



WHITEPAPER

## Sales Service – Service technicians as the key to sales success

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# Impressum

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# 1 Service as growth engine

The Federal Statistical Office puts the assets for equipment in Germany at around € 2.6 trillion (STATISTISCHES BUNDESAMT 2018a, p. 8). Typically, depending on the type of machinery and plant, an annual service potential of 3 to 6 percent of the replacement value of the equipment is assumed. This means an annual sales potential of € 80 to 160 billion in Germany alone for companies in the plant and mechanical engineering sector and for companies providing technical services. This is supported by the fact that the increasing complexity of machinery and plant, the growing focus on core functions of plant operators and the increasing shortage of skilled workers are creating a trend towards outsourcing. This makes technical service more and more an important partner for internal maintenance and production.

In addition to the existing installed base, some € 56 billion (2017) will be added annually through investments in machinery, mechanical plants, operating and business equipment (STATISTISCHES BUNDESAMT 2018b, p. 8). This corresponds to an annual growth rate of 2 percent (see figure

1). Given the current economic development, it can also be assumed that the service share and turnover of companies will continue to rise, while new business will tend to stagnate. For this reason, awareness of the potential that service can offer to the mechanical and plant engineering industry has already reached many management levels. The positive effect of a good service is not limited to a higher service turnover, but offers the possibility for synergy effects within the whole company. However, the change to a service organization not only offers opportunities for many companies, but also poses a huge challenge. Millions of service calls take place in Germany every year. Countless internal and external stakeholders must be taken into account and correctly addressed in each deployment (see figure 2, p. 6).

Integrating the sale of additional services and products into the existing service process is not only a challenge that requires the intelligent interlinking of information from different areas, but also has far-reaching organizational and cultural effects on the entire company.

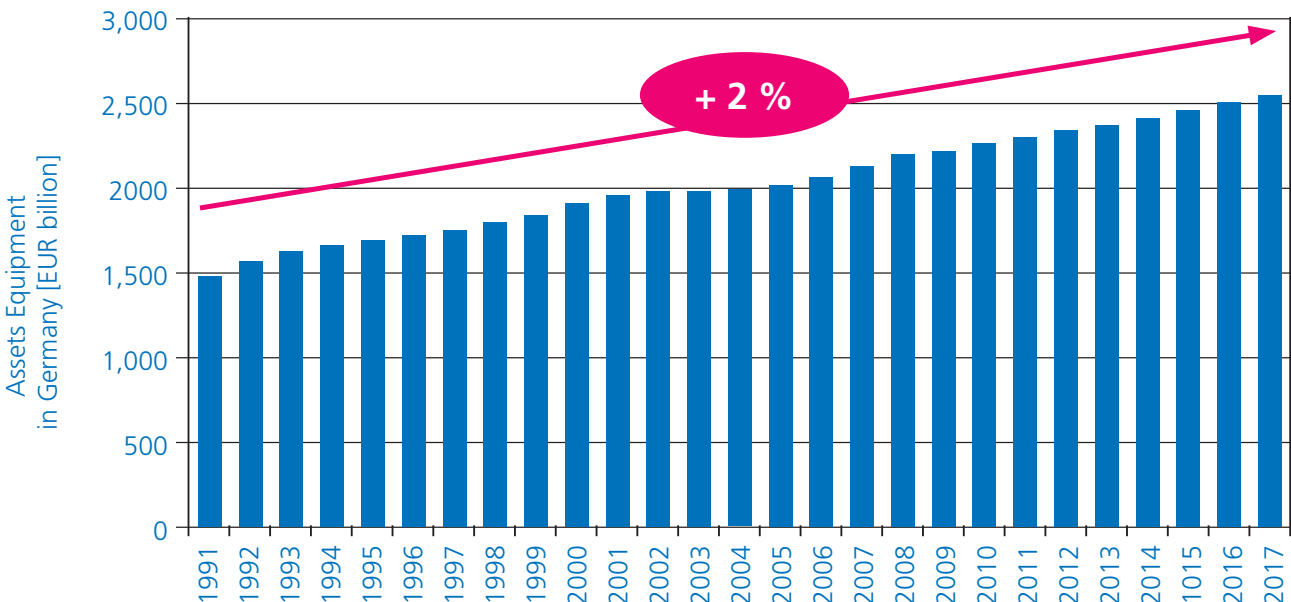


Figure 1: Equipment assets in the Federal Republic of Germany [billion euros] (STATISTISCHES BUNDESAMT 2018, p. 8)

