



# TELEKOM CLOUD

A TECHNICAL GUIDE TO THE CLOUD ERA



LIFE IS FOR SHARING.

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# INTRODUCTION

## THE CLOUD IS HERE

The IT environments of companies and other organizations are gradually moving to the cloud. The main argument in favor of entering the cloud, which is the flexibility it affords with regard to both resources and costs, is increasingly hard to resist. However, the element of security and the speed at which services can be provisioned, which does wonders for business agility, are gradually becoming the dominant factors. This is why a well-thought-out cloud strategy should be a core component of any organization's IT planning.

Deutsche Telekom and its subsidiaries already serve a large number of customers that run all kinds of applications in our cloud environments – even mission-critical ones. Understandably, not everyone currently feels comfortable entrusting key IT services to a cloud provider. It's important to know, therefore, that there are many other options available, which can instantly provide added value without taking any unwanted risks.

This handbook offers an introduction to these cloud-based alternatives and guides you through the related security and legislative aspects. It also covers basic cloud migration strategies and discusses connectivity aspects.



Security and the speed at which services can be provisioned are becoming the dominant factors

## CLOUDS AND THE EVER-CHANGING MARKET

Businesses and organizations, regardless of size or segment, are constantly exposed to changing market conditions. Even the traditional brick-and-mortar industries are suddenly facing new competition from online companies. Business areas with high entry barriers are no exception, either.

The changes can be seen all around. Uber now competes with traditional taxi services, Airbnb is taking market shares away from hotel chains, and these are just the most common examples among the innumerable online outlets that have completely changed how the world does business.

To stay profitable, or even just relevant, companies and organizations must overhaul their current IT services and introduce

new ones. Nowadays, it's necessary to create online and mobile applications that can provide services anywhere and on any device in a secure manner. In addition, managers are increasingly looking to focus on their „core“ competencies and outsource supporting functions to external suppliers.

Even traditional IT services such as ERP software, messaging, and document management must be built on an infrastructure that is cost-effective, flexible, and agile. Deutsche Telekom cloud services provide precisely this: an open and flexible foundation on which modern organizations can build to transform their business.

# CLOUD COMPUTING

Cloud computing represents a significant evolution in the way information technology and services are produced and delivered. It is a versatile and convenient way of delivering computing resources (networks, servers, storage, applications, services) to customers over the network. Customers can create and manage cloud-based services themselves – typically with a low level of interaction with the service provider.

Modern cloud providers make it possible to provision IT resources not just through an intuitive web interface designed for human users, but also via public application programming interfaces (APIs). Tasks which previously took people days to do in the physical world, such as installing a new server, can now be done by a line of code inside a program.

By making IT resources available within instants and allowing customers to set the configuration of their choice very precisely, cloud computing makes an extremely attractive offer in

terms of speed, cost, and efficiency. Traditionally, deploying IT services would require tying the relevant applications to a specific infrastructure. This would result in a persistently low rate of resource-utilization and a problematic lack of flexibility. The cloud changes all of that by enabling applications to be deployed dynamically to a precisely-scaled infrastructure. The flexibility of the cloud enables applications to scale and grow without requiring the traditional infrastructure upgrades.

## TYPES OF CLOUD COMPUTING

The cloud model allows a very wide range of IT services.

Based on the level of infrastructure they provide, these services are divided into three main types:

		
<b>Infrastructure as a Service (IaaS):</b>	<b>Platform as a Service (PaaS):</b>	<b>Software as a Service (SaaS):</b>
Virtual servers with self-service setup and management.	Software infrastructure offered as a base on which to run IT services, such as database or application servers.	End-user software sold as a service by IT service providers.

The role of a cloud provider is to build and operate the physical network, server, and disk infrastructure, and the related connectivity. The individual layers do not require any specific type of interdependence. PaaS or SaaS services may or may not be operated on a shared platform of virtual servers – IaaS.

# SECURITY IN THE CLOUD

Every customer is sensitive when it comes to the security aspects of storing data and operating IT services in the cloud – it's only natural. Our customers want to understand why they can rely on Deutsche Telekom to cover their security needs.

The first thing our customers should do is assess whether their own server room or data center is sufficiently secure. DT is likely to have more resources, knowledge, and experience to build and operate cutting-edge security technologies than the vast majority of commercial or governmental organizations.

Being a telco company makes a huge difference to the security aspect, because connectivity is so essential to the cloud. DT has an enormous advantage over other cloud service providers in that it can provide secure, SLA-backed private data lines door to door, from customer to cloud. Other cloud providers largely depend on the public Internet, which by design offers no guarantees in terms of speed and security.

## LEGISLATION ON STORING PERSONAL DATA IN THE CLOUD

Organizations classify the information they process and store in different categories based on its level of sensitivity. Personal data is unique among these categories, because its storage in the cloud is regulated by European Union rules on personal data protection.

Storing personal data in the cloud is fully supported by the relevant EU regulations on the condition that it be stored within

the European Union. In theory, data of this kind could even be stored in a cloud outside the EU, but all affected individuals would have to agree to this.

Deutsche Telekom hosts all of its cloud-based services for EU customers in data centers located inside the European Union. You can therefore rely on DT cloud services being fully compliant regarding the storage of personal or sensitive personal data.



Storing personal data in the cloud is fully supported by EU

# TCO IN THE CLOUD: FROM SCIENCE TO ART

Hosting business applications in the cloud is a good way for customers to avoid having to invest in their own computing environment. When infrastructure is provisioned as a service, fees are paid on a monthly basis based on the amount of allocated

or utilized resources, with a positive and quantifiable impact on cash flow. Still, there is a lot more to fully understanding the cost difference between in-house IT and cloud-based solutions than just adding up the obvious items.

