



FUTURE BSS

Say goodbye to software customization

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The big picture

“BSS is broken. It’s a business model that can’t carry on. Operators simply cannot afford expensive change requests (customization), and even vendors who charge a fortune for those requests realize that the situation has to change.”

Senior VP at a global BSS supplier

Communications service providers’ (CSPs’) business support systems (BSS) have been under strain for a very long time. The fundamental issue is customization which accounts for a huge proportion of the cost, time to deploy and functionality. And the customization is ongoing, with systems requiring continual maintenance by expert engineers. Indeed, dissatisfaction with the outcomes of BSS transformation programs has resulted in deterioration of the relationship between CSPs and their suppliers.

How did we get here?

BSS are critical systems that handle product, order, revenue, and customer management. CSPs’ businesses cannot function without them. The telecoms industry has been through cycles of “best-of-breed” and “best-of-suite” approaches to acquiring BSS from suppliers, but neither has delivered the capabilities CSPs want, on time or within budget.

Twenty years ago, CSPs typically bought best-of-breed solutions and then relied on systems integrators to knit the components together. Results were disappointing, with CSPs often encountering problems with customized interfaces between incompatible systems, some of which directly impacted their customers (and relationships with them). For example, in 2004 UK mobile operator O2 sent

out incorrect or incomplete bills to 1.5 million customers after deploying a new billing and customer relationship management system.

About ten years ago telcos transitioned to best-of-suite solutions from a smaller number of vendors capable of offering end-to-end solutions. This approach had the advantage of giving CSPs a “single throat to choke” but also turned out to be quite expensive because of “change requests”, meaning the addition of new features or capabilities that sit outside the scope of the main contract. While the best-of-suite approach reduced custom interfaces, solutions typically did not cover the entire operational and business support system (OSS/BSS) stack, which meant that custom interfaces around the core system were still needed. And further customization resulted from CSPs insisting that the software be adapted to their individual operational and business requirements and processes.

Read this report for an in-depth look at how CSPs procure OSS/BSS:



BSS transformation projects have morphed into huge, complex programs that almost never deliver on time. One of the highest-profile failures was a \$1 billion deal between Russian telecoms group VEON and supplier Ericsson. In 2019, three years after the 11-country project was signed, Ericsson was required to pay \$350 million in compensation to VEON.

A senior architect working for another large European operator group reiterates the problem:

“

On average, our large transformation projects arrive 150% over budget and time,” he says. “We have found that there is a direct correlation between the size and success of these projects.”

As a result, his company has firmly committed not to undertake any transformation projects that are not delivered using Agile methodology or with commercial terms based on business outcomes delivered incrementally.

What's inside?

This report examines the state of BSS today within CSP organizations and offers an in-depth look at an initiative within TM Forum to develop a reference implementation for a core commerce management system. Read it to understand:

- Why the BSS business model is broken
- What the difference is between best-of-breed and best-of-suite solutions
- Why issues like lack of standards and skills and vendor lock-in are difficult to address
- Why radical transformation of BSS (and OSS) is required
- What the Open Digital Architecture (ODA) is and how it is being developed
- Why companies like Orange and Vodafone have committed to collaborating on ODA
- The relationship between ODA and the Open Network Automation Platform
- Why more support from CSPs and suppliers is essential
- How 5G increases the need for collaboration

Section 1

Why is the business model broken?

“We haven’t found a way of moving away from the best-of-suite approach.”

CIO of a large European CSP

Most communications service providers (CSPs) rely on a combination of “best-of-breed” and “best-of-suite” business support systems (BSS). New cloud-based, best-of-breed solutions are available from startups and traditional suppliers, alike. They provide an [Agile](#) approach to deployment and can help operators become more innovative. However, most CSPs are stuck with legacy best-of-suite solutions that are highly customized and difficult to retire.

Blame for deterioration in the relationship between CSPs and suppliers rests on both sides. CSPs have endeavored to tighten up contracts to minimize the cost overrun caused by change requests, but as a result many vendors believe they are being unfairly squeezed (and punished) with contractual terms that force them to assume all the financial risk.

BSS is no longer an attractive market for suppliers. Large players are reconsidering their commitment to delivering BSS or have scaled back offers. Ericsson, for example, ended delivery of its best-of-suite solutions after writing off \$690 million in the fourth quarter of 2018. Meanwhile, CSPs have been reluctant to buy BSS products “out of the box”, partly because they believe the costly customization of solutions helps them differentiate the products and services they offer to their own customers (see panel).

Customization is a double-edged sword

While integration and customization are necessary to make applications purchased from different BSS vendors work together, an extra layer of customization also can result from CSPs’ requirements. For example, an operator may require support for a service or pricing plan that is not part of a vendor’s core product.

The need for this kind of customization is not always evident when the initial contract is agreed or signed. It can result if a requirement is removed during contract negotiations in order to achieve a lower price, or in some cases, the business requirement arises after the contractual process is finished. In either case, CSPs have viewed the customization of BSS as a competitive differentiator in their relationships with their own customers.

Operators increasingly are realizing, however, that the potential benefits of customization are offset by the additional cost and time it takes to deploy the capabilities in BSS systems. As

such, they now accept simplification as a key element of any transformation program and are more willing to consider out-of-the-box solutions.

Still, many CSPs express frustration that even when they buy products out of the box, they require some degree of customization. Says a senior engineer for a European CSP:

“

Some costs are costs we should never have seen – they are costs just to make the systems work. Our business genuinely believed we were buying out of the box, but we still faced big cost overruns. Even bits from the same vendor don’t always work together.”

Lack of standards

As CSPs begin merging network and IT teams within their organizations, they come face to face with fundamental differences in the approaches each team takes with suppliers (see infographic below). The network business is heavily standardized. Vendors tend to do their own systems integration, and it is relatively straightforward for an operator to swap out components from one vendor for those of another. Decisions on which vendor to choose typically are based on price and confidence in the vendor's ability to deliver.

