

Big data and data centers

Whitepaper

Contents		Page
1	Big data and data centers	3
1.1	Big data, big IT	3
1.2	The IT organization between day-to-day business and innovation	4
2	Modern data centers	5
2.1	Security	6
2.2	Availability and scalability	6
2.3	Connectivity.....	7
3	Executive summary.....	7
4	About ITENOS GmbH.....	8

List of figures		Page
Figure 1:	Infrastructure – the fundamental basis for the IT (source: Experton Group AG)	5
Figure 2:	Challenges faced by companies with internal data centers	6
Figure 3:	Service levels at an internal data center?	7
Figure4:	ITENOS GmbH certifications	8

1 Big data and data centers

"Big data" refers to the effective use and analysis of the large amounts of data created by modern information technology. Simply put, it involves the systematic analysis of structured and unstructured data from multiple, heterogeneous sources – in theory all the information produced by a company's business activities.

1.1 Big data, big IT

There is certainly no shortage of data at companies; it is generated in impressive quantities. A few examples:

- Internal and external e-mails
- Presentations, reports and spreadsheets for projects and products
- Comments and posts about the company on social networks and in blogs
- Information about sales from web shops and POS systems
- Data from CRM, ERP and BPM applications
- Recordings from hundreds of sensors in factory equipment and much more

The above list clearly shows: a lack of data isn't the problem. Every company has data – in fact, much more than it can analyze. They can benefit from analyzing this data, however: companies can optimize their existing business processes; establish new, additional services for their existing products and services and even develop completely new business models.

Big data technologies can benefit a variety of departments throughout a company:

- Marketing is interested in analyzing advertising campaigns and social media activities.
- Sales would like to have after-sales analyses, to generate forecasts for future purchase patterns.
- The Production department wants to analyze the existing machine data – and get additional data – about the mechanical stresses on the factory equipment.

Yet big data technologies are more complex than existing procedures for business intelligence (BI) or business analytics (BA). One example: companies that want to use big data technology have to abandon the data warehouse concept. Instead, a "data lake" is used: the largest possible storage area that contains all data as a copy and largely leaves it in its original state. It is only transformed into structured data formats during processing, by special big data analytics software. The analysis itself also imposes higher demands than standard database applications. The much larger data volumes and more complicated analysis methods normally require the use of modern in-memory databases. A prerequisite for this is appropriately sized IT systems that are specially adapted to using this technology.

In short, big data demands big IT.

When the specialist departments at a company order a big data solution from the IT organization, the requirements for the IT infrastructure might not be clear right away. This makes it difficult to find a balance between the scalability of the IT and its cost-effectiveness. Moreover, in some cases, an existing data center might not have any reserves to expand capacity – because the maximum power density has been reached or there is no space for structural expansion.

1.2 The IT organization between day-to-day business and innovation

A data center is always operated within three dimensions: firstly, the functions for the IT and business processes; secondly, the energy and resource efficiency and thirdly, flexible positioning for the future. This makes it necessary to handle a vast thematic breadth. A specific design and customized building engineering have to be taken into account, as do air conditioning, fire protection, power supply, emergency power equipment and communication links. Other important aspects include building security and access controls, which are integral parts of any high-security data center.

A data center is always operated within three dimensions: firstly, the functions for the IT and business processes; secondly, the energy and resource efficiency and thirdly, flexible positioning for the future. This makes it necessary to handle a vast thematic breadth. A specific design and customized building engineering have to be taken into account, as do air conditioning, fire protection, power supply, emergency power equipment and communication links. Other important aspects include building security and access controls, which are integral parts of any high-security data centers.

Within these diverse topics, data center infrastructure management (DCIM) ensures order. It links the IT infrastructure with the building infrastructure, for example, the power supply and air conditioning. After all, even the day-to-day operations of a data center can be highly dynamic.

The precautions against power failures must satisfy the new standard DIN EN 50600 on data center facilities and infrastructures, for example, new processes and technologies for cooling server racks must be reviewed and, if applicable, implemented, and an energy audit as described in DIN EN 16247-1 might be on the agenda as well. Even if workloads don't change much, the operator is still required to modernize the data center regularly and adapt it to new standards.

