White Paper

# Added Business Value with SAP in the Cloud

## From teknowlogy Group in collaboration with Amazon Web Services


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# INTRODUCTION

SAP is the leading provider of business applications worldwide. One indicator for the relevance of this software platform is the size of the SAP-related services business. Worldwide, more than €40 billion will be spent this year on consulting and systems integration for SAP solutions. An increasing share of these services' revenue is cloud-related as SAP is pushing forward its cloud business.

At present, SAP offers a number of cloud-based applications such as SuccessFactors or Ariba. In addition, SAP's core software products are able to be operated in cloud data centers.

Today, SAP customers spend billions on the operation of their SAP systems. Companies either run their systems internally, which means investments in hardware and software, data center facilities, IT personnel, etc., or they decide to outsource operations to an external services provider. Globally, more than €13 billion are being spent this year on external SAP hosting services alone, i.e. for infrastructure and SAP Basis management provided by outsourcing suppliers.

In the last few years, the combination of traditional hosting models with public cloud resources has become standard, both for SAP customers' internal IT departments and for outsourcing providers, often leading to hybrid environments.

Public cloud services for the operation of SAP systems are now well established. More and more companies are already using such offers and a much larger number of SAP users are planning to do so in the future.

However, operating ERP systems is just one of many use cases for cloud computing. We are convinced that companies can also use the cloud to complement their business software with a number of additional innovative cloud services. In this way, cloud computing delivers a far greater business advantage for SAP customers.

Since there is always some confusion about what exactly cloud means, here is our definition of the public cloud: It describes a cloud infrastructure in an external cloud data center of one of the hyperscalers (such as Amazon Web Services, Google, or Microsoft) that is shared by multiple customers. Meanwhile, the hyperscalers' value proposition is no longer limited to flexible and scalable infrastructures with global reach; the platforms provide a huge variety of preconfigured services that can be deployed in areas including analytics, machine learning, AI, IoT, or blockchain, for example. If we mention cloud in this document, we mean the public cloud as described above.

From our point of view, what drives companies to move their SAP applications to the public cloud is the desire to create a sustainable, modern, and efficient operating

environment for business-critical processes. This is true for both legacy SAP applications and the next-generation ERP suite, SAP S/4HANA.

SAP S/4HANA is one reason why companies consider the public cloud to be their future operating environment for ERP. The migration to this new product suite is associated with a transformation of the underlying infrastructure towards SAP HANA, including the certified hardware components that are required. Therefore, SAP customers are evaluating if and how the use of a cloud platform that provides SAP HANA-certified infrastructures or SAP HANA on-demand offerings to operate SAP S/4HANA is a viable approach. Instead of setting up the infrastructure on-premises and having to manage SAP HANA as well as the business software, they can instead opt for an infrastructure-as-a-service offering in combination with application operation services from an external provider.

However, the cloud can offer much more than just an operating environment for ERP software. Machine learning services, scalable data lakes for different data sources, IoT technology, and methods for software development provide a wealth of opportunities for innovation. On this basis, companies can expand and optimize ERP-supported business processes and implement completely new processes.

The authors of this paper, commissioned by Amazon Web Services, follow the SAP and cloud markets. The contents herein are based on results of market research projects and ongoing dialog with SAP users and partners. In addition, the writers of this document have looked at Amazon Web Services customers who have already gained experience with SAP software in the public cloud.

# SAP IN THE PUBLIC CLOUD – STATUS QUO

In the past, SAP customers used public cloud platforms mainly for SAP development and test systems, while for a long time they were considered to be unsuitable for hosting productive ERP workloads. However, since then, companies in all regions of the world have become much more open to consider this.

Many companies have already migrated their SAP applications, and the number of SAP instances that run in public cloud data centers is increasing rapidly. Thousands of companies are already running SAP workloads on AWS alone. This includes hundreds of SAP production systems hosted on the AWS Cloud. Examples can be found in all sectors, from major manufacturing brands such as Kellogg's, Heineken, Jaguar Land Rover, Novartis, or Bristol-Myers Squibb, to financial services institutions such as AIG or Liberty Mutual, to major energy companies such as Enel, ENGIE, BP, or GE Oil & Gas.

