Drowning in Data

The Data Center Optimization Initiative (DCOI) and its Potential Effects on Government Contracting

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Part 1

The DCOI and its Effect on Government

Out of the Rolling Ocean, the Data

"Out of the rolling ocean, the crowd, came a drop gently to me."

-Walt Whitman

Experts believe that **90% of all the data in the whole world has been created within the past two years,**[1] and IBM estimates that we generate upwards of 2.5 exabytes (that's 2.5 with 18 zeros after it) of data each day.[2] For many of us, data has become like the oceans; we're surrounded by it, and thrive on what it provides, but if we're not careful we can easily drown in it. All of this data needs somewhere to live and those living spaces (servers) use a lot of physical space, power, and resources. By some reports, Microsoft owns at least one million servers across up to 20 dedicated server facilities.[3] That's a lot of real estate and a lot of energy spent on patterns of zeros and ones.

Imagine, then, how much space and energy the U.S. Government needs for the amount of data it collects, manages, and utilizes. Every day the government produces data on topics ranging from agriculture to poverty, from weather patterns in Washington to those on Mars. A December 2016 report in NextGov[4] estimated that the U.S. Government owns approximately 10,500 data centers that are neither consolidated nor uniform, and much of the government is barely keeping up with managing it. The Office of Personnel Management (OPM) breach is an example of how critical data and infrastructure management are. As chronicled in Wired,[5] the OPM breach was exceptionally concerning because the malware planted on their servers could have come from any one of 15,000 individual machines of varying age.

Recognizing these issues, the Office of Management and Budget (OMB) initiated the Data Center Optimization Initiative (DCOI), a sextant to help guide and better manage the government's rough data oceans.

[1] Wall, Matthew "Big Data: Are you ready for blast-off?" http://www.bbc.com/news/business-26383058, BBC News, 02/04/2014, Web, 10/12/2016

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[3] Anthony, Sebastian "Microsoft now has one million servers - less than Google, but more than Amazon, says Ballmer" http://www.extremetech.com/extreme/161772-microsoft-now-has-one-million-servers-less-than-google-but-more-than-amazon-says-ballmer, ExtremeTech, 07/19/2013, Web, 10/12/2016
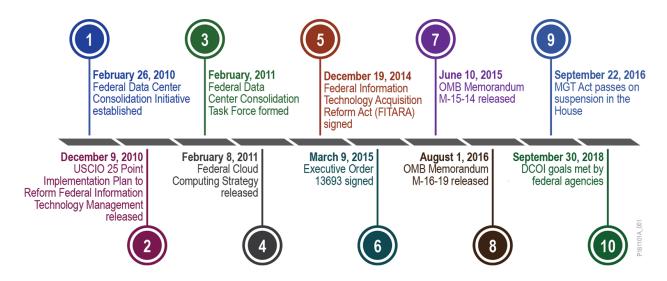
[4] Konkel, Frank "The Government Finally May Have Found All Its Data Centers" http://www.nextgov.com/cio-briefing/2016/12/government-finally-may-have-found-all-its-data-centers/133713/, Nextgov.com, 12/07/2016, Web, 1/12/2017

[5] Koerner, Brendan I., "Inside the Cyberattack That Shocked The US Government" https://www.wired.com/2016/10/inside-cyberattack-shocked-us-government/, Wired, 10/23/2016, Web, 10/24/2016

A Short, Iterative History

The DCOI is the next step in the evolution of how government handles data and shared services. The first step, back on February 26, 2010, was the Federal Data Center Consolidation Initiative (FDCCI). For its three year lifespan, the FDCCI sought to "curb this unsustainable increase [in the number of Federal data centers] by reducing the cost of data center hardware, software, and operations; shifting information technology (IT) investments to more efficient computing platforms; promoting the use of Green IT by reducing the overall energy and real estate footprint of government data centers; and increasing the IT security posture of the government."[6]

Figure 1: Beginning with FDCCI in 2010, the federal government hopes to consolidate data centers across all agencies by 2018.

