Making Money on Digital in Mechanical Engineering

Guidelines for successful monetization of digital goods and services

in Cooperation with

BCG BOSTON CONSULTING GROUP

VDMA Business Advisory

Making Money on Digital in Mechanical Engineering

Guidelines for Successful Monetization of Digital Goods and Services

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Preface

Digitization is opening up new areas of business potential for the mechanical engineering industry. Many companies are developing digital services for their customers or testing new data-based business models in pilot projects, and these promise increased customer benefits, affording opportunities for successful monetization. Digital services and products can improve the customer's cost situation—for example, through greater efficiency with regard to energy and raw materials, they can optimize machine operability or maintenance efforts and increase revenue through increased output, better product quality, or simplified administration.

Companies' expectations for future earnings from digital services are therefore quite high, making it more important to drive digital transformation forward strategically. The definition of customer benefit and a well-thought-out use case are just as important for successful monetization as are the right pricing and go-to-market strategy.

In these guidelines, we have identified promising ideas for different digital offerings in the field of mechanical engineering. In this context, our experts have analyzed more than 20 case studies of successful digitization projects in mechanical engineering as well as in comparable B2B sectors.

Due to the wide range of action areas, digital goods and services first had to be categorized. Using our analyses, we defined the major levers affecting the monetization of digital services. Mechanical engineering companies developing digital services and working on new business models can use the findings discussed in our report for orientation.

These guidelines for making money on digital in mechanical engineering are the result of a joint project of the Mechanical Engineering Industry Association (VDMA) and Boston Consulting Group (BCG).

We wish you an exciting read.

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I. Digitization in Mechanical Engineering: Opportunities for Growth Versus the Status Quo

Digital growth markets in mechanical engineering

The field of mechanical engineering can, with the help of digital innovations, optimize internal processes and expand into new business areas providing digital products and services for production companies in all sectors. Possible offerings include apps for machine monitoring and remote service to engineering software, and data-supported consulting to digital marketplaces and digitally enabled operator models.

While some mechanical engineering companies, such as Siemens, entered the industrial software market in the early 2000s, the Internet of Things (IoT) is a comparatively new market to all equipment producers. BCG forecasts sales growth of 32% for the industrial part of IoT (referred to as IIoT) for the period from 2018 through 2023; and for industry software, growth of 8% overall is expected.

Many mechanical engineering companies have high expectations for the future contributions of digital solutions to business, as a 2018 BCG survey of the sector demonstrated. Twenty-eight percent of those surveyed believe that by 2023, IoT solutions will make up over 5% of their company's revenue—almost double the 2018 rate. Currently, only 15% of the companies surveyed generate more than 5% of their revenue with digital solutions.

Expectations versus the status quo

An examination comparing expectations for the future against the status quo, however, shows a clear discrepancy. Despite expectations of revenue increases in the coming years, companies in the sector currently see a great need for catching up in the area of digitization.

For the most part, machines, facilities, and components are already equipped with information and communications technologies, but the data collected is frequently used only to guide ongoing operations and is not further aggregated, analyzed, or used to develop digital services. Another problem is data usage rights. Many machine operators are not willing to make their data available to others, especially if there is no clear benefit to their own company from doing so.

Digital growth potential well above growth in established core markets

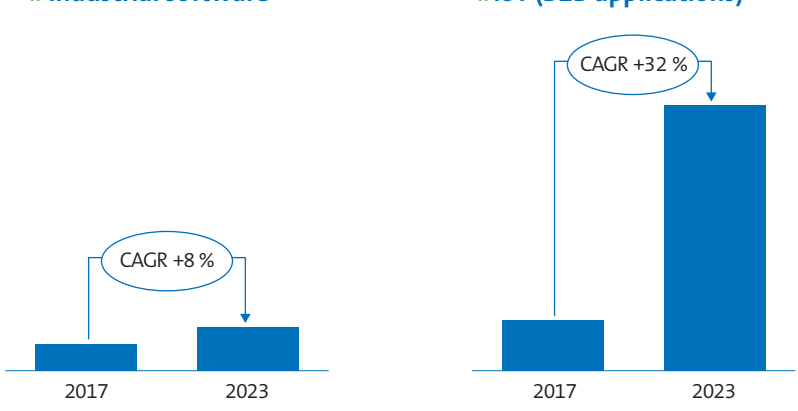
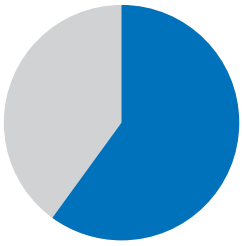


Image 1

Source: BCG market models

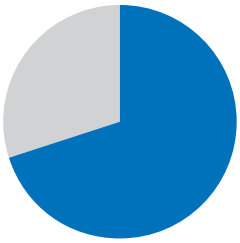
German mechanical engineers with high ambition

#Digital readiness 2017



~ 60%
are newcomers to digital products and services

#Revenue with digital offerings 2023



~ 70%
have revenue target > 3% of total revenue

- **Digital technologies largely mastered, but slow implementation in the goods and services portfolio**
- **Still low utilization of collected data, especially for intelligent data-based services**
- **Widely "task force" organizations within existing structures. Marginal revenue contribution without significant profits so far**

Image 2

Source: VDMA Industry 4.0-readiness online-self - check 2017; BCG IoT survey 2018

Between January 2017 and June 2018, the Mechanical Engineering Industry Association (VDMA) asked roughly 530 mechanical engineering companies about their "Industry 4.0 readiness." The results show that more than half of all mechanical engineering companies (57%) see themselves as newcomers to digitization needing to catch up on strategic and organizational issues in marketing digital services rather than needing technical expertise. Sixty-two percent have no or only minimal experience with "smart products." In reference to smart products, they were asked about the expansion of their own products by adding intelligent components that remain connected with the manufacturer; for example, in order to make remote monitoring possible.

Surveyed companies' products have only limited additional information and communications technology (ICT) functionalities. For "data-driven services," the percentage of companies with no or little experience was also high at 61%. They either offer no data-based services at all or offer only services that are not directly connected with the customer (bear in mind, however, that a considerable percentage of companies surveyed are component manufacturers that can offer only limited data-driven services [source: VDMA Industry 4.0 readiness study, online self-check].

Factors that inhibit digitization

Digitization in an industrial context is complex. Traditionally, the mechanical engineering industry focused heavily on technologies and products. Digitization has played an important role for quite a while in the design of production equipment and machines and has expanded the sector's range of core competencies. Currently, a market is developing that goes far beyond conventional machinery, but there is an increasing shortage of capabilities needed to develop digital solutions. The complexity of many ongoing IT projects is also frequently underestimated. Many companies have the necessary expertise for developing automation solutions, but they tend to misjudge how big the leap is from this to, for example, the permeable integration of enterprise software. Another obstacle is the long product life cycle, 20 to 30 years, in industrial and manufacturing equipment. This means companies face the challenge of incorporating existing manufacturing facilities into new digital solutions. And as with any portfolio diversification, digitization requires a relatively high level of advance investments for which the return on investment (ROI) cannot be predicted.

There is no way around creating of digital service portfolios

Digitization is one of the biggest challenges confronting the machine industry. It offers great opportunities for companies to expand their portfolio of offerings and thus get ahead of companies from outside the sector that are entering the market. But to do so, they have to develop new business models and answer tough questions, including, how can manufacturing facilities be digitally retrofitted for industrial production? Or, how can new digital services be developed that make networking and optimization of production facilities possible?

Digital mechanical engineering products and services hold great potential when they are strategically well planned, and rigorously implemented. Customer benefit, price, and go-to-market are the main levers for successful monetization of the products and services developed in this way.

Many digitization projects in the industry fail—not because of technology shortcomings but because companies often cannot estimate how much work is necessary to successfully market the digital project. A clear and user-oriented definition of goals is essential for the development of digital goods and services. It can, for example, be based on key performance indicators related to output, such as overall equipment efficiency, cycle rates, and throughput and quality times.

