

# MODERNIZE WITHOUT DISRUPTION

**A Comprehensive, Low-risk Path  
to App Modernization for the  
Government of Canada**

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Government of Canada (GC) IT operations are at a crossroads. Government data centres struggle to maintain services on aging infrastructures while demand for services to be delivered over the Internet increases. Shrinking budgets add to the challenge as legacy computing equipment becomes more expensive to operate, just to maintain the status quo. According to GC's *Report on the State of Aging IT Across the Government of Canada*: "Although older systems are functioning well, many consist of legacy applications based on dated software, relying on technical expertise that is increasingly scarce and supported by old infrastructure that is becoming increasingly more expensive to operate. As a result, these systems are considered to be at risk of not being able to provide sustained, robust and secure availability."

Legacy data centres can be brittle, inefficient and cumbersome to upgrade and scale to meet rising demand and user expectations. In addition, equipment leases for some data centres are about to expire, leaving IT leaders with a compressed timeline for modernization.

Legacy software development processes are slow and unresponsive compared to modern processes. Large monolithic applications can take years to develop and are time-consuming to change or upgrade. Modernized processes shorten development cycle times and allow developers to innovate existing applications quickly and without disruption.



## IT Leaders are Concerned About the Path to Modernization

While IT executives see the benefits of modernization, the path to a successful modernization program isn't always obvious. Many IT leaders see the app modernization marketplace as confusing, leading to a lack of understanding of the fundamentals that are critical to embarking on this journey. IT leaders struggle with several concerns:

- How to start the modernization journey, which technologies to consider and why and which use cases are best to start the journey with.
- The level and depth of change management involved. For example, how does app modernization affect software development operations?
- How to modernize without disrupting current services and operations.
- Data sovereignty and whether a public cloud solution meets requirements.

In addition, the COVID-19 pandemic has raised concerns that many government services require face-to-face interaction. Moving forward, the ability to offer essential services online will be considered a priority.

Government IT executives are also aware that many modernization programs have not delivered on their promise, sometimes creating more problems than they solve and spending beyond the budget. IT leaders who aren't comfortable with the idea of moving forward with a modernization program are not alone. Yet, the mandate for modernization is clear even if the path to success is not. Successful programs have generally involved a partnership with a cloud infrastructure provider, an app modernization specialist, a cybersecurity partner and a company that can fill the skills gap and train today's IT specialists in new processes and technologies, and shepherd the modernization process through to a successful completion.