<sup>1</sup> Vehicles, machinery and equipment, information and communication technology (ICT)

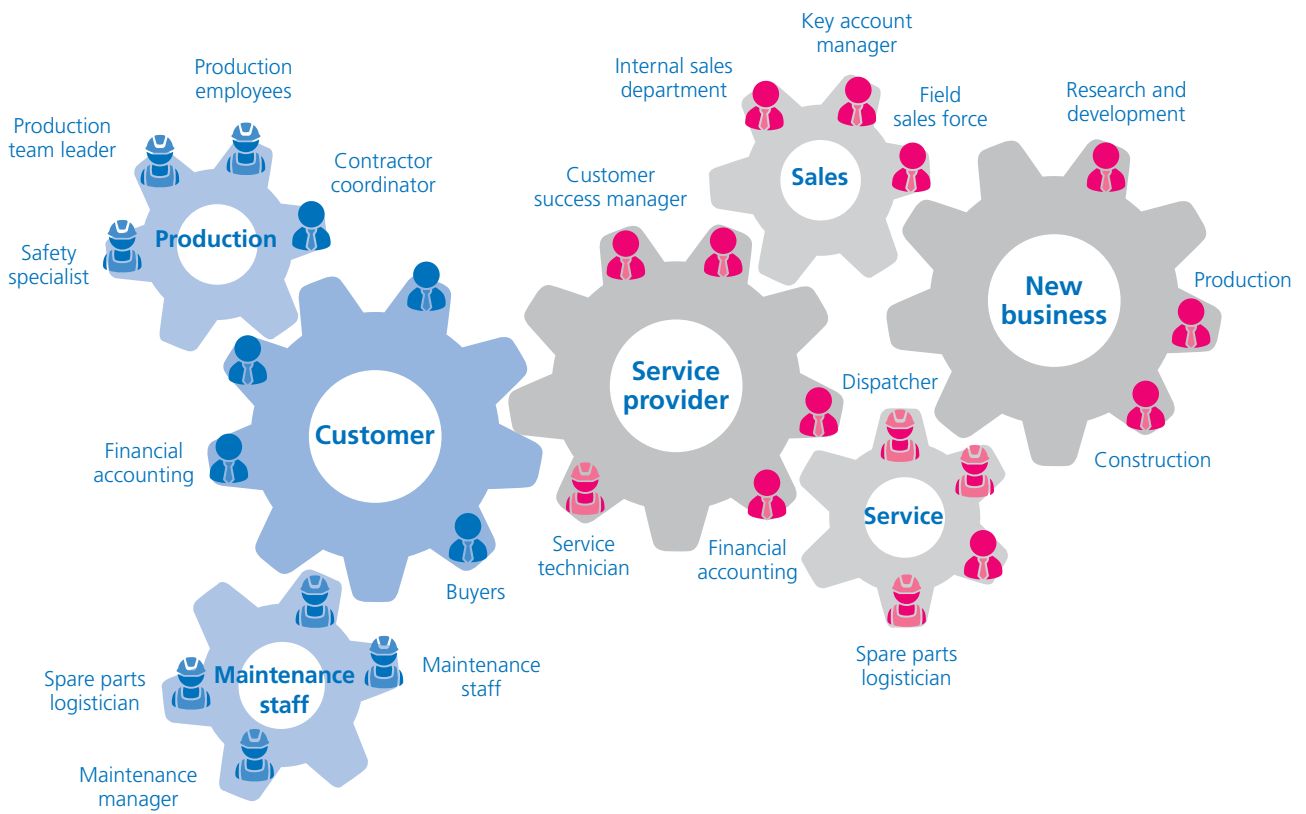


Figure 2: Customer stakeholders and service providers (selection)



