

CLOUD NATIVE OSS BSS

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Cloud Native OSS/BSS

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We hope you enjoy the report and, most importantly, will find ways to use the ideas, concepts and recommendations detailed within. You can send your feedback to the editorial team at TM Forum via editor@tmforum.org

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The big picture

Everyone talks about cloud native operational and business support systems (OSS/BSS), but how many communications service providers (CSPs) are actually using them? While there is consensus that most of the technology supporting their businesses will migrate to the cloud, progress is slow. Even a company like Vodafone Group, which is fully committed to cloud, has only migrated a third of the systems in its UK operating company. For most small to medium-sized operators – and larger ones not focusing on the B2B market – the percentage is much lower.

Cloud maturity varies across CSPs' internal organizations, with IT teams responsible for OSS/BSS typically having the most cloud expertise. Indeed, IT departments have been partnering with suppliers of cloud-based solutions for several years. Some of these applications are cloud native, while others simply have been modified to operate in a cloud environment.

Network teams have less experience with cloud-based solutions and have been wrestling with network functions virtualization for the last several years, but they, too, are moving toward fully cloud native network functions. On the other hand, individual lines of business within CSP organizations, such as product teams responsible for selling to enterprise customers, have had little success launching cloud-based services, although they do have considerable experience in partnering and reselling.

A holistic strategy is important

Most telco CEOs are convinced that their companies must transition into digital service providers, and they understand that part of this transformation requires cloud migration. Many have taken their senior leadership teams on visits to leading software companies in the Silicon Valley, while others have visited startups such as Reliance Jio in India or Japan's Rakuten Mobile, companies that have fully embraced cloud and are advocates of the technology.

The challenge for CSPs, however, lies in converting the enthusiasm for all things digital at the top of the organization into a detailed vision for the entire business. Without a holistic strategy, cloud migration could fall victim to short-term budgeting decisions. Indeed, many operators' approaches to cloud migration are poorly conceived and risk backfiring.

For example:



Setting arbitrary targets for the percentage of total workloads to be migrated to cloud by a certain date – the risk here lies in creating a culture where applications are migrated to a cloud environment (public or private) without considering the business benefits or the impact on other workloads.



Giving a mandate for aggressive cloud migration to an individual or single team, rather than taking a holistic approach across teams or departments – this can be an attractive approach to the degree that it enables the person or team to take a long-term view of cloud benefits. However, there is a risk that if the individual or team members leave the company, knowledge will walk out the door with them.



Making cloud migration purely a financial consideration

– in some cases the decision about migrating to a cloud environment is based solely on whether it will result in cost savings, but many operators have discovered that migrating applications not designed for the cloud (often called a “lift-and-shift” approach) does not save money.

Why cloud?

When assessing the key benefits that cloud computing brings to enterprises, such as lower costs and ability to respond quickly, it may not immediately be clear that telcos need to embrace cloud. CSPs’ businesses tend not to be constrained by capital, and their core businesses are predictable in terms of the number of customers they must manage and the amount of traffic they need to carry on their networks. Indeed, when was the last time a CSP successfully launched a service that needed to scale quickly?

But CSPs’ traditional revenue increasingly is under pressure as their connectivity services are exploited by innovative hyperscale cloud providers vying for control of the customer. Adoption of cloud native technologies and approaches gives CSPs a chance to change their business models and try new things, like offering new products, services and pricing plans, or implementing a new way of communicating with customers.

Operators struggle with innovation today because their back-end support systems are inflexible. It can take a year or more to bring a new service or capability to the market, by which time the opportunity may be lost. And the cost of rolling out new services is so high that it discourages experimentation.

Using cloud for future business models

All the key strategic initiatives that CSPs are undertaking now require or will hugely benefit from cloud adoption:



Building stronger digital relationships with customers

– to do this, CSPs need to use data analytics and artificial intelligence to better meet and predict customers’ preferences and requirements. By putting customer data in the cloud, rather than having it spread across multiple systems, operators can create a 360-degree view of the customer that can be used in their interactions.



Differentiation through new services and capabilities that cannot easily be replicated

– most telco services rely on legacy hardware and software solutions provided by incumbent vendors, and operators lack the internal skills needed to build differentiated services. By building their own cloud-based applications or functionalities around an application, operators can start to offer services that are unique to them.



Delivering new B2B capabilities

– CSPs will be required to deliver highly customized solutions to enterprises, but they need to be able to do this quickly and affordably. The easiest way to co-create with enterprises involves using public cloud services that can be accessed at all times by both parties, regardless of device or application.



Building new 5G revenue streams – this is a strategic imperative for most mobile operators, but new core and edge network capabilities will be required to monetize network capabilities. Edge cloud offers all the benefits normally associated with cloud but with lower latency.

The challenge for CSPs lies in translating business requirements into technology requirements and concrete strategies that can be implemented. Creating a return on cloud investment is extremely complex. However, operators can be successful if they look beyond quick cost savings on individual cloud migration projects and instead adopt an organization-wide strategy.

