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Unleashing Service Innovation with Digital-to-Network Automation

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Summary

As communications service providers (CSPs) have sought to reinvent themselves as digital service providers (DSPs), a quick win has been to revamp their customer-facing IT assets such as websites, portals, and mobile apps. At the same time, operators have been investing heavily in network automation. However, comprehensive automation of order fulfillment has often not been tackled given concerns over cost and complexity. This leaves fulfillment as a weak link in the chain, with too many manual processes and handoffs. The theory of constraints suggests that to improve any system, the weakest link (or slowest step) must be improved first; changes to other links or steps will yield no benefit.

Service order fulfillment is a fundamental system within an operator's operations support system (OSS) that enables the timely activation of a service, provisioned in accordance with the technical and business rules defined by the northbound business support system (BSS) layer and the southbound network resource layer. Most operators today still have multiple siloed fulfillment systems—one for each service type or network domain (fixed, mobile, etc.). These may have some semiautomated steps but still require a high degree of manual effort to handle exceptions and errors.

This report highlights many examples of service innovation by telecom operators. However, these companies cannot realize any revenue from new services or generate a return on their significant investments in network infrastructure unless they are able to efficiently fulfill customer orders.

Digital transformation is much more than simply creating an attractive customer interface. It requires "digital-to-network" automation spanning service lifecycle management and orchestration. Only a truly holistic transformation will enable operators to fully exploit the investments they have already made in the network and BSS.

Introduction

The communications service provider (CSP) industry invests around $340 billion each year in capital expenditure, split evenly between fixed and mobile networks. These investments have brought consumers and enterprises high speed internet access that has enabled a revolution in entertainment and office productivity. Services such as Netflix, Salesforce, and Azure that are accessed over the internet are hugely popular, in part due to their ease of use. This has raised customer expectations for telco services too—consumers and businesses expect slick interfaces, easy ordering, and immediate results.

This has motivated many service providers to become digital service providers (DSPs)—to expand from traditional connectivity to deliver and monetize the new digital services we will use to live, work, learn, relax, and socialize. To support this transformation, CSPs have invested heavily in "digitalization," making their customer engagement more appealing by revamping their portals, websites, and mobile applications. However, if beneath the facade of a whizzy interface lies a complex mess of manual processes to fulfill an order, the operator will have merely created a "Mechanical Turk"[1]—giving the appearance of automation but relying on slow and error-prone manpower.

The theory of constraints is a management tool for evaluating and optimizing processes in manufacturing, project management, logistics and other fields. In essence, just as a chain is only as strong as its weakest link, a process can only be as fast as its slowest step. To improve any system, the weakest link (or slowest step) must be improved first; changes to other links or steps will yield no benefit.

Applying the theory of constraints to the telecom service order-to-cash process, operators may find they have streamlined their pre-sales activities, their order intake, and their billing, but they have not fixed the bottleneck in order fulfillment because the problem is seen as too big, costly, or risky to tackle. But automating processes upstream and downstream of fulfillment will not improve the overall organizational efficiency since this does not improve the automation of the weakest link.

A study[2] of 78 applications of the theory of constraints in manufacturing and administrative functions across various industries (aerospace, apparel, automotive, electronics, furniture, semi-conductor, steel, and heavy engineering) found a mean reduction in lead times of 69% and a mean reduction in cycle times of 66%. The paper notes that the major difficulty in applying the theory of constraints in organizations is the behavioral tendency of resistance to change.

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[1] Wikipedia, "The Turk," https://en.wikipedia.org/wiki/The_Turk, retrieved March 17, 2021.