IT is different. Despite initiatives by organizations such as TM Forum to

introduce standardized architectures, languages and approaches, IT teams are not able to swap BSS components out easily. Perhaps the most relevant standardization effort has been [TM Forum's Application Framework \(TAM\)](#), a systems map that captures how business capabilities are implemented in deployable, recognizable applications.

"The Application Framework provides a common language for communities who specify, procure, design and sell systems, so that they can understand each other's viewpoints," says Dr. Lester Thomas, Chief Systems Architect, Vodafone Group. "It provides logical grouping of applications, then describes each application's functionality."

However, the Application Framework is not specific enough to allow operators to swap out different pieces within their overall IT jigsaw.

“

TAM wasn't good enough to say, 'I want to buy one of these,'” Thomas explains. “Vendors would state compliance to TAM, but you still needed to state your business requirements to get what you needed.”

Comparison of network and IT procurement

	Network	IT
	Very costly and vendors hold a huge amount of power and influence over customers	Lower cost and less influence
	Hardware-centric, transitioning to software	Software-centric
	Key segments are networks (core and access) and managed services	Key segments are licenses, services and platforms
	Minor role for systems integrators	Major role for systems integrators
	Strongly standards-based	Lack of standards
	Minimal customization	Highly customized solutions
	Gradual transition to cloud-based solutions	Fast transition to cloud-based solutions
	Dominated by a few large, telecoms-specific suppliers	No significantly dominant suppliers, rather a combination of some fairly large telecoms-specific vendors, a few large multi-vertical companies and hundreds of small- to medium-sized players

TM Forum, 2019

If the industry is to develop a new, open approach to BSS that allows CSPs to switch vendors, upgrade systems and introduce new capabilities, it will need to throw its weight behind something like TAM, but a framework that is software-defined. TM Forum's Open Digital Architecture (ODA), which we'll discuss in detail in the next sections, aims to deliver this kind of architecture.

Vendor lock-in

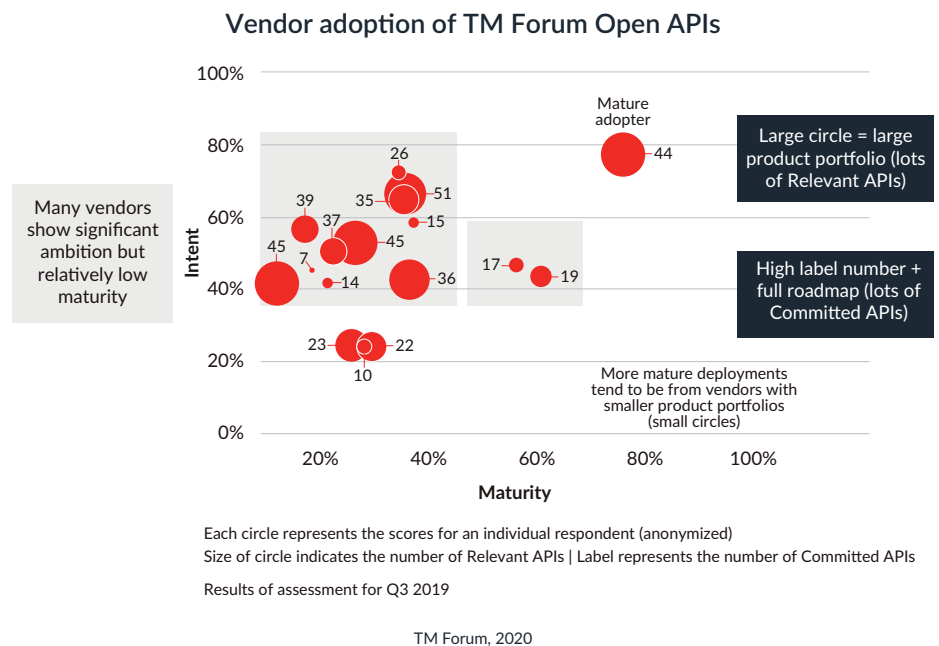
Migration to a more open BSS market where CSPs can mix and match applications from different vendors represents a threat to the control that IT vendors have exercised over their customers. Stories abound about operators trying to switch suppliers only to be told by the incumbent vendor that the cost for the support required to disentangle the solution or for maintaining another product would negate the benefits of switching vendors.

Incumbent vendors also use other forms of "soft" lock-in. C-level executives within supplier companies often make a point of developing close relationships with senior CSP management teams and then call on those friendships if they believe subordinate teams within the company are planning to choose a competitor's solution.

In addition, CSPs build a significant amount of internal expertise in working with the systems provided by a specific vendor. If a CSP switches vendors, this expertise is lost and internal teams must be retrained or replaced.

APIs can help

Adoption of common application program interfaces (APIs) is a good way for CSPs to combat vendor lock-in and build an open market for BSS applications. So far, 17 of the world's largest CSPs and 37 of their



technology partners have committed to using TM Forum's Open APIs in relevant product applications, but progress in implementing the suite of 50+ REST-based Open APIs has been mixed.

A recent survey of CSPs and suppliers released in November 2019 reveals that vendors' native Open API support lags behind demand from CSPs (see graphic above).

M&A headaches

When the telecoms market was growing, it was easier for CSPs to tolerate a less-than-ideal BSS business model with suppliers. Now, however, every department within a CSP is under pressure to drive operational efficiencies because – if operators are unable to diversify into new markets, they must cut costs to remain competitive.

At the same time, BSS requirements are becoming more complex as CSPs accumulate greater legacy in terms of the products and services they need to support. During the past 20 years, mergers and acquisitions among CSPs

worldwide have resulted in highly complex back-office environments. Many operators have been forced to put quick fixes in place to combine the billing systems of previously separate companies, and they are still living with the results.

