MNS-UP HEALTHCARE

Optimizing data center performance within the healthcare sector.

Are you ready for the 4th Industrial Revolution?

ABB Ltd.
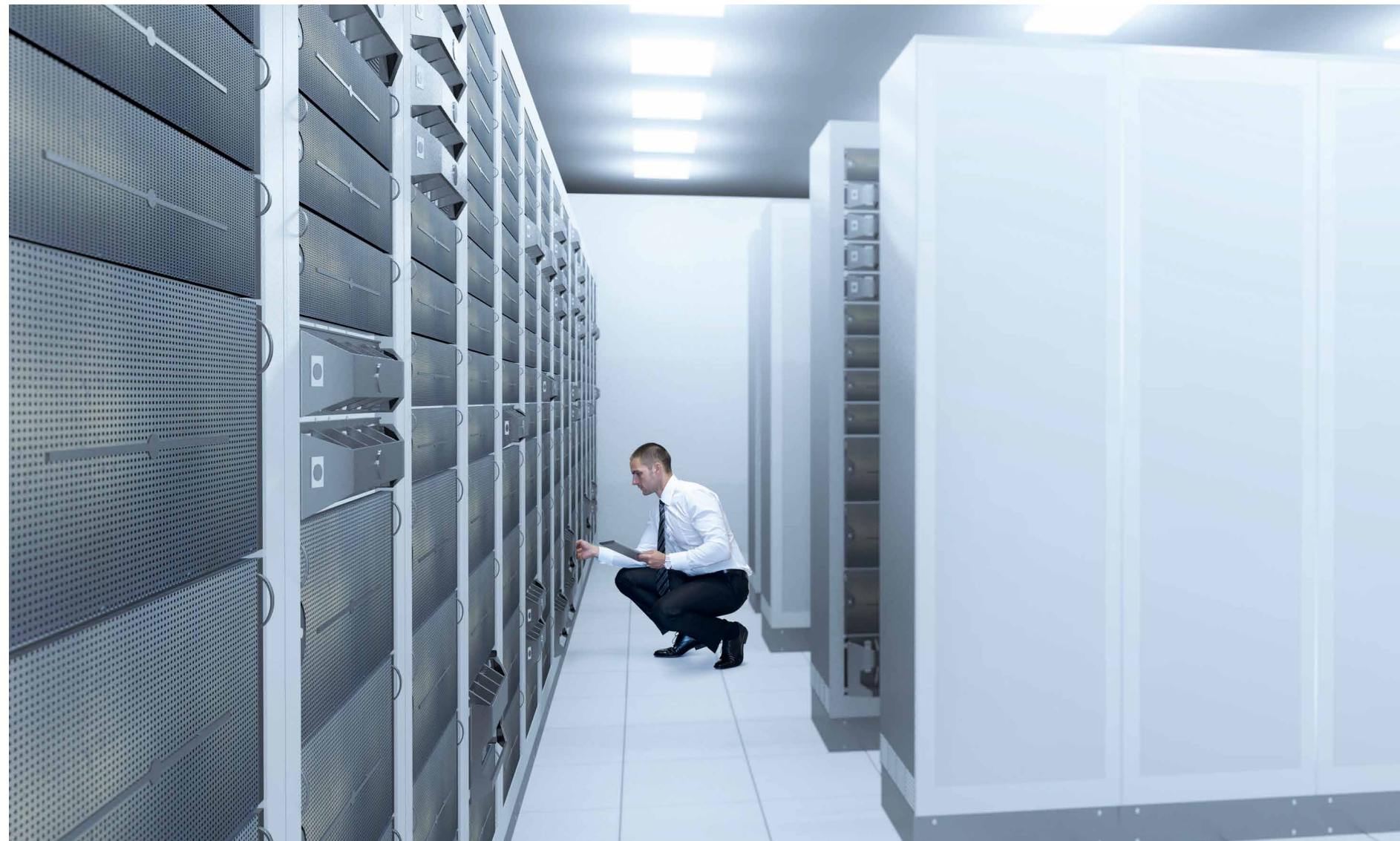Affolternstrasse 44
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Are you ready for the 4ᵗʰ Industrial Revolution?

"Demand for IT services in the healthcare sector has grown exponentially in the past few years, but the simple fact is that hospitals are not designed to house data centers."

Stephen Stewart, Assistant Director of Technology and Telecommunications, South Eastern Health and Social Care Trust, Northern Ireland.[1]

We are living through a time of huge technological change. The 4th Industrial Revolution – characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres[2] – is disrupting almost every industry, and healthcare is no exception. The application of current technological innovations within this sector has the potential to transform the way care is delivered, change how healthcare facilities operate and dramatically improve patient experience.

