Telco Trendbook

Four Steps to a Successful "Composable Business" Model:
Strategies for the Telecommunications Service Providers of Tomorrow

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MANAGEMENT SUMMARY

Digitalization alone is not enough: Digital measures can only be truly effective if they are incorporated into the whole company's strategy and someone is checking them constantly in agile fashion to see how the elements of a market presence can be reorganized and connected to one another. This is currently evident with regard to the topics of acquisitions and partnerships in the telco sector.

Uwe Ritter, Board of Directors, People at Work Systems

Modularity and composability are essential for long-term success. This insight is the first prerequisite for composable business. If a CSP applies this knowledge to all processes and the whole organization, it may secure the decisive competitive advantage.

Steven Bailey, Chief Strategy Officer, AOE

How can telecommunications companies remain competitive in a constantly changing market – with rapid development of technological possibilities on the one hand and decreasing customer loyalty on the other? This trendbook not only illustrates current challenges and opportunities for CSPs, it also provides decision-makers in the industry with approaches for enabling their organizations to act even in an unknown future – including an assignment to the areas relationship capital, financial capital, human/social capital, and technical capital.

The core of the recommendations is the concept of the "composable business," which equips organizations with the agility they need to react comprehensively to new conditions. For at many companies, the digital transformation according to a formula

OO + NT = COO

***O**utdated **O**rganization + **N**ew **T**echnology = **C**ostly **O**utdated **O**rganization*

misses the mark. A composable enterprise, by contrast, is in a position to packetize its services intelligently and adapt flexibly to new "compositions" of these packet structures and the processes behind them and adjust quickly to new market conditions.

Thanks to their many years' experience in the telecommunications industry, AOE and People at Work Systems will show you how this can succeed. Borrowing from the four building blocks of a composable enterprise, we will provide inspiration for different organizational levels in four sections. Since composable business affects not only IT and technologies, but also strategy and marketing, this trendbook is of interest to CMOs and CPOs as well as CIOs and CTOs.

The approaches and recommendations in this trendbook pay into the company's success on different levels. To make these levels more visible, the individual sections are assigned to the following areas via icons:

RELATIONSHIP CAPITAL (CUSTOMER)

Lower customer acquisition costs (SAC)

Increased customer loyalty and growth

FINANCIAL CAPITAL

Increased turnover/profits (margins)

Cost reduction

HUMAN/SOCIAL CAPITAL

Increased agility and employee satisfaction

Improvement of corporate culture and organization

TECHNICAL CAPITAL

Fit for the future thanks to modular IT

Real-time time-to-market

INTRO

What are current challenges for CSPs and how can these be tackled? These are important questions, but are they really the ones that telecommunications providers should be asking? Or is longer-term thinking required so that the answers to these questions aren't already out of date tomorrow? Shouldn't the question actually be how can CSPs set themselves up now so that they are well-equipped to tackle today's challenges and the completely unknown ones that they will encounter in the future?

For a glance at the development of the market shows that user behavior, end user devices, and the services used are subject to permanent change.

> Online media have displaced traditional media for both procuring information and entertainment. This applies to younger generations as a matter of course; however, due to the sharply disruptive effect of COVID-19, it is also increasingly true for older generations. For CSPs, this means that their target groups are more numerous and varied and that the number of channels for the formation of opinions and purchasing has mushroomed.

> Precisely for younger people, streaming content is crucial.

> This affects the end user devices: PCs aren't the medium of choice for younger people; gaming consoles and mobile end user devices are their primary media terminals.

> And younger generations are becoming more important for CSPs: Generation Z, for example, is spending more time on smartphones than any other generation. At the same time, its purchasing power is already in the three-digit-millions range; thanks to an oversupply of information, Gen Z-ers are less decisive than previous generations and therefore they can be influenced.

> People are becoming more demanding: According to a study by OC&C Strategy Consultants, source, style, and uniqueness influence the purchasing decision more than the price. Loyalty to brands and companies is eroding and people are willing to change providers more quickly.

The requirements posed of CSPs are therefore changing massively on all levels: the requirements for the CSPs' presentation to the public; their ability to anticipate market dynamics and the behavior of customer groups; and the flexibility to adapt their internal processes and rate structures quickly and flexibly – and all of this in a reproducible, repeating cycle.

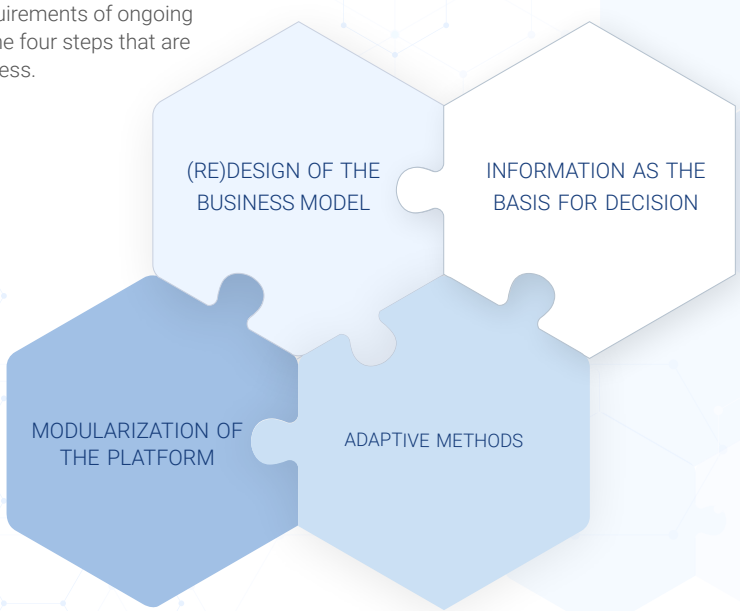
This brings us back to the question we asked in the beginning: How can I get my company there? In this context, Gartner recommends the "composable business" approach to CSPs – a strategy for equipping companies step by step with the agility they will need to maintain a successful market presence.

For in the course of digitalization, it's not enough to throw new digital projects on the market in isolation and examine these solely through the lens of existing business. Instead, it's necessary to check constantly using an agile procedure to see how the elements of a market presence might be reorganized and connected to one another. This is especially true given the trend toward acquisitions and partnerships.

The example of "Click and Buy" demonstrates clearly how indispensable it is to incorporate new business elements into customer experience and the IT infrastructure and at the same time, to maintain the greatest possible agility for each line of business. Background: Click and Buy was established in 1999 and was taken over by Deutsche Telekom in 2010 with a transaction volume of more than one billion Euros, more than 14,000 dealers, and 12 million customers. At the end of April 2016, Deutsche Telekom shut Click and Buy down. Why? Click and Buy was outside of Deutsche Telekom's core business, but it was being incorporated increasingly into the existing organization, which meant that it was losing agility and growth opportunities due to venture capital support.