And when CSPs do get around to launching transformation programs to merge disparate IT systems, the priority is usually getting existing customers onto a new system as soon as possible so that the old one can be decommissioned. As a result, new systems end up being geared toward protecting existing business rather than generating revenue from new services.

The challenge is particularly acute in emerging markets, where CSPs have been hit harder by a slowdown in revenues than operators in developed markets because of their dependency on the mobile business. The largest "best-of-suite" BSS vendors focus on supplying the lucrative European, North American and North Asian CSPs because of the revenue potential.

Lack of skills

Around the same time that CSPs were starting to transition from best-of-breed to best-of-suite approaches to IT procurement, they also were seriously exploring opportunities to outsource BSS and operational support systems (OSS). For example, in 2006 Vodafone outsourced application development and maintenance to EDS and IBM as part of a strategic commitment to reducing costs.

In many respects, the timing could not have been worse for CSPs. In the mid-2000s cloud computing began to take off, but because CSPs lacked internal software-development expertise, they were unable to build their own cloud-based systems and capabilities. It has only been in the past four to five years that operators have started to rebuild internal software expertise and capabilities.

Rethinking BSS value

The emergence of digital, subscription-based software as a service (SaaS) has changed CSPs' thinking about where the value lies – or should lie – in their BSS strategies. Digital service providers (DSPs) like Netflix and Spotify offer extremely simple pricing models and use equally simple systems to support them. The content providers typically offer only a handful of pricing schemes, and there is no indication that they intend

to use pricing innovation to move their businesses forward. This is different from the average CSP, which typically supports hundreds or thousands of legacy products and pricing plans.

Conversely, DSPs invest heavily in customer experience and personalization. Much of the value in their services lies in their ability to understand customers by leveraging data about them and their usage of services and by anticipating the kinds of services customers will want.

CSPs want to deliver similar capabilities to their customers and are rapidly realizing that product differentiation needs to be based on customer experience rather than the core capabilities of their back-end systems. But they find themselves unable to make this transition because so much of their energy (and budget) is taken up with maintaining and upgrading traditional BSS.

Making the case

The timing could not be better for CSPs to make the case for buying reimagined IT solutions that can improve customer experience while simultaneously reducing costs. Delivering enhanced customer experience is a strategic imperative for all operators, and many are now basing remuneration on teams' and individuals' ability to deliver results.

Research conducted for this report suggests that the value of the BSS market is about \$30 billion, which is equivalent to roughly 2% of CSP revenue globally. Spending on BSS is flat, in line with revenue trends.

Most CIOs feel strongly that if inefficiencies in the BSS supply chain could be addressed – for example, if operators could incrementally introduce new capabilities without going through complex transformation programs – then total spending on BSS would fall sharply. But they are unable to make the case internally because they do not know how to move towards a modular, configurable architecture that eliminates the need for customization and maintenance.

Even more difficult to estimate than the cost savings that might result from a different approach to BSS is the revenue CSPs could gain from delivering a better customer experience. This would come from increasing loyalty and the ability to sell services based on analysis of customer behavior.

In the next sections, we'll look at the work TM Forum members are doing to improve the BSS supply chain by creating a reference implementation for a core commerce management system.

Section 2

A radical, new approach to BSS

“We need to be more like a hyperscale tech company in terms of how we use software,”
CIO of an Asia-Pacific CSP

Communications service providers’ (CSPs’) efforts to address their long-held frustrations about business support systems (BSS) are possible only because they are investing in their own software capabilities. Through internal development, operators can augment third-party software and integrate solutions provided by external vendors. At the same time, even the most ambitious CSPs point out that they are not about to become software houses and that there is nothing to be gained from building products that compete with those provided by a large, diverse vendor market.

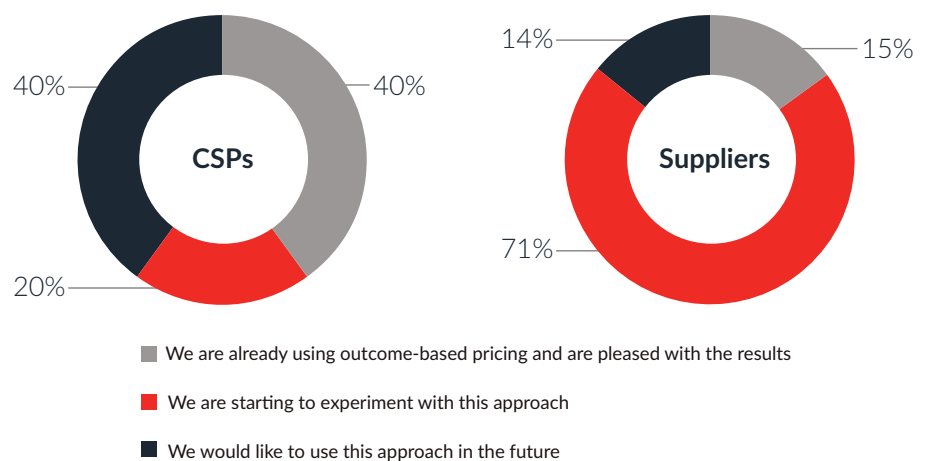
The depth of CSPs’ internal expertise varies hugely. Large European and North American operator groups are investing heavily in internal software development capabilities, while operators in emerging markets, where market stagnation is a more recent development, are still looking to cut costs and have not reinvested in software skills.

This divergence of capabilities is significant in the context of BSS transformation. There is a strong likelihood that a handful of technically “fluent” CSPs will embark on approaches and strategies that are beyond the capabilities of many other operators.

Marginal improvements

Some CSPs are already changing their commercial engagement models with BSS vendors without fundamentally altering what the suppliers deliver. For example, some operators are starting to base commercial terms on business outcomes rather than purely on the cost of hardware, software, customization and maintenance. We explored this as part of our 2019 research report [*Kill the RFP: Reinventing IT procurement for the 2020s*](#) and found that more than half of CSPs are experimenting with this approach or are using it for new business. Suppliers are lagging behind a bit but also intend to use outcome-based pricing.

