WHITE PAPER

Combine the Benefits of SAP and Clouds

REALIZE AN AGILE YET SECURE HYBRID CLOUD STRATEGY

NTT DATA Business Solutions

SAP Platinum Partner

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Trusted Global Innovator

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Market research by Gartner, Inc. indicates that global turnover with cloud computing in 2020 has exceeded the US$250 billion mark – and is continuing to grow.[1]
This trend shows once again that distributed resources have become an everyday reality for businesses all over the world. Yet cloud structures have often grown over a number of years. The result is an increasingly complex management which calls for skilled resources with a very solid level of knowledge. When setting up hybrid cloud structures, some key issues must be considered and discussed: What can the overall cloud strategy look like? How can hybrid structures be continuously developed and integrated into the cloud strategy? All of this, of course, considering the high expectations that must be met in terms of security, flexibility, and scalability.

The individual sections in this white paper discuss current cloud and deployment models available, how they differ, and how the potential added values of the hybrid cloud can translate into real-world competitive advantages. The objective here is not merely to secure the interoperability and integration capabilities of individual applications within the cloud. A targeted enhancement is just as important since this allows efficiency gains to be realized, which are usually lost when following a purely migration-based approach. A particular challenge for organizations and companies is the implementation of compliance and security requirements. Because of this, many companies opt to outsource their IT and thereby entrust the support of specialized providers. Managed services providers use the latest security technology to ensure that they are operating both the cloud and the individual applications in compliance with the applicable statutory provisions and relevant company guidelines.

- The digital transformation demands more agility – but not at the expense of security.
- Hybrid cloud environments became the ideal bridging approach to combine best of both concepts.
- It should be remembered, that only by successfully managing complexity the hybrid cloud can be used to generate real added value.

[1] https://www.gartner.com/en/newsroom/press-releases/2020-07-23-gartner-forecasts-worldwide-public-cloud-revenue-to-grow-6point3-percent-in-2020

What Is a Hybrid Cloud?

A hybrid cloud combines one or more private cloud environments with one or more public cloud landscapes. Companies are thus able to extend their own data center resources, or the resources that they obtain from their IT service provider, with the services of private and public clouds. This enables IT teams to combine the benefits of both worlds and to minimize the respective disadvantages of a single environment. Organizations and businesses are thus able to:

- use their own infrastructure (on-premise) for storing and processing sensitive data,
- exploit and scale infrastructure and platform services from hosting providers and public cloud providers,
- flexibly transfer applications or data, for example to allow latency-free working in the public cloud while providing bandwidth for data-intensive applications in the private cloud.

COMBINING AGILITY AND SECURITY IN THE CLOUD

New digital business models are emerging, technical opportunities are growing faster and faster, and the business implications of trade disputes and natural phenomena must be mastered. As a result, markets are changing rapidly, and new entrants are a threat to established businesses. This poses greater challenges to decision-makers than ever before.

Businesses of course know that agility and flexibility are among the most important factors for success if they wish to keep abreast of the increasing speed of change. No wonder, therefore, that the initial reservations of companies towards intelligent connections to data sources and databases belong to the past. At the same time, environmental catastrophes and the COVID-19 pandemic have indicated strikingly how sustainable businesses can profit from the cloud. It is after all becoming ever clearer that organizations can use cloud infrastructures and services not only to accelerate their innovations and shorten the time to market but also to have the capability of responding to unforeseen events and come up with the right answer faster during critical market developments. Market research companies such as Forrester believe that in 2021 cloud computing will contribute significantly toward enabling companies to recover from the pandemic.[2]

Businesses with cloud infrastructures are less vulnerable to critical market trends.

Yet the search for a tailor-made cloud strategy and the operational concept for IT landscapes with cloud integration poses numerous challenges for those responsible. The trend toward cloud structures from different providers is highly conspicuous. The focus here is above all on deciding on a suitable networking model, together with increased requirements for data security and compliance. This is particularly the case where IT infrastructures have grown over many years, resulting in a diversity of links and dependencies. Therefore, it is even more important to develop the right network and management models to orchestrate hybrid infrastructures sustainably and realize added values in operation. It is also crucial to evaluate the interoperability of applications in the cloud in order to implement a seamless integration.

The Best of Two Worlds

Many companies opt for a hybrid cloud strategy because they wish to keep their own infrastructure, mainly for security reasons. Yet they also want to open up new fields of application flexibly and to enable extended user experiences. Cloud platforms offer additional IT functionality for linking data in big data analyses through artificial intelligence or machine learning and further innovative application scenarios.

