Cloud Storage Adaptation

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Executive Summary

This study is an analytical evaluation of the use of digital online storage also known as “cloud storage” by students at DePaul University. The study is based on the most popular services at this time, which include DropBox, Google Drive, iCloud, SugarSync, and SkyDrive. As these services are relatively new there have not been any in-depth studies of the use of them. There are how ever subscriber numbers from the various companies, however these numbers do not reveal active subscribers or demographic information. As consumer personal computing devices transition from the use of physical media as a storage option to other means which provide a much smaller form factor, logic would dictate that there would be a dramatic increase in the use of such services. The means by which students at DePaul University are adopting such technology in all likelihood is a relatively good indicator for the late teenage early adult demographic at large, yet not representative of the larger population. While the technology may be leaning in a specific direction that does not necessarily mean the consumers have quite adapted for a variety of reasons such as security and access concerns.

Introduction

In the last several years there have been many innovations in the consumer technology sector some of these have been adopted more quickly than others. More and more consumer electronic companies are moving away from physical storage mechanisms in computers and other devices. This trend leaves consumers with few options for the storage of there data. This trend has led the introduction of “cloud storage” services have provided consumers with a service/ product that fills a very specific need. Cloud storage or cloud computing currently has a varying degree of definitions, that result from the types of products with varying functionality that are currently available that could be considered under that umbrella term. The National

Institute of Standards and Technology, Information Technology Laboratory defines cloud computing as;

> Cloud computing is 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. (Mell & Grance , 2009).

The focus of this study will be in determining the level of adaptation by DePaul students of cloud based storage services such as DropBox, iCloud, Google Drive, SugarSync, and Microsoft's Sky Drive, or alternatively a similar feature provided in the universities Learning Management System (LMS). Traditionally computer files have been stored on physical mediums such as a hard disk, originally a floppy disc, then a compact disk, now predominantly on compact flash drives. A proliferation of Internet connectivity in conjunction with a dramatic expansion of mobile connectivity has made the availability of documents and files across multiple devices a necessity for many consumers.

Many of the currently available cloud storage options are associated with specific platforms or other service, often referred to as "eco systems". This study will also seek to determine if there are specific correlations between "eco systems" and services, such as Google Drive and Google Docs, Microsoft SkyDrive and Microsoft Office, Apple iWork and Apple iCloud. While there is a convenience factor that can be attributed to cloud based storage solutions unfamiliarity with a new technology can often impede wide adaptation by consumers.

In addition to adaptation of technology being hindered by consumer unfamiliarity there are several other areas that may be areas of concern to consumers that may also influence resistance to the use of such services. When a document or file is stored on a physical medium such as a flash drive or your computers hard disk you are responsible for the security of that information, generally individuals are comfortable with that responsibility. When you store files on a cloud based system your files are uploaded to companies' servers where they then bear a level of responsibility for the security and integrity of those files.

Background

There have not been many if any scholarly or others wise studies conducted on the use of cloud based storage at this time. However there has been a fair amount of journalistic interest from a variety of credible journalistic outlets. Currently there are four major services that offer consumer cloud storage in various models. All four services offer between two and seven gigabytes of free storage, all also offering comparative amounts of additional paid storage. "iCloud is not a traditional cloud file storage and sharing service in that it requires an iOS device or a Mac to create an account and is mainly focused on keeping your stuff automatically synced between apps and devices." (Zibreg, 2012) DropBox is described as;

> Dropbox is a free service that lets you bring your photos, docs, and videos anywhere and share them easily. Dropbox was founded in 2007 by Drew Houston and Arash Ferdowsi, two MIT students tired of emailing files to themselves to work from more than one computer. Today, more than 50 million people across every continent use Dropbox to always have their stuff at hand, share with family and friends, and work on team projects. (DropBox)

Microsoft's SkyDrive, SugarSync, and Google Drive offer services that are very comparable to that which is offered by DropBox. These services allow users to save and access documents from PC's, smart phones, and tablet devices that are internet connected.

Concerns about reliability and security are not with out merit, especially when an individual gives up explicit control of their data, as explained by Kantra.