Use of outcome-based pricing



TM Forum, 2020

Vendors are also partnering with CSPs in DevOps teams to deliver new software and systems on a continuous basis. A TM Forum survey conducted in December as part of [another research report](#) on future operational support systems (OSS) reveals that a quarter of operators are now using DevOps practices across operations and 60% plan to. However, we believe that DevOps is still mostly used for internal development projects rather than ones that involve external vendors.

For more about future OSS, read this report:



BSS for 5G and beyond

The impetus for a new approach towards BSS is as much about enabling new business models to flourish as it is about improving BSS for legacy telco services. For example, as CSPs deploy 5G they are exploring many new opportunities that involve leveraging their existing assets to provide services beyond connectivity, particularly in the B2B market. Such services will mostly be sold using a software-as-a-service (SaaS) model, which requires a different approach to BSS. If every new service were to entail going through the same long, costly process of deploying an associated support system, operators would never be able to achieve the agility, automation or cost savings required for success.

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](#) (see [page 11](#)) 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. Joining Vodafone and Orange in the Catalyst were catalog vendors Globetom and Sigma Systems along with systems integrators IBM and SigScale.

Watch Orange's Laurent Leboucher and Vodafone's Dr. Lester Thomas discuss the need for a common core commerce management system:



Catalyst helps CSPs reimagine ordering and billing

The BOS Catalyst showed how to implement and orchestrate TM Forum Open APIs in order to build a complete experience for the customer, from ordering a product through to bill calculation. The output and future evolution of the proof of concept is now part of TM Forum's Open Digital Framework (see [page 26](#)), specifically the Open Digital Architecture (ODA), which is a blueprint for how OSS/BSS need to be redesigned to support digital ecosystems and take full advantage of technology such as 5G and artificial intelligence (AI).

The ODA consists of a business architecture, which describes in business terms what CSPs and their partners want to achieve, and a

technical architecture that delivers a blueprint for the underlying infrastructure architecture and data. BOS sits at the center of the technical architecture as the core commerce management system. The graphic below shows a more detailed view of what is now called the ODA Reference Implementation.

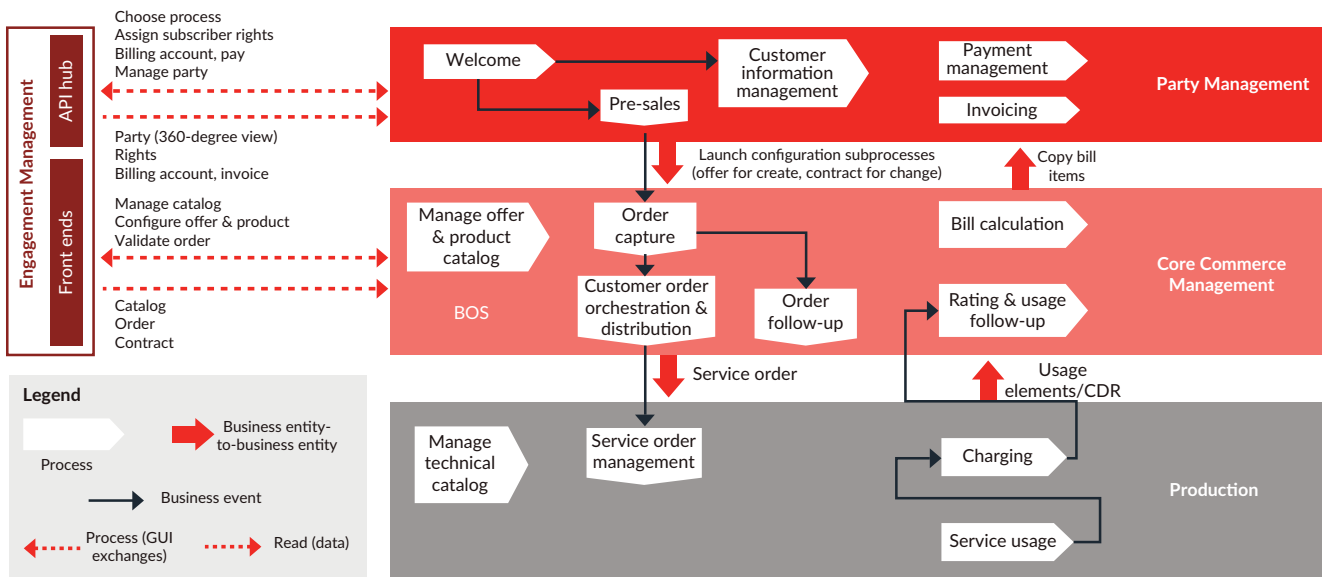
A major result of the Catalyst is development of the BOS software 'Canvas', which acts as the backbone of the core commerce system, describing which components are necessary and how to assemble them. By adopting the Canvas, CSPs and software suppliers will be able to test compatibility of commercial solutions.

The next stage of the project involves working on the software architecture or "envelope". This is being done within TM Forum's Open Digital Lab, which provides a runtime environment for conformance testing and validation of ODA components, using 'glass-box' (shared code) and 'black-box' (proprietary code) components.

Learn more from the Catalyst team:



TM Forum Open Digital Architecture Reference Implementation



TM Forum, 2020

Glass and black box

Since the inception of the BOS project, CSPs and suppliers have been debating about the balance between glass box and black box components, and whether the ODA Reference Implementation can be considered an open source project. We'll discuss this more in the next section, but it's important to point out that all interested parties are adamant that the aim of the project is not to build applications that replace the commercial offerings of today's BSS vendors.

