Migrating BSS to the Cloud: Cloud-Native BSS Application Development

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Summary

Catalyst

The telecoms industry is moving at a faster pace and generating greater volumes of data, which is placing a significant burden on communications service providers' (CSPs') legacy IT systems. CSPs are also under pressure to evolve their business models to better compete with the low-cost and digital-first services of internet content providers (ICPs). In response to the changing market dynamics, many CSPs are exploring new business models, launching digital services, and expanding into new industries. However, to ensure the success of these new endeavors, CSPs will need to adopt agile IT systems to both support existing operations and evolve the business.

Migrating systems – specifically those within the business support systems (BSS) domain – to the cloud will enable the scalability and agility that CSPs so desperately need. Despite many CSPs understanding the value of the cloud, many are unsure of where to start or how to migrate systems within the BSS domain to the cloud. This report is the fourth in a series that provides CSPs with guidance on how to migrate BSS to the cloud, including where to start, approaches, and lessons learned from the telecoms industry.

Omdia view

CSPs want to move BSS to the cloud in efforts to improve business agility and scalability and be able to react faster to market conditions and needs. In recent years, the telecoms industry has come to realize the value of cloud-native BSS applications and embracing microservices and other cloud-native technologies and principles is a top business challenge for CSPs in 2021. Despite the desire to embrace cloud-native, Omdia's 2021 OSS/BSS Evolution survey found that 61% of CSPs are hindered by limited in-house IT expertise. As a result, many CSPs will seek out solutions and services from vendors to help their organizations embrace cloud-native applications. The vendor community has responded to these challenges by providing productized solutions and comprehensive professional services aimed at lowering the barrier to entry for cloud-native BSS application development.

Key messages

- There is a significant appetite for cloud-native BSS applications within the telecoms industry, but limited in-house IT expertise and financial resources are the biggest hurdles to adoption.

- To address these challenges, CSPs will outsource application development and testing services in 2021, with billing and customer engagement systems being the biggest priorities.

- Software, systems integrators, and other services vendors have developed productized solutions and comprehensive professional services programs aimed at educating CSPs and guiding them in the development of cloud-native BSS applications and the migration of the applications to the cloud.
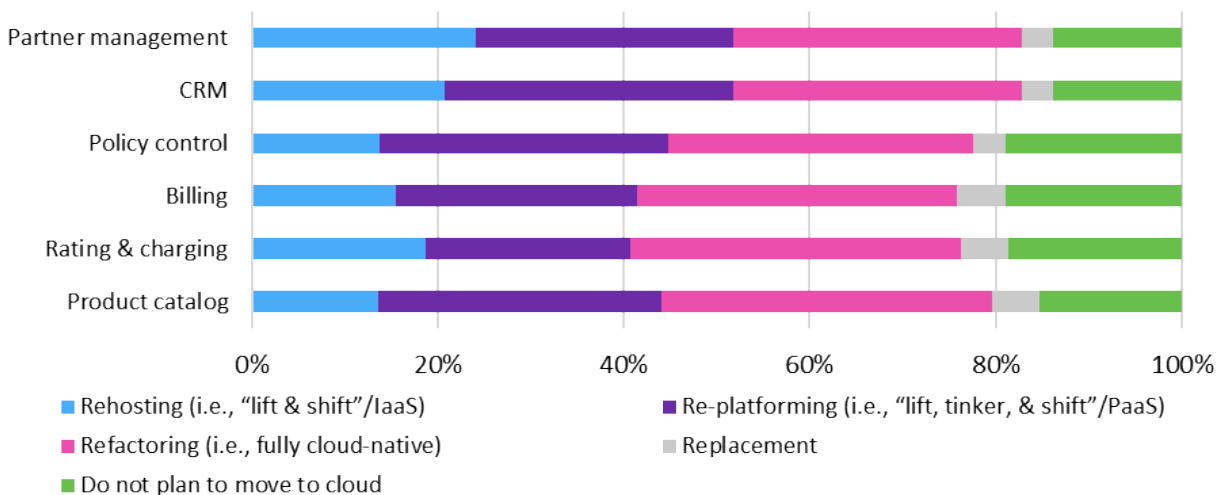
CSPs face several stumbling blocks on the road to cloud-native BSS

Cloud-native BSS adoption is stymied by limited IT expertise and financial resources

The case for moving BSS to the cloud has been stated quite thoroughly in recent years. Now, as the telecoms industry turns its focus towards improving business agility to support new monetization strategies and deliver a differentiated customer experience, the need for CSPs to embrace cloud-native is becoming more evident. Still, for much of the telecoms industry, cloud-native represents a monumental change in culture, operations, and IT. Its adoption will require CSPs to undergo a major transformation, and that's before any applications are even built.

1. Figure 1: CSPs are more likely to refactor BSS applications to be cloud-native

What path do you plan to use to migrate the following BSS applications to the cloud?

