

Geospatial Engineering Panel Briefing Sheet: Using Cloud Based Application Services

ICE's Geospatial Engineering Panel has published a series of reports concerned with various subjects such as "A civil engineers guide to GPS and GNSS" and many others. Designed to be both informative and contemporary, the reports are updated regularly and are intended to provide accurate information to a varied audience. The present report focuses on the use of cloud based application services also known as Software as a Service (SaaS).

This paper describes the benefits you may expect from using a cloud software service and then considers the subjects you should consider in selecting a suitable service. This is one of two briefing papers to be issued concerning cloud services; the other considers the use of cloud based storage [Ref 1].

Introduction

Cloud computing has become a ubiquitous term for holding data or accessing applications over the internet. However the term "cloud" is used to describe the provision of a number of different things ranging from data storage space, computing power, through to full blown business applications. Cloud services have reached the stage where they are "a must consider" approach for new IT environments or expanding existing ones. For example, Gartner reported that in 2013 41% of customer relationship management systems sold were cloud based SaaS packages. [Ref 2].

This briefing paper considers the use of cloud application services, that is the application is hosted and provided remotely by a third party who charges customers through a usage based subscription. Although prepared by the Geospatial Engineering Panel the advice contained in the paper is pertinent to all hosted applications. Table 1 provides examples of some cloud applications. By necessity this is a very small selection of a growing market place. Acquiring an application via the cloud should be treated just like obtaining any other application and should go through your organisations IT governance procedures. If there are no existing governance procedures you could consider adopting practices described in ISO 38500 [Ref 3].

Specifically excluded from this paper is the building of your own cloud application environment using services such as Microsoft Azure. With this approach the supplier provides basic compute services and the customer then installs his own application software. This approach requires the services of skilled and experienced IT staff to design, set up and implement and requires much more detailed design than can be covered in a briefing paper. In this case the final design will need to cover not only the applications, but also perimeter security, antivirus, identity management and all the components which make up the operating environment. The customer will be responsible for ensuring correct computing power for each application.

As with cloud storage the key consideration with moving to cloud applications is that you will be purchasing a service rather than setting up your own infrastructure. You need to ensure that you get the service you require rather than worrying about how it is delivered. This means that your focus must be on what the services needs to be and ensuring that it is delivered through contract definition, performance testing and monitoring. As a customer

your access will be limited to the application only, you will not have access to any underlying operating system software or hardware; that is taken care of by the supplier. This is fundamentally different from the traditional set up where you have control of the IT system, its purchase, design, implementation and operation. For the simplest services, this means reading and understanding the terms and conditions, not just accepting them on the computer screen and continuing. Throughout this paper it is assumed that the business functionality of the service meets your requirements.

Application Type	Examples Applications
Email	Google Mail, Virgin Mail; Hotmail
Office Automation	Office 365,
Business Applications	Sage One. Salesforce, SAP, Microsoft CRM
Geospatial Applications	Autodesk 360
Collaboration Tools	4Projects, Aconex, Asite, Conject, Buzzsaw (Autodesk), Projectwise (Bentley), Microsoft Sharepoint, Business Collaborator

Table 1: Examples of Cloud Application Services

Inclusion of an application in the above table does not recommend it as suitable for any particular use. Other applications are available.

Why Consider SaaS

The benefits of SaaS closely mirror those related to cloud storage with some additional points:

- a) **Speed of set up;** SaaS is likely to be much faster to acquire when compared to building your own environment. You are purchasing a service, so the time taken is largely governed by purchasing and due diligence processes rather than the need to design, procure and install hardware and software, to test the application and to train staff etc. There may be some need to locally open firewalls or to configure drive letters, improve networks etc. and there is still likely to be some staff training, local application configuration to perform and testing of the application in your environment in addition to working out what you want in the first place.
- b) **Avoidance of capital investment;** Use of SaaS will be charged in the form of a subscription in one of a number of different forms:
 - £s per named user per week;
 - £s per user account per week; or
 - £s per project (based on the size and duration of the project).

