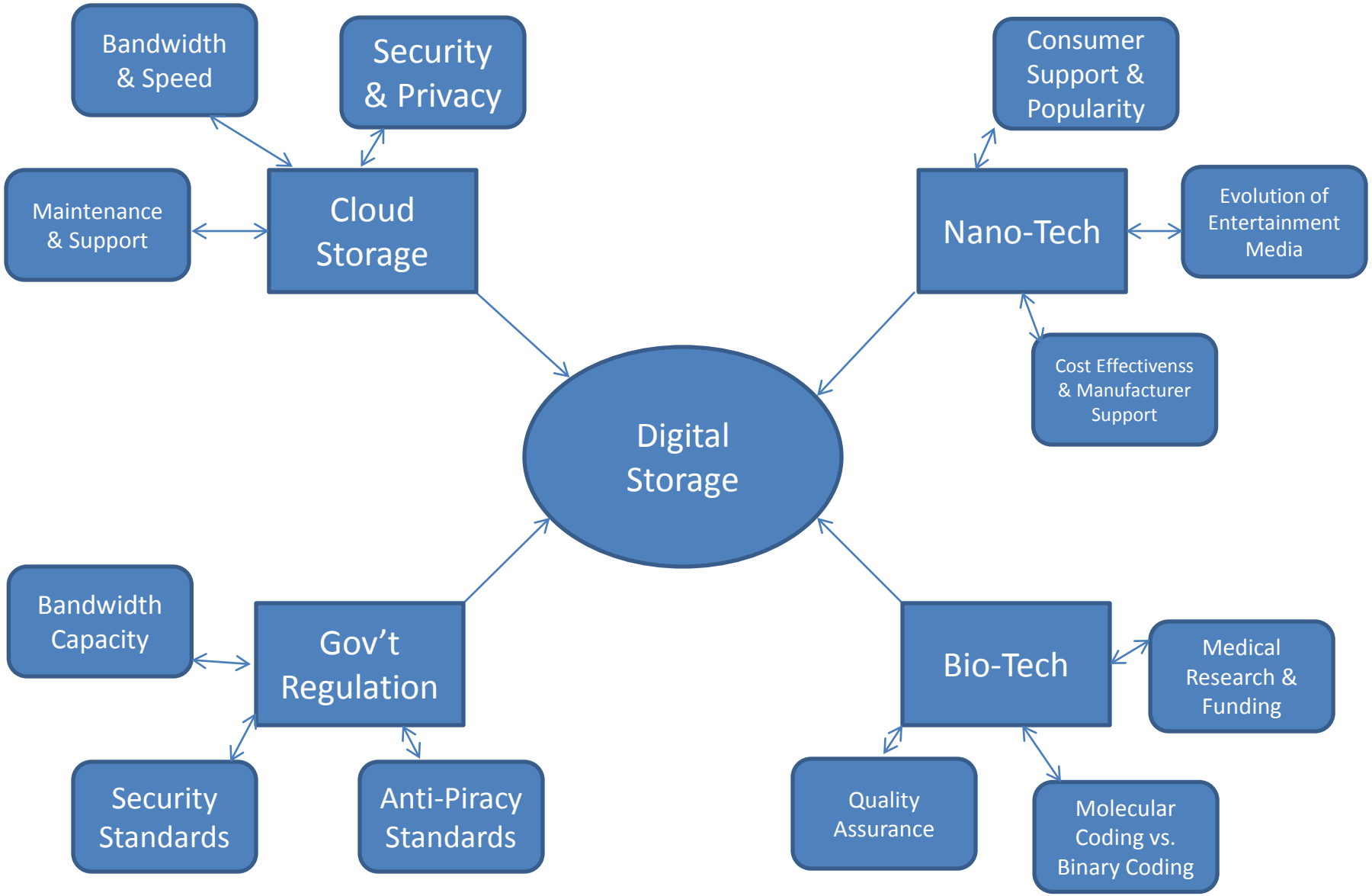
Benjamin Yu
Tech 1313 Impact of Modern Technology on Society

Topic: Digital Storage

The area of interest for my particular domain focuses on digital storage, more specifically cyber storage. Digital storage has evolved exponentially over the past decade. As each generation begins to adapt more and more to the technological era, the demand for digital storage will continue to grow and the suppliers must meet not only the demand but also the satisfaction. Not only are people going to want to keep as much data as they can for easy access but they want to keep it secured as well.
The scope of the forecast will center on the evolution of cyber storage. How will suppliers react to the demand and how will government react to the privacy aspect of it. We also have to consider the potential shortage of space and what other technologies will be developed to address that concern.