A counterexample is congstar, a company which, due to its agile behavior, developed from an incubator of Deutsche Telekom into one of the leading MVNOs in Germany.

Software plays a key role in the transformation to the "composable enterprise." And the telco CIO is also critical here. In this trend-book, we will show how the interplay of agile company units and a software platform that enables this agility can be designed, and this considering existing systems and the requirements of ongoing business. In four sections, we will show you the four steps that are required for the shift to the composable business.



Customer example of a successful company after digital transformation

Watch the video at YouTube

(RE)DESIGN OF THE BUSINESS MODEL

Dare to take the leap into the future

The heterogeneity and frequency with which the challenges and opportunities of the telco market change are increasing. For CSPs, this means that they require a business design that allows them to land securely on both feet after awakening in an uncertain future. The following examples and strategies demonstrate how important the flexibility of the business model is for telecommunications providers – today and tomorrow.

Regardless of what happens, handle new influencing factors with agility

5G, IoT, predatory competition, fiber optics – these are all trend topics of our time and thus challenges that telecommunications companies must tackle. But what exactly does this mean? With the following current influencing factors and appropriate measures, it becomes clear that every new development also offers new opportunities – as long as the company is set up flexibly enough to react appropriately.

Competition in B2C

Challenges & opportunities:

- Limited market for new users of telecommunications services
- Numerous service providers with similar products
- A certain uniqueness of the offerings is required for customer loyalty
- Various target groups' interests must be served simultaneously since users and customers are frequently not identical; for example, young people and parents

Potential measures:

- Offer family packages that bind all members to the provider for the long term
- Identify users within the family package; individual advertising of additional services for upselling
- Develop bundling offers, for example gas, electricity, smart home, and entertainment as characteristic that distinguishes your company from the competition

Competition in B2B

Challenges & opportunities:

- Numerous providers of business rates for companies
- Factors in addition to specific services, especially cost pressure and cost control
- Guarantee that costs can be planned

Potential measures:

- Scaled fixed-price packages with increasing scope of services
- Offer dynamic blocks in order to block services not included in the package, adjustable with 24/7 self-service
- Offer discount structures in order to make users aware of additional services
- Evaluate usage in order to make active, personalized new and/or adjusted offers

Formation of alliances

Challenges & opportunities:

- No CSP can offer all services relevant for its users by itself
- Around the world, CSPs are relying on "service co-creation"; that is, partnerships with other providers in order to jointly develop new solutions, e.g. with companies in the automobile industry, with production and logistics companies, and with technology and service providers
- According to Gartner's predictions, service co-creation will become more important, especially for large CSPs
- Increased competition due to cloud-based CSPs

Potential measures:

- Set up an individual division for co-creation of services in order to enable working and thinking beyond the traditional paradigms of the basic telco business
- Acquire talented people, who design new services and partnerships creatively and with gusto, and establish a suitable compensation scheme
- Create a learning-oriented error culture supported by the company and a climate that encourages a readiness to take risks

LPWAN & IoT

Challenges & opportunities:

- Low Power Wide Area Network (LPWAN) enables the regular transmission of data (for example, about fill levels or other measurements) from a device to a remote server process with very little energy
- Enables cities to irrigate green spaces and provide water to industrial processes individually and only as needed, for example

Potential measures:

- Sell services relating to transport, storage, and evaluation of IoT data
- Develop a service infrastructure
- Develop a comprehensive authentication, authorization, and security concept

Customer support & social media

Challenges & opportunities:

- Complexity of the end user devices and shift to IP-based services is pushing a significant part of the configuration tasks to users
- Great complexity thanks to multitude of technologies (telephony, Internet, TV, WLAN, mobile devices), devices, and settings
- Problems with initial set-up and later use usually can be solved by service technicians; however, such problems frequently occur outside of normal customer service hours

Potential measures:

- Establish a service infrastructure with 24/7 support
- Provide offline service offerings and bots in addition to telephone service
- Monitor social media so that problems with poor service offerings can be detected and countermeasures taken
- Use social media to make people aware of offline services and bots
- Expand self-service functions, both on the Web and via app, so that contract partners can view information about invoices and payment themselves and solve their own problems

