

Part 4 | Evolution of digital transformation in industries

Chapter 1 | From machines to eco-systems

From machines to eco-systems

Today, digital transformation and Industry 4.0 are changing the rules, how machine manufacturers create value. Their business models do not only comprise the pure production and sale of machines and tools anymore. Instead, the business models based on digital services, software and machine integration are creating more and more value for the machine manufacturers as the competition in the market for machines becomes more and more fierce (see Figure 1). Nevertheless, this also leads to new and powerful competition for machine manufacturers, since big tech companies are also ready to enter the competition and have supreme capabilities in IT compared to the classical machine manufacturers.

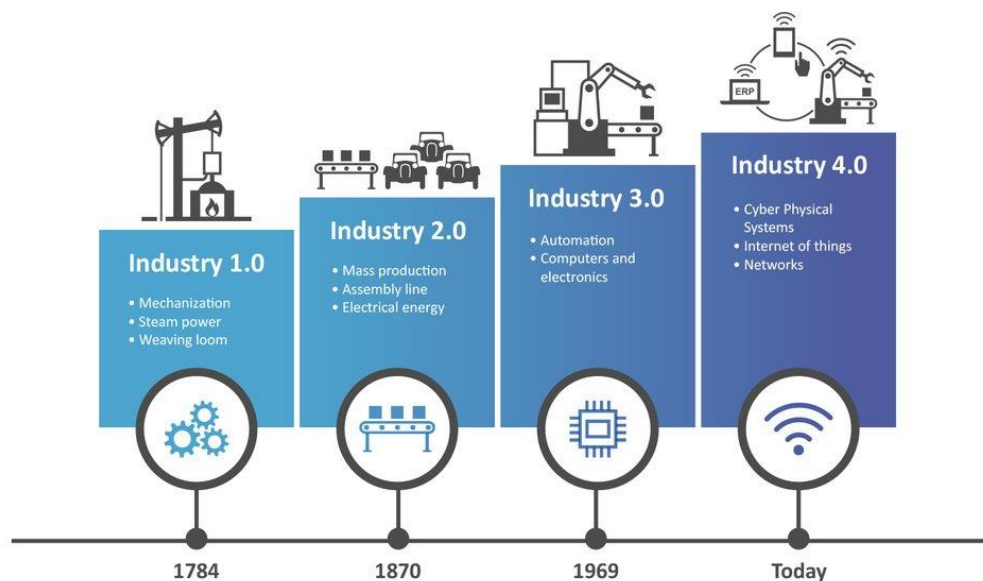


Figure 1: Evolution of the manufacturing industries from Industry 1.0 to 4.0. Source: <https://www.btelligent.com/en/portfolio/industry-40/>

A way out of this peculiar new competition against big tech is the creation and participation in industry-wide eco-systems. Here, the household names of the industry can cooperate and add their specific industry insights and networks together. This way, the eco-system partners profit from each other within the common eco-system environment and have better chances to keep the tech giants and other industry external competition at bay.

The 3 ocean models

The evolution of the industry can also be seen in the evolution of the applied business strategies. These strategies developed from classical red ocean strategy, over the blue ocean strategy towards the black ocean strategy (see Figure 2). Oceans describe here market

environments with distinct features. Red oceans describe already existing markets with a strong existing competition. Blue oceans describe still undisputed markets with low levels of competition. And finally, black markets describe eco-system driven markets, where competition becomes impossible.

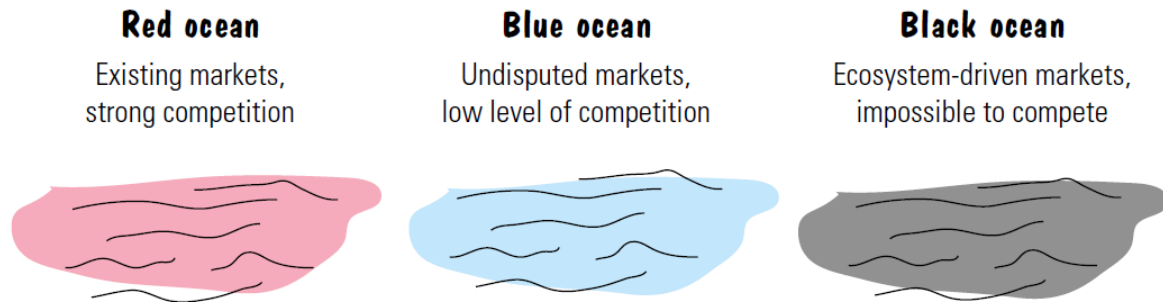


Figure 2: The three ocean models: From red to black ocean. Source: Michael Lewrick, <https://www.nextrends.org/blog/2018/9/28/design-thinking-and-new-business-ecosystems-with-michael-lewrick>

From red oceans to blue oceans

The terms red and blue ocean strategy were originally coined and described by W. Chan Kim and Renée Mauborgne in their 2005 book "Blue Ocean Strategy". There, they describe the already existing markets as dominated by a fierce competition and look for strategies to avoid the competition. This is also reflected in the definition of the oceans. In a red ocean the competition is described as shark infested waters which in turn causes so much bloodshed that the ocean turns red. The blue ocean in contrast is completely untouched and the waters are completely clear (see Figure 3).

Red Ocean Strategy	Blue Ocean Strategy
Compete in existing market space.	Create uncontested market space.
Beat the competition.	Make the competition irrelevant.
Exploit existing demand.	Create and capture new demand.
Make the value-cost trade-off.	Break the value-cost trade-off.
Align the whole system of a firm's activities with its strategic choice of differentiation or low cost.	Align the whole system of a firm's activities in pursuit of differentiation and low cost.

Figure 3: Characteristics of a red and a blue ocean strategy. Source: W. Chan Kim and Renée Mauborgne, *Blue Ocean Strategy – How to Create Uncontested market Space and Make the Competition Irrelevant*, Harvard Business School press, Boston, Massachusetts (2005)

The red oceans are hence characterized by very clearly defined and accepted industry boundaries and rules of competition within the industry. This means that all competitors are trying to beat each other in a competition within a clearly defined market segment and are trying to meet a larger share of the existing demand. So, companies in a red ocean are trying to build defensible positions within an existing market to beat the competition.

In comparison to the red ocean strategy, the blue ocean strategy tries to create value innovation. Value innovation does not try to beat the competition but tries to make it irrelevant. This is done by the creation of a leap in value for the buyers and the company and the establishment of new markets. Value innovation tries both to create value and to innovate in equal parts. Regarding the value creation, this means to avoid value creation based purely on incremental innovation and to look instead for radically new solutions. For innovation on the other side this means to avoid a technology driven approach and to always look on the customer needs and the acceptance in the market. So, value innovation is neither about technology innovation nor market pioneering. It is about combining both innovation and value creation without the need to master any of both.

This strategy can create blue oceans, which are characterized by untapped market space, demand creation, and high-growth opportunities. Often, they are created by companies from within a red ocean due to the expansion of industry boundaries. This expansion makes the previous competition irrelevant since the new rules of competition within the new ocean still have to be defined.

The six principles of the blue ocean strategy

Practically, W. Chan Kim and Renée Mauborgne defined six principles for a blue ocean strategy to successfully create new uncontested markets. Each of these principles has also the aim to reduce risks regarding the execution of the strategy. This is especially important since a blue ocean strategy forces everyone in the company to change their daily practice. Those 6 principles are (see Figure 4):

- **Reconstruct market boundaries:** Managers must think new and break out of the boundaries defining their red ocean. They need to have a look into other industries, customer groups, products, and services and into future trends. Then they can actively shape market realities.
- **Focus on the big picture, not the numbers:** Managers need to start thinking out of the box and focus on the big picture instead of a better positioning within the existing red ocean competition.
- **Reach beyond existing demand:** Here it is important that managers think beyond the existing customer base and do not get lost in the segmentation of specific customer groups. They should instead focus on the existing non-customers.
- **Get the strategic sequence right:** When formulating a blue ocean strategy, the steps must be executed in the right sequential order: Buyer utility, price, cost, and adoption. First the offering must be good enough that many people want to buy it. Second, the pricing must be set in a way, that the masses can adopt the offering.

Third, the cost and the pricing must be aligned, that healthy profits can be achieved. And finally, it has to be checked, that there are no barriers for the adoption of the offering in the marketplace.

- Overcome key organizational hurdles: Managers must overcome the hurdles, that employees have to be prepared for the new strategy, that a lot of resources are required for a new strategy, that the strategy has to be implemented with high speed, and finally they must overcome the political inertia of companies to change something.
- Build execution into strategy: Managers need to motivate all parts of the company from the top management to the lowest ranks to really execute the strategy. This is especially important since there is a high tendency to make business as usual in a company and also a high tendency to risk avoidance.

The Six Principles of Blue Ocean Strategy

Formulation principles

Reconstruct market boundaries
Focus on the big picture, not the numbers
Reach beyond existing demand
Get the strategic sequence right

Risk factor each principle attenuates

↓ Search risk
↓ Planning risk
↓ Scale risk
↓ Business model risk

Execution principles

Overcome key organizational hurdles
Build execution into strategy

Risk factor each principle attenuates

↓ Organizational risk
↓ Management risk

Figure 4: The six principles of Blue Ocean Strategy. Source: W. Chan Kim and Renée Mauborgne, *Blue Ocean Strategy – How to Create Uncontested market Space and Make the Competition Irrelevant*, Harvard Business School press, Boston, Massachusetts (2005)

The black ocean

A further development of the blue ocean strategy is the black ocean strategy. Here, no new markets, but new eco-systems are created, which leads to impossible competition. As Michael Lewrick puts it: “The goal of a “black ocean” strategy, however, is to make market entry impossible for competitors. The existing rules are changed, new framework conditions created, and an “unfair advantage” built up and used accordingly.”

As already defined before, a business eco-system is an economic community supported by a foundation of interacting organizations and individuals - the organisms of the business world. The economic community produces goods and services of value to customers, who are themselves members of the eco-system. The member organisms also include suppliers, lead producers, competitors, and other stakeholders. Over time, they coevolve their

capabilities and roles, and tend to align themselves with the directions set by one or more central companies. Those companies holding leadership roles may change over time, but the function of eco-system leaders is valued by the community because it enables members to move toward a shared visions to align their investments, and to find mutually supportive roles.

Those eco-system leaders face little competition in the black ocean and seem to control important gatekeeper positions. As economic research indicates, this is a result of network effects and economies of scope and scale.

First, a market characterized by network effects starts off fiercely competitive, as all entrants compete to gain scale quickly. However, this dynamic competition is hard to sustain and soon the market tends to tip toward one or two large winners. Thus, network effects may mean that a company can retain a sustainable monopoly in a black ocean.

Second, economies of scope and scale are particularly important for digital platforms because massively aggregated consumer data is one of their key sources of value. So, they have an advantage over smaller companies that only have few data about their small number of users and cannot exploit that data for advertising or customization. This significant scope and scale advantage available to large platforms is a huge barrier for new entrants that want to compete in data-dependent digital black oceans.