Bandwidth & Speed
Security & Privacy
Maintenance & Support
Cloud Storage
Consumer Support & Popularity
Nano-Tech
Evolution of Entertainment Media
Cost Effectivenss & Manufacturer Support
Digital Storage
Bandwidth Capacity
Gov't Regulation
Security Standards
Anti-Piracy Standards
Bio-Tech
Medical Research & Funding
Quality Assurance
Molecular Coding vs. Binary Coding

TECH 1313 – Impact of Modern Technology on Society

Instructions: Provide a **Current Overview** of your domain. That is, how is the domain structured? How does it operate **today**? You may consider the broader industry / sector(s), how large it is (people, product, service, money), where it is location(s), current practices (laws, regulations, contracts), and organizations involved? Again, this is a highlight to help others understand the current conditions of your domain. It represents our starting point.

Submit between five and ten of the most important current conditions for your Individual Domain where each one should

1) be something about the present (no changes or comparisons across time, a snapshot, a still picture)
2) give important information about the state of the domain and
3) use numbers (quantities) where appropriate.

Explain each one sufficiently using complete sentences.

Give references and citations on the source of the information.

Name of the Individual Domain: Digital/Cyber Storage

Condition	***Reference, citation***
HD quality media has pushed for an expansion of not only bandwidth but total amount of digital storage capacity. Digital storage capacity for all content distribution is expected to expand 4 times from 2010 to 2016.	Coughlin, T. (2012). Digital storage. Broadcast Engineering, 54(1), 46-n/a. Retrieved from http://search.proquest.com.ezproxy.lib.uh.edu/docview/916136933?accountid=7107
Consumer Electronics spur consistent growth and development for faster and more efficient storage content and devices.	***DATA STORAGE; 2011 Digital Storage for Media and Entertainment Report Information Technology Business September 6, 2011***
Cloud based storage offers new options to not only individual interests but large scale interests. The ease of use and lesser need of maintenance begin to replace more prehistoric forms of storage.	*WATERS, J. K. (2011). MOVE IT OR LOSE IT Cloud-Based Data Storage. Education Digest, 76(8), 28-34.*
A concern of data integrity is an issue that has been inherited by cloud storage. Many manufacturers and developers are continuing their pursuit to maintain the integrity and security of their client's data with more advanced encryptions.	***NASUNI; Top 5 Security Challenges of Cloud Storage Information Technology Newsweekly June 22, 2010***
Increasing concerns of useable space for storage becomes a catalyst in research and development of newer formats. Holographic storage quickly becomes a frontrunner when developers can successfully place 2.5 Terabits	*http://www.extremetech.com/extreme/126179-is-holographic-storage-finally-coming-to-market*

per square inch.	
Current White House deliberation of online privacy has immediate impact on all digital storage. How will the government regulate cloud based storage and maintain privacy at the same time?	*http://www.globalpost.com/dispatch/news/regions /americas/united-states/120223/obama-proposes-online-privacy-bill-rights*
Harvard Medical team cracks DNA code to storage. Allowing binary coding to transferred as DNA code. Introduces ability to store 700 TBs of data into one single gram.	*http://www.extremetech.com/extreme/134672-harvard-cracks-dna-storage-crams-700-terabytes-of-data-into-a-single-gram*

Post the template to ***Current Conditions****.*

TECH 1313 – Impact of Modern Technology on Society
Stakeholder List Template
6/6/2013

Instructions: List between 5 and 15 stakeholders (influential actors: influential individuals or groups of individuals, businesses, organizations, NGOs and governmental agencies) in your Individual domain.

For each stakeholder in the left column, identify up to three of their most important interests, goals, values, fears, positions, and such that will guide their actions in the domain.

Name of the Individual Domain:

Stakeholders	Interests, goals, values, fears, positions
1. Consumers	Consumers will benefit the most. Since competition is still relevant in the storage market, manufacturers are striving to achieve the next best thing for consumers to buy. Newer developments will bring out an easier method for consumers to store, access, preserve not only some but all of their data.
2. Manufacturers	Hard drive manufacturers are looking at profit margins. The amount of money pouring into research and development are expected to pay significant returns if they can nail down a newer, efficient method to store data. Cloud companies, similar to DropBox, are in the same category. Cloud storage is looking for methods to improve not only their storage but their security/privacy. The interesting thing is that all these manufacturers are in competition with each other. The biggest fear from each side is falling short of the curve and losing out to one or another.
3. Government	Government has played a significant role for throwing up flags for the increased development of storage, specifically cloud storage. They are very concerned about privacy standards. If they continue the trend to shift all their data onto this "secured" cloud servers, what will happen with security. In addition, they are very concerned with piracy. They do not want to endorse the actions of illegal download or distribution of copyrighted content.
4. Entertainment Industry	The entertainment industry has the most to gain and the most to lose. If Cloud storage continues along the path that peer to peer sharing did, they could lose millions of dollars due to internet piracy. If there is no regulation put in place to monitor data traffic or content, there is no way to put a stop to copyright infringement on media. However, if they support the right areas of digital storage, they could see many potential shifts to newer media content which would force consumers to re-purchase media that they already own. Many tablet and smart phone owners use their devices to stream and download media that