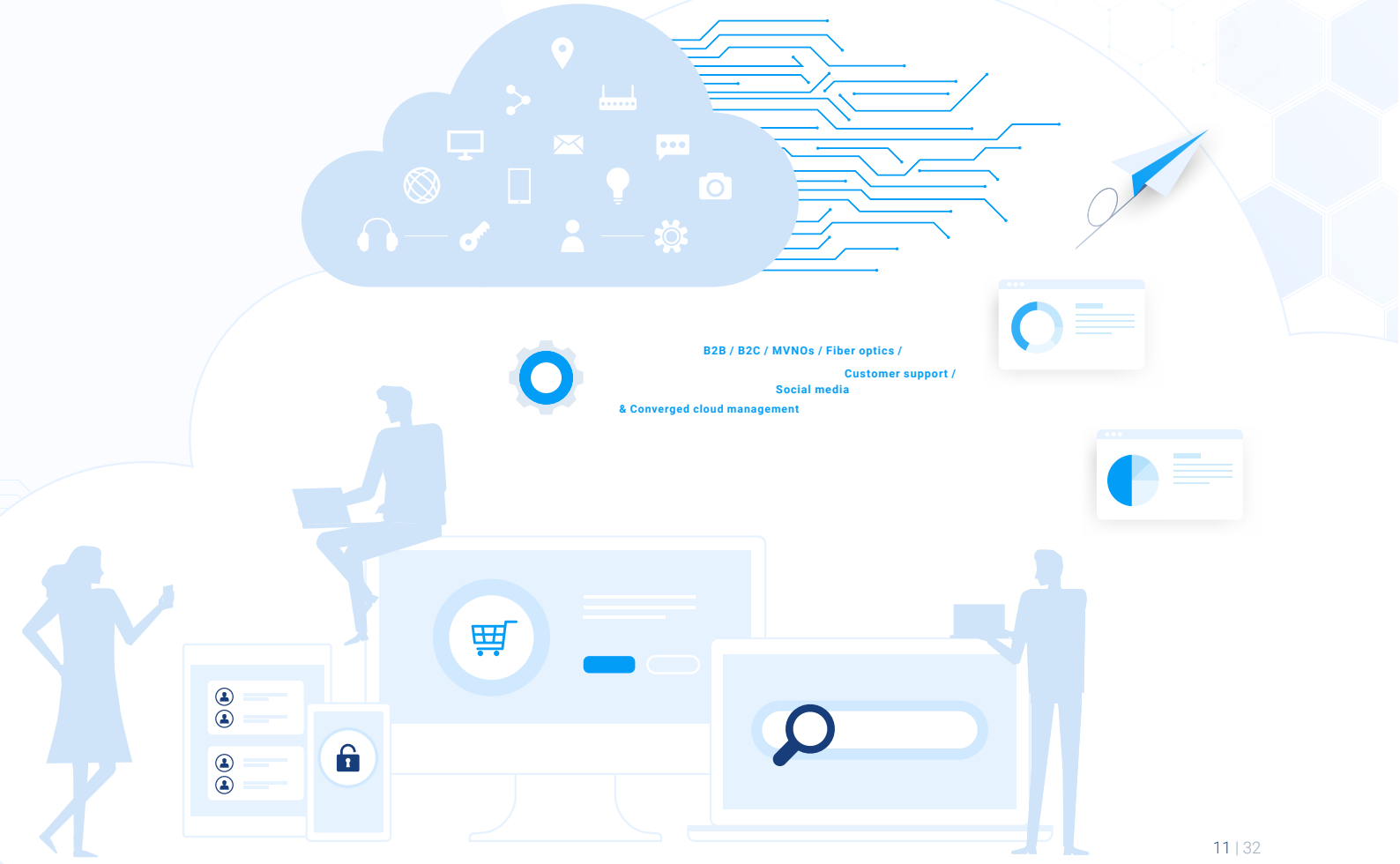
Converged cloud management

Challenges & opportunities:

- CSPs' business is closely interlocked with cloud-oriented services, cloud offerings for customers and cloud infrastructure used internally for IT and network is usually separated and used in different ways, however
- Simplification of complex cloud infrastructure management, optimization of resource utilization, and acceleration of service provision

Potential measures:

- Support converged cloud management for integration of automated provision, orchestration, and management of separate cloud infrastructures, the network functions, and IT applications
- Distributed processing (including, e.g. edge computing) with uniform and central management instead of consolidation in a physical infrastructure
- Develop a blueprint as reference for a converged cloud infrastructure
- Decouple hardware and software by default to guarantee flexibility, operate a large selection of virtual network functions and IT applications on universally designed cloud platforms
- Support open standards and open source wherever possible and sensible, in order to guarantee interoperability regardless of manufacturer and encourage competition among supporting providers
- Harmonize and consolidate the individual network and IT cloud platforms



MVNOs, fiber optics & service portfolios

Challenges & opportunities:

- CSPs do not have a completely articulated service portfolio when they go into business
- Providers who enter the market as a new or as a spin-off of a larger company (e.g. fiber optics providers or MVNOs) are initially active in the area of their core competency and initial product offerings

Potential measures:

- Some time after market entry, diversify the company's own product and service offerings and expand activity to include additional market sectors
- Adjust the IT infrastructures and business flows to ensure the required flexibility to incorporate new fields of business

5G invoicing

Challenges & opportunities:

- Investments in 5G infrastructure require the creation of a convergent system for operation and invoicing functions that can cover 3G, 4G, and 5G and that corresponds to 3GPP (3rd Generation Partnership Project, a global cooperation of standardization committees for standardization in mobile communications) specifications
- Both new fee and invoicing architecture and corresponding functions and interfaces to address new requirements in connection with fee collection and invoicing, as well as interaction with the network, e.g. invoicing of network segments and net-related functionalities

Potential measures:

- Develop business plans for 5G and prioritize use cases, including various criteria for accounting based on the business models striven for
- Create a logical and technical architecture for the future BSS level that can support the business models required
- Create the ability to define new products, acquire new partners, and invoice joint services (see "formation of alliances")
- Create an infrastructure and strong data management capabilities, as well as great elasticity and resiliency

Steady change as a constant for CSPs

The scenarios described are just examples of snapshots; tomorrow, the market requirements may look entirely different. What remains constant is the change of technologies and customer behavior – and thus, the necessity as a telecommunications provider of adapting and reinventing business models in this fluctuating and dynamic environment.

Architecture, collaboration culture, organization, delivery, operations – in Deutsche Telekom's Gigabit program, we don't regard these as separate aspects, but as interlocking dimensions that all need to be taken into account and that will only lead to success if acknowledged together. This is the only way we can manage the great complexity of this program, respond quickly to new requirements and prioritize the customer focus constantly. This approach has proven itself, for example, in the implementation of the customer portal for digital fiber optic marketing: Despite the involvement of various partners and service providers, we had an incredibly short time-to-market.

Mathijs Dijkhuizen, Executive Program Manager Gigabit, Deutsche Telekom

As communications service providers (CSPs) progress with digital transformation, they are facing many competitive pressures from inside and outside their industry. Unlike in past, the ongoing transformation is not merely for simplification or processes optimization or a new product launch or for better customer experience. It is all of such goals and enabling economic efficiency, new business models, diverse products and growth. These goals cannot be met without significant transformation of operations — particularly for network-based CSPs.

Amresh Nandan, Gartner Analyst

Interview with Patrick Naef

What will distinguish the CIO of the future?

How must the role of the CIO change in order to contribute effectively to the overall company's strategic future digitization agenda?

IT has become an important strategic component of any company. It can no longer be treated as a pure support function delegated to a CIO who focuses primarily on running the back office, e.g. on infrastructure, hardware, applications, ERP systems or cybersecurity – as was mostly the case in the past. In the future the CIO will also be measured on how IT can add value to the entire company, i.e., to the core products and services, thus generating revenue and adding value to the customer experience. At the same time, the duty to keep the back office running remains as a "hygiene factor", of course, but the area where the CIO can earn brownie points, is to explore new business models beyond the traditional IT perimeter.

"The CIO will have to play a business-oriented, strategic role"

An example of how IT and technology can initiate the development of new business areas, is what I observe from my work as a member of the board of directors at a manufacturer of professional kitchens, coffee machines, appliances, traditionally a mechanical discipline. Today, however, not anymore. The company now produces coffee machines with touch panels that, equipped with sensors (IoT), stream data via the cloud through digital interfaces. We can offer intelligent diagnostic systems and preventive maintenance by leveraging these technologies. At the same time, we can collect a lot of data and thus information about customer behavior. This opens up the possibility of completely new revenue models such as "pay by cup". At this point, the CIO uses technology to drive innovation within the company. In the future, he will have to play a different, much more business-oriented, and strategic role, moving from a support function to the core of the company, so to speak. CIOs who fail to make this leap run the risk of becoming irrelevant.