But there are also factors, which mitigate the dominance of the eco-system leaders and can make a black ocean bluer. Those are consumer behavior such as multi-homing and interoperability.

The first important factor about the competition in digital eco-systems is the consumer behavior. Here, consumers can either be active on one platform, i.e. single-homing, or on many platforms, i.e. multi-homing. Multi-homing can help diminish the impact of both network effects and the economies of scope and scale. But multi-homing does not always make sense for individual users, even as they may want a more competitive market. Also, large platforms may be exacerbating the difficulties of multi-homing to discourage competition. Nevertheless, when users can multi-home, it is easier for several platforms to coexist and introduce competition into the black ocean.

Second, also interoperability is reducing the dominance of a single platform. This is because, when platforms are interoperable, the implications of choosing a particular platform become less dramatic, as it remains possible to interact with users of the other platforms.

The role of IP in the building security eco-system

The role of IP in the digital transformation from machines to eco-systems can be observed exemplarily in the security eco-system. Building security is one of the fastest growing sub-markets in the digitalization of the home environment and for many people, the smart home is the most direct point of contact with the Internet of Things. One practical example, where

also a smart IP strategy was used, comes from the German leader in security solutions, ABUS (see additional material). They developed an electromechanical door lock (EMDL), which was developed as a retrofit solution to enable customers to add remote control capabilities to a simple mechanical door lock with very little effort. The aim was to create a product which is easy to install, can be completely dismantled, and which cannot be assembled incorrectly. The EMDL extends an ordinary mechanical door lock by means of an electric remote control and a data interface. In addition to the added remote-control capability, this also permits the integration of locks which are retrofitted in this manner into an alarm or locking system.

But the development of digital and smart products is not the end point since the increased use of data in the internet of thing makes interoperability between security systems of multiple manufacturers a more and more important topic. As a reaction, the developers of security solutions are trying to set common standards in data-centric solutions and reduce the market fragmentation by the creation of a common platform and eco-system. The driving force behind this is the Open Security & Safety Alliance. The Open Security & Safety Alliance is a non-profit, non-stock corporation that brings together like-minded organizations in order to create a framework outlining a common standardized platform for security and safety solutions that is accessible for everyone. The platform brings therefore multiple groups together in one eco-system: The device manufacturers, software developers, system on chip manufacturers, and system integrators.

Chapter 2 | From features to customer benefits

Digital products

A product has a combination of tangible and intangible attributes (benefits, features, functions, uses) that a seller offers a buyer for purchase. Today, products are becoming increasingly digital and intangible due to the digital transformation. This means, that also the dominant attributes of products change from features to customer benefits (see Figure 5).

WRITING BETTER PRODUCT DESCRIPTIONS

Highlighting Features vs. Benefits

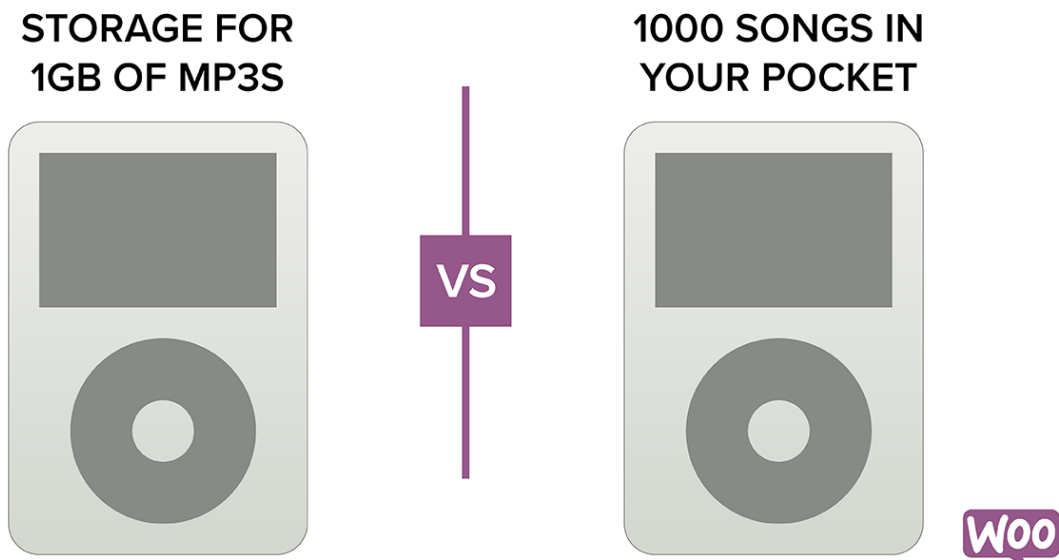


Figure 5: The difference between features and benefits. Source: <https://woocommerce.com/posts/how-to-write-product-descriptions/#>

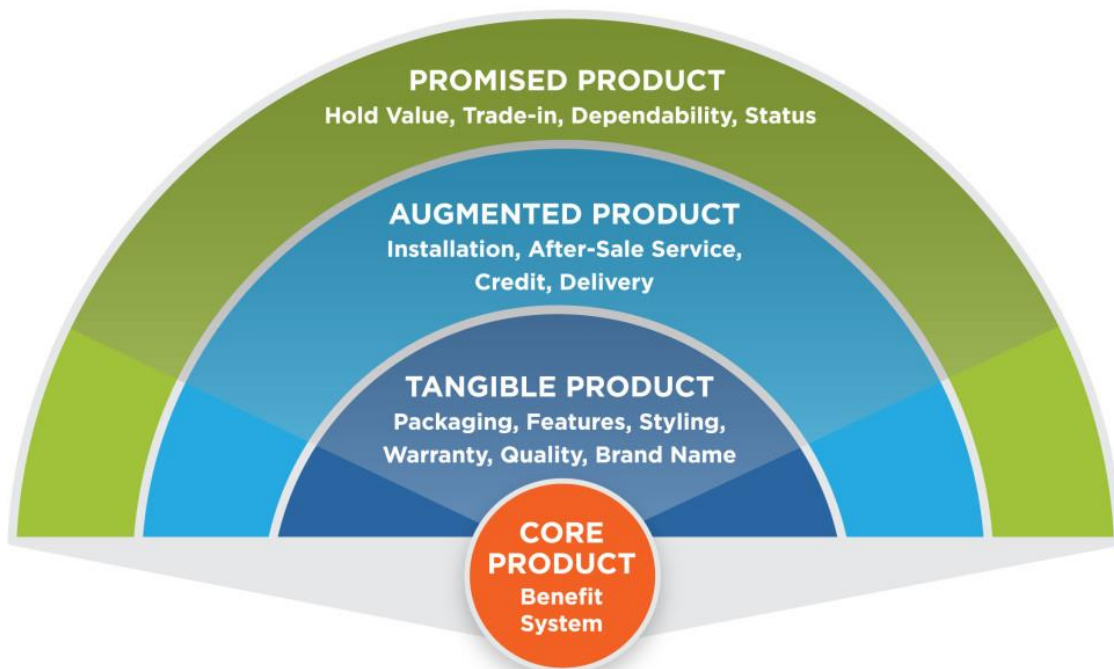
Digital products are, compared to tradition physical products, intangible products and exist in digital form. An intangible product is a product that can only be perceived indirectly such as an insurance policy. Intangible data products can further be classified into virtual digital goods ("VDG"), which are virtually located on a computer OS and accessible to users as conventional file types, such as JPG and MP3 files. Virtual digital goods require further application processing or transformational work by programmers, so their use may be subject to licenses and or rights of digital transfer. On the other hand, real digital goods ("RDG") may exist within the presentational elements of a data program independent of a conventional file type. Real digital goods are commonly viewed as 3-D objects or presentational items subject to user control or virtual transfer within the same visual media program platform.

Digital products can also be used and duplicated by multiple people without losing their quality or becoming depleted. This feature of intangible assets is called nonrivalry (see “Economics of intangible assets” -> IP Valuation (I): Part 2).

Features and benefits

The core benefit is what consumers feel they are getting when they purchase a product. The four levels of a product include: core, tangible, augmented, and promised (see Figure 6). Core, tangible, augmented and promised products feature characteristics (i.e., the total product concept or offer), which include everything a consumer evaluates before making a purchase. These factors can include:

- Price
- Store environment and/or surroundings
- Brand promise/ value
- Advertising and marketing activities
- Buyer's past experience
- Accessibility or convenience
- Brand reputation
- Packaging



FOUR LEVELS OF THE PRODUCT

Figure 6: The four levels of a product. Source: <https://courses.lumenlearning.com/suny-marketing-spring2016/chapter/reading-defining-product/>

We begin with the notion of the core product, which identifies what the consumers feel they are getting when they purchase the product. The core benefits derived when an overweight 45-year-old male purchases a \$250 ten-speed bicycle is not transportation - it is the hope for better health and conditioning. In a similar vein, that same individual may install a \$16,000 swimming pool in his backyard, not to obtain exercise, but to reflect the status he so desperately desires. Both are legitimate product cores. Because the core product is so individualized, and oftentimes vague, a full-time task of the marketer is to accurately identify the core product for a particular target market.

Once the core product has been indicated, the tangible product becomes important. This tangibility is reflected primarily in its quality level, features, brand name, styling, and packaging. Literally every product contains these components to a greater or lesser degree. Unless the product is one-of-a-kind (e.g. oil painting), the consumer will use at least some of these tangible characteristics to evaluate alternatives and make choices. In addition, the importance of each will vary across products, situations, and individuals. For example, for a 25-year old man, the selection of a particular brand of new automobile (core product = transportation) was based on tangible elements such as styling and brand name (choice = Corvette). In contrast, at age 45, the core product remains the same, but tangible components such as quality level and features become more important (choice = Mercedes).

The next level is the augmented product. Every product is backed up by a host of supporting services. The buyer often expects such services, so they will reject the core-tangible product if these are not available. Examples include restrooms, escalators, and elevators in the case of a department store, and warranties and return policies in the case of a lawn mower. For example, Dow Chemical has earned a reputation as a company that will go the distance to service an account. It means that a Dow sales representative will visit a troubled farmer after-hours in order to solve a serious problem. This extra service is an integral part of the augmented product and a key to their success. In a world with many strong competitors and few unique products, the role of the augmented product is clearly increasing.

The outer ring of the product is referred to as the promised product. Every product has an implied promise. An implied promise is a characteristic that is attached to the product over time. The car industry rates brands by their trade-in value. There is no definite promise that a Mercedes-Benz holds its value better than a BMW. There will always be exceptions. How many parents have installed a swimming pool based on the implied promise that their two teenagers will stay home more or that they will entertain friends more often?

Features and attributes of a product

The features and attributes, which means a characteristic or quality of a product, are integral to the product design process, which in turn assists in the creation of new products.

Product design is the process of creating a new product to be sold by a business to its customers. It is the efficient and effective generation and development of ideas through a process that leads to new products.

The process of designing a new product (or updating the features of an existing one) is usually completed by a group of people, designers or field experts for the product they are creating, or specialists for a specific component of the product. These people would essentially determine all the features and attributes of the product. The process focuses on figuring out what is required, brainstorming possible ideas, creating mock prototypes, and then generating the product. At this point, product designers would still need to execute the idea, making it into an actual product and then evaluating its success and seeing if any improvements are necessary.

