November 1, 2016

To: County Council

From: Leslie Rubin, Senior Legislative Analyst
                   Office of Legislative Oversight

Subject: **Emerging Models in Government Technology Procurement**

> Just as it has become almost impossible to imagine our own lives without technology, it has also become impossible to conceive of a well-functioning, efficient state [or local government] that is not supported by effective technology. As citizens, we expect to file our tax returns, renew our driver's licenses, and compare our health insurance options — all online. Whether the service has a citizen-facing component or not, we expect well-designed software to help make the [jurisdiction] more efficient, effective, and accountable.[1]

This quote neatly sums up today's environment where residents expect reliable digital access to government services and information. Information Technology (IT) has become increasingly pivotal in Montgomery County Government (MCG) – providing online access to resident services, facilitating access to and analysis of County data, and aiding the daily work of County Government employees. Acquiring the technology that makes this all possible has evolved from the days of desktop computers and floppy disks.

This Office of Legislative Oversight memorandum report summarizes new and innovative practices for the purchase of technology by governments. Part I of this report describes new types of technology that local governments are relying on more and more and summarizes research on changes to procurement processes that can make buying new technology easier. Part II summarizes Montgomery County's current *Technology Strategic Plan 2016-2019* and the County Government's current approach to technology procurement.

I.   Technology and Technology Procurement

Government procurement officials have been buying computing devices (e.g., laptops, desktops, smart phones, tablets) for decades with little or no trouble under existing procurement structures. The purchase of newer, cutting-edge technologies, however, raises new challenges for government buyers. The most prominent emerging IT model that does not fit neatly into a procurement box is internet-based or "cloud" computing and/or XaaS (meaning "Anything-as-a-Service").

The ideas that eventually led to cloud computing originated in the 1950s, but the concept did not begin to reach the mass market widely until the 1990s, when internet accessibility significantly expanded.[2] The National Institute of Standards and Technology (NIST) describes cloud computing as a model for convenient, on-demand network access (typically internet access) to shared computer resources (e.g., networks, servers, storage, applications, and services) that can be quickly and easily provided to a customer.[3]

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[1] *Recommendations to Improve Large Information Technology Procurements: A Road Map for Success in California*, Task Force on Reengineering IT Procurement for Success (Aug. 2013) [hereinafter "*Improving IT Procurements*"].
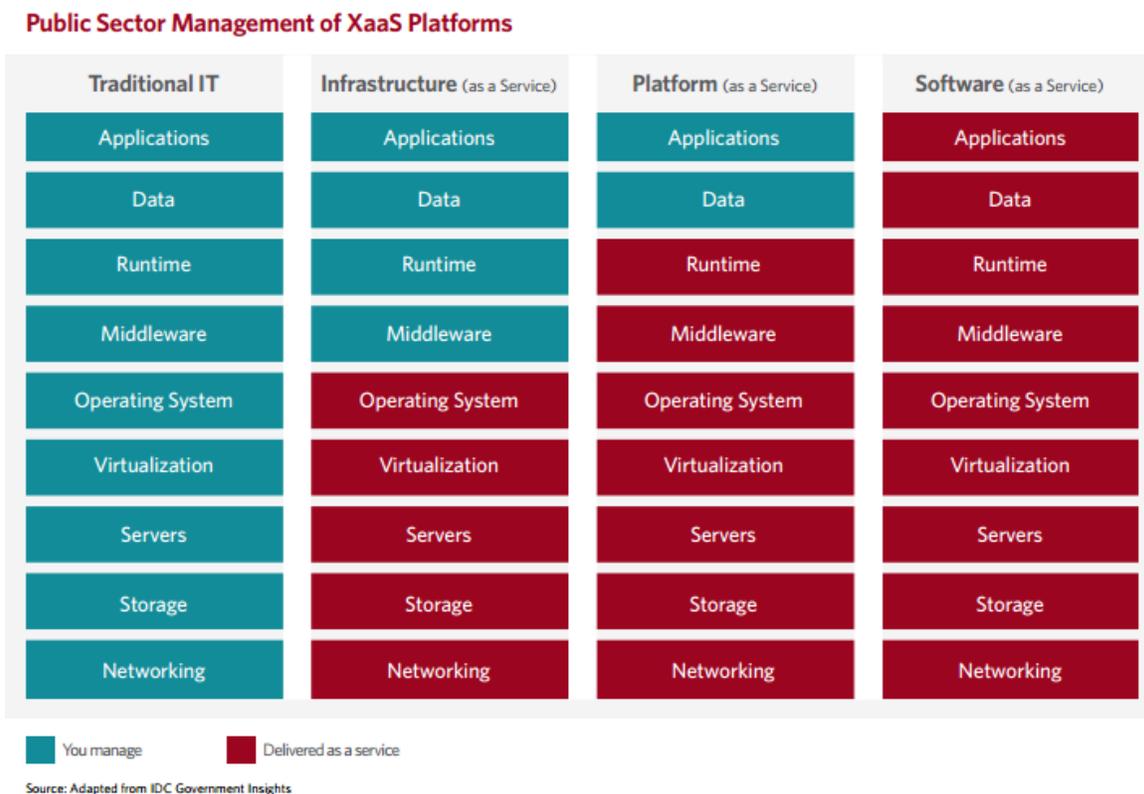[2] See http://www.computerweekly.com/feature/A-history-of-cloud-computing.
[3] "The NIST Definition of Cloud Computing," Special Publication 800-145, National Institute of Standards and Technology, at p. 2 (2011). http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf

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Cloud computing is the backbone for XaaS, which refers to cloud-based services provided to users over the internet. Common models include:

- Software-as-a-Service (SaaS) – providing software to users over the internet. Examples include Office 365, Socrata, Google, Facebook.

- Platform-as-a-Service (PaaS) – a computing platform for the creation of web applications and software, delivered over the web. Examples include Google App Engine, Microsoft Azure Services.

- Infrastructure-as-a-Service (IaaS) – a way of delivering cloud computing infrastructure such as servers, storage, and networks as an on-demand service. Examples include Amazon Web Services, Rackspace.

The graphic below shows how XaaS differs from traditional IT management. Where jurisdictions have typically owned and/or managed the components of their IT infrastructure, XaaS shifts some or all of the ownership and/or management to a vendor – shown with the differently-shaded boxes.

Public Sector Management of XaaS Platforms

Traditional IT	Infrastructure (as a Service)	Platform (as a Service)	Software (as a Service)
Applications	Applications	Applications	Applications
Data	Data	Data	Data
Runtime	Runtime	Runtime	Runtime
Middleware	Middleware	Middleware	Middleware
Operating System	Operating System	Operating System	Operating System
Virtualization	Virtualization	Virtualization	Virtualization
Servers	Servers	Servers	Servers
Storage	Storage	Storage	Storage
Networking	Networking	Networking	Networking

You manage   Delivered as a service

Source: Adapted from IDC Government Insights

Technology Procurement. Federal, state, and local governments regulate government purchasing to "ensure that purchasing procedures are standard and consistent, and conducted in a fair and impartial manner,"[4] that products or solutions are effective, and that a jurisdiction receives the best value for its money.[5] Recent reporting on government technology procurement, however, observes that most existing procurement laws and

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[4] https://www.sba.gov/contracting/contracting-officials/federal-acquisition-regulations-far
[5] *United National Procurement Practitioner's Handbook*, UN Interagency Procurement Working Group at §1.3.2 (2006). https://www.ungm.org/Areas/Public/pph/channels/PPH.pdf

regulations were developed when jurisdictions were buying materials and goods, not enterprise systems[6] and cloud services.[7]

To buy products and/or services, jurisdictions typically publicly release detailed solicitation documents (e.g., invitations for bids (IFB) or requests for proposals (RFP)) that describe the specific characteristics of the product or type of service needed. Businesses (vendors) submit a formal written response to the solicitation describing how their product or service fulfills a jurisdiction's needs and offering proposed pricing.