## 2 Service technicians: the customer's best friend

The focus is naturally on smooth cooperation with the customer. The process that the customer goes through before, during and after the purchase of a machine or system is also known as the customer journey. This is connected in parallel to the asset lifecycle, but starts earlier and ideally does not end with the discontinuation of the asset, but aims to ensure an ongoing supplier-customer relationship. This offers the opportunity to build a relationship of trust and to obtain information about the challenges and special features of the customer. In the course of the customer journey and asset life cycle (see figure 3), the customer's primary contact persons change from sales (grey) to service (blue).

Depending on the company structure, the service technician acts as the central contact person for the customer during the utilization phase. Over time, the service technician acquires the trust of the customer and sometimes maintains long-term, at times even friendly relationships. This enables an open and honest exchange between service technician and customer. However, not all problems and challenges that the service technician could solve at the customer's site are communicated by the customer. In most cases, however, this is not out of restraint or shame, but mainly because the customer is not aware of the service provider's portfolio. The customer often perceives service technicians as experts within a very specific and narrow specialist area, and in larger companies the service technician also has no overview of the company's entire service portfolio.

The service technician therefore has the task of recording customer information at various organizational levels and distributing this information in the best possible way within the company's own sales and service organization. The difficulty lies in resolving the existing information asymmetries (see figure 4, p. 8). There are considerable silos of information within the customer community and within the own service organization as well as between the companies, which have to be dissolved. Picture 4 (see p. 8) is based on the "Iceberg of Ignorance" by YOSHIDA from 1989. YOSHIDA uses this image to describe how information about production problems within the company is reduced at the communication barriers of each hierarchical level until only a fraction of the relevant information reaches top management. The same effect occurs at interfaces between companies. The service technician, who has a good knowledge of the location and plant, can put the information gained into the right context and evaluate it. In this way, existing problems (e.g. malfunctions in the production process) and requirements (e.g. planned capacity expansions) of the customer can be identified at an early stage and can be specifically addressed by the service provider through suitable service (e.g. predictive maintenance, condition monitoring) and product offers (e.g. additional machines or modules). It is important to differentiate whether the service technician is allowed to offer certain components and services independently and from when on he should only forward information (lead generation) to the right place in the company.

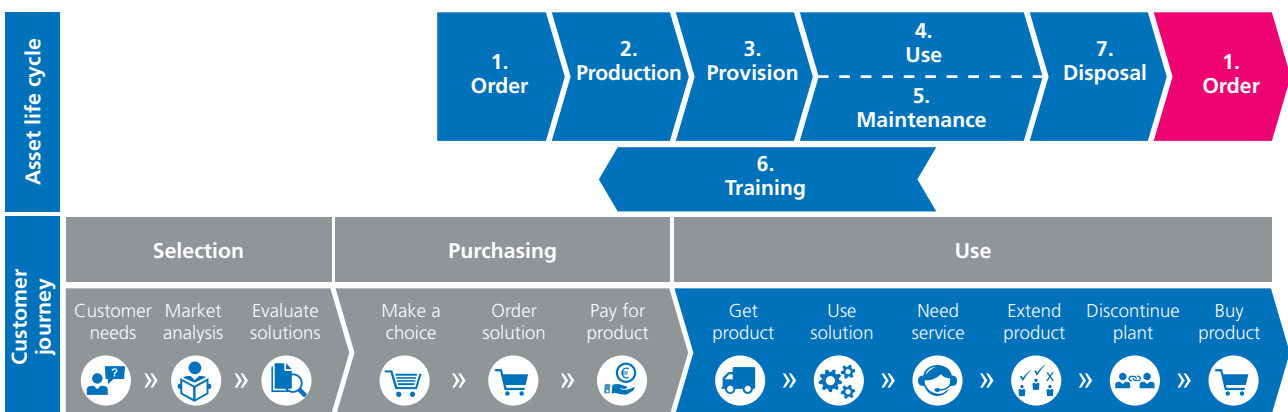


Figure 3: Customer journey in connection with the asset life cycle according to DIN SPEC 91345 (DIN SPEC 91345, p. 11)