In parallel with the development and realization of the new digital offerings, the value to the customer resulting from the software portion of the new offering has to be quantified. Go-to-market/marketing has to be well thought through and prepared. Many machine builders are not sure how to bring the new digital products to the market and how to price them. There is no magic bullet, but there are strategies that make successful monetization possible.

II. Types of Digital Service Offerings

These guidelines are designed to give the mechanical engineering industry practical assistance with monetizing digital offerings. Because digital products and services can be linked to a mechanical engineering company's own primary product, or reference that product, the possibilities are extensive. Pure software developers and digital star-tups do not have this strategic advantage. Companies from comparable B2B sectors, such as automotive suppliers, medical technology, chemistry, and pharmaceuticals, can also provide valuable best practice examples, and the following categorization of digital service offerings is based on the analysis of such successful examples. The offerings differ and follow different monetization rules, but there are two fundamental elements for categorization: portfolio context and benefit to the customer.

For the portfolio context, the classifications include services that do the following:

- Aare entirely integrated into the primary product, such as machine connectivity
- Expand the existing product but can only be used in connection with the primary product, for example digitally supported proactive remote services
- Can be used on their own but have a connection to the existing product, such as engineering software
- Can be used on their own without a connection to the primary product, such as cloud services

Increasing the benefit to the customer can be classified in the following ways:

- Incremental improvement of known KPIs
- Quantum leap in existing dimensions of customer benefit
- A new dimension of benefit

Using these dimensions, four types of digital service offerings were identified in the cases investigated, each involving different degrees of development of the key characteristics of the value proposition benefit and portfolio contexts.

Categorization of digital services in two dimensions

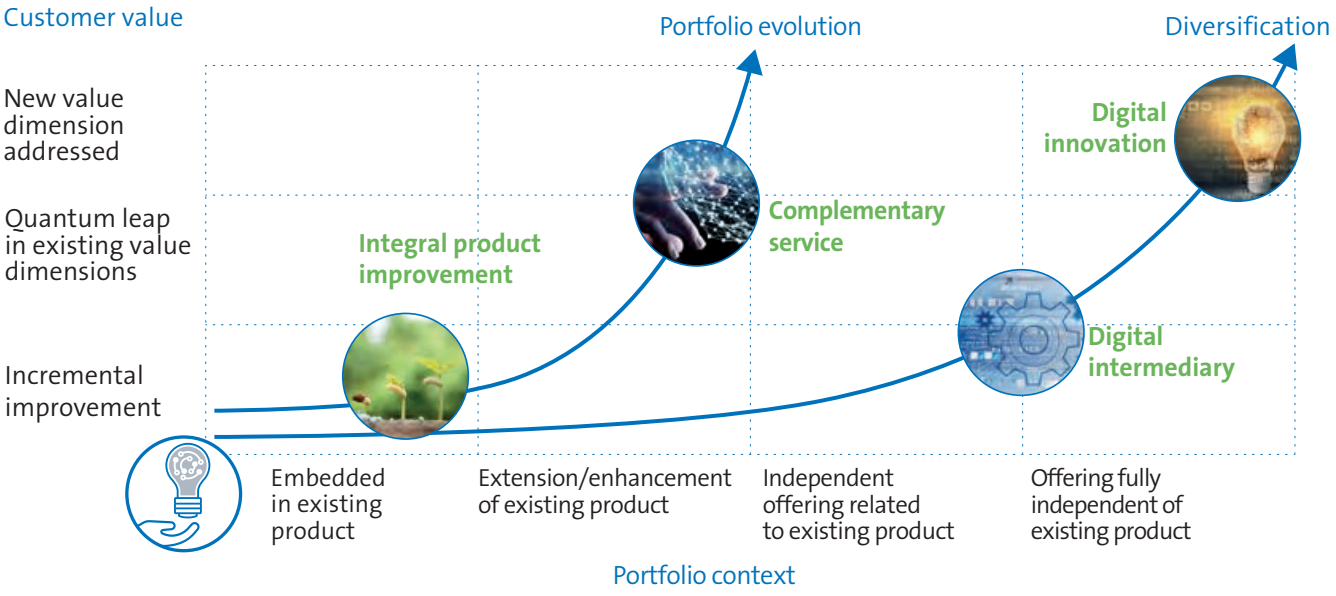


Image 3

Source: VDMA; BCG

Typical digital offering of leading players

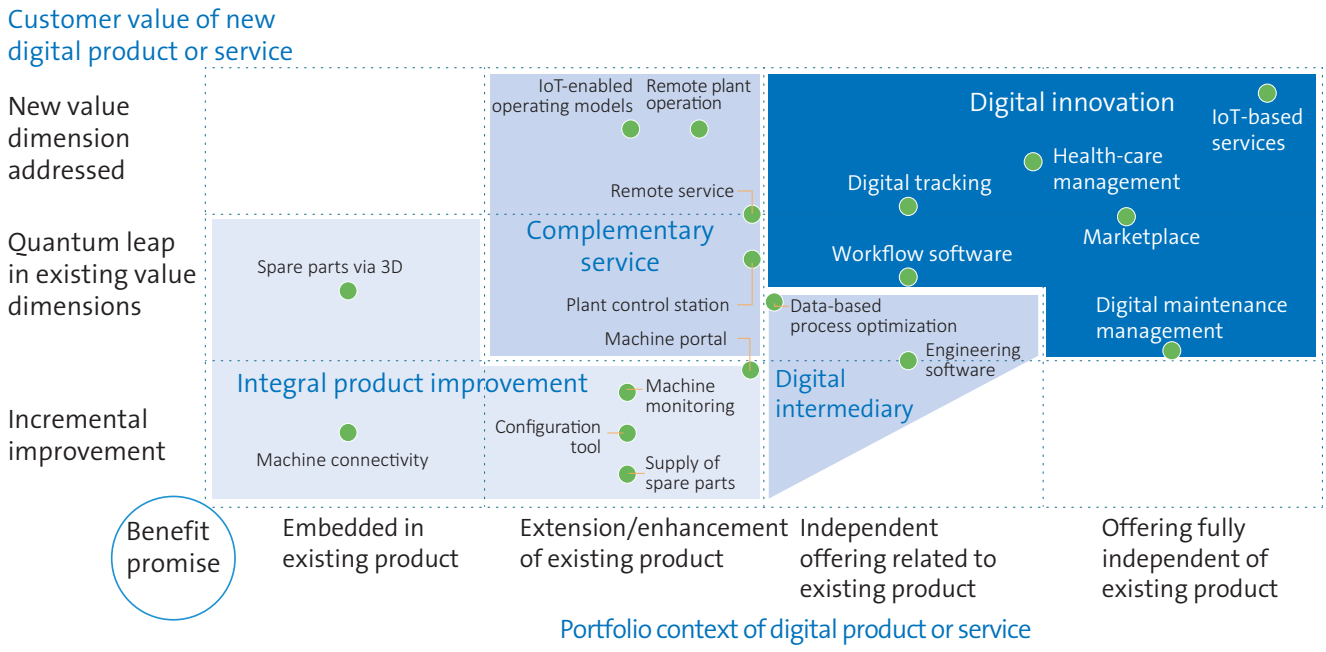


Image 4

Source: Expert interviews; Internet research; BCG experience

The Four Types of Digital Offerings

Service type 1: Integral product improvement
The functionality of the primary product is expanded using digital technologies in order to secure or increase competitiveness.

Service type 2: Complementary service
The company's own service and product program is supplemented or expanded with digital offerings that can also be used on their own. In connection with the existing products, these offerings provide customers with significant additional benefit.