## Why modernize?

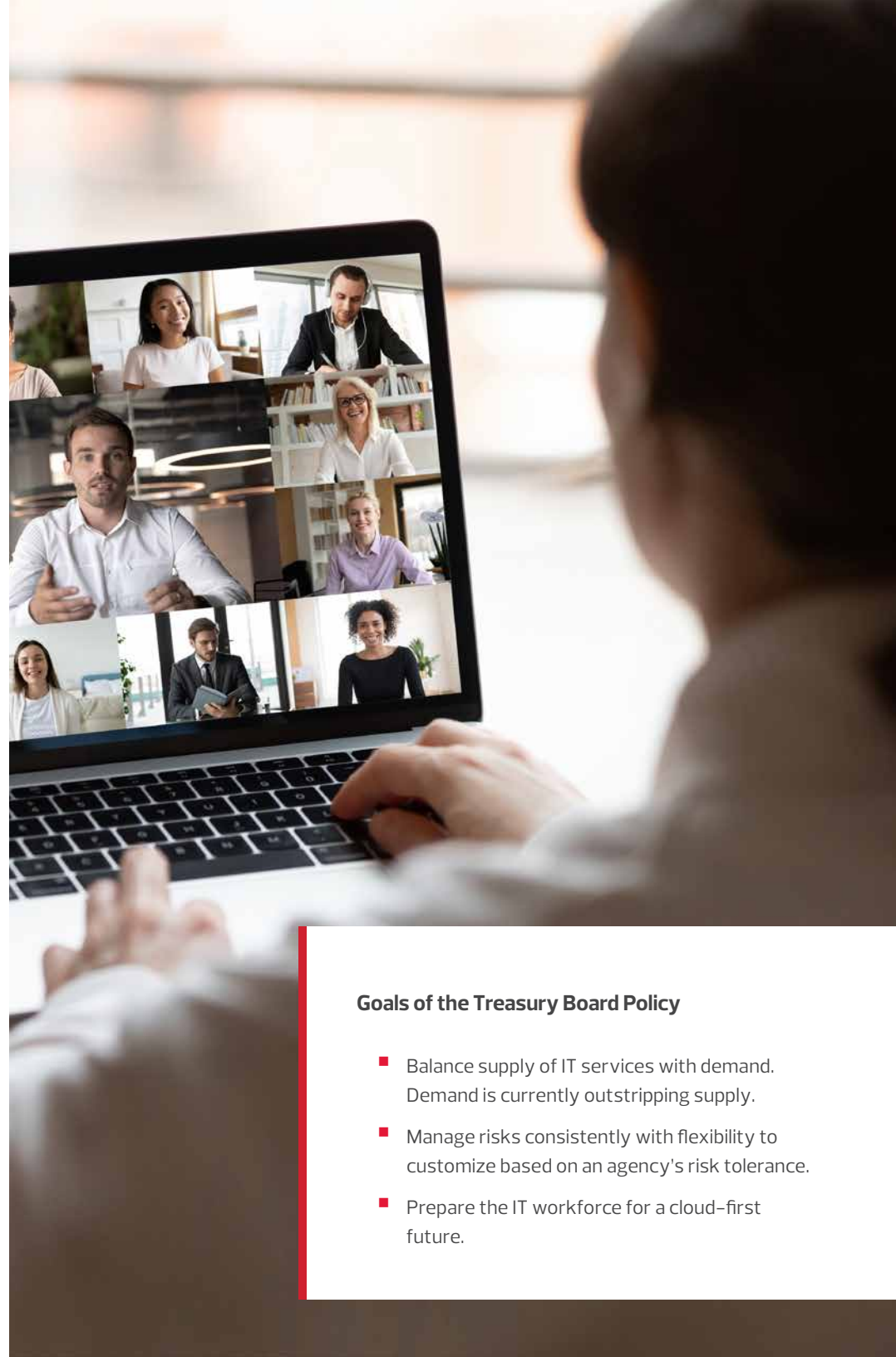
### The motivations to modernize are many:

- Canadian citizens are increasingly expecting government services to be delivered over the Internet in the same or similar ways they access commercial services.
- Modernization promises to free up capital, reduce spending on infrastructure and cut costs for application development.
- Modernization streamlines software development processes and enables incremental innovation.
- Modernization can also free up data centre operations personnel for other, more high-value work.
- The Treasury Board has a cloud-first policy for app modernization with a goal to migrate 18,000 GC apps to the public cloud for simplicity, efficiency, cost reduction and to improve services.

### The public cloud has several advantages for modern IT operations, including:

- Simplified, pay-as-you-use compute, storage and network infrastructure that's more reliable at a lower cost and that automatically scales up or down based on demand.
- Simplified and accelerated DevOps with the ability to migrate apps as microservices to streamline development, cut cycle time and allow developers to innovate apps incrementally over time without disrupting operations.
- Simplified security, where the cloud provider secures your environment and developers build security into apps, rather than apply security after the fact.

In addition, by modernizing according to Treasury Board and Shared Services standards, departments and agencies can get ahead of shadow modernization efforts, where the opportunity cost of not delivering a project is much higher than the cost of the cloud services. For example, cloud credits earned from using Microsoft Office 365 are very tempting, as is the ability to simply pay for cloud services with a credit card. Unfortunately, these programs may not meet data sovereignty or GC security requirements in the cloud.



### Goals of the Treasury Board Policy

- Balance supply of IT services with demand. Demand is currently outstripping supply.
- Manage risks consistently with flexibility to customize based on an agency's risk tolerance.
- Prepare the IT workforce for a cloud-first future.