Rather, the project focuses on how to ensure that CSPs can integrate different products from different vendors, swap one out for another, and add products without the need for lengthy, costly customization. But deciding exactly what the components are is difficult. In the BSS market, not all vendors offer similar components. As Dr. Lester Thomas, Chief Systems Architect, Vodafone Group, acknowledges:

“

Breaking BSS down into separate components is very difficult, and we don't know how to do it yet.”

As Thomas explained in Section 1 (see [page 6](#)), TM Forum's Application Framework (TAM), which is a systems map that captures how business capabilities are implemented in deployable, recognizable applications, is not specific enough to allow operators to swap components from different vendors in and out. Nevertheless, something like this is needed – although it must be software-defined.

Given efforts to move towards microservices architectures in cloud software generally, there could be a case for adopting such an approach in BSS. However, decomposing existing BSS applications categories would be extremely complicated and time-consuming and would likely be seen as a direct challenge to many of today's BSS vendors. As such, the project team has ruled out a microservices architecture because it would be too granular to specify. Instead, they are seeking to define components which will resemble existing BSS applications. Such components are likely to have five to 10 services within them.

More partners

The ODA Reference Implementation project is unusual for a TM Forum collaboration project because the team is creating software code. Most TM Forum initiatives involve defining a common language or establishing

best practices and information models to make it easier to do business. However, for the ODA Reference Implementation to be successful, it needs more partners. Says Thomas:

“

We need every multinational telco and 30 to 40 vendors to come on board. We are at 5% to 10% of where we need to be. We need to get early components out the door and to do quick [proofs of concept].”

At TM Forum's Digital Transformation event in Dallas in September, two more companies, Netcracker and Oracle, expressed an interest in working on some components. For the project as a whole to retain momentum it is important to get different components standardized and put into a GIT repository.

In the next section, we'll look at the challenges to getting the ODA Reference Implementation off the ground, the relationship between ODA and the Open Network Automation Platform, and how suppliers can benefit from ODA.

Section 3

Challenges to adopting ODA

“As things stand today we don’t have the resources. They’ve got to come from somewhere, and I don’t know how that’s going to happen.”

Vance Shipley, CEO and Founder, Sigscale

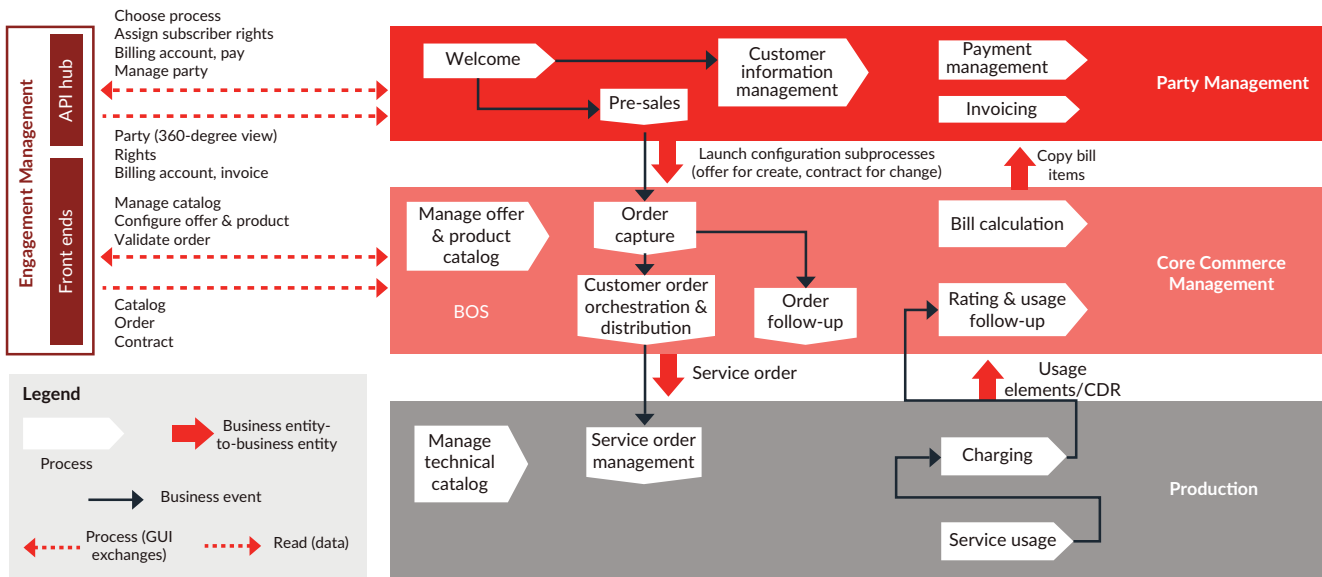
The proposal for the Open Digital Architecture Reference Implementation is extremely compelling, but that does not mean it will happen. For the initiative to succeed, communications service providers (CSPs) must collaborate, and they must commit staff and financial resources to the projects. In addition, a critical mass of suppliers must recognize and accept that if they do not embrace a new approach, they may not continue to win CSPs’ business.

As a model, the team is looking to the [Open Network Automation Platform \(ONAP\) open source project](#), which is building a platform for real-time, policy-driven orchestration and automation of physical and virtual network functions. ONAP, which is managed by the Linux Foundation, [was formed in 2017](#) through a merger of two open source projects founded by AT&T (which contributed a large proportion of the software code) and China Mobile. Other key players including Orange, Vodafone, Reliance Jio, Deutsche Telekom, Ericsson and Nokia also support the project.

Comparing architectures

ODA and ONAP are complementary. Looking again at the ODA Reference Implementation architecture (see [page 14](#)), the core commerce system focuses on customer-facing business support system (BSS) functionality, such as order capture, orchestration and billing, while ONAP works in the Production layer, focusing on network-facing operational support system (OSS) functionality such as orchestration and management of the technical catalog and inventory.