This paper sets out to examine healthcare's increasing reliance on data and the associated challenges, with a particular focus on optimizing data center performance. It offers practical advice for data center transformation and draws on a case study from the University Hospital of Basel, exploring the benefits they derived from the implementation of ABB's MNS®-Up solution, which provides their data center with power distribution and uninterruptible power supply in a single, compact system.

While focused on the healthcare industry, this paper is also relevant to other sectors facing similar challenges, such as an increasing dependence on quick and easy access to sensitive data, limited resources and zero tolerance for downtime.

[1] Information Age
[2] World Economic Forum

# Key developments within healthcare

Three key developments are contributing to the ever-increasing importance of data within the healthcare sector.

Firstly, the widespread development and adoption of Electronic Health Record (EHR) systems allow the creation of a digital version of each patient's journey, from consultation to prescription. EHRs are real-time records that make information available instantly and securely to authorized users, including medical history, diagnoses, medications, treatment plans, allergies, images and test results[3]. Patient data is centralized and made available at anytime, anywhere within the healthcare facility, for staff to make real decisions on patient care.

Secondly, improvements in diagnostic imaging, including the introduction of ultra-fast scans, 3D imaging and advanced in-depth imaging, are helping healthcare professionals to more clearly understand patients' ailments than ever before. Many different departments now generate images and videos using a wide range of applications and devices, all of which need to be stored digitally for future reference. Advances in image quality mean that file size is increasing too, with a single MRI scan averaging 100 megabytes[4].

Thirdly, the integration of connected devices presents new opportunities for the delivery of care and may completely change the way in which healthcare institutions operate. For example, data from wearables can feed into patient records and provide medical professionals with an overview of general health, whilst similar technology can be used to monitor patients remotely, helping to send patients home earlier and caring for the elderly in their own homes. Devices within the body, such as pacemakers, can also be connected. This technology is based on sensors, which are continuously producing data that needs to be stored and analyzed.

The collection of patient data through EHRs, advanced imaging and connected devices creates a vast and growing resource – the global healthcare industry generates 30% of the world's data[5] and this is set to increase. IDC predicts that healthcare data is growing by 48 percent each year and will reach 2.3 zettabytes by 2020[6]. As healthcare comes to rely more heavily than ever on data, the processing and storage of this data is increasingly important. Data centers are now a critical component in delivering patient care.
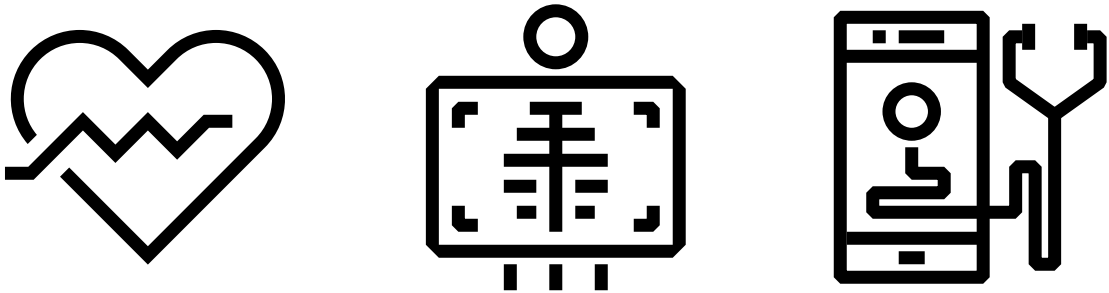
[3] HealthIT.gov
[4] Data Center Knowledge
[5] Healthcare IT News
[6] IDC