## A Modernization Partnership Designed Specifically for the Government of Canada

Not all modernization programs are created equal. While the industry press has covered many successful transformations, the reality is that many are fraught with problems, leading to frustrations that IT leaders don't need. Most organizations don't have in-house expertise to architect and build out a modernization effort, nor can they allocate the necessary levels of resources to modernize. Because of the complexity of modernization, no one tech company can deliver a full-stack solution with proven technologies.

In addition, Canadian governments may be hard pressed to find a partnership solution that is 100 percent Canadian, using Canadian citizens and companies to develop a full solution.

Seeing this pressing need in the market, CDW has assembled a partnership of Canadian technology companies designed specifically to help GC data centres modernize without disruption. Each partner specializes in a key piece of the app migration process and each of the partners has significant experience working with each other and with the federal government.

### The partners are:

- **CDW** for overall solution architecture and managed services
- **VMware Tanzu** and **Pivotal Labs** for cloud migration and skills training
- **Palo Alto Networks** for security
- **AWS** and **Microsoft Azure** for data-sovereign compute, storage and networking infrastructure



**Features of the partnership include:**

- A low-risk modernization plan designed specifically for GC data centres to comply with Treasury Board and Shared Services standards.
- Companies with extensive experience with infrastructure and app modernization.
- Companies that know GC IT culture and have extensive experience developing technology solutions for Canadian governments.
- A Canadian workforce with necessary security clearances.
- Solutions that ensure data sovereignty.

**Regardless of your chosen path to modernization, CDW recommends that GC IT leaders consider:**

- Simplifying the beginning of the journey by migrating to the cloud using familiar technologies. As much as possible, IT leaders should consider a modernization path that leverages existing investments in software platforms to contain costs and allow IT professionals to continue to work with familiar technologies.
- Simplifying with fewer changes at the back end, which will help deliver better results in migration success and less retraining.
- Finding resources experienced in the change management aspects of modernization and to address the skills gap in modernization.
- Using partners with experience in modernization and experience with GC technology and culture to develop a customized path to modernization.







