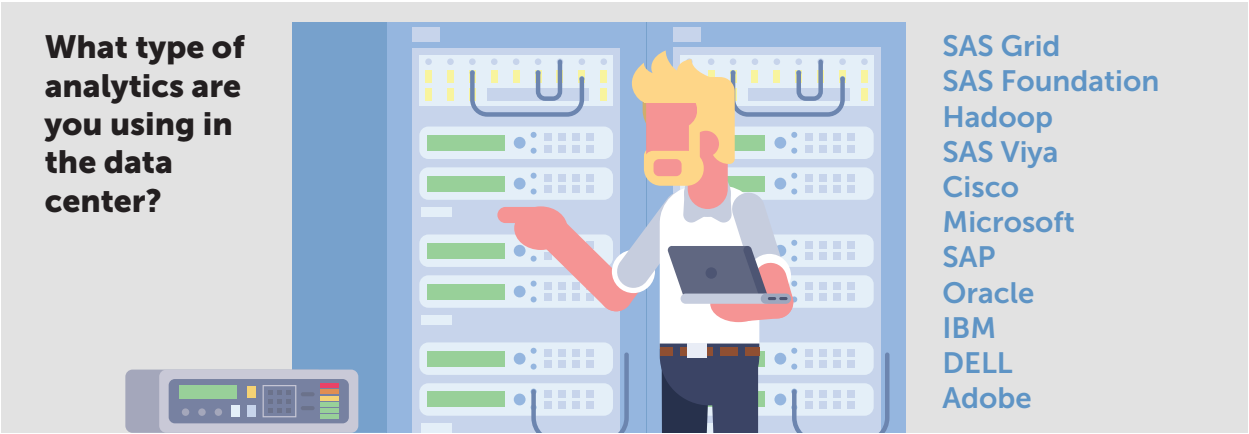
Brand Awareness and Preferences in Edge-related Computing Solutions

When asked about Edge and Cloud Computing providers and solutions, the companies surveyed provided an interesting range of answers which

can help us get a sense of how well the Edge Computing solutions provider ecosystem is connecting with the market at large.

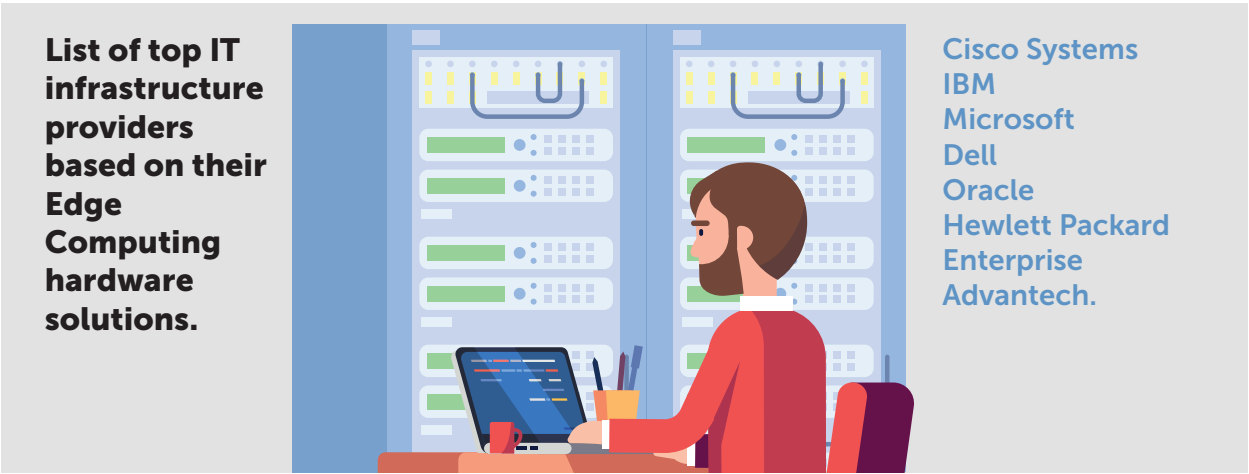
Data Center: When asked what types of analytics solutions they were using in the data center, over 50% of the companies surveyed pointed to SAS Foundation and SAS Grid. Also consistently mentioned were SAS

Viya, Hadoop, and solutions from Cisco, Microsoft, SAP, Oracle, IBM, DELL, and Adobe. We note that most of the companies we surveyed use more than one analytics solution in their data center.



