A Forrester Consulting Thought Leadership Paper Commissioned By Orange Business Services

Measuring The Value Of The Cloud

Metrics For Infrastructure-As-A-Service Need To Move Beyond Cost Comparisons

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FORRESTER®

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Executive Summary

With the increasing implementation of cloud infrastructure-as-a-service (IaaS), companies are taking advantage of new benefits such as increased flexibility, availability, and security. However, capturing value and return on investment (ROI) has become a challenge, as traditional measures fail to connect the new benefits and cost structure to business results. In October 2011, Orange Business Services commissioned Forrester Consulting to evaluate the metrics used to evaluate the ROI of cloud IaaS. Forrester observed the types of metrics enterprises are using and concluded that while companies struggle to identify ongoing *business* metrics, leading-edge firms have evolved the processes they use to measure those that they do capture.

In conducting in-depth interviews with 18 business and IT professionals, Forrester also found that these companies were at varying stages of cloud maturity and therefore had varying degrees of detailed metrics. While the least mature companies were just looking at the direct cost benefits of cloud infrastructure, the more mature ones linked their metrics to business outcomes. Developing these metrics individually and the correctly selecting the workloads where cloud computing really provided business benefits turned out to be the major ROI driver.

Key Findings

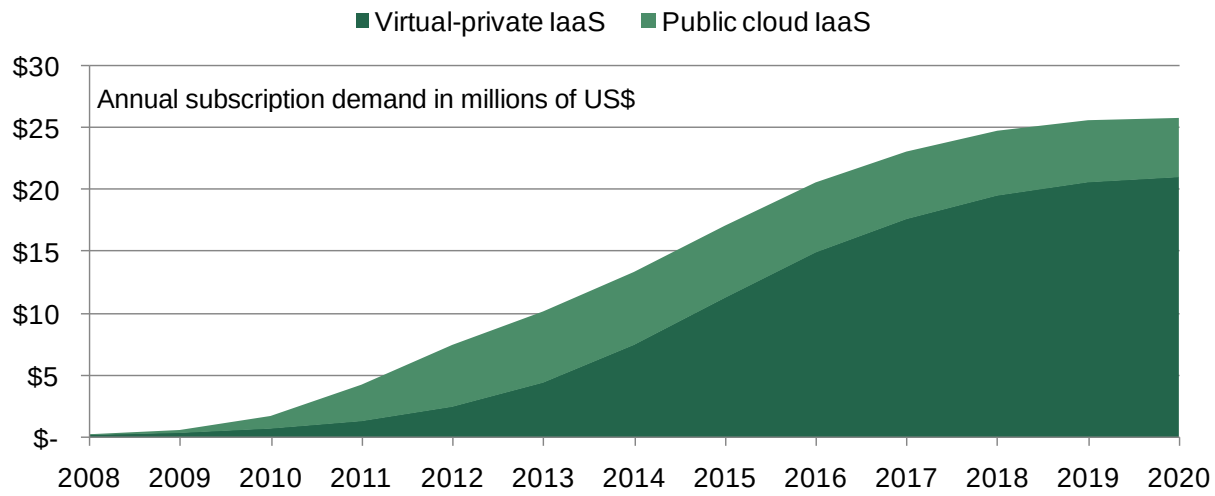
Forrester's study yielded these key findings:

- **Customers have different levels of maturity in terms of cloud consumption.** Less mature customers look for simple, immediate cost savings, whereas more mature customers value the flexibility, elasticity, and economic opex characteristics of cloud services even more highly than pure cost savings.
- **Very mature customers even go beyond productive workloads in the cloud.** These businesses would not work with a traditional IT approach at all. They are mature cloud users that use metrics incorporating business results, not just cost or technical metrics such as computing power or bandwidth.
- **An assessment of each workload's "cloudability" leads to a higher consumption maturity.** Firms can run this assessment together with their service providers to design the respective metrics accordingly.
- **Business-oriented cloud metrics help bridge the gap between business and IT.** IT departments can improve their value communication based on business-centric metrics instead of technical metrics to measure total cost of ownership (TCO) or cloud computing consumption.