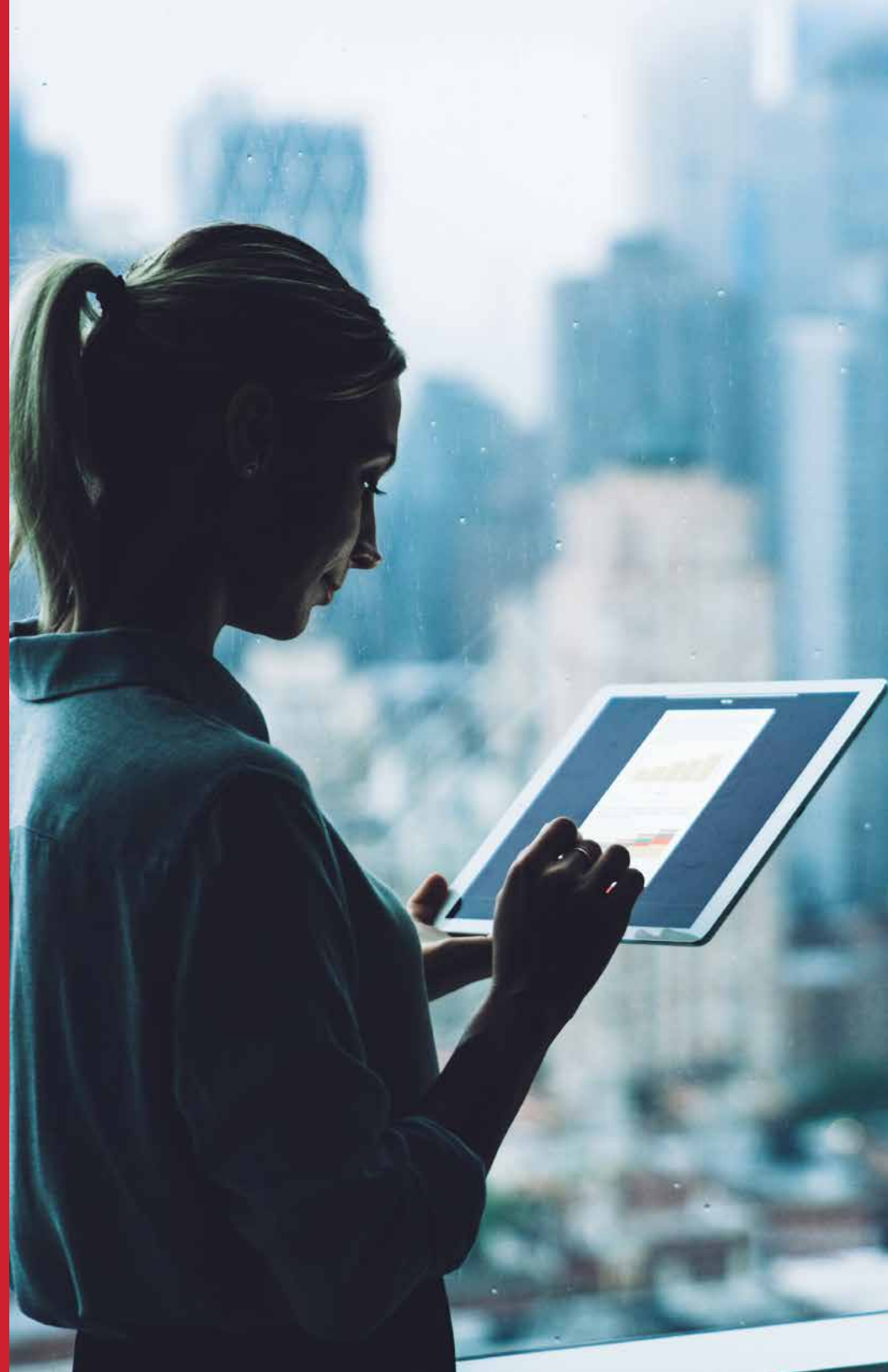
## CDW to Develop a Customized Path to Modernization

**Key benefit:** CDW works in a consulting role to develop a holistic path to modernization. CDW ties the partnership together to deliver a platform as a service (PaaS)--a platform for innovation--rather than raw infrastructure. CDW solutions cover the entire stack of services to build out the platform from top to bottom.

CDW has deep experience developing high-value solutions for Canadian federal, provincial and municipal governments, and has ongoing partnerships with VMware Tanzu, Palo Alto Networks, and Canada's leading cloud providers. CDW's solution architects and delivery teams are experts on VMware and Palo Alto Networks solutions.

**With a deep pool of technology professionals with secret clearances, CDW is positioned for compliance with governmental policies and regulations at nearly any level. CDW helps government IT departments:**

- **Design** modernization programs that help GC data centres accelerate cloud adoption with a certified team that can evaluate your readiness and build a customized path to app modernization.
- **Orchestrate** cloud migrations, integrate processes and applications and test them post-migration.
- **Manage** cloud services to give you more time to focus on business outcomes, not maintenance.



## VMware Tanzu for App Migration and Modernization

**Key benefit:** VMware Tanzu provides consistency with compute, storage and networking across internal data centres and the cloud for business continuity and app modernization, with the ability to help governments build out a hybrid cloud strategy that seamlessly integrates cloud and on-premises footprints.

VMware Tanzu enables GC data centres to build, run and manage modern applications and infrastructure and can help government data centres build a customized path to app modernization.

The VMware Tanzu portfolio offers full-stack modernization, enabling you to transform your teams and applications while simplifying operations of your software across the cloud and on-premises. Around 80 percent of federal government data centres already use VMware to virtualize workloads on premises. VMware also runs in the cloud, providing a path to modernization without disruption.