IT Infrastructure Providers – Edge Computing Hardware: When asked to identify top IT infrastructure providers based on their Edge Computing hardware solu-

tions, the most common responses, in no particular order, were Cisco Systems, IBM, Microsoft, Dell, Oracle, Hewlett Packard Enterprise, and Advantech.



Analytics Software Providers – Edge Computing Software Solutions: When asked to identify top Analytics software providers based on how well-known

their Edge Computing software solutions are, Microsoft, IBM, Oracle, SAP, SAS, Cisco, Dell, Salesforce, Amazon, Google, and Oracle came up the most often.



Key Findings

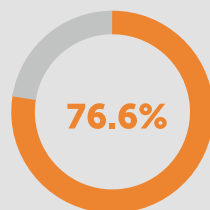
General:

- The outlook for Edge Computing, which includes Fog Computing, in 2018 looks positive, with high degrees of investment intent from companies ranging from the enterprise to the SMB space over the next 3, 6, and 12-month timeframes.
- Business confidence in Edge Computing's operational value appears to be roughly 5% ahead of overall confidence in other Digital Transformation technologies, in the aggregate.
- Edge Computing's value appears to be driven in part by the continued adoption of IoT solutions across a broad range of sectors, positive expectations ahead of the start of 5G commercialization in 2019, and the limitations of Cloud Computing solutions as they pertain to operational efficiency, data security, and the management of certain key mission-critical systems.
- Investment in Edge Computing solutions should continue well into 2020, with a likely upward trajectory as business operations' reliance on Edge Computing solutions and hybrid IT models continue to mature.

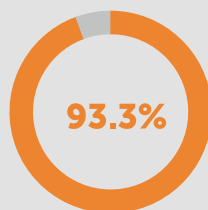
Investment Intent:

- Nearly **73%** of respondents signal that their company has either implemented or is in the process of implementing an edge computing strategy.
- Of the 27% that have not, 41% are actively evaluating the use of edge Computing for data collection, processing and analytics.
- **76.6%** of respondents intend to invest in edge computing in the next 6 months.
- **93.3%** of respondents intend to invest in edge computing in the next 12 months.
- Only 5.6% of respondents intend to wait until a year from now to begin investing in edge computing.
- Only 1.6% of respondents have no plans to invest in edge computing at this time.

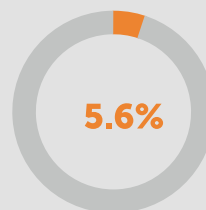
2018 Edge Computing Index – Investment Intent



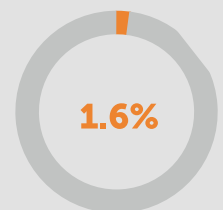
companies intending to invest in edge computing **in the next 6 months.**



companies intending to invest in edge computing **in the next 12 months.**



companies intending to wait more than 12 months before beginning to invest in edge computing.

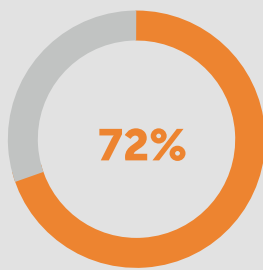


companies with no plans to invest in edge computing.

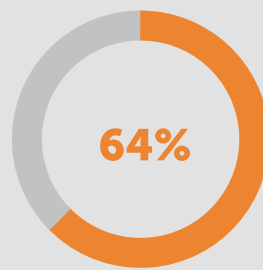
Purpose in value:

- Nearly 72% of respondents believe that their edge strategy is either critically or very important to improve business processes and productivity.
- Less than 10% find their edge computing strategy minimally or not important.
- Over 50% of respondents agree that improved application performance and real-time analytics/data streaming are the two most important benefits of edge computing.
- Only 16% are primarily focused on using edge computing to realize their IoT strategy.
- Nearly 64% of respondents are focused on combining edge computing and data center analytics.
- 15.6% aim to keep edge computing and data center analytics separate.
- 20.5% are not yet sure whether to combine edge computing and data center analytics, or keep them separate.

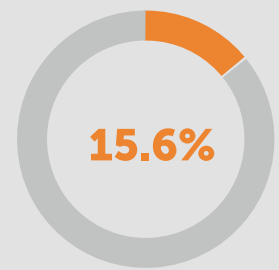
2018 Edge Computing Index – Purpose in Value



companies reporting that their edge strategy is critically or very important to improve business processes and productivity.



companies focused on combining edge computing and data center analytics.