Jurisdictions typically buy products using standards such as the lowest bid price or the "best value". Purchasing services typically involves evaluation of factors such as the experience of the vendor providing the same type of services to other jurisdictions or the expertise of the vendor's staff who will provide the services. A normal procurement can take months to complete, between writing a solicitation, releasing it publicly for a set amount of time, and reviewing bids from vendors.

Numerous reports and articles have examined how existing procurement practices can stifle innovation and implore government officials to explore alternative buying methods to keep up with changing technology.[8] Challenges include:

- The rapid evolution of technology often eclipses slow procurement processes.

- Traditional purchasing documents that require government staff to explicitly describe a needed commodity or service can stifle options when jurisdictions seek an end result, not the specific way to get there.

- Procurement rules or officials that prohibit discussion between government purchasing agents and potential vendors during the procurement process can reduce creative problem-solving.

- Traditional contract terms and conditions often can't adequately describe the relationship between jurisdictions and vendors when purchasing certain types of technology and services.

One source describes the limitations that come with traditional procurement in this way:

> Traditional RFP processes don't encourage early engagement with vendors, which can limit what companies or entrepreneurs create. Worse, the RFP often prescribes a solution, so there is no opportunity for an entrepreneur or innovator to ensure that the agency is defining the problem correctly.[9]

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[6] Enterprise systems are large-scale software systems that facilitate business processes, information flow, and data analytics in large organizations. Examples in MCG include Oracle eBusiness: financial and payroll processing, Enterprise Business Intelligence (BI) and Reporting: data modeling and analysis, and Hyperion: operating budget development.

[7] *Strategies for Procurement Innovation and Reform*, IJIS Institute at p. 9 (2013). http://c.ymcdn.com/sites/ijis.site-ym.com/resource/resmgr/Docs/procurement_report.pdf

[8] See, e.g., *Recommendations to Improve Large Information Technology Procurements: A Road Map for Success in California*, Task Force on Reengineering IT Procurement for Success (Aug. 2013); *Best Practices Guide for Cloud and as-a-Service Procurements*, at pp. 1-2; Brown, Justine, "Bringing Innovation to Procurement," GovTech.com (Mar. 4, 2014). http://www.govtech.com/budget-finance/Bringing-Innovation-to-Procurement.html; Brown, Justine, "5 Government Procurement Practices that Stifle Innovation," GovTech.com (Nov. 8, 2011). http://www.govtech.com/pcio/articles/5-Government-Procurement-Practices-That-Stifle-Innovation.html

[9] Brown, "Bringing Innovation to Procurement".

Improving Technology Procurement. This section summarizes ways to improve governments' purchase of technology, as described in recent articles and reports. Specifically, it describes five strategies:

- Understanding and evaluating business requirements and objectives before issuing solicitations,
- Meeting with vendors before issuing solicitations to gain industry insight,
- Utilizing alternative contracting methods,
- Using IT-specific terms and conditions in contracts, and
- Negotiating contract terms after choosing a vendor.

A. Understand and evaluate business requirements and objectives before solicitation

Ultimately, governments use technology to accomplish business goals – from calculating property tax bills to coordinating road construction with underground utility work to processing residents' requests for recycling bins. The series of steps needed to accomplish each goal is called a "business process." Several sources recommend that governments clearly understand their business goals and their business processes before issuing solicitations for technology related to a goal.[10]

Experts emphasize that identifying the ultimate business objectives of a project before developing a solicitation can help ensure that a solicitation does not simply reflect existing businesses processes, which may be inefficient or outdated. IT projects provide an opportunity to modernize and/or standardize business processes. Focusing on a project's goals, rather than focusing on acquiring a specific type of technology to accomplish a goal, can help identify the best technology for a job.