> I've heard from many people, including friends and family, who say that they use external hard drives to back up photos because they're afraid pictures of their kids could get out onto the Internet or that their cloud service might lose their photos. It's easy to see where these concerns originate — it seems like every couple of weeks we hear about some big company or service being hacked. Sony Entertainment Network, Zappos, even Symantec, which makes the Norton Antivirus software, have been the victim of hackers. And Internet

> giants, like Microsoft Hotmail and Amazon, have experienced service outages and data loss. (Kantra, 2012)

These concerns are derived from the lack of physical control over an individual's reliance on a third party for what was previously controlled by the individual. Similar concerns in other areas such as banking and email where the reliance is mostly on the third party to maintain security have not impeded mass adaption by consumers.

DropBox and iCloud have seen wide consumer adaptation of their respective services in the last few years. In the case of DropBox where services are not directly linked to a specific platform, yet integrated with a variety of platforms consumers have very much embraced the service.

> Through little more than word-of-mouth the company has racked up more than 50 million customers who use its software to store and retrieve their photos, documents and videos from Web-connected devices.

Where as in contrast iCloud adaptation is most likely directly linked to the ever-increasing consumer drive for iPhones and iPads both hardware devices intrinsically linked to the iCloud service. iCloud services are very much a mechanism that encourages consumers to live with in the Apple ecosystem by intensively integrating all of their various products to those.

> For example, if you're already using Apple's iLife suite of apps, then you can take advantage of iCloud. While iCloud doesn't offer synchronization of arbitrary files, it does support the iWorks suite. (Mearian, 2012)

The other predominant issue with cloud storage is the concern of data loss. This issue seems to be in favor of those who provide cloud storage solutions for multiple reasons. The largest being that cloud storage poses a far less risk of data loss as compared with other conventional means of data storage. Those conventional means are physical objects that can very easily misplaced or altogether lost.

> As far as data loss, cloud services are far more reliable backup solutions than external hard drives. Yes, in rare instances cloud-based services have lost data, but external hard drives can fail, too. What's more important is not whether your backup solution can fail, but when it will fail. An external hard drive is far more likely to fail at the same time as your computer — whether from fire, flood or theft — resulting in total loss of all your precious photos. If a cloud service fails, you still have the original photos on your PC. (Kantra, 2012)

Being far more reliable than physical media data storage makes cloud storage solutions not only viable but also very appealing to consumers.

Hypotheses

H1: While cloud storage has become more readily available it *has not become* widely adopted by DePaul students.

~H1: While cloud storage has become more readily available it *has also become* widely adopted by DePaul students.

> Microsoft recognized three groups of power users that desire personal cloud storage. College students, the first group, work from multiple locations and collaborate frequently as part of class. The second group, gadget fans, have at least three devices including smartphones, PCs, and tablets. They want to easily access their content across their devices. The third group, photo enthusiasts, have hundreds of gigabytes of photos stored on their PCs and need the ability to access them. (Ron, 2011)

H2: DePaul students *have not widely adopted* the use of cloud storage due to concerns with the security of such services.

~H2: DePaul students *have widely adopted* the use of cloud storage in spite of concerns with the security of such services.

> When a cloud provider has an individual user as its customer, it is likely to be controller of the personal data collected relating to that customer ('user-related personal data'). This may include personal data provided by the customer during sign-up as well as metadata generated regarding the customer's ongoing usage of the service. (Hon, Millard, & Walden, 2011)

H3: DePaul students *perceive* cloud storage options to be less secure than email and the use of other methods of data storage.

~H3: DePaul students *do not perceive* cloud storage options to be less secure than email and the use of other methods of data storage.

> Nasuni's survey of 451 IT decision makers in North America found that 81% have concerns about data security in the cloud, while 48% worry about data control concerns in the cloud. Forty-three percent of those surveyed plan to store data in the cloud in the next 12 months. (Kossman, 2011)

Questions

What is your age? *

1.) 19 or younger
2.) 20 to 29
3.) 30 to 39
4.) 40 or Older

What is your gender? *

1.) Female
2.) Male

When creating or editing documents what software do you use primarily?