But what about innovation? New technologies such as social media, enterprise mobility, data analytics and cloud services mean strategic IT projects at companies are increasingly crucial. Their greater productivity, innovation and increased revenues contribute to the company's competitiveness. Here, as well, complexity is increasing continually, as several typical data center projects show:

- Virtualization of servers and desktops
- VMware versus Red Hat versus Citrix
- Storage area networks with flash memory
- Planning an Exchange infrastructure
- In-memory computing for analytics projects
- Managed services

A company's IT organization is often caught between day-to-day business and the need to support innovations. This conflict can be difficult to balance. In such situations, the IT administrators and company management should consider the powerful data centers offered by co-location and housing service providers.

In addition to their flexible provisioning of performance and space, as a result of their high specialization in their core business, co-location providers are much more capable of mastering these technical challenges than the users of the data center infrastructure, whose core competencies generally lie in other industry sectors.

2 Modern data centers

Data centers have a scalable infrastructure that makes them the perfect foundation for modern IT solutions, applications and all requirements for big data, Industry 4.0 and the Internet of Things. Figure 1 shows that infrastructure is the fundamental basis for the IT.

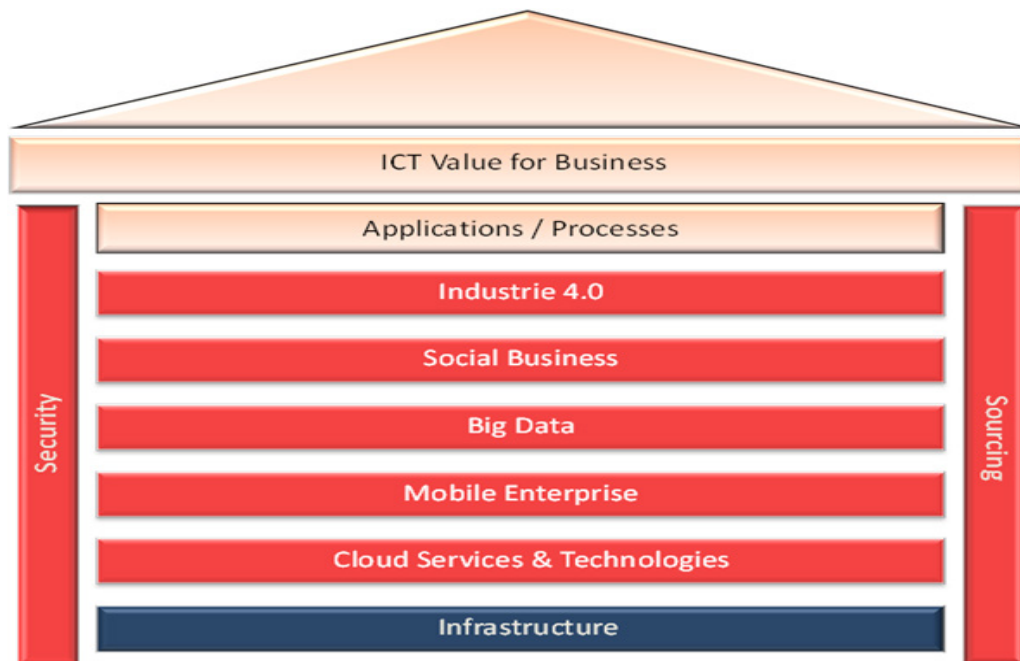


Figure 1: Infrastructure – the fundamental basis for the IT (source: Experton Group AG)

When mid-sized companies aim for a high level of digitization, they have two choices:

- They can run their own data centers, with all the associated challenges and consequences
- They can shift their IT operations to a service provider's data center

Cost is an important criterion in deciding for or against an internal data center: can the company afford independent data center operations and the necessary staffing levels? Below a certain size and revenue level, this question can be answered quickly.

