

2022 - Case Study - Telekom IT

How T-Systems has helped Telekom IT to provide a platform for innovation based on AWS

In cooperation with



Executive summary

The case study provides an overview of how T-Systems has joined forces with Deutsche Telekom IT in a Cloud Center of Excellence to provide platforms and services for Telekom applications based on AWS. Specifically, it covers areas around setting up a landing zone around security and compliance, network, user portal, consulting and migration support, site reliability engineering, but also innovative features such as chaos engineering as well as night-time savings. Due to the size of the engagement and the multitude of topics, the overview covers the approach and what made it a success. The journey between T-Systems and Telekom IT has been filled with many learnings, most importantly how trustful and agile collaboration, whilst applying DevOps and cloud technologies, can result in significant improvements in customer satisfaction, the overall velocity, and a great work environment.

About the customer

DTIT is the internal IT service provider of Deutsche Telekom AG. DTIT is responsible for the design, development and operation of all its owned and transferred IT systems supporting business processes at Deutsche Telekom AG. DTIT creates user-friendly web portals with intelligent self-service functions as a basis for an integrated, cross-channel customer experience with the Telekom Magenta brand. DT IT is in the middle of a large-scale transformation program, adopting cloud as well as agile methods such as the Scaled Agile Framework.

The challenge

Telekom is on its way to becoming the lead digital Telco. In order to achieve this goal, it needs reliable, secure and well-integrated platforms that allow application teams to innovate fast. Cloudification became a significant pillar of Telekom's strategy, resulting in the specific and ambitious goal to transform 60% of Telekom IT applications to the public cloud within two years, with AWS being a preferred provider.



Solution

Right from the start of the initiative in 2019, T-Systems has been involved as a trusted implementation partner and service provider. Since then, we are deeply integrated with Telekom IT's Cloud Center of Excellence (CCoE). As Telekom IT is embracing the [scaled agile framework \(SAFe\)](#), the CCoE forms an agile hub with several teams, working together in a rhythm defined by incremental sprints over a 3 month-long program. Within the CCoE, colleagues of T-Systems have different roles, like product owners, scrum masters, architects and engineers. Most of the teams are mixed with colleagues from Telekom IT and T-Systems contributing to the solutions side by side.