## THE SCIENTIFIC PART: FACTOR IN EVERY VARIABLE

When comparing the costs of on-premises infrastructure with utility pricing in the cloud, simply calculating the total price of a customer's hardware is not enough. The licenses for operating systems and other software infrastructure such as databases or application servers also need to be factored in – and don't forget the associated network devices, firewalls, VPNs, DDoS protection, as well as the connectivity itself.

Then there's the overall cost of acquiring and operating your own data center or leasing co-located space, with various areas that include rack cabinets, UPS, cooling, wiring, and physical security. Total cost of ownership (TCO) calculations for on-premises infrastructure also frequently omit the associated vendor support contracts, installation costs, or significant parts of the general management, operation, and maintenance work.

## HIDDEN COSTS

Even when you do the science of adding up all the conceivable costs associated with running your own game, however, the result still does not give you the whole story. For instance, planning for load peaks means you have to over-scale the infrastructure. There's also a lot of supporting hardware to purchase to keep your computational hardware in continuous operation, back it up, monitor and administer it, or even just have resources on standby to jump in if there is ever an outage. The cost of making the wrong hardware choices is very high. Unlike other consumer toys, hardware cannot be returned to the shop once it has been installed. Even when you're running IT services with highly predictable loads, ever-changing business and market conditions can still turn everything on its head with events like company mergers, acquisitions, or mere reorganizations.

On-premises TCO calculations give you a monetary figure, which is then divided by a number of months, typically derived from accounting depreciation rules. The applicable tax legislation varies considerably within the EU, with different countries allowing the depreciation of hardware over anywhere from three to six years. Does that mean the hardware, as it is purchased, is utilized productively over the following three to six-year period? The rapidly changing business environment, as well as the accelerated rate of current technological progress and even simple hardware malfunctions point to an obvious answer: no, it most likely is not.

## THE VALUE OF AGILITY

Deciding the length of the time period over which an investment into IT infrastructure should be written off – that's the point at which we move from science to art. It is simply impossible to predict the duration of utilization, and the related accounting rules are simply irrelevant from a business perspective. The only good news in all of this may be that, in a way, it doesn't really matter. With agility becoming the dominant motivating factor for adopting a cloud-based model, the true value of the cloud lies in its ability to let companies react to changes promptly by instantly scaling existing IT services and quickly provisioning new ones. A new term has been coined to describe this: the "value of agility". Although it sounds somewhat abstract, it

really can be calculated. Putting a price tag on an organization's ability to swiftly change the scale or nature of its IT services requires an in-depth analysis of the business processes involved, but it can be done.

This era of accelerated change brings with it a need to change how we value investment in IT technologies. The traditional concept of ROI may not be an accurate way of determining the true value of modern technologies for business – but if you do decide to quantify that value, don't stop at calculating a financial TCO, either.



### GRNET - Success Story

The healthcare sector faces enormous challenges: more and older patients, budget cuts, or shortages of qualified employees, to name just a few. Digitalization could be a viable solution to most of these problems. This is why 31 Greek hospitals decided to migrate to a private cloud built by OTE Group, Greek subsidiary of Deutsche Telekom. Its highly secured data center with strong connectivity was chosen to provide the rudiments for a virtualized computation and storage platform. "Cloud technology can help the healthcare sector improve its efficiency and thereby create real value for hospitals. By storing their images digitally, the radiology departments now save up to 50 percent of costs", says Ralf Nejedl, Senior Vice President B2B, DT Europe.

GRNET: Greek Research and Technology Network



# ACHIEVING SCALABILITY AND HIGH AVAILABILITY IN THE CLOUD

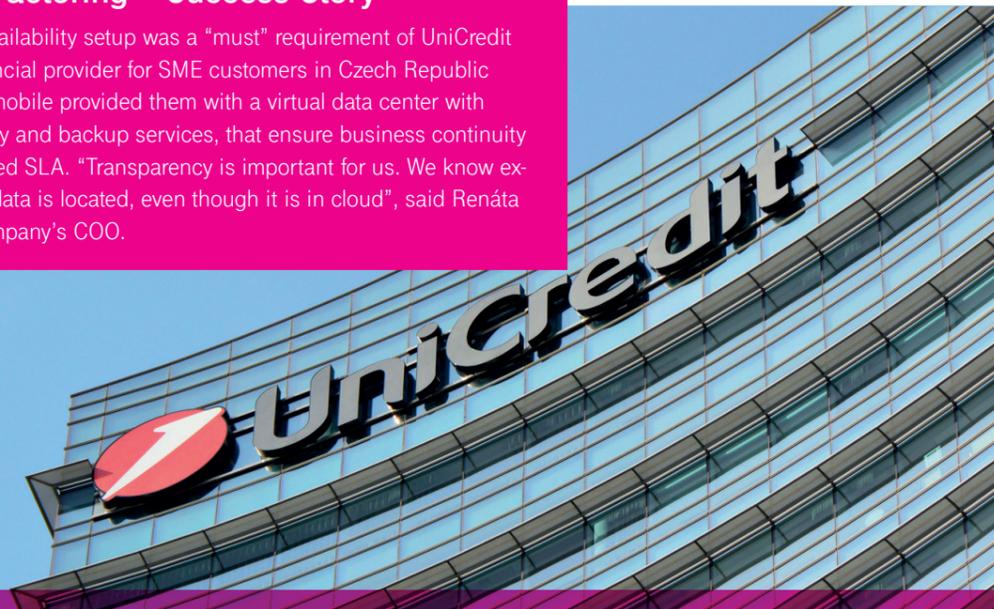
## MONOLITHIC SERVERS

Most applications are still being built on a classic one-server architecture with limited scaling and availability. The single server can only be scaled by adding memory, CPU or hard drives, but this requires downtime and worse still, it may not always be enough. This is because application performance does not scale linearly with added resources. When it comes

to continuous operations on a single server setup, it's simple: The service dies with the server. To achieve high availability, traditional clustering technologies can be used in the cloud, that use standby backup servers, that can promptly jump in, if primary server fails.