A variety of challenges for data storage

Optimize data center performance

There are a number of steps to consider when looking at how to improve data centers within healthcare facilities.
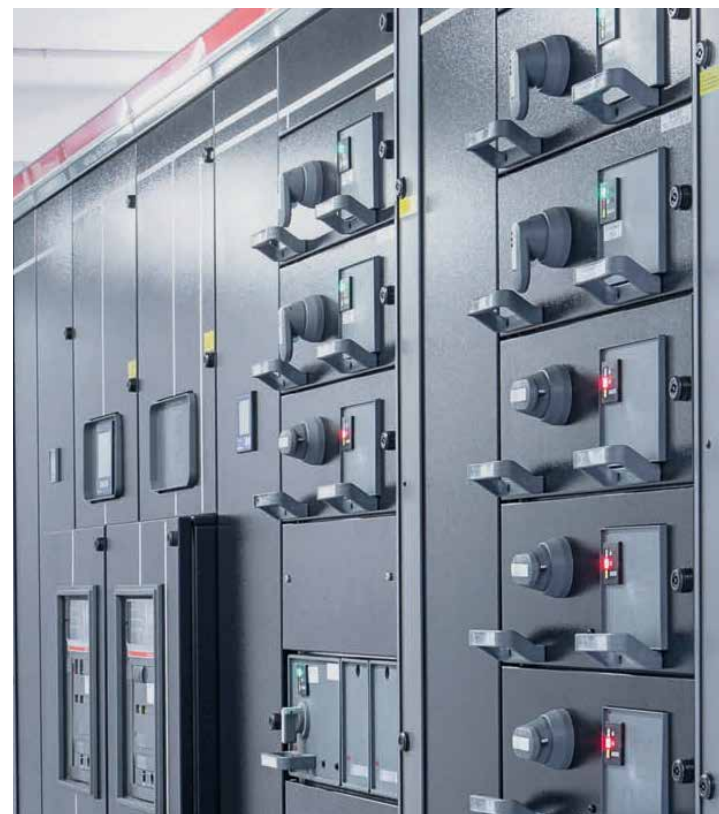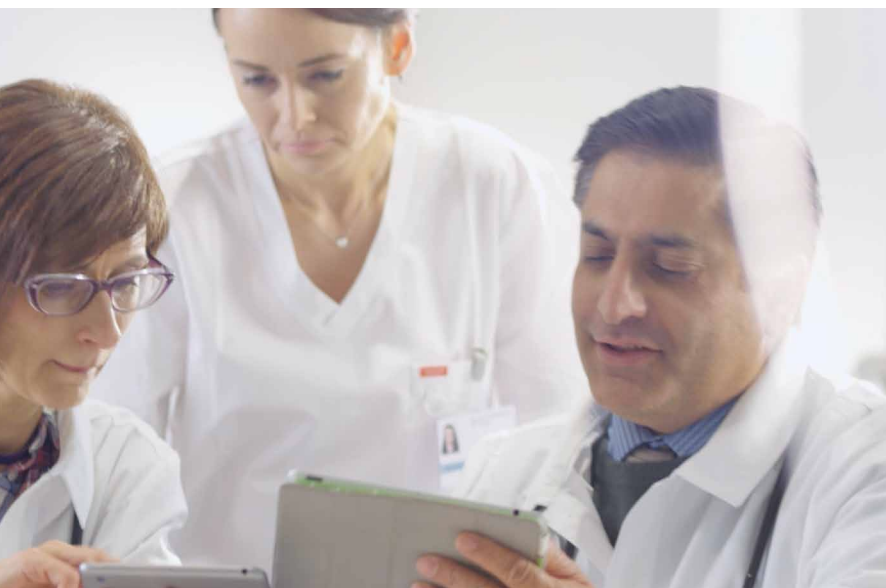
Healthcare facilities are faced with a variety of challenges when it comes to data storage. Starting with the data itself, not only is the amount of information growing rapidly, but it is also sensitive in nature, and therefore highly regulated. It may be required at any time, so needs to be stored in a live state, indefinitely.

In addition, the physical space provided for data storage is unlikely to be optimized for this purpose – after all, the building is first and foremost a healthcare facility, not a data center. It is likely that there is both a lack of space and a lack of power.

There may also be a limited budget for improvements, as the healthcare institution probably does not have funds available for expensive upgrades and retrofits. This means equipment may be aging and not built for the purpose, which it must now serve.

Finally, as healthcare facilities rely ever more heavily on data, downtime becomes a serious risk, and one which should be prevented at all costs. Failure to perform has widespread impacts – a hospital in Northern California reported that after their data center cooling system failed, their EHR system was down for a week, meaning staff could not access patient records and treatments were either postponed or cancelled[7].

It is important to develop a plan for optimization based on small but significant changes, and this should include gradually retiring old equipment whilst implementing scalable solutions, which will allow the data center to expand capacity quickly and easily in future, without taking up more physical space. Modular and scalable solutions can be helpful here, as they often combine multiple functions into one unit, thus saving space, they are flexible to add to or change, the prefabricated units are built to comply with all the necessary regulations and can be deployed in minimum time.

Collaboration is essential, and this likely means working with a much wider group of stakeholders as the number of departments using technology rooted in the data center increases. Consultations may be required with medical practitioners, sustainability managers and compliance managers to name but a few, and these conversations are necessary to make sure that the data center can provide the physical infrastructure required for each new project. If it cannot, new projects should not be started until data center optimization has taken place. This may help to encourage executive support for investment in data center upgrades. With the rate of adoption of new technologies, it is prudent to check that new solutions are ready for big data analytics, for example able to integrate with Hadoop based systems.

