



2018

—
**Trends
to Watch:**
Cloud
Computing

Meeting the challenge of
the move to the edge

Summary

In brief

Over recent years, the cloud has been growing rapidly in terms of its breadth and depth, and many organizations have been seduced by its elasticity and opex model. This has seen certain workloads that are considered cloud-native or cloud-ready delivering added value to organizations, while most legacy workloads have yet to be migrated to the cloud and remain second-class citizens. However, stepping back and taking a more considered approach to the cloud and treating it like any new technology reveals that the cloud is not a singularity or a silver bullet but is instead a concept that has many interpretations. Ovum does not believe that every workload or organization will operate 100% in the cloud, but believes that the IT environment will include a combination of different schools of cloud computing, different outsourcing or managed services models, and on-premises solutions.

Ovum view

As the use of the cloud continues to mature and become more strategic, the market in cloud computing will change in 2018 and beyond. This change will impact every aspect of cloud computing. Ovum believes that 2018 and 2019 will be pivotal years for the maturity and expansion of cloud computing. The rise of cloud-native applications designed for multi-cloud environments that include simple open integration and make workloads portable will begin to change the way organizations value IT within the business. Ovum has identified five key trends for 2018.

Key messages

- Enterprises will increasingly take a strategic view of using the cloud.
- Increased data sovereignty and regulation are creating a three-layer model for the cloud.
- A new breed of cloud providers is emerging where enterprise-grade credentials are critical.
- DevOps in 2018 will struggle to integrate infrastructure as code into operational processes.
- The market in public cloud computing is becoming bifurcated.

Recommendations

Recommendations for enterprises

For many organizations, the biggest challenge that cloud computing faces is dealing with the ever-increasing level of complexity from the number of different cloud services on offer. Coupled with this increase in product portfolios is the proliferation of different pricing models to cover all the different services. This will sound familiar to data center operators that have struggled with different licensing and pricing models for years, particularly because one of the key value propositions of cloud computing was a simple and easy to understand pricing model. Ovum believes that the value cloud providers offer is in the platform and the ability to integrate with other environments. For enterprise customers looking to adopt cloud services, the journey and its different stages need to be planned so that cloud adoption is strategic and not just tactical.

Recommendations for service/content providers

Many of the new workloads being considered for the cloud are showing signs of fragmenting along different paths (using containers, serverless, or microservices). Ovum believes that while this shows that the cloud has evolved to give solutions to a wider audience, it is also a weakness that could be exploited by alternative technologies.

The different workloads if viewed from a market-vertical perspective could be seen as specialist and therefore vulnerable to new entrants with new technologies challenging cloud-based solutions. Ovum believes that cloud providers must connect the disparate workloads so that instead of solving a specific line-of-business issue, holistic organizational value can be obtained.

Recommendations for vendors

For enterprise customers, the journey to the cloud will be not be a single path to follow, but will instead be influenced by market, competitor, and geographic challenges. For many organizations, the biggest challenge they will face in 2018 is dealing with the ever-increasing level of complexity from the sheer number of different services on offer and how to ensure the offerings are fully integrated. Coupled with this increase in provider options is the need for more transparent pricing to cover the different services. This sounds counter-intuitive because one of the key value propositions of cloud computing was a simple and easy-to-understand pricing model.

