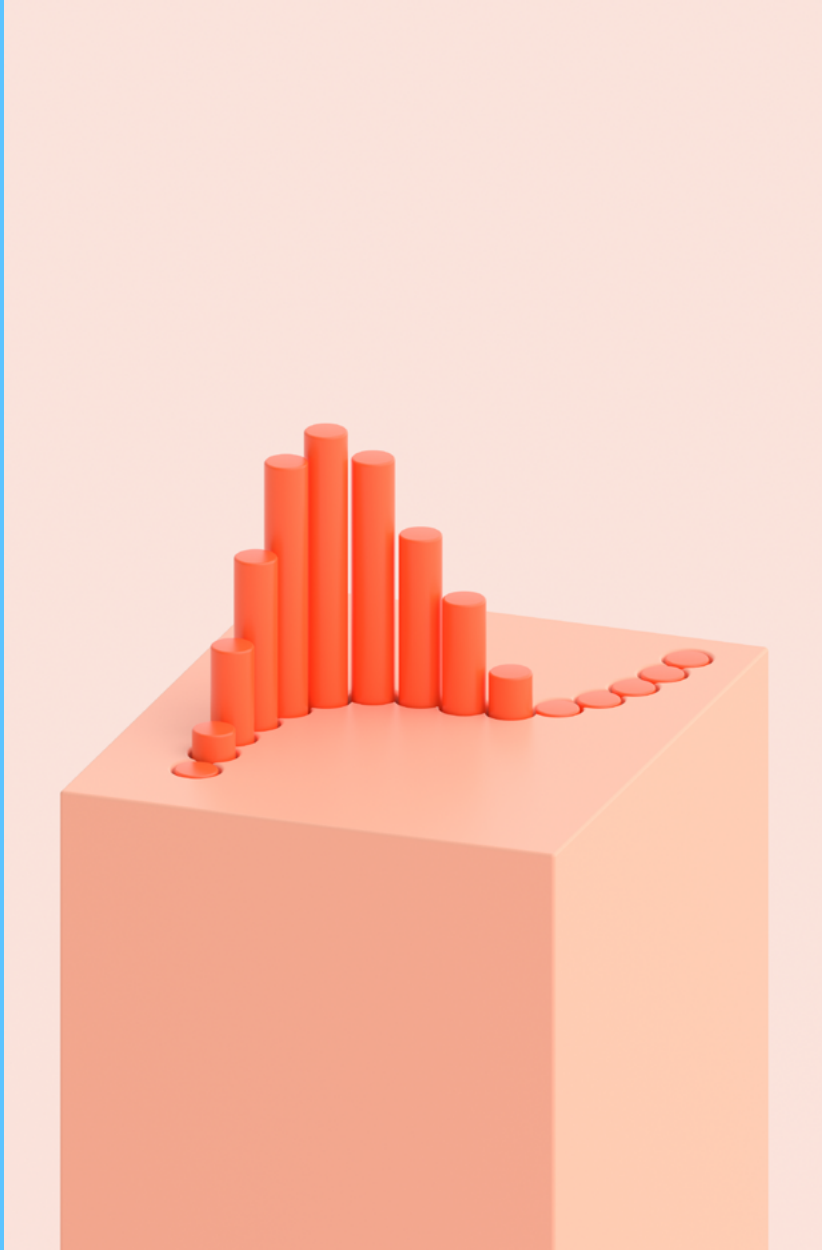
SOLUTION BRIEF

Data-driven government

A guide to digital transformation in public sector



NetApp

Introduction

Digital initiatives across government provide unprecedented opportunities for increased efficiency and innovation. The cost reduction and enhanced customer experience that derive from streamlining citizen interactions are coupled with the promise of better cross-departmental collaboration. However, the challenges of enormous data growth, data sharing, legacy systems integration and information security need to be resolved to enable the full benefit of these initiatives to be realised.

Throughout the public sector, digital initiatives and "channel shift" offer the potential to both reduce transaction costs and improve the availability and quality of services. However, it is recognised that digital transformation is more than simply moving existing services online. It requires major redesign of existing processes and systems which place greater demands on existing IT systems and may be at odds with the need to reduce operational budgets and minimise staff costs.