B. Convene pre-solicitation one-on-one meetings with multiple vendors to gain insight into IT options

With the rapid evolution of technology, government staff may not know enough about emerging technology options to find the best solution for a business need. Several experts recommend that government staff meet with multiple vendors before issuing a solicitation to learn about different technological solution to business requirements.[11] Seeking out this type of information before drafting a solicitation can help a government get the right solution for its needs. Jurisdictions can ask vendors "What is the State of the art?" or "How is this type of problem handled in the private sector?".[12]

Dugan Petty, the State of Oregon's former Chief Information Officer, asserts that engaging in these types of discussion can also help vendors understand a government's goals better than a written solicitation and can lead to the right solution for a project:

> If I'm going to put a new driveway in at my house, I might not know how to do it…. If I don't know how, why not have a conversation with driveway companies so I at least understand the basics of what I'm trying to procure? Sometimes we create processes that inhibit those conversations, and it gets harder in IT because we are ultimately trying to enable a business process, yet sometimes we don't understand that business ourselves.[13]

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[10] *Improving IT Procurements*, at p. 7; *Best Practices Guide for Cloud and as-a-Service Procurements*, at p. 55; Brown, "Bringing Innovation to Procurement".

[11] *Improving IT Procurements*, at pp. 8-9; Brown, "5 Government Procurement Practices that Stifle Innovation".

[12] Brown, "Bringing Innovation to Procurement".

[13] Brown, "5 Government Procurement Practices that Stifle Innovation".

Many jurisdictions' procurement laws prohibit this type of outreach to or communication with vendors before or during a solicitation process to avoid the appearance of a conflict of interest – necessitating a change to the law to implement.   One report notes that if jurisdictions allow this type of outreach, they can take steps to avoid the perception of a conflict of interest by meeting with multiple vendors.

C.   Examine alternative ways of contracting

Several sources recommend that jurisdictions examine alternative ways of contracting when making significant technology purchases.[14] Examples highlighted in the literature include (1) breaking up procurements into smaller pieces, (2) using Requests for Demonstration, and (3) developing short problem statements.

Breaking up procurements into smaller pieces. Many sources describe benefits associated with breaking up large technology procurements into smaller pieces – often referred to as "modular development."[15] Government acquisition of large technology systems, such as enterprise systems, often starts with a grand plan that outlines a project from start to finish, with projected costs of millions or tens of millions of dollars. The U.S. Office of Management and Budget (OMB) reports that "practical evidence and private sector experience" has highlighted drawbacks to this type of procurement, including:[16]

- Susceptibility to budget and schedule overruns,
- Difficulty for small vendors to compete for the work,
- Challenging for vendors to accurately assess all necessary requirements,
- Difficulty making potentially useful changes mid-project.

Instead, experts recommend developing projects (with separate contracts) that are divided into more manageable pieces:[17]

- Jurisdictions can choose to use multiple vendors with targeted expertise,
- Subsequent pieces of a project can be adjusted as necessary,
- Jurisdictions can implement newer technologies more quickly,
- Projects will carry less investment risk in smaller increments, and
- Jurisdictions can better assess vendor performance and can tie subsequent contracts for project components to successful implementation of earlier components.

The next graphic, from OMB's *Contracting Guidance to Support Modular Development*, illustrates dividing an IT project into smaller components.

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[14] *Improving IT Procurements*, at pp. 15-16.