	has been legally purchased.
5. Medical Field	The field of medicine has had a difficult time cataloging all their finding and patient history in a way that they can search for it easily with no time lost. With combination of the right application, cloud storage could streamline their entire process to a matter of seconds. In addition, they can cross-reference other findings from other doctors to provide more accurate treatments or newer treatments to help in the fight of cancer, heart disease, etc.
6. Public Education	Similar to the medical industry, many Universities are publishing courses on an open network for anyone to access and learn from. With government funding to public education decreasing, many school districts can utilize these materials to provide in the classroom instead of the depending on state government dollars to help with education. This also helps the University interests because people, with the willingness to learn, will have more incentive to continue their education, regardless of what background they have.
7. Community of Internet Pirates	Exactly opposite to the entertainment industry, the cloud storage concept opens up tremendous opportunity to the world of illegal downloads. Many companies that are providing the cloud service prefer not to have strict regulation with their service. The whole concept of cloud storage is relieving the difficulties with current digital storage methods. They fear that the regulation will scare people out of using their service, but its that exact idea that the internet pirates will take advantage of. But if newer security standards begin the take place, it may eliminate any last chances of pursuing that idea. Companies are opposed to monitoring their traffic to the point of intruding on individual's privacy, but open to a more up to date security measures to prevent unauthorized intrusion.
8. The Human Race	With the current developments in digital storage, any individual could potentially catalog their entire life on a strand of DNA. You would have a source of data that would not get corrupted, physically destroyed, or even broken into. You could potentially catalog the entire world and records would potentially be forever preserved, unless a massive asteroid were to decimate all life on the planet, then you may have a problem.
9.	
10.	
11.	
12.	
13.	

14.	
15.	

Post the completed template to ***Stakeholder List.***

EVENT
THE IBM 350
4th September 1956
IBM creates the first hard drive, that contained 50 disks @ 1200 RPM.
EVENT
FLOPPY DISK IS CREATED
1971
IBM creates the first floppy disk for commercial usage.
EVENT
HARD DRIVES BREAK GIGABYTE THRESHOLD
1980
IBM introduces the 1st hard drive to break the threshold of the gigabyte with 2.52 gigabytes of storage
EVENT
CD-R IS CREATED
1990 - 1990
The first record-able compact disc is developed.
EVENT
SEAGATE BREAKS A BARRIER WITH SPEED
2000
Engineers at Seagate, a hard drive manufacturer, create a hard drive with the standard 7200 RPM speeds that we see today in most common hard drives.
EVENT
FLASH DRIVES ARE INTRODUCED
2000
Utilizing the USB (universal serial bus), the flash drive came with the storage capacity of 8 MB, which was 5x that of floppy drives.
EVENT
THE APPLE IPOD
2001
Although the Apple iPod isnt a direct impact on storage devices, it had a significant indirect impact with it. Apple's ability to utilize the...
EVENT
MICROSOFT INTRODUCES THE XBOX
2001
The first gaming console with a built in hard drive. This paved the way for more media content to be stored internally as opposed to the use of memory...
EVENT
BLU RAY DISCS ARE CREATED
2002
Blu Ray discs are officially created after debuting at an electronics show. The Blu Ray disc would come to be a direct replacement for the CD/DVD for...
EVENT
FLOPPY DRIVES BECOME OBSOLETE
2003
2003 marked the year where floppy would cease to be relevant when Dell, IBM, and Apple would not include floppy disks in their computer designs
EVENT
CLOUD COMPUTING COMES TO LIFE
2006
Amazon plays a key role in the development and implementation of cloud service as it upgrades its data centers from the traditional server to the...
EVENT
SOLID STATE DRIVE IS INTRODUCED
2008
Solid state drives changed the face of hard drive technology as it has no moving parts and requires less physical space. In addiiton, it has been...
EVENT
HOLOGRAPHIC STORAGE
2009
Holographic storage, which was previously completely speculative, was finally introduced as a means of digital storage.
EVENT
CLOUD STORAGE BREAKS NEW HORIZON
2011
Cloud storage is implemented in multiple facets, primarily targeting the mobile phone industry and the entertainment industry.

