TACKLING FEDERAL TELEWORK

SPECIAL REPORT

Pandemic Telework: A Catalyst for Innovation and Modernization

In March, as the COVID-19 threat grew and Federal agencies sprinted to enable telework for nearly all Federal employees, they grappled with numerous challenges. Among them were procuring large numbers of devices, ensuring information security, expanding network capacity, training employees, shifting to new communications methods, and securing funding for all of the above.

Within days in some cases, and within weeks in others, almost everyone began working from home. The effort represented not only a technological and cultural shift in how government work gets done, but also a catalyst for innovation. Many say the changes over the last six months would have taken years to accomplish under normal circumstances.

"People have realized that telework is acceptable, and they're productive doing it. That cultural shift would have taken years had it been left to the normal course of events," said State Department Principal Deputy CIO Michael Mestrovich. He estimated that State's three-month whirlwind of tech improvements in response to the pandemic advanced agency IT modernization by four to five years.

Flexibility and Creativity Made Telework Work

The approach to enabling large-scale telework varied from agency to agency. Agencies that had already enabled mobile work for large numbers of employees were in the best position to accelerate to full telework. Their main focus was on expanding network capabilities to handle increased traffic from outside agency firewalls.

"Expanding the data center infrastructure that manages virtual desktop applications was also an important focus," said Mahtab Emdadi, a Regional Sales Director at Dell Technologies who works with the State Department.

Agencies that were able to leverage existing technology investments were in a good position to pivot to full telework. For example, the Department of Energy had implemented systems over the last three years to enable 30 percent of employees to telework in a continuity of operations environment.

"To get to 80 percent [of employees teleworking], we started in mid-February. We had a pool of laptops that we use for travel, and the IT operations organization immediately started handing them out to make sure people could work from home," said Rocky Campione, CIO at the Department of Energy.

At the State Department, where telework had been considered an accommodation in the event of a long illness or similar event, few employees had laptops. However, the department had a virtual desktop environment that it quickly ramped up. Within three weeks, the department doubled its virtual desktop capacity from 5,000 to 10,000, and then tripled it with newly ordered equipment. State also upgraded its firewalls and internet circuits.

"The pandemic was also a stimulus for creative problem solving. One example is the FBI, which is developing a highly secure mobile device in its Enterprise Remote Access Mobile Systems unit," said Emdadi. Another is the Department of Homeland Security, which developed a derived alternative credential to enable logical access to the department network for new employees and contractors, as well as current employees whose personal identity verification cards expire while they are working from home.

"It doesn't do you any good to have all this great technology if you can't authenticate to the network – so that was a huge success story," said Beth Cappello, Deputy CIO at DHS.

Agencies Prepare to Enable Remote Work for the Long Haul

Now that agencies have settled into full telework mode, their focus has shifted from enablement to technology optimization and modernization.

> *"As we go forward and hot wash our capabilities for the next event ... we'll look back at the fundamentals: people, processes, technologies, and examine what our workforce needs to be successful in this posture," Cappello said.*

At the State Department, the pandemic was a catalyst to modernize the infrastructure supporting remote work. "Working with Dell, the department implemented software-defined, cloud-ready infrastructure with Dell EMC VxRail Hyperconverged Infrastructure, which integrates storage, compute, and virtualization in a single, turnkey appliance," said Emdadi. "The IT team gains tremendous efficiencies, because it doesn't have to integrate and manage solution components individually throughout the lifecycle."

At the Department of Energy, Campione asked, "How can we do it better?" He zeroed in on the department's virtual private cloud capabilities and requested funds in the IT supplemental budget to bolster them. "There are obviously

things that we can improve," he said. "We were very grateful for the support in the building, in the government, and on the Hill."

Energy continues to optimize its technology for remote work. "After the initial surge to get everyone online at home, we are focusing on tailoring the technology to meet the needs of specific user groups, such as creating digital personas based on individual profiles," said Matt Walker, a Regional Sales Director for Dell Technologies who works with Energy.

Best Practices and Lessons Learned Offer a Roadmap for Telework Enablement

Emdadi and Walker offer best practices and lessons learned from their work with Federal agencies in the pandemic response:

- Re-consider cloud/workload options given the expanded remote work environment. Some agencies are expanding their private cloud infrastructure to repatriate some workloads from public cloud providers.