"IT has become a strategic component"

"In the interaction with the business, the CIO plays the role of a catalyst"

In your view, what external factors are influencing this new understanding of the role?

Customer expectations have changed dramatically in recent years. Digital natives are the consumers of today and tomorrow. For them, the actual product or the initially offered service is almost a secondary matter; the quality of the systems with which they can interact during or after the purchase is of decisive importance. The shift from hardware to software, or more precisely software-defined products, only reinforces this effect. The resulting trend toward virtualization and dematerialization of physical objects will have a fundamental impact on most companies.

A good practical example is my personal experience at Emirates Airline & Group. When I started there as CIO in 2006, customers would rate an airline primarily on how efficient they would fly you from A to B, how comfortable the seats were, whether the service on board was courteous, whether the food quality was right and, finally, of course, the price also played a decisive role. Today, things look completely different. A large part of an airline's service is based on IT systems. From an app or website for flight booking and online check-in or the virtual boarding pass on your cell phone to an in-flight entertainment system that allows you to stay connected to the Internet for sending messages, surfing, and streaming throughout the flight and how seamless you have access to information about your flight across the journey. At this point, IT has taken on a completely new strategic meaning as a key part of the product.

Agile methods already have a certain tradition in IT. But how does the CIO of tomorrow manage to implement the adaptation of an agile mindset within his entire corporate organization?

Agile methods were originated from IT, specifically in software development. New functionalities were developed in short cycles, but their value for the company could often only be exploited much too late. Why? Generally, the "Agile Mindset" was limited to IT. Business, marketing or production were not involved in the development, and complicated handovers, hierarchies, and bureaucracy often prevented the company from really benefiting from the increased speed or the shorter cycles in which the new features were created. But how does the CIO succeed in driving this transformation through the entire company, since in traditional structures he often reports to the CFO and, at first glance, does not have the necessary hierarchical impact on other departments? In my opinion, the reporting line or the corporate hierarchy must not be an excuse to step away from this responsibility. The CIO's job is to create network structures within the company, even if the reporting lines are different. This is not an "either or" strategy, but an "and." Network structures and hierarchies can be combined. All employees involved, including those from different business units, are integrated into the agile teams so that they and their processes become part of the agile transformation. Old structures need to be broken up and make way for the agile methods and mindsets. The mindset is always more important than the skillset. The skillset can be learned, the mindset rather not.

"Old structures have to make room for agile methods"

The advantages that arise from this strengthen the strategic importance of the CIO vis-à-vis his direct superior or even vis-à-vis the CEO. With the traditional business case approach, development was carried out to the bitter end, even if the results were already outdated by the time they were completed and, in extreme cases, no longer usable. Agile methods entail rolling planning, investments are more transparent, errors are recognized much earlier and can be corrected without drastic budgetary consequences. Once again, the need for the CIO to spend time on strategic, transformative topics becomes clear.

As for networks instead of hierarchies: Will the CIO of the future also have to rethink in the area of employee management and/or dealing with colleagues?

Yes, because hierarchical structures are only of limited use today. Digital transformation is about exploring new technology-driven business models, and it cuts across well-established hierarchical organizational silos that still dominate most of our large companies.

Today's employees are growing into a world characterized by the sharing economy, crowd sourcing and crowd funding, Wikipedia, open source, etc. Their mindset is: "The more I share, the more my network benefits and with it all of us, including myself". Accordingly, a modern CIO must be able to work and think in networks; the times of the "command and control" paradigm are over, a strict separation of the thinking and the doing we used in the industrial age no longer works in the digital age.

In interacting with the business, a CIO should play the role of a catalyst to help his colleagues from other business units to achieve competitive advantages enabled by technology. What matters is the value you bring to the table and the positive impact you can have, regardless of whose resources in the company contributed to it. Everyone is working toward the same goal, driven by a common purpose.

ABOUT THE PERSON

Patrick Naef was Group CIO at Emirates Airline & Group in Dubai from 2006 to June 2018 and during the same time, non-executive director on the board of SITA, a global telecommunications and IT services company focused on the aviation industry. Today, Naef is Managing Partner at Boyden Executive Search and non-executive director on the board of Franke Group. He is also founder and CEO of ITvisor GmbH, a boutique consulting firm specialized on advising organizations in their digitalisation journey.

He advises and supports several technology start-ups, lectures at various universities and sits on advisory boards of technology companies and venture capital firms.

Other professional positions include CIO at SIG and Swissair as well as senior positions at Zurich Insurance, HP and Bank Julius Baer.

In 2011 the German "CIO Magazin" and IDG honored him with the prestigious "CIO of the decade" award.

Patrick Naef holds a Master's Degree in Computer Science from the Swiss Federal Institute of Technology (ETH) Zurich, Switzerland, and an Executive MBA from the University of St. Gallen, Switzerland.

INFORMATION AS THE BASIS FOR DECISION MAKING

Use data for your choreography

Develop new products and services that resonate with your customers' needs: CSPs that listen to the powerful sounds of their data and act accordingly are a step ahead of the competition. This is how data mining, machine learning, and predictive analytics enable the detection and anticipation of trends and patterns from information on hand. However, the basis for innovative technologies is clean data management and the networking of existing data silos.

Acquiring information: Collecting and enriching data

Own data

The first step isn't a big one: CSPs already have a broad spectrum of customer data, from CRM and accounting systems, for example. To derive information from this that could be relevant for business development, the data must be aggregated and evaluated in suitable tools (data lake, data warehouse, etc.).

The challenges here:

> Generally this results in high requirements for storage space and computing power, which can be managed with a strategic deployment of cloud infrastructure

> However, especially with the use of resources outside the EU, requirements for data privacy and security must be complied with (e.g. EU GDPR, Privacy Shield)

External data

Even more insights can be gained from this data if it is enriched

with demographic data or a segmentation using specified criteria, for example. Ideally, customers' affinity for higher-priced bundle products or end user devices (e.g. iPhone) can be predicted this way; this enables a more precise addressing of customers. Secondary offerings from providers such as Acxiom or Schober Direktmarketing are a good choice for such services.