As such, it may be possible to account for the costs as an operational expense rather than as a capital charge. This may also help with cash flow. Work concerned with the initial set up could be regarded as a capital cost. Overall it is essential to understand the charging model and the impact. The way you intend to use the system will impact this.

- c) **Limited need for technical hardware and installation knowledge;** By subscribing to a SaaS application service the purchaser can avoid the tasks associated with the hardware design, installation and set-up of the application. This can be specially onerous, require constant training to deal with updates and difficult to organise, but will be undertaken by the service provider. You may need to involve security, desktop and network specialists to ensure secure and performant end user operation. The risks of

design and selecting hardware, installing it are also removed as they will be with the supplier.

However, this does not remove the need for detailed application knowledge as you will have to undertake application and user administration, develop test plans, undertake testing, integrate the system into your business processes etc. Although you are removed from the more technical tasks you will still need people who understand the fundamentals of the application, however they will not need to install the application etc.

- d) **Cost saving;** The overall cost of using the application should be lower through the SaaS service when compared to an in-house installation. This arises not only from the savings in undertaking the specific installation but from the fact that, unseen to the users, a single SaaS service is likely to host a number of clients on a single installation. In addition there will be some avoid costs from not having to completely set up and support your own application. Before embarking on a cloud application acquisition you must understand the cost model and the benefits which will arise.
- e) **Enabler for Collaboration;** Since the SaaS service is being provided from within a cloud over the internet, it may usually be accessed from anywhere with internet access, assuming the correct authorisations have been applied. This means that multiple organisations may collaborate and use the single instance of software and data with no issues of software or data versions, and without any party having to allow another party access to its own in house IT environment.
- f) **Timely Application Maintenance;** With a SaaS model it is probable that the service supplier will maintain the application software in a very timely manner, probably more quickly than would happen with a local installed application. However it must be remembered that the customer may incur some costs at each upgrade for things such as, testing, training and potentially data conversion, although during the life of a project these may be small.

Requirements to be Considered

The purchase of a SaaS does not remove the need to select the application based upon the business requirements. In fact the process should be similar when selecting a SaaS delivered package to one which will be delivered via an in house implementation. Tables 2a to 2d present the additional questions one should ask oneself. It is recommended that in appropriate cases a risk analysis approach is taken, in which case the processes described in ISO 31000 [Ref 4] will be appropriate.

Category	Questions to be considered	Comments
Availability	Do you require access to the application 24 hours a day or perhaps a lower level of service would suffice?	The requirements need to be defined and the service providers offering established.
	What are the arrangements for maintenance downtime, does the supplier have any times which he dedicates to maintenance and when the application may not be available?	
Location	Given the sensitivity of the data do you have any constraints on where the data may be held and who else may be using the same infrastructure?	The obvious countries such as China and Russia can bring with them security issues, but even the USA can be restrictive in certain circumstance.
	Does the location of the data or the application bring with it any constraints on what the data can be used for or bring with it any tax liabilities for the use of the data?	The location of the data or the service providers registered office can mean that the data comes under the

		jurisdiction of that country. For example, the USA Patriot Act which allows access to data in certain circumstances may apply. [Ref 5 Section 4.2]
Resilience Requirements	Do you have any requirements for special resilience for the applications?	The resilience will also depend on network and internet services. Potential ways of increasing the network resilience were discussed in the Cloud Data Storage paper [Ref 1].
	What would the business impact be if the application was not available?	
Application Security	Security of the application and the associated data (availability, resilience, access control, and audit) should meet your requirements.	The security of the application should be seen as part of your overall security model and should conform with your security procedures under ISO27001 [Ref 6] or PAS 1192-5 (when available) [Ref 7]. The customer will need to satisfy himself on customer separation, security against intrusion.
Audit Trail	Does the application log what a user is doing at, at least who is logged in?	