This challenge is compounded by the tremendous pace of change of technology. It is said that we are currently in the midst of the Fourth Industrial Revolution and that it will prove to be of a scale, speed and complexity that is unprecedented. It is characterised by a combination of technologies such as artificial intelligence, Internet of Things (IoT) and robotics and will disrupt nearly every industry – including government.

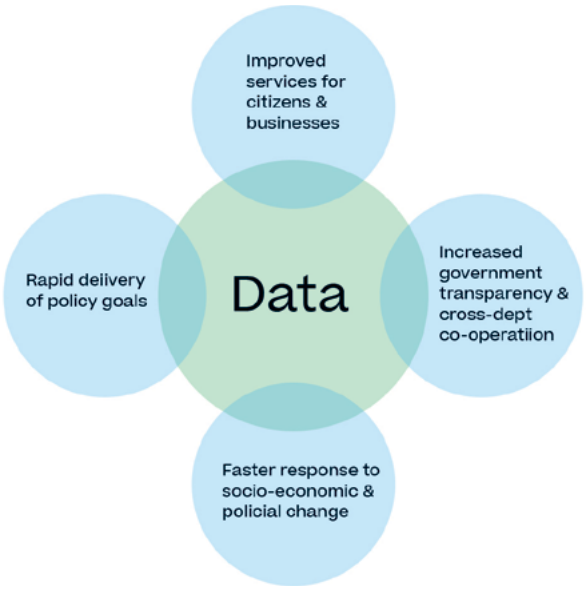
Yet, this revolution comes at a time when many agencies are undergoing major transformation programmes to modernise legacy IT systems, exit large-scale outsourcing contracts and/or re-host or re-architect their core applications. Prompted by the government's "cloud first" strategy, many are exploiting the scale, flexibility and depth of the public cloud to accelerate this change.

However, it is becoming increasingly evident that government fears becoming over dependent and "locked-in" to the major public cloud vendors. The likes of AWS, Microsoft Azure and Google undeniable offer an exceptionally rich and diverse set of services. However, their complex billing mechanisms, lack of transparency and proprietary tools can quickly lead to unexpected costs and a perceived lack of choice – compounded by some smaller locally-based service providers exiting the market in recent months.

As a result, the adoption of a "hybrid cloud" strategy is emerging as the preferred deployment model for many public sector bodies. This is where existing legacy IT systems (whether owned/operated or outsourced) are supplemented by specific applications or services delivered in the cloud. Indeed, this approach has been recognised by Crown Commercial Services, who have jointly published the "Cloud Guide" jointly with Government Digital Service (GDS) to update the "cloud first" guidance which has been in place since 2013.

The growing importance of data

Whichever deployment method is adopted, data is the strategic asset which must be securely stored, yet made available to deliver the much sought-after inter and intra-agency sharing and collaboration. This is evidenced by the Department for Digital, Culture, Media & Sports (DCMS) establishing the National Data Strategy and the appointment of Chief Data Officers in major organisations.

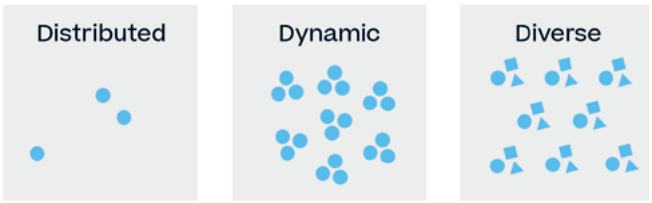


Leaders are under enormous pressure to harness today's volume of data and apply it to create new value across the entire organisation – all within limited skills and budgets – and whilst preserving the trust of citizens. It is recognised that digital transformation in most cases requires IT transformation. Consequently, IT leaders must

embrace new technologies and capabilities in order to place data at the heart of everything. This requires organisations to recognise the new realities that mean data and resources increasingly live across a complex ecosystems of in-house data centres, private and public clouds.

The risk of a hybrid cloud model is the potential of creating “islands of data” stored on different platforms in different locations with different standards. This leads to greater levels of security risk and the potential for duplication of information with an inability to exploit the data for analysis and further innovation.