Rehosting (i.e., "lift & shift"/IaaS)
Re-platforming (i.e., "lift, tinker, & shift"/PaaS)
Refactoring (i.e., fully cloud-native)
Replacement
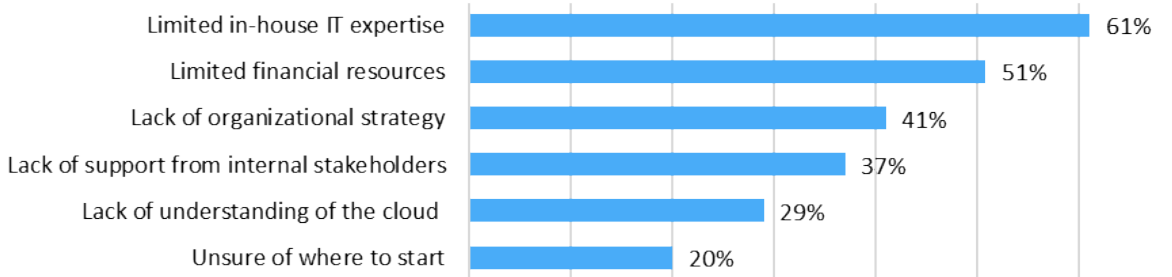Do not plan to move to cloud

n=61

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Source: Omdia 2021 OSS/BSS Evolution survey

Despite the seemingly daunting task ahead of them, many CSPs are quite keen to embrace cloud-native technologies for applications within the BSS domain. Omdia's 2021 OSS/BSS Evolution survey found that CSPs are more likely to embrace cloud-native technologies for systems in the BSS domain. As Figure 1 shows, on average, 34% of CSPs plan to refactor their BSS applications to be cloud-native in 2021. Additionally, an average of 28% of CSPs plan to re-platform BSS applications to take advantage of cloud-native features such as containers and load balancing.

2. Figure 2: Limited IT expertise and financial resources the biggest hurdle on the path to the cloud

What are the biggest challenges your organization faces in migrating OSS/BSS to the cloud?

Limited in-house IT expertise	61%
Limited financial resources	51%
Lack of organizational strategy	41%
Lack of support from internal stakeholders	37%
Lack of understanding of the cloud	29%
Unsure of where to start	20%

n=61

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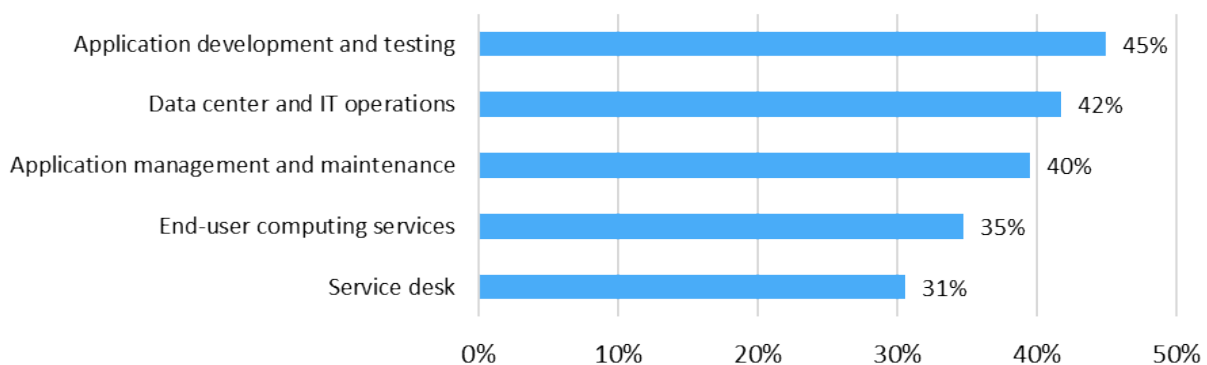Source: Omdia 2021 OSS/BSS Evolution survey

The industry's appetite and eagerness to embrace cloud-native BSS applications, however, has been met with several barriers that must be addressed. The same Omdia survey found that the biggest challenge that CSPs face in migrating OSS/BSS to the cloud is the limited in-house IT expertise, while limited financial resources present the second-biggest challenge – as Figure 2 shows. CSPs will need to rely on outside help from the vendor community to surmount these challenges if they are to fully embrace cloud-native.

Vendors will play an important role in helping CSPs embrace cloud-native BSS applications

Vendors will play an active and crucial role as CSPs take on the tall task of migrating BSS to the cloud while embracing cloud-native technologies. Limited in-house IT expertise, financial constraints, and uncertainty around the migration strategy will create a demand for professional services including consulting, outsourcing, and managed services from vendors. Omdia's *Telecoms IT Vendor Revenue Forecast 2020–25* projects BSS service revenues to grow at a CAGR of 4.5% over the next five years, with managed services revenues growing at a similar pace.

3. Figure 3: Application development and testing is the top outsourced function for CSPs

What percentage of the following do you outsource or use third-party services for?

Application development and testing	45%
Data center and IT operations	42%
Application management and maintenance	40%
End-user computing services	35%
Service desk	31%