"A hybrid cloud approach that leverages both public and private cloud together gives agencies the flexibility they want with the enhanced security they need. Providing support for multiple cloud environments is essential for digital transformation in government," Emdadi noted. "If agencies don't have a private cloud, the pandemic is a catalyst to create one."

- Plan, but be flexible. Many agencies need to manage both on-premises and off-premises users, Walker notes. "Taking that into consideration upfront when developing solutions will help agencies manage varied workforce needs in the future," he said.

- Leverage existing investments, but don't try to fit a square peg into a round hole. "A lot of existing investments can't provide the capabilities agencies need, and trying to mold them into what they want can create more pain," Emdadi said. "Agencies that have the greatest success are using the funding that comes with this event to start with a greenfield and build new capabilities that will move them forward."

- Interagency communication about what's working and what's not, procurement paths, use cases, and more is invaluable. "Getting that real-life perspective from agency counterparts is so important," Walker said. "You don't have to go it alone, and you don't have to recreate the wheel."

Pandemic Response Brings About Permanent Shift in Our Thinking

COVID-19 is an unprecedented crisis for our nation and the world. The collective response to it is a tremendous opportunity as well, government and industry executives agreed. For Federal telework, technology existed to enable remote productivity on a large scale prior to the pandemic, but funding did not and attitudes hadn't come around. All that has changed. Agencies that didn't have substantial modernization budgets have accessed new funding, and the last few months have shown that the business of government can continue unabated with a widely dispersed workforce. COVID-19 has been a forcing function that leapfrogged several generations of cultural and technological innovation.

"We've demonstrated, from my perspective, that we can continue business operations and be successful, efficient, and effective, in a remote work posture," Cappello said. "We are going to have a permanent shift in our thinking."

EXECUTIVE Q&A:

NVIDIA'S CHIP CARR ON EVOLVING THE TELEWORK ENVIRONMENT

MeriTalk recently sat down with Chip Carr, Senior Manager of Virtual GPU Technology at NVIDIA to discuss how Federal agencies have transitioned to telework environments while introducing new technologies, applications and collaboration tools – and what Carr sees going forward.

MeriTalk: What advice have you given agencies that need to expand or improve telework capabilities over the last few months?

Carr: The first advice NVIDIA gives to agencies is that they do not need to limit their VDI deployments to non-graphics users, because just about any application can be virtualized and just about any user can use a virtual machine (VM) and have a great experience working remotely by leveraging NVIDIA virtual GPU (vGPU) technology. Even though Federal leaders initially focused on VDI for providing basic office functionality, much more can be offered thanks to GPU-accelerated VMs, including access to video collaboration tools, high definition monitors, up to 8K, and multiple monitors versus just one. And, you can support higher-end use cases as well for engineers, analysts, and data scientists.

Desktops for these users have traditionally been very difficult to virtualize because they need GPUs. Once we introduced NVIDIA vGPU technology in 2013, these end users could now access their applications and data remotely, and we've continued to expand this functionality ever since.

MeriTalk: What do agencies need to do to expand or support telework moving forward?

Carr: There are two areas that agencies should focus on to prepare for the future of telework. First, employees are spending more time using video and collaboration tools, such as Webex and Zoom, and must have a good user experience to remain productive. NVIDIA testing has shown that running these applications in a CPU-only VDI environment can result in a poor experience which is almost unusable. Agencies can prepare themselves for the future – as applications become even more robust – by deploying a powerful VDI environment now. Second, agencies must expand support for engineers, analysts, and data scientists to also leverage the VDI environment, because with NVIDIA vGPU they can access applications in virtual workstations that are indistinguishable from their physical workstations.

MeriTalk: How have you worked through some of these challenges with agencies during this time as they try to figure out remote work?

Carr: *When we engage with a customer, NVIDIA always starts by understanding the problem so that we are in the best position to help solve the challenges.*

We take the time to understand the employee workflows and the types of data they use. And we work closely with the software development community, for example ESRI, to ensure our combined solution works well together – which in turn helps our customers. As we start

to understand the needs and consider the variables, we get a picture of the user profile. The team can then create an optimal user experience.

Videoconferencing is a key use case. Everyone working from home is using collaboration tools – Zoom, Skype, Microsoft Teams, WebEx. Seeing one another on camera is helpful – it helps us psychologically, it helps us connect, it helps us do our work. Those applications all benefit from GPU acceleration. A virtual desktop without GPU is going to struggle to provide a quality user experience because you need the GPU to handle the video stream. That is where vGPU comes in, delivering the user experience and performance employees expect.