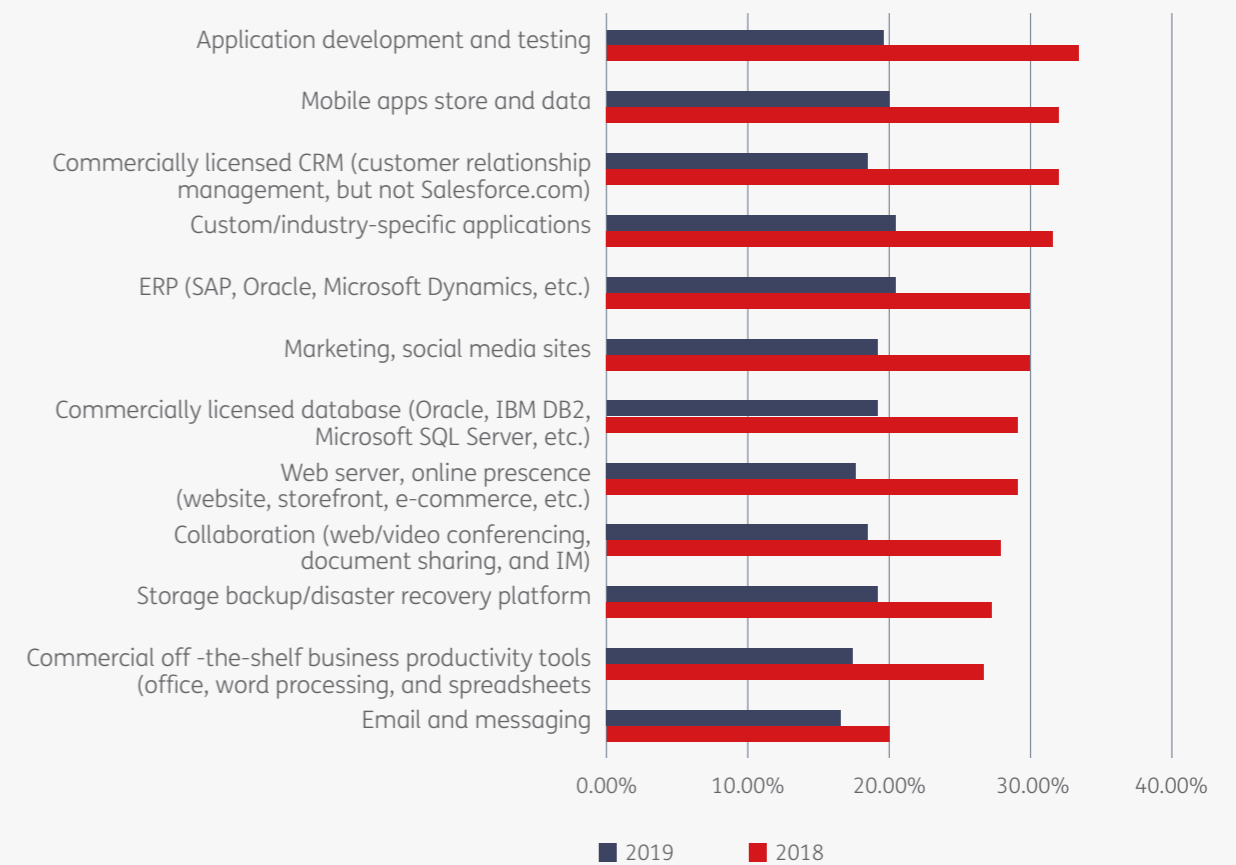
Enterprises will increasingly take a strategic view about using cloud

Workload placement will be decided based on a multicloud approach

Between 2015 and 2017 enterprise cloud spending increased, with 50% of respondents reporting an increase in SaaS spending, 46% increasing spending on IaaS, and 47% increasing spending on PaaS (Ovum ICT Enterprise Insights 2016/17 – Global: ICT Spend and Sourcing n=1,543). However, as Figure 1 shows, the workloads moving to the cloud are changing. Ovum ICT Enterprise Insights 2016/17 – Global: IoT and Cloud n=5,215 asked respondents which workloads they planned to move to cloud and when they planned to move them. The responses show that in 2018 there will be a bigger percentage and bigger differentiation between these workloads, with application development and testing, and mobile app stores and data still the top two workloads, but in 2019 only 20% of respondents plan to move to cloud compared to just over 30% in 2018, which could indicate these workloads have already been moved. In the same survey Ovum found that hybrid cloud deployments are the fastest growing segment, with 80% of respondents saying they will be using hybrid cloud by 2019. However, beneath these headline figures the detail indicates that organizations are making more strategic decisions about the cloud, particularly about where workloads are best hosted.

As enterprises take a more mature approach to cloud adoption, their approach to cloud selection is also maturing. The evidence about workloads confirms that the selection process is increasingly being driven by factors such as cost, performance, reliability, and reputation. While the Ovum data does not clearly show the link between workloads, organizational maturity, and cloud supplier reliability, deeper analysis provides evidence that workloads are being classified and deployed in the most appropriate environments. Empirical evidence from conversations in 2017 indicate that organizations are selecting two or three core cloud providers to which most workloads will be moved in 2018. The thinking behind this approach is similar to the old reluctance to be 100% reliant on a single supplier. CIOs are beginning to approach the cloud in the same way as they do traditional infrastructure suppliers. This includes having a small number of key suppliers to reduce maintenance and management, increasing the bargaining position on pricing, and ensuring flexibility in the event of any market movement such as consolidation.