1.) Apple iWork
2.) Google Docs
3.) Open Office
4.) Neo Office
5.) Microsoft Office
6.) Other

When storing documents or files on your computer what is the primary means by which you store those documents or files? *

1.) In a documents folder (hard drive)
2.) On a USB drive or thumb drive, flash drive, etc.
3.) On a CD or disk
4.) By emailing them to yourself.
5.) A cloud storage service SkyDrive, iCloud, etc.
6.) Other:

Are you aware of cloud storage (have you heard of it)? *

1.) Yes 2.) No

Do you currently use any of the following services? (Chose all that apply)

1.) Google Drive 2.) SkyDrive (Microsoft) 3.) DropBox
4.) SugarSync 5.) iCloud (Apple) 6.) D2L file "Locker"
7.Other:

If you do not use cloud storage is there a specific reason why?

1.) Security concerns 2.) Cost concerns 3.) Access concerns
4.) Privacy concerns 5.) Unfamiliarity 6.) Other:

In an average day how much time do you spend using a computer, tablet, or smartphone? *

1.) 2 Hours or Less 2.) 2 Hours – 4Hours 3.) 4 Hours – 6 Hours
4.) 6 Hours – 8 Hours 5.) More than 8 Hours

Is it important for you to access your documents and other files over the internet or via other devices? *

1.) Yes 2.) No

Explain briefly why cloud storage would be beneficial to you.
If you feel that it would not be beneficial please answer the next question.

Explain briefly why cloud storage would not be beneficial to you.

Method

My pilot study was conducted on Thursday April 26th 2012 in my Multimedia and the World Wide Web class with ten participants. The survey was created and administered using Google Docs and emailed to participants. After conducting the pilot study I was able to refine the wording and ordering of the question that will be used. The changes included altering the range of answers for individual's ages, and also a reordering of the questions to provided those participating

To conduct the study a link to the survey will be sent randomly to the email addresses of students at DePaul University. All responses that are received will be used. Expected participation is thirty to forty percent so in order to receive the maximum amount of data a large number of students will be emailed. A disclaimer will appear in the email, and also at the top of the survey. This is required by DePaul University in order to ensure the confidentiality of the participants.

Limitations

There are a variety of limitations to this study; the prominent limitations are in the size and scope of the study. The study only focuses on a relatively specific demographic consisting of individuals who are students at DePaul University. The level of participation in the survey will limit the amount of data, and that data will not likely represent the population at large. There is also a concern that individuals who are more inclined to use cloud storage will complete the survey in greater numbers than those who are not. Further more the validity of the results is based upon individuals honestly representing themselves; there is really no way to ensure that they do so.

Results

Respondents to the survey were primarily 29 years old or younger comprising 60% of those surveyed, results that fall in line with what would be expected with the demographic target of DePaul University students. The gender make up of the results were 55% male and 45% female, a result that very much may coincide with the nature of the survey. Stereotypically males are more inclined to "new" technology or gadgets. Of the total number of respondents over 90% were "aware" of cloud storage services, a total of 4 out of the 47 indicated that they were not aware of cloud storage. Respondents were also asked to indicate the amount of time that they spend in an average day on a computer, tablet, or smartphone. 75% of

respondents indicated that they spent from 2 to 6 hours in an average day on of those deceives.

I hypothesized that while cloud storage has become readily available it has not been widely adopted by DePaul Students. I believe based on defining widely adopted as more than 75% that this hypothesis is accurate. Apples iCloud service was the most widely adopted at 46%, this result however may be inaccurate in indicating actual usage because of the nature of the service. iCloud services are coupled with the ownership of an Apple smartphone, tablet, or computer. A more accurate indicator can be inferred from the 38% who indicated that they use the DropBox service, which is not bundled with any device. Those who indicated that the primary means by which they store documents on a cloud storage service over other methods was 19%, around $1/5^{th}$ of total respondents regularly uses cloud storage. My hypothesis that the primary reason for DePaul Students not adopting cloud storage services due to concerns about the security of their information was incorrect privacy concerns and general unfamiliarity comprised over 50% of the reasons why people do not use cloud storage. Those who do not use cloud storage responded that they feel that cloud storage is not something that they feel that they need.

