SURVEY REPORT

Top 10 IoT Priorities in Manufacturing

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Executive summary

The Industrial Internet of Things (IIoT) encompasses everything from computerised manufacturing to artificial intelligence and advanced analytics. It's the network of a multitude of industrial devices connected by communications technologies that results in sophisticated systems that can monitor, collect, exchange, analyse and deliver valuable insights so companies can make better decisions.

In the past, most of these systems were deployed separately and operated as islands. To achieve the true vision of IIoT, all machines will be networked and their condition monitored continuously.

Industry 4.0 for IoT will transform industries — whether it is providing predictive analytics or real-time production data — and make businesses operate more efficiently and more cost effectively.

Mobile World Live conducted an online survey of telecom service providers, end user IIoT device and software makers, IIoT software services and development companies, as well as cloud service providers and IIoT equipment makers to better understand their top priorities for IIoT.

The survey confirmed the significance of deploying IIoT infrastructure and the importance of edge computing and cloud-based services when implementing artificial intelligence at the edge. Ease of deployment is vital and so is the quality of the wireless network connectivity.

Key Findings

More than one-third of respondents have deployed new IoT infrastructure and nearly two-thirds said they will mix new and existing architectures. According to our survey, 34% of respondents said they already had new IoT infrastructure up and running and one-third said they were planning to implement new infrastructure within 6 months to one year. 23% said they had no plans to upgrade. Of those interested in IoT, a whopping 65% of respondents said that they are interested in having a mix of new and existing architectures in their environments. Only 13% said that they were interested in only implementing greenfield (new) architectures for new environments.

Upgrading connectivity in their IoT infrastructure is one area respondents say they are considering. 34% of respondents said that having higher connectivity through 5G or direct connect I/O is one component that needs to be replaced in their IoT infrastructure. 23% said that they need to replace their private cloud systems for learning and storage. 17% said they need to replace their IoT edge computers and GPUs.

Respondents want a mix of wireless connectivity choices. When asked which technologies most interested them for device connectivity, nearly half of respondents (49%) said that they wanted a mix of private networking using Wi-Fi/CBRS and 5G. Another 39% said they wanted 5G-based architectures supplied by their local operator. The other choices were evenly split between 6% wanting Wi-Fi managed in-house and 6% wanting CBRS private LTE managed by a third party.

Smart cities, smart venues, and healthcare are the top vertical industries for IoT. Smart cities/smart venues received the most interest (18%) from respondents when asked what IoT services and devices they are most interested in. Telemedicine/healthcare/life sciences also ranked high (15%) as did manufacturing and industrial IoT (15%). Transportation and logistics followed with 14% and energy and power systems with 12%.

Real-time AI analytics and the use of edge and cloud-based services are important when implementing AI/Edge. The majority (26%) of respondents said that real-time AI analytics for situational awareness and actionable insights was the most important factor when implementing AI and Edge-based services. 23% of respondents said the use of both edge and cloud-based services was the most important factor. Running multiple real-time AI-based applications on one system was important to 14% of respondents while 13% said that computer vision workflow was important. Using Intel®'s X86 Openvino toolkit was only important to 3% of respondents.

Respondents say ease of deployment is the No. 1 technical need. When asked to rank technical needs by highest priority to lowest, respondents ranked ease of deployment in terms of common workflows and setup on existing networks as the No. 1 priority followed by high compute core count with GPU/AI functions running simultaneously and data security and autonomous security management.

Digital transformation is underway for nearly half of respondents. Nearly half of respondents (47%) said that their company was in the early planning stage of digital transformation, meaning that they were getting cost estimates and looking at technology differentiation. 30% said that they were investigating their existing digital transformation and considering new technology while 23% said that they were upgrading to AI-based architectures at the edge and cloud so they could learn more about it.

Nearly half of respondents say they plan to use traditional wireless networking equipment for their industrial IoT systems. About 47% of respondents said that they plan to use traditional dedicated mobile/wireless networking equipment in their new industrial IoT systems. And 27% said that they will use embedded commercial off-the-shelf systems and software while 26% said that they plan to use x86 servers running virtual machines or containerised application software.