Table 2a: SaaS Application and Data Security Requirement Considerations

Category	Questions to be considered	Comments
Help desk	Does the supplier have a help desk, what is the availability and SLA and who can contact the help desk?	Some service companies insist that only named individuals contact the help desk which means the customer will need to have an internal arrangement to route calls. If anyone from the customer can make help desk calls, how will the SLA be monitored?
Method of subscription	What subscription models are available?	The arrangement can result in markedly different costs depending on how you will be using the application. In addition there may be data or special function charges. Typical charging regimes have been given in the "Avoidance of Capital Investment" section above.
	How are the subscriptions monitored and reported, and how quickly may they be modified?	

Table 2b: SaaS Vendor Services Requirement Considerations

Category	Questions to be considered	Comments
User Accounts / Profiles	Does the application allow you to manage your own users, remove or add users as required?	User profiles provide one way to control what each users can do and protect the data from inadvertent corruption. Alternatively, different applications could be used to access the same data in different ways.
	Can the application security be integrated with your own existing user security and how do you deal with 3 rd parties?	Management of 3 rd parties using an application can be complex. Your application management team may not be aware of changes, how will 3 rd parties inform the account admin team. Temporary staff that come and go are particularly hard to manage as there is often no well-defined joiners / leavers process.
	Can the application make use of any existing users account management and self-service features made available through existing tools, for example Microsoft Forefront Identity Management (FIM)	
	Does the application log what a user is doing at, at least who is logged in?	
Do you need the ability to restrict some users to certain functions, i.e. have the ability to define user profiles?		

	Can the user profiles be defined by you or are standard ones provided?	
	Are the standard profiles adequate?	
Setting business characteristics	Can you define your own company specific lookup lists?	It is important that the application works for the customer's business. SaaS applications targeted at commercial organisations should have this.
	Can you define your own business specific data validation rules?	
	Can you define your own business process flows?	

Table 2c: SaaS Making the Application Work for your Business

Category	Questions to be considered	Comments
Application Architecture	The required application architecture needs to be established and compared with your existing environment to ensure the two can be integrated.	<p>SaaS applications are usually provided with one of two basic architectures,</p> <ul style="list-style-type: none"> As an application accessible via a web browser. In this case it is important to consider the type and version of the web browser to ensure that it fits with your IT strategy. What happens if they get out of step? Your IT strategy does not want to cover having more than one version of the same web browser. You also need to consider if any plug-ins are required or what version of Java is required. These may not be supported by all versions of your browser. To upgrade a version of Java, say, to accommodate a new software service could mean regression many other applications leading to greatly increased costs and significant time scale extensions. Using thin client software such as Citrix. Again you need to consider how Citrix fits into your IT strategy and if there are any version issues.
Application Performance	Is application performance likely to be a problem, what is the supplier's recommendation on network bandwidth for acceptable application performance?	<p>With a SaaS model the software is located a long distance from the user. It is essential to check that the latency which is inherent in this design does not impact the usability of the system. Most providers should be aware of this and will have designed the application appropriately; sometimes local caching of data is used to achieve acceptable performance. This means that those applications which require fast access to large quantities of data may not be offered through the SaaS model. Whilst the vendor will warranty performance at his data centre he is unlikely to warranty performance over the internet or the customers own network.</p> <p>From the users perspective all performance testing must be done on a representative network. This may mean testing some things for different network configurations, e.g. company network, 3/4G, direct broadband connectivity, and different end user devices.</p>
Application upgrade cycle	What is the software upgrade cycle adopted by the supplier?	<p>All applications need upgrading from time to time. One of the benefits of SaaS is that the applications are likely to be upgraded in a timely manner.</p> <p>Too frequent upgrades can be disruptive, too infrequently could mean you are not getting use of the latest software and having to work around bugs for longer than necessary. That said, for the customer upgrades do have a cost, not from undertaking the actual application upgrade but from training, potential downtime and testing. Testing of all changes to software should be undertaken against a defined test plan.</p> <p>When taking a service for a project or longer prospective users should establish the anticipated upgrade cycles.</p>
	How much notice is given	You need sufficient time to plan, train etc.

	prior to undertaking software upgrades?	
--	---	--

Table 2d: SaaS Technical Requirement Considerations

Buyers should seek to determine all the critical service points including those above and ensure they are backed up in a service level agreement. All these key points, along with the range of standard business functions should be tested against a predefined test plan in the customer's environment before the application is accepted. In this respect a SaaS delivered application is no different from a traditional locally hosted application.