Firms Will Still Widely Adopt Hybrid Cloud IaaS, But Will Suffer From Fragmented Maturity

Throughout 2011, Forrester observed the shift from learning to implementing cloud IaaS. Service providers have evolved to deliver and implement promising end-to-end cloud suites and consulting services are emerging or expanding in preparation.[1] In tandem, enterprises are focusing on benefits of attractive opex models with new business flexibility. They are overcoming the traditional barriers of security and compliance, as illustrated by steadily increasing adoption rates (see Figure 1). Notable developments within the IaaS market are:

Figure 1
Virtual-Private Solutions Will Be The Most Popular Choice In The Future

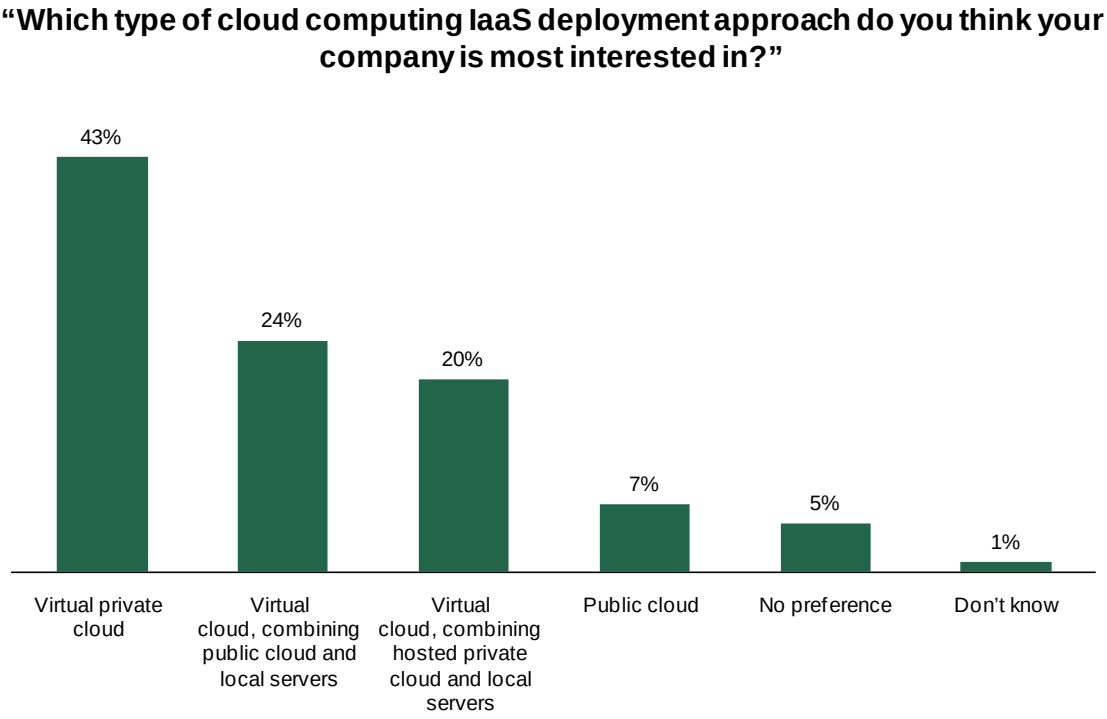


Source: "Sizing The Cloud," Forrester Research, Inc., April 21, 2011

- **Virtual-private cloud IaaS will be most widely adopted over the next 10 years.** Virtual-private cloud IaaS solutions are characterized by their elasticity and pay-per-use models, but allow the prediction of data residency for local data compliance laws. Therefore, by walking the middle ground between public and private clouds, this deployment will be attractive to firms, as it provides the necessary security and compliance options for even the most highly regulated industries (e.g., finance and healthcare) while replicating the scalability advantages of public cloud IaaS offerings. Additionally, it removes the need for capital investment necessary for a private environment.

