Testimony of

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At the Field Hearing

"Data Centers on the Cloud: Is the Government Optimizing New Information Technologies Opportunities to Save Taxpayer Money?"

Before the Subcommittee on Government Operations, Committee on Oversight and Government Reform
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Good afternoon, Chairman Mica and Ranking Member Connolly, my name is Teresa Carlson, and I am Amazon Web Services' Vice President for World Wide Public Sector. On behalf of Amazon and our customers, thank you very much for inviting me to testify today on federal data center optimization and the transition to cloud computing, and to discuss how U.S. federal agencies can do more with less to save taxpayer money. It's a subject that I know this Subcommittee and the Oversight and Government Reform Committee are focused on, and we at Amazon are also quite passionate about helping our customers save money and innovate for less.

Amazon Web Services

As you may know, Amazon.com opened for business on the World Wide Web in July 1995 and today offers Earth's Biggest Selection. Amazon seeks to be Earth's most customer-centric company, where customers can find and discover anything they might want to buy online, and endeavors to offer our customers the lowest possible prices and the best possible services. Technology innovation has always driven Amazon's growth. As we expanded our offerings for retail customers, we also expanded customer segments.

After over a decade of building and running the highly scalable set of web applications and databases known as Amazon.com, the company realized that we had developed a core competency in operating massive scale technology infrastructure and datacenters. So, we embarked on a much broader mission of serving a new customer segment – including government agencies – with a platform of web services through our cloud computing business called Amazon Web Services (AWS).

In 2006, AWS began offering developer customers access to in-the-cloud infrastructure services based on Amazon's own back-end technology platform. Previously, businesses and government agencies only had an option of either making massive capital investments to build their own infrastructure or of contracting with a vendor for a fixed amount of datacenter capacity that they might or might not use. This choice meant either paying for wasted capacity or worrying about shortages, *i.e.*, that the capacity they forecasted was insufficient to keep pace with their growth. Businesses and government agencies spent a lot of time and money managing their own datacenters and co-location facilities, which meant time not spent on their core organizational missions of

providing products and services for their customers and citizens. In large part, these inefficiencies continue today, and as you are well aware, the U.S. federal government has struggled with this challenge for some time.

With AWS, government no longer needs to make massive, risky infrastructure investments in order to develop, launch, and run flexible, reliable, and scalable IT systems. AWS provides a highly reliable, scalable, secure, and low-cost infrastructure platform in the cloud that powers hundreds of thousands of enterprise, government, education, and startup organizations.

Companies that leverage AWS in the commercial sector range from large enterprises such as Bristol-Myers Squibb, Shell, and Nasdaq, to innovative start-ups like Pinterest and Dropbox. Throughout the U.S. federal government, agencies and departments are adopting AWS for a wide range of technology infrastructure services and applications including at the U.S. National Institutes of Health, NASA's Jet Propulsion Laboratory, the U.S. Department of the Navy, and the U.S. Securities and Exchange Commission. AWS also offers its dedicated *GovCloud* to U.S. government agencies and system integrator partners, allowing them to move more sensitive workloads into the cloud by addressing their specific compliance requirements, such as the International Traffic in Arms Regulations (ITAR).

Notably, Amazon.com, as the largest online retailer in the world, has itself adopted cloud computing services provided by AWS to enable rapid innovation and growth, to transform how we deliver our services to customers, and to lower our IT costs substantially. That is, Amazon's core retail business relies on cloud services provided by AWS.

AWS is passionately committed to sharing the benefits we can achieve as a cloud provider to federal government agencies, and our economies of scale have resulted in the rapid innovation of public cloud services and the lowering of pricing for our customers. Specifically, we have lowered our cloud service prices 31 times since 2006. *Let me repeat that*: *AWS has lowered its prices 31 times since 2006.*

Given the proven, secure, and game-changing efficiencies of cloud computing, we believe that the Federal Data Center Consolidation Initiative (FDCCI) should be directly linked to the Office of Management and Budget's "Cloud First" policy in order to be truly successful with data center optimization. While there is no doubt some Federal government workloads can and should continue to operate in government-owned datacenters, a large number of workloads are much more suitably and efficiently hosted in large-scale, commercial cloud platforms. Therefore, the adoption of cloud computing services should be a central part of the federal strategy to achieve greater cost reductions, more efficiency, and to spur more innovation throughout the federal government.