Yet costs are not the only aspect. A variety of factors must be considered when it comes to building and running an internal data center: budget has to be allocated, contracts with software and hardware suppliers negotiated and signed and consultants acquired for specialist topics. Moreover, the IT organization requires appropriate processes and the operating expertise. Last but not least, numerous certifications are required to operate a data center (see Figure 2).



Figure 2: Challenges faced by companies with internal data centers

Moreover, there is the question of whether an internal data center can provide – and comply with – the operational SLAs required to deliver the mission-critical IT processes and services at all. Key business elements like guaranteed availability (with penalties in case of non-compliance), transparency of activities and costs and a clear contract in case of dispute are only possible if operating responsibility is outsourced.

2.1 Security

A data center is a high-security area that requires fire detection and extinguishing systems in addition to modern IT systems for monitoring and operations. The location is also decisive: if the data center is located on the company premises, it has to be accessible unhindered – and thus available – even in case of incidents with production equipment or other events. In addition, the systems for access control and fire detection and extinguishing systems must be coordinated with one another in detail. Last but not least, system procurement and operations are cost-intensive and highly complex.

2.2 Availability and scalability

When an internal data center is planned, its size and dimensions are always subject to some uncertainty. Ideally, the data center will provide resources for peak loads, while at the same time maintaining a reserve for future requirements that are difficult – if not impossible – to predict today. This involves both floor space in general and allocation of the cooling systems.

At the same time, technical progress will likely deliver new, smaller, more efficient IT components with lower space requirements, but higher performance. As a result, the exact requirements of a data center are extremely difficult to estimate. If supersized infrastructure is run at low loads, the IT operations can never achieve the sweet spot of optimal resource efficiency.

In contrast, modern service provider data centers achieve much greater efficiency through synergetic utilization of the infrastructure, enabling them to reduce operating costs and minimize the deployed resources. To achieve this, DCIM (data center infrastructure management) tools are used for monitoring

and operations, to avoid critical load situations and keep operating ranges within defined thresholds. These tools feature a variety of synchronized functions and enable proactive error avoidance, instead of reactive fault clearance.

What's more, all services can be contractually defined in an SLA with the data center's service provider. If this is possible at all with an internal data center, the separation of responsibility is much more fuzzy.