Product designers conceptualize and evaluate ideas, turning them into tangible products. Their role is to combine art, science, and technology to create features and attributes of current or new products that other people can use. Their evolving role has been facilitated by digital tools that now give them greater freedom to communicate, visualize, and analyze ideas.

The design process follows a guideline and involves three main sections: Analysis, Concept, and Synthesis - in a continuous feedback loop. Attributes and features play a role in all three sections.

- Analysis: Here, the designers decide on committing to the project and finding a solution to the problem. They pool their resources into deciding how to solve the task most efficiently. Everyone in the team begins research into what the product should look like to satisfy the objective.
- Concept: The key issue of the matter is defined. The conditions of the problem become objectives, and restraints on the situation become the parameters within which the new design must be constructed. The concept phase is where ideas for new features are considered.
- Synthesis: The designers brainstorm different solutions for their design problem. Once they have narrowed down their ideas to a select few, they can outline their plan to make the product. Prototypes are built, the plan outlined in the previous step is realized and the product starts to become an actual object.

In the evaluation stage, the product is tested, and from there, improvements are made. Although this is the last stage, it does not mean that the process is over. The finished prototype may not work as well as hoped so new ideas may need to be brainstormed.

Feature creep

The evolution of the Swiss army knife may be seen as a good example of this phenomenon: the ongoing expansion and addition of new features to a product (see Figure 7). Extra features go beyond the basic function of the product and so can result in over-complication rather than maintaining a simple design. Viewed over a longer time period, extra or unnecessary features seem to creep into the system, beyond the initial goals.

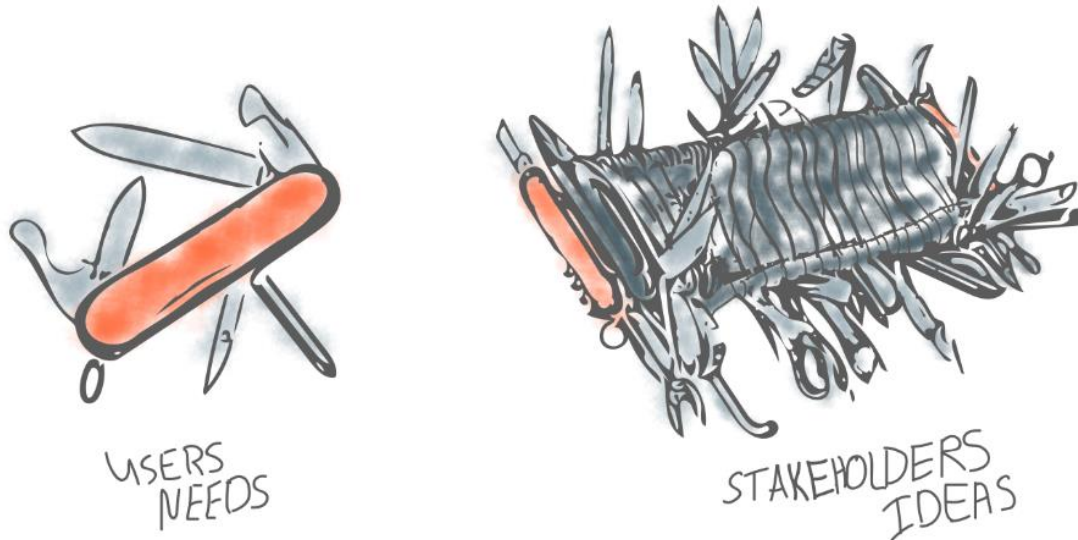


Figure 7: Feature creep in the swiss army knife. Source: <https://uxplanet.org/design-principles-kiss-the-feature-creep-7eb84b09603f>

The most common cause of feature creep is the desire to provide the consumer with a more useful or desirable product, in order to increase sales or distribution. However, once the product reaches the point at which it does everything that it is designed to do, the manufacturer is left with the choice of adding unneeded features, sometimes at the cost of efficiency, or sticking with the old version, at the cost of a perceived lack of improvement (see Figure 8). While feature creep may have positive effects, it can also lead to cost overruns and product cancellations as producers lose sight of the original goal.

Customer benefits and IP

An example for the successful IP protection of customer benefits can be found at Vorwerk with their kitchen machine Thermomix (see additional material). The revolution in the kitchen took place in 2014: Vorwerk brought a completely modernized Thermomix to the market with a chip that displays digital recipes including the necessary preparation steps, which the device takes over directly, on a touch display. “Guided cooking” meant that the user only had to follow the instructions and provide the ingredients shown. A year later came the step into the IoT age for kitchen appliances. Now the Thermomix could go online and perform additional services - for quite many users these internet-based services are the real benefit and the machine on site only helps with the preparation of the dishes.

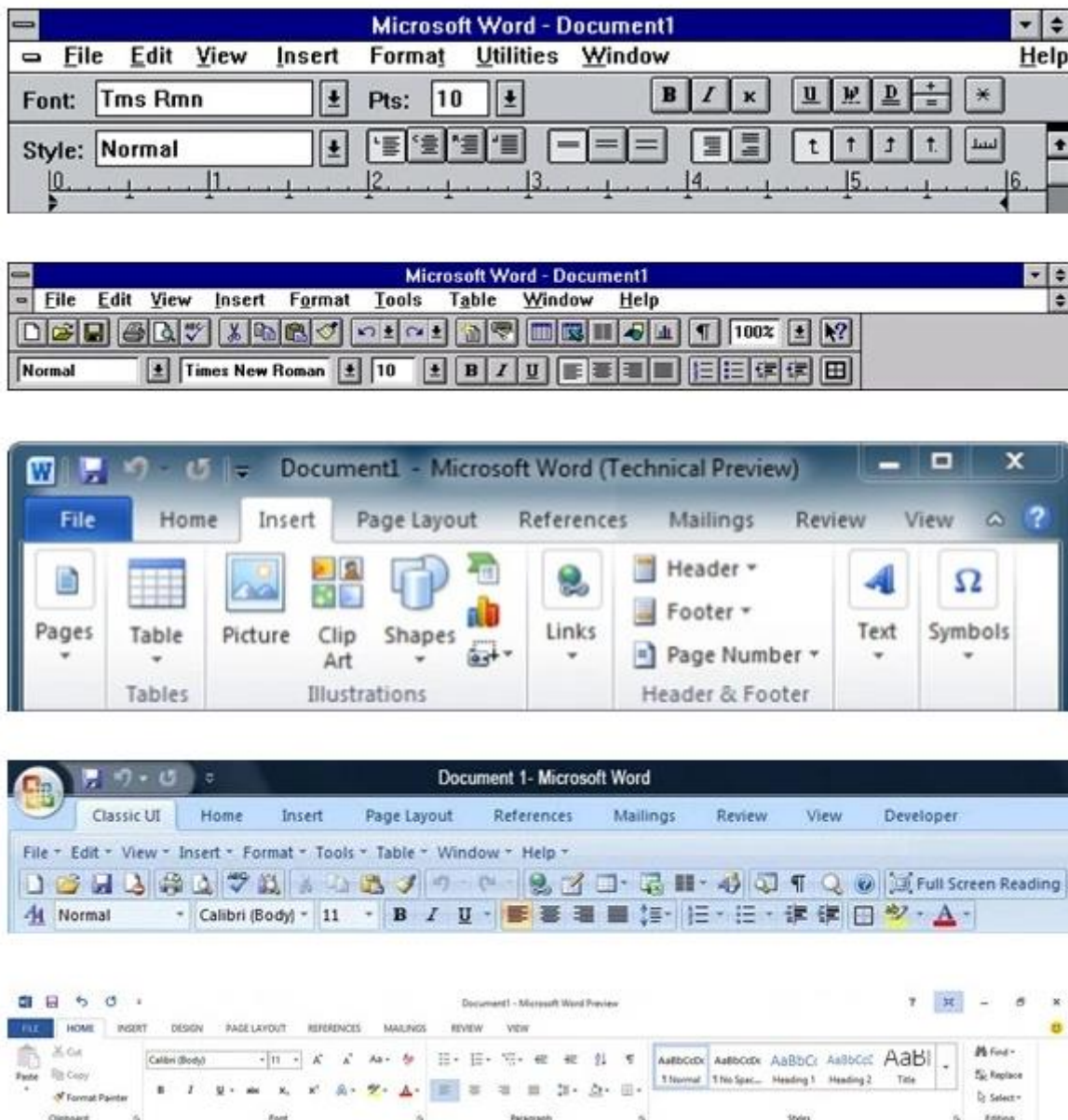


Figure 8: Bloat progression in Microsoft Word versions. Source:
<https://apelbaum.wordpress.com/2011/04/03/just-say-no-to-features/>

Vorwerk customers can access a comprehensive and quality-assured recipe database and download the recipes directly to the device and execute them there; the comparison to the iTunes-iPod idea is not accidental. Above all, the exchange with other Thermomix users is possible via the platform, for example to exchange new functions, cooking techniques and other experiences. Users can also have dishes suggested via an app and immediately receive a list of ingredients that can be sent directly to their home via locally available delivery services. The company can use the data of Vorwerk customers who have registered on a global cloud-based e-commerce platform to create customer profiles and use them to continuously improve its products and services.

The 360° IP strategy for the Thermomix TM5 was consistently and systematically designed in such a way that it covers all key customer benefits in its proprietary IP portfolio (see Figure 9). The TM5 is not just a market leader in terms of the physical device, but it is also a dominant design in terms of the entire eco-system which surrounds it. This means that customer expectations are based on the features and the user experience of the TM5. The normal reaction of the competition in an attempt to increase its market share would be to align itself as closely as possible with the TM5 regarding the benefits expected by the customer, while at the same time offering a lower price.