Service type 3: Digital intermediary
Digital service offerings that can be used on their own, with discernable benefit to the customer, that are related to the customer's own primary product but may also be usable with other manufacturers' products; these should stimulate primary business sales.

Service type 4: Digital innovation
The service can be used entirely on its own without a direct relationship to the primary product, and can also be marketed independently; may be software, a software-heavy solution, or a business model.

These digital offerings can range from digital features that supplement, and thereby add value to a company's product, to entirely new digital services and offerings. The divisions between categories are not always completely clear. In addition, some solutions can be developed further; for example, so that there is no longer a connection to the company's primary product, and the digital service becomes usable in connection with competitors' products or in new applications.

Integral product improvement is embedded in the company's existing product portfolio or supplements the existing product. Digital add-on services that are integrated into the core products are becoming part of the sector's minimum standard. These improvements secure existing sales but do not contribute to detectable growth. Nevertheless, they are an important first step toward the digital product portfolio and pave the way for developing and successfully marketing additional services that are more independent of the company's own product. For example, a mechanical engineering company may make a standard practice of connecting all new machines with its own cloud solution. It can then build successive services onto this digital infrastructure and offer complementary services such as remote machine monitoring or online advising about optimal operation of the machines. Such online advising can occur through an app via maintenance videos and can make it possible to obtain replacement parts with more accuracy and more quickly. A mechanical engineering company could also offer its customers a service app with free basic functions like documentation, support, and machine monitoring. Future prospects include installing of additional value-adding functions such as predictive maintenance, energy monitoring, and order management, which could then be

sold as complementary services by subscription. Such an app would offer the option of purchasing new digital add-on functions with new benefits as they are introduced.

A **complementary** service supplements or expands a company's portfolio by adding stand-alone digital services to give customers significant additional benefits in combination with the existing products. This provides numerous condition-monitoring systems in mechanical engineering that check the use of the company's own machinery and are incorporated via the customer's general production facility control center. Such solutions reduce the workload of the customer's technical personnel and are usually distributed using license models. Operator models with advantages for both vendors and customers are another well-known example. For the latter, the transformation of fixed costs into usage-based costs can be appealing and highly beneficial, independent of the core service. Such IoT-supported operator models can typically be applied in cases where installations are located far from each other, such as air compressors, scales, and measuring and testing equipment. Sensors collect data, convey the data in real time to a machine-to-machine platform, and from there to the cloud. Service technicians at any location can receive instructions from the cloud directly on their mobile devices. For the customer, these operator models have multiple benefits, including variable usage-based billing covering investment and maintenance expenditures, instead of fixed machine costs. The mechanical engineering company, in turn, can ensure the customer's long-term loyalty, as well as ongoing revenue.

A **digital intermediary** is a stand-alone digital service offering with clearly measurable benefit to the customer. It is related to the primary product but is not necessarily the company's own primary product. One example is engineering software or data-supported process optimization, where the company leverages its expertise in meeting the challenges of the specific customer's processes because the digital service is tailored precisely to the needs of its own or similar primary products. Xella, which manufactures building materials, is currently expanding its business model from a pure material supplier to a provider of solutions. This strategy involves planning tools for building information modeling (BIM), which help improve use of the space in a building—building on Xella's portfolio and materials specifications.

Some mechanical engineering companies offer process optimization that goes hand-in-hand with production. This is based on data supplied by existing built-in sensors, and from software services like condition monitoring or predictive maintenance. This covers manufacturing steps in which the company's own primary product is used as well as upstream and downstream process steps in which third-party products may be installed. Guaranteed performance indicators that can be derived from the existing OPEX structure are defined with the customer, who then benefits from more favorable costs per unit. A mechanical engineering company was able to integrate its service offerings and consumables, in addition to the software-supported services, into its process consulting offering. In cases when the defined KPIs are exceeded, success-based pricing models can take effect.

Digital innovation is a digital service or business model such as a piece of software that has no direct relationship to the primary product and can be marketed as a stand-alone. This is a diversification of the existing business and allows a company to take advantage of new income sources independently of the primary business.

An example of digital innovation in its pure form is Amazon, which was originally an online retailer but has, with Amazon Web Services, expanded its offerings to include cloud services. And a few years ago, Siemens also moved into industry software, establishing an entirely new market segment for itself.

Digital innovation services in mechanical engineering distinguish themselves by the fact that the software connects equipment from different manufacturers, or by the fact that those services can also be used with competitors' products. One example is maintenance apps that make it possible to efficiently manage a variety of different production facilities. Once basic installation has been performed, maintenance managers can program maintenance cycles for all the different machinery. The maintenance technician can access and work through the app using a mobile device. Data management solutions in medical technology can help design more efficient processes in hospitals or physicians' offices by

Decision tree for classification of new digital offerings

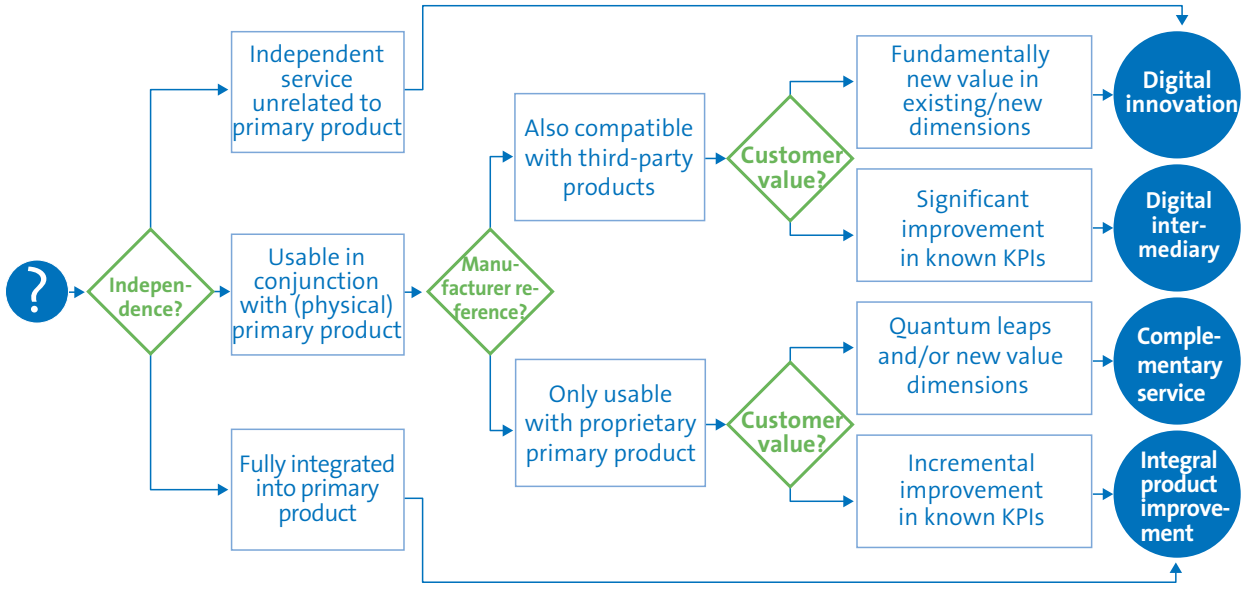


Image 5

Source: VDMA; BCG

processing data from different peripheral medical equipment, creating a central data archive of digital patient records.

Each of these four digital service types requires a specific approach to pricing and a specific type of go-to-market. The decision-making diagram below will help companies begin by classifying new digital offerings into the four categories. The first step is to ascertain whether the product or service can stand alone. Is the digital product or service fully integrated into the company's own product? Is it only usable in connection with the core product, or is it a stand-alone service?

A further distinction must be made here regarding what the relationship to the manufacturer is, in other words, whether the digital service can be used only with the company's own products or with competitors' products as well. The services are further distinguished by dimensions of customer benefit. The benefit can range from incremental improvements to a perceivable increase to significant improvements or fundamental additional benefit.