Cloud Computing

One way to think about cloud computing is that instead of buying, owning, and maintaining their own datacenters or servers, federal agencies can acquire technology resources such as compute power and storage on an as-needed basis, and dispose of it when it no longer is needed. Many industry experts refer to this as a "utility" model of obtaining and using IT capability, analogous how the government obtains access to water, gas, or electrical power. Users only pay for what they use – by the compute-hour or storage-gigabyte – and they are not locked into long-term contracts. *Let me repeat that too: using this model, federal agencies are not locked in to long-term contracts.* If a program is funded one year and then unfunded the next, or a pilot project or test program does not achieve its expected results, agencies no longer need to be tied to large, capital IT expenditures that cost tens of millions or even hundreds of millions of dollars.

There are a number of federal contract vehicles that are being structured to enable this approach and I'll highlight one that was announced recently: the U.S. Department of Interior Foundation Cloud Hosting Services

contract was competitively awarded by the Department's National Business Centre and the Acquisition Services Directorate to multiple vendors. The contract is uniquely structured to facilitate the evaluation and adoption of usage-based cloud computing services.

There are many examples of federal agencies that have begun to embrace the cloud and this new IT model. I'll highlight two in my testimony today. First, NASA's Jet Propulsion Laboratory (JPL) decided several years ago to use AWS's Infrastructure-as-a-Service (IaaS) offerings in support of the Mars Rover-related programs and had considerable success in doing so; AWS enabled the Rover program to run more efficiently. When the next major Mars mission, the Mars Space Lab (also known as Curiosity) successfully landed last year, public cloud computing infrastructure from AWS was utilized in support of various aspects of that mission, including public outreach around the landing itself as well as the data and image management pipeline dealing with all the new data streaming down from Mars. As Tom Soderstrom, the CTO of NASA JPL, has described, JPL has leveraged cloud services to dramatically reduce IT costs and, in the process, increased their agility and decreased the "time to science," while enabling JPL to have complete flexibility when using those computing resources.

Second, the U.S. Department of the Navy's CIO office recently initiated a pilot project to move unclassified data to a commercial hosting environment. The Secretary of the Navy's public-facing information portal is now hosted in the AWS cloud. As a result, in a recent blog post, the Navy CIO, Terry Halvorsen, stated that the Department "has achieved a 50 percent reduction in cost to operate the portal" because it was less expensive to use commercial cloud services than host the site in a government data center.

Let's imagine, for a moment, if that level of cost savings could be applied to all federal IT spending in the next decade?

Chairman Mica and Ranking Member Connolly, the benefits of cloud computing have been described before to the Subcommittee and Committee. Please allow me to summarize briefly those benefits to users for the purposes of today's field hearing:

- First, with cloud, IT users can trade capital expenditures for variable expenses. That is, users can pay only for what IT they actually consume, and only when they consume it.

- Second, with cloud, those variable expenses are lower than they would be if the user self-provided the IT service. With inherent economies of scale, the large-scale commercial cloud is simply more efficient than anything a particular user could build and operate for itself.

- Third, users don't need to guess their capacity needs. Before cloud, users risked the waste of buying too much IT capacity if demand were lower than guessed, or they risked dissatisfaction of their customers or citizens with shortages, if the users bought insufficient IT capacity to meet demand.

- Fourth, the speed and agility of user innovation is dramatically increased with cloud. Instead of waiting many weeks to obtain IT infrastructure, virtually unlimited capacity is available to users within minutes.