[15] *Contracting Guidance to Support Modular Development*, U.S. Office of Management and Budget, at p.3 (2012). https://www.whitehouse.gov/sites/default/files/omb/procurement/guidance/modular-approaches-for-information-technology.pdf

[16] See *Contracting Guidance to Support Modular Development*, at pp. 2-3. See also *Improving IT Procurements*, at pp. 8-9; Brown, "5 Government Procurement Practices that Stifle Innovation", Yaraghi, N., "Doomed: Challenges and solutions to government IT projects," Brookings Institution (2015). https://www.brookings.edu/blog/techtank/2015/08/25/doomed-challenges-and-solutions-to-government-it-projects/

[17] See *Contracting Guidance to Support Modular Development*, at pp. 3-6. See also *Improving IT Procurements*, at pp. 15-16; "5 Government Procurement Practices that Stifle Innovation".

Emerging Models in Government Technology Procurement

* Clinger-Cohen Act terms are indicated in parentheses
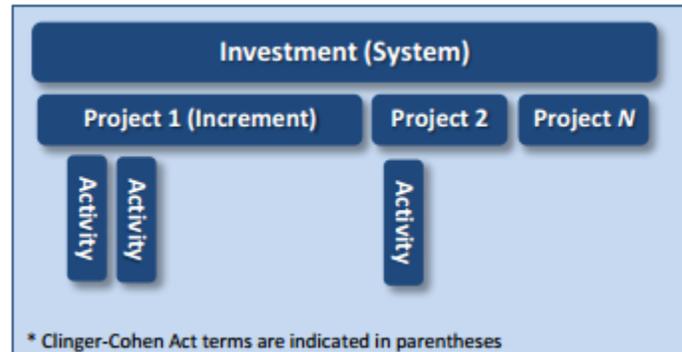
One example comes from the State of Texas, which recently moved 75% of the state's IT services to new consolidated data centers – away from individual agency data centers. To put together the data centers, Texas' Chief Technology Officer divided the project into five separate procurement components – servers, mainframe, print/email, data centers, and network – allowing companies with expertise in each area to compete for the work.

Using Requests for Demonstration. Some jurisdictions use Requests for Demonstration (RFD) where the jurisdiction requires vendors to develop and demonstrate during the procurement process a prototype of technology that will fulfill the jurisdiction's business needs. This allows government staff to see examples of proposed technological solutions before entering into a contract.

In 2013, the California Health and Human Services Agency (CHHS) developed an "interoperability" plan to design and build a coordinated information technology system that allows state health and human services agencies and partners to have common access to information and data on clients. A primary goal was to eliminate "information silos and redundant information retrieval."[18]

As a part of the project, CHHS issued a Request for Demonstration that invited firms to demonstrate how CHHS "data can be shared among multiple systems for the benefit of the user community."[19] Participating firms had to develop and demonstrate a system following state-mandated requirements in the Request for Demonstration and had to provide the demonstration at no cost to the state.

Short problem statements. Once source recommends that jurisdictions consider developing a short one-page "problem statement" rather than a traditional RFP. In 2014, the senior procurement executive for the federal Consumer Financial Protection Bureau observed that:

> [I]f agencies trust complex IT procurements to traditional procurement [methods], they will likely get poor results because the long-standing position is that the tighter the specification, the better the procurement. "Almost the opposite is true when you are asking people to invent a solution to a problem that's never been solved…. If we are asking experts to help us solve complex problems using technology, then why don't we let them use their imaginations?"[20]

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[18] *Interoperability Plan*, California Health and Human Services Agency, Office of Systems Integration, at p. 1 (2013). https://www.acf.hhs.gov/sites/default/files/assets/california_interoperability_plan_final.pdf
[19] Ibid. at pp. 1, 151.
[20] Brown, "Bringing Innovation to Procurement".

The federal government's former Chief Technology Officer advocates this approach to encourage creativity and innovation from the private sector:

> We simply say, "Here is our problem, we want the most brilliant solutions out there, and then we are going to let you fly…. Clearly none of us are satisfied that procurement as it exists today delivers optimal results when it comes to technology. Why not let the public money fund entrepreneurial ideas that might prove to be the new way to govern?"[21]

D. Use IT-specific terms and conditions

In January 2014, the Center for Digital Government convened a group of public and private sector technology leaders to develop a statement of best practices for state and local government IT procurement.[22] One outcome of this group was a recommended set of contract terms and conditions for cloud service procurements. The group's final report includes recommended terms and conditions specific to software-as-a-service, platform-as-a-service, and infrastructure-as-a-service that address:

- Data,
- Breach notification,
- Contract personnel,
- Security,
- Audits, and
- Operations.

