

**STRATEGIC ANALYSIS OF MOVING EA'S SHAREPOINT  
INSTANCES TO THE CLOUD**

**by**

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# **APPROVAL**

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## **ABSTRACT**

This is a very tough time in the gaming industry as video game sales have decreased with a slowdown in the global economy. Electronic Arts (EA) is focusing on keeping costs down in all aspects of the business. Two of the key strategies for EA's IT department are to keep costs down and to adopt the cloud where possible. This paper investigates the possible cost savings, and other related factors involved in migrating EA's SharePoint instances to the cloud. Although the human resource, license, and infrastructure costs would be saved, other factors were uncovered that would require months of further technical research in order to make a clear recommendation.

Specifically some SharePoint sites are heavily customized and many customizations are not supported in the cloud. Also, EA is one of the most hacked companies in the world, and having data stored off site is a huge security risk. Therefore the recommendation is not to adopt SharePoint in the cloud at this point, and a more accurate recommendation can be put forth when this technical research is completed.

**Keywords: SharePoint, Cloud**

# TABLE OF CONTENTS

<b>Approval .....</b>	<b>ii</b>
<b>Abstract.....</b>	<b>iii</b>
<b>Table of Contents .....</b>	<b>iv</b>
<b>List of Figures.....</b>	<b>vi</b>
<b>List of Tables .....</b>	<b>vii</b>
<b>Glossary .....</b>	<b>viii</b>
<b>1: Introduction .....</b>	<b>1</b>
1.1    The Organization .....	1
1.2    Aim .....	3
1.3    Scope .....	4
1.4    Research Methods .....	4
1.5    Structure .....	6
<b>2: Development of the strategic issue .....</b>	<b>8</b>
2.1    Aim .....	8
2.2    IT Strategy: The context for the SharePoint-Cloud choice .....	8
2.3    What is SharePoint? .....	10
2.4    What is the Cloud? .....	11
2.5    Conclusion/Strategic Issue .....	11
<b>3: Situation analysis: Sharepoint.....</b>	<b>13</b>
3.1    Aim .....	13
3.2    How is SharePoint used at EA?.....	13
3.2.1    Public SharePoint Sites.....	14
3.2.2    Private SharePoint Sites: Game Teams .....	16
3.2.3    Private SharePoint Sites: Support Teams .....	18
3.3    What is the cost of supporting SharePoint in-house?.....	23
3.4    Conclusion.....	27
<b>4: Situation analysis: Cloud .....</b>	<b>29</b>
4.1    Aim .....	29
4.2    Advantages of moving to the cloud.....	29
4.3    Risks of moving to the cloud.....	30
4.4    Types of Cloud Solutions .....	31
4.5    Microsoft’s SaaS SharePoint Offering .....	34
4.6    Conclusion.....	36

<b>5: Issue analysis</b>	<b>37</b>
5.1 Aim	37
5.2 Criteria for evaluating SharePoint in-house vs. SaaS	37
5.3 Evaluation of SharePoint in-house	39
5.4 Evaluation of SharePoint in the Cloud	41
5.5 Conclusion	47
<b>6: Conclusion</b>	<b>48</b>
6.1 Aim	48
6.2 Recommendation	48
6.3 Required Management Actions	49
6.4 Lessons Learned for Future Decisions	50
6.5 Conclusion	51
<b>Reference List</b>	<b>52</b>

## **LIST OF FIGURES**

Figure 1 - Categories of SharePoint sites.....	14
Figure 2 - EAPeople SharePoint site .....	15
Figure 3 - EAWorld SharePoint Site .....	15
Figure 4 - NHL Game Team SharePoint Site .....	16
Figure 5 - Survey to assess dependency on SharePoint.....	17
Figure 6 - Change Management Team SharePoint Site.....	19
Figure 7 - How a SharePoint outage for CM team effects entire company .....	20

## LIST OF TABLES

Table 1 - Support teams with a dependency on SharePoint.....	22
Table 2 - Yearly human resource costs of supporting SharePoint in-house .....	23
Table 3 - Yearly license costs for SharePoint in-house .....	25
Table 4 - Yearly infrastructure costs for SharePoint in-house.....	26
Table 5 - Total yearly cost of supporting SharePoint in-house .....	27
Table 6 - Summary of key factors for the different types of SharePoint sites .....	28
Table 7 - Pricing for IaaS Cloud offerings.....	32
Table 8 - Score for In-house SharePoint Model .....	40
Table 9 - Criteria that can be evaluated for the cloud model.....	42
Table 10 - Score for Cloud SharePoint Model based on information available .....	43
Table 11 - Score for Cloud SharePoint Model based on positive research results .....	46

## **GLOSSARY**

SharePoint Farm	A collection of SharePoint servers that work in concert to provide a set of basic SharePoint services that support a single site.
Titles	This refers to any game that EA makes. Examples of titles is FIFA 2013, Battlefield 3, etc.
Platforms	A platform is the type of console that a game is designed for. Examples of platforms include Xbox 360, Playstation 3, PC, iPhone, Facebook, etc.
VM	VM's (or virtual machines) replace individual physical servers. Instead of one physical machine being able to host one server, a VM Server can simulating multiple servers being run on one physical machine.
Network Share	A device that can be remotely accessed from another computer. An example is file sharing, where a file can be accessed as if it resided on the local machine.
Fiber Channel	A technology for transmitting data between computer devices at data rates of up to 4 Gbps.



# **1: INTRODUCTION**

## **1.1 The Organization**

Electronic Arts (EA) is one of the largest game developers in the world, with studios in over ten countries worldwide. The company develops games for all major platforms, including the Xbox 360, Playstation 3, PC, iPhone and Facebook. Over the past few decades, EA has been the most successful game developer (excluding console makers), measured by revenue (Cole, 2005). In 2008, EA shipped over seventy games. The quality ratings of those games were not high across the board according to the Metacritic index, as the average score for EA dropped five points from the previous year to 72 out of 100 (Smith, 2008). However customers still bought a large number of EA games, as revenues increased from \$3.6 to \$4.2 billion. EA's strategy was to focus more on quantity rather quality, since customers were buying the games regardless.

Faced with less disposable income, customers bought far less post the market crash in 2008. Since a high of 21 billion in video game sales for the entire industry in 2008, sales have decreased by approximately 10% in each subsequent year, to a low of 16 billion in 2012 (Graziano, 2012). EA was not immune from this, as their sales also began to suffer (McLeroy, 2010). Core franchises such as Need for Speed and NBA Basketball experienced a huge decline in sales (Ingham, 2010). Specifically, Need for Speed: Most Wanted sold 3.9 million copies in the US in 2005, while Need for Speed: Undercover sold only 1.4 million units in 2008 (Thorsen, 2009).

As profitability eroded and EA began to lose money, a number of strategic changes ensued. The number of games that EA shipped was reduced, and instead, there was focus on improving the quality of these games. Over the past four years, the EA portfolio has reduced from seventy to twenty titles. This reduction in games was accompanied by the laying off of two thousand employees from 2008 to 2009 (Fletcher, 2009). Most of these layoffs came from employees working on games that were eliminated. However a number of supporting functions, such as IT, were also heavily affected.

Not only were employees laid off in IT but senior management was tasked with finding other ways to potentially save money. This resulted in a reduction in IT helpdesks from one in each studio serviced by full time employees, to one centralized helpdesk in Orlando serviced by outsourced contractors. Although the change has led to decreased customer satisfaction scores in quarterly surveys, it did lead to a significant cost reduction.

Support of the hardware infrastructure is another major cost for EA's IT department. Supporting servers is costly as it involves a large number of staff: server administrators, network administrators, database administrators, etc. The advent of the cloud has greatly simplified hardware support for companies choosing to adopt it. With the cloud model, instead of hosting an application on a server in the local data center, the application instead resides on a server in an external data center. The server provider is then responsible for all the related infrastructure, and corporations simply need to manage the application being hosted on the server.

