CLOUD COMPUTING
Guidelines for SMEs & Microenterprises

Index

What is Cloud Computing?

The 'cloud' is the trending word of the moment. Everyone is talking about it, and rightly so. Cloud computing marks one of the major evolutions in computing history and is commonly used to describe the delivery of software, infrastructure and storage services over the Internet. The 'cloud' symbol is typically used to represent the Internet.

The US National Institute for Standards and Technology (NIST)[1] defines cloud computing as "a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction."

The NIST definition lists five essential characteristics of cloud computing: on-demand self-service, broad network access, resource pooling, rapid elasticity or expansion, and measured service. It also lists three "service models" (software, platform and infrastructure), and four "deployment models" (private, community, public and hybrid) that together categorize ways to deliver cloud services. The definition is intended to serve as a means for broad comparisons of cloud services and deployment strategies, and to provide a baseline for discussion from what is cloud computing to how to best use cloud computing.

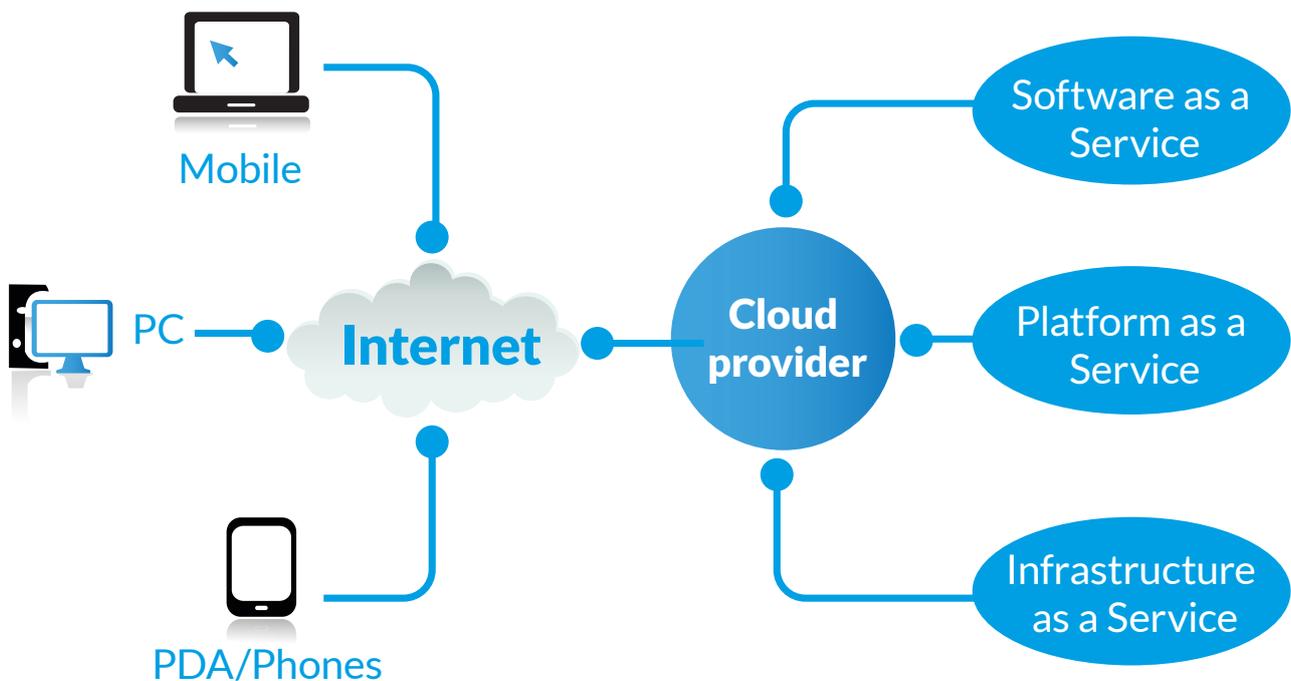The Service Models as defined by NIST are:

- **Software as a Service (SaaS)** - The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure . The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited userspecific application configuration settings.