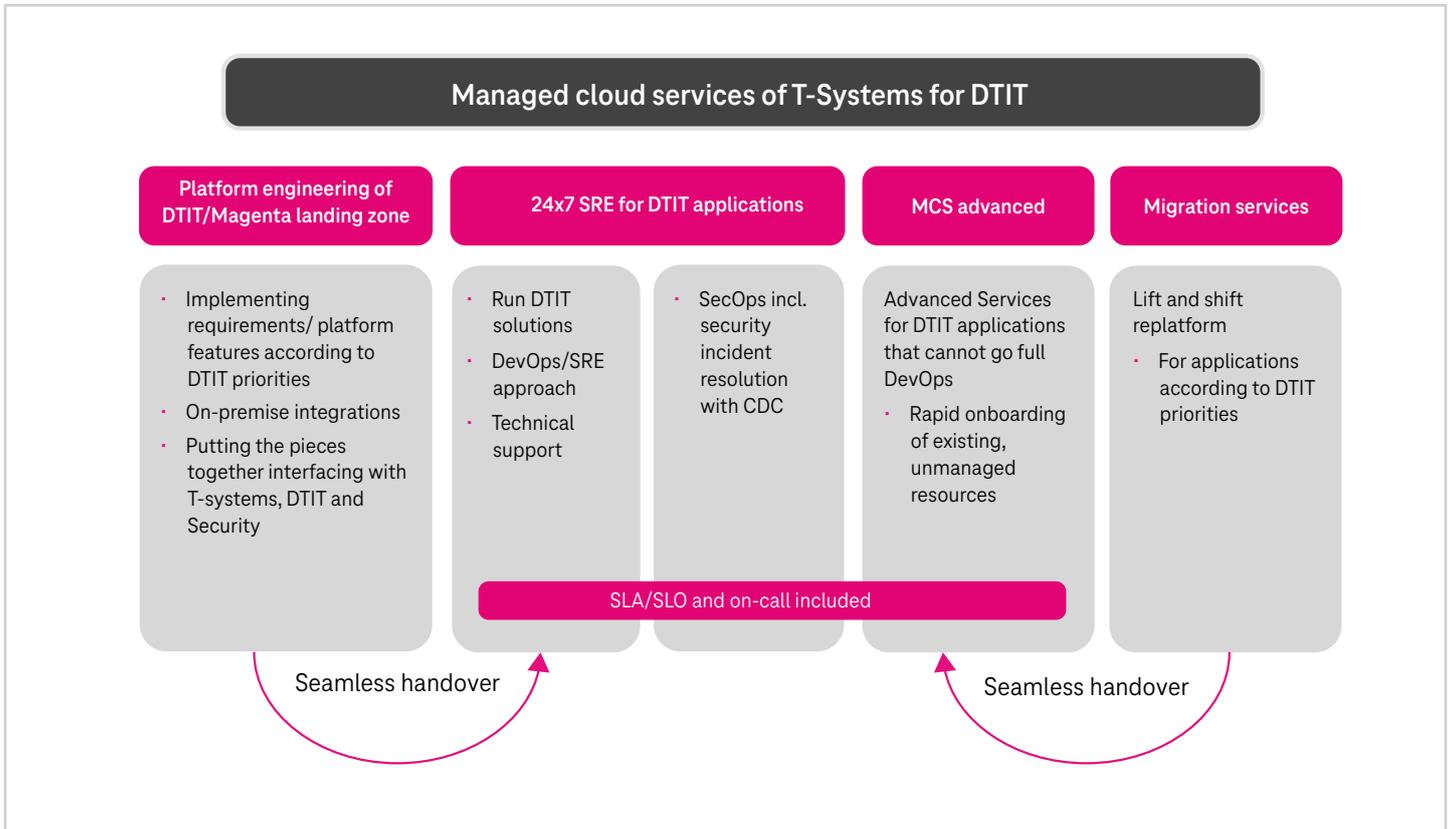


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The following teams have contributed to the successful AWS adoption by DTIT within the CCoE:

- AWS platform team
- Site Reliability Engineering (SRE) team
- Cloud Consulting and Migration Factory team



Phases within the CCoE program are shown in the figure.



T-Systems started supporting CCoE in 2019, with the Ramp-up of the AWS landing zone, including implementing security and privacy requirements in order to achieve Telekom PSA approval (details have been described in [a separate case study](#)).

In 2020, we extended the network capabilities and focused on integrations with Telekom systems. Also, the migration program ROUTE60 has been launched, accompanied with cloud evangelism and a large-scale training program.

The go-live of a new cloud management portal has been achieved in 2021, also 24x7 SRE support has been added and migrations being accelerated. We have supported first production Go Lives of Telekom TOP applications in first half of 2021 and started with financial optimization.

As an outlook, in 2022 we will improve the environment according to Telekom requirements and priorities and along the different pillars of well-architected, like reliability, security, and sustainability - which has emerged as a focus area of the Deutsche Telekom group.

A secure and compliant landing zone

All components of a landing zone have been implemented and have received internal security approvals (Telekom PSA assessment), including:

- > An automation-friendly factory for AWS accounts, using among others API Gateway, Step Functions, DynamoDB and Lambda Functions
- > User/access management, initially based on Active Directory Federation, now integrated with Cloud Management Portal of the client
- > Preventive security controls (service control policies) as well as detective controls for policy violations based on AWS Config and AWS Lambda
- > Security monitoring using AWS GuardDuty as well as integration with [Telekom Cyber Defense Center](#), including a [self-service automation for typical security incident remediations](#)
- > Single pane of glass view based on AWS Security Hub
- > Audit logging including a [break glass access method](#)
- > Billing integration using Telekom cost codes (WBS) for accounts
- > Customer communication

The details are provided in [a separate case study](#).

Deep corporate integrations (Network, CMDB etc.)

The landing zone has been enriched with deep integrations into the Telekom environment. Key features of those network integrations include:

- > Geo-redundant direct links based on AWS Direct Connect between Telekom datacenters and AWS regions
- > VPCs harmonized with Telekom IP addresses, DNS integration via Route 53 resolver endpoints, Transit Gateway etc.
- > Reverse proxy area for internet facing applications, using AWS WAF
- > Filtering/control of outgoing traffic with transparent proxy servers
- > Self service for ordering network components via AWS Service Catalog



Beyond that, we established several other corporate integrations, for instance, [integration with the Telekom IT Configuration Management Database](#) as well as the integration with the license management tool.

Cloud management portal for self-service and access

We have helped Telekom IT to launch a cloud management portal with native AWS support. Via this portal AWS environments can be managed easily (create, read, update and delete operations), including granting and revoking of access rights to users for specific roles on AWS and more features and self-services are continually added. The portal is developed mostly by Telekom, but it runs on AWS and T-Systems has delivered architecture, DevOps and engineering support as well as the application operation via SRE (see below). Mostly serverless and container technologies have been used, including AWS CDK, DynamoDB, ECS, API Gateway, Lambda as well as RDS, beyond that Keycloak as identity provider via federation with Telekom Active Directory - and Javascript for the front-end part.