Survey Methodology

This report is based on 253 responses to an online survey conducted by Mobile World Live on behalf of Supermicro. Nearly one-third (31%) of those respondents were telecom service providers followed by end user IoT device and software makers (13%) and IoT software services and development (13%). Cloud service providers made up 12% of respondents and IoT equipment makers made up 11% of respondents. Only 7% of respondents said they were looking for info on using 5G for IoT solutions deployment. 12% fell into the Other category –this category comprises a variety of mobile industry professionals in areas such as testing, components and finance and consulting.

Geographically, the largest group of respondents were from companies with headquarters in Europe (44%) followed by North America (18%) and Asia (17%). The rest of the respondents were from Africa (13%), South America (4%) and the Middle East (4%).

Introduction

Companies that are interested in the industrial IoT are beginning to realise the important role edge computing plays in a successful IoT deployment. Because an IoT system often relies on a large number of sensors and measurement devices, it can produce a large amount of data traffic. Edge computing, which places the compute, storage and network resource closer to the end user devices, and sits between the devices and the cloud, can process and filter the raw data and send only pertinent information to the cloud. This reduces the bandwidth demands for the IoT network and improves network performance.

In addition, many IoT applications that are processed locally benefit from the network's low latency and will experience better reliability and resiliency. Some examples of low latency applications include video analytics and surveillance and any motion control applications such as automated guided vehicles or autonomous driving and robotics.

Although edge computing is useful in 4G networks it is a critical component of 5G networks because the 5G IoT architecture can achieve ultra-low latency, which is necessary for use cases that involve augmented reality or autonomous vehicles.

Some companies have already deployed new IoT architecture but many want to upgrade their IoT networks so they can achieve better performance and handle more devices. This will be critical as IoT connections are expected to double in the next five years. By 2025, GSMA Intelligence expects there will be 24.6 billion IoT connections, up from 12 billion in 2019.

Ericsson reported in its June 2020 Mobility Report that it expects broadband IoT connections, which it defines as all wide-area IoT use cases that require higher throughput, lower latency and larger data volumes such as those provided by 5G networks, to make up 34% of all cellular IoT connections. This forecast indicates that IoT networks will need to be able to handle large amounts of bandwidth made possible from edge computing in the next five years.

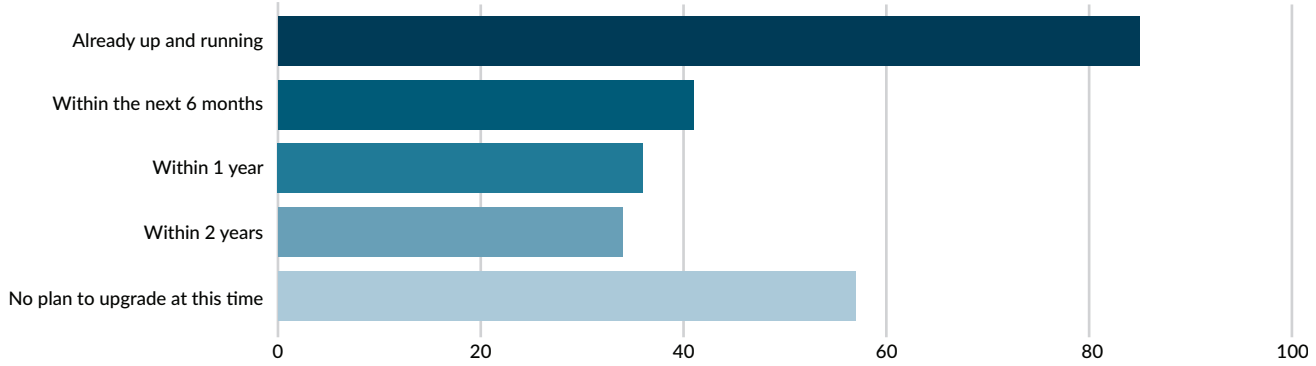
This report assesses the top priorities that service providers, IoT device and software makers, and cloud service providers have when it comes to deploying and/or upgrading an industrial IoT network, including the perceived challenges and benefits, as well as the anticipated connectivity choices.

Planning new IoT infrastructure

There are a variety of different types of IoT infrastructure and much of what companies decide to deploy depends upon how they are planning to use it. Sensors, measurements, communications protocol and analytics are all part of the IoT system. Most experts agree that cloud-based IoT platforms will simplify the infrastructure design and make it easier to scale. Edge computing is also a key factor because it can help companies achieve success with their IoT systems much faster.