III. Prerequisites for Successful Monetization

The innovation process for digital services is not a linear one. Development and the marketing plan are closely intertwined and must therefore be worked out in parallel.

Close communication with customers, in order to understand their problems and needs, is important for generating ideas, as well as for iterative product generation. This can create an optimization circuit that ensures the solution is in touch with the needs of the market.

A basic prerequisite for being able to monetize a product is having carefully thought through the benefit being proposed to the customer. How great is the digital solution's potential for improvement compared with the existing analog solution? What does the customer gain from being able to view data on mobile devices rather than just on the machine? Does this represent a quantifiable amount of added monetary value? Is the company creating an entirely new service? The possible dimensions of benefit range from optimizing of operating comfort (so the customer can view data anywhere and at any time on a smartphone, and not just directly on the machine's display) to entirely new processes that are free of media discontinuities. An example of this would be an IoT platform on which companies can book computing capacities. Equipment and machines could be connected in a plug-and-play mode and all data stored, evaluated, and analyzed in the cloud and used there for things such as increasing availability and the overall equipment efficiency.

The bigger a solution's potential to bring improvement, the greater the independence from the primary product in terms of monetizing and individually pricing the digital product or service, but the exact design ultimately depends on the particular type of digital service offering.

What is the best way for companies to proceed? Successful monetization, first of all, requires that there be marketing potential. This can only be identified by closely coordinating with customers and/or target groups, as neither the

Well-thought-out value proposition a key prerequisite for commercial success

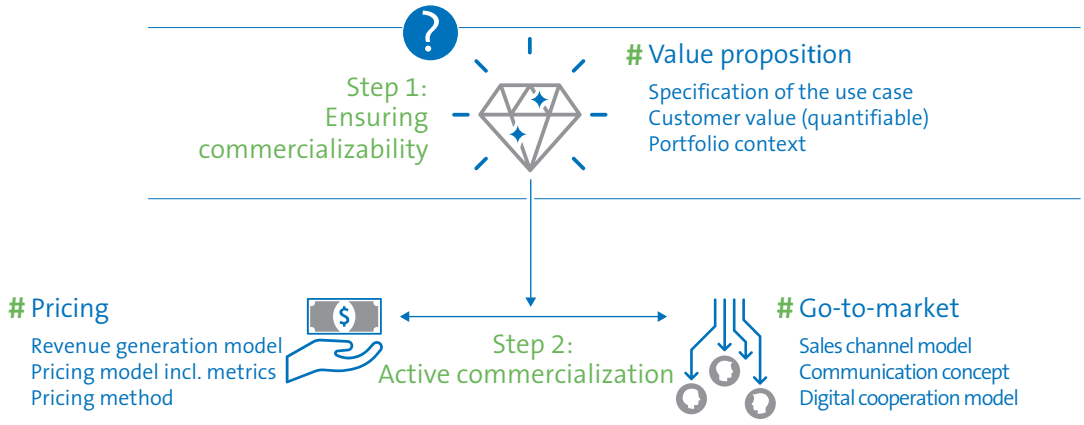


Image 6

Source: VDMA; BCG

competitors nor market data can provide a robust frame of reference for new digital services; the latter is something that works for the primary product and the related market and competitor knowledge. Then, in the second step, pricing and go-to-market occur and the digital portfolio element gets monetized.

Specifying the exact use case is important for digital solutions. Only if the use case is carefully thought out is there a chance for successful monetization.

Patterns and Methods for Monetizing of Digital Services

Checklist for assessing the use-case specification's level of maturity

- Is the product even technically feasible?
- Has the market potential been explored and have the dynamics of competition been understood?
- Is there a need and does the product solve problems of current and potential users?
- Have differentiation characteristics to potential competitors been defined?
- Has the maturity of the market and the existing technology been tested?
- Have the strategic goals and relevance for the company been defined?
- Has investment planning been sketched out and profitability estimated?

A. Pricing

Pricing defines the flow of revenues and profits and is an important marketing instrument. Because digital services are so different in nature from analog services, pricing them is more of a challenge for companies.

The three most common pricing methods are the "cost plus" method, competitor-based pricing, and value-based pricing. The main disadvantage of self-performed cost-plus calculation of costs is the risk that, because of the company's own cost structure, prices will not meet the market price level and will thus not fully take advantage of market potential. For digital services with high positive scaling effects in particular, this method is not suitable. Setting prices on the basis of competitors requires that there be comparable products on the market, and this is not always the case for new developments in the digital arena.

In these cases, a value-based pricing structure is the most suitable. The benefit to and value created for the customer are given the most weight. One benefit for the customer may also be savings in the form of cost reductions or increased return on sales. With software, for example, the license fee is often calculated on the basis of potential savings for the customer.

How much time, how much material, and how much labor does the company save by means of the digital service? And how can these saved resources be used in a profitable way? Will the customer's revenue increase due to an increase in output, an increase in quality, or a reduction in delivery times? How will this affect the customer's rate of return? This method requires the ability to determine the monetary benefit to the

customer and that the customer be able to recognize the value contributed. Perceived value pricing is based on model calculations, since exact individual calculation is not actually possible.

In the price or payment model, a distinction is made between indirect monetization, which occurs via the primary product, and direct monetization, which can be free usage and one-time payment or various forms of recurring payments that can be usage-dependent, linked to licenses, or defined by fixed installments.

B. Go-to-market

Go-to-market levers are crucial for a quickly ramping up the business, rapidly penetrating the target customer base, and gaining market shares, all of which are vital aspects of success with digital products. Distribution, communications, and marketing, as well as the creation of partnerships and networks are all important go-to-market levers.

Possible distribution channels range from entirely digital web shops or marketplaces to services that, due to their complexity, can only be sold via a company's own distribution units or distribution partners. Communications and marketing to the customer are linked to the type of distribution channel. These marketing and communications techniques, which are often used in combination, include the following:

- Directly addressing existing customers
- Forming new focus groups whose members would benefit the most from the solution that has been developed and are therefore especially open to it
- Addressing end customers
- Digital ecosystems with intelligent applications and services for customers and partners

This last alternative is especially important in the digital arena. The company can set up a digital platform as a closed system, which gives greater control and makes it possible to exclude competitors. However, if the offerings are limited, it's more difficult to design the platform in a way that appeals to customers. One alternative is cooperative systems that afford the company's digital service a greater dissemination base and represent an indirect distribution option, since such networks cover a wider spectrum of services. The high level of diversification of offerings that results from working with partners also increases attractiveness for customers. Finally, there are many approaches to building and utilizing networks. It is important that they be able to support the monetization strategy being used for the digital service in the most appropriate way.

IV. Success Models for Monetization

Digital products and services differ significantly from analog products with respect to how they are manufactured, provided, and how they are used. The most important strategic steps for mechanical engineering companies to successfully monetize digital products and services are described below. Practical case studies being analyzed and described in detail are matched to the four previously defined offering types in the field of mechanical engineering.

Success Pattern for Digital Goods and Services, Type 1: Integral Product Improvement

Integral product improvement is embedded in the company's existing product portfolio or supplements the existing product, and the price is fully integrated with the primary product's price. The offered service will give the customer at least an incremental improvement, and at best, a clear added benefit. However, it doesn't exceed a customer-benefit threshold that would make stand-alone monetization possible. The goal is to secure the primary product's current price level and create a basis for selling additional complementary services.