Consulting and migration support (Cloud migration factory)

A migration team from T-Systems is deeply integrated into the CCoE. It serves as a primary contact point for application teams who want to migrate to the public cloud. The team is embracing the [T-Systems Cloud Migration Framework](#) and supports different migration approaches (6R) from Rehosting (Lift&Shift) to Refactoring. The factory-like approach ensures fast and reliable migrations, using general cloud migration experience as well as expertise in the Telekom IT environment specifics, like supporting the required Telekom security approvals on the application level. SAFe program increments define the waves of migrations and for more fun so-called migration parties are conducted on a regular basis; thereby an application or environment is being migrated in a concentrated effort during a three-day workshop with all relevant stakeholders in reach so that blockers can be removed quickly. During the migration, the whole target environment is being implemented using infrastructure as code in Telekom's gitlab environment, managed by the application team or T-Systems in case of application's subscription for T-Systems' advanced managed services.

Site reliability engineering and injecting the right dose of chaos

There are many challenges to running applications or platforms in the cloud. The focus of [site reliability engineering \(SRE\)](#), a very popular implementation of DevOps, is to make these applications reliable whilst allowing high velocity in the development team. SRE works at the application or platform level and uses automation to manage components across the layers. To improve the reliability of any system, the SRE team works with Service Level Objectives and keeps the Error Budget in check. T-Systems is embracing the SRE method at scale as part of next generation delivery model. Our SREs run production readiness reviews, automate as much toil as possible, improve the architecture and onboard applications into 24x7 service. For DTIT several applications and platforms use the SRE service by T-Systems as a high-skill operating model.

Let's shed some light on a recent innovation in Telekom's AWS environment, inspired by the SRE toolkit. We have enabled Chaos Engineering in all development and test environments using

the AWS Fault Injection Simulator. That way, if an application is not opting out, several times a week certain errors will be applied to their systems, like the reboot of an EC2 instance. Chaos engineering is a suitable approach to improve the robustness of an application as critical situations are simulated on a regular basis so that self-healing systems will evolve over time.

Financial optimization including night-time saving

While the AWS environment of Telekom is growing quickly (at the time of writing >600 accounts), the costs also have increased. T-Systems has helped Telekom IT manage its spending on AWS. The most important means for cost optimization have been:

- Central purchases of AWS Savings Plans, including monitoring of Savings Plans coverage, which we try to keep above 80%
- Implementing [night-time saving](#) on development and test environments, i.e. shut-down of running instances in the evening except for the ones opted out
- [Architecture reviews](#) for applications using the well-architected framework, including recommendations regarding cost optimization
- Cost visibility via automated monthly reports, including the recommendations from the AWS Trusted Advisor
- Self-services related to costs, like quick config of budget alerts or upgrade from gp2 EBS volumes to gp3 generation

Also, for applications responsible for a larger number of AWS accounts we aggregated cost views for them for easier management of the costs.



The benefits

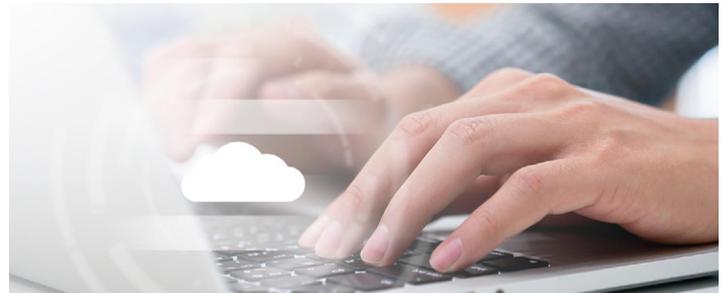
The collaboration between Telekom IT and T-Systems resulted in a quick ramp-up of a secure and scalable landing zone, approvals and guardrails for AWS usage in Telekom, deep integrations, strong consulting and migration services as well as highly reliable platform support.

Why Amazon Web Services

AWS has been selected as a platform for several reasons. The client follows a cloud strategy and is about to migrate most of their applications to the public cloud within the next few years. So, all new applications that do not process data with very specific compliance requirements are set up in the public cloud. But even more importantly, application landscapes and environments can be deployed on AWS very quickly and without any infrastructure constraints.

About the partner

T-Systems has a long track record of successfully running mission critical applications on various platforms, from enterprise systems such as SAP to cloud-native applications like the Corona-Warn-App. With a footprint in more than 20 countries, T-Systems is serving many large enterprise clients and brings a deep industry knowledge in areas such as healthcare, automotive or telecommunications into their projects. Also, T-Systems is a trusted AWS partner for Deutsche Telekom, setting up their landing zones, networks and supporting more and more Telekom hubs and applications in adopting AWS. T-Systems is an accredited AWS Managed Service Provider and Premier Consulting Partner with more than 500 experts on AWS and a growing list of competencies such as migration, SAP and well-architected.



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