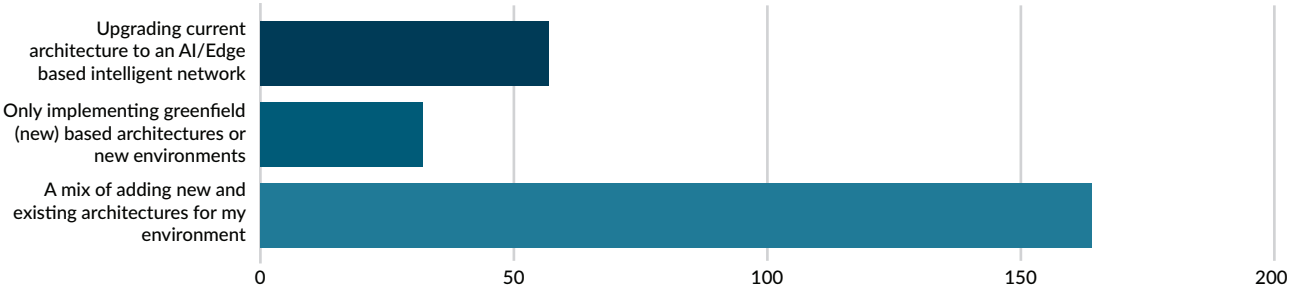
In our survey, the majority of companies (34%) said they have already implemented new IoT infrastructure while 16% say they plan to deploy new IoT infrastructure in the next six months and another 14% say they will do so in the next year. 13% say they will upgrade within two years. However, 23% say they have no plans to upgrade their IoT infrastructure at this time.

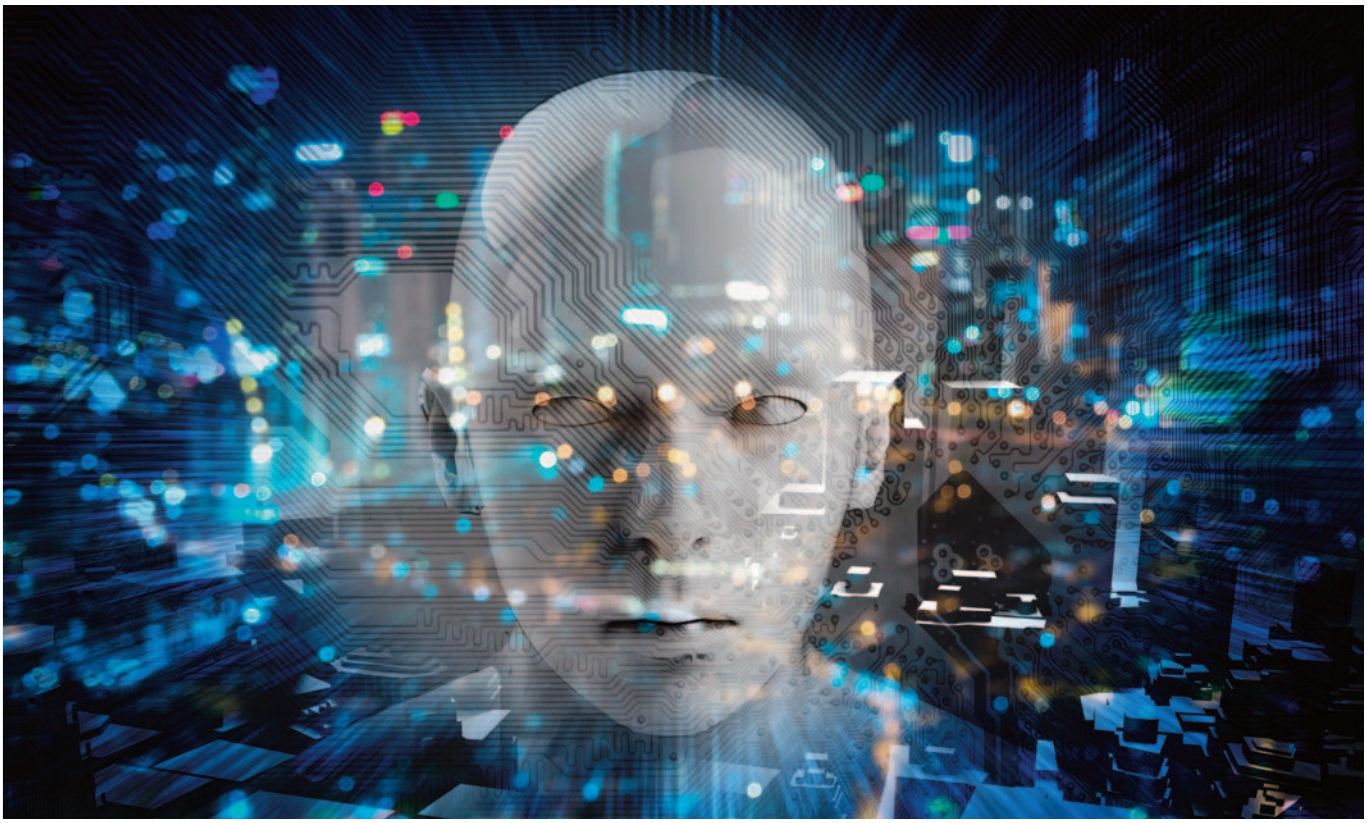
Figure 1: When are you planning to implement new IoT infrastructure?