- **Platform as a Service (PaaS)** - The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.

- **Infrastructure as a Service (IaaS)** - The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls)

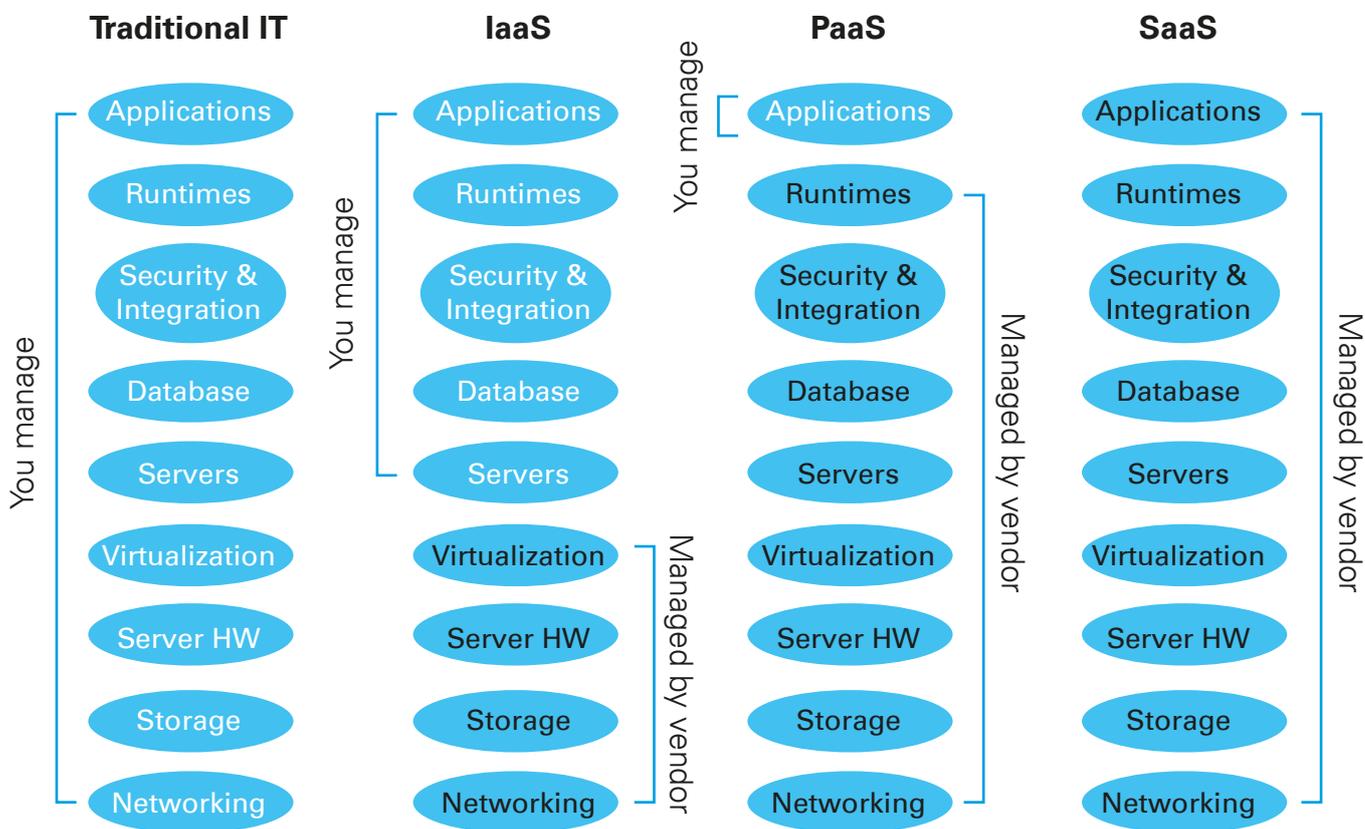Cloud computing offers a number of benefits, including capital investment savings, high reliability, availability and security, better manageability, scalability and strategic advantage.