### UniCredit Factoring – Success Story

Having a high availability setup was a “must” requirement of UniCredit Factoring, a financial provider for SME customers in Czech Republic and Slovakia. T-mobile provided them with a virtual data center with Disaster Recovery and backup services, that ensure business continuity in a clearly defined SLA. “Transparency is important for us. We know exactly where our data is located, even though it is in cloud”, said Renáta Šašková, the company's COO.



A cloud-based infrastructure designed for high availability should be built on arrays of servers, where no single server is irreplaceable.

## CLOUD-ENABLED APPLICATIONS

These are in contrast designed from the ground up to be operated in the cloud. The true cloud server is a member of a group, and is aware of its other members, and their role. The number of participants in the group can grow or shrink as needed, for example to scale performance or jump in for a member experiencing problems. The resources inside an individual server do not need to be altered to achieve scalability or continuous operations.

A cloud-based infrastructure designed for high availability

should be built on such arrays of servers designed to sustain high loads or failures, where no single server is irreplaceable. They should be built using automated tools, so that if existing servers run into trouble or together are not enough to facilitate the requests, more are added automatically. This is true for all layers in a typical IT service setup – the presentation load-balancing layer, application server layer, as well the databases, where horizontally scalable NoSQL databases are becoming more popular.

# CONNECTING TO THE CLOUD

When a business depends on a connection to remote servers, data storage, or important applications, having the right connection is essential. Cloud computing and connectivity are naturally deeply interrelated. It is easy to understand, but also simple to forget that without connectivity, the cloud is nothing.

In fact, having a dependable link to cloud-based services is so crucial to their availability, performance, and security, that when it comes to choosing the right cloud, Deutsche Telekom may have an enormous advantage over other players because it is an established telco with its own private network. The global

cloud players clearly acknowledge this by entering into partnerships with telecommunications companies. They also use trucks to transport data between their data centers and customers on hard-drives, which is an awkward concept clearly unfit for the 21st century.

## BANDWIDTH, LATENCY, OR BOTH?

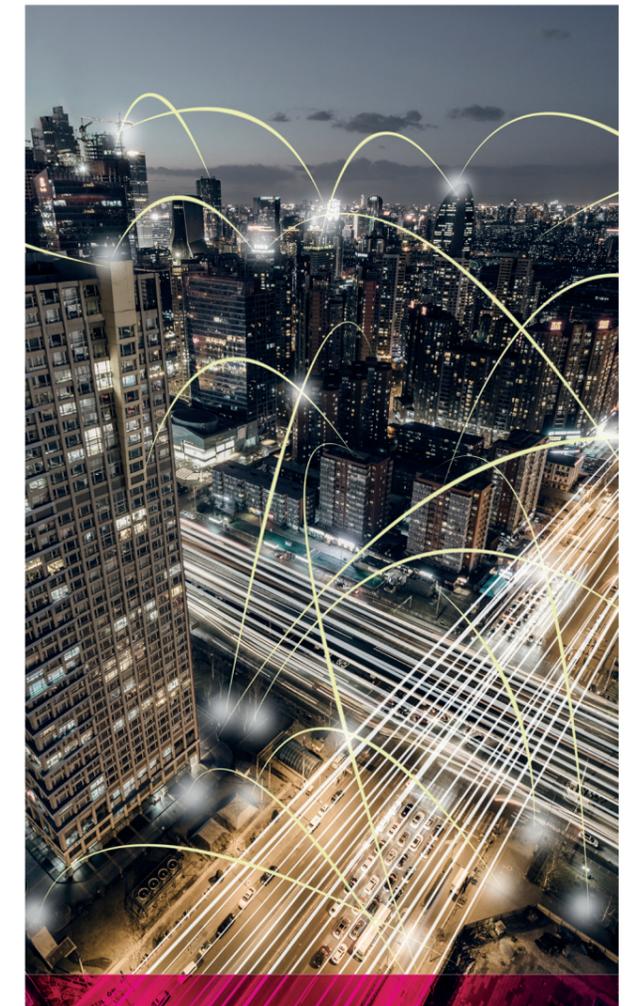
So how exactly do connectivity and distance to the cloud impact various customer usage scenarios? When using the cloud to store backups, or for disaster recovery, it is all about the bandwidth. The public Internet backbone in Europe provides around 10 to 20 MB per second, with fluctuations and no guarantees. That means it would take a half to a full day to transfer 1 TB of data, which is certainly not fast enough for most organizations, especially in a backup recovery scenario. For high-bandwidth requirements, a dedicated local private line ranging in gigabits per second is often a must.

Other applications, such as ERP or VDI, strongly depend on low latency. The public Internet provides latencies of 20 to 40 milliseconds when connecting to a cloud provider located let's say a quarter of Europe away, and that is sometimes too much. This is especially true for applications that are “responsive”, which means they require a lot of back-and-forth communication to draw the correct display.

## CONNECTING SECURELY

It is not easy to achieve enterprise-level security over public lines, and VPN connectivity satisfies only some customers. Only private lines can provide a truly secure environment. Protection from distributed denial of service (DDoS) attacks is typically expected for any online service, yet not all cloud providers offer it.

When making the move into the cloud, choosing the right connectivity and security environment is as crucial as the switch itself. While a VPN over public Internet is suitable for many use cases, dedicated MPLS lines should be strongly considered for scenarios requiring heightened security, low latency, or a guaranteed wide bandwidth.



When making the move into the cloud, choosing the right connectivity and security environment is as crucial as the switch itself.

