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MEMORANDUM

To: Kurt Triplett, City Manager

From: Brenda Cooper, Chief Information Officer

Date: April 18th, 2016

Subject: City Council Study Session: Information Technology Topics

RECOMMENDATION

Staff recommends that Council review this memo and be prepared with any questions about Information Technology. There are no other specific actions being requested of Council at this time.

BACKGROUND DISCUSSION

Almost all city staff depend on technology to help with some or all of their work. Technology has grown past the desktop and now accompanies staff into the field and reaches into citizen's homes. The periodic IT study session is designed to brief Council about important IT topics, keep Council aware of the work of the IT department, and provide Council with "peeks" into the future. Because this is the year of the biennial budget, staff felt it was also important to remind the Council of how the IT department is organized and allocates resources.

The study session content will include a presentation, followed by a question and answer session. The agenda includes a general overview of the Information Technology Department, a discussion of accomplishments in 2015, a brief list of the largest projects the department is working on in 2016 through 2018, and a general discussion of future technologies. While the presentation will touch on some larger trends, there are a few where more detail is useful.

CURRENT AND EMERGING LARGE PROJECTS

Maintenance Management System

Last year, Kirkland chose the Lucity system to replace the asset management system in use in Public Works. Lucity will also be used by the Parks Department. Lucity will help staff manage work orders, forecast and cost work, keep inventory, and respond to changing conditions in the field. Lucity is tightly integrated with GIS and the project is driving the collection of new GIS datasets as well as using existing data. The project is underway and currently on budget. The first phase, sanitary sewer and surface water, is expected to go live in October, 2016, and the project is scheduled to be completed by the end of 2017.

Financial System Change

Our current finance system was implemented in 1999. It has served us well for over fifteen years. The vendor is putting the current product at end of life. Related systems such as utility billing are also experiencing challenges. It is very likely that the systems (Core Finance, HR, Payroll, Utility Billing, and

Business Licensing) will need to be replaced. This is likely to be a multi-year project beginning now and going through approximately 2019. This will be a topic of discussion during the Financial Retreat in May as the City Manager is likely to propose investing in a new finance system. The Finance, Human Resources, and Information Technology Departments are jointly working with a vendor to survey the market and prepare budget numbers and level of effort for this project. It is expected to be a large and expensive project and more detail will be available for the upcoming CIP and budget processes.

SUPPORTING INFORMATION FOR CERTAIN TECHNOLOGY TRENDS

Cloud Computing

Because of the Kirkland 2035 process and the Comprehensive Plan Update, Information Technology did not make a study session presentation to the Council in 2015. Previous study sessions from 2013 and 2014 included discussions of cloud computing as a technology in the learning and exploring phase, with only a few small cloud applications in use at the city. Most of the cloud applications in 2014 were additive; they met needs not otherwise filled. Most were small.

In the intervening time period cloud applications have become far more common in the industry. In Kirkland, the public records request system was added to our cloud portfolio and is working out well. While the city has not yet replaced significant existing systems with cloud systems, staff expects that to begin happening with the parks registration system procurement which is underway now.
Cloud resources can be used for various levels of computing. For example, it is now possible to purchase storage and backup services or servers themselves in the cloud. Staff expects this to become the preferred choice across the next five years.

Running city systems in the cloud has advantages and drawbacks. Some of each are listed below.

Advantages associated with Cloud Computing:

1. Cloud computing is typically very scalable. For example, if a certain application only needs 10 gigabytes of data storage today and the same application needs 15 gigabytes tomorrow, a cloud computer based architecture could add the extra 5 gigabytes incrementally as-needed. Extra space can usually also be decremented – in other words, in the cloud customers pay for what they use (traditional systems operation requires extra capacity online in case it is needed).
2. Cloud computing can typically be done from anywhere and is less dependent on city infrastructure being available. Thus, it is more disaster-resilient and more convenient for users outside the office, whether remote or working in the field.
3. Using Cloud Computing for high-traffic applications can reduce the traffic that affects the city's internal network. For example, videos of City Council meetings are stored in the cloud by the vendor that provides the streaming video service and so high demand for a particular meeting does not affect city Internet bandwidth.
4. It can be faster to implement a cloud-based application. Steps like ordering, configuring, and testing hardware become unnecessary, and resource provision can usually be very fast.
5. Cloud-based architecture usually requires less city IT staff time to support after implementation. Sometimes it requires less during the implementation, but for complex systems the implementation effort is similar to on-premise systems.
6. Many systems now expect cloud component implementations. For example, the next version of SharePoint that the department plans to implement prefers to work with office and email that is also in the cloud.
7. There are a number of applications that are ONLY available in the cloud. For example, the next Parks Registration System is likely to be in the cloud because there are very few vendors operating in any other way in that market.
8. Certain cloud vendors, including Microsoft, are now certified to handle police data. This is some of the city's most sensitive data. Up until a few months ago, Washington State had not certified

Microsoft as a vendor. This removes a large barrier to city use of the cloud as a data storage option.

Risks Associated with Cloud Computing

All systems, including those managed on-premise, are at risk. Cloud computing also poses additional risks:

1. City data is often used for multiple purposes and by multiple systems. For example, city address data is stored in many applications and typically must be verified for accuracy. Some cloud services may make data sharing, validation, and integrations between multiple systems more difficult. Integrations between cloud systems and on-premises can be more challenging than integrating on-premises systems.
2. Some cloud vendors (particularly in the consumer cloud) have terms of service where they claim "ownership" or "shared ownership" of data in their cloud. This should be avoided or mitigated whenever possible. For example, Facebook has been known to make pictures posted by users into advertisements. Citizens might not want that to occur with photos they post to the city's Facebook page.
3. Data stored in the cloud may be vulnerable to viruses, malware, data theft, and other security challenges. In the case of large cloud vendors, data is probably not at any more or less risk than it is in City Hall. Smaller and less sophisticated vendors may not have or use all of the security tools that Kirkland is required to have.
4. The implementation of multiple cloud applications can expose citizens or other city data users to multiple user interfaces and user id/passwords. This can cause confusion, and also can make it easier for citizens to be exposed to malicious websites if a situation is created where it's not clear whether or not a site is actually a city site.
5. If the internet is inaccessible, the cloud application and data in the cloud will also be inaccessible.
6. Cloud applications are often updated with no input from customers, including scheduling of updates.
7. In many cases, cloud computing can be more expensive than on-premise computing. Examples of hidden cost include data transport costs, the cost to get city data back if a cloud vendor fails, or a fee for advertisement-free use of applications.

IT and Department staff will evaluate the pros and cons of new cloud based applications on a case-by-case basis to ensure that each decision provides the best balance between cost, safety and performance.

It is important to note that there will be some shifts in how computer services are paid for as more cloud applications are implemented, such as shift from capital funds to operating funds. A white paper providing more information will be available later this year during the budget process.

Smart Cities/Internet of Things

The term Smart Cities often refers to the effective use of technology in the landscape of the city itself. It can mean connected public safety, parking places, streets, and utilities. Many Smart Cities tools rely on the Internet of Things (IOT) which refers to the way that many more devices have computing and communications ability built into them. For example, almost all vehicles have smart components. It may be impossible to buy a car without multiple computers that govern its engines and brakes, and some cars can have their software systems updated over the Internet in much the same way that computers are updated over the Internet. Google has self-driving cars on the streets of Kirkland and Tesla's cars can now be summoned from the garage to open the door, start, and drive to where you await them in your driveway. Even bicycles usually have trip meters and GPS devices attached to the handlebars, making them also part of the Internet of Things.

The Intelligent Transportation System (ITS) is designed to make roads and lights smarter and to help move traffic through the city. As the system gets larger and interconnects with the traffic management systems of neighboring' cities, it will become even more efficient.