Evaluate information: Analyze data

Customer journey analytics: Learning from customer behavior

The customer journey is a valuable starting point for information, for this is where customer behavior can be analyzed across all touchpoints. It provides insights into the customer's needs and desires and the development of appropriate measures:

- Comprehensive view of all the customer's interactions with the CSP (Website, call center, social media, retail store, etc.) for analysis of the customer relationship
- Predict an increase in termination risk (churn prevention)
- Personalized addressing on all communication channels
- Optimize the segmentation
- Detect inconsistencies and interruptions in the customer journey
- Increased quality of the offerings and customer satisfaction

Enterprise information management: Structured data management for business success

Enterprise information management (EIM) is an integrative process for data organization: By networking the data silos distributed across a company, productivity can be increased, risks detected better, and new fields of business and markets exploited faster. In addition, centralized information management increases transparency about the type and use of data saved and it helps telcos comply with regulatory requirements such as the EU GDPR.

Artificial intelligence: Thinking ahead with data

Artificial intelligence (AI) offers advanced analytical processes for data interpretation, for example with machine learning, and thus helps CSPs:

- Improve customer experience and customer loyalty
- Reduce costs
- Optimize network infrastructure

There are many areas of application; however, AI in the telco environment very seldom causes disruptive changes. A reason for this: Currently there is not (yet) sufficient high-quality training data available in the telecommunications sector. For CSPs, the challenge is especially to create a usable data basis by networking existing silos.

The following areas of application offer great potential in the telco environment:

Predictive analytics

Predictive analytics seeks to predict future events using patterns in internal and external data, for example, fraud attempts or anticipated problems in customer support. In addition, the information gained prevents churn: Customers who are likely to terminate can be identified and addressed purposefully.

Continuous intelligence

Through real-time analysis, continuous intelligence generates a 360° customer view, which among other things, can be used to automate decision-making. Based on personal interests or relevant personas, a customer can be steered toward the most appropriate customer journey or the best possible next step can be suggested to him. Important criteria are the up-to-dateness of the available data and the speed of the situational analysis.

Application examples: Profit from data

Data and data analysis give telcos the knowledge that they need to make solid decisions. The following examples demonstrate that this can happen on different levels:

Adjustment of the organizational structure

The information gained from data can also flow into decisions on a strategic and organizational level: On the one hand, it helps develop new packaged business capabilities; on the other, the composition of m[illegible]ertical" teams that are equipped so that they can implement new valuable topics independently of one another and make the results available quickly. With such a company structured in "composable" fashion, the former boundaries between IT and business become blurred: Cross-functional teams can react as quickly and independently as possible to new market potential with the information made available to them.

Customer support

Intelligent decision-making and advising systems, which learn constantly based on data can assist customer support. With machine learning and AI, patterns in customer behavior and problems and terminations can be detected and tackled before they become critical (churn prevention).

Personalized product display

Based on the information available about a customer, an individualized display of products can improve the customer experience and conversion rate:

Individualized catalog sequence

Considering learned customer behavior in e-commerce, criteria-based sequence control is implemented in parallel to "classic" sort and filter options.
This functions as a ranking factor for the product display and enables modification of the catalog sequence according to the customer's interests. If the customer selects an explicit sort criterion, this generally determines the primary product sequence. However, additional influence can be exerted on the sort sequence with the personalized ranking as secondary criterion. This is how the most potentially relevant products can be placed prominently in the listing.

Badges

Another tool for emphasizing particular products is the display of additional markings in the form of icons or text on the product tiles in the catalog. These so-called "badges" are maintained as optional attributes in the course of product data enrichment; the personalization decides, based on the relevance for the customer, whether to show or hide the information.

Pre-selection

The frequent pre-selection of a product (e.g. as "our tip") can be increased by personalizing its relevance for the customer. The visual emphasis steers customer interest and makes placing a product in the shopping cart easier. The concept of pre-selection can not only be applied to individual products; it also works for individual bundles or the pre-selection of relevant options.

Addressing of abandoned shopping carts

Another field of application for data analysis in real time is the purposeful addressing of people who abandon shopping carts. Not every shopping cart has the same chance of completion, and not every potential customer is equally attractive for a CSP's portfolio.

Efficient use of resources

Based on the information in hand, the shopping cart is categorized using freely selectable

characteristics. Only the customers who are most promising are fed to the service channels, e.g. support chat or call center. This way, the limited capacity of agents can be deployed

AI is on the advance in the telecommunications industry

in-Chief of "Smart Industry – the IoT Business Magazine" and he is responsible for the "We Talk IoT" podcast. In addition, Cole has written numerous books; his latest work "Erfolgsfaktor Künstliche Intelligenz – KI in der Unternehmenspraxis: Potenziale erkennen, Entscheidungen treffen" ("Artificial Intelligence as Success Factor – AI in Business Practice: Recognizing Potential, Making Decisions") was published by the Karl Hanser Verlag.

In which areas are AI and machine learning already being used on the telecommunications market?

In particular, there are two areas in which artificial intelligence is already advancing the digital transformation in the telecommunications industry today: Infrastructure and customer support. CSPs must use the possibilities of artificial intelligence in order to process some of the existing and anticipated future floods of operating and customer data; to analyze it and transform it into valuable insights that offer better customer experience, improve operation, and increase sales thanks to new products.

Artificial intelligence is increasingly helping CSPs manage, optimize, and maintain their networks. With predictive analysis and maintenance, it is possible to make network utilization easier to plan and to react better to load peaks. From the CSPs' point of view, the result is especially cost optimization; from the customer's point of view, it is a better customer experience (CX).

In addition, artificial intelligence is indispensable for the construction of self-optimizing networks (SONs), which give the operators the opportunity to automatically optimize network quality by region and time zone based on traffic information. Applications of artificial intelligence in the telecommunications industry use advanced algorithms to search for patterns in data. These patterns allow telecommunications companies to detect network anomalies, make predictions, and eliminate problems proactively before the disturbance becomes evident to end customers.

"AI is helping CSPs to manage, optimize, and maintain their networks"

What have previous experiences with this been and where do you see potential for improvement?

CSPs have a large number of customers who execute millions of transactions every day; all of these are subject to human error. Furthermore, even today they are confronted with increasing requirements with regard to their service quality. That's why CSPs must take greater advantage of the opportunities that AI offers them in order to transform the huge quantities of data that they have col-

"Network automation and intelligence enable improved root cause analysis and prediction of problems"

lected over the years from their customer base and from devices, networks, and mobile applications; from geolocation; the evaluation of detailed customers' profiles; and invoice data into valuable knowledge about customers and their requirements.