Planning must guard against the variety of causes of downtime. The leading cause of data center downtime is reported to be UPS failure, accountable for 25% of outages in 2015[8], closely followed by the fastest growing cause of downtime, security breaches, accountable for

22% of outages in 2015[9]. If no redundancy is designed into your UPS and if security systems are not robust, these are the first areas that require optimization. Redesign your power supply architecture for resiliency and combine backup and disaster recovery to ensure there is no data loss of critical clinical data and services can be quickly brought back online after an incident.

It is necessary to implement a platform that all departments and applications can use to access data. Using standard file sharing protocols such as CIFS (windows based) and NFS (UNIX based) can help to simplify access. The cost of managing multiple image systems can be reduced by consolidating all image stores into one. It is also important to consider a methodology for data migration, which will allow data to be moved internally from old to new storage with no downtime and little cost.

Data is required to be accessible at all times, yet may not be needed for many years if individuals do not need to visit the healthcare institution. A high performance strategy, which incorporates integrated archiving can help to reduce costs.

[7] Datacenter Dynamics

[8] Data Center Knowledge
[9] Data Center Knowledge

Case study: University Hospital of Basel

With 6,700 staff and 700 beds, the University Hospital of Basel is the biggest healthcare facility in north-west Switzerland, bringing together 50 clinics, units and institutes.

From x-rays and clinical reports to administration, all patient information is stored digitally in the hospital's data center and made available to staff, whenever they need it, from multiple access points throughout the hospital buildings. It is essential that the hospital's electrical infrastructure is the best that it can be – lives depend on it.

In 2015, ABB began to work with the hospital to upgrade their data center and ensure that it was able to support new technologies. Thomas Schoeffel, Head of Electrical and Communication Engineering, explained that for the hospital, "a successful data system has to be available 100% of the time without interruption."

The hospital decided to implement ABB's MNS-Up solution, which provides the data center with power distribution and uninterruptible power supply in a single, modular, scalable and compact system. This solution means backup power is available whenever it's needed, so vital patient data is always at hand.

In addition, with the number of patients increasing every year, but limited space to expand, MNS-Up's modular and scalable design allows the data center to increase in power, but not in size, at any time.

Thomas explains: "The modular design is very important because there is never enough space. And a scalable solution has the advantage that I don't have to order, buy and install a big facility from the outset. Plus because of its small, compact size it can fit into the data center in various places. We will definitely work with modular systems again. We have already ordered a new system and we will continue to do so in the future."

With MNS-Up, the hospital staff have the peace of mind to know that the data center will provide the right information, whenever required. Reliable power means the staff can concentrate on delivering the best medical treatment and patient care.

Intelligent data needs intelligent power
It is not likely that developments in healthcare technology will slow down any time soon and the industry is set to continue producing increasing amounts of 'intelligent' data. The resulting challenges for healthcare data centers need to be addressed sooner rather than later, to prevent systems from shutting down and causing widespread issues for facilities and their patients. It is essential to plan for transformation and ensure this incorporates scalability, reliability and performance.

MNS®-Up Product Details

Benefits
- Scalable 100 kW modules enable rapid growth without over-investment
- Space savings of 20-30%
- Faster installation and commissioning means operations start sooner
- Planned incremental additions ensure responsible energy consumption and facility growth match with business growth
- Switchgear and UPS modules can be safely and rapidly swapped online, lowering maintenance costs and maintaining uptime
- Factory assembly and testing of MNS-Up means higher levels of quality and safety
- With ABB factories and service centers in 106 countries, customers receive fast deliveries and responsive, professional local support

Proven expertise
ABB is the industry leader in low-voltage power supply. The new MNS-Up power supply solution distills the company's expertise in data center technology, UPS and low-voltage power distribution into a compact, powerful system that takes your power supply architecture to the next level.

Scale up with 100 kW modules
MNS-Up's modular design expands in 100 kW steps so that companies just pay as they grow. Each frame of the system can support up to five 100 kW UPS modules. Up to six frames can be combined to provide 3 MW of backup power supply. For more power, further systems can be installed in parallel. ABB can install MNS-Up in whatever configuration works best in the space available – L-shape, U-shape, straight lines or back-to-back – and all without external bus ducts or cables.

Space savings of up to 30%
By integrating proven UPS and switchgear technologies into a single, modular, scalable and compact system, MNS-Up saves space, time and money. For a simple 500 kW system, the space saving can be 20%. For systems of 2 MW or more, the footprint saving is more than 30%.

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