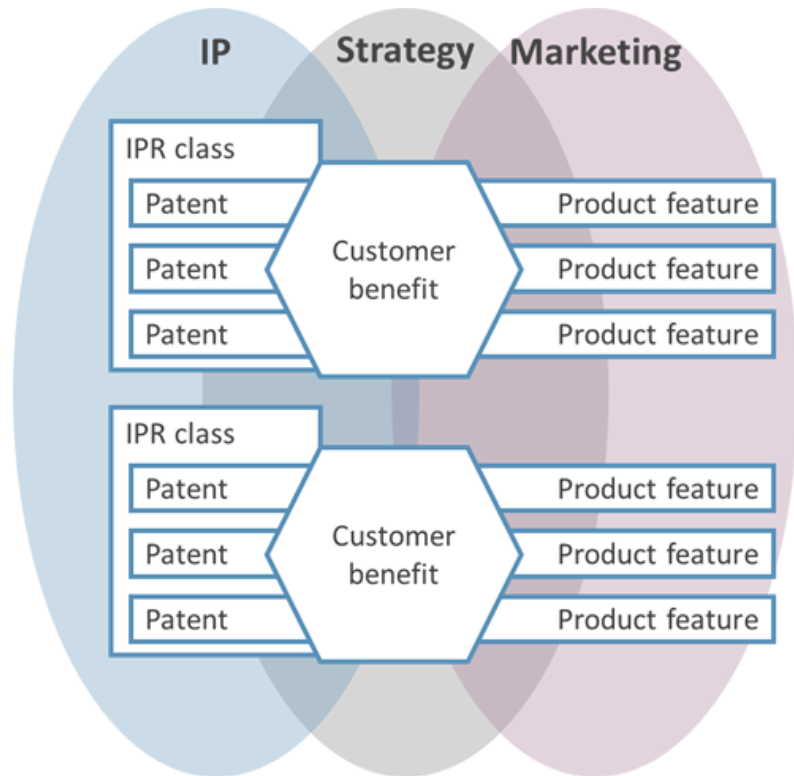


Figure 9: IP, strategy and marketing must work together to create exclusive and IP protected customer benefits based on product features. Source: *MIPLM Case Study Thermomix*

To understand what is so special about the Thermomix IP strategy, we must take a closer look. It is neither uncommon to apply for patents, trademarks, and design rights for all sorts of features of a new device, nor is it uncommon to think about how competitors might try to circumvent these rights. The modern IP approach for the Thermomix consists of three steps:

1. Determining the desired market position: Prior to defining a budget for the protection of intellectual property, it must be clear what effect a company hopes to achieve from its intellectual property rights in the market. At Vorwerk, the core objective for the Thermomix was to achieve the most unique positioning possible in terms of perceived customer benefits and exclusivity, as this allows the company to develop an optimized customer benefit compared to the competition.
2. Involving market experts in patent development: Only in exceptional circumstances the R&D department should invent new product features without the involvement of the IP department. Instead, the product management and marketing departments start by defining the perceived customer benefit and determining which features of competitive products customers are actually aware of. Based on this information, the IP department then designs prohibitive rights to prevent the competition from offering similar customer benefits.

3. Patenting customer benefits, not technology: It would be a mistake to put a too great emphasis on technical inventions when patenting a product, because it usually is not the exact technology inside a product that closes a sale. The IP department must therefore generally develop worst-case scenarios in line with the customer benefit and ask themselves the following questions: What strategies are competitors going to use in order to imitate the customer benefit of our product? How can we block these attempts? Patent experts will then develop so-called synthetic inventions together with R&D. This refers to a product design which is derived from the desired customer benefit and can be distinguished from existing technical solutions. These novelties, provided they are novel and contain an inventive step, are patented regardless of whether or not the company also uses the specific solution in question for its own purposes. In any case, this permits the company to prohibit competitors from imitating a specific customer benefit. From the customer's point of view, it increases the exclusivity of the product.

Chapter 3 | From products to services

From products to services

The newest trend in the market is a shift from pure product consumption to the fulfillment of result-oriented demand. Therefore, product companies are now more and more developing into providers of product-service systems. This means that companies are providing additional services to improve customer experience with their products. At the same time industry 4.0 is also changing the way how value is created in the industry due to increased connectivity and digital enabling technologies. So, both industry 4.0 and the increased influence of services are causing business model innovation (BMI). The degree of influence of these two factors on the business can vary from low to high levels of digitalization and from low intensity services (so called smoothing services) to high intensity services (substituting services, see Figure 10).

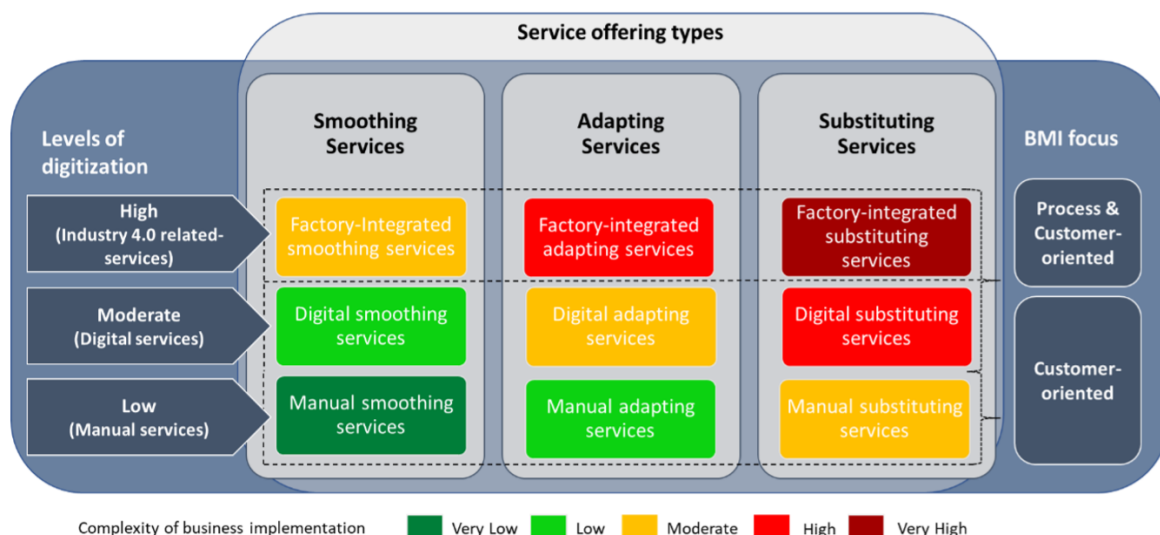


Figure 10: Matrix for the description of levels of digitalization and servitization. Source: Frank, Alejandro & Mendes, Glauco & Ayala, Néstor & Ghezzi, Antonio. (2019). *Servitization and Industry 4.0 convergence in the digital transformation of product firms: A business model innovation perspective*. *Technological Forecasting and Social Change*. 10.1016/j.techfore.2019.01.014.

In this chapter the focus lies on the phenomenon of servitization. Servitization are transformational processes whereby a company shifts from a product-centric to a service-centric business model and logic (see Figure 11). This is enabled by digital technologies, which make it possible to collect and analyze machine data. On the one hand, sensors are embedded in basically every tool in every industry so that manufacturing companies get direct access to machine data. On the other hand, big data analytics can be used to create new service offerings related to the improvement and optimization of existing products or solutions and to optimize the customer segmentation and the positioning. In summary, servitization can also be understood as part of 5 big industry trends. A shift from products to

solutions, from outputs to outcomes, from transactions to relationships, from suppliers to network partners and from elements to eco-systems.

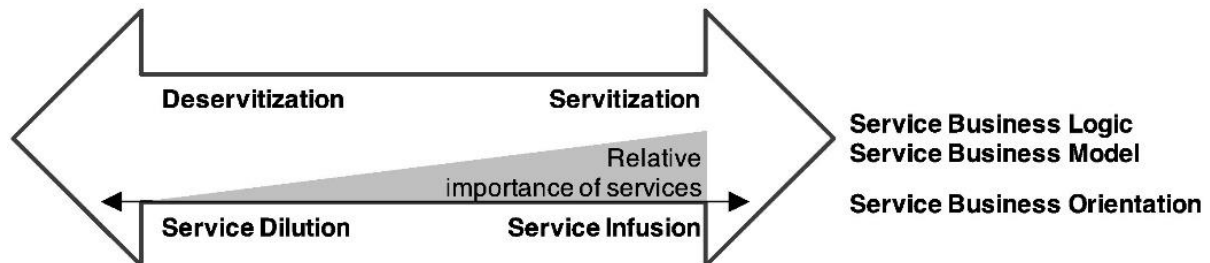


Figure 11: Servitization and deservitization depend on the importance of services in a company. Source: Christian Kowalkowski, Heiko Gebauer, Bart Kamp, Glenn Parry, *Servitization and deservitization: Overview, concepts, and definitions, Industrial Marketing Management, Volume 60, 2017, Pages 4-10, ISSN 0019-8501, <https://doi.org/10.1016/j.indmarman.2016.12.007>*.

Definition of a product

For a better understanding of the phenomenon of servitization, definitions of products and services are important. So, we can ask us the question: What is a product? It might be tempting to say, something what can be marketed or sold. In the consumer-packaged goods industry, most people have a pretty clear image in mind when one refers to the “product” the managers work on. They speak about the bar of soap or the razor in the shelf of a supermarket. But as soon as one thinks a little bit deeper it becomes quite fuzzy what “product” could mean. For example, in the internet world, when people refer to “product” it is quite unclear what they mean.

First, most of the time we are not even referring to a physical item but rather to software or a combination of a physical objects and software and maybe some cloud stored data (See Figure 12). Second, most of the time the software is not even installed on your computer but is rather running on some remote server, or even more abstract, it is running “in the cloud.” Add to this the fact that for most Internet businesses, the web site itself is so big that we break it up artificially into many smaller “products.” Big Internet companies break their site up into many (typically dozens) of smaller “products” even though this is primarily an artificial construct to suit our internal organizational needs and not something visible to the user.



Figure 12: Hardware and Software use in digital businesses. The product can be either a part of the hardware or the software or the combination of them. Source: <https://infochoices.blogspot.com/2019/05/hardware-and-software-of-computer.html>

In some cases, a product has got a “virtual”, digital, internet-based component and a physical component. One example is the Thermomix with the respective recipe platform (see Additional material). It is obvious, that it is not simple to make a comprehensive and meaningful definition of a product and even without digital components, just by differentiating the physical object, a service component and a brand image it can be tricky to understand “the product” (see Figure 13). A good starting point for a definition is the customer.

A good, idea, method, information, object, or service is created as a result of a process and serves or satisfies a need. It has a combination of tangible and intangible attributes (benefits, features, functions, uses) that a seller offers a buyer for purchase. For example, a seller of a toothbrush not only offers the physical product but also the idea that the consumer will be improving the health of their teeth. A commercially distributed good is a tangible personal property, output or result of a fabrication, manufacturing, or production process, and passes through a distribution channel before being consumed or used. More generic: A good or service most closely meets the requirements of a particular market and yields enough profit to justify its continued existence.

A product could be a combination of any or all of the following:



Figure 13: A product could be the combination of technology, brand, model, and design.

There are a plenty of definitions for products out. Some famous definitions are:

- A product is the need-satisfying offering of a firm. *Perreault, Cannon and McCarthy*
- A product is anything that is of value to a consumer and can be offered through a voluntary marketing exchange. *Grewal and Levy*

- A product is a good, service or idea consisting of a bundle of tangible and intangible attributes that satisfies consumers' needs and is received and exchanged for money or something else of value. *Kerin, Hartley and Rudelius*

At first glance, these definitions of a product may seem quite different, but let us now look more closely at the two key similarities between these definitions.

1. Meets a consumer need or provides value to a customer

The first commonality is that a product is designed to meet a customer's need and to provide value (benefits) to the consumer. Please note the similar phrases in each product definition, as follows:

- "Of value to a consumer"
- "The need-satisfying offering"
- "Satisfies consumers' needs"

2. Consumers can obtain it through an exchange

The second point of agreement is that a product is made available for customers to obtain via an exchange on the market (nearly always exchanging money and sometimes information and time), as highlighted in the following excerpts from the definitions:

- "Offering of a firm"
- "Offered through a voluntary marketing exchange"
- "Is received and exchanged"

A simple definition of a product from a marketing perspective is "anything that meets a consumer and provides value that can be obtained by a customer through a marketing exchange".