The adoption of the cloud mends well with EA's IT strategy of keeping costs down, and has been one of the main strategic foci over the past year. The choice for EA is not as simple as it may seem. There is no guarantee that the quality of the service will remain consistent if any cloud solution is adopted. The consequences of having issues with a mission critical system that impacts the game teams would be likely to far outweigh any potential cost savings. These tradeoffs and the management implications of any choice needs to be investigated thoroughly.

## **1.2 Aim**

Electronic Arts has used SharePoint, an application used for file management and information sharing, since 2003. EA currently has eight SharePoint Farms worldwide consisting of hundreds of sites. The SharePoint farms are all hosted and managed in-house. With the cost of supporting the server infrastructure and the focus on cloud adoption, EA is seeking to assess whether moving these instances to the cloud will contribute a significant cost saving while still maintaining all the functionality that is currently available.

One of the challenges with adopting any new technology is managing the impact that it will have on the day-to-day operations of a company. Making games is the core business of EA, and having to change any internal IT processes usually does not add value to a game. Therefore these types of changes are often not welcomed, and even resisted. For example, each game team used to employ a different method of storing the text that is displayed in a game. When an initiative was put forth within EA to develop a single tool that all teams across the company could use, there was major resistance since teams would have to take the time to change their process without having any marketable

features added. This is despite many benefits of a consolidated tool, such as not having to support their own text tool, and improved performance in compilation times.

Therefore the paper has two further sub aims. The first sub aim is to determine if switching to the cloud could disturb a creative process that we do not understand / have not captured, and therefore might not be able to recreate it in the cloud. The second sub aim is to determine whether the cloud is creatively, strategically, and cost-wise the best choice, and what its pros and cons are. The implications of these on how to manage the switch are discussed.

### **1.3 Scope**

The main focus of this paper is on whether hosting SharePoint in the cloud is more cost effective than hosting it in-house. The paper does not focus on evaluating other alternatives to SharePoint. This is because even though there may be cheaper alternatives such as DropBox, the impact of migrating teams to a new application would not be worth the cost savings.

There also may be cheaper alternatives to hosting an application in-house other than the cloud. However other solutions are outside the scope of this paper.

### **1.4 Research Methods**

The following research methods were used in order to gather the required data for the investigation into moving SharePoint to the cloud:

- Interviews were carried out with EA employees who support SharePoint in order to understand what is involved in maintaining this application.

Interviews were also carried out with the SharePoint users, which uncovered different ways that SharePoint was used, and demonstrated how essential the application is to their daily workflow.

- Surveys were given to EA employees to provide a quantitative analysis on how essential SharePoint is to their daily workflow, and what impact an outage would have.
- Interviews with cloud providers were undertaken to understand what types of cloud models were being offered, what model is the most appropriate for EA, what is the cost of the different models, and what would go into migrating an application to the cloud.
- Information was gathered through google searches in order to supplement the research gathered from the interviews. For example, some users brought up security issues with having data stored off-site with the cloud model. So a google search uncovered a number of Fortune 500 companies that experienced these types of issues.
- There were some limitations to the research. For example in section 3.2.3, only one of the support teams was formally interviewed, and about ten were informally interviewed, to gather their feedback on how they use SharePoint. However there are over thirty other support teams which would need to be contacted in order to get the full picture of SharePoint use by support teams.

## 1.5 Structure

Chapter 2 of this paper probes into the core question of whether hosting SharePoint in the cloud is more cost effective than hosting it in-house. It places the cloud choice within the general context of the main strategies of EA's IT department. Lastly, the key strategic issue related to moving SharePoint to the cloud is identified and explained.

Chapter 3 is an investigation into SharePoint, focusing on how it is used at EA. Interviews with key users provide a holistic indepth view of the current system. A quantitative analysis of what is required to support SharePoint in-house, including people, infrastructure, licences, etc. is conducted.

Chapter 4 provides a thorough examination of the cloud. The advantages and risks of moving to the cloud are discussed, followed by a description of the different types of cloud models. The most appropriate cloud model is then identified and examined in more detail in terms of cost and viability for EA.

Chapter 5 combines the research on SharePoint from chapter 2, and on the cloud from chapter 3, to help identify the criteria important to EA in making the decision on whether to move SharePoint to the cloud. Each criterion is described in detail, and a weight is assigned to demonstrate the relative importance of each. A COWS (Criteria, Options, Weights, Scores) table is used to quantitatively evaluate how well SharePoint is performing in-house versus how it would likely perform in the cloud, based on the outlined criteria.

The final chapter discusses if EA should adopt SharePoint in the cloud, and what further informations needs to be sought in order to improve the accuracy of the

recommendation. A list of the management actions required to answer the open questions is provided, along with the lessons learned from this investigation.

## **2: DEVELOPMENT OF THE STRATEGIC ISSUE**

### **2.1 Aim**

This chapter outlines EA's IT department's strategy, and elaborates on how specific strategies provide the impetus for moving SharePoint to the cloud. An overview of SharePoint and the cloud follows. The potential strategic issue with moving SharePoint to the cloud is then explained.

### **2.2 IT Strategy: The context for the SharePoint-Cloud choice**

The IT department at EA has over 600 full time employees and contractors throughout studios worldwide. They provide a number of services such as application support, infrastructure support, IT security and helpdesk support. Since this department is large and plays a major role in enabling the core business of game development, they have their own key strategies which are fine tuned on a yearly basis. These are listed below to consider which are linked to the question of a potential transition to the cloud from SharePoint:

- Collaborate with the Business: better positions the Global IT team to continue establishing strategic IT capabilities that address EA's business objectives, strategies and priorities.
- Implement a Standard Operating Model: enables the Global IT team to implement a standard operating model that includes the implementation



and management of standard and scalable services, processes, roles and architectures.

- Operational Excellence: achieve best-in-class operational excellence across all infrastructure services
- Core vs. Context: leverage the cloud for “Context” type services (e.g. common, repetitive); Focus on the “core” service (e.g. build services, game development) that differentiate the business.
- Migrate to Low Cost Locations: promotes transition of Global IT team from high cost locations to low cost locations to access new talent pools and reduce IT spending
- Leverage Outsourcing/Offshoring: promotes transition of Global IT team to strategic IT capabilities while outsourcing select, core IT capabilities

From this list of key IT strategies, “Core vs. Context” is the most relevant in this investigation. If SharePoint is a core technology that is critical in game development, then, according to these key strategies, it should be kept in house. However if it is simply used for common and repetitive tasks, then it can be moved to the cloud. This question is explored further in the next section.

The final two strategies of migrating to low cost locations and leveraging outsourcing and offshoring are also relevant. The commonality is that they both involve reducing costs by certain means. Leveraging the cloud also has the potential to save costs and follows IT’s overarching strategy of cost reduction.

## 2.3 What is SharePoint?

SharePoint is a content management system that was released by Microsoft in 2001. It is Microsoft's fastest growing product ever with over 100 million licenses sold worldwide. It is mainly used as an information portal that allows individuals and teams within a company to effectively connect and collaborate. SharePoint has the following features (Fleming, 2010):

- It allows organizations to easily create and manage their own collaborative web sites
- Documents can be centrally stored, maintained, and accessed
- Communications can be streamlined since it is a one stop shop for all relevant information
- Access can be limited to the team and appropriate stakeholders
- The application is easy to use as it is based on the familiar Microsoft Office technology
- Content can be updated and account privileges can be defined with no IT intervention
- Web Parts can be used to create dashboards, stream video, and provide other custom functionality
- Reporting can be done by showing a summary of the project, specific task information, and other relevant key performance indicators (KPI's).
- Search functionality can be used to quickly find pertinent information

## **2.4 What is the Cloud?**

Individuals are generally aware of personal cloud computing, where for example they can take a picture with their iPhone, and then seamlessly view it on their computer without having to sync devices. What happens in the background is that instead of the image being saved to the memory on your phone, it's saved to a server. The user then accesses that server to view the picture from their computer. However the notion of accessing a remote server is transparent to the end user, as it simply appears they are always working locally. The cloud has been around for many years, but the term has only gained popularity recently. The key to enabling a cloud is that the data must be mobile, transferable and instantly accessible (Tadger, 2010).