TECH 1313 – Impact of Modern Technology on Society
Trends Template
Feb 2011

Instructions: List the five (5) **most important** trends in your domain. A trend is a long-term, continuous change over time that could be put on a graph if you had the data.

1.

2.

3.

4.

5.

Finally, using the template, identify up to 3 implications of EACH trend you identified above. Implications are potential impacts or consequences if the trend in your domain continues. So, what else is likely to change if that trend continues as expected? For example, for the trend, "traffic congestion is increasing," implications might be that" people would seek to telecommute, or that government might institute road pricing, or perhaps even ban cars from downtown.

Name of the Individual Domain:

Trend	**Implications (up to three)**
1. Size of Storage Capacity	1. People would have better ability to store information on one source 2. Manufacturers are more inclined to create higher storage capacity standards for newer hard drives. 3. The risk of losing data in one fell swoop is more likely

2. Faster Access Speeds	1. Users can access information on the fly with less time lost. 2. Faster speeds would potentially lead to more access; more access would lead to congestion on servers. 3. FCC may have set standards of speed put in place to reduce loss of efficiency
3. Mobile Computing is increasing	1. Smartphones and Tablets would completely focus on external cloud storage to store files 2. Telecommunications companies would have to increase the coverage areas and speed of the mobile networks 3. PC manufacturers would shift production from desktop home computers and focus on mobile technology in a grander scale.
4. Power consumption is on the rise.	1. Bulky, network servers could shift to cloud servers to reduce the amount of utilities it consume to operate it 24/7. 2. Battery manufacturers are more likely create a more efficient, more powerful material to sustain heavy usage 3. Green energy becomes a focus in the office and at home to reduce electricity usage and heat output.
5. Media (Movies, music, etc.) takes up more space than any other digital content.	1. Entertainment industry shifts focus to digital license and content for users to access via any device connected to the internet. 2. Government places more focus on regulation of the internet and cloud storage access. 3. Piracy increases due to the ease of access of digital content online.

*Post the completed template to **Trends**.*

TECH 1313 – Impact of Modern Technology on Society
Baseline Worksheet
9-Mar-10

Forecasting Framework houses the basic categories and elements used in forecasting the domain.

Content:

- Each category should contain at least 2 to 3 element.
- **Constants** in your domain are analogous to "assumptions" in that they are just there, unchallenged, not expected to change in "magnitude" during the specified time horizon.
  When identifying the Constants, please, keep your focus close to your personal domain.
- **Trends** are continuing patterns of change which have a history/ data foundation and can often be represented by a line or curve. Stating the direction of change (increasing, decreasing, and such) is important. To be thorough you should draw trends from each of the STEEP societal sectors that are relevant to the domain: demographic, environmental (nature), technological, economic, political and socio-cultural.
- **Goals & Plans** of Stakeholders

Time Horizon (The future date of the forecast): **2025 to 2030**

Baseline Forecast describes the difference between the present and the expected or most likely future of the domain.

Name of the Individual Domain: Digital Storage

Constants *(what is unlikely to change before the time horizon)*	1. All innovations in digital storage stem from the original design. Hard drives have improved in life span and space, but their core design will still be the same, just evolved. Cloud media uses the traditional structure, just without all the physical components. Just like hard drives, cloud media mimics a traditional design that has been updated to modern standards. 2. Digital infrastructure will always be a "concern". One constant that most tech companies are continuing to see as a trend is the need to update the backend to support the frontend demand. There will always be a cyclical trend where providers recognize the demand, respond to it, and update their system by the time the demand begins to change again.
Trends *(can say "more" or "less" of something)*	1. As of 2012, there are only 19% of companies in the United States that have adopted cloud based technologies. This is referring to all companies, not strictly companies publicly traded. But the expected growth is there considering that trends would indicate that corporate usage of cloud based technologies would increase to 34% in 2014. 2. There are only 6% of the world population that utilize cloud

	storage options from large tech companies like Microsoft, Google or even the smaller startup companies like DropBox. Compared to numbers in 2011 and 2012, numbers have already tripled since the introduction of the technology from 100 Million users to 350 Million users.
Goals, plans *(announced intentions of influential stakeholders)*	Stakeholders number one priority is the quick implementation of cloud based storage and services. Many Americans are getting a taste of what cloud technologies have to offer through the use of their mobile devices. If the cloud tech bubble continues to trend in the exponential function that it has, the money should be there for funding from private investors in hopes that they can create the next Google or Facebook. In order for the quick implementation to apply in a reasonable fashion, there has to be a bigger push from the manufacturers to show consumers what the cloud has to offer. Mobile devices, personal computers, tablet technology must begin incorporating a cloud based application support. Not only does implementation need to be swift, but the process that it is running needs to be faster than the original. It is difficult for any users to switch to different devices/format if there are no significant gains seen immediately. The ideal situation is to have over 60% of US based companies operating in a cloud environment by 2025 and over 45% of the World's population using cloud based services.