Figure 1: Workloads moving to the cloud in 2018–2019

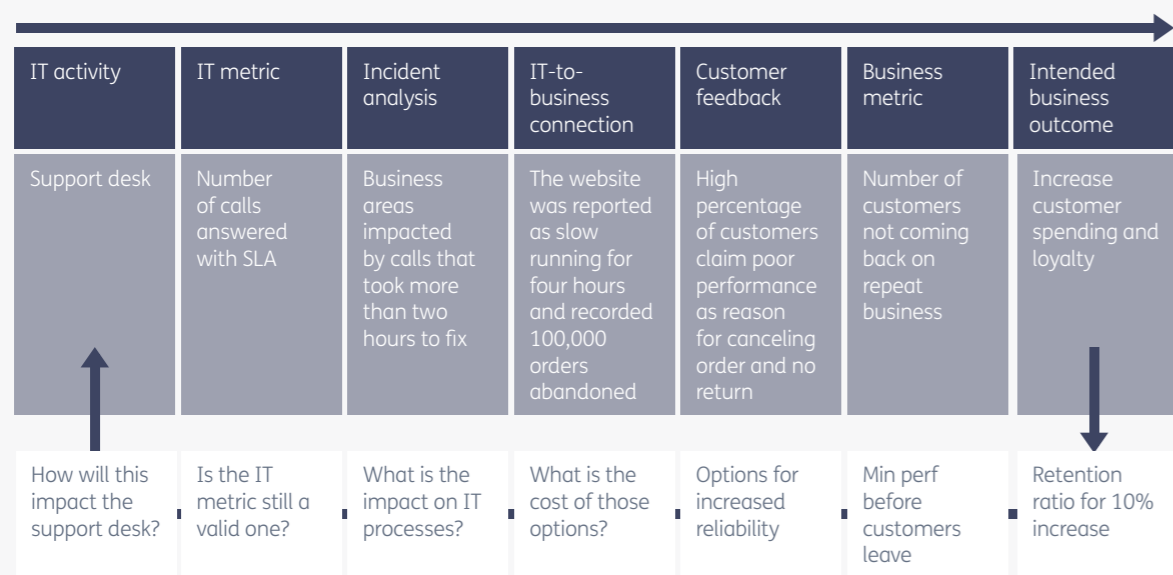


Source: Ovum

Understanding the economics of the cloud is driving adoption trends

Linking IT infrastructure spending to business outcomes has always been tricky for CIOs. With cloud computing, the relationship is much clearer. Key business activities running in the cloud can be reported on individually in terms of cost and performance. However, much of this improvement is due to the “clean slate principle” where customers move to new services, particularly in cloud environments, and the cost, performance, and risks are assessed and quantified as part of the business case for the move. Therefore, these new services are considered in terms of business requirements from the IT infrastructure aspect, but the supporting activities, change management, and operational functions must be factored in to provide a true link to business outcomes. The use of metrics is one way to ensure a more direct link is achieved between the IT infrastructure and operations and the business outcomes. Figure 2 shows an example of how these two different measures, IT metrics and business outcomes, can be linked.

Figure 2: Linking IT activity to business outcome



Feedback loop

Source: Ovum

From this example, the options question in the feedback loop (“Options for increased reliability”) is the critical point where the cloud economics can help with delivering an improved business outcome. The advances in automation technologies and the ability for cloud providers to enable auto-failover to maintain SLAs can be reduced to a monitoring/maintenance role for the support function’s involvement in delivering business outcomes for certain scenarios. If the main areas of contention are addressed through automated services, the supporting and operational activities become a secondary cost needed to correct problems, while not directly impacting business outcomes. In the financial calculations, these secondary costs can be amortized across all functions, which places them as a non-core business activity that is ideal for contracting out as a service. The one area that has yet to be addressed by the cloud is the whole change-management question. The new cloud-native applications are more DevOps-like and operate on a continuous software lifecycle with zero or minimal impact on business outcomes. However, this as a process is not as mature and well

understood as it needs to be to answer the concerns of business users. Ovum believes that the change aspect of cloud economics is therefore the most difficult to answer and link back to business activity. Ovum believes 2018 will see more CFOs looking to obtain a direct relationship between spending (general not just IT) and business outcomes. This transparency is why many line-of-business (LoB) leaders are happy to adopt a cloud-first approach, and many observers, including Ovum, believe the LoB spend will become the majority spend on technology within the next five to seven years. Ovum ICT Enterprise Insights 2017/18 – Global: ICT Spend and Sourcing n=6459 found that 70% of respondents believe the operations department is spending outside the approved IT budget, with 54% believing this to be true of the finance and accounting, and 52% of the sales and marketing department. When looked at from a country perspective 15% of North American companies in the survey reported LoB departments spent more than 30% over the approved IT budget.

Increased data sovereignty and regulation are creating a three-layer model for the cloud

The emergence of the local edge is driven by different yet related factors

The market for data center technologies has separated into three distinct categories: enterprise customers, co-lo and cloud service providers, and internet giants. The needs and requirements of these categories are defined by the extent to which they are deploying technology in disparate locations and the value of these deployments. To service all these customers requires a core set of capabilities: simplicity, rapid time to value, and flexibility. The difference between the categories (see Figure 3) is a factor of scale across three core types of location, including the ability to analyze data and obtain insights into operational costs, the flexibility of deploying edge computing, and the shifting cost associated with data center power architectures.