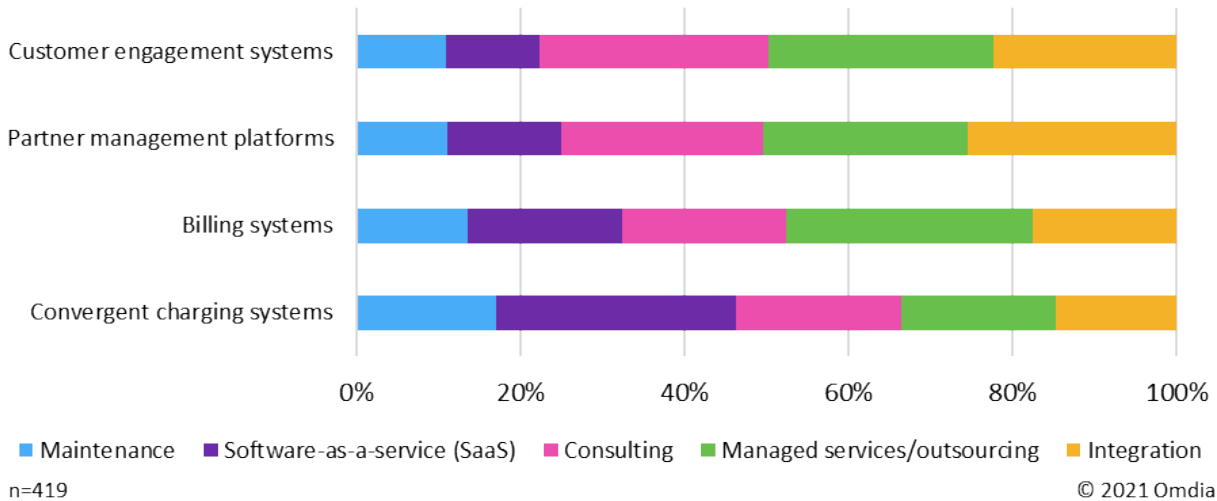0%   10%   20%   30%   40%   50%

n=110

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Source: Omdia ICT Spend & Sourcing – ICT Enterprise Insights 2021

Specifically, application development and testing is an area that has historically been outsourced at a higher rate, as the industry has struggled to attract and retain the right IT expertise. As Figure 3 shows, Omdia's 2021 ICT Enterprise Insights survey found that on average 45% of CSPs' application development and testing are outsourced to vendors.

4. Figure 4: CSPs are more likely to outsource applications in the BSS domain via managed services

What are the top areas where you expect to use professional services or outsourcing partners over the next 18 months?

■ Maintenance ■ Software-as-a-service (SaaS) ■ Consulting ■ Managed services/outsourcing ■ Integration

n=419

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Source: Omdia Telecoms – ICT Enterprise Insights 2021

The areas of importance within the BSS domain for CSPs is focused around billing and customer engagement. As Figure 4 shows, the same Omdia survey indicates 50% of CSPs will seek out consulting and managed services/outsourcing services for their billing systems in 2021. Additionally, nearly 56% of CSPs plan to use consulting and managed services for their customer engagement systems. The high rate at which CSPs seek outside help for these systems is indicative of the desire for CSPs to reduce the total cost of ownership of BSS applications and the importance of billing, partner management, and customer engagement in CSP monetization strategies. Furthermore, these trends are key drivers for the adoption of cloud and cloud-native technologies.

Migrating BSS to the cloud and embracing cloud-native architectures and technologies where possible will enable CSPs to gain more cost efficiency in the operations and management of BSS applications. The agility that cloud-native creates will also enable CSPs to rapidly adapt to market conditions and customer needs, including supporting the rapid launch of new services, pricing, or billing models.

How vendors are helping CSPs develop cloud-native BSS applications

To understand how the vendor community is helping CSPs overcome the challenges with developing cloud-native BSS applications, Omdia reached out to several software and service vendors to discuss their respective cloud-native methodologies, their approaches to helping CSPs develop cloud-native BSS applications, and what trends they are seeing in the market.

Amdocs

Amdocs' cloud-native methodology

Amdocs developed a holistic end-to-end methodology to accelerate to cloud-native at scale through DevOps and extreme automation. One of the core driving forces in Amdocs' cloud-native methodology is to help CSPs to leverage "Inverse Conway Law." Conway's Law, which was named after computer scientist Melvin Conway, states that "organizations who design systems are constrained to produce designs which are copies of the communication structures of these organizations." Conway's Law suggests that organizations are bound to develop applications that mirror the organizational structure – often monoliths. The inverse of Conway's Law, however, suggests that businesses should design their organizations in a way that reflects the type of systems they want to produce. The suggestion is that by embracing a more collaborative organizational structure based on DevOps standards, finely curated selection of tools and frameworks, well-architected platforms, and the right practices, CSPs can begin to develop systems that achieve their business needs, such as modularity and agility.

Amdocs' focus on helping CSPs to support Inverse Conway Law is an ethos the vendor has held closely in its development of Microservices360 (MS360). Not only is MS360 designed to help CSPs embrace Inverse Conway Law, it also helps CSPs to bridge the gap between domain-driven design (a software development principle) and their existing organizational structure.

Amdocs' approach to cloud-native development

Amdocs' approach to helping CSPs on their cloud-native journey has focused on lowering the barrier to entry for CSPs. Amdocs notes that cloud-native is about more than just embracing new technologies and tooling, it requires a cultural and organizational change, which can be a challenge for many CSPs. Moving to a rapid cadenced agile development and modern DevOps organization, for example, can be a steep learning curve for development teams. To address these types of challenges Amdocs has developed MS360.

Amdocs aims to streamline cloud-native application development with MS360

Microservices360 (MS360) is a microservices-accelerated development platform. The product came about as the result of Amdocs' own organizational transformation and adoption of cloud-native technologies which began more than five years ago. The result was the implementation of MS360 Essentials, which is the architecture that underpins Amdocs' cloud-native software products. It enables the vendor to offer modular, cloud-native software to its customers while incorporating cloud-native technology evolutions seamlessly over time. It also enables Amdocs to rapidly release new microservices – which can be done as frequently as on an hourly basis.

Recognizing the industry's desire and struggle to embrace cloud-native, as well as reflecting on the vendor's own challenges and lessons learned, Amdocs developed MS360 Enterprise Edition as a productized offering for CSP development teams.