When we start to talk about knowledge workers, you have to think about everything users are doing all day, and what they need. Good communication is critical to all functions of the mission. Users get bad video and choppy audio when the virtual machine is overloaded and can't process everything fast enough. Adding GPUs to the virtual desktop significantly improves video and audio performance because you free up the CPU resources. Other use cases include virtual workstations running applications like ArcGIS Pro or CATIA, for example. These applications would be pretty much unusable in a virtualized environment without a GPU. As we work through challenges

with customers – it all comes back to key questions: What are you doing? How do you do it? What apps do you use? Tell me about your data.

MeriTalk: What type of agencies have had success making the adjustment to full telework, or are close to it? Can you share some use case examples?

Carr: We have seen many examples of agencies who have made a successful adjustment to telework. Some were well positioned in advance, and levered vGPU technology early on, and some quickly adopted these strategies once the pandemic hit. This is across the DoD, civilian agencies, and Intelligence Community as well.

One of the biggest barriers for VDI is a poor user experience. Once people feel that they can't be productive working in a virtual machine, they don't want to use it. The types of agencies and departments that have had success are the ones that offer VDI with the user experience in mind. Providing desktop performance remotely without sacrifices, and making sure people can work efficiently and productively without frustrating delays or dropped frames can be a key to success.

Those with virtual desktops, especially VDI with vGPU, didn't miss a beat. Those with VDI just for use within their office environment tried to connect with a VPN, and had challenges. With a VPN connection, all computing is still done locally. Users pull data down to their laptop, but there are security risks. All data stored on the laptop is exposed to the home network, and to anyone who has access to that network.

With VDI, no data is stored locally. Everything sent across the network is a video stream. Organizations using VDI with vGPU were able keep their full team productive and secure, easily and quickly. As an example, one organization in the ship building industry needed to execute design reviews that involved very large files, 20-25GBs. Using vGPU and VMware technology, they continued reviews from home, seamlessly – impossible without the vGPU technology.

Consider it takes approximately 45 minutes to download a 20GB file through the VPN to a local laptop on a slow connection. And then, there are multiple copies of that data on laptops in homes. In the VDI with vGPU environment, users can open the same file in two minutes and the data stays in the data center. Users have the same compute resources as in the office – high-end CPUs, high-end GPUs, very fast RAM. They get a workstation-level experience over a 10MB connection at home. VDI with vGPUs is essential for speed and security for workers handling sensitive information in large files.

On the knowledge worker side, we worked with an agency who has thousands of concurrent users. In early 2019, they were unsure if knowledge workers needed GPUs. But, as we dug into how they worked, many of these users would regularly embed video into their PowerPoint presentations to communicate about their missions. We did a lot of testing and considered video playback and conferencing needs. The vGPUs made a big difference. With this environment in place, the agency easily shifted to a mass telework when the pandemic hit. They can maintain that vital level of communication across their teams and departments.

MeriTalk: What's next for Federal telework?

Carr: Federal remote work is not going away anytime soon and will continue to expand. Applications are going to continue to get more graphically and compute intensive and more complex, the data is going to continue to get bigger, and resolutions will continue to get smaller and smaller so that images become higher quality. For example, iPhone pixel resolutions have dramatically increased over just a few years. The iPhone 5 was 1.2 megapixels and the iPhone 11 is a 12 megapixel camera and it can do video at 4K. That's a 10x increase in the last 7 years. People will continue to use more video, whether for training, collaboration, or as a part of their daily work. Take for example, PowerPoint presentations, the application itself has changed dramatically just over the past few years. Previously presentations would consist of mostly text and maybe some simple, basic images. But now the capabilities have increased, people leverage more video, more sophisticated imagery, and add audio.

That cultural change has happened, so telework is here to stay. We are going to see significantly increased telework, even once the pandemic is finally past. The future will be a mix of home and traditional office, so the two need to seamlessly support moving between them without impediment to productivity.

> *VDI with NVIDIA vGPU supports this so they can work from home or the office with an end user experience of equal performance and access. Employees are productive and happy at home, and we want employees to have that flexibility.*

Regardless of what they're doing and where they're working, employees will get the same performance and have access to the same applications that they did when they were working in the office. The way they can achieve this is with NVIDIA vGPU technology – this enables their data centers to power the workloads of the future.

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