To be data-driven, you have to understand and adapt to the changing nature of data. Data is increasingly ...



For Government CIOs, managing data in a hybrid cloud environment that has evolved into incompatible data silos brings significant challenges. A decision to move data to a cloud service provider does not divorce themselves of responsibility for that data. Whilst applications are largely “stateless” and capable of being deployed rapidly in different environments, data is “stateful” and often served from specific platforms or data stores.

All of these properties of data are dynamic, which makes it necessary to adopt a comprehensive data lifecycle management policy. The common challenges afflicting organisations trying to do this across a hybrid cloud are as follows:

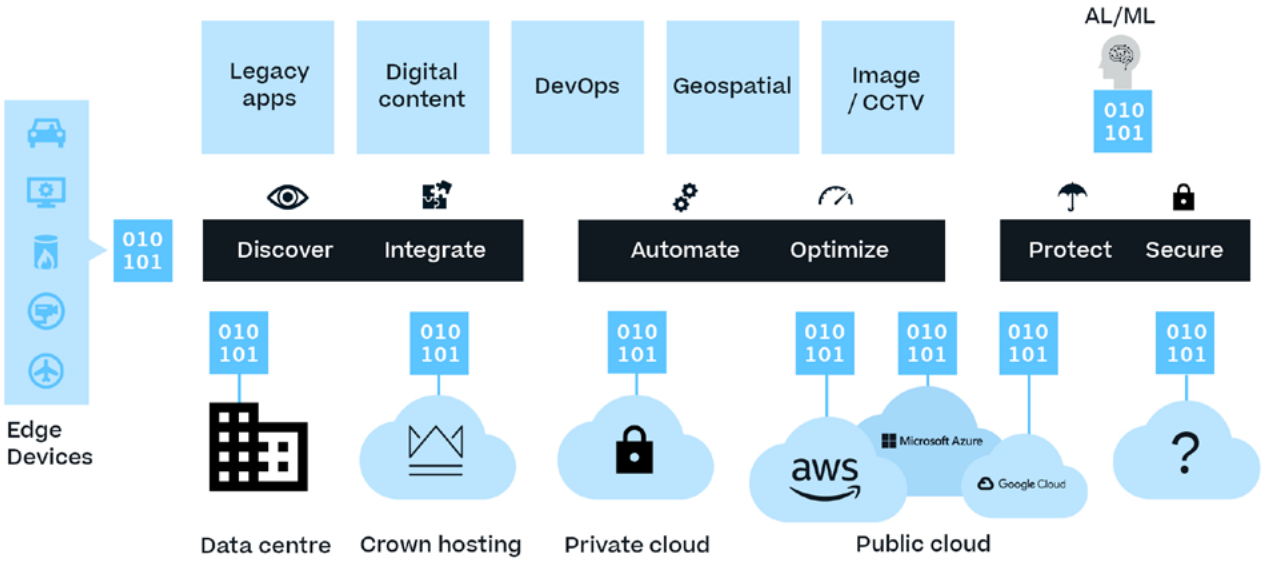
- Inability to move data. After an organisation’s data has been stored in a particular cloud, it is often difficult and costly to move it to a different provider;
- Inconsistent data management and standards. Each environment has a different set of tools and management software that make it difficult to apply consistent policies to data. IT staff must learn how to use all of these tools and applications to operate effectively;
- Limited choice. New technologies and services that do not integrate with existing environments are difficult to adopt. As a result, organisations have limited technology choices and an inability to exploit new technologies and capabilities;
- Lack of control. Data is a business-critical asset for all public sectors organisations. IT must be the stewards of that data no matter where it is. Storing that data in a cloud where there is little visibility into how it is protected and governed can introduce unacceptable risk.

To overcome these problems, NetApp is at the forefront of delivering platforms, applications and services to allow customers to create their unique data fabric - a combination of technology and strategy that brings together resources across a hybrid cloud environment in order to give organisations a unified way to control their data; providing consistent data stewardship and the ability to move data between cloud providers as required. By capitalising on the resources of multiple cloud providers, government entities can leverage the elastic and dynamic computing resources available in the cloud whilst still maintaining complete control over their business-critical information assets.