In an ideal situation a hybrid cloud combines control and security with needs-based scalability.

These objectives can be achieved with a hybrid cloud, since it combines the following advantages of a private cloud with those of a public cloud:

Private Cloud: Compatible, Independent and Secure.

A private cloud consists of dedicated resources used exclusively by one company. It may be physically situated in its own data center or be hosted by external providers, often accessible via virtual private networks (VPN). All data is protected by single or multi-stage firewalls. A private cloud offers a high level of control, since IT governance and compliance requirements can be implemented individually. In comparison to a public cloud, it therefore also results in a higher outlay for administration. Additionally, a private cloud cannot scale flexibly to all needs and does not offer the diversity of services of a public cloud.

[2] https://go.forrester.com/blogs/predictions-2021-cloud-computing-powers-pandemic-recovery/

Public Cloud: Highly Available, Scalable and Cost-Efficient.
With a public cloud, businesses rent dedicated processing power or infrastructure, storage space or applications and services. These are operated and provided by international providers such as Amazon Web Services (AWS), Microsoft Azure or Google Cloud Platform (GCP). Since companies pay a usage-based fee for these services, entry into the public cloud comes at lower cost. Additionally, there are no investments for hardware or system maintenance. A public cloud further allows for a dynamic adaptation in the event of demand peaks. Scaling options can be added in a minimum of time to meet demand. To avoid uncontrolled growth, many providers offer various solutions for demand-oriented provision of services and usage-based billing.

Many companies and organizations that must satisfy particularly high data protection requirements are choosing a hybrid cloud approach to process and monitor business-critical or sensitive workloads in their private cloud. Less critical workloads can be moved to the public cloud with its flexibly scalable capacities in order to respond quickly to new business challenges and to realize growth potential. At the same time, a hybrid cloud designed individually allows cost advantages. But there also are constellations where SAP workloads can be run more cost-effectively on premises of customers or in a private cloud than in a pure public cloud environment.

SAP workloads can be run more cost-effectively in a hybrid cloud than in a pure public cloud.

Amazon Web Services (AWS)

Amazon Web Services (AWS) is one of the world's leading public cloud platform and a technological trailblazer among the 'hyperscalers'. The ongoing development of the hardware used results in high data throughputs. The AWS Marketplace offers companies hundreds of services – from infrastructure solutions and databases to specific software solutions for machine learning, artificial intelligence (AI), data lakes and Internet of Things (IoT).

Microsoft Azure

Microsoft's public cloud platform, Azure, offers all necessary cloud services for efficient and secure operation. Latest platform services add the ongoing development of a cloud solution through intelligent data links, from sensors and databases through to the office workstation. With its 'Azure Hybrid Benefit' and through Enterprise Agreements, Microsoft offers particular cost advantages for license customers who migrate their workloads to Azure. Since 2019, Microsoft has had data centers in over 140 countries. Through the Embrace partnership with SAP, Microsoft Azure offers the simplest, fastest and most innovative methods of operating SAP S/4HANA®.

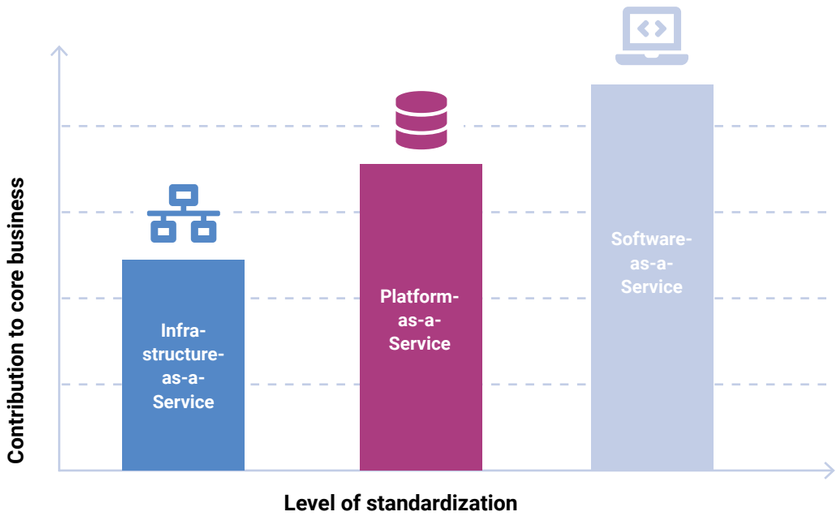
Services for the Hybrid Cloud
Private, public and hybrid clouds offer flexibly scalable ‚as-a-Service' delivery models. These are processing, storage or network services, operating environments or applications that are provided and hosted by cloud providers. The most common types of 'as-a-Service' models offered are Infrastructure-as-a-Service, Platform-as-a-Service, and Software-as-a-Service:

- **Infrastructure-as-a-Service (IaaS)** offers companies practically all infrastructure components typically found in a data center, providing processing capacity, storage space and network bandwith. The cloud provider handles the operation and maintenance of the infrastructure of its data centers. Installation and configuration are normally handled by the user or a service provider remotely.

- **Platform-as-a-Service (PaaS)** offers a complete platform in the cloud environment for the development and subsequent use of software, i.e. a development environment including software development kit (SDK) and linking options for mobile end devices and cloud-native applications, debugging processes, programming languages, monitoring functions and much more. PaaS providers handle the maintenance of the hardware and software.

- **Software-as-a-Service (SaaS)** offers users software that they can access in a familiar way via a browser – SAP and Microsoft Office applications, groupware or collaboration and many more solutions. The software is, however, operated by the public cloud provider. In comparison to on-premise installations, software licenses for SaaS are not purchased but rented. For companies, this might be more attractive in terms of initial investments and maintenance costs, since the solutions run independently of their own infrastructure or platforms.

Figure 1: Deployment models for cloud infrastructures



‚as-a-Service' reduces investment costs and lessens the burden on incompany IT.

Each cloud strategy must be oriented to individual business requirements and objectives.

1. HYBRID CLOUD: FROM BUSINESS REQUIREMENTS TO OPERATION

Nine Questions and Migration Options

Every cloud requirement is derived from the business processes and should always consider that a cloud transformation comes with implications for large parts of the company or indeed the entire organization. Depending on the status quo and the individual objectives of your business, you should therefore begin by considering the following questions:

- [ ] **1.** Does your company have sufficient experience, capacity and know-how to achieve the desired benefits from the cloud and to develop a concept linked to the company's objectives?
- [ ] **2.** If a service provider is involved: what experience can be provided? What services can it offer you? Does it operate its own data centers?
- [ ] **3.** Which of your applications are already cloud-ready? Should these continue to be operated in the cloud, or should they be replaced by native cloud applications?
- [ ] **4.** Where in your organization would it be effective to use IaaS, PaaS or SaaS?
- [ ] **5.** What standards and certifications must cloud providers and their services fulfil for your company, for example with regard to compliance, service level agreements (SLAs) and support?
- [ ] **6.** Which workloads should be deployed where in the hybrid cloud?
- [ ] **7.** Where is your business likely to experience peak loads that can be addressed by scalable cloud solutions?
- [ ] **8.** To what extent are the costs shifted from CAPEX to OPEX as cloud usage increases?
- [ ] **9.** Which employee profiles will be needed in your company in the future?

A particularly rapid journey to the cloud promises the 'Lift and Shift' method, also known as rehosting, in which the applications or workloads, including all associated data, are simply moved as unaltered copies from the data center to the cloud. The IaaS level often comes into play here, on which virtualized resources such as processing power, storage capacity and network connections can be operated without substantial adaptations.

'Lift and Shift' can be useful where time and budget are of highest priority. Operating applications that are not properly adapted, however, can result in significant cost disadvantages, since the efficiency potentials of the cloud are not exploited. Additionally, the administrative outlay increases since load peaks occurring in applications usually cannot be automatically intercepted without design changes. These disadvantages can be avoided in many ways – from code optimization through refactoring or rebuilding through to the use of container technologies, or indeed by exchanging the application with a cloud-native SaaS solution.

Migration by 'Lift and Shift' often results in high consequent costs and a loss of performance potential.

A further challenge is the decision whether the data should be stored on-premises or in external data centers or alternatively in the public cloud. This calls for an extensive understanding of the in-company IT infrastructure, the application design and the business development of a company and also of the business processes and efficiency criteria that must be observed when combining different deployment models. Here again, the 'wrong' decision can result in performance losses and extra costs.