- **Private cloud IaaS will be reserved for the most sensitive data and usually combined in a hybrid environment.** Customers can expand business processes across public, private, or virtual-private cloud environments in hybrid cloud scenarios. This increases the computing capabilities without overloading internal resources. Firms with the capability to virtualize their server environments and move toward a private cloud IaaS do not foresee this as the end game.[2] Private clouds allow firms complete control and configurability of the infrastructure and security to adhere to the strictest security and compliance regulations. Despite giving firms the capacity to host their own environments, Forrester anticipates that this will most likely still not be able to provide the necessary computing power 100% of the time or be suitable for all of a company's applications.[3] Therefore, the ability to tap into external resources on a real-time basis to facilitate peak loads is an attractive offer (see Figure 2). However, facilitating this ability into business processes will force firms to more effectively classify and standardize their workloads so they can move seamlessly between the environments without infringing privacy laws.

Figure 2
Virtual-Private Clouds Are The Most Appealing Option



Base: 148 global enterprise executives who have implemented IaaS or are planning to do so

Source: Forrsights Hardware Survey, Q3 2011

- **On-demand flexibility is the most important driver for IaaS adoption.** In a recent Forrester survey, 79% of respondents cited on-demand capacity and scalability as either the most important or an important factor for adopting or planning to adopt IaaS (see Figure 3).[4] Lowering capital expenditures followed closely behind, at 71%. This illustrates the disconnect of communicating the value of the cloud, as the majority of metrics still focus on cost, whereas the current value perception is based on flexibility and scalability.

Figure 3
On-Demand Scaling Is The Top Motivator For Cloud IaaS Adoption

Base: 148 global enterprise executives who have implemented IaaS or are planning to do so

Source: Forrsights Hardware Survey, Q3 2011

- **There is a wide variance of "cloud maturity" within firms.** From the interviews conducted in this study, it is apparent that there is a large gap between cloud IaaS forerunners and cloud IaaS laggards. Some firms are happy to use cloud IaaS for horizontal shared services such as email hosting and backup services, while others rely on their IaaS for their core business processes. The degree of integration and associated processes illustrates the level of cloud competence contained within a firm — and therefore the potential value from cloud IaaS deployments.

Flexibility Expectations Are Better Met By Sophisticated Cloud Metrics

Forrester interviewed a wide range of enterprise companies from different verticals and geographies for this study. Accordingly, the use of cloud solutions varied from simple email hosting and archiving to business-critical back-end website management. While almost all interviewees track metrics such as uptime, technical performance, and cost, only

the most mature cloud users tie specific projects to business results. However, interviewees struggle to communicate value to business executives through standardized metrics, highlighting a major communication risk.

From this spectrum, this study has segmented the results into three levels of maturity, highlighting the driving factors, characteristics, and typical metrics used (see Table 2). Additional key findings at each level are:

Table 2
Business Maturity Spectrum Of Cloud Infrastructure Consumption

Level of maturity	Driving factors and characteristics	Typical metrics and internal communications used
Initial cloud adoption	• Driven by IT • Based on cost factors (moving to opex) • Redeployment of horizontal and non-business-critical applications.	• Business case for adoption/implementation; no continuous metrics • Overall IT budget tracking; no specifics on particular projects • IT technical metrics for performance
Serious adoption	• Driven by IT for a business need • Flexibility and ease of access are key goals. • Mostly horizontal applications, but also some key line-of-business examples like CRM, are hosted on IaaS.	• Technical metrics are tracked for IT purposes. • Cost metrics are captured by a separate business unit. • Drivers of flexibility and ease of access are not captured.
Cloud first	• Driven by the lines of business • Benefits of IaaS are seen as critical to the functioning of productive applications. • IaaS is embedded into key business processes for core functionality.	• Technical and cost metrics are captured and communicated by one business unit . • Communications are tailored to different readers in metrics relevant for them. • Internal SLAs are used to ensure transparency and predictability.