The market in global cloud provision is showing significant disruptions thanks to the trend to being more precise with the location of workloads and data. Government and industry regulatory rules on data and privacy are driving demand for different layers of public cloud availability based on geographic location. However, data privacy is not the sole reason for more localized public cloud offerings. Political instability is also a driver, as is growing enterprise demand for public cloud deployments. The 2016 UK vote on membership of the EU demonstrates that even in mature markets, political change can be disruptive to other nations’ economies and business operations.

Because of such disruption, a three-tier model has emerged: global centralized resources, regional resources (the merger of global and regional facilities

is showing signs of blurring this distinction, but it is the accessibility aspect that will keep them as separate entities), and a local in-country presence. This is changing the strategic decisions of many cloud service providers and internet giants. Most of the regional and local capacity is currently located in co-location facilities, and service providers are looking for cost-effective approaches to deploying a more distributed approach at the edge.

According to market forecasts, pre-fabricated data centers are growing in number at 15% CAGR. Vendors have developed a range of solutions that deliver a complete data center capability, including the power, switching, compute, storage, networking, and cooling needed to make a data center functional. However, these capabilities do not provide all the answers for operators looking to deploy regional and edge resources. The key capabilities that are missing include the speed and scale elements of any deployment, plus the expected associated reduction in complexity and cost. Other aspects that have an impact on this move to the edge are land, power, and connectivity as the three things that dictate the speed and scale of expansion. Most co-location and wholesale data center providers “bank” enough land to build big campuses. Also, there has also been a lot of merger and acquisition activity over the last couple of years in the industry (Verizon and CenturyLink have both sold their global DC estates), which has increased the amount of regional and local capacity available from co-location providers, although most of the existing capacity needs upgrading.

Finally, one thing Ovum expects to see more of in 2018/19 is AWS, Microsoft, IBM, Google, Alibaba,

and others opening more and more in-country data centers. For example, consider the current activity of AWS and Microsoft with recent and planned openings in the UK, Paris, Frankfurt, Singapore, and other locations. Both Microsoft and AWS are also

adding or have added UK government “regions” for the public sector (public sector and government are seen as particularly big opportunities in the UK, given that projects are supposed to be cloud-first and there are some massive HMRC projects in the offing).

A new breed of cloud providers is emerging where enterprise-grade credentials are critical

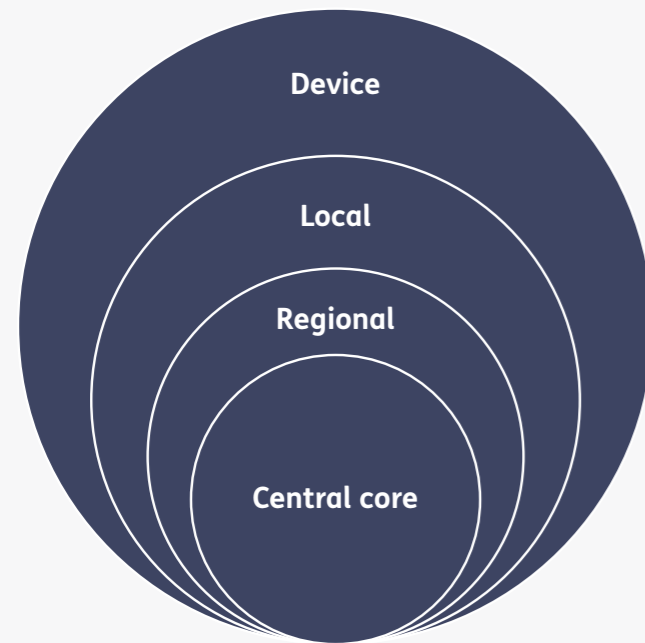
The journey to the cloud is as much about organizational maturity as it is about the technology

The journey to cloud adoption has changed over recent years. Initially the cloud was used for business productivity workloads (see Figure 5), but the selection of cloud services was also a confused mix of business-led actions without a clear IT strategic position. The dash to the cloud was driven by two main factors: first, swapping hefty license fees and cyclical upgrade-related capex for predictable opex spending, and second, the need to transform businesses to become digital. Digital transformation is about organizations thinking and acting differently, and technology is at the heart of this transformation. However, for many organizations, IT departments remain the custodians and guardians of this technology. As recent events (computer outages at British Airways in May 2017, Visa Europe in March 2017, and Delta Air Lines in January 2017) have shown, an unplanned outage can have a significant impact on business operations and a company’s reputation, notwithstanding the cost implications. Therefore, technology is critical to business success. Ovum’s research (ICT Enterprise Insights 2017/18 – Global: ICT Spend and Sourcing, n=6,489) shows that currently, operations, sales and distribution, and finance and accounting are the top three line-of-business departments in terms of IT spending outside the approved IT budget. If CEOs can get to work and meetings in self-driving cars, and can ask Alexa what is on their calendar or for a business update, why should the rest of the organization not have access to the latest technological breakthroughs in order to enable productivity and business success? The future IT department must embrace the concepts