Success pattern for monetizingn of integral product improvement

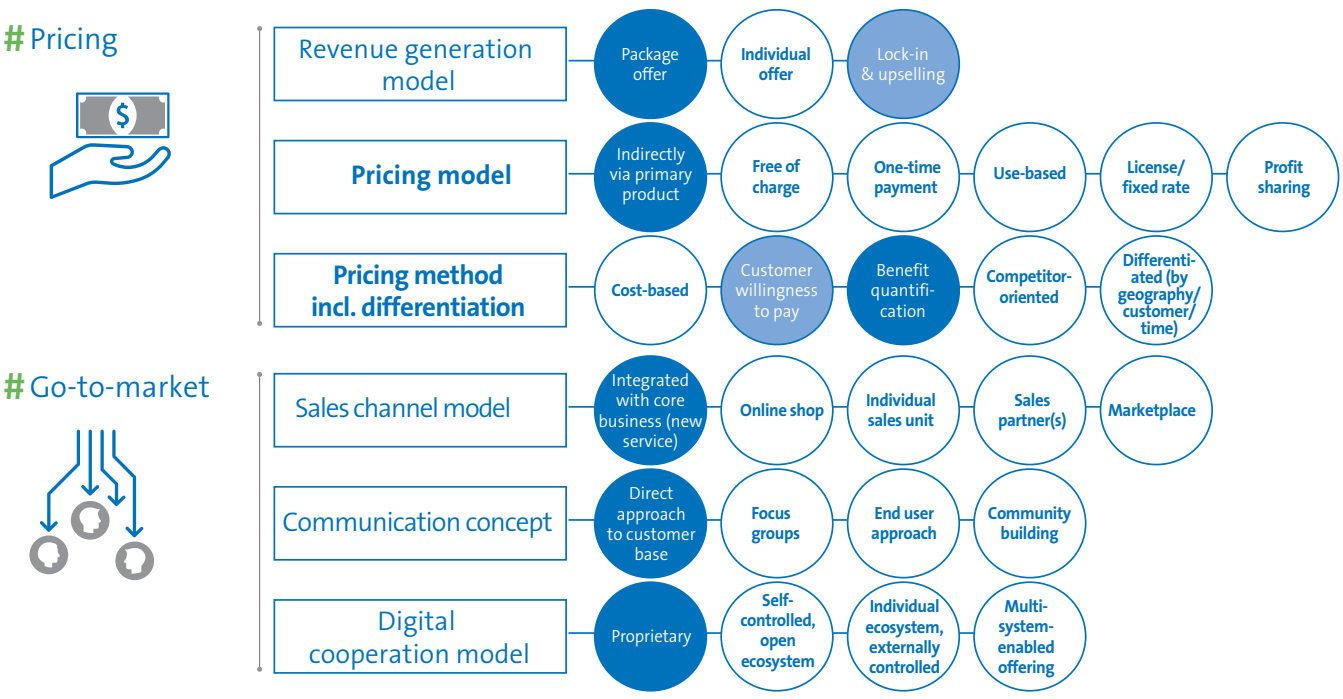


Image 7

Source: VDMA; BCG

A. Pricing

The goal of **integral product improvements** is generally to expand the primary product's existing competitive position or compensate for a potential decrease in price. Because a digital service is inextricably connected with the primary product and cannot be sold separately, it is indirectly priced via the primary product. However, it is still important to quantify the benefit to the customer.

Ideally, integral product improvement is an element of a digital portfolio of services that build on one another and can lock in the customer—the more it costs to switch, the stronger the customer loyalty.

The basic question remains as to whether integral product improvement comes with a dedicated price increase (on the base price of the primary product) or is provided for free along with the product.

The added value of the improvement to the customer should, if possible, be included when calculating the primary product's price, and appear as its own line item in the offer. However, it is important to avoid simply listing a virtual price and then not collecting it, effectively making the service available at no charge. Experience shows that this does not create the desired effect of customers feeling they are getting a discount; instead, they simply become accustomed to receiving it at no cost. It then becomes difficult to price subsequent digital services in accordance with the value they add. For example, the publishing industry has for many years made content available free of charge on the Internet, decreasing the circulation of print products that must be purchased and thereby significantly decreasing the sector's earnings. Only recently have there been a few cases in which prices have been implemented for portions of web content that were previously available for free.

Clearly communicating the scope of the benefit to the customer is also decisive for successful and sustainable pricing. With an increasing percentage of digital service components, the primary product's price and discount model can then gradually be transformed into coequal pricing of software and hardware elements.

B. Go-to-market

Typically, the existing distribution channels for the primary product are used. The integral digital product or service may require an additional digital distribution channel, for example, in the form of online access to after-sales services, but it should be integrated into the core distribution process or as part of the service distribution process.

Existing target customer groups should be addressed proactively. In the case of an expansion of the digital service palette, open flexible interfaces are created for connecting to external partners' networks, for example by placing the service on sector platforms or platforms of providers with complementary services.

C. Case example

From wood-processing company to upselling strategist

Michael Weinig AG is the world's largest manufacturer of solid wood processing machines and systems and has installations in operation around the world.

Since 2015, the company has been offering its customers the Weinig App Suite with many functions related to wood processing, such as tools for angle calculations or planning depth calculators. At the heart of the app is a machine monitor. Weinig customers around the world can access the current status of their machines as

well as in-process and completed orders using a smartphone. Production monitoring allows the user to receive evaluations of machine availability as well as maintenance intervals directly on a mobile device. Users can also be linked with regional service partners. Weinig currently operates these digital solutions via a closed cloud, but plans to use Siemens' MindSphere in the future in order to better serve international customers.

The Weinig App Suite is a classic example of integral product improvement, but one that also offers complementary services that build on one another. The app functions are linked with Weinig machines, and only a few add-on features can be used independently of the primary product. Registration for the app is free, as is use of the basic functions such as displaying Weinig machinery and local service partners. Other added-value functions are sold via in-app purchase, either as individual services or by subscription. These include machine monitoring with production order management and condition monitoring of spindles. Weinig is working on additional modularized individual services that will increase overall facility availability.

The company is following an upselling strategy by means of which the customer initially develops loyalty to the core portfolio through free services. The goal is first to support the primary product's price point, and second, to create a basis for other complementary services.

The price for added-value services is based on customer willingness to pay and on competitor offerings. The Weinig App Suite is advertised to existing customers and distributed via the Google Play store and the Apple App Store.

Summary

Pricing

- Full integration of the digital product's price with primary product's price
- Clear communication of added value for customer
- Focus on safeguarding the primary product's competitiveness and/or compensation for a potential price decrease

Go-to-market

- Go-to-market occurs along with the primary business
- Promotion of additional service offerings that build on the integral digital product
- Proprietary digital solution with open interfaces

Success Pattern for Digital Goods and Services, Type 2: Complementary Service

A **complementary service** supplements or expands a company's offerings by adding stand-alone digital services. In connection with the existing products, these offerings provide customers with significant additional benefit. The pricing of the complementary service can be set up as a one-time or recurring payment, depending on whether the degree of usage by the customer can be measured. The target customer's CAPEX/OPEX preference should also be considered.

The complementary service differs fundamentally from the primary product because it is much more software-heavy. Because of lack of capabilities in the existing distribution system, for the ramp-up phase, the complementary service requires at least a self-contained distribution unit. Alternatively, a business unit can be created that is made up of sales staff, product management, service employees, and/or strategic marketing staff experienced in digital. In addition, creating an open technology partner network to develop coordinated services for the same target group together with the other providers is of key importance. These could be partners across the production process whose partial contributions, when combined, ensure better overall equipment effectiveness (OEE) for the target customer.