The vast majority (65%) of respondents said they are most interested in mixing new and existing IoT architectures for their environment while 23% say they plan to upgrade their current architecture to an AI/Edge-based intelligent network. Only 12% said they were interested in only implementing a greenfield, or new, architecture for new environments.

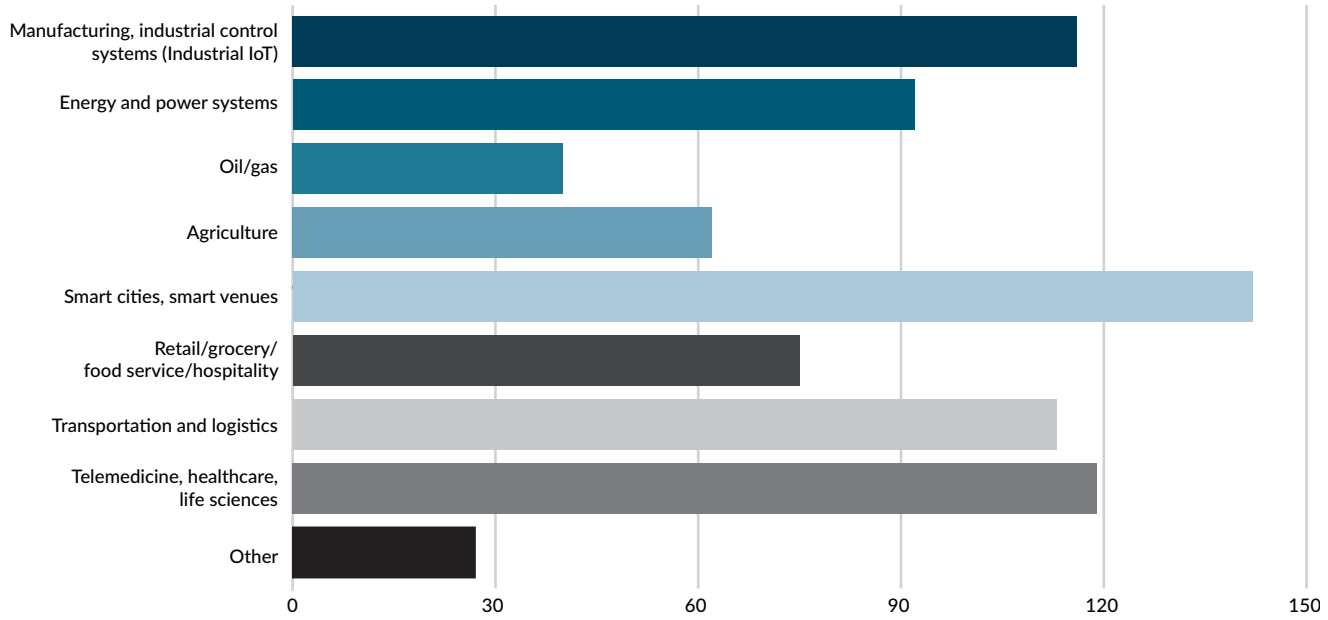
Figure 2: What is your interest in IoT focused on?