of decentralized IT management environments, greater use of emerging technologies, and increased automation. It must also deliver this in a way that avoids many of the pitfalls of decentralization, including duplicated spending, a lack of clear lines of responsibility, and compromised security and outages that could damage the company. 2018 will see organizations evolve their thinking about the path to cloud, and what that path must deliver while on the journey.

The challenge for most IT departments is that they have evolved over a number of years due to developing deep technical knowledge, which has resulted in the different and often isolated siloed teams we see today. However, as the technology evolves at an ever-increasing pace, it becomes less about understanding IT and more about how the technology can be used. The principles of software-defined management will be the driving force for this transformation where the management of IT is a decentralized model federated across different teams and different locations. Supporting this move to a decentralized IT approach, a recent VMware survey of 1,200 IT decision-makers and heads of lines of business in eight countries found 58% of respondents agreed that decentralized IT gives the business more freedom to drive innovation. The survey also found that 59% of respondents believe that a decentralized IT approach will enable the business to deliver new products to market faster. However, 49% of respondents agreed that a decentralized IT approach has led to purchasing insecure solutions, and 53% said it has caused a duplication in IT spending. Much of this next wave of technology innovation is separating the different layers in the technology stack

Figure 3: Cloud and the move to the edge



The extreme edge if the device/sensor etc that will increasingly become smart, but for most enterprise customers is considered beyond the edge

Local edge can be a cell tower or an office and is used to collect the data and process it from sensors and provide real-time analytics

Regional hubs are typically in country or region where the local edge feeds into. This is of importance in terms of sovereignty

The central core includes typically large centralized locations that will be used to correlate federated data analytics and promote distribution

Source: Ovum



and moving management to a software capability, as well as adding AI and advanced automation to improve effectiveness and efficiency. The challenge for many is that if organizations are to make this shift, the business must trust that IT can deliver the flexibility and cost-effectiveness required.

The approach taken to modernize legacy workloads in 2018 will become more diverse

In 2016 the move to the cloud was seen very much as a destination every self-respecting enterprise must have on its CV. To achieve this, many organizations simply moved existing applications from on premises to a cloud provider (or a private on-premises cloud). This was known as “lift and shift”. The benefits of this approach were not articulated very well beyond its move from a capex to an opex model. The shift in cost model proved to be of marginal benefit, and the application remained “locked” into its environment, meaning the other benefits of cloud, scale, flexibility, simplicity, and agility were not realized. The problem, as enterprises soon discovered, is that the

application must be designed for the cloud before the real benefits become realizable. Simply moving a n-tier application stack from one environment to another had very little impact on how the application operated, or engaged, with the environment. 2018 will see the continued rise of “cloud-native” as an approach to truly modernize the organization’s IT capability. Only by breaking the monolithic application stack into smaller, reusable, components that have the ability to be assembled and combined in a way that respects the data integrity, performance, security, and service quality as it scales will organizations realize the benefits of cloud computing. However, as Ovum research (IT Services Market Forecasts: Cloud Services, 2015–21) found, the move to SaaS or a PaaS approach to application migration remains a popular choice. Figure 4 shows that 56% of cloud spending, circa \$70bn, will be directed to SaaS, which is a good indication that in 2018 much of the move to cloud will be either new cloud-native or SaaS-based, with the lift-and-shift approach finding less traction due to the limited business benefit.



