Datacentre of the Future

Getting There from Today

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IDC
Analyze the Future

Contents

Introduction

Demands on the datacentre are changing rapidly. Cloud uptake, smartphone proliferation, DevOps acceptance, and other trends require faster reaction time and new approaches than in the past. Yet within most organizations, the datacentre looks rather similar today to how it did several years ago. **The last major overhaul came well over seven years ago**, with the rise of virtualization leading to the spread of virtual machines on commodity hardware. In the interim, however, many tools and techniques to secure, configure, automate, orchestrate, extend, and otherwise better manage datacentres have come to the fore.

Demands on the datacentre are changing rapidly

To prepare today for the datacentre of the future, **many variables are taken into account involving technology, skills, and processes**. This IDC InfoDoc presents an overview of the most important trendlines crossing the datacentre to assist planning at your organization.

Good Operations, Great Results

Through 2015 Canadian IT staff spent less time on new and innovative projects and more on basic admin tasks. The decrease in time spent by IT staff on innovation in the past year adds up to nearly 2 weeks per person.

Good operations and great results involve a considered approach to integrating new systems, deployment models, and architectures within the existing environment. Because there is no such thing as rip and replace of architectures, skills, processes, systems, and so forth, IT has to determine how to appropriately add new layers on top of existing ones.

Over several decades IT and the industry as a whole have evolved best practices to effectively manage and secure systems within the datacentre, from ITIL to ISO 27000 to COBIT. Moreover, there are legacy systems that operate as reliably as dial-tone and need little time and attention. These known quantities are integral to the future of datacentre computing.

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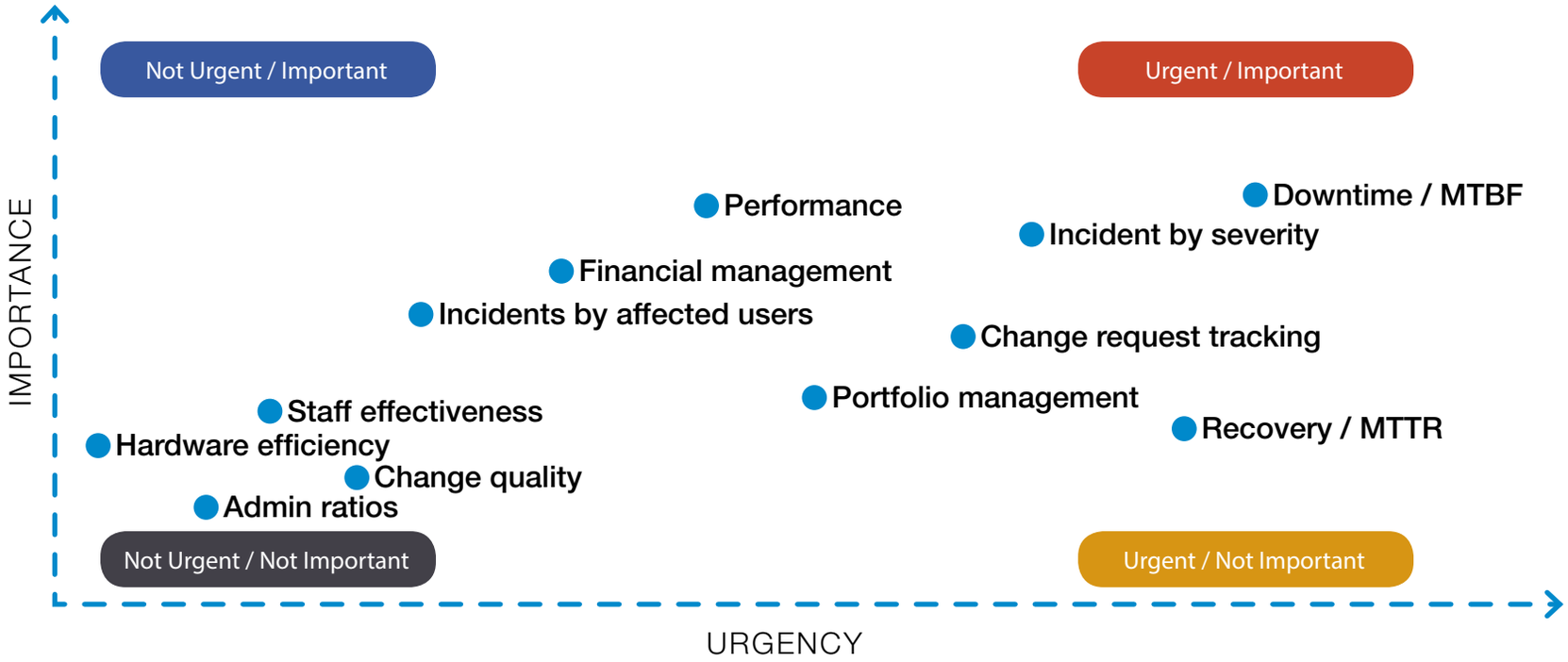
Within this report, IDC will mainly speak to "where the puck is going" rather than "where it has been." However, as IT considers "legacy" application and system requirements — and raises the questions of modernization — consider a measured approach that examines risk (e.g., availability, security), costs (e.g., IT/business training), and returns (e.g., IT/business outcomes).