VMware Tanzu can help government customers decide whether to containerize existing workloads to run in the cloud for quick gains in manageability, or to re-architect and rewrite existing mission-critical software to be continuously delivered and resilient.

To fill the skills gap, VMware Tanzu's Pivotal Labs delivers critical education for your developers on the methods, software and tools that drive app modernization. Pivotal Labs provides guidance and training on modern software development, CI/CD tooling, how to run modern platforms and how to develop modernized apps.

### VMware Tanzu can help you:

- **Transform applications and infrastructure** in a way that's right for you, at your pace.
- **Help modernize the applications** that matter most and automate the path to production.
- **Help establish a consistent, unified operating model** for virtual machines and containers across your data centre and the cloud.



## Palo Alto Networks for Security in the Cloud

**Key benefit:** Palo Alto Networks provides consistency in security across on-premises and cloud environments, allowing developers to continue to use familiar tools to secure sensitive government data.

Many GC data centres are already using Palo Alto Networks to secure their on-premises data. By using Palo Alto Networks' Prisma Cloud Compute, all of your current policies, compliance and security features are directly transferrable to the cloud. Securing access to apps and services in the cloud will be similar to how you secure your environments today.

### Key features of Prisma Cloud Compute include:

Prioritize risks contextually in cloud-native environments across your entire infrastructure and throughout the software lifecycle, including real time connectivity graphs with runtime threat data.

- **Automate security for speed and ability** by enabling developers to deploy as quickly as possible to speed time to market and improve security outcomes.
- **Embrace any cloud-native technology you prefer** to future-proof infrastructure decisions.

## Simplify Your Path to Modernization by Leveraging Familiar Tools and Technologies

You don't need to blaze your own trail to go to the cloud. The partnership is designed for GC data centres to protect their investments in current technologies like VMware and Palo Alto Networks. That's because both companies continuously update their technologies to work seamlessly across cloud and on-premises environments. Much of the skills and knowledge you have today are transferrable to a modernized infrastructure.

Leveraging familiar tools and technologies help simplify the journey.





### Simplify Migration

While the Treasury Board policy is cloud-first, it's not cloud-only. So in many cases, departments and agencies will not do a 100 percent cloud migration, but are likely to retain some on-premises infrastructure for specific needs. That's why the partnership is supporting technologies that are portable across platforms and allow you to centrally manage a hybrid infrastructure along with the security. Keeping these environments consistent simplifies the migration to reduce risk during the modernization journey.

**Depending on the situation, there are at least a few ways to approach app modernization.**

- **Migrate workloads gradually:** For example, IT professionals can identify workloads that can be tested in the cloud and the partnership can help design a proof of concept(PoC) for those workloads. Assuming success in the PoC, the partnership can create a customized plan to continue the migration.
- **Forklift all workloads** to the cloud to gain performance improvements on a modernized platform and modernize apps gradually as IT practitioners get skilled up in the process.
- **Modernize in flight** by assessing everything and modernize in a production line to put legacy technology behind you. This strategy assumes that the skills are in place for success and may not be the most pragmatic approach, as there may be risks to business continuity.

The beauty of using VMware for consistency across platforms is the ability to assess and maintain application dependencies. VMware Tanzu has automated this process to quickly assess which applications are running in which environments and which ones are passing information to each other.

### Simplify Infrastructure

One of the biggest benefits of app modernization is the opportunity to outsource all or part of your compute, storage and networking to a public cloud provider. This eliminates the need to buy, install, configure and run hardware on-premises and can provide a huge cost savings, with the possibility of minimizing capital investments for hardware. By outsourcing infrastructure, you pay only for what you use and you don't need to be concerned about capacity. Cloud providers scale your infrastructure in the background, up or down, to meet demand for your online services.

Outsourcing infrastructure also helps developers focus on application development rather than provisioning infrastructure for their projects. In addition, with infrastructure management outsourced to experts, IT leaders can focus their workforce on areas that deliver more value to the organization.