A product is defined as a "thing produced by labor or effort" or the "result of an act or a process". The word "product" stems from the verb "produce", from the Latin *prōdūce(re)* "(to) lead or bring forth". Since 1575, the word "product" has referred to anything produced.

In general, a product is a bundle of benefits - physical and psychological - that a marketer wants to offer, or a bundle of expectations that consumers want to be fulfilled. Marketers can satisfy needs of target consumers by products. Product includes both good and service. Normally, product is taken as a tangible object, such as a pen, television set, bread, book, vehicle, table, etc. But a tangible product is a package of services or benefits.

Marketers should consider product benefits and services, instead of products itself. Importance lies in the services rendered by the product, and not the tangible object itself. People are not interested in just possessing products, but the services rendered by the products.

Definition of services

Services are different than tangible objects. Intangibility, variability, inseparability, perishability, user participation and lack of ownership, are the 6 main features of services (see Figure 14). Services make our life safe and comfortable. Trust, reliability, costs, regularity, and timing are important issues. The police, the post office, the hospital, the banks and insurance companies, the cinema, the utility services by local bodies, the transportation facilities, and other helpers (like barber, cobbler, doctor, mechanic, etc.,) can be included in services. All marketing fundamentals are equally applicable to services and products. 'Marketing of services' is the emerging facet of modern marketing.

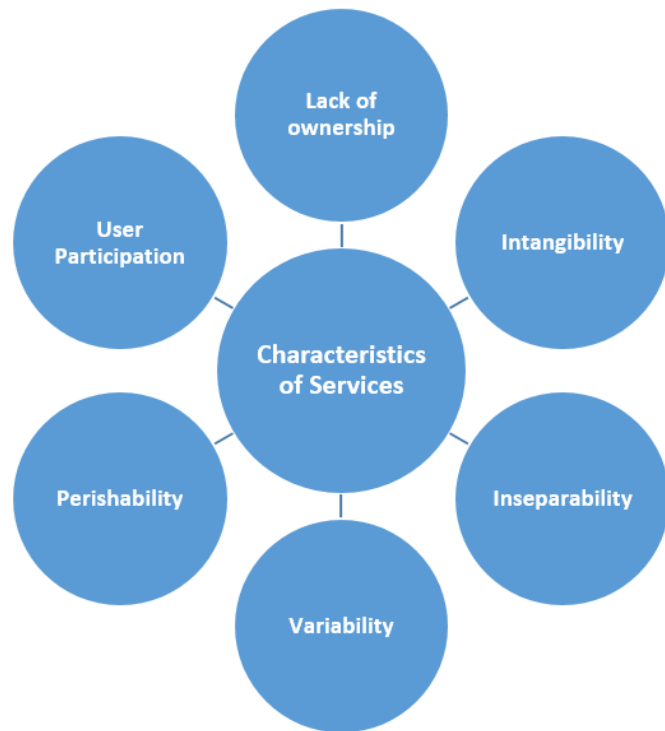


Figure 14: Characteristics of services. Source: <https://marketing-insider.eu/marketing-explained/part-iii-designing-a-customer-driven-marketing-strategy-and-mix/characteristics-of-services/>

The lack of ownership of a service directly follows from its intangibility, but also inseparability. Since services are not tangible and inseparable, you cannot put it on a shelf like a product.

The intangibility of a service means, that it has no material embodiment and cannot be physically touched. Also, immaterial, or intangible economic goods are distinguished from financial economic goods by the fact that they do not possess a direct financial embodiment and also cannot be transformed into liquid financial means directly through a conversion mechanism.

Services are also inseparable, which means, that the service provider and the customer of the service are not separated at the point of the provision of the service. The service provider produces the service right at the moment of provision and the customer consumes it there, unlike products. Those are produced before the selling process and can also be stored for some time before purchase.

Variability of a service means, that the provided service is each time different even, when the same service provider is involved. So, for example the service at a restaurant can vary each time depending on the behavior of the waiter and other customers or the quality of the dish of the day.

The perishability of a service is also related to the inseparability and refers to the fact, that services cannot be stored. In the case of a restaurant, this means for example that at some times the restaurant is empty and at other times more customers want to have a seat than the capacity allows. Here, the free capacity cannot be stored and moved to times of higher demand.

User participation means, that in each service the user is a part of the service. For example, in the restaurant the user consumes the food themselves during the service.

New services in the paper eco-system

The digital transformation affects all business eco-systems, including the paper industry. The traditional use of paper is being replaced by digital solutions, in newspapers and journals, in computer printouts and in payments: paper is on the decline across the board, even tax authorities accept electronically completed forms. The paper industry has to reinvent itself and is coming back as a digital industry with smart products and IP design plays a crucial role in this.

One example is the Felix Schoeller Group. Felix Schoeller Group is one of the world's leading manufacturers of specialty paper, in particular photo paper and decorative paper, and digitalization is a significant and important milestone on Felix Schoeller Group's journey into the future. A separate digital unit has been established, which pursues three main priorities: the development of digital business models along the value chain and the development of digital services for current products and markets, the digitalization of internal business processes and procedures, and the digitalization of production to increase performance and reduce costs in line with Industry 4.0.

Here, also a fitting IP strategy must be used to protect the new service-based business models. Such an IP strategy for a company in a processing industry can be derived from the generic IP strategy of the value chain monopoly. Industrial production can be defined by the ability to manufacture identical reproducible goods using industrial production methods. The key feature of this definition of the industry term is identical reproducibility based on clear technical specifications. As a rule, this involves the consumption of materials and resources. An industrial value chain is defined by all stages of the manufacturing process, including all upstream and downstream activities. It is therefore the operational complement to networks and cooperations working together in an organized manner beyond mere supplier relationships. Ideally, an industrial value chain can be broken down into four stages:

- Primary commodity and material-related activities
- Upstream services and supply of components
- Production activity; creation of the final product or service
- Downstream services

The value chain is a mechanism allowing manufacturers, processors, dealers, etc. to contribute value added towards a final product without being bound to a specific place or time frame while the product is being processed by the respective value chain member. Each company in the industrial value chain initially acts individually and independently, but the companies share common goals as all of them are dependent on the success of the final product with the customer. The better the quality of the final product, the greater the integration within the industrial value chain. In the food, steel, cotton, or paper industries, for example, the quality that can be achieved at each individual stage of value creation depends to a significant extent on the quality of the product supplied by the previous value creation stage. Performance increases along the value chain require an increasing integration and linking of production and processing steps. This usually requires detailed information about process and material properties from different processing steps.

The generic IP structure of the value chain monopoly is based on this fundamental characteristic of industrial value chains. The different value creation stages require precise information from the other stages to optimize their respective processes. If further partners such as insurers, service companies, and complementary partners come into play, we also speak of an eco-system. If, for example, the various value-added partners exchange digital data in order to optimize process parameters and use these optimizations to improve their own products, this leads to a control circuit which also permits the use of AI technologies (see Figure 15 and additional material).

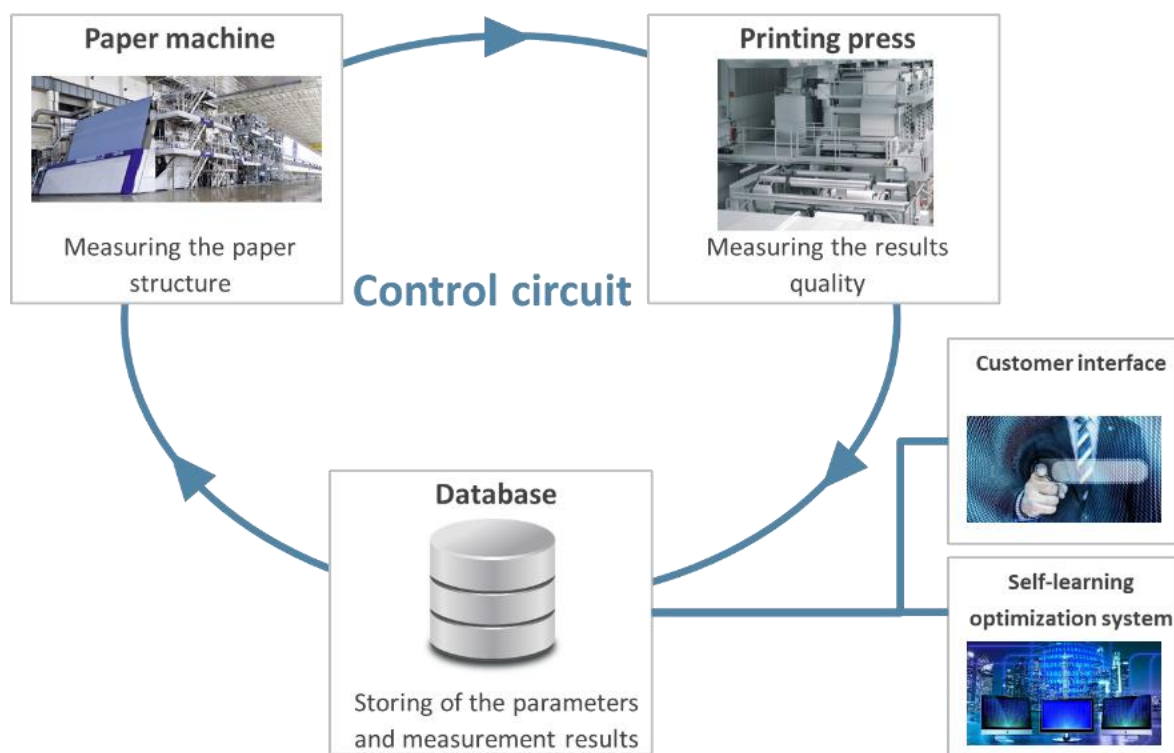


Figure 15: The control circuit in the paper eco-system. Source: MIPLM case study Schoeller.

Chapter 4 | From niche players to orchestrators

Business eco-systems

Business ecosystems have been continually defined, re-defined and studied over the past 20 or more years. In their work, *Jansiti and Levien* attribute the business dominance of Walmart and Microsoft to the success of their respective business eco-systems. They define these eco-systems as “loose networks of suppliers, distributors, outsourcing companies, makers of related products and services, technology providers, and a host of other organizations that affect and are affected by the creation and delivery of a company’s own offering”.

The synthesis of the concept of digital business eco-system emerged in 2002 by adding “digital” in front of Moore’s (1996) “business eco-system”. Starting in the early 1990s James F. Moore used the concept of a business eco-systems. The definition comes from his 1996 publication “The Death of Competition: Leadership & Strategy in the Age of Business Eco-systems”.

A business eco-system is an economic community supported by a foundation of interacting organizations and individuals - the organisms of the business world. The economic community produces goods and services of value to customers, who are themselves members of the eco-system. The member organisms also include suppliers, lead producers, competitors, and other stakeholders. Over time, they coevolve their capabilities and roles, and tend to align themselves with the directions set by one or more central companies. Those companies holding leadership roles may change over time, but the function of eco-system leaders is valued by the community because it enables members to move toward a shared visions to align their investments, and to find mutually supportive roles.