Amdocs MS360 Enterprise Edition is an out-of-the-box platform that is comprised of numerous functional layers, out of which two are key differentiators: microservices software development kit (SDK) for developers and the infrastructure-as-code (IaC) layer. The platform can be deployed on any Kubernetes-based infrastructure and is supported on top of Red Hat OpenShift for on-premises and the leading public cloud providers for off-premises.

Within the developer SDK, CSPs have access to libraries of microservices templates that run on top of numerous layers of CI/CD pipeline best practices and to tools that enable the rapid design and coding of microservices-based applications. The SDK layer was built into the platform to help speed up the onboarding process and reduce the learning curve for CSPs embracing cloud-native development practices. Amdocs achieves these objectives by providing developers with a library of templates to simplify the development process. The developer selects the appropriate template and focuses on writing the code and business logic of the application being developed, rather than having to also learn about tooling and connecting to the infrastructure. The MS360 platform then handles all of the southbound functions – including the tooling, orchestration, and runtime – associated with the selected template.

The IaC layer rapidly automates the management of external resources (private or public infrastructure, network appliances, etc.). IaC also relies on libraries of Terraform-based templates that describe the desired end-state in a declarative form, minimizing and often negating the need to redevelop declarative modules, promoting reusability and maintainability.

Amdocs believes that this approach enables CSPs to reduce the learning curve for teams moving to cloud-native development practices. The vendor recognizes that limited in-house IT expertise, particularly around cloud-native tools, is a barrier to adoption for many CSPs. Teams can often become encumbered by identifying and learning to use the appropriate tools on the backend, which can severely hinder application development time. Knowing that the cloud-native landscape is evolving at a growing pace, Amdocs believes that CSPs must consider selecting an integrated DevOps ecosystem, such as MS360, that is based on a set of industry best practices and curated selections of technologies and is continuously upgraded as cloud-native technologies and best practices evolve.

Amdocs' perspective on cloud-native BSS trends

An appetite for co-development

CSPs often have an appetite for co-development of cloud-native applications. While MS360 provides CSPs with the capabilities that development teams need to get started with building cloud-native applications, Amdocs also receives requests for the co-development of cloud-native applications. These cases tend to be from CSPs that have an appetite for microservices but not enough skills in-house. In such cases Amdocs either develops or co-develops the applications with its customers until the customers ramp up their skills and gain the confidence to continue using MS360 on their own.

Cloud-native tools are not agnostic

As CSPs get underway in the cloud-native journey, many come to realize that several of the underlying tools are not agnostic, and sometimes even capabilities such as Kubernetes are not always the same everywhere. To mitigate these challenges, Amdocs centered the capabilities of MS360 on the business logic layer using templates. This allows CSPs to focus on the code and business logic of the applications in development rather than focusing on scouting and identifying and skilling up on the right tools. In turn, the underpinning technologies such as the container, runtime, and orchestration tools are left to Amdocs to manage on behalf of the CSP.

Increasing developer lifetime value (DLV)

CSPs are struggling to recruit and retain the appropriate IT skills. Amdocs believes that with cloud development skills in high demand across industries, it is essential that CSPs retain as much of their IT talent as possible. The vendor has consequently focused on "increasing developer lifetime value," leveraging MS360 to enable a quicker and cheaper developer acquisition process, increase developer productivity, and reduce developer churn, so increasing DLV.

IBM

IBM's cloud-native methodology

IBM's cloud-native application development methodology is centered around "IBM Garage for CloudTM," the vendor's end-to-end service offering aimed at guiding CSPs (and enterprises across industries) through the cloud adoption process, from planning and governance through to operating the new software in production.

IBM Garage for Cloud is a framework that has been developed based on experiences and lessons learned from delivering cloud projects over the years. These experiences and lessons have been gathered as part of an iterative process that IBM runs alongside its customers to co-create, co-execute, and co-operate the cloud-native applications. IBM Garage for Cloud focuses on working towards the iterative or minimum viable product (MVP) process, in which CSPs develop applications that can function effectively in production. Then through continuous iteration, the application's capabilities evolve over time. This approach not only mirrors that of ICPs like Google, but also enables CSPs to reduce the time to launch for new applications or services and determine fit for use quickly, rather than investing significantly over a longer period of time into something that will not bring the desired value and outcomes.

Security is also a cornerstone of IBM's cloud-native methodology. The vendor strongly advocates for "DevSecOps," a development principle that focuses on integrating security and risk mitigation at every stage of the application development process. IBM believes that DevSecOps is critically important as IT moves to the cloud and that CSPs will put themselves in a vulnerable position if they only begin to think about security only once an application is ready to be released into production. IBM believes that security can no longer be an afterthought; it must be a conscious and deliberate consideration for CSPs at each step of the development phase, from co-creation to co-execution.

IBM's approach to cloud-native development

IBM's approach to helping CSPs with their cloud-native BSS application development includes formulating a "journey to the cloud." IBM's comprehensive offerings include "Advise on Cloud," "Move to Cloud," "Build for Cloud," and "Manage on Cloud." This approach starts with understanding the CSP's needs and goals, developing a cloud roadmap based on an assessment of which applications should be moved or migrated to the cloud and the ideal migration path (lift-shift, containerized, re-architected into microservices or built new), and executing on this roadmap. The vendor also uses IBM Cloud Paks and several other "accelerators" – tools and best practices gained from previous projects – that are packaged on a platform to help speed up the development process. DevOps Commander is an example of one of IBM's accelerators. DevOps Commander is a platform with pre-integrated DevOps tooling that enable CSPs to quickly set up a new DevOps environment – which IBM reports is up to 70% faster than traditional methods. In addition, this accelerator enables the development of a customized DevOps tool chain and can integrate with already deployed DevOps tools in less than an hour.