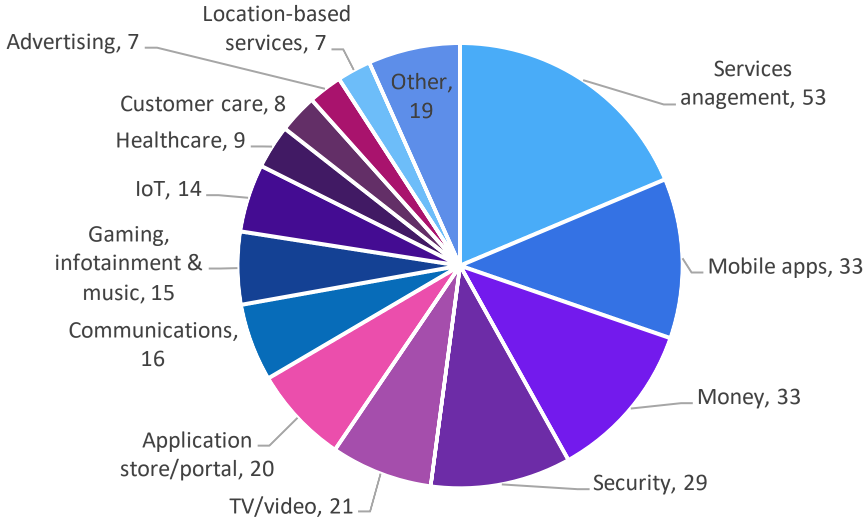
[2] A. Mason, S. Henderson, and A. Philpott, eds., "A Review of Goldratt's Theory of Constraints (TOC): Lessons from the International Literature," Proceedings of the 33rd Annual Conference of the Operational Research Society of New Zealand, Auckland, NZ, August 31 – September 1, 1998, pp. 205–214.

Service innovation is alive and well

Omdia keeps track of new service launches in the telecoms sector globally. In 4Q20 we tracked 284 such launches around the world. The majority (71%) of these were a combination of service types, one-quarter were mobile-only, and the rest were either fixed line- or TV-specific. Sixty four percent of the services were consumer-oriented, while the remainder were for enterprises.

Figure 1 below shows the breakdown of the new service launches by category. The most popular category was services management, a broad-brush grouping that includes a number of subcategories such as business services and communications. Mobile apps was the next most popular category followed by money, security, and TV/video.

Figure 1: Telco Services Innovation Radar 4Q20 – new service launch categories



Source: Omdia. Total number of service launches tracked in 4Q20 = 284.

Omdia analysts reviewed all 284 announcements and gave each service launch a uniqueness rating from 1 (low) to 5 (high). Below we show the 15 service launches that were ascribed a top rating (5) for uniqueness. As can be seen, these cover a variety of topics including augmented reality, drones, tele-medicine, and electric car charging. This diversity demonstrates that, contrary to some perceptions in the industry, telecom operators are continuing to innovate and there is no shortage of bright ideas. The challenge the industry faces is not so much in service ideation but in productizing these new services such that they can be delivered with a high degree of repeatability and automation.

Table 1: Telco Services Innovation Radar 4Q20 – most unique new service launches

Company	Customer	Primary category	Details
EE	Consumer	Gaming	EE has designed a Match Day Experience feature for iPhone customers to experience augmented reality viewing while watching a game.
ER-Telecom	Consumer	Location-based services	ER-Telecom has installed sensors in St. Petersburg to support people with disabilities in locating exact entrances and their movements.
Optus	Enterprise	Services mgt.	Optus has collaborated with the Australian National University (ANU) to create a system that can detect bushfires early and take preventive measures.
Proximus	Enterprise	Services mgt.	Proximus has teamed up with SkeyDrone and DroneMatrix to introduce a network platform to support drones in carrying out business activities.
SK Telecom	Enterprise	Services mgt.	SK Telecom has collaborated with the Ministry of Oceans and Fisheries and the Busan Port Terminal to create smart port facilities based on 5G technology.
Telefónica	Consumer	Customer care	Telefónica has partnered with the CNSE Foundation to add sign language to its Spanish customer service platform.
Telefónica	Consumer	Healthcare	Telefónica, in association with Teladoc, has created Movistar Salud, a tele-medicine and remote wellness service.
Telkom	Consumer	Mobile apps	Telkom South Africa has created a payment solution where customers can pay for access to Apple content—including Apple Music, Apple TV+, movies on Apple TV, Apple Arcade, and iCloud storage—through their airtime credit.
T-Mobile	Consumer	Healthcare	T-Mobile US has introduced a helpline number (988) offering free mental health services to support its customers.
Ukrtelecom	Consumer	Mobile apps	Ukrtelecom has launched UTrecharge, an electric car charging service, which can be booked through a mobile application.
Verizon	Consumer	Infotainment	Verizon has designed a special Snapchat lens based on its 5G network to create an augmented reality experience for its users.
Vodafone	Consumer	Gaming	Vodafone Netherlands has designed a 5G-based system that uses lidar scanners to support visually impaired Paralympic cyclist Tristan Bangma.
Vodafone	Consumer	Healthcare	Vodafone Ukraine has partnered with Botkin.pro to launch Zdorro, a tele-health service based on AI, big data analysis, and IoT.
Vodafone	Enterprise	Location-based services	Vodafone Germany has partnered with Ericsson to design a navigation solution that allows drones to detect risks.