# CLOUD INFRASTRUCTURE USAGE SCENARIOS

## DATA STORAGE

The simplest form of presence in the cloud may be data storage. Companies can share any files and documents placed in the cloud among their users. This cost-effective service is also suitable for storing corporate backups in a secure place outside the company. It typically provides direct access to data

from terminals such as PCs, laptops, smartphones, and tablets, or through a web interface. Customers can also manage the access privileges for individual users and encrypt their data.

## WEB HOSTING

The most economical form of hosting websites, e-shops, photo albums, and Internet applications is web hosting. Deutsche Telekom provides both Linux PHP and Windows .NET platforms.

Customers can simply upload their webpage, using an FTP interface for instance, and gain a functional presence on the web.

## RESEARCH, DEVELOPMENT, AND TESTING

Applications in this area are usually created for short periods of time and have changing computational requirements. For this reason, they clearly benefit from the IaaS public cloud pay-as-you-go pricing model. Development and testing environments do differ: While developers require specific tools, testers need to replicate the actual production infrastructures. What they have in common, however, is that their need for maximum com-

puting power lasts only for short periods of time and that it is preferable to have both located outside of the actual production environment. This makes them ideally suited to run on virtual servers. The advantage is that the service, along with the replication of disks, configuration setups, or entire virtual servers, can be set up very quickly.

## DATABASES, ANALYTICAL APPLICATIONS, BIG DATA

Data analysis applications are also characterized by their changing requirements in terms of computing resources, making the dynamics of the cloud ideal for them. Solutions based on typical monolithic applications, such as Oracle and MS SQL databases that run on a single virtual server, utilize dynamically-allocated computing resources. Allocating additional memory or processors to a given virtual server running on the cloud platform does require restarting the operating system, but still takes a fraction of the time needed for similar operations in the physical world.

Some software applications do not provide a favorable licensing model for the cloud environment. This part of the infrastructure can instead be allocated and operated on a virtual private server, or a dedicated physical server – with everything often being kept in the same data center and managed by Deutsche Telekom. Combining various types of virtual servers with dedicated hardware or co-location hosting is one of the clear advantages that Deutsche Telekom has over the global cloud players, which specialize only in virtual servers.

Other database types which allow horizontal scaling and are resistant to individual virtual server outages, such as NoSQL, may become popular in the future. These allow additional resources to be allocated by adding multiple instances of the same database, and by balancing the load between them. Systems like this are resistant to the load fluctuations of the cloud as a whole, and are independent of both the infrastructure underlying the applications and the hypervisor properties.

When entering the cloud with a traditional SQL database that requires high throughput to disks, it is advisable to carry out performance tests prior to migrating the production load. Most clouds limit the overall IOPS throughput to avoid clogging up the shared disk arrays. In these cases, you either need to select a virtual server with higher IOPS throughput, or opt for a virtual private cloud or a rented dedicated server instead.

## ENTERPRISE APPLICATIONS

Applications that manage supply chains, human resources, customer relationships, and cost accounting are the pillars on which companies and organizations of all sectors rest. Techno-

logical progress, digitalization, and the online world are now bringing disruptive change to the traditional world of ERP and CRM applications:



They now have to be able to scale flexibly, to meet constantly changing load requirements.



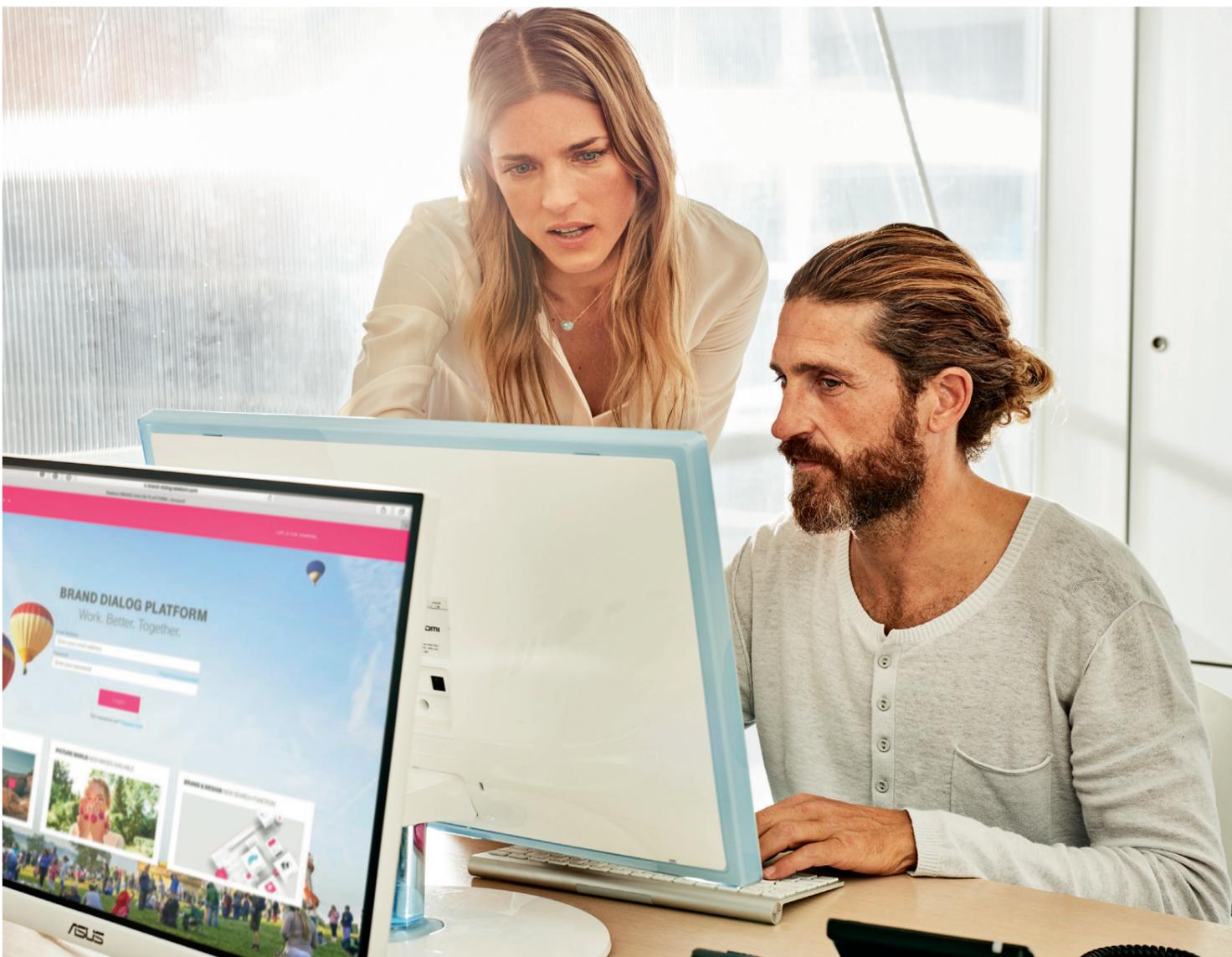
They need to be available and working at all times, to support round-the-clock operations.