As another example, IBM's Microservices Generator accelerator enables CSPs to speed up the development time for cloud-native microservices by leveraging several capabilities and inputs, such as automated code generation.

IBM's accelerators are one of the vendor's most differentiating capabilities. Leveraging these tools and best practices, the vendor notes that CSPs can develop new cloud-native applications within one and a half to three months, from start (i.e., design and planning) to finish (i.e., production) using the MVP approach. This, coupled with IBM's Garage for Cloud method of co-create, co-execute, and co-operate enables CSPs to get hands-on experience during the transformation and development process. It enables them to learn the

method and gain the confidence needed to continue their cloud-native development on their own, if they so choose. IBM highlights that while CSPs are under no obligation to work with the vendor for a contracted length of time, most of the vendor's engagements continue beyond 9–12 months.

IBM's perspective on cloud-native BSS trends

Cloud-native SaaS adoption

IBM has observed an increase in the adoption of cloud-native SaaS offerings across the telecoms industry – particularly for the BSS domain. CSPs have begun to embrace SaaS for systems, like CRM, where there is little need for customization, standard frameworks are available, and new innovations are a part of the SaaS release cycles. Moreover, IBM has observed that CSPs are typically embracing SaaS in areas where there are no significant differences in capabilities with traditional on-premises software. The most common scenario under which CSPs are embracing SaaS BSS is during a large transformation that includes support for the launch of a digital brand in a quick time-to-market scenario using out-of-the-box features with added flexibility and scalability.

Cloud-native custom builds

The demand for custom builds of cloud-native applications also plays a role within the telecoms industry's move towards cloud-native. While not every system across the BSS domain will need to be rebuilt from scratch, IBM has observed that CSPs tend to trend towards custom builds for APIs for greenfield deployments using open API standards (eTOM) or when there is a need to transform/refactor existing monoliths into a microservices-based architecture.

Containerization

IBM's definition of cloud-native also includes the re-platforming of monolithic applications using containerization. IBM has found that CSPs typically use containerization when there is a need to improve the scalability and operational aspects of an application but no real need to change its functionality or capabilities. The vendor uses its IBM Red Hat offerings, including the OpenShift platform, to help CSPs rapidly containerize applications and port them across cloud platforms.

Infosys

Infosys' cloud-native methodology

Infosys' cloud-native BSS application development strategy is focused on customers' objectives, and strategy is delivered from a systems integrator perspective for the telecoms industry. With more than 250,000 employees across nearly 50 countries and actively serving nearly 70 CSPs worldwide, Infosys has a breadth of reach in sourcing the expertise needed to guide CSPs on their cloud-native journey.

Design thinking is at the heart of Infosys' cloud-native development methodology, which involves turning input from CSP end-users into an MVP roadmap. For B2B projects, Infosys conducts conversations with CSP enterprise customers to understand their needs and challenges. For B2C projects, conversations are held with the CSPs' product development and customer-facing stakeholders, such as customer service representatives, to align the MVP roadmap with customer needs. This process ensures that as CSPs develop new applications they are investing in the capabilities that will have the biggest impact for their customers. Infosys notes that the design-thinking process has often revealed that features or capabilities that CSPs had initially identified as being important were not a priority for their end users. This process is supported by a combination of alliances and partnerships – which include various commercial off-the-shelf (COTS) vendors, cloud/technology companies, and niche competencies – and in-house innovation platforms such as Cobalt, 5G Living Labs, Telco Labs, AssistEdge, and more. This combination of in-house and partner-delivered

capabilities allows Infosys to offer a wide array of capabilities and expertise to guide CSPs on their cloud-native journey.

Infosys' approach to cloud-native development

Infosys' development approach can be broken down into three phases: envision, design, and DevSecOps. The envision phase includes understanding the CSP's business needs and objectives and creating a business transformation roadmap, which is facilitated in part by design thinking. The design phase includes establishing process models as well as product and service modeling. Application development, deployment, and operations take place during the DevSecOps phase.

To streamline the development process, Infosys leverages several accelerators that the vendor has developed based on lessons learned from previous projects. For example, the configure-price-quote (CPQ) accelerator includes a library of use cases and is hosted in a test environment on the cloud. By utilizing the use case library, CSPs can test new capabilities and scenarios to identify the features and capabilities to be developed for its CPQ. By deploying the CPQ in the Infosys lab, CSPs can quickly implement a proof of concept.

As a systems integrator, Infosys is in a unique position to leverage its extensive knowledge of the BSS product landscape. One of its core differentiating capabilities is Infosys' vendor-agnostic approach to BSS application development. The vendor employs consultants that are BSS domain experts and can help CSPs identify a shortlist of BSS products to meet their needs. Additionally, Infosys has dedicated practices for each software product vendor, which are used to provide insight and guidance on which products from a specific software vendor would meet the needs of the CSP. Each product practice includes a team of consultants, certified specialists, and accelerators to train, build, and operate.