This same concept is being adopted at a corporate level, where instead of hosting an application on a server in the local data center, the application instead resides on a server in an external data center. The server provider is then responsible for all the related infrastructure, and corporations simply need to manage the app being hosted on the server. Much like an end user accessing their photos, a corporate user accesses the application without any knowledge of what's happening in the background. The main advantages to corporations are the cost savings from not having to manage the server, and the ability to quickly scale up or scale down server requirements based on required usage.

## **2.5 Conclusion/Strategic Issue**

Moving SharePoint to the cloud appears to fit well with the IT strategy at EA since there will most likely be an associated cost savings. However the strategy also

mentions that if it is a “context” system where usage is mainly for common, repetitive tasks, then it should be moved to the cloud. But if it is a “core” system which is critical to the business, then it should be kept in-house.

Therefore the key strategic issue is even if there is a cost saving with adopting the cloud model for SharePoint, is there a chance that there will be a disruption to a creative process that we do not understand or have not captured. For example, there could be a 20% cost saving by switching to the cloud, but there may be a 30% loss in efficiency if engineers are not able to follow certain processes setup in SharePoint. This strategic issue is investigated thoroughly in the following chapters, and a recommendation on adopting the cloud is then made based on the evidence gathered.

## **3: SITUATION ANALYSIS: SHAREPOINT**

### **3.1 Aim**

This chapter is an investigation into how SharePoint is used at EA. Three different perspectives are sought. First, interviews with support engineers and end users describe for what purpose the application is used, and to determine whether the cloud could deliver the same functionality. Second, the same interviews reveal the impact of not having the application available for an extended period of time given that this might prevent users from completing their tasks and eventually impact EA globally. A quantitative analysis of the costs associated with supporting SharePoint in-house is also detailed given the aim is to save costs as well as to ensure that value adding activities of SharePoint are not unduly affected.

### **3.2 How is SharePoint used at EA?**

EA currently has eight SharePoint farms hosted in various data centers worldwide. An interview with Andrew Betz, who has been managing these SharePoint farms for the past four years, revealed that SharePoint sites at EA fall into two specific categories. Figure 1 illustrates the different categories.

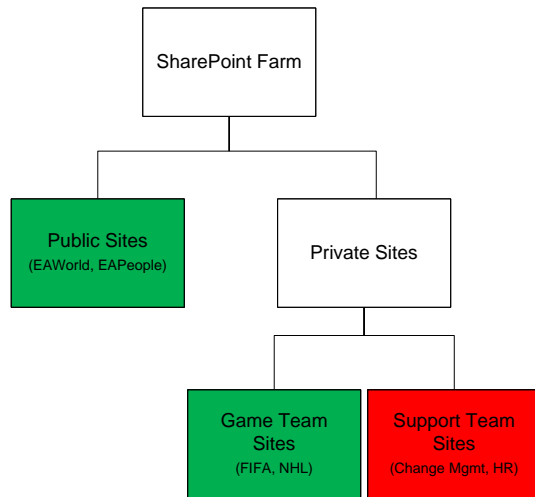
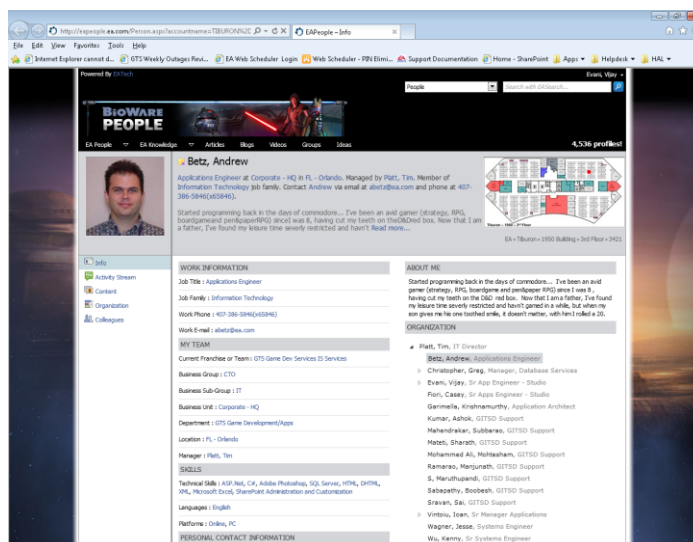


Figure 1 - Categories of SharePoint sites

### 3.2.1 Public SharePoint Sites

The first category consists of sites that are public and are used by all employees. EAPeople for example is a site that has a page for each employee (see Figure 2). The employee can customize that page with any content they choose to share with other employees, such as a picture, their skills, their interests, etc. Another example is the EAWorld portal which contains links to all the department websites, relevant news about EA, commonly required documents, etc. (see Figure 3)



**Figure 2 - EAPeople SharePoint site**



**Figure 3 - EAWorld SharePoint Site**

Eric Lebitsamer, the engineer who developed the EAWorld portal reports that this site has over ten thousand hits a day, and that the reason for this wide use is that it is the best place for employees to go if they have questions about any related topic. They can find out about their health benefits, they can see if someone else wants to carpool from a certain location, etc. This site has been developed over the past two years and is very heavily customized. This includes custom web parts which can stream recent EA twitter activity, or even capture, edit and post videos.

The primary benefit of this site is that it saves employees time and allows them to focus more effort on their current tasks. A sustained outage would not be crippling, since there are other avenues of finding information, but it would impact productivity as that information would be harder to retrieve. In extreme cases, it might be so difficult that people do not bother and so make decisions with less information.

### 3.2.2 Private SharePoint Sites: Game Teams

The second category of SharePoint site used at EA are private sites for each specific project. There are two subcategories of private sites, those used by game teams, and those used by support teams. The NHL game team, for example, has a SharePoint site (see Figure 4) that is used by Ken Ball, a software engineer working on the front end screens. Interviewing Ken, he stated the site is mainly used to share applicable documents with everyone on the team. It also lists key contact information and milestones for the project. Being able to access certain documents, such as requirements documents, is important at the beginning of a project. He also mentioned the revision history is very useful to make sure that changes are not overwritten and there is a history of all changes. The site is not customized at all as only the out of the box functionality is used.

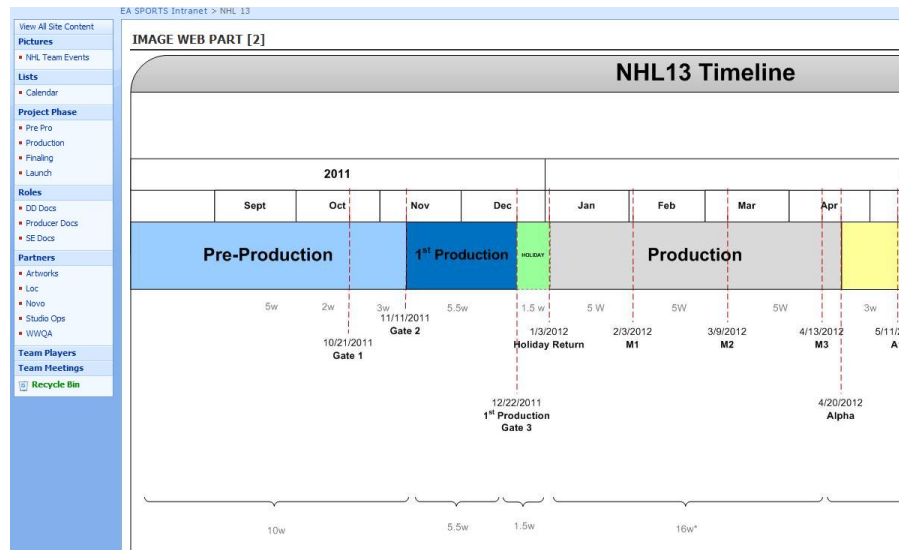


Figure 4 - NHL Game Team SharePoint Site

He was of the same mindset as Eric, in that he felt that if SharePoint was unavailable for any length of time, it would be a nuisance, but the team would adapt by



passing around a document through email or another avenue. It would not have the same impact as having the bug tracking database, which is independent of SharePoint, become unavailable where a developer would not be able to see the bugs that require fixing and so would not be able to work. In fact, when asked to show this site, it took Ken a few minutes to find the link, demonstrating that SharePoint is not a key part of his daily workflow.