Cloud computing provides the means through which everything, from computing power, to computing infrastructure, applications and business processes, can be delivered to you as a service, wherever and whenever you need them.

Cloud computing solutions can simplify the way businesses operate, particularly in terms of hardware and software needs. Cloud based solutions allow you to connect and access the same information anywhere, any time as part of a more organised and streamlined setup.

Examples include Dropbox, Google Drive, Amazon Cloud Drive, Microsoft OneDrive and iCloud. With the proliferation of mobile devices used in today's business environment, access to your data is even easier with the cloud.

Traditional IT	IaaS	PaaS	SaaS
Applications	Applications	Applications	Applications
Runtimes	Runtimes	Runtimes	Runtimes
Security & Integration	Security & Integration	Security & Integration	Security & Integration
Database	Database	Database	Database
Servers	Servers	Servers	Servers
Virtualization	Virtualization	Virtualization	Virtualization
Server HW	Server HW	Server HW	Server HW
Storage	Storage	Storage	Storage
Networking	Networking	Networking	Networking

Traditional IT: You manage (all)

IaaS: You manage (Applications–Servers); Managed by vendor (Virtualization–Networking)

PaaS: You manage (Applications); Managed by vendor (Runtimes–Networking)
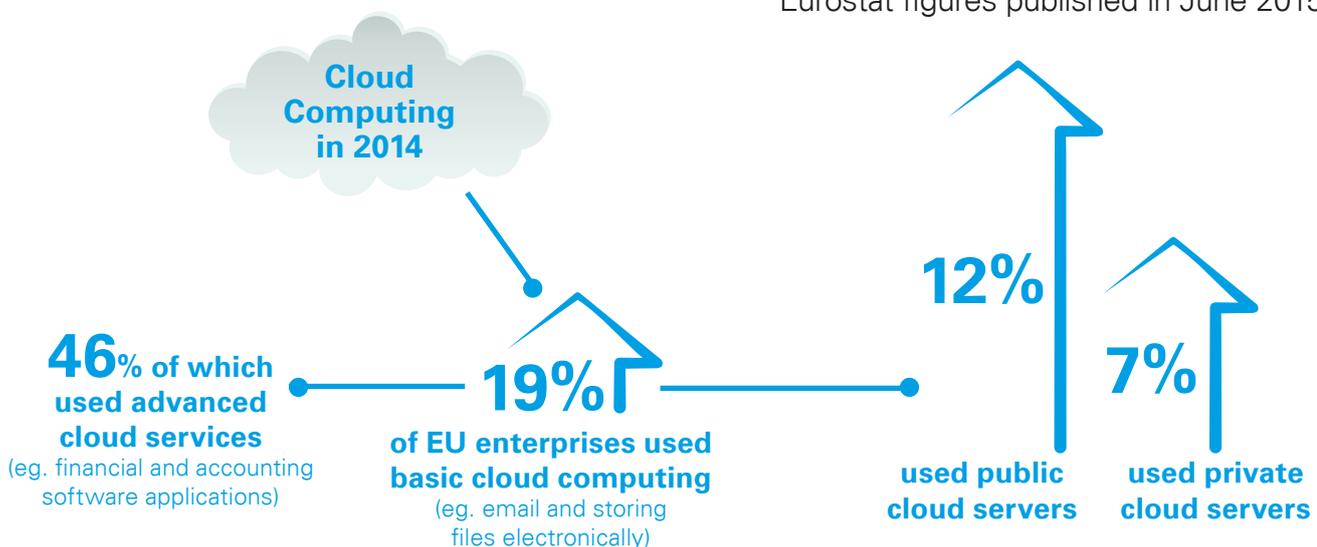
SaaS: Managed by vendor (all)

Benefits of Cloud Computing

The benefits of cloud computing cannot be underestimated. Cloud computing is not just a technology solution or a server stored in another location; it is a business enhancing form of computing that affects the business on a positive level. Cloud is designed to help organizations move from a capital-expenditure (CAPEX) model to an operating-expense (OPEX) model while providing different payment options, such as pay-as-you go or pay-per-project. In particular, this results into benefits of reduced infrastructure costs, reduced dependency on in-house IT skills and flexibility to adjust the services delivered to their needs are significant. Here are some of the main benefits of cloud computing solutions.