The research institute Statista predicts that by 2025, 75 billion networked devices will be in use. Each and every one of them is a source of information and insights, which represent immense value for the CSPs. Artificial intelligence makes it possible to unearth this treasure and become one of the top players in the telecommunications industry.

And which areas do you believe will be on the rise in the near future?

Robot-assisted process automation (RPA) will have significant effects on the telecommunications industry. Paired with AI, RPA will increase CSPs' efficiency by allowing them to manage their back office flows and large quantities of repeating and rule-based actions more easily. With the rationalization of the execution of complex, work-intensive, and time-consuming processes such as invoicing, data entry, personnel management, and order processing, RPA will set CSPs free for more valuable work.

"5G will become the prerequisite for remote operations, intelligent industry applications, and V2V"

The British provider Celaton helps CSPs with a technology that it calls intelligent process automation (IPA) by extracting and validating key information from incoming correspondence such as e-mails, Web forms, and social media posts. Based on this information, the system provides suggested answers to service technicians.

The software provider Kryon uses a process it calls process discovery in order to automatically identify CSPs' workflows; map the main path of a process and its variants visually; assess its suitability for automation; and suggest changes to the workflows to increase their efficiency.

In the short term, network automation and intelligence will enable better causal analysis and prediction of problems. In the long term, these technologies will support strategic goals, e.g. the creation of new customer experiences and the efficient management of new business requirements.

AT&T's innovative solution uses AI to assist with its maintenance processes: The company is testing a drone in order to expand its LTE network coverage and use the analysis of video data recorded by drones for technical support and maintenance of its mobile phone towers.

What specific opportunities do CSPs' AI and machine learning offer in the customer service sector?

Here, AI platforms and natural language input and control will produce the greatest changes. Juniper Research recently predicted that so-called "virtual assistants" are in a position to automate and scale individual conversations such that they will reduce CSPs' business costs by up to $8 billion per year by 2022.

Some telecommunications companies are already using virtual assistants to manage the large number of support inquiries for installation, set-up, troubleshooting, and maintenance, and to help customer service employees, who are often overwhelmed. With AI, operators can implement self-service functions that show customers how they can install and operate their own devices.

KPN in the Netherlands is already analyzing notes made by its contact center agents and using the insights gained in order to make changes to its interactive voice response system (IVR). With their permission, customers' behavior at home is observed and analyzed, such as the switching of channels on their modem, which can indicate a WiFi problem. As soon as these problems are detected, KPN takes a proactive approach to solving them, which increases the success of the technical team.

How do you regard the connection between AI/ML and 5G technology?

According to the analysts at Deepsig, a start-up headquartered in Virginia, the core algorithms of the current generation of 5G smartphones consume much too much electricity and achieve lower data rates than expected. The replacement of common algorithms with deep learning will drastically reduce power consumption and improve performance.

Existing 4G networks use relatively inefficient broadband connections based on Internet Protocol (IP). Machine learning (ML) and AI will enable operators to create fast 5G networks that are both predictive and proactive. Intelligent base stations will be in a position to make decisions themselves, and mobile devices will be able to

ABOUT THE PERSON

efficiently to win over the relevant customer groups. Segments that are prioritized lower can be contacted asynchronously at a later time, for example, via a personalized addressing upon another visit to the Website.

Interview with Tim Cole

Tim Cole is a pioneer of the Internet. Topics relating to the "new economy" are his world. When digitalization was still a foreign word for many people, Tim Cole was one of the first journalists to understand the significance of the World Wide Web.

As an opinion leader of the digital economy, he is a popular columnist, Internet expert, and blogger, not to mention speaker. Cole became familiar to a broader audience as moderator of the n-tv TV show eTalk and later on N24. Since 2018, Tim Cole has been Editor-

ADAPTIVE METHODS

Keep on moving

CSPs that don't fall out of step so easily but instead keep on moving are more likely to succeed in handling changed market conditions, changes in customer behavior, and new technological innovations in such a way as to enrich their business. Such flexibility is only possible if the company is structured in such a way that individual units are allowed to act quickly, independently, and in agile fashion. This is where digital business can learn a lot from agile software development.

create dynamically adjustable clusters based on learned data. This will improve efficiency, latency time, and the reliability of network applications.

It is anticipated that 5G will produce a series of revolutionary new applications, including autonomous driving, industrial automation, virtual reality, ultra-high-resolution video streaming, and electronic health care services. 5G will offer the necessary scalable connectivity to expand the possible number of wireless devices with efficient transmission of even small quantities of data across extensive coverage areas and with greatly reduced latency – all of which are prerequisites for things such as remote operations, intelligent industrial applications, and vehicle-to-vehicle communication (V2V), to name just a few. In any case, ML and AI will be the keys for the successful implementation of these new services by CSPs over the next few years and decades.

Agile work: What telcos can learn from IT development

Short time-to-market with great complexity – one of the biggest challenges in the telco industry is something that software development has tackled for decades with agility: Agile methods consider the complexity of projects, for example unforeseeable changes to external conditions or new, additional requirements. This makes them a more effective alternative to traditional methods: According to the 2012 study "The Chaos Manifesto" by the Standish Group, agile projects are three times more successful than projects that are implemented using the classic waterfall model. They fail less often and fulfill more customer requirements. Thanks to iterative implementation according to a prioritization, time-to-market is short; the solution is then expanded and adjusted constantly.

That's why it's worth taking a look at agile principles and procedures in order to transfer the benefits and lessons from software development to CSPs' digital business.