They must be secure, yet opened to third parties including suppliers and customers.



They should be able to deliver new functionalities in an agile way.



### Are enterprise applications a barrier to innovation?

The reality is that very few of the traditional enterprise applications meet all of these new requirements. In fact, enterprise applications are often seen as a major barrier to achieving the agility necessary for a corporation to be able to scale or

innovate rapidly within its range of products and services. Heavy-duty legacy applications may in fact be the single biggest obstacle preventing large organizations from achieving the much-desired dynamics of a small startup company.

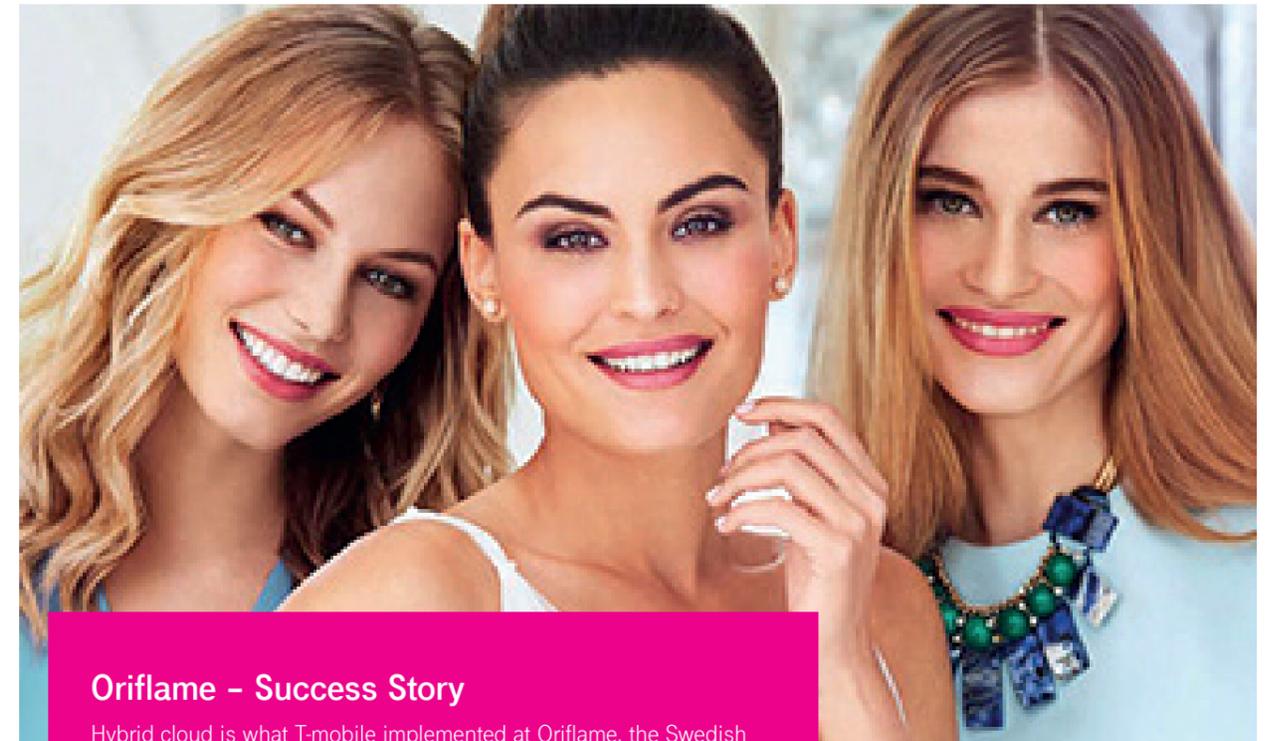


### The paradigm-shifting cloud

The cloud changes this paradigm in so many ways. Its flexibility and pay-as-you-go model are ideal for acquiring the instant scalability demanded by market forces or internal transformations. A virtual server in the public cloud is a fully-featured replacement for a conventional, physical corporate server designed to run these enterprise applications. Public clouds utilize computer virtualization technologies, so these applications can't really tell the difference when they are run in the cloud.

The benefits of copying a physical server to a virtual server one-to-one are felt instantly: Suddenly, resources can be adjusted at the click of a mouse. To realize the cloud's full potential in terms

of scalability and availability, however, the application's architecture may have to be altered to a horizontally balanced one as discussed previously. Legacy applications do need to be altered to utilize platform services such as object storage or database-as-a-service, but the required investment in development is likely to be paid back many times over. CRM is a good example of an enterprise application for which many organizations are realizing that it is more advantageous to migrate to a completely new SaaS application such as Salesforce.com, rather than just re-hosting their existing application to virtual servers.