TM Forum Open Digital Architecture Reference Implementation



TM Forum, 2020

ODA and ONAP both envision the creation of a common architecture that allows suppliers to develop differentiated features on top. Similarly, integrators would be freed up to focus on helping CSPs develop innovative products and services, rather than spending all their time on complex integration tasks.

Now in its fifth release, ONAP includes several million lines of code, and its technical committee represents a veritable who's who of CSPs and vendors. Even so, the

project's overall success and impact on the industry remain somewhat unclear.

The process of creating a new architecture has taken longer than was originally envisaged when ONAP was started, but in the meantime, technology has evolved. Network functions virtualization (NFV), for example, has become yesterday's story, while the focus now is on cloud-native technologies that use containers and microservices.

In addition, opinions vary widely as to whether ONAP is production-deployable or whether it needs to be heavily customized for different CSPs. In short, the challenge for initiatives such as ONAP (and ODA) lies in securing the involvement of a critical mass of working partners and contributors while at the same time moving fast enough to capture the benefits of the latest technology.

Convincing suppliers

As more CSPs join the ODA initiative, pressure will increase on vendors to collaborate. If a supplier's biggest clients are on board with a technology project, it is difficult not to support it. However, and in the meantime, it is important to promote the potential benefits of ODA purely from the perspective of vendor's own technology, product roadmaps and commercial strategies.

Some suppliers are suspicious that operators want to create deployable open source code, which would represent a direct threat to their business. But CSP members of the ODA project team have stated emphatically and repeatedly that this is not the aim of the project, neither short nor long term. The aim is to produce a reference implementation only.

Even if suppliers can be persuaded that the ODA Reference Implementation is not a direct threat, it still represents a big change in the business model for vendors whose revenue includes fees for customization and maintenance. Even though CSPs have moved to protect themselves from over-spending on customization through tighter contractual terms, this remains a big business for many vendors. Furthermore, if successful, the ODA Reference Implementation could pave the way for new vendors of cloud-based systems to enter the market.

5G as a Catalyst

Perhaps the best chance for CSPs to "win the argument" about the need for a new approach to BSS is to include it in the discussion about 5G business models and new lines of business. Such discussions should focus on two areas:



The need for CSPs to reduce the cost and complexity and increase agility of BSS in order to increase the chances of success for new lines of business.



The potential for vendors to build new businesses and capabilities to support these services and reduce their dependency on legacy BSS revenues.

Even though CSPs want to diversify beyond connectivity, they want to retain the business model – a monthly recurring fee – for whatever services they provide. Increasingly these will be software-based services. As such, the CSPs will be using the tried and tested software-as-a-service (SaaS) approach used by digital service providers (DSPs).

As noted in [Section 1](#), there is little innovation or differentiation in BSS among DSPs. It is merely a tool for delivering a subscription-based service. The players are also different in the digital world. Consider Zuora, which provides software for businesses to launch and manage their subscription-based services. The company is now marketing itself to CSPs with a service which, it says, "lets telecom providers launch services fast."

CSPs must reduce the cost of IT in order to make services such as the internet of things (IoT) profitable. The value of connectivity in the context of IoT services is already trending towards zero. For example, China Mobile reported that it had 551 million IoT connections at the end of 2018 and that its IoT business generated revenues of RMB7.53 billion (\$1.09 billion). This is equivalent to just \$0.165 per month, nearly 50 times less than the ARPU for its core mobile business. While China Mobile has not reported on the profitability of its IoT business, unless it transitions to new, low-cost, cloud-based IT, it seems highly unlikely that IoT will remain a profitable business (assuming it is indeed profitable).

Such an outlook for BSS requirements represents an extreme challenge for vendors. On the other hand, and in stark contrast to the existing telecoms business, IoT and other subscription-based services represent pure growth and new markets. Furthermore, volumes will ultimately be much larger than for the core telecoms business.

From a vendor's perspective, margins will be lower, but the business could become more profitable. In addition, the opportunity exists (or will exist) for vendors of back-end systems to extend the services that they provide to CSPs' customers, where data will be core to the product itself and customer experience will be a differentiator.

In the next section, we'll outline some steps CSPs and suppliers can take now to reimagine BSS.

Section 4

Make it happen: Join the ODA team

Aside from application program interfaces (APIs), TM Forum members traditionally have not created software code. But in order for the Open Digital Architecture (ODA) project to enable real change, a critical mass of communications service providers (CSPs) and suppliers must collaborate on a reference implementation. Below are some recommendations for getting started. If you would like to learn more about ODA or to join the project, please contact TM Forum's VP, Architecture & APIs, [George Glass](#).



Collaborate on software

Dr. Lester Thomas, Chief Systems Architect, Vodafone Group, who is one of the original founders of the *Business Operating System Catalyst* (see [page 11](#)), believes that every multinational telco and 30 to 40 vendors must participate in the ODA project. Bringing CSPs on board will be easier than recruiting 30 to 40 suppliers. The potential long-term gains for CSPs are clear, but for suppliers the development of a core commerce system reference implementation represents a step into the unknown and commitment to a project that could cause short-term business model disruption.



Think long term

CSPs must do their best to convince suppliers that everyone will benefit from ODA long term. Realistically, it will take several years for the ODA vision – and related architectural and software assets – to be developed. The Open Network Automation Platform (ONAP) project was officially launched three years ago (and the two initiatives that combined to form ONAP, a year before then). Today ONAP is on its fifth software release, but its eventual success and adoption is still by no means guaranteed.



Build a business case

The CSPs we interviewed for this report are confident about the business benefits of ODA. Cost savings resulting from a dramatic reduction in the level of customization is the clearest benefit, but greater agility could also drive revenue by helping CSPs respond quickly to market opportunities. However, until technology teams can articulate these business benefits, for example by putting together a proper business case and demonstration of return on investment, it may prove difficult to attract the interest or support of senior management.