Infosys also believes that its managed services capabilities help to differentiate its approach in the market. Infosys notes that it can be challenging for CSPs to find the capital needed to support transformation projects such as adoption of cloud-native BSS. To help CSPs release capital to fund the projects when necessary, Infosys often runs other applications as managed services. This enables the CSP to lower the total cost of ownership and reallocate the funds towards migrating BSS to the cloud.

Finally, Infosys has several proprietary solutions and services to support cloud-native development and adoption. Infosys Cortex2, for example, is an AI-driven customer engagement tool that allows CSPs to improve the customer experience across engagement, operations, talent development, and enablement. Infosys Cobalt is a comprehensive suite of services, platforms, and frameworks used to accelerate the cloud journey.

Infosys' perspective on cloud-native BSS trends

Changing culture is not easy

Infosys observes the challenge that CSPs face when adopting cloud-native. The vendor highlights that even for vendors with an established cloud-native strategy, organizational culture is not easily changed, despite CSPs understanding the need to embrace DevSecOps. Consequently, Infosys has found the need to offer training and other consulting services to help CSPs make the cultural move to the cloud as well as the technical move.

Netcracker

Netcracker's cloud-native methodology

The core of Netcracker's cloud-native BSS application development methodology focuses on being a joint development partner for CSPs. To support this approach, the vendor has closely aligned itself with industry standards and focuses on the interoperability of its software products with open source tooling such as Kubernetes, CassandraDB, and Kafka.

Open source technology plays such an important role in the vendor's methodology that it established a center of excellence dedicated to the testing of various open source technologies alongside Netcracker's software products. Through this ongoing testing the vendor can recommend the best open source technologies to use to meet a CSP's business and technology needs. For example, which open source databases would work best with a certain type of data (e.g., static data versus data that needs to be streamed between the database and the application).

Netcracker began its cloud-native journey in 2016 when the vendor first introduced a microservices architecture for its software products. Since then, Netcracker has been heavily involved with TM Forum on its domain-driven design principles which is reflected in the vendor's development methodology. Netcracker emphasizes that CSPs must strike the right balance when designing microservices. Designing systems that rely on too many microservices can put unnecessary demand on IT teams who may not be well enough equipped to maintain such complex systems.

Netcracker's approach to cloud-native development

Netcracker offers several professional services to help CSPs embrace cloud-native for BSS, including its Cloud Transformation Services. Netcracker's Cloud Transformation is a portfolio of services that includes Cloud Strategy Design, Cloud Delivery, and Multi-cloud Operations. While Netcracker's software is cloud agnostic and interoperates with open source cloud-native technologies, the vendor provides additional services and capabilities that underpin all its OSS and BSS products to ensure the cloud operates at "telco grade." This includes working in active-active mode with load balancing, which ensures a high uptime of applications across multiple data centers, delivering 99.999% availability, and carrier-grade security.

Netcracker offers several professional services, including DevOps Enablement which comprises consulting, training, environment design, organization setup, and joint application development with CSPs. To facilitate this, Netcracker provides several tools including smart plug-ins, which enable CSPs to develop their own custom code and plug it in to the core application. Netcracker's service delivery team also makes use of low-code capabilities (including low-code microservices) which enable the team to quickly deliver software customizations for CSPs.

Furthermore, Netcracker is also focused on providing closed-loop cloud operations. This is achieved by monitoring all layers of the software being delivered on the cloud, including the hardware, IaaS, PaaS, cloud services and SDK, and the application layer. Automated scaling in and out of software is executed by combining analytics with insights gained from monitoring CPU consumption, memory, the number of virtual machines, and the number of containers being used, offering CSPs more-efficient cloud consumption.

Finally, Netcracker believes that its proximity to parent company NEC (which provides hardware, infrastructure, and platform services for the cloud) and the vendor's focus on security across all levels of the cloud (from hardware to application) are its biggest differentiating capabilities. Netcracker notes that, historically, concerns and skepticism around the security of the cloud have been the biggest detractors of CSPs' adoption of the cloud. To curb these concerns, Netcracker has invested in incorporating several

security features throughout its software, including a secure enclave environment, anonymization, separation of duties, and governance and polces, to name a few.

Netcracker's perspective on cloud-native BSS trends
Telecoms' increasing appetite for joint development

An emerging trend in the telecoms industry is the increasing appetite for jointly developed cloud-native applications. Netcracker notes a growing trend of CSPs preferring to develop components of an application on their own – such as an e-commerce portal. In these cases, the vendor sets up a synchronous DevOps pipeline alongside its CSP customers to enable joint development.

CSPs are embracing open source databases to keep costs down

CSPs are embracing open source databases such as CassandraDB. This is being driven by the desire to keep cloud costs down, especially as transaction volumes rise exponentially (and even more so in 5G). Even under scenarios where data is being zero-rated, the CSP must still process this data. This puts pressure on database costs to remain low to ensure profitability, and Netcracker has observed that this is the biggest driver of the adoption of open source databases.

Nokia

Nokia's cloud-native methodology

At the heart of Nokia's cloud-native strategy is Nokia Common Software Foundation (CSF), a development framework used to develop all of Nokia's software products. CSF is based on cloud-native principles including DevOps and CI/CD and enables Nokia to develop OSS/BSS products using a microservices architecture with Kubernetes-managed containers. Nokia CSF has reusable components, including a common graphical user interface (GUI), API library, application logic, and runtime, as well as a library of additional software infrastructure components that has, in turn, enabled the vendor to deliver faster product releases for its customers.