### Oriflame – Success Story

Hybrid cloud is what T-mobile implemented at Oriflame, the Swedish beauty company. 50 websites, 350 virtual servers and 9 racks of dedicated hardware were migrated to a new hybrid infrastructure. Now Oriflame does not look after its IT operation, and has a predictable regular monthly IT cost. Perhaps even more importantly, Oriflame can now react flexibly to changing market demands. "What we appreciate most about the solution is the deployment of our systems in the cloud environment, meaning all our corporate applications are easily available to our employees and consultants," Richard Hamrik, Managing Director IT Centre of Excellence for Oriflame.



### The hybrid sweet spot for multitier applications

Most enterprise applications are multitier, with structurally separate presentation, application, and data management functions. As a result, each layer may be more or less suited for migration to the cloud. For reasons linked to performance and licensing, it is likely to be more appropriate to stick to on-premises hardware to house heavy-duty databases, for instance, while presentation and application servers are ideally suited for the cloud's flexibility. This situation calls for a hybrid setup. However, the two worlds cannot be too far apart: That's why low latency and high bandwidth are crucially important to any cloud-based solution.

In cases where the security of an enterprise application running in the cloud is essential, it is advisable to use a dedicated private data line (MPLS), or a strong VPN connection to access the cloud via the Internet.

Whatever the right mix of in-house and cloud-based infrastructure for your specific enterprise application may be: The elements that you choose to move into the cloud are sure to benefit from its scalability, security, and instant reactivity.

## CUSTOMER-FACING APPLICATIONS

Business applications that communicate with third parties are increasingly common, ranging from online stores, customer relationship management to support ticketing systems. Above all else, these applications require a strong and stable connectivity. That generally makes them very suitable for placement in a data center operated by a service provider. High security – on a level that is hard to achieve on most companies' own premises – is an important factor for applications of this kind, because they carry sensitive business information yet also have to be opened to outside networks, including the public Internet. Anti-DDoS protection is another must-have in this area.

Some of these applications, such as e-commerce or ordering systems for small companies, can be operated on a Deutsche Telekom web hosting service. If the customer requires higher levels of performance or availability, however, the ideal solution is to run them on virtual or virtual private servers. When architecting server and application infrastructure for this type of use, special care should be taken to achieve a high degree of scalability and availability. Customers expect continuous operation of these portals, as any downtime would have obvious negative impacts on their business.

## INTERNET APPLICATIONS

Presenting an application to the public Internet has both desired effects and unwanted side-effects on its operation. An overwhelming surge in customer demand is the most pleasant possible cause of higher activity on Internet servers. Unfortunately, however, it's hostile attacks that are increasingly causing high loads or malfunctions.

Once a web application is published on the Internet, it is likely that within a few hours, it will have attracted botnets. These are automated attack servers that seek to break into web applications to misuse them for malicious activities such as spreading viruses or sending out spam e-mails. They do this by searching for security vulnerabilities in the accessible applications, or

simply by trying to guess passwords for administrator access. Although most of these attacks are unsuccessful, they still do generate excessive loads and can cause downtime.

When running Internet applications, it is crucial to have robust and secure connectivity that includes anti-DDoS protection. The cloud platform is an invaluable tool for dealing with sudden changes in operational loads, whether wanted or unwanted, because it offers a flexible way of adding more computing power when needed. The most common solution, discussed in more detail in the previous separate chapter, is to distribute the load across several servers so that no component of the infrastructure is irreplaceable.

## CLOUD BACKUP & DISASTER RECOVERY

It is so easy to lose company data. Apart from the "classic" hazards like hardware failure, theft, flooding, or hackers, new threats appear, such as the recent wave of "ransomware", a type of malware which encrypts hard drives and demands a ransom to decrypt it.

Backups at small companies are usually done manually, thus only sporadically, and are often stored too close to their primary source, so certain disasters, such as fire, destroy both. Large organizations do backups complying to a basic rule called. "3-2-1".



They have **three** copies of data



Stored on **two** different media types



And at least **one** copy is held at a remote site

This requires big storage devices including tape libraries, that need sophisticated operation, and complex logistics to move the backup media to secure remote locations.

What does cloud bring to backup? Nothing, except low costs and simplicity, which is enough for a complete revolution. Anyone can now backup like the big guys. Cloud counts as a different type of media, and is housed at remote locations which are more secure, than most organizations could afford or would have the knowledge to build. Hence cloud satisfies all three points of the decades old backup principle, while bringing more reliability, and security. And more.

Backup must be fully automated and cloud-based services provide the software part that ensures exactly that. Older versions are stored, so that one can go back years in time. Using cloud for backup does not require initial investment, and monthly costs are scaled as needed.

Transferring data to cloud does require proper bandwidth. Global cloud players have a limited reach to most locations in Central and Eastern Europe and do not own the required networks to do vast transfers. DT, with its local NatCo clouds and Open Telekom Cloud has a clear advantage here. There could be no difference in company's data before and after it is lost. If it is backed up to cloud.



# MIGRATING INTO THE CLOUD

When planning a move into the cloud, it is crucial to think about the order and manner in which specific applications are migrated. It's important to assess which services to begin with. The first impression will resonate for a long time and affect how the cloud is perceived by the entire organization.

What is the motivation to enter the cloud for the specific migration plan? Business managers are typically attracted by the cost flexibility, and most IT professionals come to get rid of the hardware hassle. Both expectations are well-founded, but if you choose to begin with the right IT service, you can uncover the true beauty of the cloud, which lies in its agility and security.

## BEGIN NON-MISSION-CRITICAL

It may not be the best idea to begin a cloud experience with a mission-critical application. IaaS is a stable and mature platform perfectly suited to running them, but applications may behave slightly differently when operating in the pools of shared resources, so simply re-hosting them without making some minor adjustments may yield unfavorable results.