The recommended terms and conditions seek to clarify "the party's respective responsibilities for control and operation" of hardware and software related to the purchase of cloud-based services, which "is fundamentally different from traditional IT."[23] IT specific terms and conditions can help jurisdictions address contracting issues related to cloud-based services that don't typically arise with other types of purchases, such as cybersecurity, data confidentiality, and liability related to data breaches or system failures.

E. Engage in negotiations with a chosen vendor

Several sources recommend that procurement laws allow governments to engage in contract negotiations after choosing a vendor.[24] Some procurement systems require a jurisdiction to set out all necessary terms for a contract in an RFP, with no option for negotiating contract provisions after a vendor has been chosen. Other systems do allow jurisdictions to negotiate contract terms with a vendor before finalizing a contract. Experts recommend the latter approach, which gives jurisdictions more freedom to develop the best contract for a project.

Jurisdictions can give notice to vendors that it is willing to negotiate certain terms and conditions by (1) identifying those terms and conditions in an RFP, or (2) allowing bidders to identify in their proposals problematic terms and conditions from the RFP.[25]

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[21] Brown, "Bringing Innovation to Procurement".

[22] *Best Practices Guide for Cloud and as-a-Service Procurements*, at p. 1.

[23] Ibid. at pp. 6, 23.

[24] *Improving IT Procurements*, at p. 13; *Best Practices Guide for Cloud and as-a-Service Procurements*, at pp. 53-54; *Recommendations to Improve Large Information Technology Procurements*, at pp 13-14.

[25] *Best Practices Guide for Cloud and as-a-Service Procurements*, at pp. 53-54.

II. Technology Procurement in Montgomery County Government

Technology use in County Government departments is ongoing and expanding. At the policy level, the County Government has outlined its vision for County-related information technology in a *Technology Strategic Plan* that sets out broad goals for technology development and procurement. Together, the County's Department of Technology Services (DTS) and Office of Management and Budget (OMB) work with County departments to implement these goals.

DTS manages the procurement of most enterprise-wide technology systems (e.g., MCTime) and consults with OMB and County departments on department-specific technology procurement. To evaluate how department IT projects fit into the parameters of the *Strategic Plan*, OMB and DTS use standardized criteria that look at a project's:[26]

- Business priority,
- Urgency of need,
- Overlap with existing technology projects,
- Cost/benefit,
- Project success factors, and
- Security vulnerability compliance.

This section describes technology goals outlined in the County Government's recent *Technology Strategic Plan 2016-2019* and provides an overview of technology procurement in the County Government, including recent purchases of cloud services.

Technology Strategic Plan. DTS most recently outlined the County Government's long-term technology goals in in June 2016. The *Technology Strategic Plan 2016-2019* outlines the County Government's vision for technology initiatives in the coming years, outlines departmental responsibilities, and includes "tactical plans" for implementation.

The *Technology Strategic Plan's* seven goals all touch on acquiring and using technology to better deliver public services, to provide public access to County Government data, and to protect confidential data and information. Goal #6, "Improve Agility of Technology Delivery and Utilization," addresses the challenges associated with technology procurement:

> The County's goal is to improve the speed with which technology solutions can be implemented within the County by improving the process to plan, acquire, and integrate technology solutions and processes. Technology changes rapidly and with delays there is risk of lost opportunity, obsolescence, and stakeholder frustration and disengagement.[27]

The strategic priorities associated with this goal are to:

- Use agile solutions development and integration methodologies and practices,

- Support a streamlined and effective technology procurement process,

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[26] See *Technology Strategic Plan 2016-2019*, Montgomery County Department of Technology Services, at p. I-3 (2016) [hereinafter "*Technology Strategic Plan*"].
[27] *Technology Strategic Plan*, at p. I-13.