1 February 26, 2010
Federal Data Center Consolidation Initiative established

2 December 9, 2010
USCIO 25 Point Implementation Plan to Reform Federal Information Technology Management released

3 February, 2011
Federal Data Center Consolidation Task Force formed

4 February 8, 2011
Federal Cloud Computing Strategy released

5 December 19, 2014
Federal Information Technology Acquisition Reform Act (FITARA) signed

6 March 9, 2015
Executive Order 13693 signed

7 June 10, 2015
OMB Memorandum M-15-14 released

8 August 1, 2016
OMB Memorandum M-16-19 released

9 September 22, 2016
MGT Act passes on suspension in the House

10 September 30, 2018
DCOI goals met by federal agencies

Eventually, however, the time came to update the government's data center policy. On December 19, 2014, Congress passed the Federal Information Technology Acquisition Reform Act (FITARA), which quickly transformed the face of how the government uses technology and required OMB to do just that. The new policy was to refresh the strategy, goals, and requirements for agencies' data centers, and with it, OMB was required to provide public updates on performance improvements by the agencies and review agencies' data center inventories and strategies. It was "... a historic law that represents the first major overhaul of federal IT in almost 20 years."[7]

But the DCOI pushes even further, instituting a full-stop on new development of data centers:

"... agencies may not budget any funds or resources toward initiating a new data center or significantly expanding an existing data center without approval from OMB OFCIO. To request

> **The DCOI supersedes the FDCCI and fulfills the data center requirements of FITARA. Under the DCOI, agencies are now required to:**
> - Develop strategies for optimization and closure of their data centers;
> - Transition to more efficient infrastructure, such as the cloud and shared services;
> - Put control over data center-related budget and management decisions in the hands of the department-level CIO;
> - Replace dependency on human-centric methods for data center management with automated tools for server "crawling"; and
> - Provide quality digital services to the taxpaying public.

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[6] "Data Center Consolidation and Optimization" https://cio.gov/drivingvalue/data-center-consolidation/, CIO,gov, Web, 10/12/2016
[7] "Management and Oversight of Federal Information Technology" https://management.cio.gov/, CIO.gov, Web, 10/12/2016

such approval, agencies must submit a written justification that includes an analysis of alternatives…
and an explanation of the net reduction in the agency's data center inventory that will be facilitated by
the new or expanded data center."

The Lighthouse and the Gatekeeper

Although OMB is actively overseeing agencies' implementation of the DCOI requirements, the DCOI
names the General Services Administration's (GSA) Office of Government-wide Policy (OGP) as the
managing partner for the DCOI line of business. As one strategy toward consolidation, GSA consults
with the Unified Shared Services Management Office (USSM) to "... establish and maintain a data
center shared services marketplace and coordinate shared services for inter-agency consumption."[8]

OGP has three primary objectives under the DCOI:[9]

- Develop a federal shared service marketplace for data center services;

- Maintain operating standards and ensure the DCOI compliance of those who provide those
  shared services; and

- Create and administer a government-wide Community of Practice (CoP).

Federal employees can access the shared services marketplace for different data center tools and
services through the [Federal Acquisition Gateway](#) site, which displays existing shared solutions to
common data center needs in a click-and-buy fashion. The Community of Practice administered by
OGP has been sponsored by the Chief Information Officers' (CIO) Council – the department-level CIOs
of each agency, but CIOs are not in attendance. The main purpose of the CoP is as a forum for agency
staff and technical experts to share knowledge and solutions to common challenges.[10] All Executive
Branch employees are encouraged and welcome to join the CoP, which is coordinated via the DCOI
listserv established in the policy.

While there is no mandate for agencies to move to shared services (nor will there be due to the costs
associated), USSM's participation in the DCOI guidance is a sign that OMB and OGP believe shared
services are the wave of the future for data center procurement. USSM is the integration body for
shared services across the federal government and helps OGP execute the shared services strategy
through several contributions. For example, they are establishing an investment review process for
business cases and implementation plans for shared services, reporting to OMB on their findings and
working with OMB's Office of Federal Procurement Policy (OFPP) to develop a government-wide
management and acquisition strategy for shared services.