Nokia's approach to cloud-native development

Nokia offers several professional and advanced consulting services including business consulting, operations consulting, data science consulting, technology consulting, and security consulting to help CSPs modernize the BSS and migrate systems to the cloud. Many of Nokia's cloud-native BSS engagements begin with "myth-busting" common misconceptions about the cloud, as well as educating and defining elements of cloud and the cloud-native process. The vendor then follows an end-to-end framework that begins with understanding the CSP's business needs and technology requirements and assessing the current IT landscape so that the vendor can perform a gap analysis before creating a transformation roadmap.

Project delivery can be broken down into phases, which include guiding CSPs on how to implement a cloud environment, define the right cloud architecture for the CSP's business needs, migrate BSS applications to the cloud, and ensure the security of the applications in the cloud. Nokia streamlines this process, leveraging modules and templates based on lessons learned from previous projects.

Nokia has coined the term "DelOps" (delivery and operations) which the vendor says allows CSPs to remove silos, reduce time to market, reduce rollout cycle times, and manage the complexity of hybrid operations. Nokia says that DelOps focuses on creating customized delivery and integration processes for each environment or platform, which Nokia reiterates is necessary when managing the complex reality of the CSPs' IT ecosystems which include multiple domains, cloud environments, and software providers. In

simpler terms, Nokia refers to the difference between DevOps and DelOps as CI/CD for one-to-many (DevOps) versus many-to-many (DelOps).

Nokia's perspective on cloud-native BSS trends
Varying degrees of cloud-native maturity

Varying degrees of CSPs' cloud maturity frame Nokia's engagements. Some CSPs have well-defined cloud strategies and a clear vision of the cloud-native tooling they will use. In these cases, Nokia can integrate with the CSPs' existing CI/CD pipelines to deliver all product releases to customers and encourages its customers to consume each product release.

At the opposite end of the spectrum, many CSPs do not have a container service set up and rely on Nokia for guidance. The vendor offers container-as-a-service (CaaS) to support these CSPs, which they can use either as their container service or until they make a final decision on a container service. Nokia notes that often those CSPs without a container service identified at the start of the engagement require additional guidance in setting up other tooling to support cloud-native implementations. This includes helping with monitoring and networking in addition to containers and orchestration.

The future of microservices in telecoms

Finally, Nokia has observed an emerging trend of microservice use in the telecoms industry. Nokia's perspective is that CSPs should look for where a microservice functions best and look to reuse that microservice across multiple applications when necessary, rather than building the same function twice. For example, certain microservices within the charging function (CHF) can be reused in mediation and billing systems, rather than building the same functionality three times across these systems. Nokia believes that this approach, coupled with TM Forum frameworks around the Open Digital Architecture and Open APIs, will create an ecosystem that will allow CSPs to build custom applications by reusing microservices across the business or bringing together microservices from different vendors to build a custom application. Nokia has also identified a growing interest from CSPs looking to consume and reuse microservices from multiple vendors to build their own custom applications.

Oracle

Oracle's cloud-native methodology

Oracle's cloud-native application development methodology is born out of the vendor's position as a cloud infrastructure provider. Oracle's methodology emphasizes the importance of culture and organizational processes in the cloud-native journey. The vendor notes that cloud-native is not a technology solution for a technology problem and that without the proper processes and culture in place, CSPs will face many challenges with operating BSS in the cloud.

Despite Oracle offering cloud infrastructure services (with Oracle Cloud Infrastructure or "OCI"), as a software provider the vendor also recognizes the need to interoperate with other cloud infrastructures including hyperscale cloud providers. As a result, the vendor touts its alliance and compliance with the standards of the Cloud Native Computing Foundation – of which it is one of 20 platinum members.

Multi-service architectures over "microservices"

What stands out most about Oracle's BSS cloud-native methodology is the focus on "multi-service" rather than "microservices" architectures. While the technical difference between multi-service and microservices is negligible, the different terminology represents Oracle's approach to cloud-native application development: systems designed using microservices must be designed thoughtfully. Oracle's perspective is

that not every component or function of an application needs to be decomposed into fine-grained microservices and that the microservice granularity should be chosen to make the most sense for the specific functional and non-functional requirements of the application. The danger being that introducing too many microservices without the capability to properly manage them all can lead to IT fragility.

Oracle's approach to cloud-native development

Oracle's engagements with CSPs to deliver cloud-native application development services begins with understanding the CSPs' goals, markers of success, and unique organizational needs (such as regulatory or executive mandates). Oracle's consulting arm uses a maturity model to assess how mature the CSP is in its adoption of cloud-native practices and technologies. The outcomes of the maturity model assessment then allow Oracle to develop a plan of action to bridge the gap between the CSP's current capabilities versus its goals.

Based on where a CSP falls within the maturity model, Oracle then prescribes one of seven packages meant to help the CSP embrace cloud-native practices, regardless of what stage they are at in their cloud-native journey. The packages range from frameworks that help CSPs who have not yet begun their cloud-native journey to those who are very advanced. Oracle states that even in scenarios where the CSP is quite advanced in its use of cloud-native technologies, there are often variations in the approaches or types of tools used by the different teams within the CSP.