Read this report to understand:

- What cloud native means and how it's related to virtualization and software-defined networking
- Why CSPs are slow to adopt cloud native technology
- What it means to “lift and shift” applications to the cloud
- Why an evolutionary cloud strategy is needed and how TM Forum's Open Digital Architecture can help
- Why APIs are an important part of a cloud strategy
- Where to start adopting cloud native technology first
- What the biggest challenges are to moving OSS/BSS to the cloud and how to address them

“ Operators struggle with innovation today because their back-end support systems are inflexible. It can take a year or more to bring a new service or capability to the market, by which time the opportunity may be lost. ”

Section 1

Differentiating between virtualization, cloud and cloud native

There are two ways to view the slow adoption of cloud technology by communications service providers (CSPs): On one hand, it's surprising that a technology-focused industry has been slower than others, such as financial services, to embrace cloud, but on the other, it could be a natural consequence of CSPs' conservative, risk-averse culture and their dependence on telecoms-centric vendors that have been slow to offer cloud-based delivery.

There is also confusion about what cloud is and how it relates to other technologies, which can inhibit adoption. The definitions below explain the difference between virtualization, cloud and other terms that are sometimes conflated and misunderstood.



Virtualization – using software to create an abstraction of computer hardware that allows a single computer's processors, memory and storage to be divided into multiple virtual machines, or VMs, which act as independent computers running their own operating systems. Virtualization is the foundation of cloud computing.



Cloud – a global network of VMs operating as a single ecosystem. Clouds can be public, private or hybrid. *Public clouds* share resources and offer services over the internet. *Private clouds* offer services over a private internal network typically hosted on-premises. *Hybrid clouds* share services between public and private clouds.



Cloud native – an approach to building and running applications that exploits the advantages of cloud computing. To be cloud native, solutions must be broken into functional blocks and run as microservices within containers on elastic infrastructure using

Agile processes and continuous delivery workflows. “Containerized” cloud native applications are bundled with all the related configuration files, libraries and dependencies required to run efficiently and reliably in different computing environments. Containers isolate an application and its dependencies into a self-contained unit that can run anywhere.



NFV – network functions virtualization decouples network functions (for example, firewalls, switches or routers) from dedicated hardware and instantiates them in software-based *virtual network functions* (VNFs) on commercial off-the-shelf servers which can sit in a service provider's network, on the customer's premises or in the cloud. Now CSPs are beginning to deploy next-generation *cloud native network functions* (CNFs), which are essentially are containerized VNFs.



SDN – software-defined networking is a network management architecture that decouples control and forwarding functions, allowing the network to be centrally controlled, or programmed, using software applications.

Moving to the cloud

Over the past decade, CSPs have virtualized many network functions only to discover that VNFs alone don't deliver the benefits they expected (for example, agility and lower costs), so now they are looking to adopt cloud native technology. But the differences between virtualization and cloud are not always understood in the boardroom.

As the CEO of a medium-sized European CSP explains, "The business tends to see cloud as a faster way of doing IT."

Another CEO said that while his company has a "cloud first" strategy, it's unclear what that means: "Does this mean public cloud or private cloud? Does it apply to infrastructure-as-a-service? Platform-as-a-service? Software-as-a-service? Does it require containerization and microservices? None of this has ever been clarified or specified."

This lack of specificity also applies to key performance indicators (KPIs) that may be put into place to measure the success of cloud migration. Many CSPs set targets for the percentage of workloads or applications migrated to the cloud without specifying whether to use public, private or hybrid clouds, for example.

It is also often unclear whether the migration is merely a "lift and shift" exercise, in which an existing application is cloud enabled by putting it into a container, or whether it includes deployment of applications designed from the outset to be cloud native.

As such, decisions about what "flavor" of cloud to adopt are often left with CIOs, whose enthusiasm for cloud native approaches may depend on several factors, such as:

- **Their own passion and evangelism** – CIOs with experience working in a cloud native environment understand the potential benefits.
- **Whether they have the confidence and backing of their superiors and other stakeholders to adopt an ambitious cloud migration strategy** – a cloud native approach necessarily means less support from systems integrators and the absence of a "single throat to choke" when things go wrong.
- **How their performance is measured** – CIOs who see their main role as managing overall IT costs are more likely to be cautious about cloud migration than those who see their role as adding value to the overall business.

Does 'lifting and shifting' pay off?

If simple lift-and-shift cloud migrations generated huge cost savings, it would be easy for CIOs to adopt an aggressive cloud migration strategy. However, this is not the case.

"Whenever I did a calculation in terms of cost benefits, I found that the numbers were not there," says the CIO of a Brazilian CSP.

The CIO of a large European operator agrees, expressing frustration that while public cloud vendors generally claim their services are cheaper than on-premises solutions (he says that AWS and Microsoft promise a 30% cost reduction over on premise solutions or private cloud], this does not prove true. In this CIO's experience, "a straight lift and shift would have been more expensive, and that doesn't actually include the cost of the migration itself."

Evolving to cloud

TM Forum CTO George Glass, who was previously Chief Architect at BT, makes a strong case for an evolutionary cloud strategy that includes lifting and shifting some applications as well as deploying cloud native applications.

"You may want to put an application into a container and drop it into a public or private cloud because, for example, you are running a slightly older version of the application and you are worried about incurring technical debt," he explains.