Success pattern for monetization of complementary services

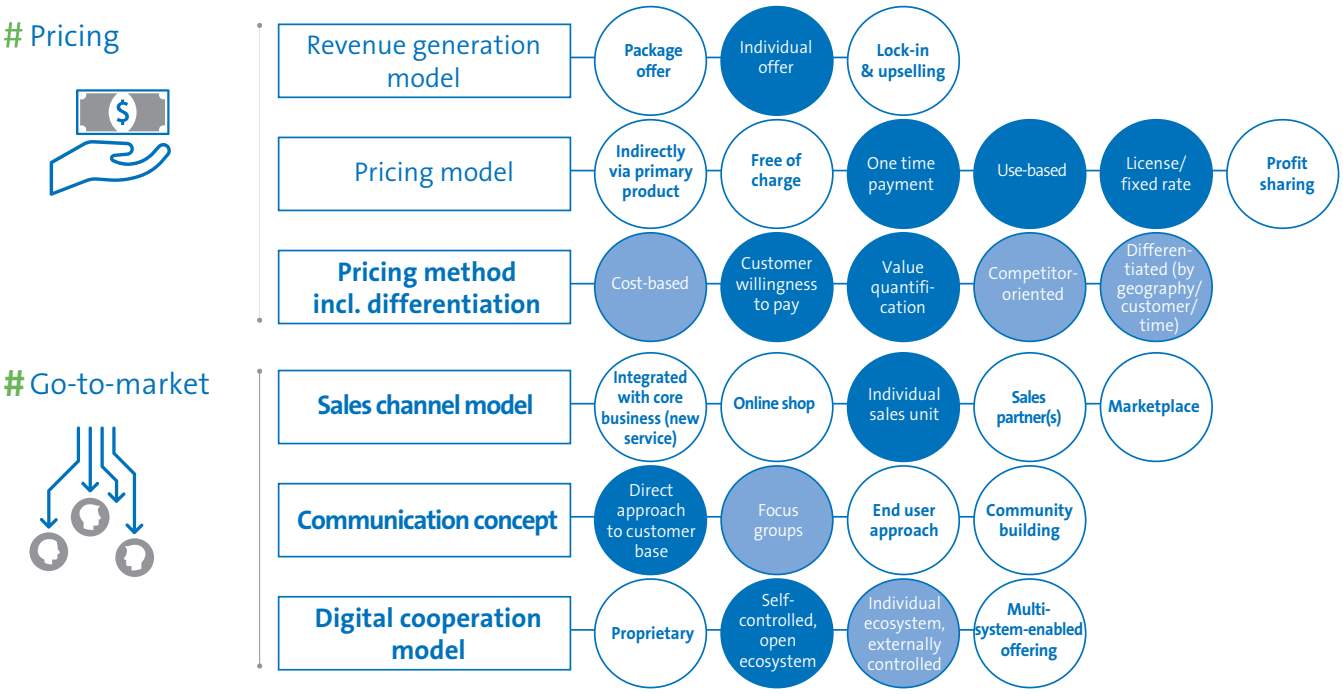


Image 8

Source: VDMA; BCG

A. Pricing

As a stand-alone service with significant measurable added operational or financial benefit for the customer, the **complementary service** should be priced separately. It can be distributed on its own or in association with the primary package. Because it is a stand-alone service, the complementary service can also be seen as an alternative business- and revenue-generating model to the primary product.

Pricing depends on the type of service being offered. Recurring usage-based payments require the usage to be measurable, as with operator models, and are usually based on the customer's variable cost drivers. Remote solutions are often sold as license models, and one-time payments that can be coupled with recurring maintenance or service fees are appropriate for on-premises solutions.

In order to keep the barrier to entry as low as possible, a "freemium" model or cost-free test phase is definitely recommended. Complementary services must exceed the critical number of users, meaning the first goal is not to cover costs, but rather to acquire market share.

The suitable target price can be determined on the basis of quantified customer benefit, target costs, and willingness to pay, as well as—if available—competitors' prices. It's frequently possible to differentiate pricing by customer using centrally guided price architecture specifications. It is important to leave wiggle room for price adjustment during the ramp-up phase.

B. Go-to-market

In order to do justice to digital products' complexity, we recommend the current distribution unit be supported by a new unit. The two units jointly take care of customers during the market introduction phase, ideally addressing existing customers directly. A "double accounting" incentive system promotes collaboration and prevents internal competition. The entire sales organization should be qualified for the sale of digital goods and services in the medium term, so that the units can then be consolidated if desired.

Many complementary services may also work independently of the primary product but would be difficult or impossible to market for this purpose. Adding complementary services can create a network of partners that is very attractive to customers and providers, and from which ultimately all participants will profit.

The risk of being too ambitious with digital projects is reduced if companies focus on their respective core areas of competency when creating complementary services and at the same time actively build up a sector- or segment-specific network of partners with additional complementary offerings. Such communities thrive because of their openness. But it is better if one partner does not dominate the networks, as doing so often causes the networks to become less dynamic. Forming groups in open networks can create an attractive environment for customers, and at the same time offer suppliers a chance to participate in shaping the development of digital offerings in the sector.

C. Case example
From machine maker to digital networking company

Kampf Schneid- und Wickeltechnik (Kampf Slitting and Winding Technology) is among the world's leading providers of large machines for manufacturing and processing all types of films and laminates. Its machines can be found in over 3,500 factories around the world. Together with its partners, the company has developed a platform called the@vanced, an integrative software platform that offers efficiency-increasing digital add-on functions for the operation of machines and facilities, such as monitoring production processes on mobile end devices. The platform integrates add-on equipment and ensures connectivity and interoperability with digital company infrastructures.

Initially, the@vanced was developed as an on-premise platform—the solution ran on a server at the customer's location. It can be used to automatically monitor and analyze the data flow from all networked machines. In order to connect machines at other locations as well, a cloud solution was developed that machine operators can use to get information at any time about the machine's status. Because of the real-time monitoring, productivity can increase as maintenance costs decrease. The the@vanced software and service package can be tested for free, but there is a charge to continue using the package. Users can acquire licenses to do so, and prices differ by service package and machine type.

The@vanced began as part of Converting 4.0, an interdisciplinary network that develops new digital ideas for optimizing production for film and laminate manufacturing. The goal of the collaboration was to offer solutions that could cover a factory operator's entire production process and increase the availability of the installed machinery. This is an example of the type of cross-sector development possible only within a large network of partners.

Kampf plays a big role in driving Converting 4.0 forward, but it does not control it. Over 50 partners from different disciplines have now come together to jointly develop practicable digital applications for the film and laminate industry. Kampf is also a founding member of the MindSphere World forum, which creates solutions from cloud-based IoT operating systems.

Summary

Pricing

- Stand-alone pricing of the digital service
- One-time or recurring payment for the service, depending on the operating model and the target customers' CAPEX/OPEX preference
- "Freemium" model or free test phase
- Multidimensional determination of target price according to willingness to pay, quantification of benefit, and, if applicable, market price level

Go-to-market

- Addressing existing customer base directly
- Self-contained distribution unit needed for the ramp-up phase, closely networked with existing distribution organization
- Active creation of an open technology partner network with additional complementary services

Success Pattern for Digital Goods and Services, Type 3: Digital Intermediary

A **digital intermediary** is a stand-alone digital service offering with clearly measurable benefit to the customer. The service must be related to the primary service, however, it can also be integrated into competitors' products and other complementary end peripherals, and stimulates primary business sales. The focus is clearly on a lock-in and upsell effect for the core product portfolio. In the standard version, the digital service can be offered free of charge, and a success-based fee may be helpful. However, such a fee must be far below the amount the customer is willing to pay for the service. If the price is too high, the service will no longer be perceived as intermediary. There will a self-contained distribution system, closely connected with the regular distribution system, but set up as a stand-alone unit.

As of yet, there are only a few examples in which this type of digital service is in use. One is when digital data-based process optimization occurs along with production and covers the provider's primary products as well as competitors' products. This type of service holds great potential for the field of mechanical engineering.