A data fabric accelerates data-driven digital transformation by simplifying the integration and orchestration of data services across the organisation’s choice of clouds. This reduces complexity and permits data and applications to be deployed in the right place at the right time.

NetApp is the leader in hybrid cloud data services. We help customers build and manage their data fabric with capabilities to:

- Discover resources and understand the current state of the data, applications, systems and services;
- Integrate disparate data services so that they can be managed in a coherent way;
- Automate operations and define rules so that the fabric can take care of itself;
- Optimise the fabric over time by monitoring and reacting to changes over time;
- Protect data through effective backup and recovery;
- Secure data everywhere to simplify compliance, preserve integrity and control access.



By building a data fabric with NetApp, IT leaders in government support key priorities in the following ways:

- Accelerates digital transformation initiatives by increasing the velocity of test/development activities to reduce the "time-to-market" for new services;
- Accelerates the adoption of a "cloud first" policy without increasing data governance and security risks;
- Enhances organisational agility by allowing cloud services to be turned on/off in response to changing business demands and/or changes in economics and by delivering the agility/elasticity of the cloud but with the control and management of an internal private cloud;
- Reduces lifecycle data management costs by utilising a common data management platform from inception through to archive; high-performance strategic applications through to large scale information repositories;
- Reduces IT staff costs by utilising a single data management tool across clouds, leveraging the significant pool of existing NetApp experience within UK public sector entities;
- Supports austerity measures by reducing the costs associated with data storage.

Avoiding cloud lock-in

As cloud providers aggressively compete for business, the headline cost for services continues to fall. However, the longer-term cost for deploying close-based production systems may be prohibitively high which may render some services unaffordable in the long term. A sustainable cloud strategy needs to be underpinned by a mechanism for moving data between cloud providers or to on-premise platforms quickly and cost-effectively to exploit changing economics over time.

Whilst it is true to say that the public cloud is attractive for certain use cases such as test/development, backup and archive; it is not necessarily the most cost-effective mechanism for deployment of production systems. It is also evident that some providers are offering attractive commercial proposals to lure customers in; only to increase prices subsequently. This means that it is necessary to monitor costs on an on-going basis to understand if services can be delivered more cost-effectively elsewhere or via an in-house solution.

One of the most prohibitive costs of many cloud services are the charges associated with the transfer of data. Whilst the headline costs for the storage of data "at rest" may be attractive, there are costs associated with accessing data or transferring it across the network. This means that there may be significant exit costs attributed to moving data from

one provider to another that may also be time-consuming and have an impact on the availability of production systems.

Building a data fabric with NetApp provides a number of solutions to help obviate this issue.

Firstly, it provides the opportunity to exploit computing resources in the cloud whilst retaining ownership and control of data storage. This architectural approach requires the use of a data centre or hosting facility with a suitable high speed, low latency network connection to the cloud provider of choice - into which a NetApp storage system is deployed. Compute resources can then to be consumed as required and increased/decreased in line with business needs without the need to actually transfer data into the cloud. Some data centre providers also provide direct links into multiple cloud providers to permit the flexibility of choosing different providers for different workloads or to provide resilience in the event of an outage.

Additionally, NetApp provides the option to deploy our data management platform onto native cloud storage in the major public clouds (including AWS, Azure and Google Cloud Platform). This approach augments the standard storage offering to deliver a rich set of enterprise-class data protection, replication and management capabilities that allows cloud storage to be seamlessly integrated into an overarching hybrid cloud strategy. It also reduces cloud consumption costs by:

- Reducing the amount of cloud storage required by automatically compressing and de-duplicating data;
- Providing efficient backup copies of data which consume very little incremental storage;
- Reducing data transfer costs through the utilisation of the highly-efficient NetApp replication technology;
- Providing consistent data management tools for managing on-premise and cloud storage;
- Accelerating application development by supporting the latest dev ops workflows and methodologies;
- Providing visibility of cloud costs through a single management portal.

By building a data fabric with NetApp, government entities can ensure that their data is available and accessible at all times; whilst maintain security and privacy whilst still benefiting from the scale, flexibility and speed of the cloud.