Based on the material you have about your domain, next describe the expected future of your domain at a specific time in the future (2025 to 2030) in about 500 words. It may be helpful to "pretend" you are writing a newspaper or magazine article or a blog post. Remember, the expected future is what is likely to happen if nothing unusual happens, if past trends continue into the future, if stakeholder plans are successful. Nevertheless, there should still be some interesting parts even in that future so concentrate on telling us something that we don't already know. Write this below, and when finished, post the completed template to ***Baseline Worksheet.***

Description of Baseline (Expected) Future

Ushering a New Era of Technology

Like the rising waters in flash floods, we, Americans, find ours neck deep in the era of the cloud technologies. Introduced in 2011, cloud technology was designed as a means to an end, the end of the primitive tech era we suffered in. Data was constantly being lost, computers were cumbersome and slow after a few uses, and we are shackled by the constraints of content sharing. With the cloud, it broke through those boundaries and took us into a new playing field, where we eliminated the "what-ifs" and welcomed the final answer to our constant questions.

The big breakthrough came when Google introduced the operating system free environment. This allowed for all the speed issues to be addressed in a single swoop. Consumers and companies alike could easily access their applications on the fly without any loss in productivity. The infrastructure updates came shortly after when Congress proposed the Cyber Intelligence Sharing Act of 2017 which allowed for government funding in updating US cities to run on the cloud.

From there, it was a matter of time before every other industry began to focus on the importance of the cloud. Tech manufacturers began their crusade to focus on the relationship between mobile devices and cloud services. Considering the number of American household already connected via mobile devices (roughly 93% in 2012), it was a simple task once the groundwork was laid out. Joint ventures with Verizon, Samsung, and Apple reduced redundancies with operating system compatibility, mobile speeds, and connectivity issues.

Google's collaboration with independent developers created an atmosphere where achieving the next best thing outweighed the potential financial gains. Google attributes most of the significant leaps and bounds made in the past decade to the individual efforts of the small startups that were initially overshadowed by the tech giant.

1. Primary change**: Describe the primary change (the center) of your futures wheel:**
2. Futures Wheel: **Paste your futures wheel here:**
3. List the most important implications of the change, particularly those you hadn't thought of before the exercise:
4. Winners : **Identify which groups would be better off this change were to occur:**
5. Losers : **Identify which groups would be worse off if this change were to occur:**
6. Analysis**: Write a 200-word description of the future in the form of a future newspaper article. Describe the important implications from your wheel. Write the article as if the events and the issues had just occurred or were just discovered.**

1. The primary change describes a situation if cloud data storage options were to actually become the primary source for storage. Currently, hard drives and iterations of hard drive technology are still the primary source, but the benefits that cloud storage has, at the moment, certainly make it a viable option for nearly every format that we currently use.
2. Future wheel can be found on the 2nd page.
3. The most important implication that came to mind happened to fall within the replacement of the traditional PC. Considering that everything can be stored on the PC, why couldn't the operating system be as well. People would necessarily have a physical device for them to interact with (with the exception of the mouse and keyboard). They could essentially pack their entire PC with them to any place they go without having to carry hard ware.
4. The "winners" are the consumers and the economy. Consumers get good hardware for a cheap price, and the economy will benefit because these new era of technology could potentially bring them out of this recession.
5. The "losers" are the manufacturers and the government. At first, government seemed to be a winner, but implementing security and privacy standards (which they are trying to do right now) could potentially cross a line with our 1st amendment rights, since right to privacy is inherent with the 1st amendment. Manufacturers would have difficult time with dealing with the sheer demand. People already want a lot of space to begin with, how can they accommodate that demand in an effective time frame without losing business?
6. Cloud data finally becomes the number one choice for PC users as their format of storage. What does this mean for the current PC technology? Technology business has been focusing on newer formats to assist the transition of the cloud era with newer developments in virtual PCs. There has also been a stronger emphasis in current mobile technology. We are already seeing significant gains in the mobile speeds as well as the device speeds. However, the U.S. government does want to step in and make a stand on cloud data that they weren't able to with previous technology. There are large concerns coming from Washington about how secure our nation will be

to potential cyber threats. There are rumblings from law makers in Congress about security and privacy policies. That adds another item to list of our concerns to the incoming change. Newer cloud manufacturers aren't showing much worry or concern with the technology change. They are many viable options for consumers to choose from. These options range from companies that are state side and local to companies that are significant storage options for very appealing prices. Time will only tell to see how these changes turn out.