For example, the Datacentre Operations Matrix is a quantification of how Canadian organizations act toward 12 key areas of operations that encompass finances, portfolio management, people, equipment, change quality, recovery, and availability management. The horizontal x-axis is a measure of how mature these areas are. The vertical y-axis represents how important they feel it is to invest in each. The matrix provides a view into how your peers are acting and planning. Legacy practices are extended into PaaS and IaaS, for example, both the good and the bad. It's important to hone what's in place today to increase success moving forward.

Just under 1 in 5 Canadian organizations' investments in next-generation datacentre infrastructure and practices are ahead of where they'd expect to be. Half of organizations admit falling behind, while the remaining third tread water. Yet IDC studies of IT operations show that the group of organizations staying ahead of the curve outperform their peers in a number of areas from quality of service to application deployment time to revenue growth.

Many findings can be drawn from this chart. For example, the areas identified in the upper right align with avoiding headaches (e.g., downtime and knowing which systems to keep up and running by severity). In the middle of the chart, clearly more attention is needed for portfolio management (e.g., setting the priority of project deployment), and likewise for change quality farther down. Organizations tend to direct investments and time toward the urgent matters, but not necessarily toward those that are most important.

Datacentre Operations Matrix



Starts with Security

Alongside myriad innovations in the datacentre, security skills, practices, and tools are under pressure to keep pace with a vastly different attack surface in 2016 than in the past. IDC finds organizations are reacting in widely different ways. Two groups, defined by their contrasting abilities to limit breaches, are emerging.

Loosely, these groups can be described as the "haves" and the "have nots." One major point of differentiation between them is the maturity of their risk processes for determining which controls are deployed when (e.g., based on probability and impact of potential breaches).

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Security Maturity

Have Nots

Defeatists
23% OF MARKET

- ✔ *IT security is weak and underfunded*
- ✔ *Little planning, more "trial and error"*

Denialists
35% OF MARKET

- ✔ *IT security is weak and they remain over-confident.*
- ✔ *Understand technology more than risk*

Haves

Realists
25% OF MARKET

- ✔ *IT security is fair and they strive to do better*
- ✔ *They perform risk management practices*

Egoists
17% OF MARKET

- ✔ *IT security is good but they are too confident*
- ✔ *They do focus on quality staff, risk mgmt and training*

Breaches suffered	Highest	High	Lower	Lowest
Budget	Under spend	Overspend	Appropriate spend	Appropriate spend
Confidence	Low	High	Low	High
Approach	Trial and error	Technology "know how"	Good risk process	People, process and technology
Maturity (1-5)	1-2	2-3	3-4	4-5

Cloud, mobility, rapid development, and software-defined datacentres are reshaping how security will be delivered and how investments are apportioned. For example, IDC research shows that mobile vulnerabilities are likely receiving too little attention (e.g., in comparison to the traditional network perimeter defences), capturing less than 4% of security budgets. Traditional perimeter security remains important, but extending the datacentre security architecture outward needs more focus. Such planning will include the network up to the application layer and from on-premise to the cloud.

Cloud security becomes a focal point in 2016 as hybrid cloud spend surpasses $1 billion in Canada.