Not least SAP itself has been a major public cloud customer for many years. Already back in 2008, SAP became a customer of AWS. The software vendor not only uses cloud resources for development and test scenarios, but also for the hosting of their solutions, including SaaS products such as SAP Concur or SAP SuccessFactors, or the SAP Cloud Platform, for instance. AWS also was the first cloud provider to run SAP workloads. Over the recent years, SAP has extended its partnerships to all major cloud providers to further drive cloud-based innovation.

The public cloud platforms offered by the major providers have been certified by SAP. Also, they have matured in terms of the coverage of the different regions, and have taken precautions to ensure high availability, reliability, and security, including corresponding regional and vertical quality and security certifications. Therefore, it is not a surprise that according to our research, almost half of the SAP customers in countries such as Germany, the UK, and the US consider that the operation of ERP systems in the cloud is relevant for their SAP strategy.

In our view, there are a number of reasons for SAP customers to opt for the public cloud:

**Modern platform to deploy ERP and innovate processes:** Most companies are striving both to make SAP operations more efficient and to modernize existing business processes, or even enable completely new ones. To innovate processes, companies no longer look at applications alone. In addition, technologies that provide analytics, data management, and machine learning features, and the use of data from connected devices, machines, or vehicles (the internet of things) can make a significant contribution to enabling innovative business processes.

***Customer Example – Engie:*** *The international utilities company, Engie, is headquartered in France and runs its SAP systems on AWS. The decision to opt for cloud operation was related to the migration of the existing ERP software to SAP S/4HANA. For Engie, the cloud offered a faster way to deploy and scale SAP S/4HANA. The company had previously transformed its financial management and introduced new concepts for company-wide data analysis. Therefore, the cloud was chosen to meet the future operational requirements of the ERP system environment and the analysis systems.*

*AWS was not new to Engie as they had already gained experience with cloud services from other activities. Therefore, they did not start from scratch when the migration of the in-house applications of SAP Business Suite on SAP HANA to SAP S/4HANA to the AWS cloud was completed.*

*When the company started running SAP on AWS, 80% of their AWS usage was Amazon EC2, the company's service providing cloud computing capacity. Today, Engie's SAP on AWS-related usage has shifted to less than 50% of Amazon EC2: these days, the remaining 50+% are comprised of further AWS managed services.*

*In 2019, the company used 117 different AWS services for a variety of use cases.*

**Higher agility and cost reduction:** Cost reduction remains a key trigger for companies to consider a change of the deployment model for the operation of SAP systems, and to evaluate public cloud usage. Beyond that, companies also consider a shift from OPEX to CAPEX expenditures, a variabilization of costs, and greater agility in deploying new SAP systems as an advantage.

***Customer Example – Coca-Cola İçecek:*** *Coca-Cola İçecek (CCI) produces, distributes, and sells sparkling and still beverages under the Coca-Cola brand. In addition to its home market of Turkey, it operates in Azerbaijan, Iraq, Jordan, Kazakhstan, Kyrgyzstan, Pakistan, Syria, Tajikistan, and Turkmenistan. It is the world's fifth-largest bottler of Coca-Cola products by sales volume, serving more than 380 million customers. After evaluating various on-premises and cloud options, CCI decided to move its mission-critical SAP platform to AWS.*

*"By using AWS, we're saving 50-60 percent on our SAP infrastructure costs," says Levent Yildirmak, Technology Manager, Data Center and Cloud at CCI. "With the new AWS environment we're constantly optimizing our architecture, looking at the workloads we're running, and scheduling capacity only when it's required."*

*Another example is Kellogg's:*

> ***Customer Example – Kellogg's:*** *"Using AWS saves us $900,000 in infrastructure costs alone, and lets us run dozens of simulations a day so we can reduce trade spend. It's a win-win," says Stover McIlwain, Senior Director of IT Infrastructure Engineering.*

**Focus on core competencies and innovation:** Moving to the cloud can also help to free up the internal IT organization from operational tasks. This can be helpful for companies that have difficulty finding skilled personnel anyway and need the existing IT organization for more important tasks than managing IT systems.