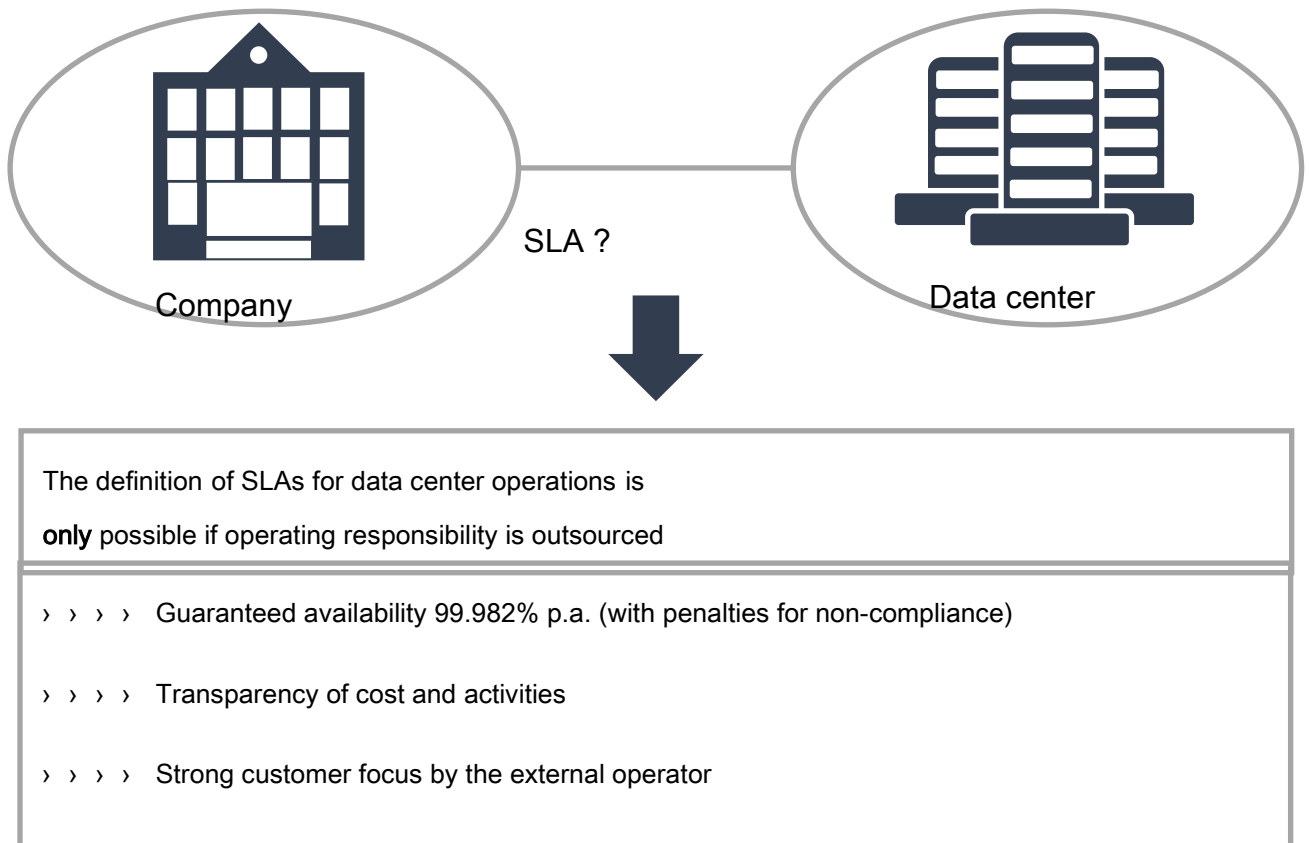


Figure 3: Service levels at an internal data center?

2.3 Connectivity

Another advantage of service provider data centers is their simple connectivity with powerful backbones, carriers and IP exchanges. As a result, there is direct access to main fiber-optic links and to IP services from numerous domestic and international providers. Internal data centers only rarely offer this kind of diversity.

In addition, a service provider data center creates ecosystems that enable companies to connect with customers, suppliers and other service providers easily. The benefit: they do not have to establish expensive, latency-critical links between their own data center and their business partners separately.

3 Executive summary

Big data solutions require relatively high IP outlays, because large amounts of data have to be stored and processed in real time. It requires enhancements to a company's IT infrastructure. In many cases, existing data centers are frequently not equipped to meet the demands of big data and expansion is not always a simple matter.

The logical solution in many cases is the migration of big data solutions to modern, high-performance data centers run by co-location and housing service providers. This enables companies to keep a handle on their own IT outlays and saves them from having to invest in expansion of their own IT infrastructure and hire additional experts.

4 About ITENOS GmbH

ITENOS – From expert group to IT service provider

Established in 1993 as an expert group for data communication and network management, ITENOS is fully integrated in the Deutsche Telekom Group. ITENOS was involved with major projects from its beginnings and quickly became a leading specialist for secure information and communications technology (ICT).

Within the Deutsche Telekom AG group, ITENOS and its three business areas Data Centers, Networks and Managed IT Services is specialized in meeting the needs of SME customers. ITENOS serves as a flexible, reliable partner whose independence ensures that decisions are always made in favor of custom-tailored solutions in long-term partnerships with its customers, while at the same time being able to draw on the resources of a major corporation on demand whenever needed.

Certifications

ITENOS operates certified management systems throughout the company, including IT service management under ISO 20000, quality management under ISO 9001, information security management under ISO 27001 and energy management under ISO 50001. Compliance with these strict international specifications is checked annually and independently by DQS GmbH.



Figure4: ITENOS GmbH certifications

The Author



Thomas Hochhaus,
Account Manager
Business Unit Data LogistIX
ITENOS GmbH