So, in each business eco-system participants can have different roles. Those roles are for example: Leader, disruptor, niche player, orchestrator, or something else.

Eco-systems and domains

To better understand the different roles and their features, we should have a look at the setup of an eco-system first. As defined already before an eco-system consists of a community of interacting organizations. Those organizations or businesses can be grouped

into so called domains. A domain is group of organizations closely related to each other like a classical industry. Those domains can also be part of multiple eco-systems.

From an eco-system perspective, it is crucial, that each domain of the eco-system performs well. Here, it goes like the saying, that an eco-system is only as strong as the weakest link in the chain, which is the weakest domain.

As an example, an overview of the eco-system of Microsoft and the number of firms in its domains is given in figure 16.

Niche players

The typical member of an eco-system is a niche player. Those niche players have highly specialized capabilities to differentiate themselves against the competition. In the eco-system they try to use complementary resources from the other eco-system members to further develop their domain expertise. When the orchestrator supports their growth, they are responsible for most of the innovation and value creation within the eco-system. But at the same time, they are very dependent on the other companies in the eco-system and constantly need to analyze their eco-system and the roles of the orchestrator.

The niche players are in the situation that they are in constant competition with other niche players of the same domain and potentially the orchestrator.

Therefore, an enormous pressure lies on the niche player to constantly innovate. When they do not reinvent themselves constantly, they run the risk to get finally swallowed by the eco-system platform. So, niche players have to try to escape the eco-system's force of attraction by the innovation of their services and products.

Nevertheless, niche players are not completely powerless, they can themselves loosen bonds to an eco-system's platform. Especially, when multiple niche players threaten to leave a platform, they can put pressure on an eco-system orchestrator. Also, since multiple eco-systems and domains exist, companies can be niche player in one and orchestrator in another eco-system, which may be even created by themselves with the introduction of a new platform. Here, niche players may start in one domain providing a specific digital

Microsoft and Its Ecosystem

Microsoft's success depends on the health of the numerous domains—some of which comprise thousands of organizations—that make up its software ecosystem.

Domain	Number of Firms
Systems integrators	7,752
Development services companies	5,747
Campus resellers	4,743
Independent software vendors	3,817
Trainers	2,717
Breadth value-added resellers	2,580
Small specialty firms	2,252
Top value-added resellers	2,156
Hosting service providers	1,379
Internet service providers	1,253
Business consultants	938
Software support companies	675
Outbound hardware firms	653
Consumer electronics companies	467
Unsegmented resellers	290
Media stores	238
Mass merchants	220
Outbound software firms	160
Computer superstores	51
Application service provider aggregators	50
E-tailers	46
Office superstores	13
General aggregators	7
Warehouse club stores	7
Niche specialty stores	6
Subdistributors	6
Applications integrators	5
Microsoft Direct resellers	2
Microsoft Direct outlets	1
Network equipment providers	1
Network service providers	1

Source: company data.

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Figure 16: The domains in the eco-system of Microsoft. Source: Marco Iansiti and Roy Levien, *Strategy as Ecology*, Harvard Business Review March 2004

solution targeted to a specific customer segment to lay a foundation for their new eco-system and continuously diversify. At some point they are able to play the role of an orchestrator in their very own eco-system coordinating the multiple solutions of eco-system members on their platform (see Figure 17).

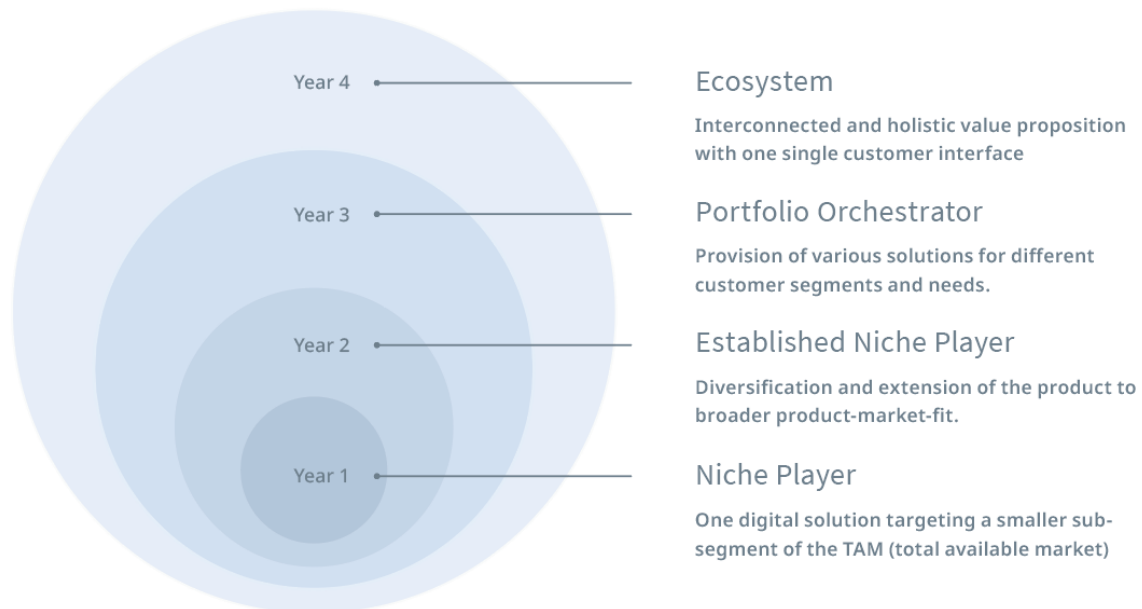


Figure 17: The evolution of a niche player to an orchestrator with an own eco-system. Source: <https://bridgemaker.com/press/tpost/n6scadaxx-successfactors-for-digital-ecosystems-pr>

Orchestrators

Eco-system orchestrators have a broad set of roles and responsibilities in an eco-system to make it successful and sustainable. The orchestrator builds the eco-system, fosters the participation of others in the eco-system, sets the rules of the eco-system and acts as an arbitrator in the case of conflict between eco-system members (see Figure 18). The orchestrator has a huge influence how the value created is distributed in the eco-system and can keep the lion's share of the residual profit, but must also take care, that the eco-system members profit enough to stay in the eco-system. Otherwise the eco-system may break apart.

Manufacturing companies usually want to become the orchestrator in the eco-system themselves, because they do not want to be reduced to original equipment manufacturers (OEMs) or lose the access to customers. Nevertheless, as a niche player they may also have the opportunity to choose the most attractive eco-system for themselves or participate in multiple eco-systems.

The role of the eco-system orchestrator typically is occupied by the creator of a platform. But in young eco-systems the position of the orchestrator may be contested. In industry 4.0 eco-systems the orchestrator could for example be one of the classical manufacturers, but also a big IT corporation. So, a company cannot just set up a platform and choose to be the

orchestrator. As an orchestrator you must be chosen and accepted. In general, there are 4 factors, which are important to be accepted as the orchestrator:

- The orchestrator is an essential member of the eco-system and control resources such as a strong brand, customer access, and key skills.
- The orchestrator has a central position in the eco-system and is interdependent with many eco-system players to effectively coordinate each other.
- The orchestrator is perceived as a fair partner.
- The orchestrator has the highest net benefit from the eco-system and can make an investment into the eco-system in advance

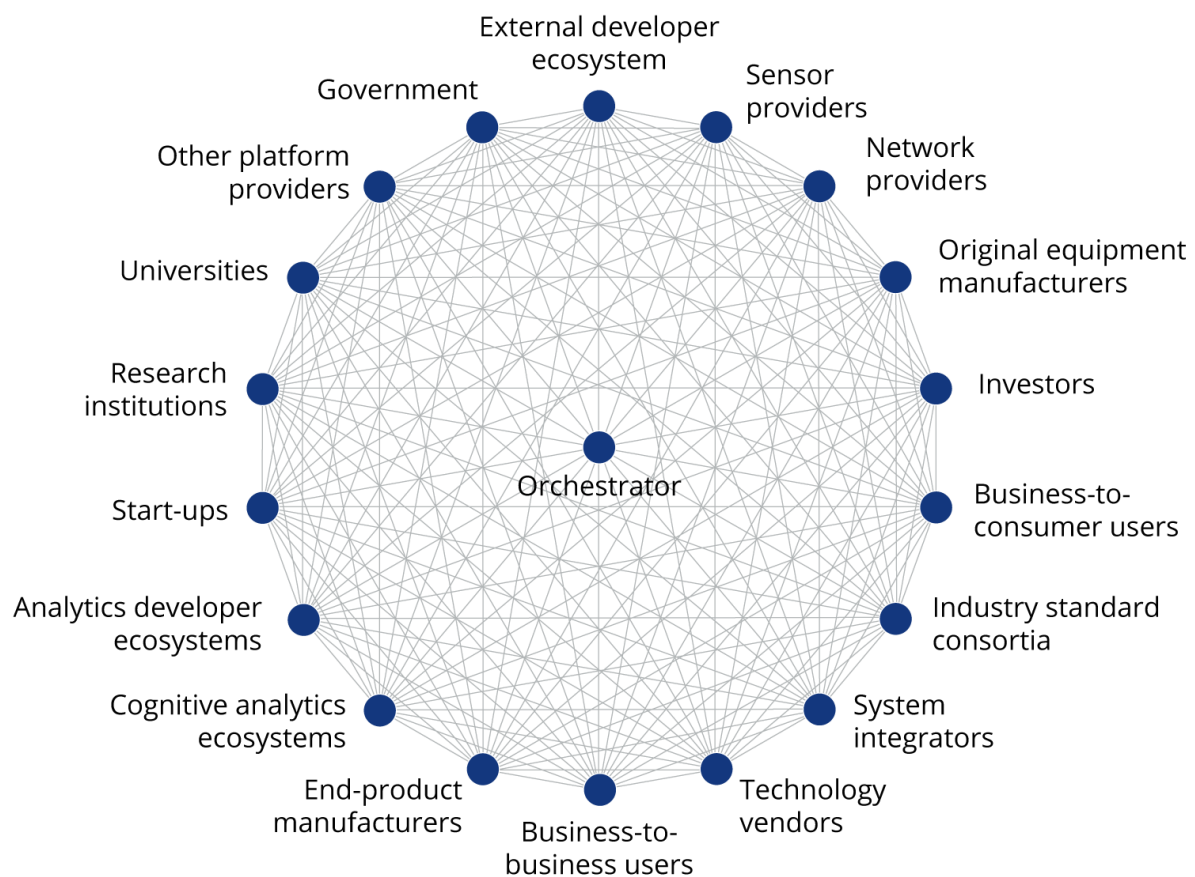


Figure 18: Position and role of an eco-system orchestrator within an eco-system. Source: *Deloitte analysis*, https://www2.deloitte.com/content/dam/insights/us/articles/3598_growing-internet-of-things-platforms/figures/3598_Figure4.png

Strategies of an orchestrator

To be a successful eco-system orchestrator, many different roles must be successfully played. The first role is to grow the platform. This means to integrate as many members and users as possible into the eco-system and make use of the network effects to grow the business (see Figure 19). To grow the network two main strategies can be chosen. This is on the one side a predatory pricing strategy, where one side of the platform is offered very low prices to create a large user base and the other side of the platform is expected to pay for it.