Smart cities and smart venues are at the top of the list (18%) when it comes to IoT services and devices that are most interesting to our respondents. Manufacturing and industrial IoT attracted 15% of responses as did telemedicine, healthcare and life sciences (15%). Transportation and logistics garnered 14% of responses followed by energy and power systems (12%), retail/grocery/food service and hospitality (10%) and agriculture (8%). The oil and gas segment drew the smallest amount of interest (5%).

Figure 3: What IoT services and devices are you most interested in (check all that apply)?

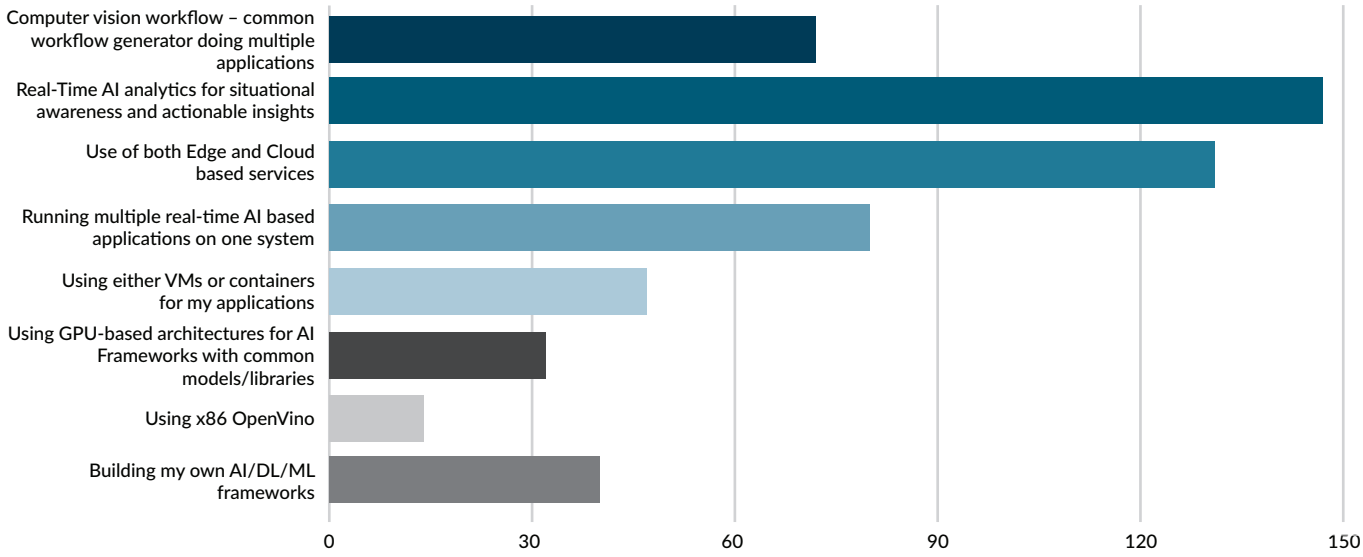


Advantages to Edge/AI based services

Some companies are quite bullish on deploying AI/Edge-based services because of the potential advantage the technology offers. For example, devices that are AI-enabled can process data faster than other devices. This faster processing of data provides a security advantage because with a shorter processing time, there is a lower risk of tampering. Another advantage is that AI/Edge-based services make lower latency services possible.

For those that are planning to implement AI/Edge-based services, 26% said the most important factor is real-time AI analytics for situational awareness and actionable insights followed by 23% that said the use of both edge and cloud-based services is the most important factor. Running multiple real-time AI-based applications on one system was considered the most critical by 14% and 13% said that computer vision workflow or having a common workflow generator doing multiple applications was the most important factor.

Figure 4: Are you planning on implementing AI/Edge-based services, and if so, what are the most important factors?



Respondents were also asked to rank the most important priorities when it comes to technical needs. The top three priorities were ease of deployment (common workflows and setup) on existing networks, high compute core count with GPU/AI functions running simultaneously, and data security and autonomous security management.

Technical priorities of slightly less importance were container/VM autonomous system management for remote devices, lower power constraints for edge devices and open software architectures enabling some customisation.