Consider 5G

CSPs globally are focusing on how, when and why to deploy 5G networks, so it's a good time to put forward initiatives that help to build a case for rolling out the new technology. Monetizing 5G is a concern for every CSP. If IT teams can demonstrate to business leaders that reimagining BSS can help with monetization, they are more likely to win support.



Hone software skills

CSP that lack in-house software talent will have a tough time evolving to a modular, configurable BSS. This could be a bigger challenge for Tier 2 and 3 operators which may simply lack the resources to recruit new software teams, but this should be a goal.

Additional features & resources

- 19** | [Operators Need Digital BSS to Innovate in the Platform Driven Ecosystem Economy](#)
- 22** | [TM Forum Open Digital Framework](#)
- 23** | [TM Forum research reports](#)
- 24** | [Meet the Research & Media team](#)

Operators Need Digital BSS to Innovate in the Platform Driven Economy

The telecom business environment and the competitive landscape are changing radically. Operators are no longer only competing with each other, but against a raft of disruptive and innovative players that have entered their market. 5G is acting as a catalyst for further disruption, opening up many opportunities, including other industry verticals competing for value added services' revenues. At the same time, operators themselves are increasingly delivering services through or with partners in ecosystems.

To innovate and compete in this market, the role of BSS is fundamental and crucial to support the fast-changing requirements. BSS is the monetization engine, but in the digital era, it's no longer only about billing and charging for a core portfolio three or four services; now operators are competing in platform-based economy where innovation is created through partner ecosystems.

Even before 5G becomes mainstream, operators are providing a wealth of services, from banking to smart healthcare, security, and much more themselves and with partners. As their revenues from consumers either flattens out or falls, most are looking to their enterprise customers and business-to-business (B2B) and B2B2X opportunities for growth beyond connectivity. This is highlighted by [Vivo, the subsidiary of the Telefonica Group operating in Brazil](#), where Netcracker's Digital BSS solution enables Vivo to set and manage product pricing, promotions and delivery strategies across its diverse enterprise lines of business, resulting in a better experience for its B2B customers.

Digital BSS must be able to aggregate services, accommodate changing relationships with partners and other players, faster and with greater flexibility, to support new business models. BSS is a cornerstone of innovation, and we can expect future functional characteristics to embrace flexibility, cloud scale, intelligence and multi-channel engagement. Let's take a look at some of the critical functional areas that Digital BSS must enable.

Going cloud native

BSS of the future must have a cloud-native architecture, to provide unprecedented levels of flexibility and scale due to its modular nature and adaptability. Cloud native architectures will allow operators to leverage the cloud's multi-tenancy characteristics to build consistency of process across OpCos, scale based on service demands, minimize customization and significantly reduce time and cost for development.

Cross-industry loyalty schemes

At first glance, this might not look like a must-have for Digital BSS, but loyalty schemes that cross borders between sectors will become increasingly important, reaching way beyond the bounds of voice, data and video consumption, and service adoption. The disrupter here is the new mobile operator, Rakuten Mobile in Japan. Its parent company, also Rakuten, operates in more than 70 sectors and its customer membership and loyalty scheme spans all of them, from loans, credit cards, travel and insurance to a wide range of consumer goods.

Customers are offered a whole lifestyle experience that isn't matched by any other e-commerce giant. Rakuten intends to take its mobile business and deployment model – building a cloud-native infrastructure from scratch – global. The parent company already operates in some capacity in more than 29 countries and regions, and has more than 1 billion customers.

Multiple vertical businesses

As 5G has already demonstrated, the potential revenue from vertical-centric services is tied to the actual ability to build a profitable partner-ready business model that sets a value, prices and bills for these new services. As such, BSS must be able to support multiple vertical businesses and their various models simultaneously. Consider platform providers such as Amazon Web Services, Google Ads and YouTube...all are successful because partners clearly understand how they can use them to earn revenue. To compete, operators must offer this facility, and ensure it is easy for partners to use and benefit from. Being easy to do business with is the first rule for successful business, and this is even more so as part of an ecosystem.

B2B2X business models

Enabling multiple business models necessitates having a multi-rated, multi-tenanted Digital BSS to support partners and other players who themselves need to rate and charge for services, then bill their own customers accurately and quickly. This keeps the order-to-cash cycle as tight as possible, yet still allows for flexibility in the way revenues are divided or shared.

New payment mechanisms

The number of new payment mechanisms has expanded over time, giving the end customer newfound flexibility in how to consume and pay for services. This trend will continue, thus extending BSS capabilities beyond electronic fund transfer and credit cards, to handle Apple Pay, digital currencies, and near-field communications (NFC) for contactless payments.

Partner management and multi-party payments

Managing partners and related services are now a ubiquitous part of virtual every operator's service ecosystem, where different partners typically offer a variety of value-added services and complement the operator's existing service offerings. This means partner management and management of multi-party payments must be embedded in BSS. Partner related service revenues will likely will be paid in different ways (subscription, ad hoc, pay as you go, and so on), and also may need to be split between various parties.

For instance, an operator selling security services through a partner on a subscription basis of \$10 or \$20 a month may need a three way revenue share between the security service provider, the operator and any other partner involved. Also of note is how certain services will have multiple touch points which BSS must manage effectively.

Opportunities at the edge

BSS will be key in enabling operators to leverage the newfound power at the edge. The ability to support new, low-latency services is already being accelerated in every sense by 5G. Thus, BSS layer must be able to provide distributed rating and charging, and online charging across the edge.

The edge sites collectively create a wider range of application and service options which can be dynamically switched at different times of day, for example, or to relieve congestion, relying on the dynamism of cloud-native network functions and infrastructure. Maximizing the value of the edge requires a BSS that can be equally dynamic and adaptable to allow operators to extract the most value out of their resources for their own internal efficiencies, but also to give their customers the best quality of services, and their customers' customers too.

