A Forrester Consulting
Thought Leadership Spotlight
Commissioned By Dell Technologies
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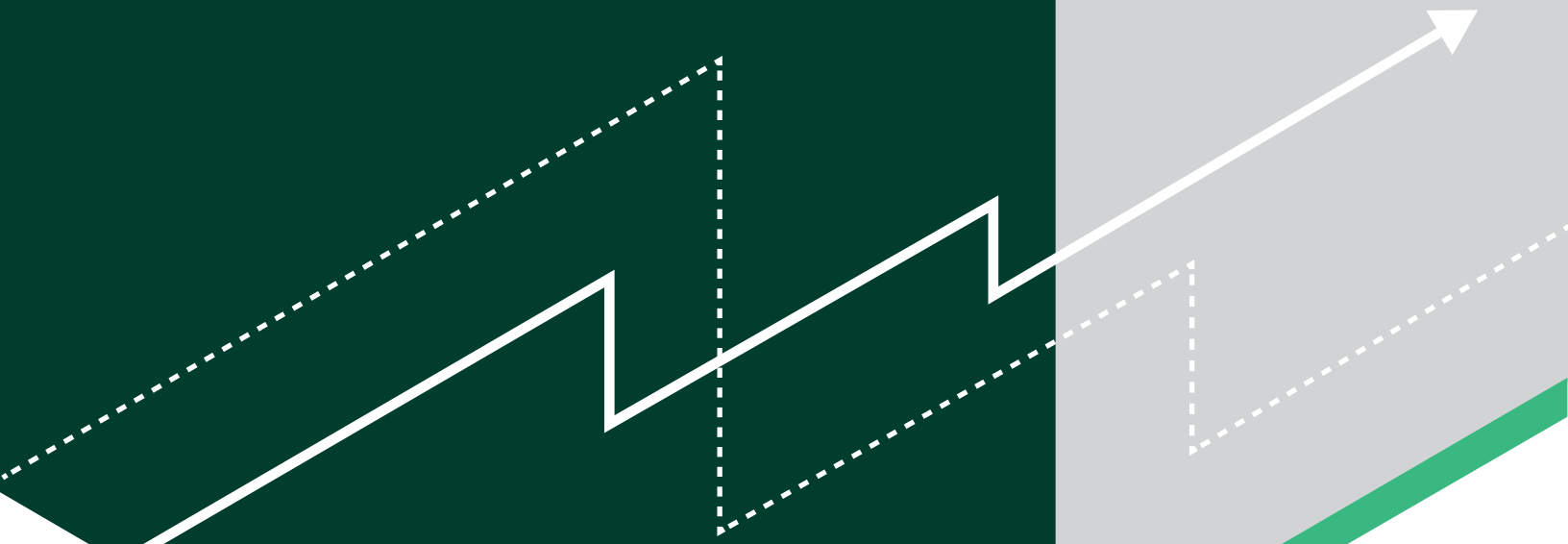
# AI And HPC In The Cloud: A Spotlight On Healthcare

## Healthcare Results From The August 2020 Thought Leadership Paper, "Hybrid Cloud: A Smart Choice For AI And HPC"



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# Introduction

The need to quickly get answers to complex problems based on multiple data sets is not unique to any one industry. While these answers can often be the key to staying competitive in a crowded marketplace, for healthcare organizations it can also be a question of life and death. As firms in the healthcare industry attempt to balance the needs of their business with the needs of patients, technologies that can enable the answering of complex questions from large data sets and advanced analyses — like AI and high-performance computing (HPC) — will prove increasingly useful.[1] Historically, these were prohibitively expensive options, but the expansion of cloud computing has removed the economic hurdle. The infrastructure options for how to run compute-intensive workloads like HPC, AI, and machine learning (ML), have expanded, opening new analytic opportunities for healthcare organizations.

Dell Technologies and Intel commissioned Forrester Consulting to understand how cloud is being used to run AI and HPC workloads within the healthcare industry. To do so, Forrester conducted an online survey with 110 IT decision-makers at healthcare organizations across the globe.

Healthcare organizations are working to harness the power of cloud for AI and HPC workloads.