Bare metal as a service will increase in popularity in 2018

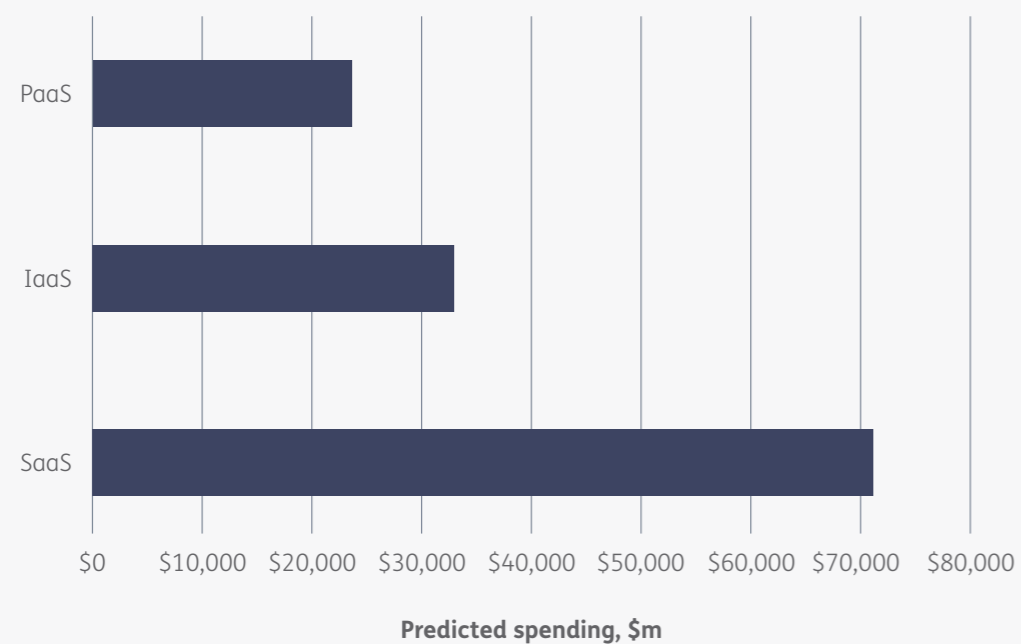
One of the fastest growing sectors of the IaaS market, according to cloud suppliers, is in bare-metal services. The movement of workloads to the cloud is becoming more varied, and while “lift and shift” to virtualized cloud environments is not seen as providing the agility benefits of the cloud, it does answer a short-term capital exposure for those facing infrastructure-refresh programs. Bare metal as a service is a new way to provide yet another solution to mitigating some of the issues with public cloud virtualized environments. Bare metal reduces the noisy neighbor issue, creates electrically isolated services, and still offers the scale and flexibility of virtualized public clouds. Ovum believes this approach will find a ready market in situations where high data intensity burst requirements with very low latency are needed, such as high-performance computing, media rendering, and big data.

In 2017, AWS agreed a deal with VMware to run VMware cloud on AWS. This move required AWS to offer to VMware bare-metal services so it could build its VMware cloud on its own hypervisor and not KVM that AWS uses. This announcement has revived the concept of bare metal as a service, where enterprise customers can move from existing on-premises infrastructure to an opex-based cloud model, although in the VMware/AWS case, it’s more about allowing VMware to have complete control over its stack and services. The market for cloud providers to

offer bare metal as a service to enterprise customers is not yet common practice, but as Oracle and other smaller providers promote this service, Ovum believes that it will eventually become another variant of the IaaS market. The key driver for the wider adoption of bare metal as a service is the value for the enterprise of migration to cloud. On a bare-metal service, the customer can install the same environment as it has on-premises, move the workloads, and use the same tools and skills to manage the hybrid environment. While bare metal as a service will offer the ability to scale on demand, it is still unclear how this will operate in practice for customers. While it is true that bare metal can be made available rapidly, customers will need to install and configure the servers and storage for the specific purpose needed. Ovum therefore expects to see a significant increase and improvement in the automation and provisioning tools provided by cloud suppliers. These tools will be needed to help ensure that scalability and flexibility are still able to be performed to meet business demand, and prevent a return to traditional processes that cause delay and frustration.

Another benefit seen as a value add with bare metal as a service is that it can eliminate the licensing costs of hypervisors and improve performance in scenarios such as database workloads (Oracle RAC clusters) where you don’t want a hypervisor getting in the way. Ovum believes that to get the same benefits plus the agility benefit for other workloads, running containers on bare metal is the direction the market will take.

Figure 4: 2018 cloud service-line spending forecast, \$m



Source: Ovum

DevOps in 2018 will struggle to integrate infrastructure as code into operational processes

Containers and microservices are at the forefront of this revolution

The rise of cloud-native applications has gone hand in hand with the use of containers and microservices so that applications are not locked into any particular environment. The concept is that running applications and processes in software containers enables them to operate as an isolated unit of application deployment, and as a mechanism to achieve high levels of resource isolation. Proponents believe that containers improve overall developer experience, foster code and component reuse, and simplify operations for cloud native applications.

However, to manage containers, a new and different tool is needed to provide the ability for containers to be actively scheduled and managed by a central orchestrating process. This approach delivers radically improved machine efficiency and resource utilization that also has the effect of reducing the costs associated with maintenance and operations.