A sizeable attack surface in its own right, the exceptional growth of cloud usage adds potential weak points. Cloud providers have better security practices than most Canadian organizations, but there are a number of security considerations that a provider can't take on. For the most part, it won't know which data should be prevented from exiting its datacentre, or who should have which access privileges or potential application layer vulnerabilities in the case of PaaS and IaaS. Data loss prevention, identity management, and proper virtual firewall rules settings are a few of the many security considerations that extend into cloud.

Hybrid Cloud Reality

Public and hosted clouds of all forms have experienced significant growth in Canada. These deployment options impact datacentre operations, equipment purchases, IT architecture, and security. Legacy applications and recently private clouds will need to be connected into a hybrid cloud architecture. Begin preparations around ingress/egress filtering, identity management/access rights, workload portability, capacity balancing, performance, systems management, orchestration, and appropriate distribution of application logic and data. Personnel skills, training, and career path questions need to be addressed too. Particularly in the face of uncertainty, HR change management takes on greater significance.

Cloud Impact on IT Headcount

	Small	Mid	Large
Reduce	5%	14%	18%
Redeploy	23%	40%	41%
Add	14%	16%	13%
Don't know	58%	31%	28%

Lots of uncertainty about cloud impact on IT headcount. Likely more staff redployed than cutbacks.

In 2015 Canadian organizations reported that 22% of IT budgets was spent on cloud and that this will increase to 35% by 2017.

Going Hybrid: As an analogy to new hybrid architectures, whenever an app is downloaded onto a mobile phone, there is an architecture that the app creator has defined. It is distributed across a number of cloud and other options. There is some combination of any/all application logic and data accessible on the phone, some hosted with the app creator, some with the phone manufacturer, some run in a cloud provider, and some data stored on a local PC. In our consumer lives, this architecture is rarely given a second thought. In the enterprise, however, these hybrid decisions will need to be made proactively.

With particular ramifications for the datacentre, **PaaS spend will more than double from $177 million in 2015 to $344 million in 2018, while spend on IaaS in Canada will more than triple from $273 million to $857 million in the same time period.** In fact, by 2019, spend on IaaS will surpass half of all datacentre hardware spend in Canada. IDC expects the public sector and financial services industries to factor in significantly toward this market expansion. The push in these verticals has been private cloud centric, but that is shifting to include public cloud use. Consequently, hybrid cloud considerations are emerging with many more deployment options available.

DevOps Is Here

Driven by growth of mobility and cloud in particular, the notion of development plus operations (DevOps) has captured the attention of many organizations. The rationale behind DevOps boils down to "Agile" test and development in support of an "agile" organization. It brings concepts such as orchestration into the discussion to enable self-service for developers and admins alike. DevOps is realized through a large and expanding set of tools that address development, deployment, and maintenance. Organizations have a wide variety of options to select from. Popular tools within OpenStack, and others such as Ant, Jenkins, Docker, Chef, OpenShift, and Nagios, are among dozens of free open source options that each enable aspects of simplified operations.

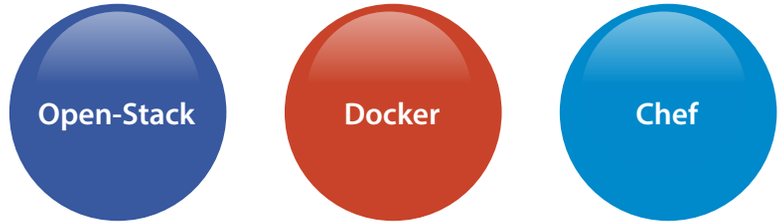
DevOps, SDDC Begin to Factor In

Top IT staff challenges

Making changes (patches, upgrades, other)	49%
Getting performance / speed from systems users need	37%
Not enough hardware capacity	23%
Admin ratios for hardware mgmt	23%
Too many manual steps / not enough automation	20%
Challenging to deploy applications fast enough	14%
Maintaining good system uptime	14%
Other	6%

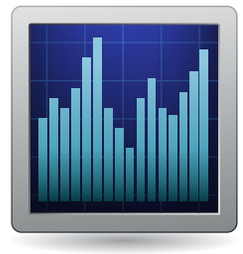
Dealing w/ the basics remains top focus

DevOps and SDDC drivers still building



DevOps grows in significance as organizations push ahead along many different megatrends. As an example, the results from a Big Data project should be rapidly embedded within the workflow of employees or customers. This likely means making speedy changes to mobile applications to reflect changing conditions so that an employee or customer makes the right decision or is more efficient completing a given process or task. Moreover, the very nature of Big Data is largely schema-less (versus traditional SQL approaches), which itself feeds into the DevOps ideals of no-hassle quick changes and updates.