> ***Customer Example – Zalando:*** *Zalando is a European online fashion platform based in Berlin, Germany. The company has 31 million active customers, offering more than 500,000 products from 2,500 brands.*
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> *Zalando runs a large SAP environment on AWS that allows the company to scale resources for peak times, e.g. during the Christmas season or on Black Friday. Also, the cloud helps to automate the deployment and provisioning of new SAP systems and additional SAP users. Through automation, the online retailer managed to drastically reduce the maintenance tasks for ERP operations as well as the effort involved in scaling IT resources in the cloud.*

**Scalability and performance:** Companies that grow fast require an infrastructure that can be expanded in terms of resources (such as compute power and storage) and in terms of performance. Cloud environments offer the ability to scale up IT resources without the need for a lengthy procurement process. Regarding scalability and performance, there are special requirements if companies run SAP S/4HANA, as the underlying in-memory platform SAP HANA needs a lot of CPU power and RAM.

Although performance by itself is not a business benefit, it can help to optimize business processes in terms of customer service or faster financial closing.

> ***Customer Example – Delivery Hero:*** *The fast-growing global online food ordering and delivery service provider has moved its SAP workloads into the AWS cloud. One of the benefits is the drastically increased speed to perform batch jobs and to process millions of invoices from restaurants. According to the company, the invoice processing time for one month has dropped from 20 hours to 90 minutes.*

# SAP IN THE PUBLIC CLOUD – MORE THAN AN ALTERNATIVE OPERATING MODEL

**Migration vs. new implementation**

Many companies today use public cloud services already. Therefore, they have experience with the cloud when they turn to SAP operations. We notice that many companies using SAP ERP solutions are interested in cloud operations and we expect that many of those firms will migrate existing workloads into the public cloud.

In addition to that, a huge number of firms want to switch from old-fashioned ERP solutions from third-party providers to more modern ones, such as those from SAP. As a matter of fact, a large part of those that buy SAP S/4HANA today are new to SAP. We expect that these new SAP customers are likely to opt for the cloud to run their ERP applications.

For both types of users, choosing a provider that can help ease the migration journey or offers ways to fast-track the migration can make a real difference.

> ***Customer Example – Delivery Hero (continued):*** *Delivery Hero decided to engage with a consulting partner for its massive migration. "We were still building up in-house AWS resources and expertise, and it proved invaluable to have a trusted advisor working with us at every step of the migration," says Johannes Langguth, Senior Director of Finance Systems at Delivery Hero.*

**Beyond SAP hosting**

SAP customers which have set up their operational environment for their SAP applications will benefit from looking at additional cloud services beyond the core ERP context, such as software development, data lakes, analytics, machine learning, and the internet of things. We explore some examples below. Early adopters of cloud technology already see the benefits of hosting SAP on AWS infrastructure and integrating it with further AWS Cloud Services.

***Customer Example – Zalando (continued):*** *Zalando began migrating its SAP systems from an on-premises infrastructure to AWS in 2016.*

*As of today, Zalando has integrated its SAP systems with 36 AWS technologies and created a hybrid data architecture.The architecture gave Zalando a more cost-effective alternative to running a larger SAP S/4HANA database, which lowered costs by optimizing usage of AWS services such as Elastic Compute Cloud (Amazon EC2) and Amazon Elastic Block Store (Amazon EBS).*

## Analytics & Data Lakes

Collecting and analyzing large amounts of different data is on the agenda of many companies around the world, and this is also true for SAP customers. However, it is not only operational data that is relevant. Data comes from different sources and in various formats.

Data lakes provide the environment for this. Cloud platforms offer a number of services, i.e. storage, integration tools, and analysis systems, required to build such data lakes.

Given the volume of data to be processed and the specific integration requirements due to the different types and formats, the cloud is an obvious choice as it allows many companies to scale IT resources more easily and quickly than is possible in their own data centers. This is also true for enabling real-time data analytics on the basis of such data lakes.