The uninterruptible and error-free operation of business-critical applications such as SAP® ERP or SAP S/4HANA plays a prominent role in any migration project.For many IT departments, data and service migration nevertheless poses enormous challenges. To exclude any possibility of risk, many businesses rely on the support of external service providers with extensive experience in the fields of hybrid cloud management and application management services. Any failure can then be either proactively avoided or quickly remedied by the relevant remote services.

Integration and Management of a Hybrid Cloud

According to Statista, 70 per cent of all companies surveyed still regard the migration of existing IT solutions to the public cloud as a major challenge in 2020.[3] Difficulties with meeting compliance and security requirements are particularly common here. In many cases, however, it is the company's own IT infrastructure that slows down the cloud operation. On top of this is the insufficient adaptation of business and IT processes and a lack of qualified personnel.

Professional hybrid cloud management helps avoid business-critical risks during the migration of data and services.

[3] https://www.statista.com/statistics/511283/worldwide-survey-cloud-computing-risks/

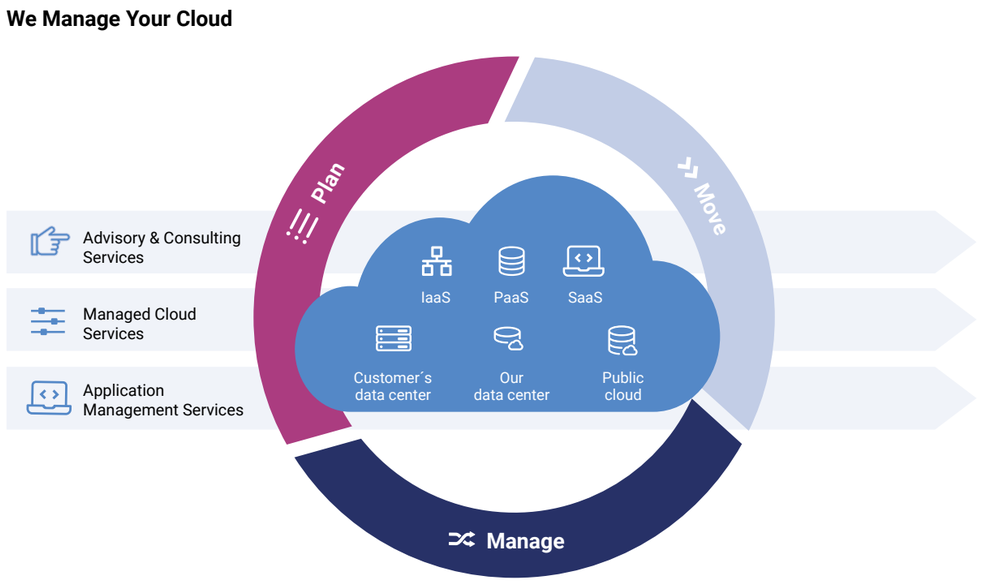


Figure 2: Because of the intermeshing services from consulting to cloud and application management, NTT DATA Business Solutions customers can focus entirely on their core business

Indeed it is no trivial matter to integrate different networks securely and scalably. Both, however, are basic preconditions for interoperability and for goal-oriented data connections in real time. In addition to the expedient migration of applications and data, one of the critical key factors for successfully running a hybrid cloud is thus also a suitable link via defined interfaces within the networked cloud infrastructure. To simplify the challenges associated with this, consistent cloud management is necessary. It is helpful here to employ a cloud management platform (CMP) that brings together the administrative functions for hybrid and multi-cloud environments in one dashboard. Added value can be obtained directly here by using managed cloud service providers that, for example, come with an additional service delivery management including ticketing tools, along with extensive control and adaptation options up to the application and user levels.

Interoperability and latency-free working in the hybrid cloud require a secure and scalable integration of the various networks.

Effective cloud management offers IT administrators more than just an overview of their system landscape. It can also contribute significantly to increasing operational agility, since companies can detect, analyze and correct changes faster in the hybrid cloud. Additionally, effective service management brings many other advantages. Depending on the provider, services range from service request management and the automation of process sequences, orchestration and provisioning to resource, capacity and performance management and to secured compliance and IT governance. In high-performance services, an accounting and cost management facility should also be included.