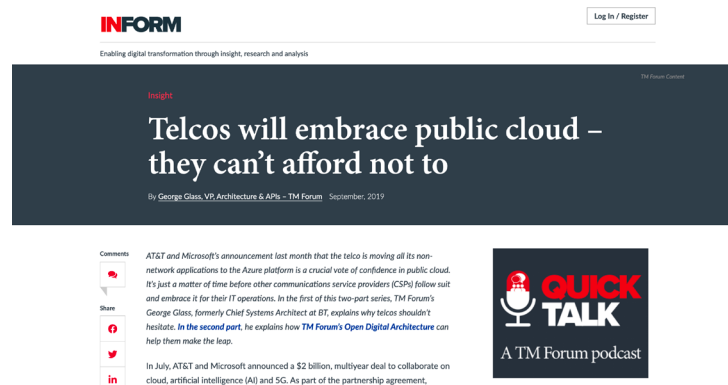
In a cloud native approach, on the other hand, applications are developed with services packaged in containers, deployed as microservices and managed on elastic infrastructure using Agile DevOps practices including continuous integration, delivery and testing.

The advantage of a cloud native approach is that it allows the IT estate to grow horizontally. CSPs can move away from procuring large, monolithic applications towards an environment where they can make small, incremental changes and upgrades.

They can do this by building a library of microservices that can be used to build different applications.

The **TM Forum Open Digital Architecture Project** is working on a blueprint for evolving OSS/BSS (see page 15). In the next section, we'll look at some of the drivers for adopting a cloud strategy as part of digital transformation.

Read more about how Glass views the transition to cloud in this two-part series on *TM Forum Inform*:



Section 2

Executing a strategy to deliver cloud native IT

While it's still early days, migration to cloud native IT is gaining momentum among communications service providers (CSPs), and as the early adopters realize business benefits, the speed of transformation will accelerate. Says Ibrahim Gedeon, CTO of Canadian operator Telus, "The opportunity for cloud native has to come with true business transformation and not just IT next-generation release."

Some consensus is emerging around the types of workloads and applications that offer a compelling case for migration to the cloud. Front-end digital systems such as mobile apps, chatbots and websites are a good place to start because the systems are new and speed of adoption is unpredictable. This makes them ideally suited to public cloud deployment – there is no costly upfront investment and no fear about managing a surge in demand when, for example, a new device hits the market.

By starting with low-hanging fruit, CSPs can develop the expertise and competence they need to tackle more challenging migrations in two to three years' time. In almost all cases, operators are moving away from full-stack, multi-year transformation programs that require committing to capabilities that may no longer be relevant or necessary by the time they are ready to deploy them.

Cloud offers flexibility

Identifying elastic IT functions and workloads for both existing and new business is the easiest starting point for cloud migration. Whether to use a cloud native approach depends on how often an operator wants to be able to make changes to the digital platform and whether decoupling of front- and back-end systems is important.

Front-end systems refer to those that customers directly engage with (for example a mobile app), while back-end systems refer to the operator's own internal systems such as charging or mediation.

In traditional business support systems (BSS) the front- and back-ends are tightly coupled making it extremely difficult to make changes that aren't costly and time-consuming. To address this, some CSPs are using cloud native technology to build a layer that sits between front- and back-end applications, effectively decoupling them.

Vodafone Group refers to this as the Digital Experience Layer (DXL) which it has built using a microservices architecture. The DXL sits in the Amazon Web Services cloud and uses abstraction via **TM Forum Open APIs** to isolate legacy, downstream systems of record from changes occurring in the digital layer.

New lines of business

Because there is no legacy to address, many CSPs are using cloud native IT applications to support new lines of business such as TV, video services or IoT. Another example of this is setting up new, entirely digital brands, which some operators refer to as in-house mobile virtual network operators (MVNOs). Verizon's new service **Visible** is a good example.

Verizon CIO Shankar Arumugavelu describes Visible as a “cloud native service provider” whose IT functions such as customer relationship management (CRM) and charging run in a private or public cloud. Verizon is applying what it learns from Visible to its own five-year cloud migration program which has been underway for three years.

“There are lots of learnings that we have been able to bring back to the mothership,” Arumugavelu says.

Shifting core IT applications such as billing, charging, revenue assurance and mediation to the cloud or adopting new cloud native apps for these functions is more difficult than adopting cloud native CRM, and mistakes or delays can have a direct financial impact on the business. Even so, most CSPs believe they need to transform these applications.

Fixing BSS

In our recent report *Future BSS: Say goodbye to software customization* we explored why many CSPs and vendors believe BSS is “broken” and requires transformation.

Key findings in the report include:



The cost of customizing legacy solutions every time a change is needed to support a new service is untenable. Even for vendors, the traditional approach to BSS does not represent a viable commercial model because CSPs are no longer prepared to enter into a commercial arrangement that requires them to commit to change requests every time customization is needed.



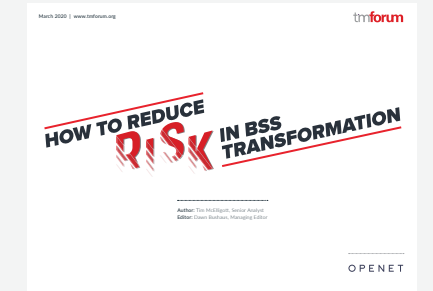
Transformation projects meant to help operators introduce new capabilities have a high rate of failure because they are too complex and often use procurement processes that results in a mismatch between what the operator thinks it is buying and what is actually delivered. In addition, lengthy implementation cycles mean that capabilities initially requested may no longer be relevant by the time they are available, and compromises to ensure that new systems meet the requirements of the legacy business are often prioritized over new business.