Producers working on NHL, which is a different job type, were also interviewed. Producers are responsible for designing the features to be programmed into a game, whereas engineers like Ken are responsible for implementing those features. When informally asking a few producers to comment on their SharePoint usage, they also stated that they used it more at the beginning of the project to share and access documents. However SharePoint was not an integral part of their workflow and that if it was unavailable, they could easily upload these documents to a network share for access by team members.

A short survey helped to quantify the results to see if SharePoint sites used by the game teams are critical to the creative process (see Figure 5).

1) Is the usage of SharePoint part of your workflow and core responsibilities?

*Strongly Disagree*    1    2    3    4    5    *Strongly Agree*

2) Would a SharePoint outage make you unable to perform your daily tasks?

*Strongly Disagree*    1    2    3    4    5    *Strongly Agree*

**Figure 5 - Survey to assess dependency on SharePoint**

Twenty random people on game teams were surveyed, which included engineers, artists, producers and managers. The average score for both questions was 1.5. This indicates that SharePoint is not a part of the game team's daily workflow and an outage would have almost no impact on a game team, regardless of the users job title.

### **3.2.3 Private SharePoint Sites: Support Teams**

Interviewing Nirmal Jit Singh on the change management team revealed a very different perspective. His team is a support team, which falls into the second subcategory of private SharePoint sites. They are responsible for managing all changes that happen to any internal infrastructure, including the servers, network, databases and applications. There is a detailed process in place where a request to make a change must be submitted to his team, the request is audited to ensure compliance, the change must be presented in a meeting with subject matter experts, the change must be approved by a set of appropriate approvers, and lastly the change can be executed. Every aspect of this change management process is automated through SharePoint. With the volume of changes that his small team must process, not having the application available would make it very difficult for him to do his job, as he would have to go directly into other tools and pull data manually which would be time consuming and error prone.

Figure 6 shows the Change Management SharePoint site with the built-in customizations such as the changes scheduled for today and their status, along with a calendar which shows future changes. These custom web parts were built specifically for the change management process and are now an integral part of storing and tracking all change requests. There are also links to custom reports that pull data from other sites,

and are viewable in SharePoint. These custom reports are also used everyday by the team and are an integral part of their workflow.

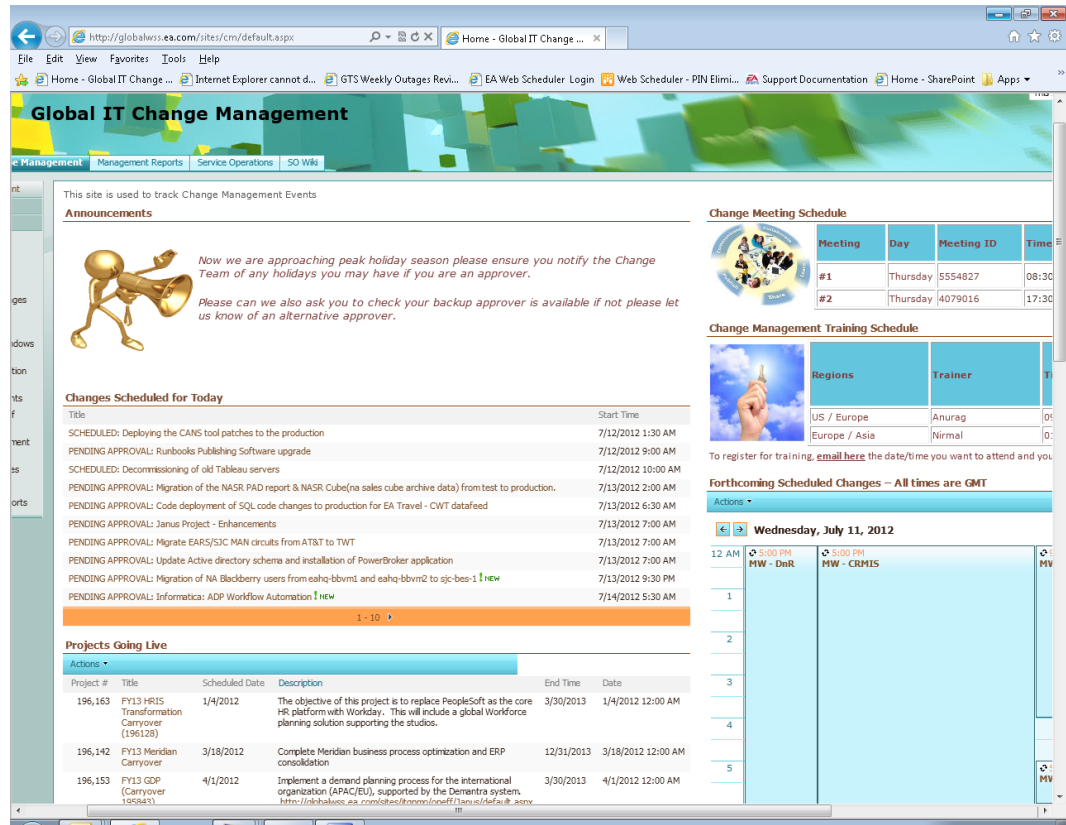
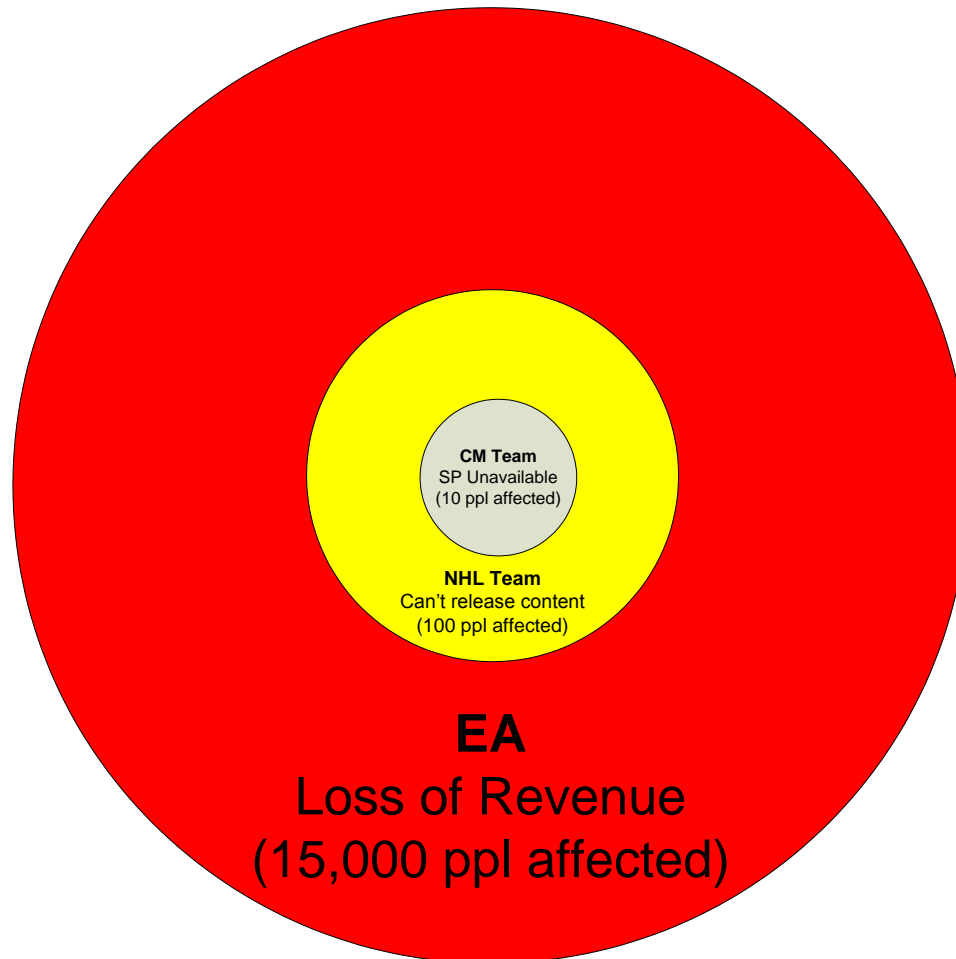


Figure 6 - Change Management Team SharePoint Site

When distributing the same survey in Figure 5 to members of the Change Management team, the results were drastically different. The average score for the first questions was 4 and for the second question was 3. This indicates that SharePoint is a critical part of the team's workflow. It also reveals that even though there are other avenues to pull the same information, an outage would inhibit productivity since they would have to fall back to a manual and error prone process.