[8] Scott, Tony "M-16-19" https://obamawhitehouse.archives.gov/sites/default/files/omb/memoranda/2016/m_16_19_1.pdf,
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[9] Sale, Dominic "A fresh approach to optimizing federal data centers" https://gsablogs.gsa.gov/gsablog/2016/08/10/a-fresh-approach-to-
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[10] "DCOI Community of Practice" https://datacenters.cio.gov/community-practice/, CIO.gov, Web, 10/12/2016

Downstream Effects

One of its primary goals is to increase agencies' use of shared solutions to common data center problems. For example, a small agency may find that it is cheaper and easier to rent data center space from a large agency. As this becomes more prevalent, agencies will find they need to communicate more thoroughly. The CoP has a forum to facilitate this type of communication, but it will take effort to share all of the knowledge that agencies will accrue as they make changes to comply with the DCOI. As described in Executive Order 13693, "Planning for Federal Sustainability in the Next Decade" the government wants to chart a path toward greater energy efficiency and reduction in its carbon footprint.[11] Data consolidation is an effective way for that to happen; however, this initiative will lead to several changes for the government. Aside from the obvious changes to procurement and technology – an increase in shared services and cloud utilization, both public and private – government employees will also find themselves on uneasy seas.

As the DCOI is implemented, the way the government uses data centers will change. New skills will be needed in order to maintain the new waves of technology. For example, most data centers operated in the commercial sector are automated. Eventually, as the government adopts commercial best practices, data centers in government will also become automated. This does not necessarily mean there will be fewer jobs. It means that the jobs will change to suit the technology.

The DCOI Community of Practice (CoP) is a free way for agencies that are on the cutting-edge of technology to share with other agencies lessons learned and best practices. Those in the CoP give presentations, talks, and other events to share their knowledge and help those who are interested prepare for the next phase of government's technology evolution.

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[11] Obama, Barack "Executive Order — Planning for Federal Sustainability in the Next Decade" https://www.whitehouse.gov/the-press-office/2015/03/19/executive-order-planning-federal-sustainability-next-decade, White House, 03/19/2015, Web, 10/12/2016

Part 2

The DCOI's Effect on Procurement and Government Contractors

A Sea Change

Our ability to produce, store, and manage data has evolved with technology. One time, not long ago, a person who wanted to take a photograph would have to use a camera dedicated solely to that purpose, manually take the data (the film) from the camera and clean (develop) it herself, or take it somewhere to be done. Then, once her data (the picture) was complete she had to store it someplace that was accessible, like a shoebox.

The present-day equivalent of this exercise is entirely intangible, but it is also instantaneous, secure, and optimized for maximum utility. Now, we use our phones to take machine-readable digital photos and upload those directly to a cloud for storage. These new photo services do exactly what we tell them to do, when we demand them, so that our only limitation is ourselves.

Similarly, the government currently houses data in rooms of loud, physical servers with manual processes that take time and effort to achieve desired goals. However, services exist that can make data storage, management, and analysis as easy as uploading a photo to Instagram. Cloud providers are among those producing some of the most commonly-used and popular web-based services in the world. Amazon and Microsoft provide infrastructure that transform agencies' data storage from something they have to own and manage to on-demand utility-style services. Agencies' data center managers can continue to take requirements and procure and configure their agencies' cloud instances, without ever leaving their desks.

Leveraging these common public cloud services isn't the only move the government has made toward the cloud, though. For example, the MAX suite of Shared Services includes a platform-as-a-service on which other applications, can be built at lower cost while meeting all government security requirements. As of September 2016, the MAX suite had more than 185,000 active users at 180 federal agencies.

This path toward shared services is the ultimate destination for the DCOI. Now, instead of every agency building, operating, and maintaining their own data centers, there will be an option to leverage data centers already in operation. GSA Deputy Administrator Adam Neufeld highlighted the increasing importance of government shared services when he said, "Every dollar spent on administrative services or every minute of a leader's time spent on these (administrative) functions is a dollar or a minute away from the mission. The government simply cannot afford to do what it has been doing. We need to improve our shared services across the board."[12]

At GSA's Shared Services Day in August, USSM revealed that USSM will roll out a catalog where agencies can shop for shared services. The catalog will include a list of more than 260 subfunctions or activities that will inform stakeholders on the shared services process.

