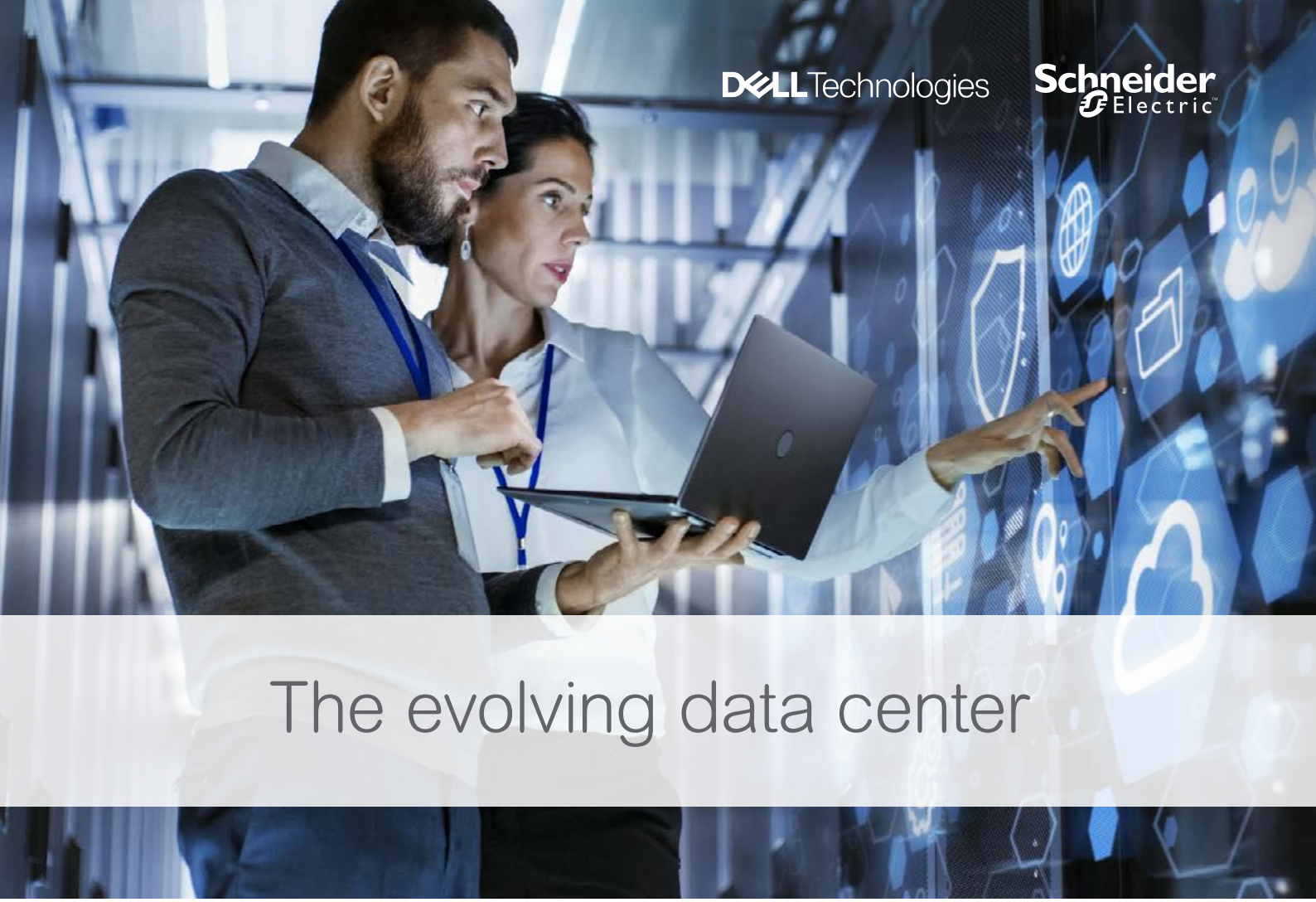

The evolving data center

High-density computing demands a fresh approach

The Fourth Industrial Revolution is placing massive demands on data centers. Advanced technologies such as artificial intelligence (AI) and high-performance computing (HPC) create data-intensive environments that support complex computations and enable scientific breakthroughs in fields such as medical research, oil and gas generation and distribution, and movie special effects generation.

Data-intensive work requires high-density computing (HDC), which places high concentrations of compute power and storage in small spaces. HDC rack power can range from 15kW to 100kW depending on the compute needs. Yet, the impact on data centers isn't hard to guess: Soaring heat and power consumption. Traditional data centers weren't designed for such high demands, but there's a way to address them: HDC solutions combining high-performance computing with power and cooling.

The global artificial intelligence market size was valued at $27.23 billion in 2019 & is projected to reach $266.92 billion by 2027.[1]

End-user spending on global data center infrastructure is estimated to reach $200 billion in 2021, which is an increase of 6% from 2020.[2]

With the demand for high-performance computing on the rise, the HPC market size is expected to grow from USD 37.8 billion in 2020 to USD 49.4 billion by 2025.[3]

[1] Fortune Business Insights, Market Research Report July 2020.
[2] Gartner Press Release, Gartner Says Worldwide Data Center Infrastructure Spending to Grow 6% in 2021, October 7, 2020.
[3] MarketandMarkets, High Performance Computing Market Report, December 16, 2020.