Although Change Management is a very small team, the inability for them to complete their tasks does end up having a profound impact on the company (see Figure 7):



**Figure 7 - How a SharePoint outage for CM team effects entire company**

Using concentric circles, this figure illustrates that if SharePoint is unavailable to the Change Management team, then a small team of ten people are impacted directly in that it is more slow and cumbersome for them to complete their tasks. However indirectly, the NHL game team will be delayed in releasing new content or patches since

the Change Management team is now processing changes much slower. This will then impact all of EA since a delay in releasing new content leads to a loss of revenue and a corresponding drop in share price.

Speaking further with Andrew Betz, he shared a number of other support teams who he felt had a heavy dependency on SharePoint (see Table 1). The table below lists these teams along with what the technical dependency on SharePoint is, and what the impact would be from not having SharePoint available. There is also an approximate value put on this impact with five being a major impact and one being minimal impact. However this information came only from Andrew, and follow up interviews with these teams would need to be carried out to uncover the extent of this dependency, and remains out of the scope of this project.

<b>Team</b>	<b>Technical Dependency</b>	<b>Managerial Dependency</b>	<b>Approximate Disturbance</b>
Change Management	Automations to pull data for simplified tracking and reporting	Process required to deploy changes to servers; Prevents late ship dates.	5
Global Strategic Sourcing	Use SharePoint as a DB and reports on this data	Tracks what purchases are made, cost, vendors, etc.	3
Investor Relations	Data pulled from sources for simplified reporting	Provides reports to shareholders and the general public	3
EA Games Label Launch Readiness Group	Single point to update statuses for current projects	Easier to track status since EA mobile games made all over the globe	2
HR	Process to onboard new employees	Minimizes time to integrate new hires for better productivity	2
QA	Process to train new testers	Minimizes time to train new testers; Important with high turnover	2
3 <sup>rd</sup> Party/Vendor Management	Interfaces with other tools to automate approval/access for 3 <sup>rd</sup> parties	Quickly provide external users access to EA network; Toughest part in working with 3 <sup>rd</sup> parties	3

**Table 1 - Support teams with a dependency on SharePoint**

### 3.3 What is the cost of supporting SharePoint in-house?

Table 2 is a breakdown of the yearly human resource costs for supporting SharePoint in-house based on the tasks provided by Andrew Betz, and the salary information provided by Tim Platt who manages the majority of these engineers:

<b>Task</b>	<b>Cost</b>	<b>Description</b>
SharePoint Administrator	\$45,000	50% of an engineer's time at \$90,000/yr
DBA	\$9,000	10% of a DBA's time at \$90,000/yr
Windows SA	\$3,750	5% of a Windows SA's time at \$75,000/yr
Network Engineer	\$1,500	2% of a Network Engineer's time at \$75,000/yr
Data Center Specialist	\$800	2% of a Data Center Specialist time at \$40,000/yr
Storage Engineer	\$1,500	2% of a Storage Engineer's time at \$75,000
<b>Total</b>	<b>\$61,550</b>	

**Table 2 - Yearly human resource costs of supporting SharePoint in-house**

Andrew noted that these estimates are actually low since the individuals supporting SharePoint are doing this as a small portion of their job for the most part. They have many competing projects and only devote the bare minimum amount of time to “keep the lights on”. Ideally these engineers would be proactive and keep tabs on things like network traffic and CPU usage to see if the app is performing well or if there are issues that need to be addressed. But work is only being done when an outage has occurred, which translates into service interruptions for the end user. For example, if an engineer encounters an issue, most of the time the resolution is to just restart the server. However no investigation is being conducted as to figure out why there was problem in the first place, and why restarting the server fixed the problem. With engineers’ time being stretched so thin, they only have time to complete the bare minimum to temporarily alleviate the problem, but not actually put the time in to make sure the issue doesn’t recur. When using the cloud, the vendor has a contractual responsibility to investigate every outage thoroughly, find the root cause, and put preventative measures in place.

Table 3 is a breakdown of the yearly license costs for running SharePoint in-house based on the information provided by Andrew Betz, and the license costs provided by Asset Manager Colin Porteous:



<b>Task</b>	<b>Cost</b>	<b>Description</b>
SharePoint License	\$12900	This is the cost of 3 SharePoint licenses for internal facing sites (ie. 3 FE servers)
SharePoint CALs	\$0	There is also a per user cost for using SharePoint called a CAL, however EA has Enterprise CALs which covers all SharePoint users
Windows OS License	\$6400	This is the cost of 8 Windows Server 2008 R2 standard licenses (3 FE servers, 3 BE Servers, 2 DB servers)
SQL Server License	\$2000	This is the cost of 1 SQL Server 2008 R2 standard license
<b>Total</b>	<b>\$21,300</b>	

**Table 3 - Yearly license costs for SharePoint in-house**

Table 4 is a breakdown of the infrastructure costs for running SharePoint in-house based on the information provided by Windows SA Todd Jacobs:

<b>Task</b>	<b>Cost</b>	<b>Description</b>
VM Server Cost	\$0	2 VM servers for redundancy at \$11,000 per server, but this is ignored since we already own servers.
Storage Costs	\$4320	3Tb's SAN storage required at \$0.12 per Gb per month
Network Costs	\$0	It would be ideal to use fiber, but iSCSI is sufficient which has a negligible associated cost
<b>Total</b>	<b>\$4,320</b>	

**Table 4 - Yearly infrastructure costs for SharePoint in-house**

Todd noted that although there is a fixed cost for the hardware associated with hosting SharePoint in-house, this does not take into account the complexity of adding CPUs, RAM or storage. For example, if additional CPUs were required and the current VM server was maxed out, an entire server would have to be purchased at \$11,000, compared to only a small incremental cost with the cloud. Similarly if there was a need for Fiber Channel to improve the network speed, there would be a major cost with upgrading all the infrastructure to support Fiber.

Therefore the entire cost of running SharePoint in house is approximately \$90 thousand dollars per year when accounting for hardware, license and support costs. This does not include the cost of replacing a server if it is out of warranty or malfunctions. However since servers at EA traditionally last six to eight years, the cost of replacing a server is negligible when amortized over that time period.

<b>Costs</b>	<b>Amount</b>
Human Resource	61,550
License	21,300
Infrastructure	4,320
<b>Total</b>	<b>\$87,170</b>

**Table 5 - Total yearly cost of supporting SharePoint in-house**

### **3.4 Conclusion**

This chapter describes how EA has public and private SharePoint sites. Table 1 highlights the dependency on SharePoint, along with the amount of customizations present in each type of site. The company wide public sites and the private sites used by game teams are not critical to the daily workflow for those users. In contrast the private site, used by the support team that was interviewed, revealed that SharePoint is more tied to their daily workflow. Any loss of access to these sites would not only impact the particular support team directly, but would also impact all of EA through delayed ship dates, loss of revenue and a decreased stock price.

In terms of customizations, public sites are heavily customized, whereas the private sites used by game teams are not customized at all. Only one of the support teams was examined in detail and their site was heavily customized. Others support teams would have to be interviewed in order to more accurately determine the extent of customization, as well as the impact of an outage. Lastly the full cost of running SharePoint in-house was examined including the hardware, license, and support costs, which ended up being \$87 thousand dollars per year.