Things like testing or development may be better services to start off with, and will clearly benefit from the cloud's ability to scale flexibly. Another good place to start is backup or disaster

recovery. The cloud fulfills all standard requirements for backup media, and DT's widely distributed data centers are just off-premises enough to secure the data, yet never so far away as to cause the bandwidth or latency issues that are clearly present with other cloud players. When looking for support for backup migration to cloud within your internal organization, look for a solution that provides all the necessary automation tools, and if there is difficulty trusting the cloud, mention the fact that they can encrypt with their own keys.

## CUSTOMER-FACING APPS INSTEAD OF BACK-OFFICE

If you want to be able to demonstrate the cloud's ability to improve the company's overall agility and time-to-market, don't begin with back-office apps like HR or accounting. Pick a service directly related to the customer's core product or service. A modern customer portal, online shop, marketing campaign, or data gathering IoT device are all examples of applications that would certainly benefit from our cloud's advanced features – such as elastic auto-scaling or object storage – and could dramatically improve your organization's willingness to build and operate scalable, secure online services.

It is also smart to build brand new applications right into the cloud. Save everyone the future migration hassle. The cloud era is clearly here: New apps should be cloud-based by default, and if not, there should be a clear reason why.



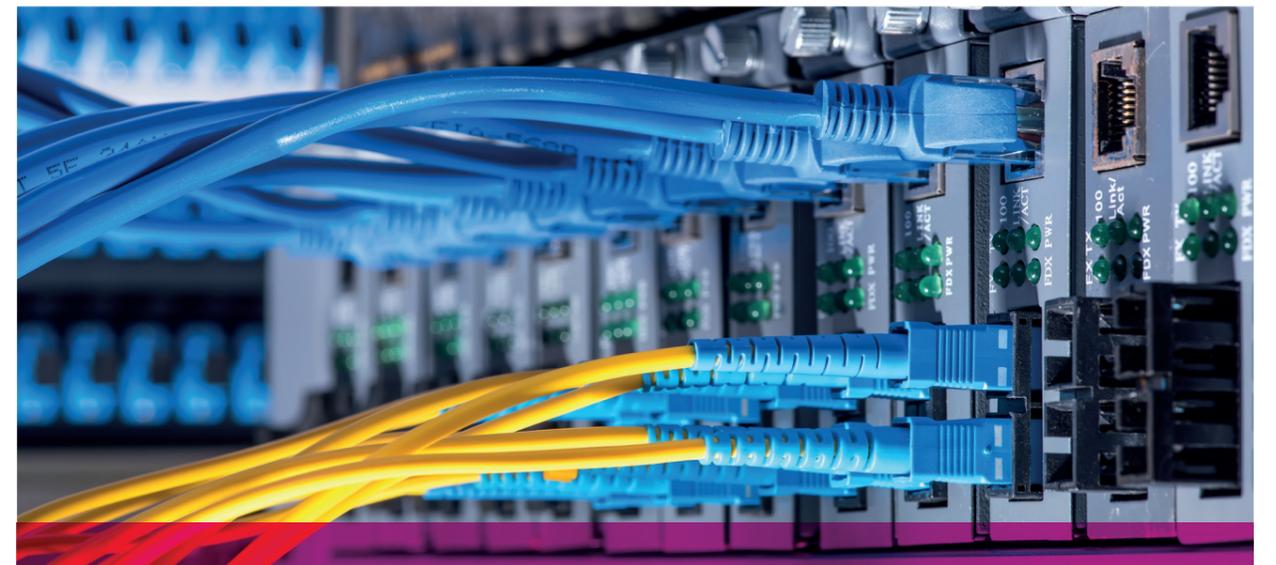
# MIGRATION METHODOLOGIES

The success of your first steps inside the cloud also depends on how you choose to walk in. Simple one-to-one re-hosting of virtual servers requires little effort, but may not bring about the desired changes. Consider making the application more cloud-aware. Use PaaS, DBaaS. Change monolithic applications into horizontally scaled ones, replace block storage with object storage. Only then will you unleash the real power of the cloud.

Sometimes, it may be more effective to migrate to the cloud by completely replacing the IT service with a new SaaS appli-

cation. Thinking about re-hosting on-premises Exchange servers to IaaS? Why not just switch all e-mail to O365? This is especially true for backend IT services, which should all use mostly standardized applications. Learn to concentrate custom development on customer frontend apps.

What else is needed for a successful cloud migration? Oh, just some minor things like management support, solid in-house knowledge of the cloud, and a taste for trying out new things. But all that can be helped with, by a knowledgeable cloud provider.



Sometimes, it may be more effective to migrate to the cloud by completely replacing the IT service with a new SaaS application.

## CLOUD POWER: DIGGING INTO DEV-OPS

DevOps – a combination of the terms development and operations – is a big buzzword at many companies these days. But to get the most out of cloud-based IT services, combining development and operations just makes sense.

Cloud-based computing is driving profound changes in technology, society, and business. The cloud is always on. It offers instant processing power. This immediacy has become a crucial factor helping push the large transformative shift that we see

around us. And so the ability to adapt IT priorities quickly has become essential to staying relevant.

Many companies are moving towards cloud computing primarily to achieve developmental and operational agility. They can no longer afford inflexible hardware and software solutions, stifling innovation and tying down resources. But to be truly agile in the cloud age, companies also need to rethink how they are organized.



## THE CONCEPT OF DEVOPS

Traditionally, organizations split development and operation of IT services into separate departments, such as networking, operations, development and storage. But if a service needs to be changed or scaled, problems occur, as several different departments, with distinct priorities, procedures, or cultures, need to be involved.

The DevOps concept is about combining development and operations of a particular IT service into a joint team. Obvious advantage of such cross-functional teams lies in flexibility and

speed. Many important changes can be accomplished within one team.