The legacy approach to BSS does not support transitioning to **Agile** ways of working, but this is an important goal for most CIOs. At least one large European CSP interviewed for the *Future BSS* report said his team will undertake new projects only if they are delivered using an Agile approach.

In the next section, we’ll explore further the challenges CSPs face in adopting cloud native technology and explain how the **TM Forum Open Digital Architecture** addresses them.

To learn more about BSS transformation, read these reports:



Section 3

Addressing the challenges of going cloud native

Communications service providers (CSPs) face individual and collective challenges to moving IT systems to the cloud, namely winning support from their suppliers and finding the right skills. The **TM Forum Open Digital Architecture** offers a blueprint for evolving from legacy support systems to applications that are cloud based and cloud native, but widespread agreement, collaboration and contribution among many CSPs and vendors is necessary to advance it.

For CSPs to adopt cloud native technology, suppliers must make such solutions available. Most operators are still using hundreds of legacy operational and business support systems (OSS/BSS) that were designed for on-premises deployment in CSPs' operational environments. As discussed in the previous sections, some of these systems can be modified to operate in a cloud using containers and industry-agreed APIs as an evolutionary step toward fully cloud native applications.

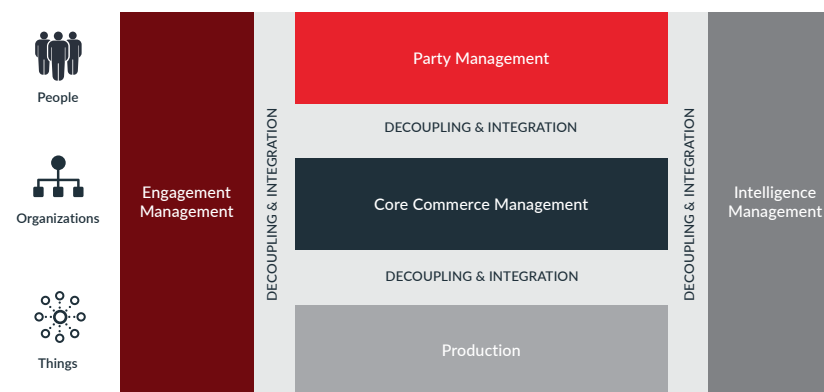
Transitioning to cloud with ODA

CSPs basically have two options for moving support systems to the cloud: "lift and shift" existing applications or rearchitect them to be cloud native. The former shortchanges operators on the benefits of cloud, but the latter takes too much time and is costly. TM Forum's Open Digital Architecture, part of the **Open Digital Framework** (see page 27), provides an evolutionary path between the two.

The ODA is fundamentally designed as a component-based architecture, with the business services of a component exposed as a set of **Open APIs**. The APIs can be, and typically are, further decomposed into a set of services and microservices. The advantage of using microservices is that they can be managed on scalable infrastructure using **Agile** development practices.

CSPs and their suppliers can use the ODA to set an architectural vision and plan relevant roadmaps to implement it. For example, companies can use optimization, reengineering or abstraction to manage migration from their current hosting infrastructure, which is usually a mix of dedicated hardware, virtualized infrastructure, private cloud deployments and some public cloud deployments, to a cloudbased environment.

TM Forum Open Digital Architecture: a work in progress



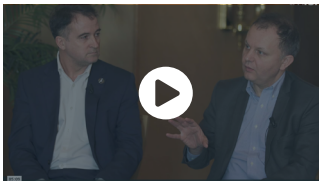
TM Forum, 2020

The ODA accepts that not everything has to be cloud native and that simply cloud enabling some legacy components may be appropriate to manage costs. In addition, re-engineering or abstraction allows for the decomposition of a component into services and microservices enabling a company to move to a cloud native deployment.

In January 2019, TM Forum's Collaboration Community published an exploratory report for members entitled **Business Operating System Pioneer Project Report**. Led by Orange and Vodafone, the paper made the case for creating "a common and fully interoperable framework for CSP core and future business, including their future digital services and ecosystems created by CSPs."

A **subsequent TM Forum Catalyst proof of concept** developed an interoperable reference implementation of a core commerce management system including a product catalog and order management service, marking the first time TM Forum members had collaborated to develop software code for testing.

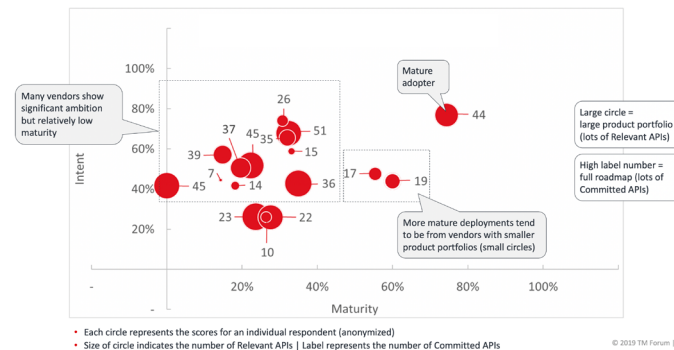
Watch these videos to learn more about the project:



The importance of APIs

APIs are key because they give CSPs the freedom to work not only with legacy vendors, but also startups offering services optimized for cloud. TM Forum regularly tracks the adoption of Open APIs by CSPs and their suppliers. **A recent survey** of both released in November 2019 reveals that vendors' native Open API support lags behind demand from CSPs (see below). Indeed, the average maturity level is 26% higher among CSPs, which indicates that many operators are taking a do-it-yourself approach, using temporary workarounds until their vendors deliver native Open API support.