Type of Site	Outages an Issue?	Heavily Customized?
Public Site	No	Yes
Private Site - Game Teams	No	No
Private Site – Support Teams	Yes	Maybe

**Table 6 - Summary of key factors for the different types of SharePoint sites**

## **4: SITUATION ANALYSIS: CLOUD**

### **4.1 Aim**

This chapter examines all aspects of the cloud, commencing with identifying the pros and cons associated with adopting the cloud model. The different types of cloud models are then discussed along with a recommendation of what is most appropriate for EA's SharePoint instances. Lastly the most appropriate cloud model is examined in more detail.

### **4.2 Advantages of moving to the cloud**

The cloud has become one of the most talked about trends in IT. Gartner, which is the leading information technology research and advisory company, named the cloud it's top CIO priority in a 2011 survey of two thousand CIOs (Leites, 2011). Another survey stated that 97% of companies adopting the cloud said they saved money and offered greater flexibility than their in-house solutions (Talbot, 2011). Yet another survey mentioned that document management and collaboration are the third and fourth most adopted cloud technologies behind storage/backups and email (Talbot, 2011). This directly applies to EA since companies are happy with their adoption of the cloud, and SharePoint-type solutions are some of the main solutions being pushed to the cloud by these companies. Therefore EA is not dealing with the risk of being an early adopter, rather this is a proven cost saving exercise.

Other advantages of the cloud include:

- Server and license costs are included in the price of the pay-per-usage model, and the rate is substantially lowered when signing a long term contract. The price of maintenance such as hardware and software upgrades is also included in the hourly rate.
- Ability to ramp up and down the number of servers, CPU's, memory, and storage within minutes without any upfront costs (only usage fees). With the in-house model, a new server would take weeks to deliver and setup.
- Backup/Recovery is included in price, and providers would be proficient at recovering quickly since this is their core business.

### **4.3 Risks of moving to the cloud**

Although surveys highlighted in chapter 4.2 state that the majority of companies are satisfied with their adoption of the cloud, large companies still voice major concerns. For EA specifically, these concerns are exacerbated since they are subject to more hackers than most other companies. Therefore the main risks to EA with adopting the cloud include:

- The possibility of breaches relating to sensitive data. Security is subject to the standards of the provider, and they might not have as strict standards as EA does. For example, it would be highly detrimental to the company if documents stored on SharePoint containing the upcoming features for FIFA were made public as competitors are then aware of EA's strategy for that title. There is the ability to encrypt all data, but then this leads to performance issues with this extra layer of security.

- EA has so many existing data centers containing thousands of servers that the financial advantages are not as significant in adopting the cloud
- There is a greater chance of network issues and outages if dealing with cloud servers outside the corporate network. For mission critical systems like SharePoint, there is then a need to setup redundant servers in another cloud data center, drastically reducing any cost savings.
- Cloud companies employ a virtual environment, meaning multiple virtual servers actually exist on one physical server. Therefore EA's servers could be exposed to viruses brought in by other companies who are not as judicious about security.

#### **4.4 Types of Cloud Solutions**

Putting a name to the types of cloud solutions offered by providers is difficult since with rapid changes in the field, definitions are always in flux. Also different providers can offer a blend of different solutions. However there are two general models that apply to EA in terms of hosting SharePoint in the cloud (Sourya, 2011).

The first model is called Infrastructure as a Service (IaaS), where a hosting company provides servers and the underlying infrastructure, and it is up to the purchasing company to configure and use these servers as they choose. This solution offers the greatest amount of flexibility, since companies like EA who do have IT expertise, can leverage their skill set of server management without having to deal with the basic tasks of standing up a server.

The second model is called Software as a Service (SaaS), where a company will simply use a software application that is hosted in the cloud. For example a company can have their email hosted in the cloud, and don't have to worry about managing the server or setting up the software. They only need to connect to the server and retrieve email for the end users.

Grant MacLeod from Amazon Web Services (AWS), the account representative who EA has been dealing with over the past two years on other cloud related projects, was interviewed about their IaaS model. He discussed two different models: on demand and reserved model. With on demand, customers pay purely based on CPU usage. With the reserved model, you pay a small up front fee, but then pay a drastically reduced hourly rate. The following table shows a breakdown of the prices:

	<b>On Demand Model</b>	<b>Reserved Model</b>	<b>Notes</b>
<b>Up front cost</b>	None	1 yr - \$1325 3 yr - \$2000	
<b>Hourly rate</b>	1.29/hour	.32/hour	For less powerful servers, the hourly rate is less. (eg. 3 high end, 3 low end servers for SharePoint)

**Table 7 - Pricing for IaaS Cloud offerings**

Grant also said it was possible to try out the on demand model first to get an idea of usage, and if it was high, it would be just a billing change to move to the reserved



model. Another cost advantage is that the cost of the operating system and database licenses are included in the hourly rate.

Before pursuing a more detailed breakdown of cost, Will White, whose team at EA has been using Amazon's IaaS offering for the past year was interviewed. He noted that Amazon is the only cloud provider mature enough to be recommended to other teams at EA. However his main concern with the IaaS model is that the provider often has outages.

There have been many articles over that past year about Amazon cloud outages taking down Netflix, Instagram and other big companies (Ludwig, 2012). Although only the longer outages are publicized, shorter outages happen frequently. Will said that to prepare for this, a high availability architecture is required. Therefore his team has an identical solution built out in another data center. So if one data center has an outage, the application automatically fails over to the other data center, preventing any downtime.

However Will said that this is an extremely complex solution and requires a team to design and manage this architecture. It made sense for his team however as his architecture contained hundreds of servers so there were still significant cost savings, and the flexibility to quickly scale up and down. As was noted in Chapter 3, SharePoint is a mission critical system to certain teams at EA, and this type of architecture would be necessary to maintain constant uptime. But with an application that's only using eight servers, having a complex high availability architecture would cost more money to support, than the current in-house architecture that exists now. Therefore Will recommended the SaaS model instead.

## **4.5 Microsoft's SaaS SharePoint Offering**

Shawn Baumgartner is a member of EA's IT department and is currently running a pilot for Office 365. The main focus of this pilot is to evaluate cloud based email. Amazon and other big providers do not generally offer SaaS solutions because of licensing costs. But Microsoft offers this service for Office, which is what is being evaluated by Shawn, and also for SharePoint.

The advantage of this SaaS model is that there is no need to manage anything at the server level as all management can be done from the front end. This includes creating sites, granting permissions, adding customizations, etc. So not only are in-house infrastructure specialists not required to manage the server, but an engineer is also not required to manage the SharePoint application itself. Also, redundancy is managed by Microsoft, so there is no need to architect a complex high availability solution. In fact, Microsoft guarantees 99.9% uptime, or else they will compensate the affected company. Specifically if the application is unavailable for more than 525 minutes in a year (.1% of minutes in a year), then they will pay a certain dollar amount for every minute over that threshold. However, the contract for the Office 365 pilot states that the maximum amount paid is six thousand dollars, which is miniscule compared to the impact of a game being shipped one day late. Shawn said that this figure is still being negotiated further with Microsoft.

Shawn also cautioned that one of the biggest inconveniences of a SaaS offering is the need to have a separate user account and password. However to overcome this, they have built a hybrid solution where a user is authenticated through in-house servers with their EA credentials, and then automatically redirected to their cloud outlook client. This

“single sign-on” solution adds a layer of complexity to the cloud solution, but makes it much more convenient for the end users. A similar solution would have to be put in place for SharePoint, however this would be far less difficult since there is in-house experience now which can be leveraged.

Another drawback of Microsoft’s SharePoint cloud solution is that some customizations will be hard to implement in a cloud deployment, and some functionality might be lost during a migration from an in-house instance. For example, access to the file system, ADO.NET, and third-party .NET controls cannot be used. So teams at EA running SharePoint sites using this functionality, would have to be modified. Other important restrictions include SQL Server Reporting Services, Excel Services, FAST Search, and Word Automation all being unavailable (Marwitz, 2012). These features are all used by various teams at EA. These customizations made to sites running on the in-house SharePoint instances would have to be tested thoroughly in the cloud to accurately see any incompatibilities. However this would be a lengthy technical investigation which remains outside the scope of this paper.