Running HPC and AI in a hybrid environment provides significant business benefits.

**KEY FINDINGS**

- **Cloud can be transformational for healthcare organizations.** Cloud computing is a powerful force with the capacity to truly transform operations. Unfortunately, many organizations today have yet to truly harness the full power of cloud, using it to simply tack on improvements or extend certain capabilities without fundamentally altering business models. Healthcare organizations that can expand their use of cloud to transform and modernize operations will be better suited to advance their AI capabilities.
- **A desire for efficiency and speed drives cloud use for AI and HPC.** Though HPC and AI services are mostly run on-premises today, there will be a shift towards more public and private cloud use in the coming year. Driven by the need for faster analysis and better infrastructure utilization and efficiency, most organizations will work with hybrid environments that encompass both on-premises and cloud options moving forward.
- **Teams struggle with high costs, upskilling, and security concerns.** There are some challenges to cloud migration. Respondents report trouble with security, application architecture, and the work needed to get internal teams up to speed on key skill sets — all while trying to balance the costs and benefits of moving workloads to the cloud.
- **Hybrid drives results.** Teams aren't simply choosing to keep some applications on non-cloud infrastructure; rather, healthcare IT teams are making infrastructure decisions based on a myriad of business and application requirements. HPC and AI workloads running in hybrid environments will lead to business benefits that help organizations overcome the challenges inherent in cloud migration while also providing returns on initial investments.

# AI And HPC Use Spur The Move To Cloud

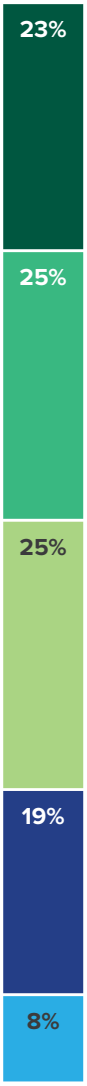
Classically used in genome processing, HPC healthcare use cases now exist for molecular modeling and pharmaceutical design.[2] Investments in AI and ML are also increasing due to the technology's ability to solve business problems through actions, such as proving the viability of new care models using population data and enabling security and privacy automation.[3] Eighty-nine percent of respondents report their healthcare organizations will access AI capabilities in some way this year and 70% either plan to train or are already training employees on these technologies.[4]

All this computational work requires a modern IT infrastructure. Eighty-four percent of healthcare decision-makers say their AI initiatives increase the need to modernize servers and HPC, while 69% of respondents report the same for hybrid cloud infrastructure. This begs the question of how and why cloud computing is being leveraged to run these workloads. Our study shows:

- **Cloud can transform the business, but few are there yet.** Cloud is used in a variety of ways among healthcare IT teams (see Figure 1). For those just starting out on their journey, cloud is a way to make incremental improvements without fundamentally changing anything about the business. About half have progressed to using cloud to add capabilities to their on-premises environment or as a means of modernizing existing infrastructure to fundamentally change operations. Only 23% have successfully leveraged cloud to significantly transform their business model and operations.
- **Speed and efficiency drive the move to cloud.** Currently, only about 20% of healthcare respondents utilize public and private cloud environments for either HPC or AI workloads. However, within 12 months, this will change. Thirty-six percent of respondents say their institutions plan to run HPC services in public cloud, while 27% of respondents say their organization plans to run AI/ML on private cloud. A desire to improve overall infrastructure utilization and efficiency, and achieve faster data analysis drives this move.
- **Hybrid cloud is the new reality.** The move to cloud is not a move entirely away from other deployments. Most institutions today pursue a mix of public and private cloud environments based on application and business requirements. Our study also found that respondents' teams often deploy their AI technologies in either a hybrid or multicloud environment during exploratory and development, testing, and production phases.

**Figure 1**

**"Which of the following statements most closely describes your organization's use of cloud platforms today?"**




**Transform:** We use cloud to significantly transform our business model and operations as an immediate goal.

**Transition:** We use cloud to change or modernize many apps, infrastructure, or processes as we implement fundamental changes to our business model and operations.

**Extend:** We use cloud to extend or add capabilities to our existing on-premises IT environment.

**Tactical improvement:** We use cloud to incrementally improve some apps, infrastructure, or processes, but we don't fundamentally change our business model and operations.