In addition to the maturity model, Oracle's service delivery team provides a complementary assessment in what the vendor calls "value stream mapping." During this process a comprehensive review of the CSP's people, processes, and technologies is carried out, enabling Oracle to determine where the CSP would most benefit from adopting cloud-native processes and technologies first. For example, a value stream mapping may conclude that embracing cloud-native for the CSP's test environment will offer the biggest immediate impact. By identifying where CSPs can see real gains from embracing cloud-native first, Oracle empowers its customers to quickly realize the business benefits of adopting cloud-native while providing the CSP with ammunition (and confidence) to tackle additional projects. This "proof of concept" approach is important for creating momentum within the CSPs themselves as Omdia's 2021 OSS/BSS Evolution survey found that limited financial resources and lack of organizational strategy are among the top three challenges that CSPs face on the road to the cloud.

Finally, Oracle believes that OCI, along with the knowledge and best practices gleaned from the other nine vertical industries in which the vendor operates, are key differentiators. Oracle uses these assets to its advantage, for example, by exploiting the cutting-edge innovations happening with cloud infrastructure and services.

Oracle's perspective on cloud-native BSS trends
Pre-production environments in the cloud
Oracle sees the implementation of pre-production (e.g., testing) environments in the cloud as an important trend for CSPs embracing cloud. Pre-production environments that enable CSPs to test different rating models or billing scenarios for new offerings are an important step in application development. Setting up testing and other pre-production environments on-premises, however, can be inefficient. The provisioning of physical servers can be time-consuming and costly and hinder a CSP's time to market. Oracle has seen an increase in interest in CSPs establishing their pre-production environments in the cloud, which enables them to spin up new testing environments for things like root-cause analysis very quickly while also minimizing the infrastructure cost.

Multi-mode adoption across teams

Oracle has observed the trend of a so-called "multi-mode" adoption of cloud-native within a CSP's organization. While a CSP may have begun the cloud-native journey across the business, Oracle has found in its engagements that different teams across different departments tend to have different levels of adoption. This is where Oracle's consulting team is needed to help bridge the capability gap between the different teams within the organization and standardize the cloud-native practices and tooling used throughout the organization.

Tecnotree

Tecnotree's cloud-native methodology

As a product company, Tecnotree's cloud-native development methodology focuses on providing CSPs with tools to help them embrace cloud-native. Using the insights and lessons learned from its own cloud transformation, Tecnotree has developed a product to help CSPs transform their IT capability and embrace cloud-native. Developed in Tecnotree's Innovation Lab in Finland, Surge was launched in 2019.

Tecnotree's approach to cloud-native development

Surge is a cloud-native, dual-speed accelerator platform for the rapid modernization of CSPs' IT capabilities. Tecnotree developed the platform to enable CSPs to make a swift transition to digital service provider. Tecnotree achieves this by deploying Surge on top of the CSP's legacy IT systems. Surge then acts as an orchestrator of the northbound (i.e., customer engagement) and southbound (i.e., revenue management, CRM, charging, etc.) functions.

The most unique capability of Surge is its use of low-code microservices which enable CSP business users to design the workflow orchestrator. Using a library of no-code workflow conditions based on microservices, CSPs can design the decision-making logic behind different workflows. The drag and drop GUI allows business users to quickly design workflows – such as determining which events or actions require human intervention or which trigger an email – that then orchestrate functions across the engagement channels and southbound systems. These orchestration functions allow CSPs to simplify their IT capability and enable the rapid development of new services.

Surge also acts as a first step in a longer-term IT transformation effort. Its implementation allows CSPs to systematically consolidate and decommission IT systems and implement new or modernized BSS applications while allowing CSPs to work at their own speed and without sacrificing market competitiveness during the transformation process. Surge also leverages open APIs, which CSPs can use to expose their IT environments to partners (including self-onboarding) to create to digital services.

Finally, in addition to the Surge platform, Tecnotree also offers DevOps support for CSP development teams. DevOps services include helping CSP teams implement a DevOps process to work alongside the vendor to develop custom capabilities for the workflow orchestrator.

Tecnotree's perspective on cloud-native BSS trends

Many CSPs still stuck on-premises

Tecnotree notes that, interestingly, while many CSPs are eager to adopt cloud-native BSS solutions, they struggle to implement the applications in the cloud. From the vendor's perspective, many CSPs continue to deploy BSS applications on-premises. Among those that are embracing a cloud model, the applications are typically deployed in the private cloud in another (local) CSP's data center. Tecnotree highlights that the concern is probably due in part to data privacy and sovereignty laws, however it is important to point out

that this is also likely a reflection of the regulations in the markets where the vendor's footprint is largest (i.e., MEA), rather than being indicative of a larger, industry-wide trend.

Appendix

Methodology

The information included in this report is based on primary research gathered through discussions with telecoms software vendors, managed service providers, and systems integrators. Additionally, insights gained from Omdia's 2021 ICT Enterprise Insights survey and 2021 OSS/BSS Evolution survey are also included in this report. Secondary research from publicly announced contracts and case studies were also used to support the findings of this research.

Further reading

Migrating BSS to the Cloud: Cloud-Native BSS Adoption Trends (March 2021)

Migrating BSS to the Cloud: Determining a Migration Path (June 2020)

Migrating BSS to the Cloud: Preparing the Business (February 2020)

OSS/BSS Evolution Survey – 2021 (November 2020)

ICT Enterprise Insights 2020/21 – Global Survey: Telecoms Survey (November 2020)

ICT Spend & Sourcing – ICT Enterprise Insights 2021 (September 2020)

Telecoms IT Vendor Revenue Forecast 2020–25 (September 2020)

Author

Omdia Analyst

askananalyst@omdia.com

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CONTACT US

omdia.com

askananalyst@omdia.com