Vendors' adoption of Open APIs



TM Forum, 2020

M1, a CSP operating in Singapore, is implementing a fully cloud native migration strategy, and Chief Digital Officer Nathan Bell has a stark message for any potential vendor that does not support its approach: “If you’re telling me I have to change everything, then you’re opening the door to my bringing in another vendor.”

He notes, however, that he is encouraged to see many incumbent vendors rearchitecting their solutions to be truly cloud native. M1 has completed the migration of its postpaid billing systems, for example, and Bell notes that the software partners the company has chosen are “mainstream guys pushing to the next generation.”

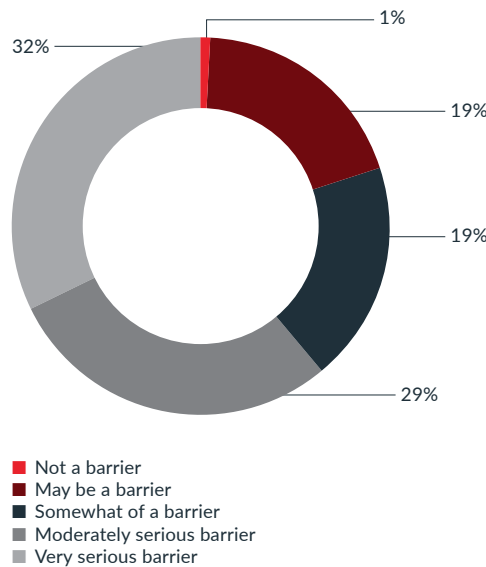
Similarly, Verizon pushed Netcracker to go cloud native, according to CIO Shankar Arumugavelu. “We pushed Netcracker to take their entire rating and billing module and make it cloud native,” he says. “Now they can say they are cloud native. They were receptive and now they are benefiting.”

Addressing the skills gap

In addition to challenges surrounding the changing relationship with suppliers, CSPs are finding it difficult to hire people with the software skills needed to implement cloud transformation. For the past four years as part of the Digital Transformation Tracker, TM Forum has surveyed CSPs and suppliers about progress with digital transformation. We always ask a question about skills, specifically whether a lack of software and Agile talent is a problem.

Our most recent survey, which is analyzed in *Digital Transformation Tracker 4: The culture wars of transformation*, found that lack of skills is becoming increasingly challenging. In 2017, for example, only 17% of respondents saw availability of skills as a very serious barrier to transformation, but that number nearly doubled to 32% in 2020.

Is availability of skills a barrier?



TM Forum, 2020

Insourcing cloud expertise, and software skills more broadly, is a major focus for Tier 1 CSPs committed to becoming “tech” companies. Nearly all of them are retraining existing employees in addition to recruiting new talent. In some cases, operators are plugging skills gaps by contracting with professional services firms on a temporary basis.

M1, for example, is outsourcing all its legacy systems to a systems integrator to give its own teams the necessary “headspace” to focus on cloud native technologies.

If CSPs do not acquire or train people in the requisite cloud software skills, they risk failing to exploit the full benefits of the technology. As the CIO of one Latin American operator explains, “Unfortunately we don’t seem to be getting the ROI [return on investment] we expected. Technical teams have never done cloud before. They got a mandate to do a ‘lift and shift’, but what this means is that they are not taking the opportunity to look at what cloud can do in terms of bringing efficiencies more broadly.”

In the next section, we offer some guidance for CSPs and suppliers to help them with the evolution to cloud native support applications.

“ If CSPs do not acquire or train people in the requisite cloud software skills, they risk failing to exploit the full benefits of the technology. ”

Read more about skills and cultural transformation in this report:



Section 4

Make it happen – Strategies for adopting cloud native IT

Most telco CEOs are convinced that their companies must transition into digital service providers, and they understand that part of this transformation requires migrating operational and business support systems (OSS/BSS) to the cloud. The challenge for communications service providers (CSPs), however, lies in converting the enthusiasm for all things digital at the top of the organization into a detailed vision for the entire business. Following are some steps companies can take now to begin transitioning to cloud native IT.



Define concepts

Ensure that there is clarity within the IT department and the larger organization about what the difference is between virtualization, cloud and cloud native. Any hesitation, or inconsistency, in how these concepts are defined likely will result in muddled thinking and unsatisfactory outcomes. With clarity around these initiatives, executive leadership will be positioned to map out and prioritize the migration of applications and workloads. Setting key performance indicators to measure progress should be wholly consistent with the company's definitions.



Think long term

Leadership, evangelism, enthusiasm – and maybe even stubbornness – are necessary in any IT organization that is looking to adopt a cloud native approach to technology evolution. It will be difficult to justify making individual decisions without these qualities and the ability to persuade other business leaders across the organization to make decisions that might not yield business benefit in the short term. The key stakeholders to convince are the heads of the lines of business and the finance team.

Showing developers and architects working to support the enterprise line of business where they can co-create with their customers is perhaps the best way to gain their support.