The lines between traditional roles within and on the periphery of the datacentre — such as developer, systems admin, and database admin — blur on account of DevOps. Although human resource change management becomes an issue, the simplification that results is worth the initial overhead. As the traditional client-server architecture becomes far more distributed across cloud options and mobile devices, developers — and the supporting infrastructure — must move faster.



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Software-Defined Matters

Opposite DevOps, at the bottom end of the stack, SDDC is redefining how resources are allocated, accessed, moved, secured, and orchestrated. The industry has had software-defined servers for years in hypervisors. Software-defined networking (SDN) and software-defined storage (SDS) are the next dominos to fall as more datacentre hardware functionality is pulled into the software layer.

Two-fifths of Canadian organizations are interested in learning more about SDDC.

Storage processes have been abstracted from hardware for decades — LUNs, RAID arrays, and SANs are all abstractions, managing complex tasks on behalf of users and applications. Storage virtualization takes this abstraction another step forward, and SDS aims to reduce the complexity of provisioning and managing storage resources even further. Policy-based management of storage services within a large environment allows a single management plane to rapidly provision, move, and manage storage workloads beyond a single storage system, allowing the requirements of an application to determine the characteristics of its storage environment.

The insertion of key services — such as automatic tiering and caching, compression and deduplication, snapshots and replication — can occur where needed, rather than being limited by physical controllers or appliances. These effects can add responsiveness and speed to implementing private cloud functionality in the datacentre. More importantly, SDS will ease the management of capacity and information across hybrid cloud options.

Similar to SDS, software-defined networking simplifies network control while adding new capabilities that support trends from hybrid cloud to Big Data to DevOps (just like SDS). With the control plane abstracted from the data plane (normally integrated in hardware) it becomes possible to make changes to individual switches or segments or turn the network into something closer to a collection of services. In a hybrid cloud scenario it eases VM mobility across domains, for example, while allowing specificity in security levels. Most notably, though, SDN reduces time spent on mundane network admin tasks, while increasing consistency of changes and so forth. SDN became popular owing to the promise of capex reduction, but opex benefits more.

There are varying implementations of SDN, from the overlay network of virtual machines to the underlay network supported by standards such as OpenFlow. Neutron is the OpenStack SDN offering and other open source projects such as OpenDaylight function in concert with it.

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The OpenStack Option

OpenStack crosses the boundary of DevOps, hybrid cloud, and SDDC. There are many competitors, but OpenStack is the one option that many commercial and open source players alike are backing. Interest in OpenStack is building in Canada. In 2015, 1 in 10 organizations was using it, while an additional 37% know it's important. OpenStack is a collection of several dozen projects that generate on-premise and public cloud IaaS. It also sets the groundwork to build into PaaS (e.g., with projects such as OpenShift). From compute (e.g., Nova) to storage (e.g., Swift) to networking (e.g., Neutron) to federated identities (e.g., keystone), OpenStack has functionality to handle most aspects of an IaaS implementation.

OpenStack was born in the cloud with a different mission to the closed source alternatives. OpenStack presupposes an application-level resiliency compared with the infrastructure-centric nature of the other approach. This is a meaningful difference for admins (and architects) who are used to VMs spinning back up on their own after a failure. In OpenStack this can be automated with tools such as Ansible, but it's otherwise manual — and that's by design. The application needs to be smarter for what OpenStack otherwise considers disposable hardware/VMs. Storage and networking too are treated in a new manner in OpenStack — a consequence of the OpenStack founders being hyperscale in nature. Consequently, software-defined — and the notion of hybrid — have been built from the ground up within OpenStack.