Cloud providers expand sizes
Users more inclined to store all data on cloud
Companies need bigger facility
Need for Bigger Infrastructure
New security companies answer demand
Job market improves
Gov't policies for security
Colleges have new security programs
Security & Privacy are #1 priority for government
New PC sales boost ailing retail businesses
Increase in demand for retail workers
Cheaper to make, requires less parts
Unemployment goes down
New Virtual PC takes its place
Cloud Storage overtakes traditional hard drives as the primary format for storage.
Traditional PC dies out
Pricing is inconsistent
New Manufacturers come in and overtake old ones
Cheapest, not best gets chosen
Issues begin to occur
Users lose data to bad desgin
Cloud tech sets itself back
Different company, different standards
Users unsure of what to buy
Sales fall short to expectation
Old manufacturer becomes new competitor
Allows old tech to come back
Mobile devices are new "PCs"
4G LTE is replaced with faster speeds
Speed demand drops price of service
Phones & Tablets are faster than old PCs
Windows isn't primary OS provider

Key Uncertainty(s)

Instructions

This assignment helps you prepare for your Alternative Futures Forecast assignment. The Baseline Forecast, which you did last week, projects the most likely future based on current trends. The Alternative Future Forecast, as you might suspect, is an alternative to the baseline – it is different than current trends. But how do you come up with it? The worksheet below gives you three potential sources of alternative ideas – the most helpful one (or more) is selected as the "key uncertainty(s)" that will form the basis of the alternative futures forecast.

One **very important** instruction is to avoid the "nothing happens" uncertainties, which lead to a "nothing happens" alternative future. Yes, the "nothing happens" future is possible, but it is obvious and not very interesting. For example, let's say you had a baseline trend of "fuel cell vehicles are growing 5% annually." The "nothing happens" version is to say "fuel cell vehicles don't increase." That could happen, but the goal here is to imagine how your technology might succeed. Think in terms of potential breakthroughs rather than failures. So your task here, as you look at your baseline forecast and think about the categories below, is to speculate on what might happen instead of the baseline future.

The first step is to generate some candidates by filling in the template – the categories are described below. Your journal postings should be helpful here.

Potential events, wildcards	Expected or unexpected events and wildcards that would disrupt, change, and potentially end the current era. Often appear as a headline in a news source.
Issues, conflicts, controversies, dilemmas, choices	Issues that are currently being discussed and those that could become important (emerging) along with the various ways they could be resolved and the implications of each of those ways. In form of: "Should we…" or "Should they…"
New ideas, images, perspectives	People and their ideas that present a new or insightful look at the domain, particularly about its structure, types and rates of change and plausible futures. Something really new or novel, even if unusual.

One key uncertainty can be enough to form the basis of an alternative futures forecast, but you can use more than one if you like. A useful key uncertainty is one that is very important to the future of your domain, but its outcome, or how it plays out in the future, is highly uncertain.

Key uncertainties	The quantities, potential events, issues and ideas that would have the greatest impact on the future, yet which are least predictable (i.e. most uncertain) (The key uncertainties are a selection of the most important items from events, issues and ideas above. Key Uncertainties do not contain any new elements that are not listed above.)

TEMPLATE (you fill this in)

Fill out the three boxes with at least two or three ideas (in each box) that could become the key uncertainty(s)

Potential events, wildcards	1. Decriminalization of copyright laws. A copyright law in entertainment is the one factor that deters certain people of the general public from downloading online. Every disclaimer before any movie describes the extent of how the copyright law works. Currently, the US government has been struggling with keeping up with copyright laws in the digital world is because most of these servers that contain these downloaded files are kept overseas where their jurisdiction is invalid. If the United States were to decriminalize or lower the crime to a low class misdemeanor, there would certainly be larger support for digital storage and cloud data because of the potential peer to peer network increases. There would essentially be less red tape for developers and manufacturers to deal with and it would essentially spur development even further. 2. Government agrees that cloud data is constitutionally protected by 1st Amendment laws. Currently in Congress, there is on-going debate about the treatment of cloud data servers that are being supported within the United States. The US government is concerned about the type of content that is stored (i.e. child pornography, terrorist plans, anti-government conent, etc.). If Congress were to establish laws that would protect privacy on the cloud and leave it up to independent security contractors as the main line of defense, cloud data support and development would increase exponentially. Similar to the idea of decriminalization of copyright laws, the lack of red tape for companies to cross would essentially give them free reign on what their goal or mission is to achieve. Plus, the lack of government involvement would spur more international interest similar to how US based hosting companies were interested in international servers due to the low government involvement. 3. The success of nanotechnology There are a lot of current developments that incorporates nanotechnology into the mix of things. One of the big "what-ifs" that is floating around the realm of digital storage is the implications of infrastructure. If we can provide the storage quantity, can we support the user quantity? It is already apparent that cloud storage is becoming more popular, and people are using quite of storage on physical drives, but how