Similarly, some of the specialty vehicles and equipment that the city uses also have extra computing capability. The sewer trucks feature robots that drive through sewers taking video of possible problems, and they have computers and GIS-based applications in the trucks that the operators use all day long. Police and fire vehicles have Automatic Vehicle Locator (AVL) systems in them, and departments are considering using similar systems for snowplows and other equipment.

Police and Fire both have an interest in drones for safety and emergency management situations, but recognize that a major policy discussion among the Council and the public must take place first before any drones are implemented in Kirkland.

Sensors can provide data about street conditions, temperature, and traffic count, and can even act as beacons to provide information to either people or other automated systems. It's not far-fetched at all to imagine beacons in parking places that communicate to nearby driverless cars so the cars can come over and park, whether or not the cars are inhabited at that moment.

Some cities are using street lights or traffic lights as Wi-Fi hot spots, and New York has repurposed telephone booths throughout the city as hot spots.

All of these applications rely on bandwidth, and thus relate to the work staff is doing to encourage commercial development of broadband in the area and/or the work staff is doing to build city-owned broadband for government purposes. For example, Kirkland owns most of the fiber that connects city buildings and most of the fiber that connects the ITS cameras to each other and back to city hall. This transport cost would be significant if the city purchased it on the open market.

As departments purchase smart vehicles and other tools, there are IT implications:

- Most Internet-enabled objects have software license agreements, support services, and licensing requirements.
- In many cases, smart devices will need to work together and compatibility issues will be important. In many cases, devices will need to talk to our city network and in some cases our city network needs to expand to reach out to the devices (for example, our fiber network needed to be expanded to include the traffic signals that are part of the city's ITS program).
- Security will be a serious issue for IOT devices that are connected to the city's network and for the devices themselves. For example, as systems that monitor our utility systems get smarter and more connected, care will need to be taken to ensure that they are protected and that our core network services are protected from them.
- Smart devices will, in some cases, record citizen data that has utility to the citizen. For example, city traffic cameras have recorded accidents.
- Most city data is subject to retention and to public request. IT can be helpful in assuring that data is managed in accordance with the rules and laws that govern that data.

The city will need to pay prudent attention to costs and associated benefits as smarter devices are rolled into production. It will be important to understand the ongoing costs associated with smart cities applications and invest when practical and after technologies have proven themselves in the field.

Wearables

While "wearables" is actually a subset of the Internet of Things, they are of particular interest to cities when considering the number of interactions staff has with citizens, particularly in public safety. It is likely that most police officers will someday wear body cameras and/or their cars will have dash cameras. Citizens may also wear cameras when talking to public officials, even for routine business.

Other wearables include smart watches. These devices have a quickly growing capability set, and may be able to act like fully-featured computers within the next decade or so. Screen size will limit their use for some applications, but as flexible and holographic displays come down in price it's possible to imagine a world were a desktop's worth of computing is strapped to staff member's wrists.

Personal wearables (such as fitness monitors) are playing an increasing role in health care. Staff use of these tools may benefit the city as it seeks to improve health outcomes and reduce health costs.

Wearables do present security and privacy concerns.

Deeper Analytics, Reporting, and Structured Data

As complexity increases, data and analytics become important. One of the city's largest assets is the amount of data it collects. Some areas where the city has applied deep data analysis in the last few years include support for the comprehensive plan capacity analysis and in the fire station siting process. Police use analytics in crime reporting. Public Works is applying analytic tools to work management.

Many governments have some form of open data that is directly available to the public. Kirkland does not at this time. While city GIS data is highly structured and can be used for reporting and deep analytics fairly easily, many of Kirkland's other systems come from different vendors which makes it more difficult to integrate and federate the data. Over the past 5 years the city has moved many of the database structures to a single platform (SQL Server) which aids in the integration and analysis of this data. As older systems are replaced, staff will work to assure that the database structures, integration points and architecture supports the organization's need for greater use of city data including business intelligence and analytics.

Conclusion

Other projects will be discussed during the study session, and a demonstration of improved public records search tools will be performed for the Council by Deputy City Clerk Anja Mullin. There will be time at the end of the presentation for Council questions and comments.