In terms of cost, the price is listed on the website at \$4 per user per month. However Shawn mentioned that since EA uses so many products from Microsoft, the figure would be much less. An exact estimate could not be given since this figure is still in negotiations for Office 365. However the negotiations team is aiming to have the per user cost be similar to what is paid for the per user cost of running Office in-house. That would be a win-win situation as Microsoft still makes the same amount of money, and EA saves the cost of having to support the infrastructure in-house. There is the assumption that SharePoint in the cloud would be a similar cost.

## **4.6 Conclusion**

This chapter began by detailing how the cloud is one of the hottest trends among CIO's and that most companies adopting the cloud have been satisfied. Although there are cost savings and an ease of scalability, there are still issues like data security and lengthy outages that persist.

The different cloud models are examined and SaaS is deemed to be the most appropriate for EA since an expensive and complex high availability architecture would not have to be designed and maintained. Although the per user price would still have to be negotiated, it will most likely be similar to what is paid now for the in-house instance of SharePoint. This would make the overall cost of SharePoint in the cloud less than running it in-house. However issues like some features not being supported in the cloud would prevent a seamless migration, as these affected customizations would have to be recreated.

## 5: ISSUE ANALYSIS

### 5.1 Aim

This chapter combines the research on SharePoint from chapter 2, and on the cloud from chapter 3 to help identify the criteria important to EA in making the decision on whether to move SharePoint to the cloud. Each criteria is described in detail, and a weight is assigned to demonstrate the relative importance of each. Next a COWS (Criteria, Options, Weights, Scores) table is used to quantitatively evaluate how well SharePoint is performing in-house, based on the outlined criteria. Lastly, there is a similar evaluation of how SharePoint would perform in the cloud based on the same criteria and the current data available. There is also a discussion on what issues require more research in order to make a more robust and accurate recommendation.

### 5.2 Criteria for evaluating SharePoint in-house vs. SaaS

The following are the main criteria identified in order to make the decision on whether to adopt the cloud, based on the research from chapters 3 and 4. The criteria are described, and a weight is assigned to each based on relative importance. Section 5.3 shows the individual scores for each criteria and a total score for running SharePoint in-house:

- **Cost:** The main purpose for evaluating whether the cloud is a viable option for EA is the potential cost savings that could arise. The total cost of both the in-house and cloud solutions is outlined in detail in sections

3.3 and 4.5 respectively. A weight of 30% is given to this factor, higher than any other, as this is the most important aspect in deciding whether to adopt the cloud given the strategic direction of EA currently.

- **Security:** Not being in control of the data is a risk for all companies. This is even more of a risk for EA as they are one of the most hacked companies in the world. Section 4.5 discusses how EA already has a pilot underway to test email in the cloud, and this has been approved by the Security team. However documents containing features for upcoming games are much riskier to have stored off-site. This criteria is given a weight of 20%, one fifth of the total weighting, as it is one of the biggest drawbacks of the cloud, and one of the biggest risks to EA.
- **Customizations:** This criteria ranks the ability to run the current customizations. The investigation in section 4.5 uncovered that some functionality that is used currently will not work when run from the cloud. Therefore this functionality would have to be refactored which would take time, or may even be unreproducible in the cloud in the worst case. This criteria is also given a weight of 20% since certain teams require these customizations, and would be hampered in performing their daily tasks without them.
- **Need for Internal Support:** Chapter 3 and 4 both uncovered that there is a need for internal support with both solutions. The in-house solution requires a subject matter expert to manage the application, whereas the architecture in the cloud is more complex since it would require a hybrid

solution. This criteria is also given a weight of 20% since there may be a cost savings with moving to the cloud, but there also needs to be a measure of how complex the cloud solution is to support.

- **Scalability/Performance:** One major advantage identified in section 4.2 was the ability to quickly scale up and scale down the hardware required based on usage. Specifically, performance is monitored closely in the cloud, so if the usage is high, more hardware can be added within an hour. In contrast, performance monitoring is rarely done at EA because resources are stretched too thin, and ordering and installing additional hardware can take weeks. This criteria has a weighting of only 10% as it is not currently a huge concern for EA, but would definitely be taken advantage of if the cloud model was adopted.

### **5.3 Evaluation of SharePoint in-house**

Based on the criteria outlined in section 5.2, Table 8 shows a score for the In-house SharePoint model.

	<b>Weighting</b>	<b>In-house Score</b>	<b>Weighted Score</b>
Cost	30%	8	2.4
Security	20%	9	1.8
Need for Internal Support	20%	8	1.6
Customizations	20%	10	2
Scalability/Performance	10%	7	.7
<b>Total</b>	<b>100%</b>		<b>8.5</b>

**Table 8 - Score for In-house SharePoint Model**

The following is a discussion around the reasoning for each score given:

- **Cost:** A score of eight is given since the cost is fairly reasonable at \$87,170 for human resource, license and infrastructure costs. Also the per user cost is included in the total per user cost for all Microsoft products. Therefore although this initial investigation was undertaken to see if costs could be reduced by adopting the cloud, the in-house SharePoint implementation is actually not that costly to support.
- **Security:** A score of nine is given since having all data inside the EA corporate network is the best way to prevent theft. Having a secure firewall setup and monitored in-house is much safer than sharing an app with other companies whose security may not be as strict. A perfect score could not be given since hackers inevitably breach even the most



secure company's security. However this is much more rare in the case of EA.

- **Customizations:** A score of 10 was given for customizations since there are no restrictions on customizing SharePoint with the off the shelf version that is run in-house. Also the teams using SharePoint have already implemented their required features, so no changes are required. However when adopting the cloud, potential changes would have to be made due to the limited functionality present in the SharePoint cloud model.
- **Need for Internal Support:** A score of 8 was given since a subject matter expert is required in order to administer SharePoint. However the architecture of the application is very simple which contributed to the higher score despite requiring an administrator.
- **Scalability/Performance:** A score of 7 was given since it is fairly cumbersome to scale up and down the hardware used for SharePoint. Specifically, there is a long turnaround time required to order and install hardware. Performance was not identified as a major concern for EA, however it was noted in chapter 2 that more attention would be paid to scalability/performance if it was easier to adjust these factors on the fly.

## 5.4 Evaluation of SharePoint in the Cloud

Unfortunately an accurate evaluation of using SharePoint in the cloud cannot be completed similar to section 5.3, since there is incomplete information. Table 9 goes

through each criteria and lists if a recommendation can be made, and the reasons why a recommendation can or cannot be made:

Criteria	Can Recommendation be made?	Why?
Cost	Maybe	Need to confirm that negotiated per user price is same as what is paid for in-house model
Security	No	Need to gain a better understanding of how cloud provider will protect data, especially when sharing the app with other companies
Customizations	No	Need to test each customization in the cloud to see what will not work and the implications of that
Need for Internal Support	Maybe	There needs to be a hybrid solution, but the complexity is not yet known
Performance/Scalability	Yes	All information to evaluate performance/scalability is available

**Table 9 - Criteria that can be evaluated for the cloud model**

Since a definitive recommendation cannot be made, Table 10 shows a score based on the current information that is available:

	<b>Weighting</b>	<b>Cloud Score</b>	<b>Weighted Score</b>
Cost	30%	10*	3
Security	20%	5*	1
Need for Internal Support	20%	8*	1.6
Customizations	20%	6*	1.2
Scalability/Performance	10%	10	1
<b>Total</b>	<b>100%</b>		<b>7.8</b>

**Table 10 - Score for Cloud SharePoint Model based on information available**

(\*denotes estimate)

The following is a discussion around the reasoning for each score given:

- **Cost:** A score of ten is given assuming that the negotiations team at EA is able to obtain the same rate that is paid per user for the in-house SharePoint model. In that case, the per user costs would be equivalent, and EA would save the \$87,170 on human resource, infrastructure and license costs.
- **Security:** A score of five is given since by not having data in-house, EA is at the mercy of the cloud providers. The cloud providers did not provide

any method of having an enhanced means of security and there are many news articles about large companies using the cloud, being hacked.