- Reduction in capital expenditure costs as you simply pay as you go and enjoy a subscription-based model.

- Improved flexibility as cloud computing enables your employees to work from any location.

- Increased accessibility. You can access your data anytime, without risks associated with physical storage since this is managed by cloud providers.

- Complex disaster recovery planning is avoided. Your cloud computing provider would take care of this for you.

- Cloud computing puts you on the same technological playing field as your bigger, more established competitors. Cloud computing providers take care of server maintenance therefore, your resources have more time on their hands for more important tasks

- Having all your files and documentation centrally located allows all your employees access to a central copy, thus facilitating document management. Cloud computing also offers increased operational agility as it is easy to scale up or down your cloud capacity depending on the current needs of your business.

The following illustrations are based on Eurostat figures published in June 2015[2].

Cloud Computing in 2014

46% of which
used advanced cloud services
(eg. financial and accounting software applications)

19%
of EU enterprises used basic cloud computing
(eg. email and storing files electronically)

12%

7%

used public cloud servers

used private cloud servers

Enterprises with cloud

39%

Four out of ten enterprises using the
cloud reported the risk of a security
breach as the main limiting factor in the
use of cloud computing services.

Enterprises without cloud

42%

A similar proportion of those
not using the cloud reported
insufficient knowledge of cloud
computing as the main factor that
prevented them from using it.

Salesforce.com who became one of the
first major adopters of the cloud, lists the
most common benefits of cloud computing.

1. Flexibility

Cloud-based services are ideal if your
business experiences growing or fluctuating
bandwidth demands. If your needs increase,
it's easy to scale up your cloud capacity,
drawing on the service's remote servers.
Likewise, if you need to scale back down,
the flexibility is there. This level of agility
can give businesses using cloud computing
a real advantage over competitors – it's not

surprising that CIOs and IT Directors rank
'operational agility' as a top driver for cloud
adoption.

2. Disaster recovery

Businesses of any size or form should
invest in robust disaster recovery, however
for smaller businesses that may lack
the required cash and expertise, such
plans may be more of a nicety than a
necessity. Cloud computing is now helping
more organisations challenge this trend.
According to Aberdeen Group[3], small
businesses are twice as likely as larger

companies to have implemented cloud-based backup and recovery solutions, which save time, avoid large up-front investment and include third-party expertise as part of the deal.

3. Automatic software updates

One of the main advantages of cloud computing is that the servers are off-premise, out of sight and out of mind. The providers themselves take care of them for you and roll out regular software updates – including security updates – so you do not have to worry about wasting time maintaining the system yourself, leaving you plenty of time to figure out ways of growing your business.

4. Capital-expenditure free

Cloud computing cuts out the high cost of hardware. You simply pay as you go and enjoy a subscription-based model that's favourable to your cash flow. This, coupled with the fact that such solutions are easy to set up and manage.

5. Increased collaboration

When your employees can access, edit and share documents anytime, from any place, they are automatically able to do more together, and do it better. Cloud-based workflow and file sharing Apps help them make updates in real time and gives them full visibility of their collaborations.

6. Work from anywhere

With cloud computing, if you have an internet connection, you can be at work. The more serious cloud providers offer mobile apps, allowing you access to your 'virtual office' through any device, at any place, any time.

This can allow you to offer more flexible working conditions to your employees so they can enjoy the work-life balance that suits them – without negatively affecting productivity.

7. Document control

The more employees and partners collaborate on documents, the greater the need for watertight document control. Before the cloud, files were sent back and forth as email attachments, at times worked on in parallel by different employees, resulting in a mess of conflicting file content, formats and titles.