**We don't have a formalized strategy.**

Base: 110 global decision-makers on IT infrastructure cloud strategies, high-performance computing strategies, or AI strategies at healthcare organizations
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell and Intel, June 2020



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# Hybrid Cloud Helps Firms Overcome Challenges And Accelerate Benefits

The move to cloud can be challenging. Cloud migration forces institutions to reassess and update existing processes and applications. It requires ample foresight to plan for application growth and scale.[5] Maintaining strict security and privacy protocols is incredibly important to healthcare teams, since it is a highly regulated industry — but this can be an area of concern and high costs. Teams also struggle while training, hiring, and reskilling staff on critical skills and reworking applications to maintain peak performance and achieve desired scale (see Figure 2).

Costs are also an issue. In addition to the costs that result from challenges, over half of healthcare respondents struggle with infrastructure cost and cost transparency when implementing AI and HPC workloads. Teams are keenly aware of the issue. More than half consider cost optimization when determining the best cloud strategy for both AI and HPC workloads, and another third acknowledge that multicloud cost tracking and optimization would be a valuable tool as they expand their use of hybrid cloud.

But despite the costs, organizations are starting to see returns from their time and effort. Sixty percent of healthcare respondents in our study report a positive financial impact on their organization's bottom line from migrating workloads to the cloud. Within three years, these benefits are expected to increase — 82% anticipate a positive return.

"A business disruption of just an hour can cost tens of thousands of dollars if the cloud platforms are not safe."

*VP in IT, Australian healthcare organization*

**Figure 2**

**Key Challenges To Executing AI And HPC In The Cloud**

| | | Security | Training/lack of skills | Application architecture issues |
|---|---|---|---|---|
| **Cloud challenges** | | **51%** Security and privacy issues | **50%** Learning new cloud-native architectures | **55%** Application architecture of existing apps |
| **Biggest costs** | | **35%** Identity and security rework | **35%** Training, hiring, and reskilling staff | **38%** App reconfiguration |
| **Infrastructure challenges for:** | **AI** | **52%** Insufficient security | **57%** Lack of systems design and integration skills | **43%** Lack of scalable solutions |
| | **HPC** | **52%** Security and compliance | **51%** Lack of systems design and integration skills | **48%** Application performance |

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## AI AND HPC ON HYBRID CLOUD DRIVES BUSINESS RESULTS

These positive returns are a direct result of the cloud's benefits. Our study shows that running workloads in a cloud environment drives critical business benefits for healthcare respondents. Not only do respondents enjoy lower compute and storage costs to help offset some of the cost concerns that migration can cause, but they also see higher developer satisfaction and improved data management. Most of all, hybrid cloud can cut down on the time spent on data center maintenance, allowing healthcare IT teams to focus on strategic projects. This opens the door for increased innovation.

Running AI and/or HPC workloads specifically on hybrid cloud also helps alleviate cost concerns as better overall IT cost management is the most often experienced benefit. These firms also experience lower compute and storage costs from their hybrid environments. Additional benefits, such as improved application and infrastructure performance, improved security and compliance, and better IT infrastructure management and flexibility, can help counteract some of respondents' top challenge areas (see Figure 3). If organizations want to make the most efficient use of the infrastructure options at their disposal, running AI and HPC workloads in a hybrid environment is a wise choice.

Within three years, 47% of healthcare organizations expect a positive boost of more than 5% to their bottom lines from cloud migration.

**Figure 3**

**Top Benefits From Running AI And/Or HPC Workloads In A Hybrid Cloud Environment**

Better IT cost management overall

Ability of our IT departments to focus on strategic projects rather than be data center managers

Improved IT infrastructure management and flexibility

Access to temporary or peak capacity to meet demand spikes

Faster release of new features

Improved app or infrastructure performance

Lower compute and storage costs overall

Improved security and compliance

Base: 110 global decision-makers on IT infrastructure cloud strategies, high-performance computing strategies, or AI strategies at healthcare organizations
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell and Intel, June 2020

# Key Recommendations

Traditionally, setting up HPC infrastructure is capital-intensive. With the value brought on by Moore's Law, as well as the advanced services that cloud vendors now offer, bursting HPC to the cloud is a viable option for organizations of any size. It can offer significant advantages, including freeing up IT support resources to focus on innovation.[6] However, the right method will require a systematic approach from planning to operations. With the advent of robust cloud options and services, healthcare organizations may consider optimal solutions for AI and HPC workloads to be on-premises or in a variety of hybrid cloud scenarios.