Customer engagement

Revenue management aside, the other key to innovating and competing in the digital world is how effectively operators engage with their customers. At work and in their private lives, customers are used to the level of service provided by digital natives and have come to expect it from all their providers. This puts pressure on the operator to enable multi-channel communications, data integration across those channels to ensure customer activities are visible and understood regardless of the end point, and ensure that service promised are in fact services delivered.

Intelligent customer journeys

Applying artificial intelligence (AI) to customers' journeys allows an operator to constantly evolve how it engages with customer based on what it 'learns' about their behaviour, needs and preferences. This could range from which channels they tend to use at what time of day for what purposes and how they like to be communicated with.

Proactive, not reactive, care

Intelligent proactive care that uses data intelligence to support early action helps address any issues that arise before they turn into problems, helping to prevent churn and increase customer satisfaction. Plain and simple...if you're not providing satisfactory service to your customers, you are likely losing customers and losing revenue.

Pricing and promotions

Being able to offer dynamic pricing and promotions to customers at the most appropriate moment, such as reaching data capacity, location based offers, or cross-sell/upsell create new opportunities for greater customer satisfaction, loyalty and revenues.

The case for digital BSS

Netcracker's cloud-native Digital BSS solution ensures operator's ability to reduce costs and unlock new revenue streams by monetizing cross-service offerings and multipartner business models. Netcracker's solution enables analytics-driven dynamic discounts and promotions, as well as cross-channel, real-time interactions so you can deliver a superior customer experience and drive your evolution into a digital service provider. All Netcracker solutions are equipped

with our best-in-class security features to keep CSPs customer, service, operations and network data secure.

Netcracker's end to end Digital BSS and OSS is already helping [Telefónica](#) become more efficient today, by speeding up service delivery, implementing zero-touch provisioning and unifying product and services bundles through a single catalog. [Telefónica Business Solutions](#) will leverage Netcracker's full [Revenue Management solution](#), including

converged rating and billing capabilities. In particular, Netcracker is helping the company accelerate its order-to-cash cycles and build a foundation on which to deliver and manage new revenue-generating services.

In summary, Digital BSS is all about helping to reimagine the scope and capabilities of operators' businesses in the future – always remembering that the future starts right now.

About Netcracker

Netcracker was founded in 1993, and has been a wholly-owned subsidiary of NEC Corporation since 2008. Driven by its focus on R&D, Netcracker's end-to-end product portfolio and related professional services enable telecommunications and cable service providers, utilities, financial services, logistics and other business services providers to transform their mission critical back office and front office processes.

Netcracker offers an extensive range of solutions for digital service providers, such as business service innovation, 5G and digital service monetization, IT transformation, hybrid network operations. The company has over 250 customers across more than 60 countries in the Americas, Europe, MEA, and APAC regions. Netcracker remains steadfast and focused on enabling monetization of any service on any network, bringing together 5G-ready components that enable proactive customer engagement, dynamic pricing and bundling, partner powered business models, and targeted AI driven customer engagement.

Netcracker's Digital BSS solution is the optimal choice for service providers looking for a converged platform to optimize customer experience, monetize innovative new services and provide a foundation for business agility.

TM Forum Open Digital Framework

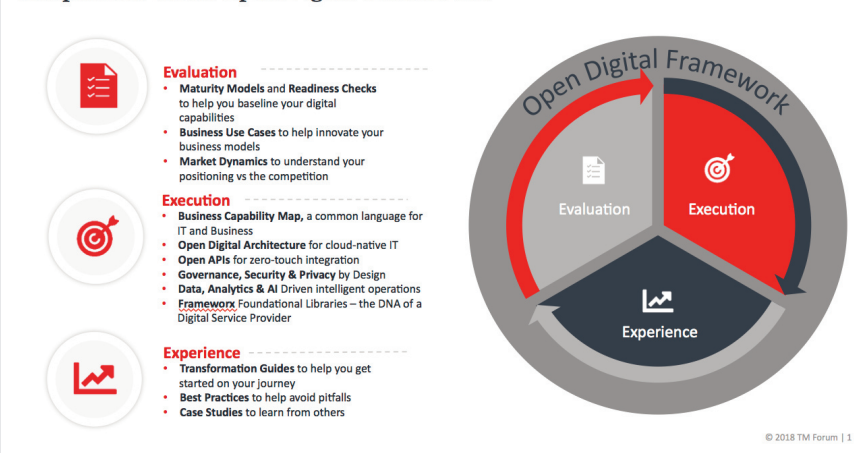
Delivering the tools to go from concept to cash in just 18 days

The [TM Forum Open Digital Framework](#) is an interactive, continuously evolving collection of tools, knowledge and standards that give communications service providers (CSPs) 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.

A prototype version of the framework [is available now](#) for TM Forum members to explore. It is being developed through the [TM Forum Collaboration Program](#) and [Catalyst Program](#), 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,

Components of the Open Digital Framework



together with standards maximizing the potential of AI to enhance customer experience and increase operational efficiency

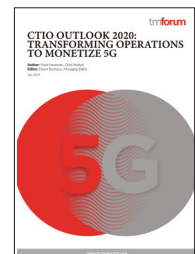
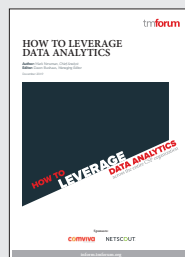
- **Reference implementations** – a framework for assembling and validating ODA components in the Forum's [Open Digital Lab](#), fostering the creation of a services marketplace
- **Practical guidance** – guides and videos showing how the Open Digital Framework can be used to transform the core business and enable new business growth
- **Foundational libraries** – normalized models providing a common language for business processes and information that

simplifies and de-risks transformation projects

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. Much of the collaborative work that is part of the framework is already available, but it helps to organize it and make it more accessible. The framework is a work in progress and will improve through crowdsourcing.

If you would like to learn more about the project or how to get involved in the TM Forum Collaboration Community, please contact [Andy Tiller](#).

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