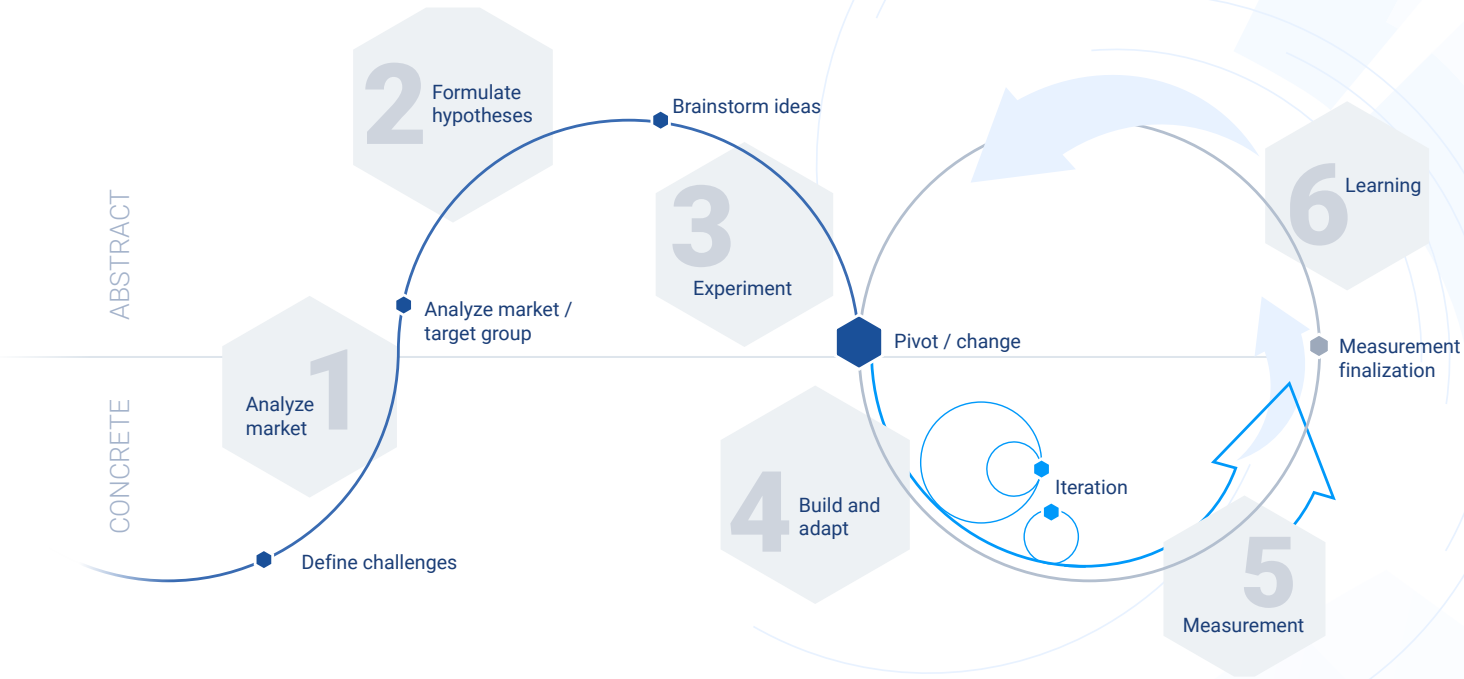
Agile mindset

The mindset at the whole company is crucial: With a work culture that is designed to handle new requirements all the time, it is possible to react quickly and efficiently to changes on the market, new user requirements or crises that arise. Employees assume end-to-end responsibility for their tasks if they have great self-learning expertise and this encourages them to work independently – for example, C-level people cede responsibility and decisions are made instead by the expert teams. Feedback loops, reflection ceremonies, and cooperation on a level playing field enable joint learning and growth and trust on all levels.

Processes

In agile software development, particular processes (Scrum and Kanban, for example) provide a framework and a structure. The breakdown into iterative phases (e.g. planning, implementation, review) and regular reflection ceremonies with all relevant people, for example, can be transferred to the CSPs' strategy development.

Confronting complexity



In successful agile projects, many approaches have established themselves to deal with complexity, for example:

- Learning: Is necessary on the one hand to confront complex problems. On the other hand, complexity management itself can be learned
- Decisions: Make them at the right time and based on the information on hand and re-think them if the situation changes
- External perspectives: Orientation toward external references
- Teams and communication: To create a "collective intelligence" through different perspectives

The implementation

Innovation through design thinking, lean start-up and agility

"Design thinking" is an interdisciplinary process that reveals solutions for complex and nearly insoluble problems in a technically feasible, commercially sensible and emotionally comprehensible manner. Here the concern is not finding a "final" solution, but rather enabling dynamic adaptation and flexibility.

In order for this approach to function as it should, teams have to work in collaborative, cross-functional and, optimally, also business-driven fashion. The starting point is always the market and its target groups: What are the customers' needs and problems, and which digital services would be the best response to these? Thanks to the iterative procedure, services and products can go live early on with the most necessary functions and then be tested directly by users – and based on this, evaluated and improved.

Handling of the ecosystem

A CSP's actions do not take place in a vacuum – the company interacts with a multitude of other organizations, including partners and service providers. If an agile mindset and agile work end at the company's boundaries, a lot of potential is lost. Ideally, the CSP will operate in an ecosystem in which partners and suppliers are just as much part of the agile structures as the internal teams.

Deutsche Telekom, for example, is implemented its digital customer portal for fiber optic marketing with various partners. Internal and external teams worked together cooperatively, transparently, and closely connected, all based on agile development methods. Team structures were adjusted constantly to the requirements; one successful tactic was to establish specific contacts for cross-cutting architectural topics. This procedure ensured high efficiency and optimum results, despite the communication-related challenges posed by having numerous teams spread around different locations.

Technology

If a CSP considers the concept of composable business when developing and implementing its business model, it quickly becomes clear that the technology should not be understood as an end unto itself, but rather as a tool that can be used to help achieve business goals.

It also serves to collect, make visible or evaluate information that is necessary for making solid decisions in favor of a company's own business goals (cf. section "(Re)Design the business model").

The selection of a technological solution and its function does not depend on the possibilities and current innovations, but rather on the users and their requirements – and the defined goals.

The flywheel effect: Digital transformation with focus

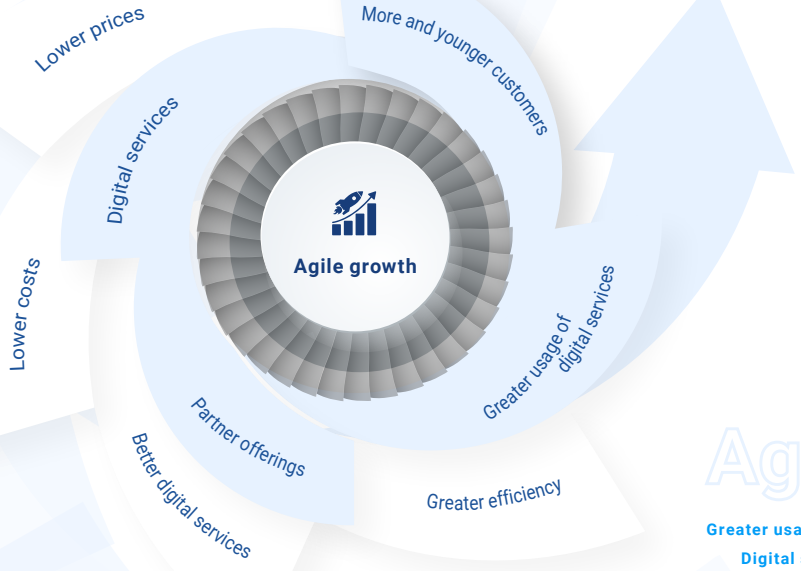
What is it?