Create a new team

Creating a team within the organization to advance adoption of cloud native technology may be necessary to win support for making bold decisions. This group should comprise the IT and technology teams, plus product owners from the lines of business and from the procurement department. Such an approach reduces the risk of the project being undermined due to differences in prioritization and a reluctance to change traditional approaches and principles.



Be willing to increase spending

Be prepared for the impact that cloud migration will have on CapEx and OpEx. The adoption of cloud native technologies and ways of working will inevitably result in increased operating costs, although some operators are discussing with their suppliers the possibility of capitalizing their costs for using public cloud solutions.



Persuade vendors that cloud is the future

Without technology partners that understand the benefits to their own businesses of adopting cloud native approaches, migration will be difficult. Large, incumbent vendors may not see a clear business case for building cloud native systems because they necessarily disrupt traditional systems and approaches. However, if they can be persuaded that the investment required to satisfy one operator can be recouped as they roll the same approach out to others, a clear business rationale can emerge.



Partner for skills

Do not assume that migration to cloud native applications will necessarily require the recruitment of large teams of developers. To regain control of their technology roadmaps and innovate around third-party cloud solutions, operators certainly will need to build up their expertise in cloud and software development, but learning how to partner better with suppliers and develop Agile ways of working with them is just as important.



Support the Open Digital Architecture

The **TM Forum Open Digital Architecture** offers a blueprint for evolving from legacy support systems to applications that are cloud based and cloud native, but widespread agreement, collaboration and contribution among many CSPs and vendors is necessary to advance it. Consider joining the team of companies working to advance the architecture and develop Open APIs. If you're interested in learning more, please contact **TM Forum CTO George Glass**.

“ Without technology partners that understand the benefits to their own businesses of adopting cloud native approaches, migration will be difficult. ”

Cloud-native OSS/BSS Modernization



Getting to cloud-native is a very common concern these days.

Getting to cloud-native is a very common concern these days. In addition to selecting the right technologies for cloud-based consumption models, digital service providers must change how they approach people and processes. Infrastructure technology changes from vertical, specialized platforms to a horizontal architecture that supports cloud-native applications and services. Red Hat has worked with several service providers to develop a more horizontal cloud platform which can support their services, operations and network functions.

Digital Service Provider Transformation

Becoming cloud-native is a critical step for communication service providers (CSPs) in their journey to becoming digital service providers (DSPs). There are three pillars in this transformation: digital services, digital network, and digital engagement and operations.

Digital service providers have the ability to offer a wide variety of innovative digital services, and can quickly adjust the services to new demand while providing a compelling customer experience. Target services include 5G, Internet of Things (IOT), media services, smart home, smart cities, and others.

Simplifying the delivery, accelerating the innovation, and scaling to match demand for these services efficiently all depend on a foundation of digital networks and operations.

The digital network is a key pillar. It is software based and leverages technologies like software defined networking (SDN) and network functions virtualization (NFV) to provide increased programmability and flexibility, responsiveness and innovation. Cloud capabilities bring desired agility and scalability.

As container technologies mature and are enhanced for networking, many virtual network functions deployed in virtual machines (VMs) will evolve to a microservices architecture deployed in containers.

The third pillar, digital operations, uses automation along with network, IT and data management, to allow the network to readily and reliably deliver services to customers.

Three Pillars of CSP to DSP Transformation



Three Pillars of CSP to DSP Transformation

Cloud-native OSS/BSS Modernization



Modernizing OSS/BSS processes to use cloud-native architectures allows service providers to create greater operational efficiencies. It also helps them develop new services in shorter innovation cycles and generate revenue faster. They can minimize risk by using this modern infrastructure's ability to easily spin up and test new services for market viability.

The e-book **"Connecting The Digital World"** outlines how to modernize telecommunications infrastructure using an open framework. Information-rich data generated by the network can be used to optimize services and application performance. Service providers are not only in a race to deliver new and innovative services, they are

also competing to deliver radically enhanced customer experiences, which a modern OSS/BSS system allows them to do.

Pacing and Planning OSS and BSS Modernization

Existing OSS and BSS systems are critical to running today's service provider businesses, and yet they are very complex. Therefore it is not possible to just replace them overnight. The best way to modernize them is to plan a series of smaller projects and steps that incrementally deliver new functionality.

Step 1: Quick Win

An effective first step is to automate existing processes and federate multiple, isolated databases, to provide a single view of all managed data. Legacy systems still required can be wrapped with APIs and integrated into the newly automated processes.