- Fifth, cloud computing allows a user's scarce technical talent to focus on its core mission, not on maintaining basic compute and storage infrastructure to support it. With the budget challenges that agencies face today, that focus is valuable now more than ever to government users.

Federal Data Center Optimization

Those benefits of cloud computing should be applied to the objective of reducing the number of data centers as intended under the FDCCI. Reducing the number of data centers in use by the federal government is a worthy and important goal. The cost savings that could come along with the closure of federal data centers could be substantial over time, whether it can indeed be $3 Billion by the end of 2015 as is the previously stated goal noted in the most recent U.S. Government Accountability Office (GAO) report. But regardless of the total amount to be saved by data center reductions under FDCCI, shuttering underutilized data centers to save money is only part of the equation. The IT models that are used for the remaining federal agencies' data centers – whether it is 2,000, 1,000 or fewer – will ultimately determine the magnitude of overall cost savings and benefit to the federal government.

Even if in the next several years, the number of federal data centers is reduced to less than 2,000, if the IT models utilized for those data centers are still to invest tens of millions or even hundreds of millions in IT infrastructure, services and capital investments, then how much of possible cost savings will be left on the table? What other benefits will be sacrificed or unrealized?

The reality is that cost savings is only part of the picture and that is why we think that it's fundamental to clearly link the transition to cloud computing with federal data center consolidation in order to achieve the maximum benefits of federal data center optimization. Doing more with less has become a key public policy goal in Congress and it's one that we strongly agree with. That is what we have been committed to at AWS since the beginning. But, it's also about *innovating for less*. And that is where cloud computing excels more than any other IT model. That's why some businesses are now shifting their entire IT infrastructure to the cloud. Even enterprises that invested a lot previously in their IT infrastructure and became really good at it, decided that they could not achieve the same efficiencies and benefits – including the ability to innovate faster at a substantially reduced cost – as they could if they shifted to the cloud. *That same approach needs to be applied to the federal government*.

The bottom line is that there are some IT missions that federal agencies should no longer pursue on-premise or by using the old model of capital expenditures to build out IT infrastructure and have lots of people manage it. This brings me back to the Navy Department example that I referenced earlier. What Mr. Halverson, the Navy CIO decided, was that instead of being satisfied with the old model, he was going to innovate and use a new model, one that was more efficient, more flexible, more scalable, and every bit as secure – if not more secure -- than the old one. In his words: "The decision to host the data on a public Web server resulted from an analysis of several factors, including the type of data stored in the portal, the ease of access due to significantly faster response times, security, and cost."

Consider also the mission and business needs that were factors in NASA JPL's decision to utilize public cloud infrastructure. It wasn't just about cost savings, it was also about flexibility, scalability, security – and landing a rover on Mars is a pretty obvious example of "mission critical." The cloud has also enabled a new level of secure data sharing and collaboration with other research centers in the U.S. and around the globe. The cloud actually enables much tighter control over data access than sending datasets on hard disks or allowing arbitrary data downloads from around the globe. Finally, leveraging cloud computing also provided NASA JPL the option to use the infrastructure when they actually needed it, and to turn it off when they did not.

There are many other examples highlighting the benefits and opportunities of leveraging cloud computing to achieve significant and lasting "data center optimization" results for the federal government. But as exciting as the opportunities are, there continue to be obstacles in the way as well. And that is where I think that the Committee is playing a critical role. Without additional oversight and updates to federal IT acquisition processes, budget models, and IT procurement policy, it will be a struggle to achieve lasting results. That is why we

support the advancement of the Federal IT Acquisition Reform Act (FITARA), including the federal data center optimization and cloud computing provisions in the bill.

Federal IT Acquisition and FITARA

Chairman Mica and Ranking Member Connolly, as you have both pointed out on various occasions, the way government defines its requirements and acquires IT can be considered antiquated. Given the many benefits of adopting new IT models that I have described today, Amazon believes that a principal aim of federal IT acquisition reform legislation should be to facilitate federal government acquisition of cloud computing services.