The rise of high-density computing

It's a data-driven world, after all. Data is now the lifeline of business. As industrial organizations embrace Industry 4.0 to reinvent themselves, they leverage data from diverse sources that travels between data centers, clouds and edge sites supporting Internet of Things (IoT) implementations. All the while, data is growing exponentially. By 2025, 463 exabytes of data will be created daily.

Data is now the lifeline of business HDC supports the lifeline

Extracting value from all that data is no easy task. And it's what drives the implementation and convergence of technologies such as high-performance computing, data analytics, artificial intelligence (AI), and machine learning (ML) for a fast-growing variety of outcomes. Some sample use cases are:

- Creating special effects for Hollywood blockbusters
- Crunching massive data volumes to fight fraud in financial transactions
- Enabling genomics and clinical research to improve patient care and produce life-saving medications
- Supporting space exploration to better understand the universe and identify new worlds

Traditionally, expensive, proprietary supercomputers operated by specialists handled data-intensive tasks. But HDC solutions now offer a more affordable approach, placing the needed capabilities within reach of more users. This democratization of high-performance computing accelerates outcomes that have a deep impact on industry and society.

A growing trend

HDC solutions are inherently scalable, leveraging small clusters and workstations to deliver compute, storage, networking, and services. As Industry 4.0 evolves, HDC solutions are gaining traction, and doing important work to reshape industries and improve society.

Why HDC is a game changer

HDC provides an easier, more accessible way to make sense of the data and feed it to AI and ML models for meaningful results.

Achievements enabled by HDC solutions can have a profound impact. The rapid development of COVID-19 vaccines is a good example. High-performance computing and advanced analytics played key roles in developing and distributing shots to millions of people around world. Other areas where HDC plays a role include:

Cybersecurity and fraud detection – AI and ML models that sift through enormous piles of data for anomaly detection and pattern recognition are enabling counter-measures against hackers and fraudsters. This work is especially critical as IT and operational technology (OT) environments converge, potentially introducing new risks to industrial environments.

Research labs – Whether in academia, life sciences, space exploration or some other industry, HDC-enabled research is helping organizations achieve breakthroughs that otherwise would take much longer – or be delayed indefinitely because of cost and complexity.

Media and entertainment – The creation of highly stylized 3D graphics in TV programming and advanced effects in Hollywood films require massive compute power and storage, which increasingly involves HDC environments.

Oil and gas – Producers are using analytics and HPC for well exploration and to enhance drilling accuracy, which improves production and reduces environmental impact.

Smart grids – Data capture from sensors and other devices in power distribution networks enables real-time decisions to prevent power outages, manage load balancing, and respond to emergencies.

High-density challenges

Packing more compute and storage power into smaller spaces has clear advantages, but it creates challenges in the data center such as:

- Substantially boosting power consumption
- Increasing heat generation

Today, most data center racks generate less than 10kW, but average densities are increasing at a 70% clip, according to the Uptime Institute. HDC is a major contributor to this trend, driving rack densities to 20kW and higher. Data centers were not designed for these densities, so operators need to rethink a number of factors including aisle width, rack proximities to each other and overall layouts.

The challenge boils down to:

- Ensuring proper airflow for cooling to prevent overheating
- Increasing backup power capacity to support higher power consumption

Rack, row and room power densities have to be taken into account to address these challenges. As HDC environments expand, data center operators need efficient, cost-effective solutions with all the compute, storage, analytics and networking capabilities, as well as power and cooling.

Cooling accounts for **40% of power used** in data centers

Reliable HDC solutions from two industry leaders

To address HDC data center challenges, Schneider Electric and Dell Technologies have teamed up to deliver end-to-end data center solutions with all the necessary components for all environments, regardless of capacity. Ideal for remote locations, these modular solutions include required IT and networking components, including:

- Compute
- Networking
- Storage
- Power and cooling
- Analytics
- Security

Schneider and Dell are leaders in their respective market segments, and have worked in partnership for 25 years to meet customer needs across a wide range of industries. As digital transformation drives Industry 4.0 adoption, organizations can leverage Schneider and Dell HDC solutions to meet their evolving requirements.

Turnkey solutions powered by Schneider Electric and Dell

Solutions are rack-level systems optimized for data-intensive technologies such as HPC, AI and data analytics. Components are designed to support high-density computing needs, quick deployment and remote management.

- Dell PowerEdge™ servers combined with Dell's Ready architectures and Precision workstations are able to crunch high data volumes, solve complex problems and derive valuable insights.
- Schneider Electric Uniflair™ InRow Cooling with Containment creates a powerfully compact and energy efficient design for the most versatile and predictable close-coupled cooling system that minimizes the number of units deployed, saving on installation costs.
- Schneider Electric NetShelter™ 9000 series Switched Rack PDUs provide reliability with high temperature performance, gigabit Ethernet ports, enhanced cybersecurity and remote monitoring and management capabilities.

Dell EMC PowerEdge™


Uniflair™ InRow Cooling


NetShelter™ 9000 (Rack PDU)

Future-proof your data center

There is no stopping the relentless evolution of technology – and HDC is proof of it. For the foreseeable future, more and more data center space will be dedicated to high-density environments. Schneider and Dell can help you future-proof your data centers with reliable, scalable, flexible solutions that help meet the challenges of today and prepare for those of tomorrow.

Schneider Electric and Dell provide a one-stop-shop for high-density computing solutions. **Discover more.**

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