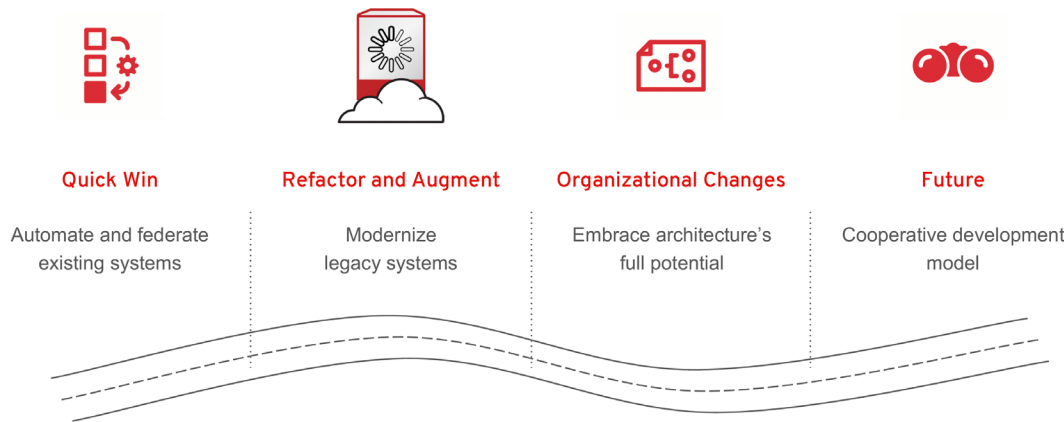
Step 2: Refactor and Augment

The second step is to refactor legacy systems no longer providing sufficient functionality into a cloud-native design, or to augment them with new containerized microservices. This delivers more efficient and manageable scalability and allows ready integration with the evolving architecture.

Step 3: Breaking Down Organizational Boundaries

The industry has started to accept that transformation is just as much (if not more) about culture as the adoption of new technologies. Therefore, service providers must start breaking down organizational boundaries and silos to better realize the new technologies' full benefits. The TM Forum **"Digital Transformation Tracker 4"** behavioral study shows many respondents relying less on process and more on empowering teams, an approach IBM President and former Red Hat CEO Jim Whitehurst advocates in his book, **The Open Organization**.

OSS / BSS Modernization Journey



OSS/BSS Modernization Journey

Cloud-native OSS/BSS Modernization



Step 4: Enabling the future

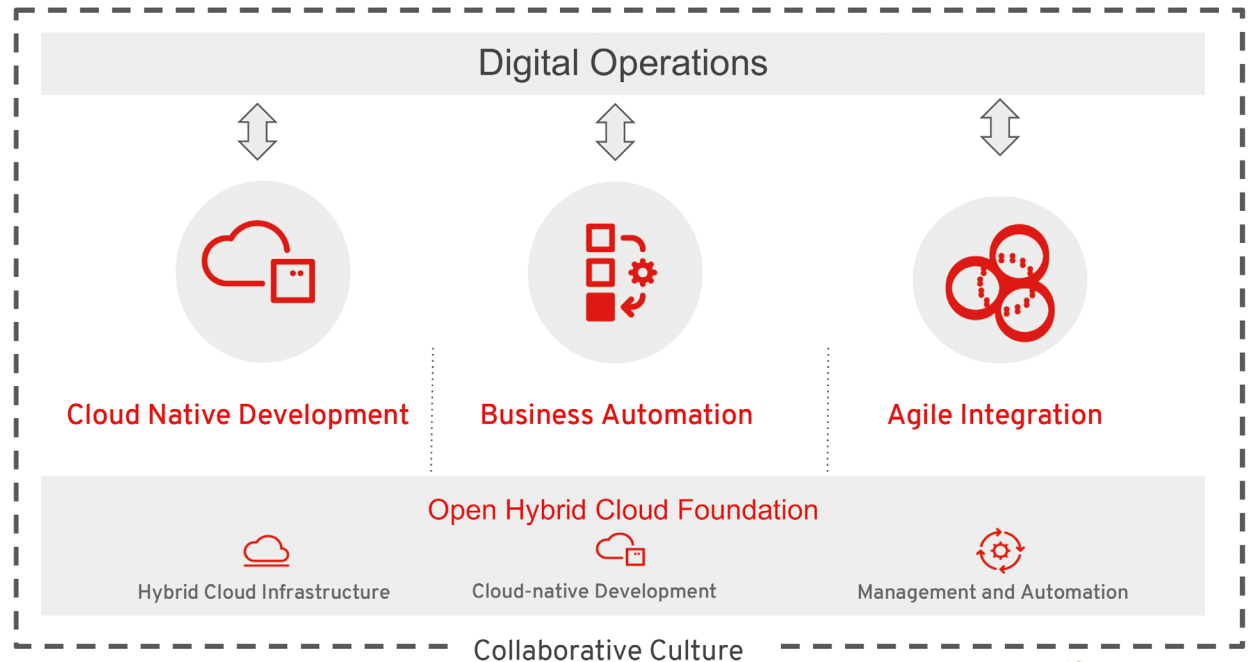
Microservices, open source software and agile integration allow for a cooperative development model among service providers, network equipment vendors and independent software vendors. Service providers will purchase new microservices from vendors and integrate them into their overall architecture.

Service providers can incrementally automate and refactor selected capabilities one at a time. After several iterations, they can interconnect processes to achieve full end-to-end process automation. Modern integration technologies allow legacy systems to be leveraged where feasible, so service providers can define the pace for their modernization journey. The ACG Research white paper, "Open source for modernizing telecommunications OSS/BSS," outlines those essential steps and available open source tools.

Recipe for Success

Modernizing OSS and BSS is a critical component on the journey to becoming a digital service provider. As digital service providers seek competitive advantage, they need a consistent application foundation to foster innovation and speed, and allow an ecosystem that maximizes choice.

Red Hat helps move service providers and their partners toward that destination with an open hybrid cloud foundation.