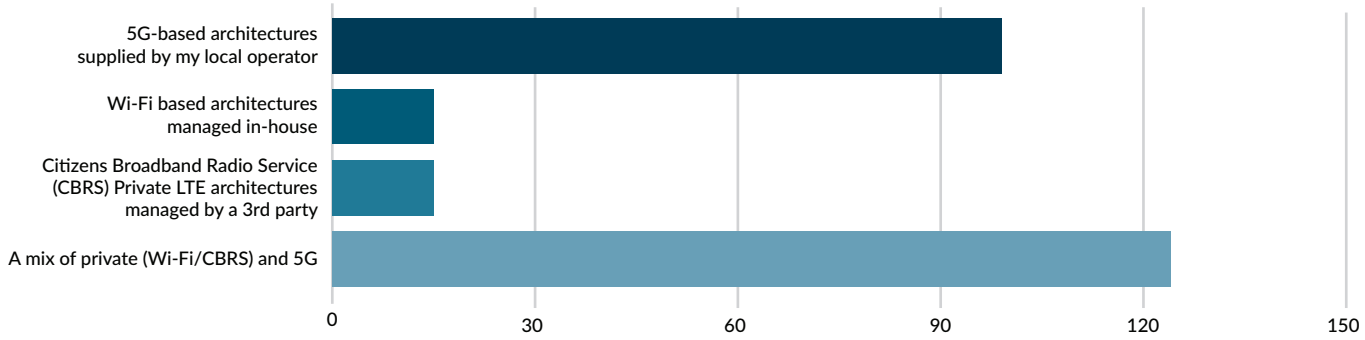
And finally, technical needs of lowest priority were low latency edge services using common hardware and software infrastructure and long life cycles for hardware with ease of upgrades.

Wireless connectivity challenges

With industry projections showing that connected IoT devices will dramatically increase over the next five years, it's clear that wireless networking will have to scale to keep up with this growth.

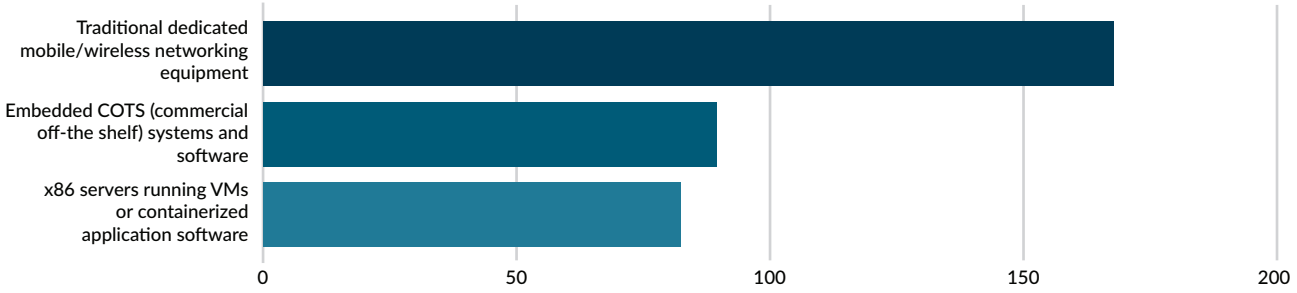
When asked what wireless technology is most appealing for device connectivity, respondents overwhelmingly (49%) said that a mix of private networks using Citizens Broadband Radio Services (CBRS) spectrum and Wi-Fi and 5G is most appealing. 5G-based architecture deployed by a local operator was selected by 39% of respondents. And 6% opted for Wi-Fi based architectures managed in-house while another 6% chose CBRS private LTE architectures managed by a third party.

Figure 5: If you had a choice between Wi-Fi and 5G wireless connectivity, which technology most interests you for device connectivity?