Success pattern for monetization of digital intermediary

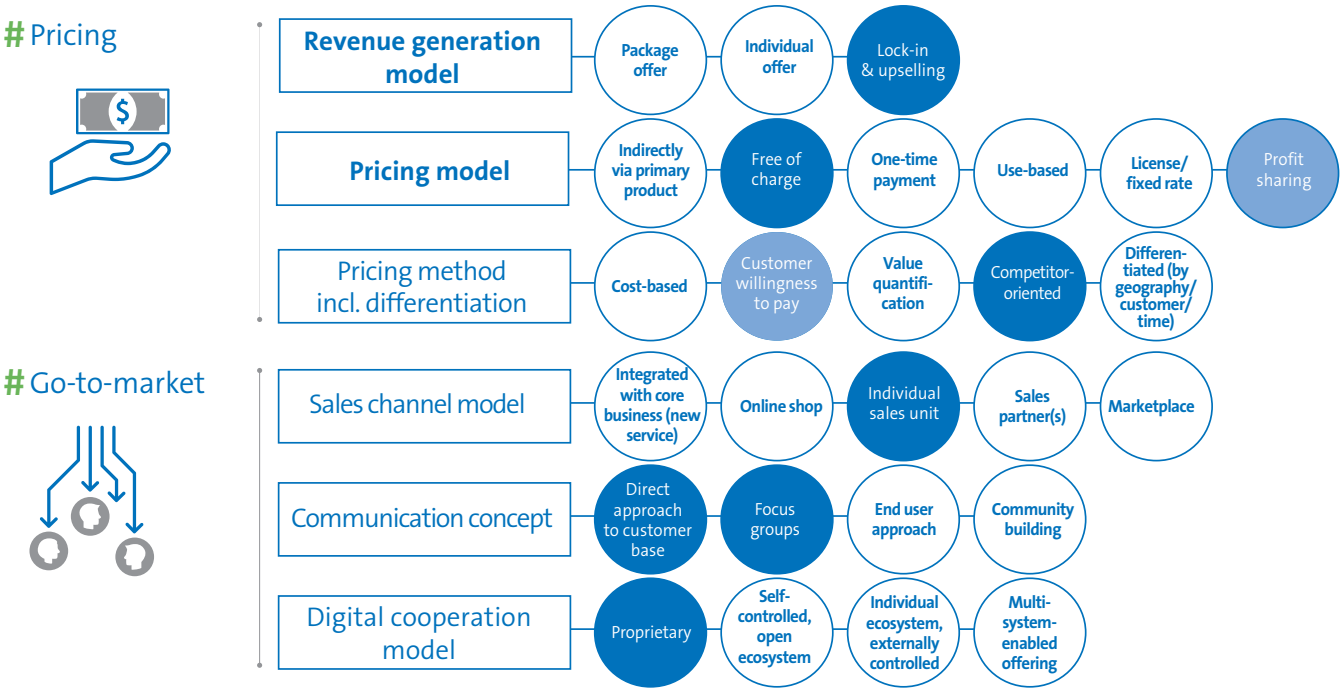


Image 9

Source: VDMA; BCG

A. Pricing

The **digital intermediary** type of service aims to realize additional sales and/or improved price points with and around the primary product. The idea is to first achieve lock-in effects and then build on that to sell more products and traditional services at a higher price point.

As with many digital services, it is important to keep the barriers to entry as low as possible. Therefore, stand-alone pricing should occur only if it can be designed in a performance-based way.

In order to achieve broad dissemination as quickly as possible, the basic service can be offered for free or for a nominal price. Benefit-based price components can then be developed for individual elements of the service, such as referral fees for third-party providers or profit sharing in the event of improved performance.

The price point is thus significantly below the amount customers are actually willing to pay, which helps achieve the desired lock-in effects. This can be compensated for by means of a better price or increased sales for the primary product. If the price is based on competitors' comparable products, it must be set below the price of those products.

Other digital intermediary business models are built to realize an improved price structure based on the primary product that is being used or for the customer's overall production process. Mechanical engineering companies guarantee improved output for the target group, which can be expressed in a decreased unit cost, in effect, "pay per part."

B. Go-to-market

A self-contained distribution unit with service-specific expertise is necessary for the digital distribution channel. In practice, companies even recruit personnel from the customer target group for this in order to determine quickly the benefit for potential customers. This distribution unit collaborates with the traditional distribution system. The **digital intermediary** leverages sales of the primary product and also can be used to actively generate leads for the primary business. The existing customer base is addressed directly, and new customers can be identified and acquired via solution-oriented content marketing created through the use of focus groups. There continues to be a close connection between digital intermediary and primary product, since the digital service references the primary product. Internal communication is especially important in this model because, while the service is new, it is closely related to the primary product and is ultimately intended to support sales of that product.

The digital solution is adapted to the company's own product and should therefore be designed in a proprietary fashion but with open interfaces. The involvement of partners should be extremely selective and should be guided and controlled by the company itself.

C. Case example

From building materials manufacturer to digital systems provider

The Xella Group produces and distributes building and insulation materials. It is one of the world's largest manufacturers of aerated concrete and calcium silicate. The company is currently using various digital offerings to expand its original business model from materials supplier to systems provider.

One example from the B2B area is the blue.sprint building information modeling (BIM) solution for a fully digitized planning process. The unique selling point of blue.sprint is the combination of avoidance of errors, higher efficiency in the construction process, shorter construction time, and lower construction costs. The benefit to the customer is thus directly quantifiable.

This service can use various types of planning data to identify opportunities for optimization, such as how thick walls need to be or how many support columns are needed, which can ultimately reduce the amount of materials used and/or increase square footage. Xella experts' planning support can also help optimize process planning on the construction site, especially for large projects.

With blue.sprint, Xella has developed a stand-alone digital offering that helps customers achieve the construction planning system of the future. Because the BIM software is based on Xella materials and their specifications, the company runs only a very low risk of cannibalizing its own product portfolio. On the contrary, positive effects can be seen on the company's core product sales and cross-selling potential. Customers can use the service free of charge, and when Xella products are purchased using blue.sprint, the purchase price is simply offset by discounts on construction materials. Because of the positive effects of 3D planning, this is an extremely attractive offer for customers. Xella offers blue.sprint via a designated digital unit in collaboration with its core distribution system.

Summary

Pricing

- Lock-in and upselling model intended to generate new revenue with the primary products
- Provision of digital service either free of charge or with downstream usage-based elements
- Minimization of potential barriers to entry

Go-to-market

- Stand-alone, distinct type of service requires its own distribution unit as well as collaboration with established distribution channels
- Go-to-market initially via existing customer base, subsequently via focus groups and user communities

Success Pattern for Digital Goods and Services, Type 4: Digital Innovation

This involves a digital service or business model, such as software, that has no direct relationship to the primary service and can be marketed as a stand-alone. **Digital innovation** is a means for the mechanical engineering industry to diversify. The billing model should be entirely based on usage or performance, and rapid dissemination in the market is decisive for success, so barriers to entry must be as low as possible. A self-contained distribution system is essential, and placement in an open partner ecosystem supports rapid market penetration. In this case, the company should focus its digital offerings on the areas of the partner ecosystem in which it can achieve a leading position.

A. Pricing

Because it is a stand-alone offering, **a digital innovation** is based on a revenue and price model that is independent of the core product.