Kubernetes is currently the tool of choice. It is used by 47% of respondents to the OpenStack user survey 2017. The second most popular tool, with 22%, is an own-built approach. The challenge in 2018 for cloud providers will be how to promote a container-managed service to customers. The problem for many enterprise organizations is that managing containers requires new and different skills to those needed for managing VMs, and the skills needed are in short supply. While the developers are more advanced with the use of infrastructure as code, the role of operationalizing these workloads is behind the technology. This situation is adding to friction in DevOps, because containers can be generated from

the agile processes, but testing, QA, and operations do not have a sufficiently robust ecosystem of tools for more mainstream adoption.

New operating processes and procedures are required for a cloudy world

Global economies are changing, driven by the rapid advances in technology, and organizations must embrace this change if they are to succeed in the new digital economy. One of the central technology shifts driving this move for digital transformation is cloud computing. The new cloud-based technologies that are being deployed alongside more traditional data center solutions require a new thinking in terms of how they are managed. Digital enterprise management (DEM), or enterprise service management (ESM), includes the idea that managing the digital enterprise requires seven different aspects to be considered, and also requires expertise in seven different disciplines:

- The digital workplace
- Agile application development
- The alignment of security teams with operations teams or secops
- Service management excellence
- Big data
- IT optimization
- Support for multisource cloud

The most important aspect of DEM's focus in 2018 will be the need for service management excellence. This covers a wide set of ideas and concepts that will challenge the ITIL-based view of what ITSM is and how organizations should deploy it. DEM takes a more holistic perspective on service management and recognizes that it should not be

a pre-packaged one-size-fits-all solution, but must instead be tailored to the business and market where the customer is operating. Ovum believes that taking a wider perspective introduces the prospect that line-of-business departments can use the DEM/ESM solutions to solve their own service-management challenges when they move to cloud environments. BMC quotes the example of German car manufacturer BMW that is using the BMC DEM solution for a much broader use case than dealing with IT incidents. BMW is using the solution for its dealer network for tasks such as being able to order branded accessories for vehicles more easily and with greater transparency.

However, for Ovum, it is the IT optimization capabilities that demonstrate how DEM is building the link between the technology and the business.

This area of IT financial management and visibility is the aspect of DEM that many vendors lack in terms of maturity of understanding, and ability to integrate with all aspects of ITSM. Ovum believes that DEM represents a vision of how IT should be managed in a multicloud environment where cost and value will be important facets business leaders will want to have visibility of.

As organizations recognize that new operating processes and procedures are needed for a cloudy world, with some of the work being performed by what today is considered non-IT staff, in 2018 new roles and structures will emerge, such as site-reliability engineers.

The market in public cloud computing is bifurcating

The mega-cloud providers are in a race to dominate the enterprise-grade market

According to Ovum's ICT Cloud Enterprise Insights survey 2017/18 n=5,125, 80% of the IaaS market is served by four suppliers: AWS, GCP, IBM Bluemix, and Microsoft Azure. However, early indications from the 2017/18 survey show that enterprise customers are increasingly selecting more than one cloud provider. The other change that is happening in the cloud market is the type of workloads now moving to the cloud is changing, and with it the expectations of organizations.

The Ovum research showed the shift in workloads is clearly moving from productivity workloads, such as email, to more core, mission-critical, enterprise workloads such as ERP. ICT Enterprise Insights

2016/17 – Global: IoT and Cloud showed that 20% of respondents report a plan to move email to the cloud in 2018, compared to 55% in 2017, while ERP workloads in 2018 is reported as being moved to the cloud by 30% of respondents.

This split in the workload type is creating a split in the cloud market, with enterprise-grade cloud now being used to describe cloud providers that can provide all the necessary capabilities required by enterprise IT. The characteristics of an enterprise-grade cloud include:

- Simplicity, which is the ability to manage and orchestrate workloads from a single console across the entire estate without the need for specialist skills. The simplicity characteristic also refers to the pricing model and ways of working with the cloud provider.

- Transparency, which refers to the ability to have visibility into the cloud provider's services and make adjustments to the resources to match the needs of the workload. This transparency (including pricing, service levels, clear delineation of responsibilities, security and privacy) is also needed at the level of operational tasks such as patching level and policies so that governance can be confirmed.
- Performance and scale, which is the ability to provide the required resources to deliver the performance needed by the enterprise and to enable the workload to scale up and down to meet demand and maintain performance.
- Service quality, which includes the availability and reliability of the service, is one of the most important aspects of enterprise-grade cloud. For mission-critical workloads, availability is a core element of what makes them critical, so any cloud provider must have a robust architecture that can deliver the levels of availability required while also delivering the performance.
- Support, which is important because many enterprise customers are moving to the cloud so that they can refocus their IT teams on more value-added activities to drive business growth and profitability. Therefore, for a cloud provider to be enterprise-grade, some level of maturity in internal operational processes and good account-management principles are expected. Enterprises see the cloud as a collaborative partnership rather than a supplier/customer relationship.