	can we sustain the growth of the community? MIT, Harvard, IBM are all examples of research groups that are attempting to solve this problem. If we can use nano-bits to assemble newer hard drive constructs, we could immediately eliminate issues with power consumption and storage capacity. There would be less concern about current infrastructure issues and more concern about how quickly we can update all system with newer nanotechnology.
Issues, conflicts, controversies, dilemmas, choices	1. One of the largest issues being discussed among cloud developers and manufacturers is government involvement. For instance, Congress feels that it is necessary for Google to allow federal agencies access to their mail servers. In other words, the government wants to be able to access people's emails without the consent of the user. Google, thankfully, has declined the government any ability or access. Their opinion is that if you need a warrant to search someone's house, the same needs to be applied in terms of the cloud or mail servers. There shall not be any exceptions. The question at hand is should we give up our privacy of our cloud data or email data in order for the government serve the purpose of monitoring any illegal activity? For the most part, I think the decision of most individuals to keep government out of the cloud because of the fear of the idea of "give them an inch, they take a mile". Congress may be probing servers for national security but is searching someone's cloud/email for any illegally downloaded content any means related to national security? 2. "See No Evil, Hear no Evil" This is mindset of many cloud providers. One of the biggest selling points for cloud storage to users is freedom, on top of price and space. Price and space go hand in hand. Space goes up, and prices come down in order to keep customers happy. However, users strongly consider the freedom. Similar to lack of government intervention with cloud data, most users do not want any one snooping around their data. Many current cloud data providers are currently in cahoots with agencies like the RIAA over copyright infringement and illegal content sharing. Most of the companies, in order to lose potential customers and revenue, adopt the mindset of "hear no evil, see no evil". As this is tremendously helpful to the users, this does completely newer companies from being more market competitive in fear of getting wrapped up in litigation with the entertainment industry. Should companies adopt stricter content filtering mechanism? Well, limitations now in a growing environment could completely cripple the support of

	the technology. With the digital age coming to a new horizon, limitations will only set us back. The bureaucratic red tape that most of the companies have to jump around will only mark the beginning of the end of cloud storage. Similar to the argument of national security, how does one adapt to an age where content filtering is stricter than airport security and copyright infringement accusations are loosely thrown around?
New ideas, images, perspectives	1. The one particularly new idea that is creating a lot of buzz amongst the sphere of storage is DNA storage. DNA storage solves nearly every issue and concern that users, providers, even bureaucracies. Users are always concerned about longevity and security, but DNA storage answers both with the fact that DNA storage cannot fail or stall and can only be accessed by the user's DNA code. Providers are considered about the infrastructure and support of the backend but both will be virtually non-existent in this realm. DNA storage requires no power or maintenance; it is self-sustaining for extended periods of time. The bureaucratic nonsense will begin to slow as DNA storage requires a true carbon footprint of user, if they can solve and agree upon a legitimate way of securing and searching users without violating civil rights. The reason I mention this newer technology because it poses as one of the biggest threats. Assuming that they could market DNA storage as an affordable option to traditional storage methods, there would significant consideration from the general public to make the attempt to test it out. 2. Another school of thought is to phase out from the traditional hard drive and evolve into a new format. The traditional hard drive is used in different methods from home use to business use, for music and movies to corporate data. The problem at hand for the traditional design is there is a time table on the inevitable collapse of that drive. It's a lingering worry for all kinds of people. Many researchers are attempting to achieve a similar design but different parts. The first attempt has been solid state hard drive, a hard drive that has no moving parts. Another method is using different magnetic recording techniques. Other researchers have created smaller mediums that could be used to replace the hard drive. The main goal for all these developers is to achieve a greater design that would solve a lot of the current issues surrounding the traditional design without having to address any infrastructure issues.

From the table above, select one or more key uncertainties, which will be the basis of your alternative future (next Assignment).