I included a question regarding the software that respondents used for document creation and editing to determine if there was a correlation between the use of cloud storage and the software that individuals use. Interestingly while Microsoft Office was the most used it only garnered 34% with other alternatives each having around 12% of the respondents. It is likely that those that use software associated with specific cloud storage services are more likely to use those services. The most intriguing result was the methods by which individuals store their documents the most popular method surprisingly was emailing them to your self with 28% of respondents, followed by the traditional flash drive with 21%.

Discussion

Primarily the results from the survey were along the lines of what I expected with two or three exceptions. The demographic of the responses fell very much within the expected results with male respondents slightly outnumbering female with a primary age range of 19-29, which is respective of a university environment. I do not know however if the results would remain the same with the same survey of a larger demographic and a greater number of respondents. I would imagine that the results from such a survey would show far less of adaption of not only cloud storage but the use of technology in general. Students by the nature of being students are required to use technology to an extent there for more likely to adopt new technology.

Unexpected results in the software used by students for document creation and storage were far different from expected. Personally I expected the majority to use Microsoft Office and store their documents on a USB flash drive. The results showed that only roughly 1/3rd of students used MS Office and that the most popular method to store documents was to email them to one's self, which technically is a form of cloud storage by proxy. Respondents reasoning for not using cloud storage as well as for using cloud storage were mostly inline with the hypothesis.

Responses for: Explain Briefly why cloud storage would not be beneficial to you.

"I just don't need something like that."; "It does not seem like something I would use."; "I can't think of a reason why it would be."; "I can just email docs to myself"; "Why do I need more than I have?"

Interestingly all of those who responded to that question were MS Office users, which may indicate a correlation between the two. Additionally no one mentioned privacy or security as concerns that would lead me to believe that most of those individuals use technology at a sparse minimum and stick with what they know.

Responses for: Explain briefly why cloud storage would be beneficial to you.

"It is beneficial to be able to access my files from any device at any time."; "Mobility is important to me...to have all of my documents and files whenever I need them on multiple devices."; "Immediate access of most of my important documents."; "The convenience of accessing everything anywhere."; "For sharing large files with people--files too big to email. Or if I am sharing a bunch of files (like 100 photos), so much easier to Dropbox than to email."; "So I do not lose anything"; "I like to edit my papers on my iPad."; "As a back up"

Those who responded that were users of cloud storage fell in line with most of the reasons why people would find such a service useful, most of which are touted in advertisements' for such services.

Beyond what was hypothesized there seems to be a correlation between the devices, software, and services that individuals use. This would be inline with the business strategies of the majority of large consumer electronic brands looking to lock consumers into a specific "ecosystem" i.e. Google, Microsoft, and Apple.

Conclusion

The study confirmed to an extant the hypotheses and also information regarding the use of services in conjunction with specific software and devices. For a demographic that is inclined to the use of technology to find that there are individuals that do not necessarily adapt to changes and continue to cling to what they know and what works is insightful. Technology is rapidly changing, as are its various uses in society and specifically in education. To find that there are individuals that appropriate the use of email as a method of storing documents and files was intriguing. Furthermore the hegemony that has developed with in brands was also an intriguing finding. In a larger study with a broader demographic it would be interesting to follow this trend over time and within specific demographics.

Questions from this study were not necessarily specific enough to answer questions related to specific patterns of usage. I would hypothesize that individuals

who spend the most time on an Internet connected device are the most likely to adopt new forms of technology. However the questions used in this study were not specific enough to make any sort of correlation.

Intended as a survey of the use of cloud storage services by students at DePaul University, the results and study it's self, look in retrospect more like a market research study. Similar studies could build upon such a study to develop marketing strategies that target those who are least likely to embrace, even use new technologies and products. Additional studies could be conducted that examine usage within specific ecosystems and consumer tendencies toward products that are ecosystem based, or those that examine consumer resistance to new technology and services.

The limited scope of the respondents to this study most likely do not represent what the results would look like on a far larger scale along the lines of ten thousand plus respondents. A larger study would more effectively gage information that would be respective of the population at large. Such a large scale study would need to have more specific questions even successive question that would garner more accurate information based on specific choices and behavior.

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