A prerequisite for the success of a fully digital service is a high degree of market penetration. In the digital world, maximum dissemination and

Success pattern for monetization of digital innovation

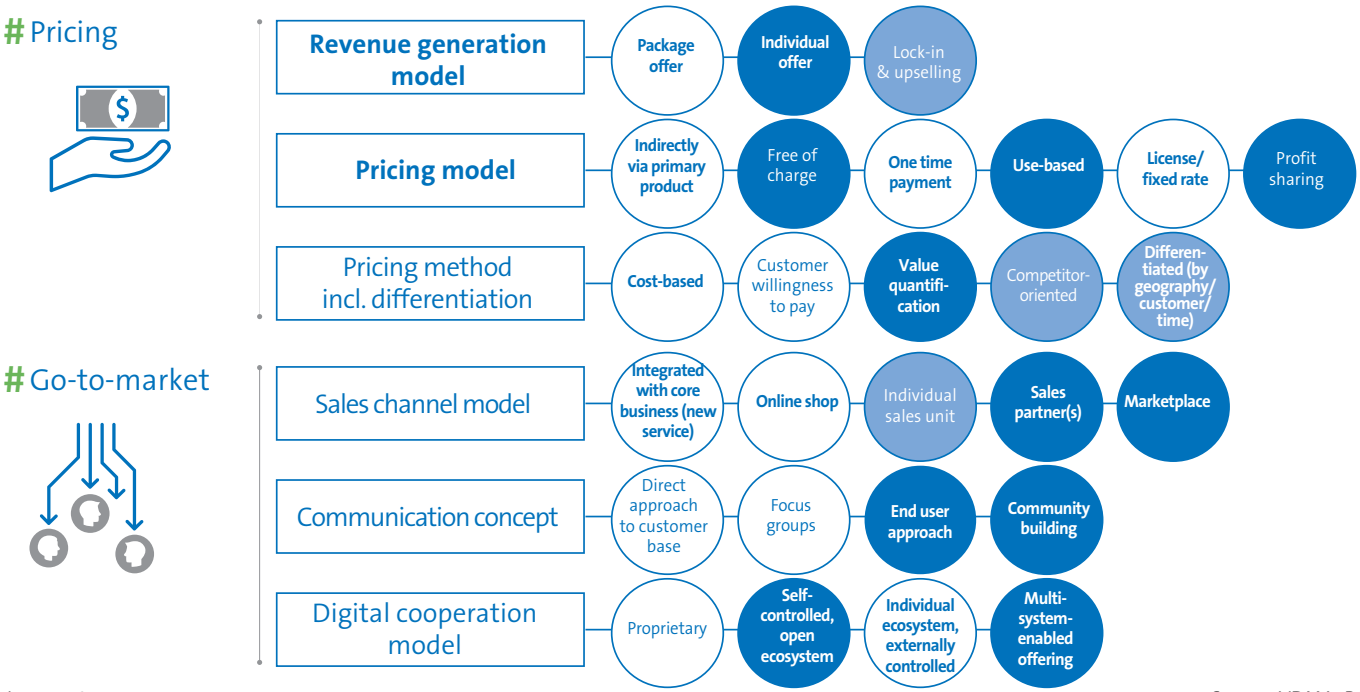


Image 10

Source: VDMA; BCG

market penetration speed, rather than a quick breakeven, are central factors for success in the ramp-up phase.

New customers therefore receive either free entry-level offers, for a limited time or amount of use, or the service is marketed as a "freemium" model. The extent of the free entry-level offer should depend on how the market shares develop in the initial phase. The price model should be usage-based at a granular level, with discounts, tiered pricing, or prepaid offers. Digital billing systems make this relatively easy to do. Ongoing optimization of the service offering makes it possible to continuously adjust prices.

Price should be based on customer benefit quantification and the price of potential competitor offerings, as the cost structure of fully digital goods is generally characterized by high fixed development costs and low to nonexistent variable costs for reproduction and distribution, as well as high scaling. In a fully digital environment, maximum price differentiation among different customer groups is also possible.

B. Go-to-market

Digital innovations such as industry software or cloud applications naturally require their own distribution units. Especially suitable channels include distribution partnerships and online marketplaces. Only key accounts are handled by the direct distribution system.

Communities, which may include customers, suppliers, and potential users, are important supportive entities. Companies should actively help initiate such communities in order to reach as many potential customers as possible, and should make use of the entire repertoire of online marketing, including placement of links and presence in all expert forums and relevant media.

In order to achieve the highest degree of market penetration possible, the system must be open to the widest possible range of digital partner networks. For mechanical engineering, there should be a rigorous focus in these networks on a company's own strengths, such as specific technology and sector expertise.

C. Case example
From online trader to cloud provider

Amazon Web Services—AWS for short—entered the market in 2006 as a subsidiary of the Amazon online retailing company and is now one of the world's leading cloud computing services. Its customers include large Internet pure players such as Netflix and Dropbox. AWS offers more than 120 different cloud services that can be used for a very wide range of digital solutions and applications.

Amazon, as a globally active online retailer, depended and still depends on a stable digital infrastructure. In order to be able to act on the market as independently as possible, Amazon created its own server infrastructure early on. A new business model was then developed from that. AWS is an example of pure digital innovation. With it, Amazon developed a form of offering that previously did not exist. Creating and maintaining infrastructures is very time- and labor-intensive for companies with digital offerings; but at the same time, the company's own structures are not generally well utilized. With the idea of offering computing capacities, AWS met the needs of the rapidly growing online market very precisely.

AWS's pricing is prototypical for an online offering. In order to keep the barriers to entry as low as possible, AWS offers the essential services that are needed to create a stand-alone cloud application free of charge for 12 months.

Some of the services remain free even beyond that test phase, but there is a charge for core services after that. Billing is based on usage or traffic, and there are no framework agreements or volume requirements—increasing the customer's sense of flexibility. There are also special offers for individual situations, based on a company's needs. For example, computing capacity may be available under favorable conditions within fixed periods of time. There is also the option of purchasing available computing capacities on an ad hoc basis. Such capacities can only be used within the specified window of time, but the price is far below usage-based costs. AWS thereby ensures a high rate of system utilization and acquires new customers by means of the favorable price. As with most purely digital products, distribution occurs online to a great extent. However, individualized attention is also available for customers of all sizes.

Summary

Pricing

- Stand-alone offering with billing model based on usage/performance
- Minimization of barriers to entry for the customer using "freemium" or free entry-level offerings
- Determination of price points based on customer benefit and prices of competitors' offerings, by customer segment

Go-to-market

- Stand-alone distribution with autonomous mix of channels and communication plan
- Active formation of community from customers, suppliers, and end users, as well as rigorous end-customer marketing
- Sustainable success only possible within open partner network(s)

V. Recommendations for Action

What must mechanical engineering companies do to successfully monetize digital products and services?

Here are six strategic steps:

1. **Target definition of digitalization strategy**
   Is the business model a fundamental digital innovation, or should the existing hardware portfolio be supplemented, even if only in the first step, by a digital service? Both strategies can make sense, but they imply different approaches.

2. **Thoroughly think through the customer benefit and monetization model**
   The most essential aspect for successfully marketing a service is its benefit to the customer. Digital products and services in mechanical engineering can result in many different dimensions of benefit. The exact description of the added value for the customer lies at the heart of the digital business model.

3. **Define logic and launch sequence of the digital service portfolio**
   Almost no digital service stands alone. Generally they are components of an overall portfolio, often one that has yet to be developed. The definition of the launch sequences triggers development and monetization activities.

4. **Create technical solution and monetization simultaneously and iteratively**
   The right monetization strategy depends on how the technical solution is designed. They must be developed and implemented in close connection to each other.

5. **Optimize monetization concept gradually after go-to-market**
   The digital service itself, as well as pricing and the way customers are a must be continuously adapted to new conditions—customer needs, competitors, technical developments—and optimized.

6. **Ensure necessary skills, culture, and willingness to change**
   Companies wishing to be successful with digital services must ensure that the necessary expertise is present internally. Digital business models are highly dynamic, meaning great willingness to change is also a prerequisite. Ultimately, this is a question of the company culture.

Several factors are necessary for the success of digital offerings in mechanical engineering, and the logic with which digital offerings build on the company's core portfolio is fundamental. The chosen marketing strategy depends on this build. The more software-heavy a service is, the more the mechanical engineering company must act like a software company and market the digital offerings separately from its established machinery business. This requires companies to be willing to change and, very importantly, to bear the start-up costs, which may be very high.

Companies that proceed strategically and display good endurance have a chance for sustainable, profitable, digital business growth.

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