## Simplify Data Sovereignty

One of the big risks of moving data into the cloud is ensuring data sovereignty, which is imperative for GC IT operations. If you're simply using a credit card to buy cloud services without regard to controls for data sovereignty, you may be putting sensitive government data at risk. A cloud solution for GC must include a guarantee for data sovereignty. For example, putting government data into the cloud introduces the possibility that data could be moved outside the country, even temporarily, as part of a cloud provider's process such as load balancing.

From cloud providers' perspective, ensuring data protection for governments is not much different than ring-fencing data for similar concerns that private sector companies must follow to stay in compliance with legislation and regulations. CDW works closely with two cloud providers, Amazon Web Services (AWS) and Microsoft Azure, to ensure a cloud environment where data sovereignty is guaranteed.

For a deeper dive into data sovereignty with Microsoft Azure, read the white paper, *Enabling Data Residency and Data Protection in Microsoft Azure Regions*. AWS also addresses data sovereignty in its white paper, *Addressing Data Residency with AWS*.

## Simplify Security for Consistency and Speed

Many government IT leaders are rightfully concerned about security in the cloud. If it's a public cloud, how do you secure private data?

According to the GC white paper, *Data Sovereignty and Public Cloud*, "The Treasury Board of Canada Secretariat (TBS), in consultation with key departments, has determined that a commercial public cloud can, under certain conditions, offer sufficient protections for data up to and including the Protected B level."

Cloud providers are responsible for securing the overall cloud presence from unauthorized access using a zero-trust model where permissions are turned off by default. AWS and Microsoft Azure have earned internationally recognized infrastructure security certifications and offer robust security features that would be difficult for any one organization to match.



## How Microservices Work

Modern applications are developed and delivered as microservices. For example, when scheduling a ride with Uber, customers use a scheduling app (microservice). Uber drivers use a separate app to manage their schedules. If the company wants to update or rewrite the customer scheduling app, it can do so without impacting the drivers' app. Similarly, the passport application process can be separated into pieces to enable innovation.

Applicants can use one app to manage their end of the application process and government employees can have one or several apps to process the passport application through its required steps. In this way, modernization helps the government future proof for new laws, regulations or trends that prompt a need for an app update.





For IT organizations, the responsibility is to secure access to apps and data in and out of the cloud and within the cloud.

Traditionally, security has been a slow process. After a new application is written, or changes are made to the environment, security is applied after the fact, often in a back and forth process between developers and security experts that can take weeks or months.

Palo Alto Networks is focused on supporting the VMware Tanzu stack through its product, Prisma Cloud Compute, which automates security processes, integrates them into the DevOps process, helps establish a strong security posture and provides insight into the security and compliance of cloud resources.

In a modernized environment, security is written into the code during development. Before an app goes into production, developers can submit an image to Prisma Cloud Compute via API, which automates the process of finding vulnerabilities or misconfigurations. Once you know what you have, where you have it and how secure it is, you can build and enforce customizable governance. This instant feedback streamlines the security process and applying security after the fact is no longer a process bottleneck. Essentially, developers validate security as they build.

As environments evolve, automated processes from Prisma Cloud Compute adapt and update security dynamically to help departments stay compliant throughout the entire application lifecycle and across hybrid on-premises and cloud environments.



### **Simplify Software Development for Agility**

A primary barrier to innovation in legacy systems is the inability to adapt to change. Updating or adding functionality to meet the changing needs and expectations of constituents, or to account for new laws and regulations, is difficult, if not impossible in many cases. These systems are always in use and can't be taken offline for improvements without disrupting services.

Moving from a monolithic workload-based IT strategy to containerized apps opens the opportunity to break legacy systems into manageable "microservices," which are connected by APIs. Essentially, you have a web of small apps delivering big services giving developers the ability to innovate in smaller pieces without impacting your services and user base.

Modernized DevOps procedures allow organizations to roll out app updates incrementally. One technique to deploy apps from test to production is the "blue green" application release model, where developers innovate one microservice without taking the whole system down. The new "green" version of the app is gradually rolled into production to replace the old "blue" version. Once the green version is fully deployed, the blue version can be sunset or used as a fallback if issues arise with the green version, or be used as a template for further innovation. This allows IT departments to make small changes to online services without taking down an entire system.