Securing business-critical data

From collecting population data to preserving patient records to collecting tax receipts, government generates significant quantities of data that needs to be stored and kept safe in case of a disaster. Backup and recovery is critical to the successful operation of any IT system. The loss of data has operational and monetary implications and can set an organisation back years in terms of research and operations – representing an unacceptable loss of time and money – and potentially impacting public trust.

Backup/DR is emerging as one of the most viable use cases for the cloud. Sending backup data into the cloud can eliminate common backup problems and provides additional flexibility in the event of a disaster. As data does not need to be routinely accessed, on-going costs are minimized and once in the cloud, the data will remain there until you need to access it. Furthermore, data can be protected with the newest security technologies available (such as encryption) which protects against unauthorised access.

Building a data fabric can help government organisations seamlessly integrate cloud-based backup and recovery into an overarching data management strategy. By avoiding the need to use proprietary software, organisations can leverage their investment in existing software tools with the option of creating a local backup repository if required. Advanced de-duplication and compression saves network bandwidth and the use of encryption for data “in flight” and “at rest” protects against unauthorised access. By using an “incremental forever” backup strategy, the need for periodic full backups is eliminated - which in turn reduces backup windows and provides faster data

recovery as well as reducing the storage capacity requirements at the destination.

By preserving the investment in existing tools, scripts and processes, the NetApp solution also reduces on-going administration costs by avoiding the need for re-training etc.

Accelerating key business applications

Consumers are increasingly demanding 24/7 access to public sector services. They expect the same ease-of-use and personalisation that they experience from online retailers, banks etc and expect to be able to use their preferred mobile and tablet devices. This clearly represents a huge challenge to public sector bodies, which have traditionally dictated the terms of engagement, and, for the most part, delivered services with citizens in an office-based 9–5 environment.

Equally, there is a significant incentive on the part of government departments and agencies to respond to this demand. The savings from fulfilling citizen interactions online as opposed to traditional face-to-face engagements are acknowledged to be significant – as evidenced by the comparative cost-per-transaction highlighted below. This creates a strong catalyst for implementing so-called "channel shift".

In order for government to continually offer the best, most efficient services possible, agencies need to be able to innovate at the pace of private enterprises. Rapid development, testing and deployment of new applications are therefore an important component of digital transformation. Once deployed, applications must meet heightened expectations in terms of performance and availability – placing greater demands on IT infrastructure and operations.

As previously outlined, testing/development is one of the most common workload types being moved to the cloud. Using the cloud, organisations can quickly deploy resources, test out new applications and react quickly to both successes and failures without investing in expensive physical assets. Less time is spent acquiring equipment, software, etc. and development activities can commence more quickly. Beyond that, agencies doing dev/test in the cloud are not limited by the hardware that they already own. This is especially important because, when developing, it's often difficult to know from the outset what systems, hardware or languages will work best. Cloud eliminates this problem by allowing experts to experiment and try different things.

There is also a significant cost benefit associated with using the cloud for dev/test workloads as resources only need to be paid for when they are needed rather than being available 24/7, 365 days a year. Services can be shutdown at weekends and during periods of inactivity. When it comes to the testing phase, the cloud can also help government bodies try outs newly-developed applications in the most realistic environment possible – at scale and under stress.

Modern development methodologies encourage an element of experimentation and by greatly reducing the costs associated with project implementation, agencies can turn failures into an informative, necessary part of innovation.
Once applications have been passed fit for deployment, organisations can choose to continue to use the public cloud for live implementations. Depending on the rate of uptake, their data fabric provides the ability to move the service to another provider or in-house if/when required.

A data fabric built with NetApp also facilitates enhanced online interactions by:

- Increasing the performance of key online transactional applications;
- Maintaining availability at peak times and ensuring quality of service of business-critical services;
- Providing developers with up-to-the-minute copies of production data for test purposes with little implication to performance or cost as well as tight integration with open source automation and deployment tools such as Docker, Flocker, Mesos etc.

Artificial Intelligence (AI)

Artificial intelligence (AI) has tremendous potential to improve the lives of citizens and help government organizations deliver on their missions—reducing pollution, saving and generating energy, improving safety and privacy, improving public health, enhancing agricultural outcomes, enabling smart transportation, and optimizing infrastructure.