The flywheel concept helps companies develop a comprehensive digital strategy by defining a global goal for their company. All areas and activities must strive for this global goal in the end. This makes it easier to prioritize which measures are truly important, which will be ineffective in the long term due to lacking integration into the overall concept – and what disturbs the dynamics of the flywheel by causing too much friction. At the same time, it enables the concept of transforming smaller business units (e.g. individual departments) directly, as long as they still go along with the strategic planning. The flywheel concept is used successfully at Amazon, for example.

What's the benefit?

- The digital strategy moves into the spotlight and gets a clear direction
- This creates internal trust and increases the employees' motivation across all areas and departments
- Results become tangible and measurable
- Transformations can take place gradually in an orderly manner without a "big bang" and without losing focus of the overall goal

What's required for this?



MODULARIZATION OF THE PLATFORM

- Vision & goal: e.g. definition of the company's mission and values
- Self-reinforcement: Mutual support and strengthening of all business areas
- Clarity & simplicity: "How do we achieve our goal?" in a nutshell
- Focus & concentration: On the company's own strengths and USPs as compared to the competition
- Flexibility & adaptability: Regular adaptation of the flywheel to changing conditions
- Consistency & endurance: For the internalization of the flywheel, even in case of difficulties
- Communication & acceptance: Pick up and inform employees
- Minimize friction: Reduce or eliminate weaknesses

and risks

Compose your new direction

An ensemble of modularly structured business units on the one hand and a repertoire of data and information on the other hand: What kind of software can a CSP use to orchestrate both of these in the rhythm of agile principles in order to encourage business? This requires a digital platform that can be put together in just as modular and "composable" a fashion – as a kind of operating system for business flows.

Goodbye monoliths – hello modular platforms!

CSPs' historically developed monolithic software systems frequently stand in the way of adapting business processes to new market requirements – both on the OSS and on the BSS layers. The consequence: Many projects that start as well-conceived and effective initiatives fail due to the load of compromises that result from IT that is decades old and inflexible. The logical reaction: CSPs add missing functions through new, smaller, specialized systems that were embedded into the existing landscape through interfaces. What was, in principle, a good approach has created a heterogeneous application network that poses many new challenges:

- Complexities and dependencies, and thus increased effort required for releases
- Redundancies and inconsistencies due to applications' own data storage, replication of data between systems, few clear distinctions
- High costs (maintenance, support, operation) and poor customer experience due to complexity

The optimal solution could be created according to the following principles:

- Design thinking (see page 24)
- Separation of concerns (clean separation of the functional properties)
- Contract first (first interfaces, then functions)
- Headless architecture (separation of back end and front end)
- Microservice architecture (modular core functions)
- TMF standards (interoperability with other providers, customers, partners, and suppliers)

FUNCTIONALITY

MODULARITY & GRANULARITY

ORCHESTRATION OF THE MODULES

ARCHITECTURE & INTERFACES

STANDARDS

COST STRUCTURES

Many modern software systems work this way. Essential benefits are, for example:

THE ADAPTIVE TELCO SUITE

- Fewer dependencies between the application parts

- Easier maintenance of the applications
- Organization in container structure (e.g. Docker and Kubernetes) and cloud environments possible
- Lower costs
- Scalability
- Reliability
- Composability: quick adjustment, changing, and re-orchestration of individual services

The benefits make clear: Such a platform is optimally suited for fulfilling the requirements of a "composable business." However, CSPs can seldom completely reconstruct a platform – existing systems must be considered and ongoing operation ensured.

Be flexible in the balancing act between implementation and ensuring ongoing operation: This is how you will bring your projects to a successful conclusion

Ideally, implementation is handled step by step. It has proven effective with regard to the selection of new software elements to rely on an adaptive mix of best-of-breed and open source software. The following elements are important here:

Since no software program fulfills a large CSP's requirements completely right from the get-go, individual functions have to be adjusted or added. Here, the "buy & build" approach has proven useful; that is, a combination of a finished standard solution and newly developed parts.

Because ideally IT is oriented according to the business and not vice-versa, these adaptations are not a one-time process, but rather a permanent state. That's why it's important to examine the software's basic functionality, to see how modular it is and whether the functionality can be expanded gradually without releases becoming

CONCLUSION

CONCLUSION

larger projects, and ascertain to what extent it corresponds to the new design principles.

The adaptive Commerce Suite for Telecommunications Companies, which is provided jointly by AOE, Salesforce, and People at Work Systems meets precisely these requirements.

Here, using the principles outlined above, we have created a modular system for online order processing and comprehensive customer management, one that can map even very complex product structures and business processes.

Possible modules in a system structured this way could be:

Due to the modular structure, the functional levels can be organized in layers that take on specific tasks.

A uniform customer addressing is possible if customer contact is supported as part of integrated flows across a wide variety of platforms and interfaces:

ABOUT US

AOE is a leading agile software provider for digital solutions in the enterprise sector. Based on more than 20 years of enterprise open-source expertise, over 250 employees in eight global locations develop digital product, portal, E-commerce, and marketplace solutions. AOE helps global corporate groups digitally transform existing business models and develop new digital solutions and products. For the telco industry, AOE offers a "Adaptive Telco Commerce Suite" (further information also on www.telco-commerce.com).

In addition to its extensive telco expertise, AOE has in-depth knowledge in industries such as healthcare & public, fintech, and aviation. Its long-term customers include Deutsche Telekom, congstar, BMW Group, Frankfurt Airport, Commerz Real, Singapore Airlines, Sony, and T-Systems.

People at Work Systems AG (PaW) is a management and technology consulting company established in 2003, which is headquartered in the greater Munich area. It assists its well-known customers, including Deutsche Telekom, Vodafone, Lufthansa, and DHL, with custom solutions to handle all management and IT challenges. This includes professional support for customer management for all IT-relevant and process-related problems, on through to interim management.

In addition, PaW has long-standing expertise in the go-to-market services sector and assists its customers in planning, expanding or redesigning their own market launches. The company also provides content support for the implementation of complex transformation projects, especially in the areas of IT and application architecture, analytics and business intelligence, Java development, data migration, cloud technologies, CRM, Salesforce, Siebel, and Microsoft Dynamics.

PaW also offers a framework for automated business processes and a flexible rules engine that can be implemented as finished product solutions.

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