For example, a bank is no longer just a bank – it's also a software company. It most likely has a mobile app developed internally. In effect, every successful company will have to become a software company, no matter the industry. Meaning they will have to focus on creating custom applications intended for customer interactions. Development is the ability to program innovative solutions and procedures in relation to clients.

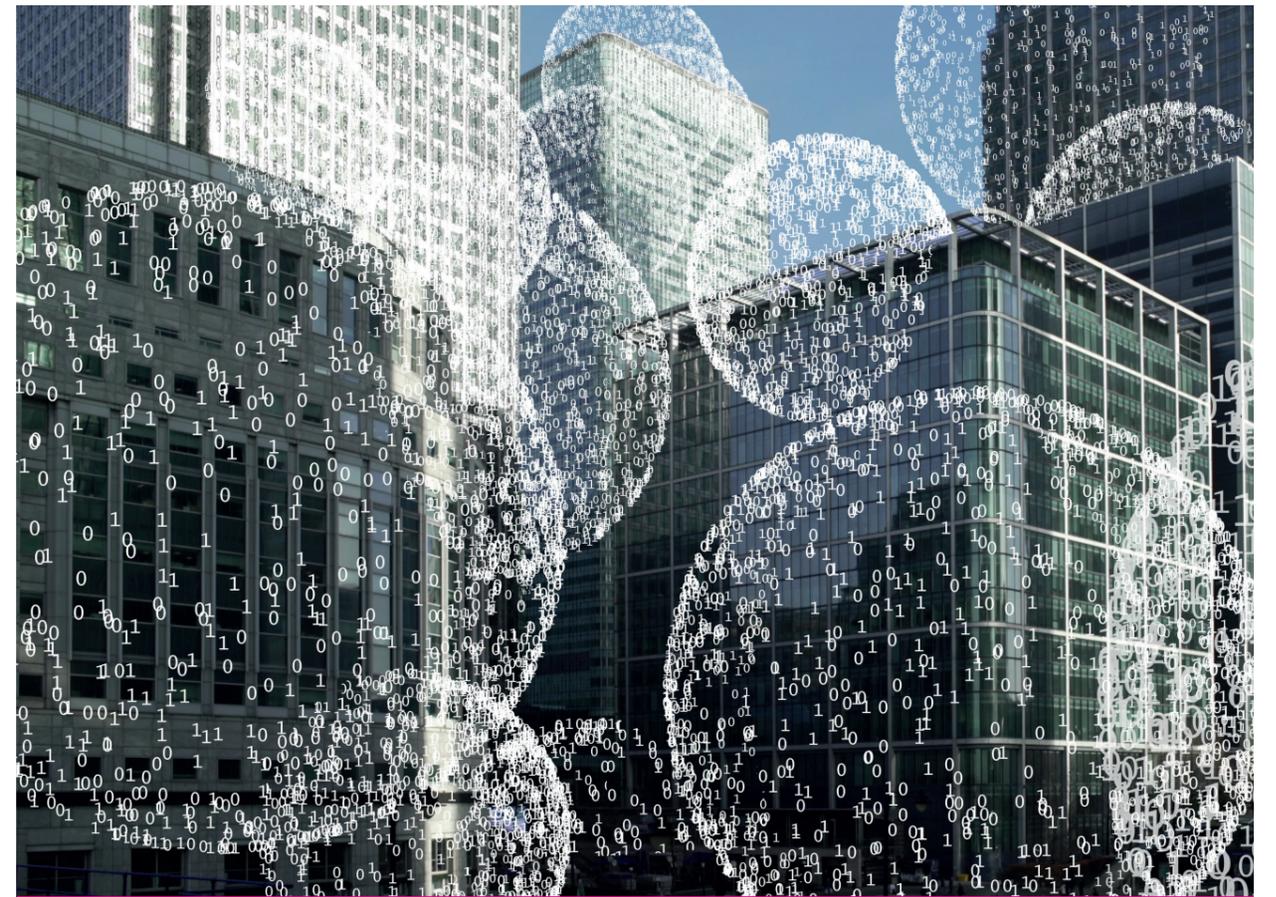
## A CHANGE IN THINKING

IT ops often claim that change causes outages, and rightfully so, causing them to oppose new approaches. They might, however, not realize that postponing change also causes downtime, when a response was badly needed but not executed. When operational personnel is transferred to DevOps it develops sensitivity as to what that service is really all about. This may trigger, in turn, a development of a feeling of personal responsibility for a product, if not the compassion of a product manager.

At core, DevOps is about a change of culture – and a change in thinking. The whole concept is not confined to large teams but also to individual employees. DevOps is about being inquisitive and wanting to learn new things. It requires operations to learn

new programming skills and development experts to get a feel for what it takes to run their applications. But an operations person does not have to write code to be DevOps. He or she can, for instance, be a project manager, in charge of implementing a change designed to fix an operational issue. Can you imagine a better-motivated project manager than someone just given a team of programmers to fix his problem?

Even at companies still living in the classic world of IT – where hardware is delivered and software is implemented on top of it – it makes sense to put aside some money and energy to discover the agile DevOps model. It could end up being crucial to the whole business.



To fully take advantage of cloud benefits in the future, you have to begin using cloud today.

## CONCLUSION

Many organizations still run their application workload on their own hardware. The cloud phenomenon, however, is truly unstoppable. Cloud reduces the costs of operating infrastructure and significantly increases an organization's dynamics. Potentially the most important factor is that cloud allows you to primarily concentrate on your core business. To fully take advantage of cloud benefits in the future, you have to begin using cloud today.

# WHERE WE ARE

Deutsche Telekom has own fixed and mobile infrastructure across 13 European countries in the CEE region and 60 Data Centers with over 70,000 square meters of customer space.



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