- Maintain IT staffing resource contracts to rapidly procure and deploy people with skill sets not existing or not readily available in-house, and

- Be proactive in identifying the needs of functional departments, especially small departments that do not have dedicated IT staff.

The *Plan* advocates exploring new technologies for enterprise use, such as cloud-hosted systems, and adapting business processes to work with new technology solutions.

Some County Government technology procurement happens through agency and component unit collaborations such as the Interagency Technology Policy and Coordination Committee (ITPCC), established by the County Council in 1984. The ITPCC coordinates shared projects and services among County agencies and component units – its largest project being the development and operation of FiberNet, a broadband communication network connecting over 470 County locations.[28] The Technology Strategic Plan indicates that current and future projects of the ITPCC include cloud services, virtual networks, data centers, information security, and spatial systems.

MCG Technology Procurement. The County Government is not new to technology procurement – having implemented major enterprise systems in recent years (e.g., ERP, MCTime) and moving some resources to the cloud (e.g., Office 365). From an overarching perspective, DTS works to ensure that newly-purchased technologies are compatible with existing technology and, whenever possible, purchases off-the-shelf software, which is easier to implement, integrate, and maintain than software created uniquely for the County Government. To this end, DTS seeks out open platform systems, which allow users to access data directly and also allows access to the data by other information systems. DTS also has staffing contracts with IT vendors where DTS can issue task orders to hire contractors with IT skill sets that DTS cannot get in-house.

In recent years, DTS has helped several departments implement new technologies, working with the Department of Public Libraries, the Office of the County Attorney, and the County Council to migrate the library system to the cloud, purchase a new work management system, and purchase a communications management system, respectively. The departments and the Council each chose the technology and DTS helped implement the systems. DTS also advises departments about potential risks associated with certain systems or vendors and maintains a dialogue with various vendors to keep abreast of new innovations.

DTS has acquired several significant cloud-based enterprise systems in recent years. Two examples are Office 365 (Microsoft cloud-based productivity software including word processing software, spreadsheet software, a database, etc.) and Socrata (the County Government's open data platform). DTS purchased Office 365 by bridging a contract between Microsoft and the State of Maryland – where the County Government was able to purchase the software under the existing State contract for Office 365. The County Government purchased Socrata through a "sole source" contract – meaning that MCG did not solicit bids from multiple vendors because, at the time, Socrata was the only company that could provide the needed product.

DTS representatives' descriptions of technology purchases in recent years shows that DTS already uses some of the procurement techniques described in Section I, such as meeting with vendors to learn about new technologies, developing multi-phase projects, and negotiating contract terms. DTS also supports the idea of developing IT-specific terms and conditions for the County to address issues unique to IT cloud purchases.

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[28] *Technology Strategic Plan*, at p. I-4.

Some contracting methods available to County departments can facilitate such IT purchases, such as Requests for Expressions of Interest (REOI). These solicitations ask vendors for information that can be used to prepare subsequent IFBs or RFPs and to develop a source of potential vendors for a subsequent solicitation. REOIs can provide a vehicle for the County to request demonstrations from potential vendors. Representatives from the Office of Procurement note that requiring demonstrations can potentially exclude small business with fewer resources from responding to a solicitation.

III. Conclusion

The Councilmembers may want to consider the following questions in future discussions about the purchase of new technology in the County Government:

- Would developing IT-specific terms and conditions for contracts save time and resources in future contract negotiations?

- In what ways do departments examine ways to adapt business processes to improve outcomes when purchasing new technology as opposed to layering new technology onto existing business processes?

- To what extent do County departments seek out industry expertise when determining how a technological solution can help a business process?

IV. Acknowledgements

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