As companies become more global, even those small in size, file sharing can become even more complicated.

When you make the move to cloud computing, all files are stored centrally and everyone sees one version. Greater visibility means improved collaboration, which ultimately means better work and a healthier bottom line. If you're still relying on the old way, it could be time to try something a little more streamlined.

8. Security

Lost laptops are not uncommon and amount to billions of dollars in expenses for companies worldwide every year. However, the cost of replacing the hardware in insignificant compared to of the loss of the sensitive data it carries. Cloud computing gives you greater security when hardware is lost. Because your data is stored in the cloud, you can access it no matter what happens to your device. And you can even remotely wipe data from lost laptops so it doesn't end up in the wrong hands.

9. Competitiveness

The cloud offers enterprise-class technology solutions which are accessible to everyone. Smaller businesses can in fact act faster than big, established competitors. Pay-as-you-go service and cloud business applications lower barrier to entry for the smaller businesses.

10. Environmentally friendly

Apart from the direct benefits to your business, the cloud is also beneficial to the environment. When your cloud needs fluctuate, your server capacity scales up and down accordingly. This helps to achieve energy savings and carbon emissions reduction making cloud computing a truly green technology.
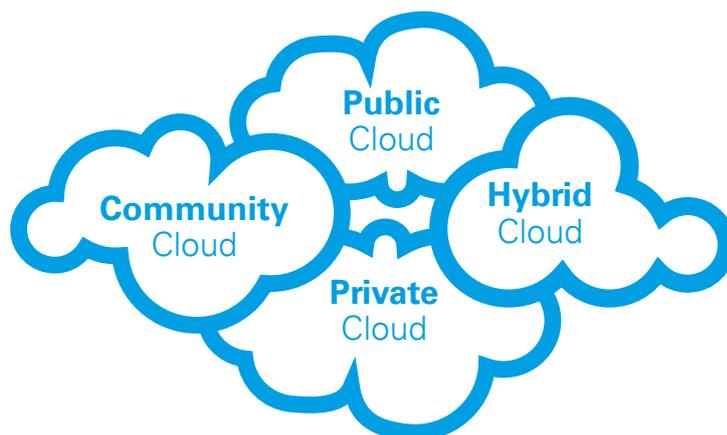
The Building Blocks of Cloud Computing

There are a number of terms that are used in relation to cloud computing. It may be daunting trying to understand the ins and outs of the cloud but what is the most important thing for you to understand is the different ways in which cloud computing solutions can be implemented. Apart from the different solution models mentioned on page 2, that is Software as a Service, Platform as a Service and Infrastructure as a Service, here are some other terms you should familiarise yourself with.

NIST defines deployment models of cloud computing as follows:

- **Private cloud -** The cloud infrastructure is provisioned for exclusive use by a single organization comprising multiple consumers (e.g., business units). It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises.
- **Community cloud -** The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.
- **Public cloud -** The cloud infrastructure is provisioned for open use by the general public. It may be owned, managed, and operated by a business, academic, or government organization, or some combination of them. It exists on the premises of the cloud provider.
- **Hybrid cloud -** The cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load balancing between clouds).

Public Cloud

Community Cloud

Hybrid Cloud

Private Cloud

Best Practice Guidelines

1. Conduct a readiness assessment for your organization

A readiness assessment will let you know which areas of your business are ready and developed enough to warrant a cloud computing solution. This will also show which areas of your business need additional work to get them ready. This step is important as it safeguards you from rushing into a solution for which you are not prepared, or which can have a negative effect on your business.

The following questions will help you assess whether or not you are ready to move to the cloud, you should ask yourself the following questions:

- Do I currently use in-house enterprise applications (e.g. Accounting and Payroll, HR, or even email)?
- Do I have to dedicate time of my staff to maintaining these applications?
- Do I currently use applications "in the cloud" (such as Gmail, Dropbox, Skype, Webex etc) without knowing I am using cloud computing?
- Do I have to invest in hardware, software licenses, etc to run these applications and other needs (databases etc)?
- Do I believe that the performance and reliability of my IT systems (software, hardware) could be improved?
- Does my company have issues in keeping up with changes in technology including software upgrades, etc?