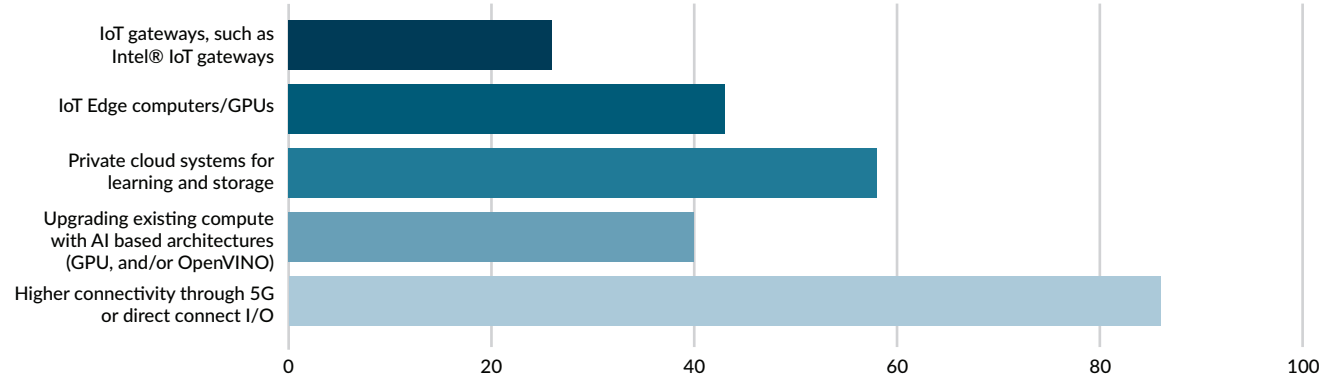
There is no doubt that wireless connectivity is key to industrial IoT deployments. When asked what types of equipment respondents would expect to use for their new industrial IoT systems, nearly half (47%) said that they would require traditional dedicated mobile/wireless networking equipment. 27% said that they would require embedded commercial off the shelf (COTS) systems and software. And 26% said that they would need x86 servers running virtual machines or containerised application software.

Figure 6: What types of equipment do you expect to use for your new industrial IoT systems? (check all that apply)



Connectivity ranked very high when respondents were asked about what components they would need to replace for their new IoT infrastructure. One-third (33%) of respondents said that higher connectivity through 5G or direct connect I/O was necessary. Private cloud systems for learning and storage also were flagged by 23% of respondents. 16% said that they would need to upgrade existing compute with AI-based architectures such as GPU, and/or OpenVINO. Only 10% said that they would need to replace IoT gateways such as Intel® gateways.

Figure 7: What components need to be replaced for your new IoT infrastructure?



The role of the cloud

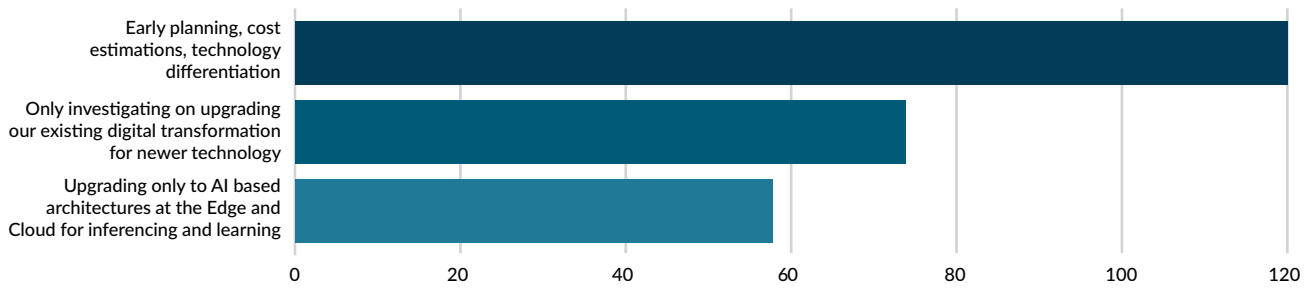
The cloud plays a critical role in IoT and has significant implications for companies. Most IoT systems will make use of a large number of sensors to collect data and then use that data to make intelligent decisions. The cloud will make it possible to aggregate that data and handle the compute and storage of that data.

In addition, the cloud allows for scalability. When you have hundreds or thousands of sensors, the computational power on each sensor will be too expensive and energy-intensive. By using the cloud, data can be sent from the sensors to the cloud and processed in aggregate.

Of course, at what stage a company is at in its digital transformation will play a role in how quickly it will be moving to an IoT infrastructure that includes cloud computing.