2. USING FLEXIBILITY AND SCALABILITY TO BOOST PROFITABILITY

Intercept Peaks and Support Organic Growth

The elasticity of the public cloud not only makes it possible to intercept short-term or periodic load peaks and to introduce new applications faster; it also aids organic growth and corporate mergers and the integration of external partners for collaborative projects. It is also no longer necessary to reserve overcapacity in the in-company infrastructure to cope with seasonal or other fluctuations. Instead, resources such as storage space, in-memory processing power and other function-alities can be scaled just in time and precisely, while sandboxes, for example, can be used cost-effectively for test scenarios or development projects, without the need to purchase and maintain hardware.

Resource pooling brings high availability on demand to the resources that require scaling. In practice it makes them usable within minutes, and they can be freed up again just as quickly. It is billed in a pay-as-you-go model.

Scaling the Hybrid Cloud

In a hybrid cloud, the desired scaling effects are best achieved when the on-premise software works smoothly with the software of the public cloud. The reason: if one application scales more slowly than the other, the desired increases in performance do not materialize and the positive cloud effects are lost.

In addition, companies must ensure that along with the technical scalability, their business processes must also be scaled. Cloud applications boost commercial benefits and profitability only when the extra processing power available is actually used for fast and specific processes within the company and in exchanges with suppliers and customers.

Cloudbursting and Autoscaling

Cloudbursting

In cloudbursting, an automatic switch to the public cloud occurs when the resources of the on-premise solution or the private cloud are used up. Costs can only occur when the additional performance is actually used.

Autoscaling

Autoscaling enables performance optimization in applications when the demands are changing. If, for example, an application registers millions of accesses in the daytime but none at night, the additional resources required for the application are automatically provided for the appropriate time period.

3. ENSURING DATA SECURITY AND LEGAL CONFORMITY

Maintaining Transparency and Control
The largest concerns and difficulties around cloud computing continue to be security and compliance. By using a public cloud, a company is also surrendering a large amount of control of its data and information processes. At the same time, if the security concepts are inadequate, vulnerabilities that can be exploited by cyber criminals open up.

The associated risks are many:

- Offering services over the Internet opens the gate to hackers and malware if security is not sufficiently maintained.
- Differences in international law and high data protection requirements in the European Union make compliance with statutory provisions complex.
- Depending on the provider's particular management console, virtualization technologies can complicate the overview of the server landscape and the monitoring of resources.

For less critical applications, such as for collaboration or communication, the risks may still be acceptable. With business-critical applications such as ERP or the processing of data from the development department, the tolerance limits are nonetheless very strict. Ultimately, cloud users remain responsible for the security of their data and for observing compliance requirements even when the data is held by the cloud provider. Every cloud strategy therefore also involves classification of the various data: which are non-critical, which are critical, and which are subject to special statutory requirements?

Trustworthy Providers Offer a High Level of Security
As well as choosing a trustworthy and appropriately certified public cloud offering by Amazon Web Services (AWS) or Microsoft Azure, it is also important to note the location of the data center for the hosted private cloud. For any company, it is always simplest to keep its data within the country of its headquarters and its business activity. If this is not possible, a contractual agreement with the provider should clarify the country in which the infrastructure to be used and who can access it. In a hybrid environment, this enables the private cloud to be implemented in legal conformity. With public cloud solutions this can sometimes be more difficult, for instance when special services such as load balancing or machine learning can be obtained only in the USA or if log files are stored in third countries. These issues must be specifically addressed with the relevant provider when drafting the contract.

Irrespective of this, compliance and IT security remain a complex challenge for smaller and medium-sized businesses. Many companies therefore rely on assistance from certified providers for managed cloud services that use up-to-date security technology and adapt industry-specific applications to the particular statutory provisions that apply. At the same time, for purposes of business continuity it is also wise to outsource the data center for the operation of a hybrid cloud to suitable service providers with their own high-availability data centers.

Why You Should Make the Most of Hosting Partner's Data Center Capacities

For many companies, IT or SAP outsourcing to external data centers is an efficient, robust and secure alternative to their own infrastructure. This approach enables the fixed investment costs of operating the SAP landscape in an in-company data center to be noticeably reduced, since costs occur only for services that are actually used. At the same time, companies benefit from suitably audited and certified providers of the highest security standards, up-to-date, high-availability technology, and comprehensive support and expert know-how that is rarely available in-house.

A cloud provider with its own data center should nevertheless be chosen only on the basis of strict criteria. The provider must thus be able to demonstrate sufficient bandwidth, must offer high availability at any time by means of redundancy, and ideally should have its own development competence in order to optimize workloads. Also crucial are certified security processes, robust physical protective measures, a convincing backup and disaster-recovery strategy, and legally compliant data storage.