- Do my applications and data have different levels of privacy, sensitivity and mission-criticality?
- Do I currently have large capital expenditures and maintenance costs for my current hardware/software requirements for functionality that is well suited to the Cloud?
- If you answered yes to more than five of the above questions, it is very likely that your organisation is ready to move, or at least partially, to the cloud.

2. Create a strategy and a set of realistic goals upfront

As with any business initiative, setting goals setting is important for a clear direction as to where you want to take your business. Together with your cloud solution provider, you need to make sure that you both understand what makes a successful cloud implementation. What is most important to you will influence the selection and design of the right package and service.

3. Learn from others

Ask questions to those who have tried and failed, or succeeded in setting up a cloud solution.

There are going to be other companies just like you who have tried to implement a similar solution, for some it may have been plain sailing, others may have faced challenges. It is in your best interest to learn from others so that you avoid as many pit holes as possible.

4. Implement a strong framework for governance

Cloud computing will change the way that your business runs. This means that there needs to be a clear and well understood set of rules which covers how and where documentation is stored and who has access to what information. This is a security measure to make sure that your business is safe from any potential risks.

5. Be sure to understand what data you can afford to move to the cloud, and what you cannot

For whatever reason, there may be critical data that you do not wish to move to the cloud or unable to move due to compliance/ legal reasons at the given time. This could be data that you are worried could become a security risk. It is important that you understand the relationship between your sets of data, as well as which data you are willing to move now, and which can be moved at a later stage.

6. Be sure to connect with a reputable cloud computing provider and avoid lock-in

Make sure that you are dealing with a cloud computing provider that fully understands your particular needs and requirements. Be sure to follow up on client testimonials and reference checks before engaging a particular service provider. Also make sure that you address any lock-in concerns by keeping an eye on migration policies and contract details.

7. Establish guarantees of performance and data availability from your service provider

One important thing to remember about cloud computing is that you are not in full control of the hardware that you are using. This means that you need to be sure that the service provider you choose gives you guaranteed up-time and business continuity. This is generally laid out in the Service Level Agreement (SLA) agreed between yourself and the cloud vendor.

Choosing a Cloud
Computing Service Provider

Choosing a partner can be difficult. There are many factors that need to be considered: not only whether or not they are affordable, but also considerations such as your experience as a customer, and cultural fit with your business. Here are some tips on what you should consider when selecting your cloud computing service provider.

- Find a provider with deep knowledge in the specific product you plan to buy. Ask the service provider for a list of clients or completed projects using a similar cloud solution that you are considering using.

- Be sure that the service provider can demonstrate expertise in your specific industry sector A cloud solution in financial services can look very different to a cloud solution in agriculture. Vendors that have developed vertical solutions often have sophisticated knowledge of that market and great technical expertise that may be costly – but often worth paying for.

  If the cloud vendor has worked in your industry before, they will already have experienced some of the unique challenges that your industry might have. They will therefore be able to deliver a better service and be prepared for some of the challenges. This may include specialized software add-ons or software stacks which could be of benefit to you.

- User adoption is the lifeblood of any successful enterprise deployment. Find a cloud service provider with proven experience, and who are continually seeking to refine their approach and service to align IT and business users.

- Hire a company you like and (more importantly) trust. Implementing cloud is just one step in a potentially long-term relationship between you and the software vendor or cloud service provider. Once the implementation is done, the vendor is responsible for the maintenance and upkeep of the cloud solution. While their credentials are important, it is far more important that you feel you can trust and work with the vendor; their corporate culture should resonate with yours. Do business with companies that place your success at the top of their list.