Forrester's in-depth survey yielded the following important recommendations:

**Consider cost, latency, and data gravity as the core deciding factors.** HPC and AI workloads are resource-intensive. They can require specialized infrastructure including support from graphics processing units and high-speed networking and storage, as well as innovative software approaches. Whether you are experimenting with AI workloads or you already have an HPC environment and are expanding it, establish a clear framework centered around data gravity and internal cloud readiness for assessing the right approach for cloud usage.[7] Unlike regular workloads, HPC and AI workloads quickly attract associated applications and large amounts of analytical data. This eventually makes further migration efforts cost-prohibitive. Considering data gravity upfront will make AI and HPC workloads more successful and cost effective in the long run.

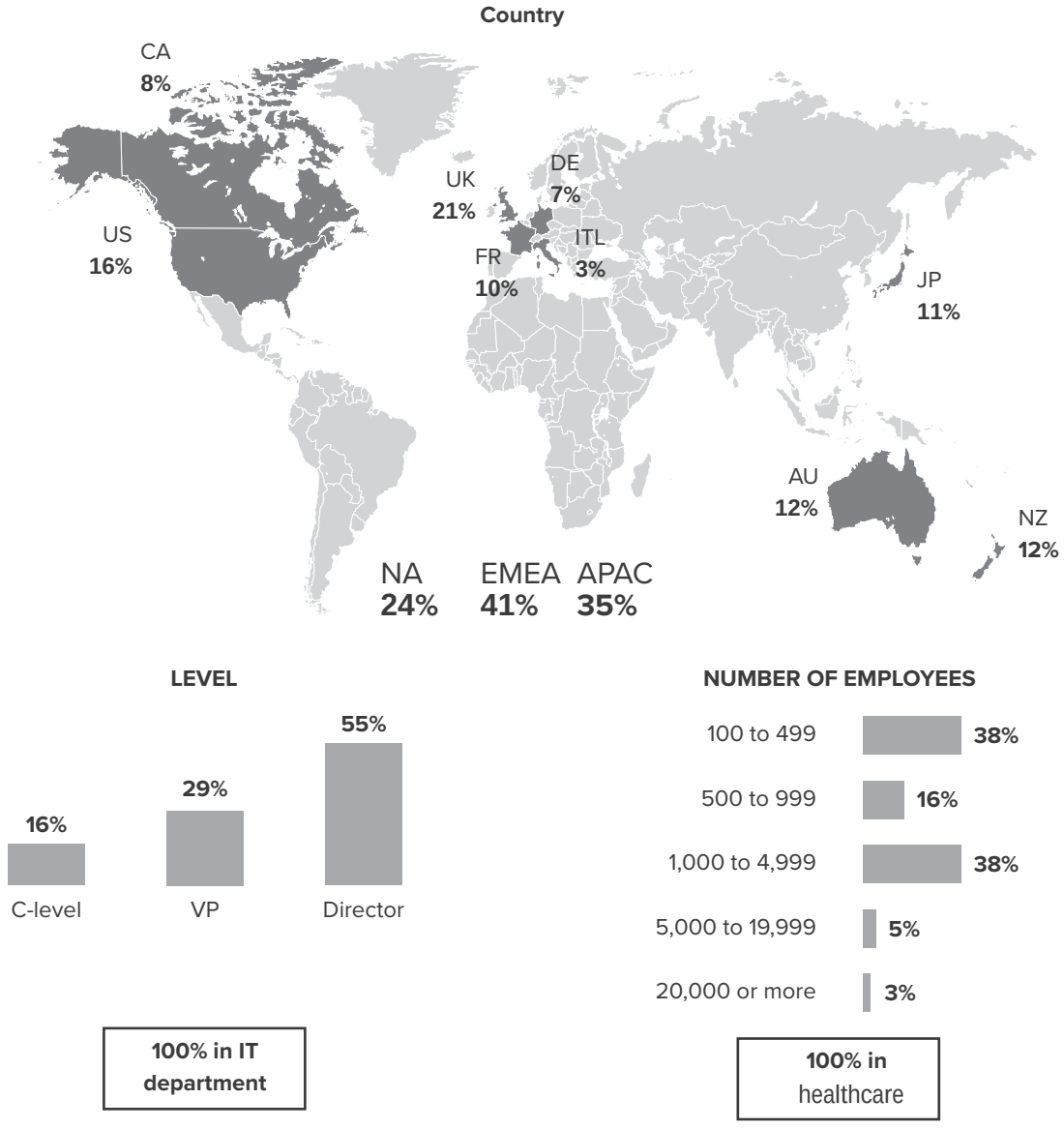
**Adapt your architecture to the hybrid cloud.** Data from this survey emphasizes that a hybrid cloud approach not only addresses the top concerns of organizations with regards to AI and HPC on the cloud, but it also forces digital transformation through a cloud-first approach in application development. An all-cloud strategy for AI and HPC workloads can significantly skew the economic benefits in the long-term unless justified by a lack of scalability requirements or network access. With the advent of mature HPC virtual machine orchestration engines, which provide the functionality of a physical computer via software, and reliable data center interconnection networks, a hybrid approach offers the best of both worlds.