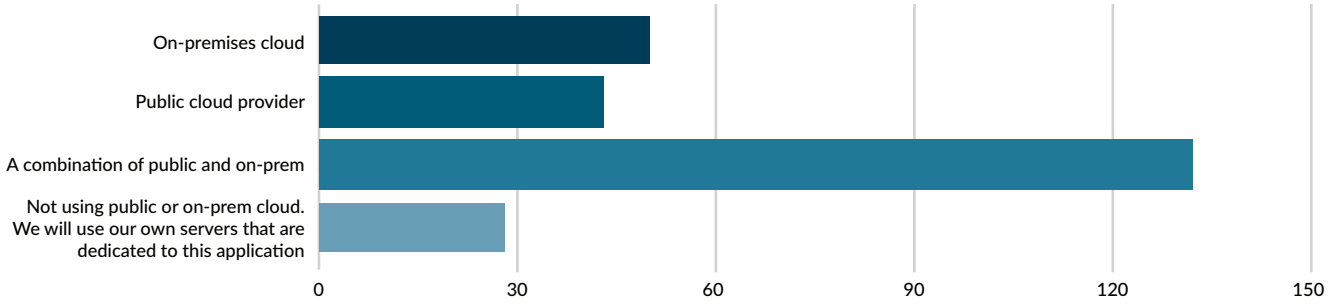
Of the people that we surveyed, nearly half (47%) said that their company was in the early planning stages of the digital transformation process, meaning that they were estimating costs and deciding technology differentiation. 30% of respondents said that they were only investigating upgrading their existing digital transformation to newer technology and 23% said that they were upgrading to AI-based architectures at the edge and cloud for inferencing and learning.

Figure 8: At what stage in the digital transformation process do you perceive your organization to be?



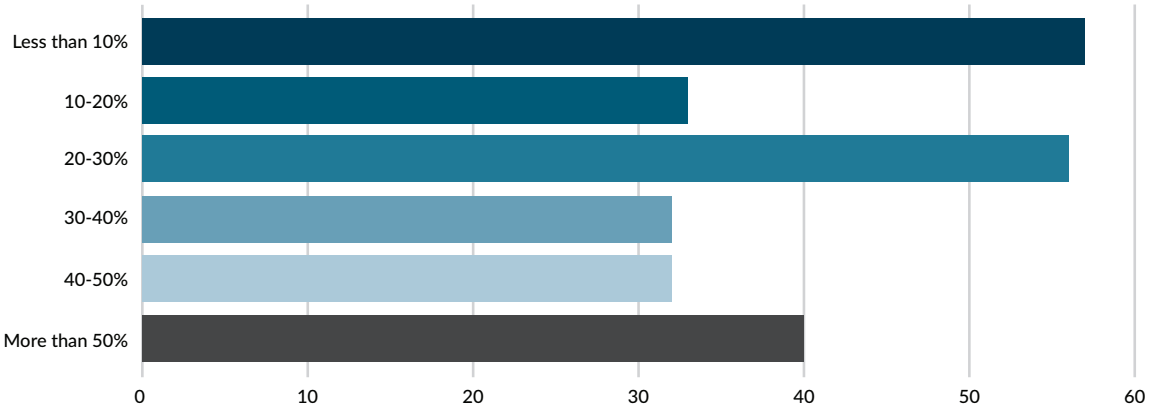
The majority of people surveyed (52%) said that they will use a combination of public and on-premises cloud for storing their IoT data. Only 20% said they will be using on-premises cloud solely and another 17% said that they will only use the public cloud. 11% of respondents said they will use their own servers.

Figure 9: Will you use a public or on-premises cloud for storing the IoT data?



The majority of respondents indicated that they will be reliant upon the cloud to process much of their IoT data. 23% of those surveyed said that they expect less than 10% of data to be generated and processed outside the cloud and 22% said that they expect 20% to 30% of data to be generated and processed outside the cloud. However, 16% said that they expect more than 50% of data to be generated and processed outside the cloud, which suggests a reliance upon their own servers.

Figure 10: What percentage of your data will be generated and processed outside the cloud?



Conclusion

The industrial IoT is a significant opportunity for enterprises and it is clear that edge computing and the cloud will both play a big role in the success of IoT. This survey highlights that many companies have already implemented a new IoT infrastructure and many more plan to do so in the next six months to a year.

Even though it is still early in the deployment of edge computing technology, smart companies understand that implementing edge computing will help them make their IoT deployments more efficient and reliable as well as help them deliver low latency services. As the survey data indicates, companies are planning to leverage edge computing for real-time analytics, and 5G technology using a mix of public and private networks.

As in all new technologies, ease of use plays a huge role in how quickly companies make the transition to IoT and edge computing.

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