Title I of the FITARA bill would give federal agency CIOs more authority and budget flexibility. Amazon supports this idea and we believe that it would lead to the adoption of more efficient solutions, including cloud computing, to the challenges faced by federal agencies. The TechAmerica Cloud Commission, which I was a member of, reached the same conclusion in 2011, recommending that "agencies should demonstrate flexibility in adapting procurement models to acquire cloud services and solutions. Congress and OMB should demonstrate flexibility in changing budget models to help agencies acquire cloud services and solutions." (*Cloud First, Cloud Fast: Recommendations for Innovation, Leadership and Job Creation*, TechAmerica Foundation, 2011.)

One area where CIOs should be given more authority and flexibility is with respect to spending models, specifically capital expenditures (CAPEX) versus operating expenditures (OPEX).

Given that much IT hardware and software has only a three-year lifecycle, we believe that agencies should be allowed to place capital funds into "Working Capital Funds" that preserve the funding for the agency to pay in multiple years for cloud computing services based on what they actually use. The current "use or lose" approach is a disincentive to saving money. Agencies should shift to paying only for what they use in OPEX, versus spending to stockpile servers, software, etc., because their budgets expire at the end of a fiscal year, in CAPEX. As the Software & Information Industry Association stated in its 2012 White Paper: "Cloud computing drives agencies away from purchasing IT in a way that requires capital expenditures and overhead, and toward an 'on demand' IT model that purchases IT services as it consumes them. Capital planning guidance must keep pace with this changing dynamic." (*Beyond the 25 Point Plan: A Roadmap to Implementing Cloud Computing and Reforming Federal IT*, Software & Information Industry Association, 2012.)

We agree and believe that FITARA could accelerate this change. We applaud the Committee for reporting a FITARA bill that includes language in Title III that establishes cloud service Working Capital Funds that "may preserve funding for cloud service transitions for a period not to exceed 5 years per appropriation."

Title II of the bill, on data center optimization, is also a crucial part of the legislation. In Section 203, we recommend including a direct link between the required plan for implementation of the Federal Data Center Optimization Initiative and OMB's Cloud First policy. As I described earlier in my testimony, data center optimization should not merely aim to reduce the number of federal data centers via the FDCCI. FITARA should clarify that using commercial cloud services is an equally valid way to comply with the data center consolidation mandates, because commercial service providers can make available more compute power and storage for a fraction of the cost based on what agencies actually use. Put another way, data center consolidation is a good start, but cloud computing fundamentally changes both the process and the output, thereby *optimizing* how government operates IT.

Thank you again for inviting me to testify today. I look forward to your questions.

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Committee on Oversight and Government Reform
Witness Disclosure Requirement – "Truth in Testimony"
Required by House Rule XI, Clause 2(g)(5)

Name: **Teresa Carlson**

1. Please list any federal grants or contracts (including subgrants or subcontracts) you have received since October 1, 2010. Include the source and amount of each grant or contract.

None.

2. Please list any entity you are testifying on behalf of and briefly describe your relationship with these entities.

I am testifying on behalf of Amazon Web Services, Inc. ("AWS"). I am Vice President, World Wide Sector at AWS.

3. Please list any federal grants or contracts (including subgrants or subcontracts) received since October 1, 2010, by the entity(ies) you listed above. Include the source and amount of each grant or contract.

AWS provides commercial cloud services to numerous federal customers through various direct and indirect channels. AWS's commercial cloud services are offered by value added resellers to various federal government customers under GSA IT Schedule 70 contracts as follows:

Reseller	GSA IT Schedule 70 Contract Number
Apptis, Inc.	GS-35F-0586V
Aquilent, Inc.	GS-35F-4729G
DLT Solutions, LLC	GS-35F-4543G

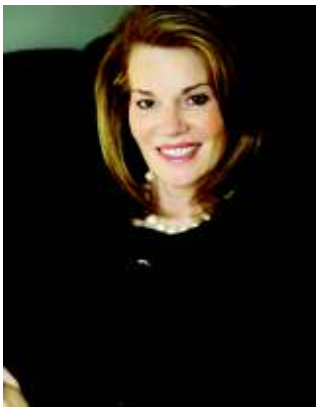
AWS's commercial cloud services are also offered by numerous AWS Partners to various U.S. Federal Government customers under other Government Wide Acquisition contracts and Agency ID/IQ contracts such as: NASA SEWP IV, NIH ECS 3, NIH CIO-SP3, Navy Seaport-e and the GSA IaaS BPA.