Key uncertainty(s)	One of the largest uncertainties involved with current digital storage standards is government involvement. There is a lot of legislation floating around such as SOPA, CISPA, and other potential laws that would prohibit certain activities on the internet. And one big factor of how cloud data will evolve will strongly depend on the development of these laws and the willingness for Congress to see this law come into action. Some of the arguments floating around the US that are against these types of laws is that it will create more havoc as content filtering and strict security will deter users from exploring potentials with what cloud services will have to offer if it requires multiple hoops to jump through. As much as people enjoy their anonymity on the internet, there is more concern about the data that is collected and searched through by outside parties. As much as these laws will affect the internet, cloud services being part of the internet will suffer as much assuming that legislators get their way. In addition to the potential legislation issues that are arising, the rise of a new technological competitor is another challenge that current institutions are going to have to deal with. The cloud can be potentially be everywhere and anywhere, but there are still lingering issues with infrastructure and backend support. How can cloud services be competitive if they cannot provide a quick and reliable service? There is nothing with traditional servers; the technology is just old and outdated for current standards. Users want a lot of space that can be accessed really fast. Solid state, new magnetic recording, even DNA storage coding are alternatives to the current option. All of these newer alternatives answer questions about infrastructure, speed, and space. Convenience is the best argument that the Cloud currently has, but what happens when these other formats address the issue of convenience. If they can manage to do so, the cloud era could be put on the backburners until these newer formats can be used along with cloud services. This means retrofitting all old equipment with newer ones, making sure the consumer markets can sustain the changes, and more importantly, people are willing buy and use it.

One Door Closes and Another One Opens

2013 was a bright future for many cloud devotees. Government agencies were making agreements with large tech companies to supply their cloud data needs. Google and Cisco Systems were agreed on a joint venture to produce a nationwide cloud network for the American public. Homes were being integrated to the cloud at an exponential rate. This was until the Presidential election of 2016.

In 2016, Senator Marco Rubio was the poster boy for the Republican National Convention and the platform he stood on centered the security of the American people from an unknown threat. Somehow, his stance on shutting down our borders to put an end to illegal immigration surrounded the world of cloud data services. His statement during his visit to Ohio voters labeled, “the invisible virtual cloud as the biggest flaw in our security” as it promoted Americans to open their virtual homes to unknown visitors. Most people did not take notice of rants from Rubio, it wasn’t until the summer of 2016 where the largest cyber-attack on CIA networks took place.

In 2013, the Central Intelligence Agency signed an agreement with Amazon for the online tech giant to supply them with streamlined cloud services. Amazon’s senior architect for the Matrix, as this project was labeled for its intricate design, stated that there was a known security flaw within the system’s framework but was ignored to meet CIA deadlines. It was this event that single handedly put Marco Rubio in the Oval Office and sent the cloud data world to a crippling halt. First order of Rubio was to propose a new legislation called Cyber Protection Act of 2016 that deemed all cloud services must adhere to new government standards and regulations. That was considered the last nail in the coffin as cloud services dropped to below 10% in nearly a year.

Amazon was near bankruptcy due to their negligence, Google was chained up by the government’s virtual locks, and nearly every American household connected to the cloud was under watch. However, there was a rumbling coming out of Harvard, where they had successfully transferred DNA based storage from one source to another. Harvard had first successfully stored nearly 1 TB (terabyte) of data on one single source of DNA code, and it was this idea that sparked further endeavors. Harvard and a Swiss based company were able to map the DNA code to that of a series of binary codes (1s and 0s). From this coding, they were able to create the first DNA hard drive, using DNA codes from a series of Harvard researchers and storing a series of research papers, music, movies, and a copy of the Declaration of Independence on each one.

Hard drive manufacturer, Seagate Inc., saw some of their work at a research conference in Geneva and voluntarily pour $500 million dollars in research grants to the University. Seagate President, Stephen Luczo, issued a statement after the donation saying, “This is the Tech revolution that is necessary to bring us back from the stone age[…]that the US government has sent us”. In 2023, Seagate’s money finally paid off as the research provided by Harvard created a newer format. The Carbon Drive, as Seagate labeled, flew off the shelves and began replacing conventional hard drive technologies. Current standards list that over 45% of Fortune 500 companies are utilizing carbon drive technologies. American households are rising at 12% each year as the technology is becoming more cost effective.

But how did such a quick transition take place when the cloud era took so long to implement? Well for one thing, demand, funding, and support were all there. This was a format of storage capability that was not previously explored by mainstream providers. Once the coding for the product was finalized and deemed ready for mass production, many people jump at the opportunity to get a hold of the final product. Why? Well, here was a device that had the best security in the world, your DNA code, which is 100% unique to all 7.5 Billion people in the world. In addition, there were no infrastructure demands or issues that would normally arise in any other situation. This device could run for ages on virtually no power and as long as you did not lose it, the data would always be 100% intact. Once they established the means for Peer to Peer transfers, the technology ended up being better than the cloud. No physical means of storage along with no infrastructure issues with security tighter than Fort Knox, how did it take us so long to discover such a device? No matter, as long as we have it now.

It was difficult to say bid adieu to the era of the cloud, but if “carbon drive” age is what takes its place, then good riddance.