Source: Forrester Research, Inc.

- **Everyone still struggles to identify ongoing, standardized metrics.** This further illustrates the immature relationship between IT and the business; almost all interviewees failed to identify a relevant business metric. Furthermore, the majority of metrics are not communicated to a business stakeholder on a regular basis. The few business metrics that were mentioned were only captured on an ad hoc basis, making it difficult or impossible to show increasing value over time.

"We do not capture information on an ongoing basis after the implementation is complete. We use a comprehensive business plan to prove the case for adoption, which will change for new considerations, but we do not have specific measures afterwards." (Information technology infrastructure manager, North American manufacturer and distributor)

- **Initial cloud adopters do not rely on IaaS for productive applications and focus on cost advantages.** These companies are interested in the horizontal applications of IaaS, such as redeploying their email or archiving systems — similar to the wave of interest in outsourcing low-value services. With an impetus to reduce the bottom line, interviewees focused on moving toward an opex model to avoid capital expenditures. While there was some mention of internal budget tracking, the majority of these companies focused on the opportunity cost of moving to IaaS and then continued to focus on technical comparisons.

"We concentrate on the top cost categories — capital, maintenance, contracts, and FTEs. The opex model has obvious advantages here and this should be good enough to make the cost savings obvious for the business case." (Senior enterprise architect, North American retailer)

- **Serious cloud adopters gain a competitive advantage through the cloud and observe some soft benefits.** These firms have started hosting some of their productive applications for lines of business within cloud IaaS deployments. When asked about the advantages of cloud IaaS, improvements in flexibility and reliability were widely used to describe the drivers from the business. However, these benefits were not formally captured and therefore were not communicated to the relevant stakeholders.

"The stability of our network is now great. Previously, most offices had to deal with errors individually and did not communicate or collaborate. Now, for example, when there are updates, everyone gets them at the same time. This is changing the culture, as we now feel we are a firm working with the latest technology and we are more professional." (Director of information technology, North American services company)

- **Serious cloud adopters rely on cloud IaaS and illustrate value by highlighting business results.** Mitigation of risk emerged as one of the key themes for firms with cloud IaaS embedded in business processes. By having the security of multiple machines running through the cloud, not just local servers, these companies sacrifice some performance for a highly available network. This reduces the risk of a network failure, allowing business to continue as usual. Additionally, these firms have the ability to seamlessly scale hosting capabilities to handle peak loads with minimal prior planning, further increasing uptime and freeing IT resources for other projects. Tracking metrics such as uptime and performance benefits and illustrating worst-case scenarios of lost business due to downtime directly links the value of cloud IaaS to revenue and the business.

"Our virtual-private solution allows us to handle flash crowds without having to monitor it. This leads to better performance, more satisfied customers, and therefore a better conversion rate. Also, if the site goes down for 4 hours, I am out of a job. It's not cheap, but it's less expensive than trying to provision all the hardware ourselves." (Vice president, North American retail enterprise)

"One big factor is reduction of risk in the new infrastructure. Risk can be quantified through cost savings and therefore shown as a business advantage." (Enterprise Windows infrastructure manager, European bank)

"There are agreed SLAs for performance and uptime. These reports are sent to BUs on a monthly basis for them to sign off on and accept the service they are receiving. When systems are working well, no one hears about this, but when there are problems, everyone hears about it. Therefore, this provides perspective. Also, by highlighting a lack of failures to the board, they can argue for more budget for more services." (Head of IT for a major branch of a European bank)

- **The most advanced cloud adopters follow a cloud-first approach.** Forrester talked to enterprises whose core business would not be possible with a traditional IT approach. These business models are either based on the massive elasticity of computing power in the cloud or on the distributed storage capacity around the world. A vendor of forecasting solutions for the retail and manufacturing industry can compute totally new simulation algorithms at a competitive price because it has not invested in any on-premises infrastructure:

"Our forecasting service is not only cheaper but also more precise, as we can temporarily invest in far more computing power than any of your retail or manufacturing customers could invest in on-premises. The pricing is based on the number of forecasts — this is a pure business metric. We do not share the physical IaaS consumption that our forecasting engine consumes." (Chief technology officer of a European forecasting-as-a-service vendor)

Another cloud-first firm we talked to was a social media service delivering electronic greeting cards around the world:

"Our business has a lot of peak loads, such as on Valentine's Day. We could not run such a rich content delivery business without a large content delivery network (CDN) operating thousands of servers at hundreds of network providers. The CDN costs are the majority of our IT budget and are directly considered in every product we launch." (VP of IT operations of a US-based media services firm)

Firms Need Help To Develop Relevant Metrics And Pick The Right Workloads

This research study highlights the disconnect apparent between what the business is looking to achieve and what IT is communicating via the metrics it collects. However, this is not a single department's fault, as the value of cloud solutions highly depends on the process it is used for. Therefore, to capture the maximum value from IaaS solutions, firms must assess the business processes they are looking to migrate to the cloud and decide which metric(s) most accurately describes business success. For example, the metric of a customer-facing eCommerce site should not be the how many virtual machines it has or how many gigabytes of network traffic it transfers. It should directly measure, for example, the number of transactions achieved within a certain time frame.

To do this, firms must analyze the following aspects to determine the viability of cloud IaaS for their IT landscape:

- **Variance of demand for the provision of services.** Processes with high variance due to seasonality or peak times will gain advantages from performance elasticity offered by cloud IaaS solutions. Workloads with flat performance requirements will realize fewer benefits.

- **Local and industry data security and compliance requirements.** One of the main inhibitors of the cloud in the past is now one of its main drivers. Virtual-private IaaS providers are arguably more secure than individual enterprises, as they are a specialized service provider with more mature business processes and can achieve better economies of scale to implement security measures. Additionally, all data is secured under contract and there is no risk of losing physical devices. Workloads that have medium security and privacy requirements will realize great benefits from cloud services, whereas it will be more difficult to see such returns for these workloads that have extremely high data privacy requirements.

- **External collaboration scenarios are better facilitated within a cloud environment.** Workloads that incorporate direct interactions with customers, suppliers, and business partners — such as extranet solutions and supply chain management — will see more benefits from cloud infrastructure than the hosting of internal applications such as manufacturing management solutions.

- **The degree of specialization of the process or application to a firm or industry.** Commodity services like email, email archiving, and data backup or ready-to-use software-as-a-service (SaaS) applications such as CRM are already highly standardized. Only minor differentiation exists between firms, and no individual intellectual property is implemented in this class of workloads. These will be the easiest to move to IaaS. In contrast, processes and applications, which are specific to an industry and may have been custom-built over decades, are on average more difficult to move to the cloud.

- **The relevance of mobile applications.** Technically, on-premises applications can be opened up to mobile devices in the same way as cloud-based SaaS applications or custom applications deployed on IaaS. However, in reality, granting secure mobile access is a significant effort. Thus, many enterprises realize that applications that require mobile access provide an additional TCO advantage compared with traditional deployment.

Some IT workloads may be "cloudable" and promise a good ROI for one of the above criteria but not for another. Successful cloud transformation projects took an average of these five benefits and came up with a priority for each workload on its journey to the cloud. Forrester realized during the customer interviews that firms need help on this journey. The design and implementation of the metrics necessary to communicate the business value and avoid the disconnect are critical success factors. Therefore, customers need to engage with their service providers for methodologies to translate metrics such as availability and performance into flexibility and provisioning times to illustrate business value. Doing so not only reduces costs, but also allows the IT department to clearly illustrate its business impact. The interviews revealed some commonly used metrics in relation to IaaS and how these metrics are disrupting traditional SLAs (see Table 2).