## The App Modernization Journey

App modernization gives IT departments the ability to quickly scale applications to meet demand from coast to coast. The CDW partnership helps GC agencies and departments prioritize apps for modernization with a customized roadmap for app modernization, starting with some basic criteria.

- Newer applications with APIs are generally easiest to migrate.
- Older applications that require in-depth work to modernize can be prioritized for migration based on criticality and complexity.
- Some older applications can sunset or be completely rewritten.

Another way to look at the app modernization journey is the “6 Rs” approach:

- 1. Repurchase**, or change the licensing scheme from on-premises to the cloud for existing applications that are also available as a cloud solution.
- 2. Rehost**, otherwise called “lift and shift,” moving applications from on-premises to the cloud without modification, for example, shifting on-premises VMs to the cloud.
- 3. Replatform**, or modify existing applications to work in the cloud (lift, tinker and shift).
- 4. Refactor** or re-architect to completely overhaul an application to adapt it to the cloud.
- 5. Retire** applications that are redundant or can be sunset.
- 6. Retain** critical on-premises applications that don't port well to the cloud, won't get a performance improvement in the cloud, that run on unsupported operating systems, or are required to be on-premises for regulatory reasons.



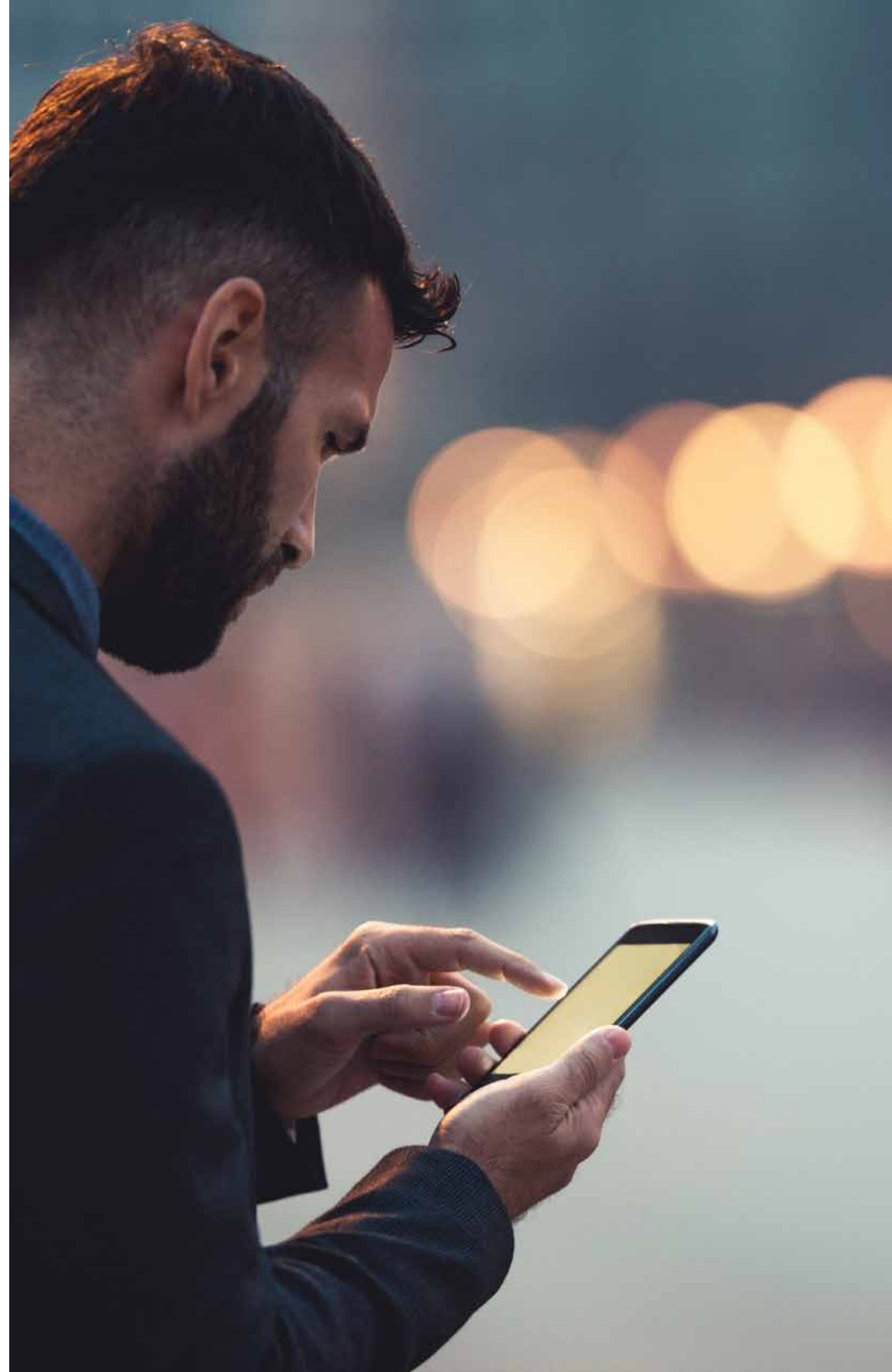
## Change Management for Modernized DevOps