**Empower teams with the right tools and guidelines.** Infrastructure and operations leaders must empower HPC teams with guidance on how to use cloud platforms safely, sustainably, and cost-effectively. To do this, develop governance and security guidelines, and training that prepare IT staff and researchers to leverage the cloud responsibly and productively. Pay special attention to security needs of sensitive analytical workloads. Be prepared to supplement the cloud services that public cloud providers offer with cloud monitoring tools, orchestration tools, an efficient cloud release management process, and cloud access guidelines for your teams.

# Appendix A: Methodology

In this study, Forrester conducted an online survey of 110 healthcare decision-makers in the US, Canada, the UK, Germany, France, Italy, Australia, New Zealand, and Japan with responsibility for IT infrastructure, high performance computing, or AI strategies. Respondents were offered an incentive as a thank-you for time spent on the survey. The study began in May 2020 and was completed in June 2020.

# Appendix B: Demographics




Base: 110 global decision-makers on IT infrastructure cloud strategies, high-performance computing strategies, or AI strategies at healthcare organizations
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell and Intel, June 2020



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# Appendix C: Supplemental Material

**RELATED FORRESTER RESEARCH**

"Predictions 2020: Cloud Computing," Forrester Research, Inc., November 4, 2019.

"The Forrester Tech Tide™: Compute Platforms, Q4 2019," Forrester Research, Inc., October 19, 2019.

"Top 10 Ways To Master Performance For Your Cloud Migration," Forrester Research, Inc., April 13, 2020.

# Appendix D: Endnotes

[1] HPC platforms are those where large clusters of computational nodes conjoin with high volumes of storage and bandwidth to allow for faster computing and complex problem solving.

[2] Source: "Fire Up Cloud-Based High-Performance Computing To Stoke Innovation," Forrester Research, Inc., November 23, 2020.

[3] Source: "Audio: The Long-Term Impact Of Emerging Technology On US Health Insurers," Forrester Research, Inc., July 7, 2020.

[4] Source: Forrester Analytics Business Technographics™ Data And Analytics Survey, 2020.

[5] Source: "Top 10 Facts Tech Leaders Should Know About Cloud Migration," Forrester Research, Inc., March 14, 2019.

[6] First observed by Intel co-founder Gordon E. Moore, Moore's Law essentially states that the number of transistors in a given unit of space will roughly double every two years, thereby doubling computing power but halving cost.

[7] Data gravity is defined as the ability of bodies of data to attract applications, services, and other data. The larger the amount of data, the more applications, services, and other data will be attracted to it.

To read the full results of this study, please refer to the Thought Leadership Paper commissioned by Dell Technologies and Intel titled "Hybrid Cloud: A Smart Choice For AI And HPC."

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