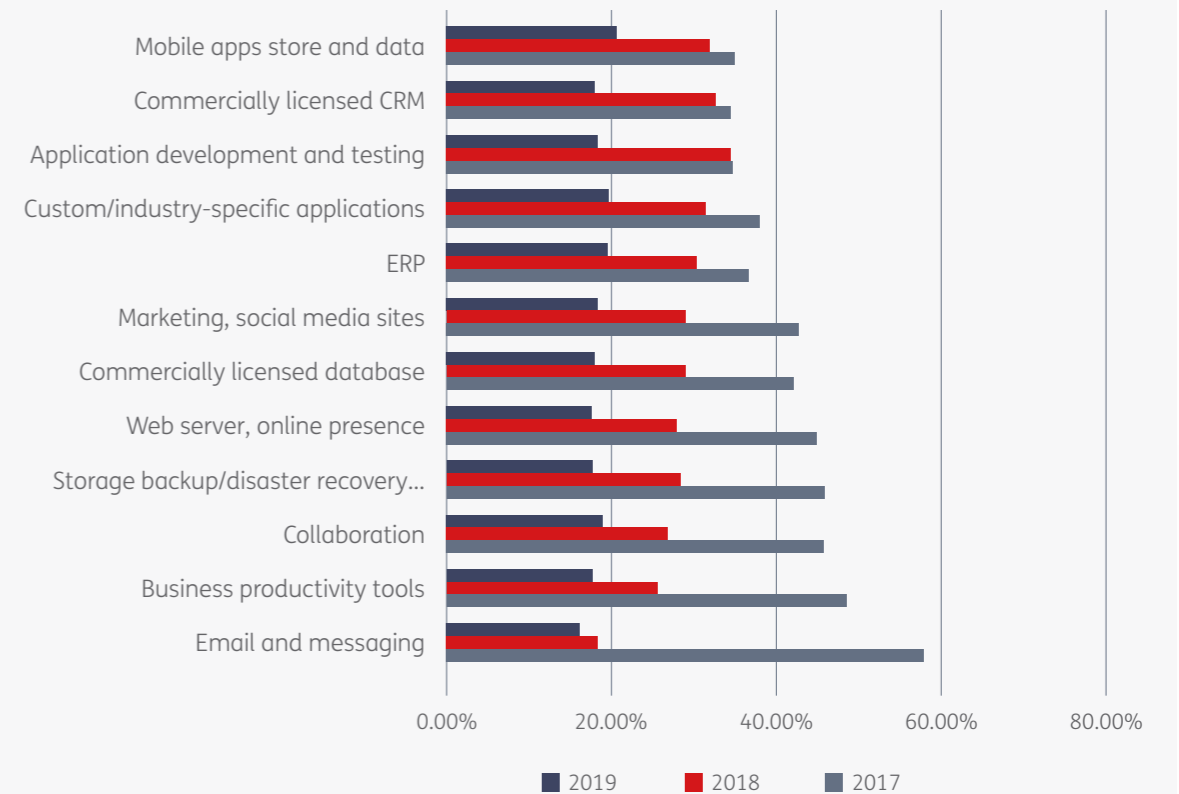
The leading cloud providers are now positioning themselves as enterprise-grade in an attempt to secure much of the new workload moving to the cloud.

Mid-market and SME customers will influence the market growth of the regional cloud providers

With the large cloud providers shifting their focus to meet the demands of enterprise mission-critical workloads, mid-market customers will find they are put in a difficult position. They have just as great a need for enterprise-grade cloud as large enterprise customers, but they do not require this globally. Instead, mid-market customers will look for specialist providers in their sector or in their region that can provide the services required, with a degree of understanding in terms of the business challenges. Ovum believes that this area represents a significant area of potential growth because customers in the mid-market are unlikely to have a direct relationship with a mega-cloud provider, and could feel unsupported as they continue on their cloud journey. The tipping point for many mid-market customers will be when they begin to migrate ERP, CRM, and databases to the cloud. Figure 5 shows this is scheduled to start in 2018 and continue into 2019.

Ovum believes that as the mega-cloud vendors focus on the mid-market and above, the customers in the SME and mid-market sector will look for cloud solutions that match their needs and offer the help and guidance needed to migrate to this new operating model.

Figure 5: Mid-market customer adoption of workloads on the cloud



Source: Ovum

Appendix

Further reading

Ovum Decision Matrix: Selecting a IaaS provider, 2017-18, IT0022-001035(August 2017)

Understanding the complexities of cloud economics, IT0022-000937 (May 2017)

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