Therefore this remains a major concern.

- **Customizations:** A score of 6 is given for customizations since there are a number of unsupported features in the cloud that are used by sites at EA. Affected teams would either have to redo their customizations or change their workflow in order to use SharePoint in the cloud. However these customizations would have to be tested in the cloud to give a more definitive score.
- **Need for Internal Support:** A score of 8 was given which was similar to what was given for the in-house instance. The main issue is that a hybrid solution would be required for things like “single sign-on”, which is described in chapter 4. However the architecture is not that complex, and it has already been completed for the email pilot, making it easier to support.
- **Scalability/Performance:** A score of 10 was given since it is very quick to increase or decrease hardware based on the usage and performance. This is one of the main benefits of the cloud.

Based on the information that was gathered in chapters 3 and 4, it would not be prudent to adopt the cloud as the cloud model receives a score of 7.8, compared to 8.5 for the in-house model. However the score for the cloud could be refactored once further technical research was completed. Specifically the security and customizations criteria need much more in-depth investigation.

Security is critical to EA's success, because if documents stored on SharePoint containing upcoming features are stolen and made public, then EA loses their competitive advantage. Although the cloud providers do not provide any additional security over their firewall, there are other options to enhance the security. For example, encryption could be used to obfuscate the stored documents. However it would take months to research a solution such as this, since an encryption algorithm would need to be implemented to ensure performance is not diminished, etc. As this is not trivial, it would take a few months of engineering time to investigate, with no guarantee that security would be actually enhanced.

Customizations would also need a significant amount of engineering time to investigate. A SharePoint test environment in the cloud would need to be setup and configured, then each site containing customizations would need to be migrated to this test environment and tested. With each test, an engineer would also need to evaluate if another feature of the cloud be leveraged to reproduce the functionality or if it is irreproducible. Similar to the security investigation, this would also take months of engineering time to complete.

In order to make a more definitive recommendation, the security and customizations criteria will need to be researched more thoroughly by an engineer, making the work outside the scope of this more strategic paper. Although based on the current information, the recommendation would not be to adopt the cloud, Table 11 highlights what would be required to give a "go" recommendation:

	<b>Weighting</b>	<b>Cloud Score</b>	<b>Weighted Score</b>
Cost	30%	10	3
Security	20%	<b>9</b>	1.8
Need for Internal Support	20%	<b>7</b>	1.4
Customizations	20%	<b>8</b>	1.6
Scalability/Performance	10%	10	1
<b>Total</b>	<b>100%</b>		<b>8.8</b>

**Table 11 - Score for Cloud SharePoint Model based on positive research results**

Table 11 shows that if an encryption algorithm is implemented, then security would be enhanced to a level similar to that of in-house. Also if the customizations only needed minor modifications, then that would also increase the score. However the Need for Internal Support score would decrease as the complexity of SharePoint would increase with the added encryption layer. With both of these changes, the score for the cloud moves from 7.8 to 8.8, which is 0.3 better than the score for in-house. So if research demonstrates that the changes required to improve the security and customization scores is all that is required, then the recommendation to adopt the cloud model could be made.

## **5.5 Conclusion**

This chapter brought together the research on SharePoint and the cloud in order to identify the criteria important to EA in making the decision on whether to move SharePoint to the cloud. These included, cost, security, customizations, the need for internal support, and performance/scalability. Evaluating the in-house instance of SharePoint gave a score of 8.5. However there was not enough information to calculate a score for SharePoint in the cloud, since further research is required on security and customizations.

The required research is purely technical and would take a few months of engineering time to perform, making it outside the scope of the paper. Based on the current information available, SharePoint in the cloud received a score of 7.8. However if this technical research regarding security and customizations was completed and came back more positive, then the overall score would be 8.8, and a “go” recommendation could be made. This reveals that this decision is not clear-cut and further research is indeed highly recommended.

## **6: CONCLUSION**

### **6.1 Aim**

This chapter commences with a discussion of the recommendation on whether EA should adopt SharePoint in the cloud, and what further information needs to be sought in order to improve the accuracy of the recommendation. Next is a list of the management actions required to answer the open questions. Lastly, there is a discussion of the lessons learned from this investigation.

### **6.2 Recommendation**

Based on the information that is currently available, adopting the cloud is not recommended. Although there would be an approximately \$90,000 annual cost savings, there are other unknown factors which require months of further technical research to uncover. There is a distinct possibility that these unknown factors could actually contribute to a higher cost of operating in the cloud than in-house.

Section 5.4 highlights the areas where further technical research is required in order to definitively make a recommendation. Specifically, the following questions need to be answered:

- Will the per user cost of SharePoint in the cloud be the same as that of in-house? Even if the cost is slightly more per user in the cloud, then there would be very little benefit if you factor in the large number of users at EA.



- Is there a method to secure the documents stored in the cloud to provide the same level of security as that of in-house?
- Which customizations will not work in the cloud, how much effort will it take to refactor them, and what impact will this have on end users?
- What other aspects are involved in the hybrid solution? Specifically, other than “single sign-on”, what would have to be run in house and integrated with the cloud solution?
- How much will the need for internal support be, based on the complexity of the hybrid solution, and based on securing the data?

It is highly unlikely that a best case scenario will occur, where all of these questions come back positive. If even one of them comes back negative, then based on the quantitative analysis from section 5.4, it would not be prudent to move to the cloud.

### **6.3 Required Management Actions**

Although this entire investigation reveals that moving to the cloud at this point would not be beneficial, the following actions would help EA to resolve some of the open questions listed in section 6.2, and make the process of evaluating other SharePoint options easier in the future:

- Create a catalog which contains the names of all the active sites , a contact person for each site, and a list of customizations for each site. This information will help communicate a possible transition to the cloud, as well as track what non-standard functionality would need to be reproduced in the cloud.

- Request a test environment from a cloud provider in order to test some of the more complex SharePoint sites that are highly customized. This will provide an indication of how much effort would be required to move these sites to the cloud. It would also give the company some hands on experience of the cloud revealing possibly some information we are not aware of now.
- Research more into the next version of SharePoint to see if Microsoft is looking into making it easier to migrate in-house SharePoint sites to the cloud. If so, then this could be a big step in easing the transition to the cloud, and could then make the cloud a more viable solution for EA.
- Hire a security consultant to see how other companies that are using the cloud, protect their sensitive data. Also find out how complex a more secure solution would be and what performance overhead is added.

## **6.4 Lessons Learned for Future Decisions**

Over the course of this investigation, some key learnings were uncovered that would be beneficial in future investigations of adopting new technologies:

- This investigation began as a cost savings exercise for EA, but it quickly became apparent that it is very difficult to make a decision purely based on this factor. Interviews uncovered the multi-dimensional nature of this decision, and demonstrated how complex IT is at EA. In fact, the other factors could make the cost of the new technology more than the current technology, therefore all these hidden elements need to be accounted for.

The main lesson is that even in a tough economic climate, there cannot be a sole focus on cost, but instead a more holistic approach needs to be undertaken.

- Given tough economic times, EA should be more proactive about putting itself in a more knowledgeable position when it comes to their own internal systems and architecture. The main goal of this investigation was supposed to be examining the new technology and comparing it to the old technology. However, the bulk of the investigation was spent trying to understand how the old technology was used, as this essential information is not routinely tracked. Cataloging this information would provide a sense of readiness, and allow EA to move quicker on investigating new technologies.

## **6.5 Conclusion**

This chapter highlights that based on the current information gathered, the recommendation is not to adopt the cloud. It discusses what further information needs to be sought in order to make a more clear cut decision, including further details around customizations and security in the cloud. A list of management actions is provided in order to answer these questions, such as setting up a test environment in the cloud to test the customizations, and hiring a security consultant to discuss methods to enhance data security in the cloud. Lastly, there is a discussion of the lessons learned from this investigation, including how you cannot make decisions purely based on cost, and that, in this tough global economic climate, EA needs to be more knowledgeable about their current systems in order to move more quickly on investigating new technologies.

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