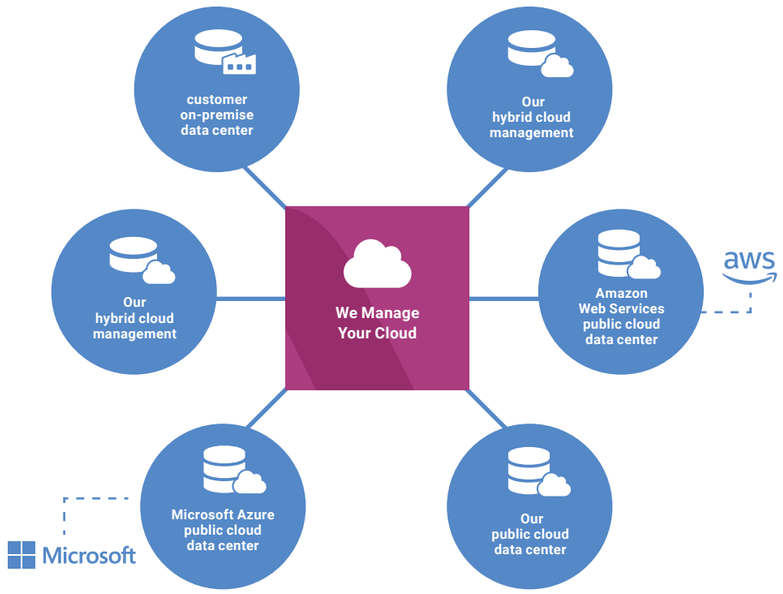


Figure 3: Integrated cloud management with secure access to any cloud solution

4. SUMMARY: DETECTING POTENTIAL AND USING IT STRATEGICALLY

As an advantageous symbiosis of private and public environments, hybrid cloud infrastructures satisfy high security requirements while also meeting the growing needs for agility and speed of response. At least, that is the theory. In practice, however, hybrid cloud landscapes have grown over many years and a large number of links and dependencies complicates their management.

There are various reasons for uncontrolled growth, but mainly it is because of an insufficient reflection of the business requirements or insufficient resources. Thus, for example, supposedly straightforward 'lift and shift' methods are used to effect rapid cloud migrations that later result in performance losses and avoidable costs. Generally recommended are code optimizations, the use of container technologies, or the conversion of an application into a ‚Software-as-a-Service' model. Very important is the choice of the best location for the data. While the public cloud, with its pay-as-you-go models, offers a flexible cost-effective solution, certain SAP workloads can be operated significantly cheaper in on-premise or private cloud environments.

Companies that wish to place their hybrid cloud on a solid, future-ready basis and so avoid risks to their business-critical applications are well advised to involve an external service provider. With deep IT expertise and a neutral consulting expertise, such a provider can advise on hosting, private and public cloud structures and thus lay the basis for a secure and scalable cloud strategy serving the company's individual business requirements and objectives. The careful outsourcing of IT and/or SAP applications can result in noticeable reductions of fixed investment costs while also satisfying high demands for security and compliance through certified access management systems.

Finally, the complexity of effective cloud management can be substantially reduced by setting up a central dashboard that offers a transparent overview of the system landscape and by using a managed service provider. Companies are thus enabled to focus on their core business, while the service provider ensures continuous operation, scalable as required, and simultaneously supports the strategically focused extension of the hybrid cloud.

We Manage Your Cloud!

Offering expert consulting, Managed Cloud Services, Application Management Services and with a unique core competence in the SAP portfolio, NTT DATA Business Solutions provides companies with help and advice. For over 30 years we have successfully met the high demands that digitization and the economic framework conditions impose on companies and their IT infrastructures as a global full service provider. In doing this, we offer a tailored combination of standardization and individualization, enable business processes to be more flexible, and design processing capacity to be scalable, while also focusing on cost efficiency, IT security and compliance. With integrated services, ten high-availability data centers and strategic partnerships with the leading public cloud providers we enable individual outsourcing models for your own business-critical solutions and applications.

We Transform. SAP® Solutions into Value

Digital transformation helps companies reach their full potential – if the underlying technologies work for the people using them! At NTT DATA Business Solutions, we design, implement, manage and continuously enhance SAP solutions to make them work for companies – and for their people.

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