Source: Omdia.

Service fulfillment remains a challenge

Telecom operators cannot realize any revenue from service innovation or generate a return on their significant investments in network infrastructure unless they are able to successfully fulfill customer orders efficiently, rapidly, and at scale. Service fulfillment is a fundamental system within an operator's OSS that enables the timely activation of a service, provisioned in accordance with the technical and business rules defined by the northbound BSS layer and the southbound network resource layer.

When service fulfillment systems were originally built, operators offered a relatively small number of services to consumers and enterprises. Today the number of services has exponentially increased in an attempt to avoid the commoditization of traditional voice and data. Services complexity has increased as well, and services are now provisioned over multiple network and technology domains and to many different types of user devices.

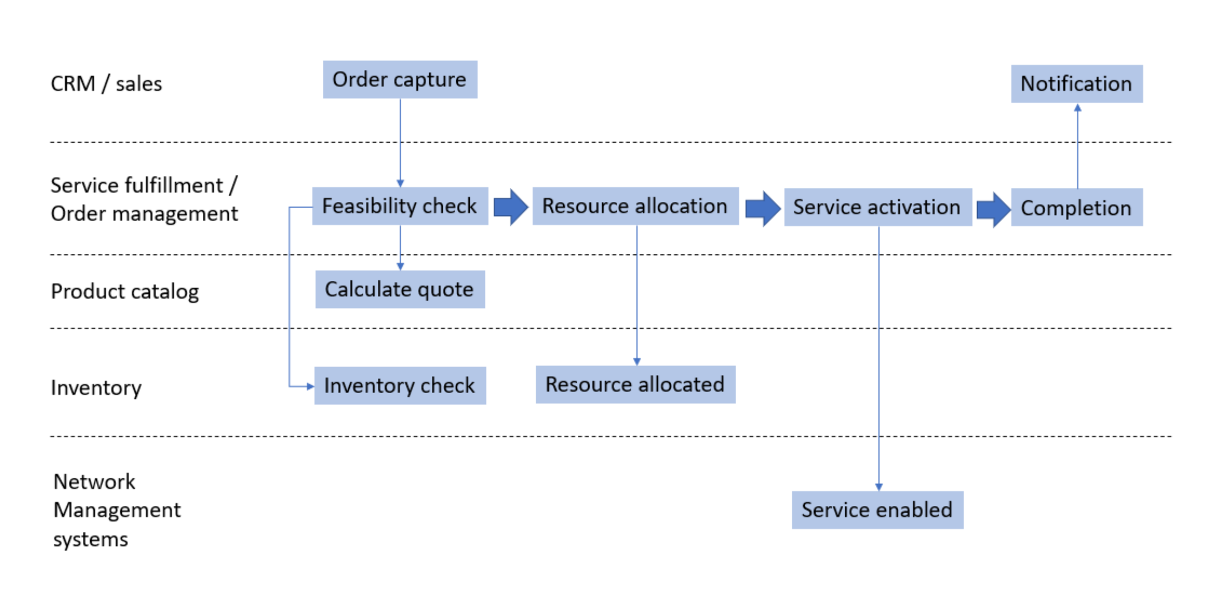
Provisioning is one of the key steps in the service fulfillment process. A service order must be decomposed to identify all the network elements that will be required to complete the order. To do so, the service provisioning system must talk to other OSS subsystems such as service catalog, orchestration, and activation. Service activation must be carried out in a complex and precise sequence to assemble all the necessary network resources (including virtualized network functions, functions running on public cloud, and even third-party services such as security) to enable the service.

Customers nowadays expect a digital "cloud-like" experience. They prefer to order and control their services through a self-service portal or app. Just like when they request a music or video stream, they expect a rapid response, whether it is activating a new service or changing an existing one. However, gaps in the digitalization of CSP processes results in a significant lag between clicking to place an order and receiving the purchase. This delay is the result of a disconnect between the slick, digital user interface and legacy, back-office processes.

The digital transformation of CSPs has typically started at the customer-facing end (websites, portals, and apps) addressing basic e-commerce and customer care processes. However, the digital illusion these frontends present quickly breaks down if customers must wait weeks for a service to be provisioned or for a technician to visit and configure their home gateway. Such delays occur because the CSP's underlying business and operational support systems (B/OSS) are not seamlessly connected with the network to automatically orchestrate and activate services.