- Prefer vendors who have gone through a third-party compliance audit. One example of an audit is the StarAudit Cloud Quality Scheme[4] provided by EuroCloud. EuroCloud[5] is an independent non-profit organisation that promotes the use of Cloud Computing across Europe. Cloud service providers need to be able to show that they deliver on the promises they are making.

[4] *https://www.staraudit.org/*

[5] *https://www.eurocloud.org/*

The European Legal Landscape

At EU level, there are a number of initiatives that are governing the evolution of Cloud Computing. Here are some of the main initiatives.

- EU Commission: Strategy for "Unleashing the Potential of Cloud Computing in Europe" (Sept. 2012)This strategy establishes three key actions:
  - safe and fair contract terms and conditions;
  - cutting through the jungle of standards; and
  - establishing a European cloud partnership.
- EU Parliament: Resolution on unleashing the potential of cloud computing in Europe (Dec. 2013)

  The resolution establishes the main challenges and issues governing cloud computing
- EU Commission Staff Working Document: Report on the Implementation of the Communication 'Unleashing the Potential of Cloud Computing in Europe' (July 2014)

These and other documents can be located at: *https://ec.europa.eu/digital-single-market/en/european-cloud-computing-strategy*

The following are the top legal issues you should take into consideration on your journey to the cloud.

Service Level Agreements

A Service Level Agreement (SLA) is a contract between you and your cloud computing service provider and it defines the level of service expected from the cloud service provider. The starting point for establishing an SLA is the business case and intended use of the service. As an SME or microenterprise, you will need to understand what business problem the cloud computing service will be solving; the intended internal and external users; when, where and how the service will be accessed; whether or not the service is business-critical; the practical consequences if the service is down or degraded for any period of time; and how the use of the service may change over time. The SLA needs to reflect these requirements.

Typically, the sole remedy in case of a breach of the SLA is a service credit, which is usually capped based on some percentage of fees paid during the previous 12-month period.

Termination or suspension of service

The software application and/or the data running or housed in the cloud may be critical to your business. Continuity of access and use (to both the application and data), especially when both are on a third-party server, are of utmost importance. To that end, does the cloud vendor in each instance notify you when any of the terms

of the agreement may have been violated, and are you given an opportunity to remedy each violation?

There is, of course, a delicate balance that needs to be struck. In a setting where there are multiple customers (tenants), the cloud vendor will have competing obligations to the other customers, and, inasmuch as the actions of one tenant may degrade performance for another, some level of flexibility is required. One approach is to distinguish between the service and the data; in the case of suspension, for example, you can come to an agreement where even in cases where the service is suspended, you can still access your data.

Representations and warranties; indemnities

In terms of potential pitfalls, these provisions may be the most important. A representation is a statement of fact, either past or present, while a warranty may express a promise. Typical representations and warranties should confirm that there are no pending or threatened claims of intellectual property right (IPR) infringement and address continued non-infringement, performance (as to the underlying app), and data security and privacy.

Breach of a warranty will typically give rise to a limited remedy and thus will be to the exclusion of other remedies, such as monetary damages. Therefore, be sure the limited remedy makes business sense and will suffice. Note also that cloud providers typically request representations and warranties from you, including those pertaining to the customer's data. To that end, you must be careful about the sources of your data or risk exposing yourself to liability.

An indemnity is a contractual obligation to compensate a party for a loss. Thus, an indemnity would compensate you for any claims that your use of the service has violated any third-party IP rights, such as patent, copyright or trademark.

Confidentiality

You should be sure to get satisfactory promises regarding which vendor personnel will have access to confidential information (including customer data) and what steps the vendor will undertake to maintain the confidentiality of that information.

Other

The considerations above are a good starting point but they are just the tip of the iceberg. Other matters that you also need to think about are: storage fees, if and when there are automatic upgrades; whether or not there are multiple environments (e.g., development, test, and production) available to you; how customisation works in a cloud setting; how many data recoveries does the cloud computing provider provide free of charge (and what are the costs of additional backups); and how easy is it to move to another cloud and how the provider will support the transition.