The app modernization process provides IT departments with the ability to transition from a culture of writing and running monolithic systems to designing interconnected microservices, where large-scale services are developed and delivered in pieces, tied together with APIs.

While this sounds great on paper, the reality of managing an internal culture shift is not something that IT leaders are prepared to organize, given that they're already running a complex business. And, a DIY modernization program can stall for lack of knowledgeable resources.

Modernizing internal processes for innovation is a big step and for success, requires outside expertise with experience in change management in complex IT environments. A key goal of the partnership is to help organizations modernize without disruption. Change management is included throughout the modernization process, with each partner playing a critical role.

One partnership strategy for change management is to modernize incrementally so developers can gradually understand the modernized environment and its processes. Specifically for DevOps, the partnership is supported by VMware Tanzu and Pivotal Labs, which have been through this process many times with government and commercial customers and have provided the education and training necessary to build success into modernization programs.





## Migrating to Containers

The most common method to scale applications is containerization, with open-source Kubernetes being the de facto industry standard for container orchestration.

### Benefits of containers include:

**On demand scaling:** Containers are designed to automatically scale up to meet peaks in demand and scale back as demand ebbs.

**Efficiency:** A container encapsulates a copy of the app and only the binaries and libraries it needs to run, so it's compact and resource friendly. Containers open the possibility of lowering operating costs by using less capacity while they're running. And when demand slows, containers vanish, freeing up capacity. For example, if you traditionally have low demand at night or during certain seasons, you don't need to operate unnecessary capacity to keep the app available.

**Agility:** Containers provide the ability to iterate on applications quickly, so you can go from idea to delivery much faster.

**Security:** Containerized solutions tend to be more secure because of the zero-trust model, where developers open permissions for apps to communicate with each other in the code, as opposed to a traditional workload where every port is open for the most part.

VMware Tanzu provides the platform for DevOps modernization along with expertise in migration and training for your workforce.

For more information on containers and how they compare with VMs, [see this resource from VMware Tanzu.](#)



## Modernize with Confidence

Modernization isn't necessarily easy. There's a lot to consider and even with a strong partnership behind you, there will be bumps in the road. At this point, it's not really a question of if to modernize, or perhaps even when, but how and how to build success into your modernization program. With the right technologies and right services to support this very important, very large change in how IT services are developed and delivered, GC departments and agencies can modernize with confidence, compliance and sanity.

**If you're curious about the modernization solutions at your organization or would like to learn more, contact our CDW solution and service experts at 800.972.3922 or visit [CDW.ca](https://www.cdw.ca).**

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