OMB has already identified several areas of commonality across government agencies for which it makes sense to use shared services. In February of 2015, OMB commissioned a study of 22 focus groups made up of over 90 stakeholders and analyzed more than 100 documents to inform their conclusions. They found that acquisitions, financial management, human resources, travel, and IT requirements can all be reliably shared.[13]

> The star charts read clear: shared services are the future of government data production, management, and storage.

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[12] Cordell, Carten "4 Takeaways from GSA's Shared Services Day" *http://www.federaltimes.com/articles/4-takeaways-from-gsas-shared-services-day*, Federal Times, 08/23/2016, Web, 10/12/2016

[13] Mader, David & Roth, Denise Turner, "Scaling Implementation of Shared Services", https://www.whitehouse.gov/blog/2015/10/22/scaling-implementation-shared-services, White House, 10/22/2015, Web, 10/12/2016

Build A Better Ship

In certain cases, however, agencies will not be able to move everything to the public cloud. Some data center ownership and management will likely always be necessary for certain government entities, and those will face the common challenges of ensuring optimization. The DCOI sets a suite of goals and metrics in motion for data centers that remain federally managed.[14] Among these:

- Automated energy metering tools must be installed and report on energy usage data to OMB by September 30, 2018.

- All existing tiered data centers (defined as a data center that has a separate physical space for IT infrastructure, an uninterruptible power supply, a dedicated cooling system, and a backup power generator) must have Power Usage Effectiveness (PUE) of 1.5 or lower by September 30, 2018. Data centers that are not operating at that PUE will be recommended for closure, consolidation, or migration to a shared service.

- Data centers must be fully equipped with automated crawling tools that can collect and report information about the data center and its servers to agencies' staff continuously.

- All new data centers developed after September 2016 will need to be designed to operate at a maximum PUE of 1.4 and are encouraged to operate at a PUE of 1.2.

- Beginning in January of 2017, approvals from OMB will be needed for new data center development or expansion in excess of 18% of gross floor (white space) area or 660 square feet.

Going forward, the government is required to include, and contractors will begin to see, these restrictions in data center contracts and solicitations. This means that innovation will be rewarded over the long term. Those contractors that have already built or know how to utilize shared services in a cost effective and efficient way will be at an advantage for upcoming procurements. Most important, however, will be experience with closing or migrating data center capabilities. Such skills and experience will be needed federal government-wide through FY 2018 in order to meet the closure targets in the DCOI.

Steer Toward the Lighthouse

With all of the new requirements and the new developments for data center consolidation and shared services, procuring the work necessary to fulfill the government's new requirements is a challenge. The DCOI charges GSA with making "available an acquisition vehicle for automated monitoring and management tools to support agency needs."[15] What form might that take?

At GSA's August Shared Services Day, Steven Krauss, the director of GSA's Category Management Strategic Execution Office, said, "What we are starting to look at is what constitutes a best-in-class

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[14] "OGP's Significant Expansion Definition" *https://datacenters.cio.gov/significant-expansion/*, CIO.gov, Web, 10/12/2016
[15] Scott, Tony "M-16-19" *https://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m_16_19_1.pdf*, White House, 08/01/2016, Web, 10/12/2016

contract vehicle and how do we get more agencies to be buying off of those recognized vehicles as opposed to, say, creating their own standalone contracts." He went on to mention OASIS (One Acquisition Solution for Integrated Services) and GSA Schedule vehicles as likely choices for future shared services.

However, that isn't to say there won't be specialized shared service contract vehicles developed to meet the goals of the DCOI. Should no current vehicle suffice, GSA may charter a new vehicle or Blanket Purchase Agreement that can meet agency requirements. In that case, contractors can expect a competition to win the work or the ability to bid on future work.

Get Underway

Since the late '90s the government has seen exponential growth in a decentralized environment that was counterproductive to energy responsibility. Beginning with the FDCCI and running through the DCOI, the winds have changed.

To keep pace, the government and contractors need to adjust their sails to navigate toward new shores. There are many routes to take — cloud, shared services, development — but the destination is the same: a future where data centers are centralized and energy efficient.

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