Changing Hardware

Converged and Hyperconverged

Datacentre hardware has evolved immensely over the past decade, owing mainly to Moore's Law and the demands for high VM density. Despite cheaper computing and storage, hardware budgets continue to grow as capacity balloons. Counterintuitively, the average spend per server in Canada continues to increase, even in the face of cloud. It's a tale of two datacentres. On the one hand, there is hyperscale buildout of very low cost self-built hardware. On the other, the pendulum swings back toward integrated systems in the form of bigger boxes (e.g., more cores/RAM/etc.), converged systems (e.g., integrated server, storage, switches, hypervisor, and tools), and hyperconverged (e.g., similar to converged, but storage is contained within each server).

IDC forecasts more than $300 million will be spent on converged and hyperconverged systems in 2016 in Canada.

There has been a shift over the past couple of years away from the notion of only high-end ERP, database, or VDI workloads being run on integrated systems. As these systems have evolved, in some extreme cases, they are replacing entire datacentres worth of equipment — and generally serving a wider range of high- and lower-end workloads than in the past.

From Storage to Information Management

Finding the optimal balance regarding where to store data has grown in complexity over the past five years. Storage tiering (in part a function of data classification) is an important topic to master when planning your enterprise architecture of the future. There are plenty of choices where data can be stored (e.g., traditional on-premise, private cloud, public cloud), which type of hardware to use (e.g., flash, hybrid flash/HDD, HDD), which protocols to support (e.g., fiber channel SAN, iSCSI, NAS, DAS), which file systems, and so forth. The best storage options will be determined by a number of factors such as timing (e.g., a long while or for minutes at a time), availability (e.g., recovery time and recover point objectives), financial, performance, capacity, and records management (archiving, compliance) requirements.

Finding the optimal balance regarding where to store data has grown in complexity over the past five years.

Automation, Orchestration, and the Power of Prediction

Hardware efficiency has improved dramatically as organizations corralled capital costs by vastly increasing VM density. However, the operational side of the ledger has seen much less improvement, with 7 out of 10 organizations recognizing the need for greater automation and fewer than 1 in 10 recognizing the need for orchestration. IDC believes 2016 is a year of change in Canada, however.

More than 70 cents on every datacentre dollar is directed toward managing VM sprawl and underlying hardware.

It's time to make the switch from manual effort to tools for automation, and to reduce IT staff time allocated toward routine tasks (e.g., patching/updating, config, break/fix). More than 70 cents on every datacentre dollar is directed toward managing VM sprawl and underlying hardware. Tools for automation and orchestration target all layers from hardware to hypervisor to applications — and are available in commercial off-the-shelf and open source varieties. As described earlier from a DevOps perspective, we anticipate an inflection point of adoption of automation and orchestration as organizations look to reduce management headaches, increase consistency (e.g., better change management results), gain faster IT reaction time to business change, and reduce opex.

Analytics goes hand in hand with improved automation. Big Data power is coming to the datacentre to reduce downtime. Mainly used today for security threat intelligence, it can help predict when servers may fail and when new capacity is required. This will create a more proactive IT environment able to get out in front of changes in capacity, performance, and other issues. Analytics are embedded within an increasing number of tools and are available in standalone form to help predict performance issues, and measure compliance, suggest capacity levels. The goal is to move from basic dashboards (reactive, looking backward) to predictive and prescriptive analytics to forecast incidents before they happen in order to avoid them.

Next Steps

Organizations need more planning to take advantage of the megatrends that on the one hand are redefining industries wholesale and on the other extending legacy approaches by small steps. Whether the future is identified as services-oriented (e.g., network and storage "services") or simply more pliable to enable incremental improvements in agility, consider SDDC at the bottom of the stack and DevOps near the top to enable orchestration for success in hybrid cloud, Big Data, and mobility.

In order to make good decisions, IDC suggests taking a measurable approach to all aspect of operations and the trends that lie ahead, as noted in the earlier section "Good Operations, Great Results." It will be chiefly a qualitative exercise but informed by as many trackable metrics as possible that involve both line-of-business and IT stakeholders. In 2015, for example, on a five-level hybrid cloud maturity scale, 76% of Canadian organizations rank at levels 1 and 2. This means they have just started their initial plans (level 1) and have begun basic implementation (level 2). By 2018, 70% of firms believe they will achieve level 3 (e.g., standardized approach to cloud across business and IT) or higher. However, without a solid plan in place that covers the complete vertical IT stack from top to bottom and the horizontal deployment model options from traditional on-premise to public cloud, they won't get there in time.