Data lakes store data from operational systems, user behavior information from websites, and logs from IT systems or social media feeds. In a way, they are the new breed of data warehouses. In many cases, data lakes provide data that is analyzed by specific applications to improve business processes and gain deeper insights. Companies run analytics against these data sets in order to better predict demands in supply chain management or to gain deeper insights into what their customers want, for example.

***Customer Example – Zalando (continued):*** *Zalando combines SAP S/4HANA with Amazon Redshift, interactive query service Amazon Athena, and an Amazon Simple Storage Service (Amazon S3) data lake. It also uses AWS Glue, a fully managed extract, transform, and load (ETL) service, which makes it easier for customers to load their data for analytics.*

*As a result of its hybrid solution, Zalando has lowered the cost of ownership for its SAP data architecture by 30 percent. The business has invested the savings in the development of solutions to enhance customer service and efficiency.*

*Yuri Volosenko, Director for Enterprise Applications and Architectures at Zalando, says: "We've built chatbots for employees to answer questions on company procedures and introduced image recognition technology to speed up invoice processing. We've also improved the workflows of our website processes for customers as evidenced by the rise in our net promoter score."*

## Internet of Things

Using data from connected devices, machines, vehicles, and other equipment, the internet of things (or IoT) is another key driver for innovative services and even new business models. Connected cars, smart energy grids, digital factories, and smart cities are just a few examples of scenarios that are driven by IoT.

Cloud platforms have become the predominant environment for IoT applications. They provide comprehensive technology stacks to:

- write IoT-based applications;
- connect devices, machines, vehicles, and other equipment, as mentioned above;
- collect and store large amounts of data from devices;
- apply analytics and artificial intelligence to this data.

The cloud matches well with the infrastructure requirements of IoT-based applications in terms of collecting and storing large amounts of data. Companies create data lakes in the cloud that can scale with requirements.

IoT-based applications never run in isolation from the rest of the IT landscape. They need to be integrated into business processes and, therefore, into the applications that run them.

Companies that develop IoT applications will, sooner or later, need to integrate them into their existing ERP back ends.

## Machine Learning

There are only a few topics that get more attention these days than machine learning. These specific software systems combine algorithms and statistical models for tasks such as predictions or the identification of patterns or anomalies. Other use cases are the detection of the main characteristics of data sets and the visualization of data including the relationship between data fields.

The capabilities of machine learning are being used in various ways, such as the analysis of text (e-mails, documents) in customer service, the prediction of customer churn in telecommunications, or the identification of trends in prices for airline tickets in the travel industry. Due to its versatility, machine learning is used to optimize various business processes in many different ways. This may involve recommendations for buyers in an online shop or the determination of the ideal price point for a new product to be sold. Some companies also adopt machine learning to combine efficient business reporting with intelligent cost monitoring.

> ***Customer Example – Manufacturing Company:*** *A diverse manufacturing and advanced technology company with multiple strategic business groups in the areas of aerospace and defense, automotive, and chemicals. The customer needed a central business reporting system defining the state of the business across different strategic business groups.*
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> *Combining AWS data lakes with the serverless technology called AWS Lambda and ETL service Glue, query service Athena, Cloud Data Warehouse Redshift, and Sagemaker Machine Learning service has helped the company to quickly deploy new KPIs without having to bother about infrastructure, scalability, or availability. They were able to fully concentrate on building their business logic. The cloud-based pay-as-you-go model also helped the customer reduce costs based on usage for some data-heavy machine learning inferences and ETL jobs.*

Providers of cloud platforms have created comprehensive environments for machine learning that comprise tools to build machine learning applications, to train algorithms with data, as well as to test, improve, and manage those developments. Machine learning applications that typically require a large amount of IT resources to perform leverage the scalable cloud infrastructure (compute power, storage, networking, and data management).

Also, the cloud platforms contain comprehensive development environments plus a growing number of pre-built models. The idea behind this is to allow projects to start more quickly, even for people who do not have a deep domain expertise in machine learning.

Machine learning in the cloud is special as different profiles are involved: data scientists that build models and understand the concepts, and software developers that develop applications. Both types of experts require specific tools, which the cloud platform should provide.