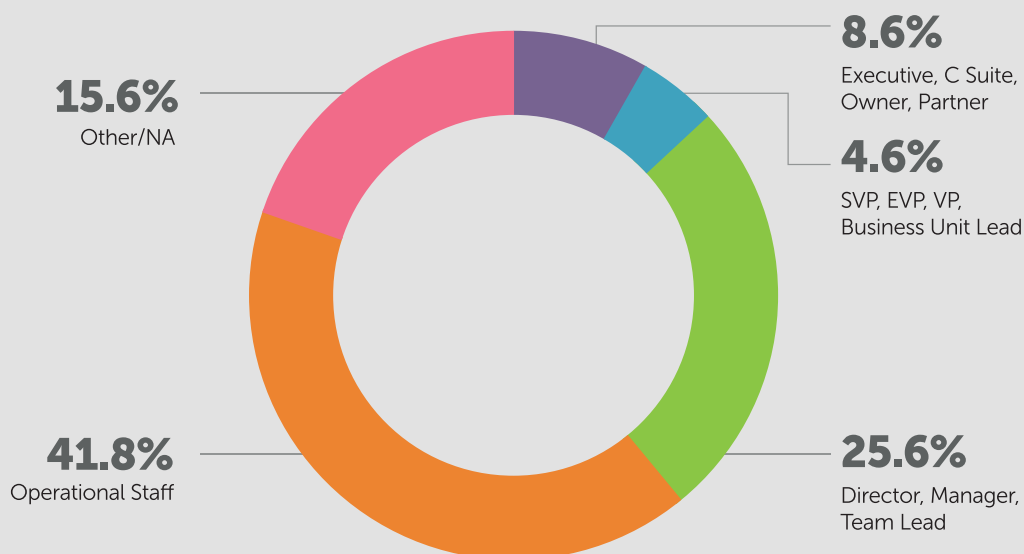


companies aiming to keep their edge computing and data center analytics separate.

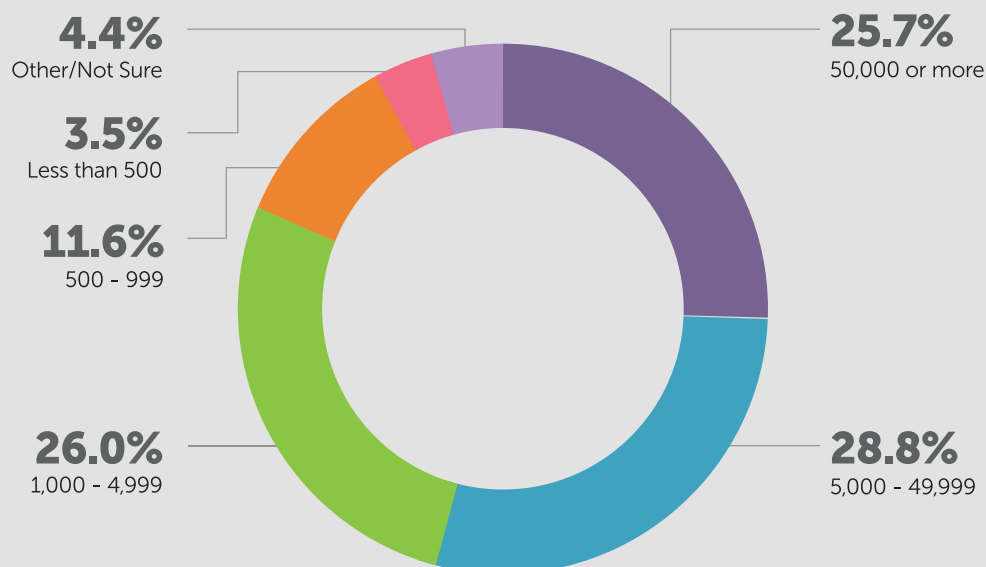
APPENDIX A

Demographic Info

Level of Responsibility



Company Size





About SAS Software and Cisco Partnership

The world's leaders in connectivity and analytics have come together to offer their customers proven, trusted, and secure capabilities for digital transformation. Cisco and SAS uniquely enable organizations to take advantage of existing infrastructure, access data wherever it is, and provide real-time streaming analytics from the edge to the data center. The Cisco® and SAS Edge-to-Enterprise IoT Analytics Platform offers enterprises a powerful, reliable, and flexible architecture to quickly collect, process, and analyze massive amounts of data in real time, both at the network edge and in the enterprise data center. The partnership between Cisco and SAS puts powerful analytics tools into the hands of stakeholders, no matter where they are or what device they're using.