Table 2
The Evolving Metrics Of Cloud Delivery Models Are Disrupting Traditional SLAs

Metric	Measured in the cloud	Measured in traditional IT	Cloud achievement
Uptime	A list of outages of business applications on trust pages[5]	Statistical uptime in 99.xx%	Based on the scale and virtualization of cloud providers, they can overcome the failure of a single set of hardware.
Performance	The typical response time of a defined user interaction in milliseconds	The number of incidents that violated the maximum response time for defined user interactions per day or week.	Cloud providers can deliver higher average performance for a lower price based on high utilization and dynamic adaption of physical resources.
Elasticity	The effort to scale out applications dynamically in cost multiplied to double the performance.	The effort and time to provision a new server for a specific application.	In many cases, cloud providers support automatic policy-based scaling into a large pool of virtual resources.
Cost	Cost per user and per month	Traditional enterprises have significant effort for an initial server.	The cloud provider can shift from application/tenant pricing to user/transaction/volume pricing in an opex model.
Business outcome	The cost of cloud resources directly related to a transaction, such as a forecasting service	IT cost is much more indirect, hidden in multiple corporate capex and opex expenditures.	The direct relation between cloud expenditures and business outcomes is much more transparent to business units.

Source: Forrester Research, Inc.

KEY RECOMMENDATIONS

- **Enterprises should define cloud metrics corresponding to their adoption maturity.** While technical metrics are helpful in the early phases, more mature consumption of cloud computing will demand business-oriented metrics that measure the success of a cloud service.
- **Even traditional industries can benefit from new business models fueled by cloud resources.** Cloud resources cannot only be an alternative to an existing on-premises infrastructure. The cloud can also enable business cases that were not previously possible. More accurate forecasting can, for example, optimize stock volume and thus directly and significantly affect the profit of a retail organization. However, the traditional cost of such a forecasting computation might have been bigger than the savings.
- **Cloudability can differ by workload.** Not every IT workload will benefit from the cloud. Firms should work with the cloud provider of their choice to assess the current on-premises workloads with respect to performance requirements for elasticity, uptime, security, and legal compliance.
- **Business-oriented metrics help IT departments communicate value to their business units.** While the lines of business used to struggle with translating traditional IT costs into business value, opex-based cloud models can be related directly to business volumes. The better an IT department and a cloud provider manage to translate storage, computing, and network consumption into business value, the more strategic cloud computing becomes.

Appendix A: Methodology

In this study, Forrester interviewed 18 organizations in US and Europe to evaluate the metrics used for measuring the value of IaaS. Survey participants included decision-makers in IT operations. Questions provided to the participants asked "Please can you describe your usage of cloud infrastructure? What are the typical computing workloads", "Can you estimate the number of users of productive applications on cloud infrastructure?".. Respondents were offered access to this final published paper as a thank you for time spent on the survey. The study began in October 2011 and was completed in December 2011.

Appendix B: Supplemental Material

Related Forrester Research

"The ROI Of Cloud Apps," Forrester Research, Inc., June 23, 2011

"Sizing The Cloud," Forrester Research, Inc., April 21, 2011

"2011 Top 10 IaaS Cloud Predictions For I&O Leaders," Forrester Research, Inc., February 14, 2011

Endnotes

[1] Source: "2011 Top 10 IaaS Cloud Predictions For I&O Leaders," Forrester Research, Inc., February 14, 2011.

[2] Source: "Enterprise Cloud Management Capabilities Road Map," Forrester Research, Inc., December 22, 2010.

[3] Source: "Deliver Cloud Benefits Inside Your Walls," Forrester Research, Inc., April 13, 2009.

[4] Source: Forrsights Hardware Survey, Q3 2011.

[5] See Stefan Ried's blog for the role of trust pages in contrast to traditional SLA reporting: http://blogs.forrester.com/stefan_ried/10-09-15-trustplatformcom_—_how_communicate_slas_cloud.