We expect that SAP users that operate ERP in the cloud will also use the machine learning features of these platforms. For example, in sales and marketing, machine learning algorithms can access operational ERP data about orders and external data about buying behavior of customers to predict future revenues and the success of marketing campaigns. Another common use case of machine learning is predictive maintenance in the manufacturing industry. Based on runtime data of a machine, algorithms can predict the ideal time to carry out maintenance in order to prevent disruptions caused by quality problems, failures, or malfunctions.

## Software Development

We also see a strong uptake of custom development of new applications as companies digitize their business. Cloud environments offer tools to develop, test, and deploy applications by leveraging, among other things, microservices architectures, serverless features, and container technologies. These technologies, which are provided by the cloud environment, allow for fast deployment, testing, and scaling of new applications.

Integration functions are available to connect these new applications with the back-end processes of the ERP solutions that also run in the cloud. In this way, cloud-based application development can be used to deploy new features to innovate existing ERP-driven processes or to provide new services that complement existing business

applications. This is another way of adding features to ERP landscapes, rather than customizing SAP solutions.

Firms that develop software in the cloud have started to adopt concepts such as agile programming and DevOps. Such things are common for developers that build code in the cloud, and more and more companies are following that path, including SAP customers.

> ***Customer Example – Utopia:*** *Utopia is a software and services company specializing in data cleansing, migration, and governance. The business is also the official third-party developer of SAP Master Data Governance plugins, such as SAP MDG for Enterprise Asset Management extension by Utopia, SAP MDG for Retail & Fashion Management extension by Utopia, and SAP Asset Information Workbench by Utopia.*
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> *Utopia had been conducting most of its development work with Oracle SQL Developer on a third-party cloud platform, which ran out of a colocation data center. However, it struggled to switch to SAP HANA due to capacity and scaling issues at the data center. Utopia conducted a six-month evaluation of cloud service providers before deciding to move its SAP systems onto AWS. Rahul Ganjiwale, head of SAP Basis and Infrastructure at Utopia, says: "AWS environments are easily scalable, convertible, and highly fault-tolerant, matching our needs of achieving high business agility with minimal disruptions."*
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> *For its SAP migration, Utopia moved 120 servers to the AWS Cloud in just three months, hitting its stretch target for the project; the original target was four months. Its strategy included a detailed proof of concept backed by careful risk management planning. During the migration, AWS solutions architects conducted intensive sessions on any issues that arose.*
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> *The savings since migration have been substantial, and Utopia can now handle more workloads at a lower cost. The business has reduced its monthly spend by 47 percent since moving from the previously used solution to AWS, while increasing its workloads by 40 percent with new ML projects. They also carefully monitor their usage of servers and turn them on only when needed – a feature unavailable in the colocation data center environment.*
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> *Utopia's management is also pleased with the time savings gained on the AWS Cloud. For instance, when a client requested a trial of Utopia software before, the team would take one to two weeks to set up a dedicated test system. With AWS, this now takes just two days. "Being able to offer our clients a faster turnaround helps us immensely in selling software," Peter Aynsley-Hartwell, CTO, Utopia Global, Inc. says.*

# SUMMARY & RECOMMENDATIONS

We believe that SAP in the public cloud is becoming a mainstream topic. Companies recognize the benefits of using cloud infrastructure instead of buying and managing hardware and software. They also like the agility and scalability, and the access to the very latest technologies, which makes the cloud advantageous over many of the traditional SAP outsourcing services. The migration towards SAP S/4HANA will bring an additional push.

Examples such as the ones given in this paper demonstrate how the public cloud provides benefits to those companies with specific requirements in terms of fast provisioning and scalability of cloud services. However, we do not think that a pure cloud migration of SAP workloads into the public cloud alone will provide such huge benefits for all other SAP customers. Rather, SAP operations in the public cloud are going to become a commodity.

We believe that the combination of SAP operations in the public cloud and the use of cloud services in combination with the core ERP system make the difference. SAP software runs the back-end processes while cloud services provide the basis to drive innovation in business processes. These cloud services foster analytics, data management, machine learning, IoT, and software development.