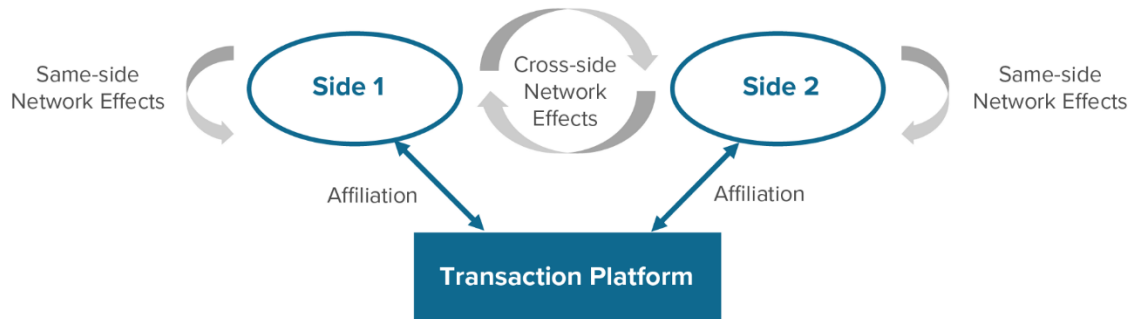


Figure 19: Network effects in a two-sided transaction platform. Source:
<https://medium.com/@eleanor.kolossovski/a-strategists-guide-to-platform-thinking-9069b60e5f5a>

On the other side, also expansion into new markets is possible, where the already existing customers are offered new products and services, which are complementary to the existing offering.

Another important role is the constant improvement of the platform and to guaranty the quality. This may have many different facets in practice. For example, from the technical point of view the orchestrator must take care that the functionality and customer experience of the platform is constantly improved and meets the highest standards. But also, the structure of the platform may play a role for the degree of innovation and quality. Some platforms are open platforms to incorporate the innovation of as many as possible eco-system members, but others are closed because for the offered services it is critical to deliver reliable results and only selected companies are reliable enough to be granted access. Finally, also analysis of user data can be useful to improve the quality of the platform by offering the customers a tailored experience and make them individual recommendations.

A vital part of being an eco-system orchestrator is also to keep the platform under control and manage the relations to users and eco-system members. The biggest threat for a platform is multi-homing, i.e. users but also eco-system members are using multiple platforms for the same product or service. The users or eco-system members are looking for the best deal on multiple platforms and are likely to leave a platform for another one, when a better deal is possible. To suppress this effect, orchestrators can e.g. create exclusive offerings on their platform, so that users do not get the same service on another platform, or provide other incentives, which increase the participation on the platform.

Finally, after enough members joined the eco-system, the quality is ensured and the eco-system is under control, the orchestrator also needs strategies to monetize the eco-system. There are 4 main strategies:

- Increase fees: The first way to monetize an eco-system is to increase the fees. Nevertheless, this only works effectively, when the eco-system members are closely

tied to the platform and cannot leave due to high switching costs or when there are no other platforms providing a similar service.

- Increase competition in the eco-system: Here, the orchestrator provides additional support to the members of the eco-system to help them to improve their services. This makes the platform and its offerings more attractive and increases the overall revenues of the platform.
- Substitute eco-system members: Another way to monetize a platform is the substitution of members by offering their service. Here, the orchestrator eliminates all companies competing with its own service from the platform and takes their revenue share. This only makes sense when the attractiveness of the platform is not harmed.
- Cross-selling and upselling: Eco-system orchestrators can also use their platforms for cross-selling and upselling (see Figure 19). This means to offer the existing users additional or more expensive products and services. This method only works well, when the orchestrator knows the needs of the users well enough, e.g. through the use of user data and algorithms.

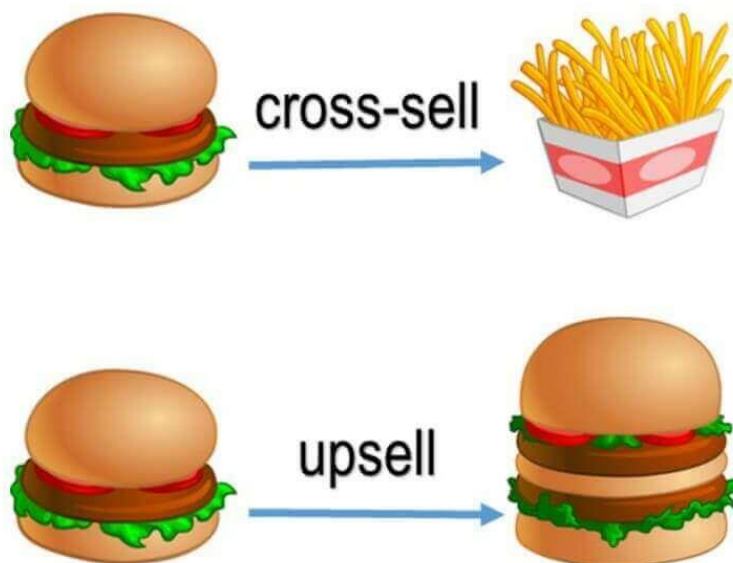


Figure 20: The logics of cross-sell and upsell. Cross-sell means the addition of a complementary offer and upsell means the offering of a more expensive version of the product. Source: <https://www.pepperi.com/how-upselling-and-cross-selling-can-dramatically-increase-field-reps-orders/>

Chapter 5 | From transactions to relationships

Revenue models

Before we can discuss the change in revenue models through the digital transformation and the consequences for IP, a short definition of business models and the role of revenue models within them should be made. A business model describes the ways in which companies generate revenues and make profits. A business model explains the mechanics, resources, and competences of how products and services are generated along a value chain and explains the company's market access and position and how customers are reached and attracted (see Figure 21).

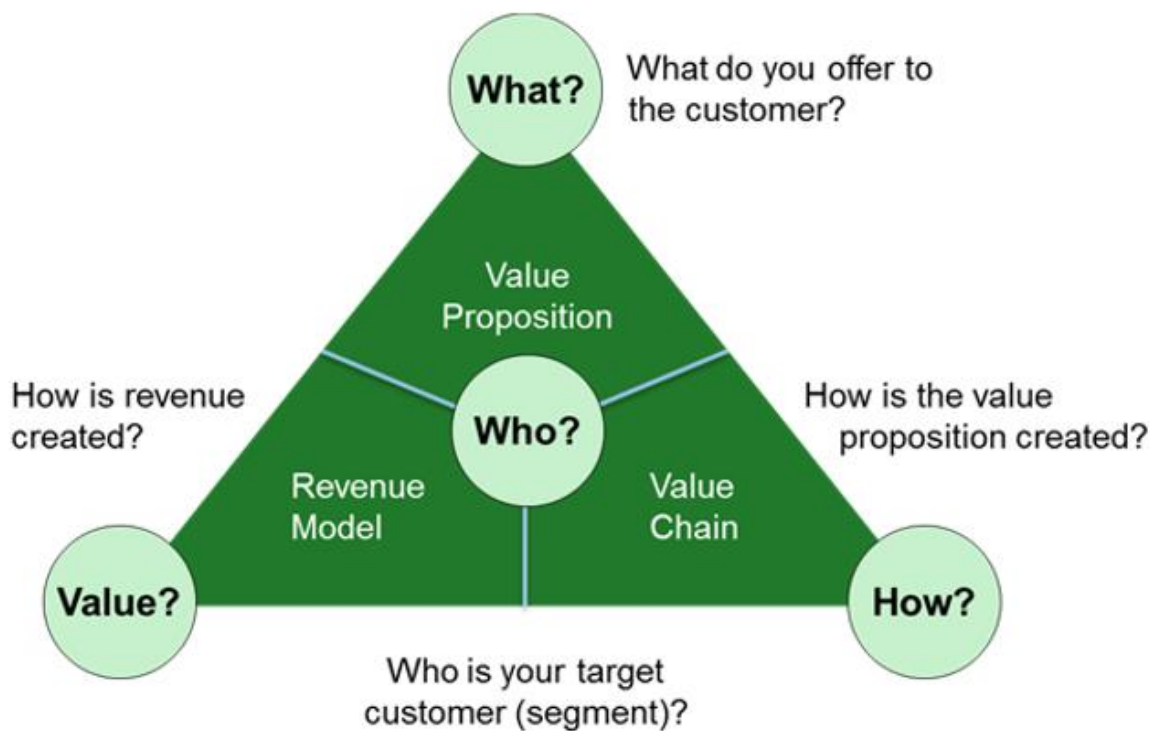


Figure 21: The magic triangle of a business model with the four questions which a business model has to answer. Source: Gassmann et al., *St. Gallen Business Model Navigator*, <https://www.thegeniusworks.com/wp-content/uploads/2017/06/St-Gallen-Business-Model-Innovation-Paper.pdf>

Here, the core of most business models consists of one or multiple business model patterns, whereby 55 typical business model patterns were identified by Osterwalder. Those business model patterns define the value proposition and the revenue model in a new business model. The revenue model defines then how the company is compensated in each implemented business model pattern. This can be a financial transaction, but also other types of compensation for an offered product or service are possible. Finally, each revenue model is composed of one or multiple revenue streams.

The evolution of revenue models

Due to the digital transformation an evolution not only in business models, but also in revenue models can be identified. An example is the shift from software as a product (SaaS) to software as a service (SaaS) business models (see Figure 22). In the classical software as a product business model, the software company sells physical copies of their software to the customer, who get a license to use the software for its specified purpose. In the software as a service business model the customer will get in comparison a right to use the software for a specified time, e.g. monthly for the payment of a monthly fee. Here, the software is not delivered physically and also runs in the cloud, instead of the computer of the customer.

But the important difference from the revenue model perspective is not, that in one case the software is delivered physically and in the other case digitally. The difference is that in the software as a product the revenue is generated in a single transaction and in the software as a service case it is generated via a monthly fee in a subscription model. This has important consequences also for IP, since it is not anymore about a single transaction of a product or service, but a continuous relationship with the customer must be created and therefore protected with IP.



Figure 22: Retail copy of the Microsoft Office xp software and the cloud-based office 365 by Microsoft. Sources: https://archive.org/details/en_office_xp_pro_201907 and <https://www.365tech.ca/hey-get-cloud-microsoft-office-365/>

Transaction-based revenue model

The traditional revenue model is the transaction-based revenue model. Here, a product or service is sold directly to a customer. This can be both a real customer in B2C business or another company in B2B business. The transaction is always a one-time sale of a good or service, so that constantly new transactions must be generated with new customers. Since

the revenue model is based on direct sales the competition between companies is fierce and this leads to a price deterioration.