I certify that the above information is true and correct.

Signature: Teresa H. Carlson Date: **May 9, 2013**

B I O G R A P H Y

Teresa H. Carlson, VP World Wide Public Sector, Amazon Web Services



Currently the head of World Wide Public Sector, Teresa is responsible for strategy, operations, sales and business development for Amazon's Web Services and Cloud Computing business. She is charged with driving both revenue and partnership strategy across public sector in all geographies. Teresa also serves as the lead public policy advisor to the business for global public sector.

Teresa has more than 20 years' experience as a business executive driving innovation and change and producing successful business results. A highly respected leader in the information technology field, Teresa's customer focus has delivered exceptional value to her client while consistently exceeding her organization's business goals.

Teresa has earned a number of awards for her leadership, most recently receiving the 2013 FCW Federal 100 Eagle Award for her service to the Federal Government customer. She has received numerous other awards for her leadership, including being named to Washingtonian magazine's "100 Most Powerful Women" and honored as one of the "2013 Tech Titans" for contributing prominently to the growth of the Washington DC tech market.

Teresa was also named to FAST Company's 2010 list of one of the 12 top executives in its "Most Influential Women in Technology." Other awards include the 2010 "Outstanding Achievement in Industry" Government Initiatives Excellence Award from the Armed Forces Communications and Electronics Association; and the March of Dimes "Heroines in Technology Lifetime Achievement Award" in 2010. Teresa was also a Federal Computer Week "Fed 100" award winner in 2013 and 2009 for her efforts in support of the US Federal government.

Before joining Amazon, Teresa was Vice President of Federal Government business at Microsoft Corporation, where she defined the strategy and oversaw the execution of sales, contracting, pre-sales technical support, product marketing, customer satisfaction, and performance of the US Federal Government business worldwide.

The Federal business unit represented approximately $1.7B in revenue for Microsoft. She also held a variety of other positions at Microsoft including General Manager of the US Civilian Agencies and NGO's; Director of the US Federal Solutions Unit, responsible for the Federal solutions framework and the US Federal partner channel that consisted of more than 2500 Microsoft partners; and US Federal Director of Strategy and Operations.

Prior to joining Microsoft, Teresa was the World Wide Vice President of Marketing and Business Development for Lexign Incorporated (formerly Keyfile Corporation), a software company focused on secure, end-to-end business transactions. Upon acquisition Teresa was responsible for the overall strategy of the integration and world-wide launch of the newly merged companies.

Before moving into the information technology arena, Teresa spent nearly 15 years in the health care field, as a practitioner and consultant initially, then as a business manager and area vice-president, responsible for national accounts, marketing, and business development. During this time, she led customers through numerous transformations, including Joint Commission certifications and significant payment system changes.

Teresa has an undergraduate and Masters of Science degree in Communications and Speech and Language Pathology from Western Kentucky University. She holds a variety of certificates.

Teresa also serves in philanthropic and leadership roles to support her community, with a special emphasis on the military. This includes service as the Board Chairman of the American Red Cross in the National Capital Region, the Red Cross Tiffany Circle National Philanthropic Committee, NVTC Board, The Women's Center Board, Vice-Chair of the Public Sector Board of TechAmerica, The WolfTrap Foundation Board of Directors, and the USO of Metropolitan Washington Board of Directors. She was also appointed to a five year term as a member of the Board of Directors for Virginia Commonwealth University in 2012 by Governor McDonald. Here she serves as the Vice Chair of the Governance Committee.

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