There is no doubt that cloud platforms offer a tremendous amount of services to create innovative features, and new functions are being added all the time. However, it requires well-trained experts to use these services to develop new features and integrate them with SAP applications.

For this reason, we expect that cloud providers together with their partners are going to provide more out-of-the-box features based on cloud services, e.g. for analytics, machine learning, and IoT, which can be integrated with SAP systems.

**Recommendations**

If you plan to migrate to SAP S/4HANA or to transform existing SAP infrastructure, evaluate what benefits public cloud environments can provide to migrate, transform, and operate both applications and the technical frameworks for your SAP systems.

A pure migration of the operating model of SAP solutions from on-premises into the public cloud can provide a number of advantages. However, companies should not reduce the cloud to just that. Cloud platforms should be regarded as a means to drive continuous innovation of your business processes with all of the associated services such as analytics, machine learning, data management, and IoT.

Migrating SAP workloads into the cloud requires proper planning and a skilled project team. Cloud services require additional expertise in managing the use of an external IT infrastructure, monitoring service levels, controlling subscriptions and service costs, and providing support for SAP users. You may need an external service provider that can help with the migration and the management of the cloud services once the systems have been set up.

Check what already exists as packaged services in the cloud to innovate your SAP environments. The more companies migrate their SAP systems to the cloud and develop additional solutions or have them developed by service providers, the broader the range of ready-made services will become.

Selecting a cloud service provider should comprise a number of different criteria. Besides the services being offered, the geographic reach, the quality, security, and performance of the platform, the price and pricing models as well as the contractual terms and conditions, the availability of skilled consultants and other value-added service providers is important. Also, check what methodologies and tools are available to automate the planning of the migration of SAP systems. Find out from existing customers how they have experienced their collaboration with the ecosystem of partners of the various cloud platform providers.

Embracing the innovation potential of cloud platforms for SAP landscapes requires experts and the right culture within the organization. Strategy definition, software development, and management of operational change within the company are just a few examples of the various disciplines that need to come together. As a result, it is not enough to rely on technologists alone. Collaboration is required between IT experts, business analysts, and talents from the various lines of business, as well as external support, to provide a good environment.

However, when all of these aspects are considered, a public cloud migration can be more than just a change of the SAP deployment model. It can be one of many building blocks for the transformation of a company towards a more agile and future-ready organization.

# AMAZON WEB SERVICES AT A GLANCE

Amazon Web Services (AWS) is the world's most comprehensive and broadly adopted cloud platform, offering over 175 fully featured services from data centers globally. Millions of customers—including the fastest-growing startups, largest enterprises, and leading government agencies—are using AWS to lower costs, become more agile, and innovate faster.

AWS offers a Competency Program designed to provide its customers with top quality APN Partners who have demonstrated technical proficiency and proven success in specialized solutions areas.

SAP Competency Partners help customers implement, migrate, and manage SAP applications on the AWS Cloud. It also offers "SAP Quick Starts" to help customers deploy popular technologies on AWS, based on AWS best practices for security and high availability. These accelerators reduce hundreds of manual procedures into just a few steps.

For more information, please visit: https://aws.amazon.com/sap/getting-started/

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# ABOUT TEKNOWLOGY GROUP

teknowlogy Group is the leading independent European research and consulting firm in the fields of digital transformation, software, and IT services. It brings together the expertise of two research and advisory firms, each with a strong history and local presence in the fragmented markets of Europe: CXP and PAC (Pierre Audoin Consultants).

We are a content-based company with strong consulting DNA. And we are the preferred partner for European user companies to define IT strategy, govern teams and projects and de-risk technology choices that drive successful business transformation.

We have a second-to-none understanding of market trends and IT users' expectations. We then help software vendors and IT services companies better shape, execute and promote their own strategy in coherence with market needs and in anticipation of tomorrow's expectations.

Capitalizing on more than 40 years of experience, we operate out of seven countries with a network of 140 experts.

For more information please visit www.teknowlogy.com, and follow us on Twitter or LinkedIn.

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