A generic IP strategy which can be used to support such single transaction-based revenue models is called a “fortress monopoly”. This IP strategy is today still used in pharma and chemicals, where patents are mainly used to exclude competitors and preserve the market positions of incumbents, and to “build walls around entire research areas”. For a fortress monopoly, it is important that IP, in this case especially patents, can cover the entire product. In so-called empirical industries like the chemical and pharmaceuticals industries, the innovation is nearly identical with the invention, and can be covered completely with a product patent and likely a patent for the process to produce the product, thus leading to a high degree of exclusivity for the product as a whole.

Subscription-based revenue model

In subscription-based revenue models the customers pay a monthly or yearly fee for a product or service. This has the advantage of a recurring revenue. Also, the company can use this model to reduce the upfront costs for customers, so that customers do not pay a big single transaction fee, but low monthly subscription fees. So, the company running the subscription revenue model does not capitalize on a single transaction, but a long-term relationship with the customer. Therefore, the company needs to become a vital part in the life of their customers, so that they do not want to cancel their fees. This is achieved through the creation of deep relationships with the customers, giving the customers exactly the service and experiences which they want and improving these experiences. Therefore, companies using a subscription revenue model typically use highly personalized and individualized service offers to create these individual customer experiences. To do so they need an IP portfolio, which supports those activities.

As a service business models

Two types of business models which typically use a subscription revenue model are “as a service” business models and streaming business models. “As a service” business models can usually be separated into three categories (see Figure 23):

- SaaS: Software as a service
- PaaS: Platform as a service
- IaaS: Infrastructure as a service

In the software as a service model application software is licensed to the customers on demand, while the application itself runs in the cloud on the provider’s infrastructure. The customers can then use the software for a limited time on any device. Examples for SaaS cover many applications ranging from on demand gaming to the office software included in Microsoft Office 365. SaaS has the end customer as the target.

The platform as a service model focusses on developers. Here, not a software is provided to the customer, but a platform to develop software. So, the resources, i.e. operating systems and data storage etc., are provided to the developer, who would traditionally develop everything on a stationary computer.

Finally, infrastructure as a service models are providing fully virtualized platforms. Here, the consumer has the control over operating systems, storage, and applications in the cloud infrastructure. Therefore, the customer does not need to purchase the resources themselves.

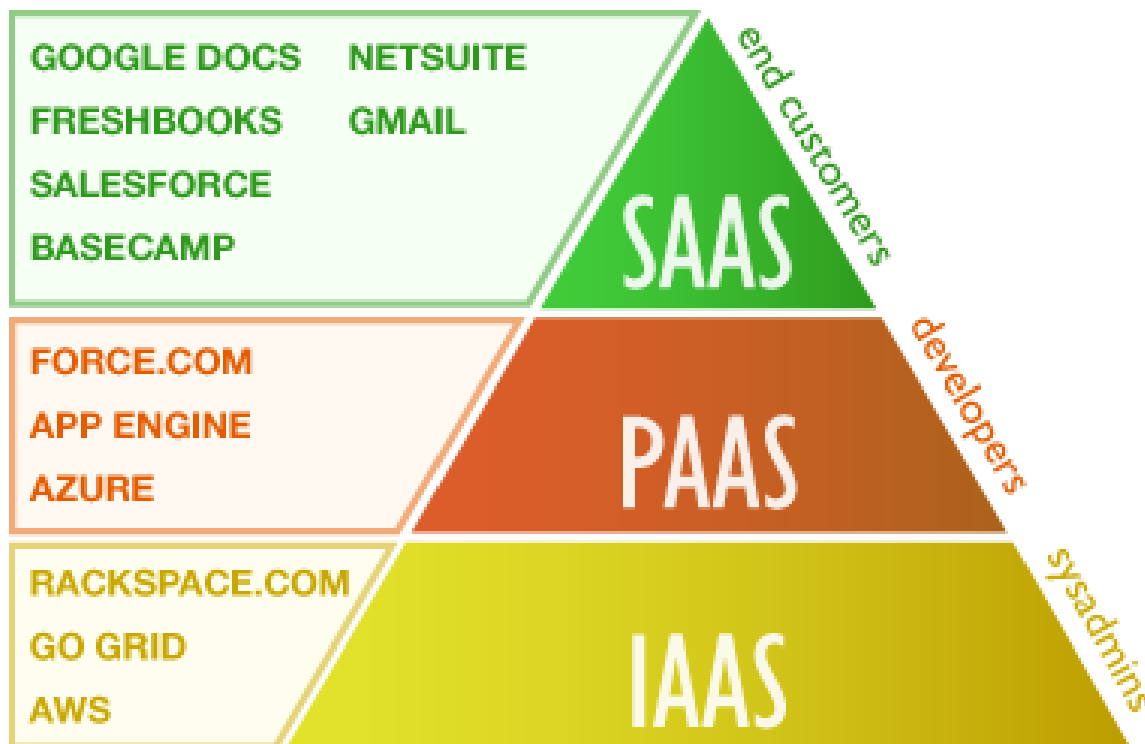


Figure 23: Service models of cloud computing. Source: <https://www.eztalks.com/cloud/types-of-cloud-services.html>

Advertising-based revenue model

Another revenue model is the advertising-based revenue model. Typically, the advertising-based revenue model is run in B2B settings, where one company is paying another company for showing ads on their platform. Therefore, it is highly popular at social media platforms, such as Facebook, Twitter, Instagram, and TikTok, and with search engines, such as Google (see Figure 24). To be profitable a very high and stable number of views needs to be created, so that only big platforms can run this revenue model.

Also, the individualization and targeted placement of advertisements is crucial to provide a valuable advertising service. Here, also a solid IP portfolio is vital. One example of such a patent protected targeted advertising service for streaming platforms can be found at

Mirriad. Here, the subscription revenue model and the advertising revenue model are both used.

The development of streaming platforms was the big step to transform the business eco-system of the media sector and media is also for other sectors a leading example how the digital transformation changes the business. To make this change of business models successful and sustainable companies must define their patent strategies and build a strong and fitting patent portfolio. In the case of streaming services companies try for example to make use of the data of the buying behavior of the streamers to introduce targeted advertisement personalized for the individual streamers. An example for the optimal implementation of this type of new business model is the cooperation between the Chinese tech-company Tencent with the British AI and product placement experts of Mirriad, who have a very strong European patent portfolio to protect the new AI based business models.

A whole range of streaming platforms are currently fighting for the favor of consumers. In addition to the pioneers in the industry such as Netflix and Amazon Prime in the USA, there are also Disney+, HBO Max, AppleTV Plus and Peacock. In China Baidu's streaming platform iQiyi is the fastest growing nationally, also known as the Netflix of China. Together with Alibaba and Tencent, collectively known as "BATs", these three companies have the data about practically every Internet activity in China on their servers including streaming video files. The platform logic forces the players to quickly reach a size that is as dominant as possible - one can certainly speak of a "streaming war". This is where the question of business models, financing and patent positions in this global race arises.

The ever-increasing production costs for the streaming content cannot be financed solely from subscription fees. Classic advertising is here out of the question because its absence is one of the basic promises of streaming services. This is how streaming platforms came up with the concept of AI-based digital product placement. Product placement is nothing new as an advertising concept. Audiences have already gotten used to the fact that James Bond drives an Aston Martin since "Dr. No" in 1962, his watch is an Omega and in "Skyfall" he drank Heineken. In 1985 you could watch Michael J. Fox aka Marty McFly in "Back to the Future" wear Nike sneakers from 2015 without shoelaces and be assured that there will still be Pepsi in the future. Also, the sale of Ray Ban sunglasses has increased 40% in the seven months since the filming of the fighter pilot drama "Top Gun".



Figure 24: Sponsored posts on Instagram.

Source:

<https://www.theverge.com/2019/6/26/18759518/instagram-explore-page-ads>

But conventional product placement is very complex and requires extremely long lead times. It may take 15 to 18 months between shooting and broadcast, which is an unacceptably long time for some high-tech products such as cell phones. The product also must be integrated at an early stage of production planning, so marketing budgets have to be set one and a half years in advance - hardly any branded company is willing to do so today. In addition, the advertiser for real product placement depends on the people on the set, the camera work, the mood of the director and the film editing - for marketing managers, an unacceptable loss of control.

In the case of digital product placement, the product placement is subsequently inserted into the original content using digital technology. This has many advantages over the old method:

- The placement can be integrated without the usual time and organizational pressure, since the product is not integrated directly on the set and the integration does not have to be synchronized with the usual film processes.
- The artistic creation process is not disturbed. The director and the actors do not have to adjust to the product during the actual production and can fully devote themselves to the film
- The product placement can be controlled in detail. While the design of the placement is influenced by many people in the classic case and rarely can be planned perfectly beforehand, you have full control when you edit it later.
- The product placement can be removed, updated, and customized at any time analogous to today's search engine marketing

This last point is of particular importance for the streaming providers. Since the actual data remains in their hands, the customer only sees the current data stream. This means that the digital product placement can not only be customized, but also adjusted at any time according to the desired relevance. Product generations could also be updated, and new brand logos integrated. In addition, digital product placement can also cross the border of the screen. For example, the carmaker Lancia has developed a technology that sends a sound that is inaudible to people whenever a digital product placement of their vehicles appears on the screen, as shown here in the image of



Figure 25: Retrospectively integrated Lancia advertisement. Source: <https://www.campaignlive.co.uk/article/digital-technology-bring-virtual-product-placement/1178175>

the retrospectively integrated advertising board (see Figure 25). With the help of the Lancia InteracTV app, which was developed by the Armando Testa agency in cooperation with Mirriad, fans of the brand can receive special promotional offers via their mobile phone whenever they see the placement in a TV show or in a film, in which the non-perceptible sound is sent and analyzed by the mobile phone.

AI technology is used in various places. It is not just about optimizing the visual representation, since the integration of the advertising is not done manually, but automatically. It is also about the question of what is displayed at all. With machine learning, algorithms can continuously monitor changing data, recognize patterns, and predict which products or services are likely to be most relevant to a consumer without knowing the real life of the people. It is also about how effective the respective product placement is in the context of the watched program. The decisive factor is the right emotional framework for the ideal, forward-looking product placement. From the point of view of the advertising industry, the aim is to make an individual, suitable offer at the highest personal level and not to finance widely dispersed, irrelevant and expensive mass advertising campaigns.

With the technology of Mirriad's AI experts, such scenarios are possible and for the most part already real. Among other things, the technology company Tencent, one of the largest companies in the world, needs these opportunities to finance its own expansion of the streaming platform. Tencent is active in the development of digital hardware, search engines, video games and entertainment content. Tencent is not only behind the WeChat messenger service with more than a billion customers but is also the world's largest online game company. It is a kind of melting pot for technologies that develop from the (online) game world into classic formats such as film, series, and show. Digital product placement is just one application variant of these AI-based concepts.

This cooperation is primarily about the very strategically structured patent portfolio of Mirriad. The British company has successfully established some of the most effective patent types in its business eco-system at the European Patent Office. The two European patents granted

- EP 2 418 593 B1 Device for tracking objects in a video stream and
- EP 3 076 681 B1 Producing Video Data

show how consistently and oriented towards future business models Mirriad thinks when it comes to IP.