Digital Operations

- With Red Hat® **OpenShift®**, applications built on containers improve production efficiency, allow elastic scaling, and facilitate DevOps processes, while allowing operations to maintain a more secure and reliable infrastructure.
- Red Hat **Ansible®** Automation Platform enhances productivity, encodes processes to eliminate errors, and improves experience, while reducing costs.
- Red Hat **Integration** helps to remove development bottlenecks, to optimize reuse of components, to better use disparate data sources, and to securely collaborate across the platform.
- Red Hat **hybrid cloud infrastructure** allows resources to be provisioned quickly for developers, so they can start on the next big idea. Together, hybrid cloud, multi-cloud, container, and Kubernetes technologies provide the agility and stability needed to deliver services faster.

Cloud-native OSS/BSS Modernization



Red Hat is the industry leader in delivering commercial open source solutions for these technologies to build an open hybrid cloud foundation. Red Hat's portfolio and large ecosystem of certified partners and applications allow migration at a flexible pace to a cloud native microservices-based OSS and BSS architecture, integrating legacy applications as needed. With this foundation, service providers and their partners can start with manageable, impactful automation projects (particularly in the OSS) to simplify network management tasks and ensure better consistency. They also gain workload portability among clouds and the ability to run applications where and when needed.

To learn more about how Red Hat can help you in your transformation projects or to schedule a discovery workshop, please visit us at www.RedHat.com/telco

TM Forum Open Digital Framework

Delivering the tools to go from concept to cash in just 18 days

The **TM Forum Open Digital Framework** is an interactive, continuously evolving collection of tools and standards that give communications service providers (CSPs) and their suppliers an end-to-end migration path from legacy systems to modular, cloud native IT components. Simply put, it is a blueprint for service providers to deliver intelligent operations fit for the 5G era.

The Open Digital Framework is being developed through the **TM Forum Collaboration Program** and **Catalyst proofs of concept**, and builds on the success of the Forum's established **Open APIs** and the **Framework suite of standards**. Specifically, it includes:

- **Open Digital Architecture (ODA)** – an enterprise architecture blueprint, common language and key design principles for modular, cloud-based, open digital platforms that can be orchestrated using AI
- **Open APIs** – 50+ standardized REST-based APIs to facilitate zero-touch integration and zero-touch partnering
- **Data & AI standards** – an industry-agreed data model, together with standards maximizing the potential of AI to enhance customer experience and increase operational efficiency
- **Reference implementations** – a framework for assembling and validating ODA components in the Forum's **Open Digital Lab**, fostering the creation of a services marketplace
- **Foundational libraries** – normalized models providing a common language for business processes and information that simplifies and derisks transformation projects



Evaluation

- **Maturity models and readiness checks** to help you baseline your digital capabilities
- **Business use cases** to help innovate your business models
- **Market dynamics** to understand your positioning vs. the competition



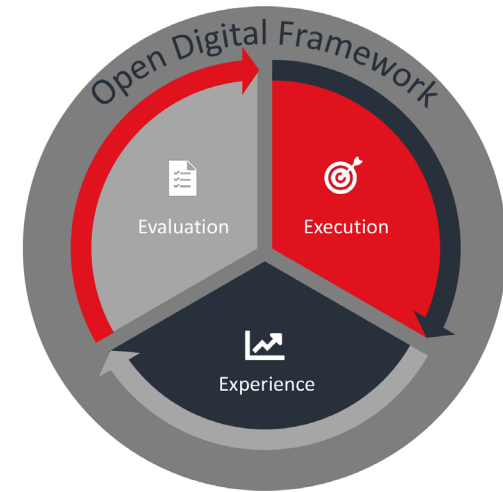
Execution

- **Business capability map**, a common language for IT and Business
- **Open Digital Architecture** for cloud-native IT
- **Open APIs** for zero-touch integration
- **Governance, security & privacy** by design
- **Data analytics & AI-driven** intelligent operations
- **Framework** foundational libraries – the DNA of a digital service provider



Experience

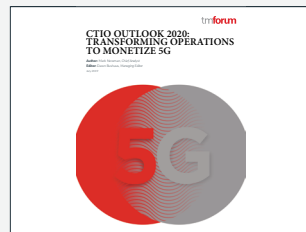
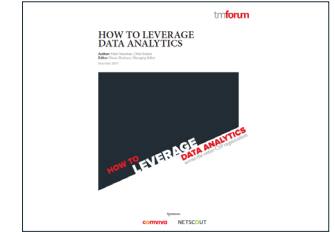
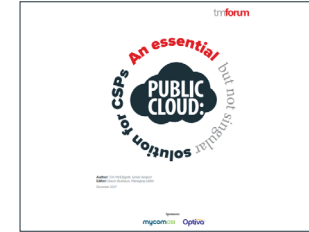
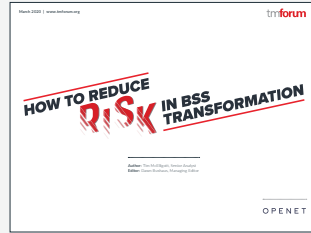
- **Transformation guides** to help you get started on your journey
- **Best practices** to help avoid pitfalls
- **Case studies** to learn from others



The goal of the Open Digital Framework is to help service providers increase agility and drastically reduce the development cycle for products and services from 18 months to 18 days. The Framework is a work in progress, continuously improving through crowdsourcing. Much of the collaborative work to build it is already complete, and the Framework helps to organize this work and make it more accessible.

If you would like to learn more about the Open Digital Framework and its components or how to get involved in the TM Forum Collaboration Community, please contact **George Glass**.

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