But AI isn't just a technology of the future. Most government organizations are using AI in some way today, starting with foundational applications such as voice assistants, chatbots, and big data analytics. For example, the U.S. Postal Service uses handwriting recognition technologies to sort mail by ZIP code. In the UK, a recent study by NetApp found that over 50% of NHS Trusts are using AI to alleviate the pressures placed on healthcare workers, to improve the quality of care and fast-track medicine delivery to patients.

Government IT leaders say that data silos and technology complexity are the two biggest challenges to moving AI projects into production. Government organisations need to move quickly without the limitation of where data exists. They need a true data fabric.

NetApp helps you tailor your data fabric to accelerate your journey to AI. Only NetApp enables you to integrate your data fabric and streamline the flow of data from ingestion and collection at the edge, to preparation, training, and inference at the core, to analysis and tiering using the world's biggest clouds. Our unified data management supports seamless, cost-effective data movement across the hybrid multi-cloud environment.

NetApp provides deep technical integrations with leading AI technologies so you can simplify, accelerate, and protect your data pipeline for AI. With NetApp, you can build a data fabric that enables you to deploy AI with confidence.

Accelerate Your Data Pipeline

- Get up and running faster with the NetApp® ONTAP® AI validated reference architecture from NVIDIA and NetApp.
- Increase training throughput—up to four times faster than competing solutions.

Streamline DataOps

Automate the deployment of Kubernetes on NVIDIA DGX supercomputers with Ansible modules for NetApp.

- Enable persistent storage for Kubernetes with Trident.

Simplify Version Control for Machine Learning

- Monitor and track every version of your experiments using fast, space-efficient NetApp Snapshot™ copies.

Tap into the Cloud

- Take advantage of innovative AI software in the world's largest clouds, while retaining NetApp data management and NFS capabilities.

Summary

Data is the common thread which underpins all digital government initiatives. Indeed, it is the currency of Digital Transformation.

This document has highlighted some of the ways in which a "data-driven" hybrid cloud strategy can accelerate digital transformation whilst meeting operational and budgetary imperatives. As organisations evolve their adoption of private and public cloud solutions, it will become more important than ever to maintain control over their most important asset: data.

NetApp is unique in providing solutions and tools that deliver consistent and far-reaching data protection and data management capabilities across a hybrid cloud infrastructure. This enables organisations to exploit the elasticity and unparalleled scale of the cloud whilst maintaining control of their data – allowing them to respond to the demands of citizens and government guidelines alike – without compromising security.

For existing NetApp customers, data fabric builds on the same technology that is already widely deployed and proven today. This provides a seamless and low-risk mechanism to exploit the cloud whilst protecting existing investments in IT infrastructure. Existing skills and process can also be exploited to reduce deployment time and effort.

Data fabric is the approach which also underpins the services offered by more than 250 service providers across the globe, giving organisations the flexibility to selectively outsource elements of their IT infrastructure whilst utilising a common data management standard. UK providers are standing up services specifically geared to the requirements of public sector entities that help enable innovation whilst lowering operational costs.

In summary, data fabric is the glue which helps bind together disparate systems (both legacy and next generation web-enabled) into a seamless infrastructure which supports the need of organisations now and in the future so you can:

- Exploit the scale, flexibility and reach of the public cloud
- Avoid cloud “lock-in”
- Deliver a cloud-like experience on-premises
- Modernise infrastructure to deliver business-critical enterprise apps
- Develop and deploy new applications faster
- Accelerate your journey to AI

About NetApp

In a world full of generalists, NetApp is a specialist. We’re focused on one thing, helping your business get the most out of your data. NetApp brings the enterprise-grade data services you rely on into the cloud, and the simple flexibility of cloud into the data center. Our industry-leading solutions work across diverse customer environments and the world’s biggest public clouds.

As a cloud-led, data-centric software company, only NetApp can help build your unique data fabric, simplify and connect your cloud, and securely deliver the right data, services and applications to the right people—anytime, anywhere. Learn more at www.netapp.com.

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