A "digital-to-network" automation approach is needed in order to deliver on the promise of on-demand services in a cost-effective manner, spanning the entire service fulfillment and activation process from the user engagement layer all the way through to the network delivery, billing, and service management. Service fulfillment processes are highly complex. The diagram in **Figure 2** is a considerably simplified order-to-activation end-to-end process flow. Even this simplistic sketch of the process gives a sense of the complexity involved of interactions between multiple different systems from CRM and sales down to the network elements themselves.

Figure 2: Order-to-activation, simplified end-to-end process flow



Source: Omdia.

Consider, for example, the order capture. This step will involve cooperation between the CRM or sales platform, the order management system, and the product catalog. Before we allow a customer to place an order, we must do a feasibility check to ensure the service is actually available in their location. This might involve querying the customer's address in the CRM database and checking the resource inventory. To activate a service, we may need to allocate some specific resources such as a telephone number or IP address. The availability of these resources must be checked before the order can proceed. At this stage we might encounter a problem that requires the order to go into an error handling subprocess not shown in the diagram above.

If we get to the service activation stage, then our fulfillment system will need to communicate with the underlying network infrastructure management systems. This may be possible through modern REST-based APIs. But older infrastructure may use telecoms-specific protocols such as CORBA. The ability to easily add new adaptors to communicate with the network management layer while retaining the same business logic of activation (create, update, reset, delete, etc.) is key.

An installation step is not shown in the diagram in **Figure 2** but might be required for a new subscriber that has no customer premises equipment preinstalled. Integration with a workforce management system would be required if a field engineer is required to do the installation. Before the activation is complete the service provider should test and validate that the service is working properly. This may require coordination with a service assurance system that checks the relevant performance parameters, makes a test phone call, or verifies video picture quality.

Digitalizing service lifecycle operations end-to-end and driving true digital-to-network automation is key to reaping the full benefits of new network infrastructure investments. In practice, most operators today still have multiple siloed fulfillment and inventory systems—one for each service type or network domain (fixed, mobile, etc.). These may have some semiautomated steps but still require a high degree of manual effort to handle exceptions and errors.

Trying to manage highly complex and continuously changing environments using manual processes that span multiple internal system silos is increasingly hard. Older processes and systems are particularly inflexible; this prevents service providers from achieving deeper and more comprehensive automation. This problem is particularly acute where a composite service offering spans multiple technology domains and requires stitching together multiple constituent services, for example an SD-WAN service that uses mobile 4G and 5G networks as backups to the main fixed line connectivity.

Adopting an efficient, automated, and integrated approach to fulfil, activate, orchestrate, and operate consumer and enterprise services (with full-service lifecycle management) will enable CSPs to reduce their operating costs, service order processing times, and order fallouts, thereby improving the customer experience.

Conclusions

The communications industry remains highly innovative. The pace of innovation is likely to accelerate with the rollout of 5G and features such as network slicing. At the same time as operators are investing heavily in their network infrastructure, they are investing in digital transformation initiatives that improve their customer-facing applications such as portals and smartphone apps. This digital renovation has also penetrated down the BSS stack into new customer care and sales platforms that improve the potential to monetize new services.

The weak link that remains in many CSPs' technology stack is the OSS. Areas such as order management and service fulfillment often depend on a patchwork of legacy systems held together with manual processes. This issue is exacerbated when services span multiple technologies such as physical network devices, virtualized network functions, and cloud-hosted applications. The theory of constraints suggests that investing in the automation of OSS will yield far greater returns in terms of overall business agility than if those investments continue to flow to areas that have already benefited from modernization and transformation.

Digital transformation is much more than simply creating an attractive customer-facing, self-service interface. It requires digital-to-network automation spanning service lifecycle management and orchestration, with seamless integration all the way up to that slick customer engagement interface. Each operator's OSS landscape and process bottlenecks will differ; no two journeys of digital-to-network automation will be the same. However, they should all take a more strategic approach to automating end-to-end service lifecycle management. This includes inventory management, order fulfillment, configuration, activation, and automatic fault detection and resolution across multiple lines of business and network domains. Only a truly holistic transformation will allow operators to fully exploit the investments they have already made in the network and BSS. Digital-to-network transformation should enable greater business agility to bring new services to market faster and deliver them on demand with lower operating expense and improved customer satisfaction.

Appendix

Methodology

This report is based on Omdia's research reports, desk research of publications by various communications service providers, and interviews with executives representing the CTO office of telecoms operators and their technology partners.

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