As with cloud storage, SaaS providers should provide detailed SLAs. Some provide real-time metrics of uptime, to back this up and against which performance may be judged.

Don't just look at the infrastructure issues but also undertake due diligence on the hosting provider - as well as network stability and reliability, you need service providers with reliable management and stable finances.

Service Provider Stability / Longevity

On purchasing a SaaS package customers must consider what will happen when the contract comes to an end, either naturally or through early termination. In either case, there could be large quantities of data to move and/or transformed so that they can be used with another system. Users will need training in the new system. These could be complex tasks and it will be imperative that the original service supplier assists. The range of assistance to be provided at the end of the contract should be agreed before the contract is entered into.

More difficult to deal with is the unexpected none availability of the service supplier. Prospective purchases should consider how to secure their data and application. One possible approach may be to adopt an ESCROW [Ref 8] approach to protect the software. Another approach being offered by one software service provider is to arrange for his 3rd party hosting provider to maintain the platform's uptime for at least 30 days to allow customers time to migrate the application and/or data to alternative hosting or another supplier

However neither of the above is ideal and they will be difficult, disruptive and complex if required to be acted upon. By far the best way forward is to select a stable and mature supplier with a strong financial base. This needs to be given as much, if not more importance than the technical issues.

Conclusions

SaaS is becoming more pervasive as a method of delivering applications and has some significant potential benefits. This approach needs to be considered for all new or upgraded applications. However this new approach does not negate the need to consider ones business requirements, or remove the need to appropriate testing, training and business readiness activities in general.

References

- 1 Geospatial Engineering Briefing Sheet : Using Cloud Based Storage Services. Institution of Civil Engineers, Geospatial Engineering Panel, December 2014,
(<http://www.ice.org.uk/topics/geospatialengineering/Best-practice-documents>)
- 2 Forbes, Gartner CRM Market Share 6th May 2013 11.57am.
<http://www.forbes.com/sites/louiscolumnbus/2014/05/06/gartners-crm-market-share-update-shows-41-of-crm-systems-are-saas-based-with-salesforce-dominating-market-growth/>
Date accessed 11th December 2014.
- 3 ISO/IEC 38500:2008, Corporate governance of information technology
http://www.iso.org/iso/catalogue_detail?csnumber=51639
Date accessed 11th December 2014
- 4 ISO 31000 – Risk Management 2009;
<http://www.iso.org/iso/home/standards/iso31000.htm>
Date accessed 11th December 2014
- 5 European Journal of Law and Technology, Cloud Computing : Centralisation and Data Sovereignty Primavera De Filippi & Smari McCarthy Feb. 2012. ISSN 2042-115X
<http://ejlt.org/article/view/101/234>
Date accessed: 11th December 2014.
- 6 ISO/IEC 27001 - Information Security Management, International Standards Organisation 2013 <http://www.iso.org/iso/home/standards/management-standards/iso27001.htm>
Date accessed 11th December 2014
- 7 BIM Task Group announcement re BSI Public Available Specification 1192:5
<http://www.bimtaskgroup.org/pas-1192-5-specification-for-security-minded-building-information-management-digital-built-environments-and-smart-asset-management-is-currently-in-development/>
Date accessed 11th December 2014
- 8 ESCROWGUIDE - Source Code Escrow - Guidelines for Acquirers, Developers, Escrow Agents and Quality Assessors - Part 2: A guide to using source code escrow to protect procurement CEN - The European Committee for Standardisation as CEN Workshop Agreement 13620, June 1999