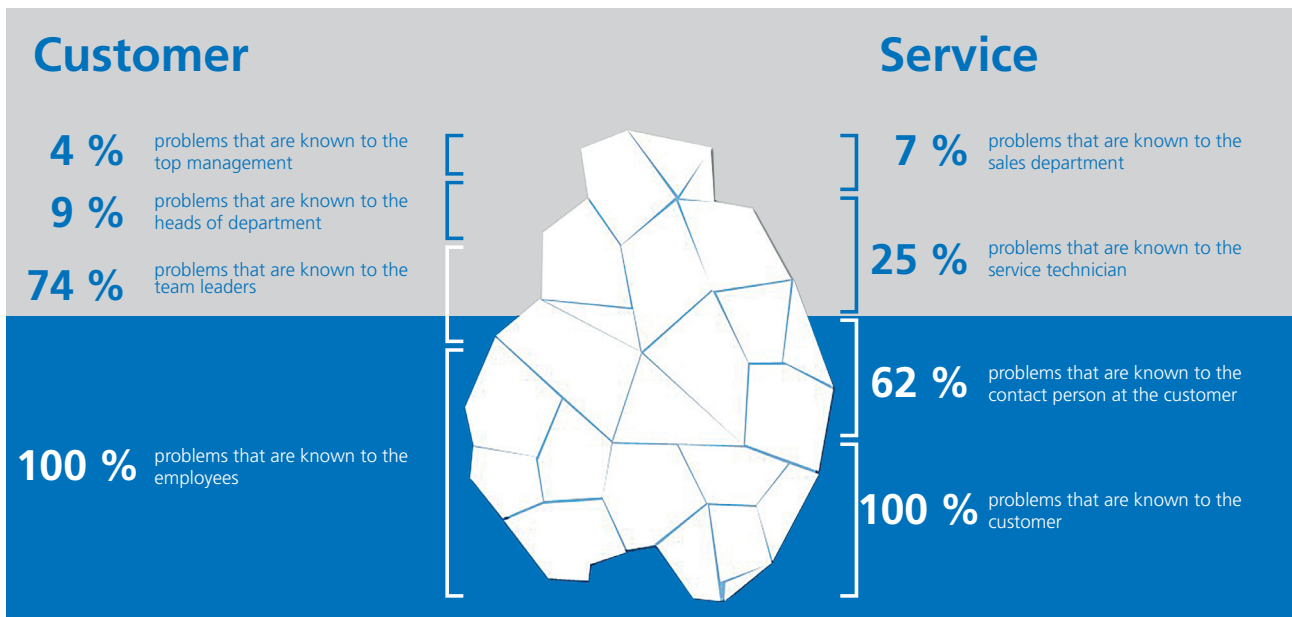


Figure 4: Iceberg of service ignorance (own representation following YOSHIDA (1989), cited in CHAKRAPANI 1991, p. 1)

In most companies, however, the potential that exists in the close cooperation between the service technician and the customer is not fully exploited. This has a lot to do with the expert position of the service technician, which leads to the fact that in the service technician's self-perception there are reservations about sales activities. In general, there are three main reasons why it is more difficult for service technicians to establish themselves in the sale of other products and services (see figure 5):

**Technician:** Due to the expert position of the service technician, he enjoys a lot of recognition from his customers. He solves problems and overcomes challenges that the customer cannot solve and master on his own. This specific expertise, however, means that in some cases he lacks general knowledge about the complete service portfolio of his company and therefore cannot or will not recommend additional products or services.

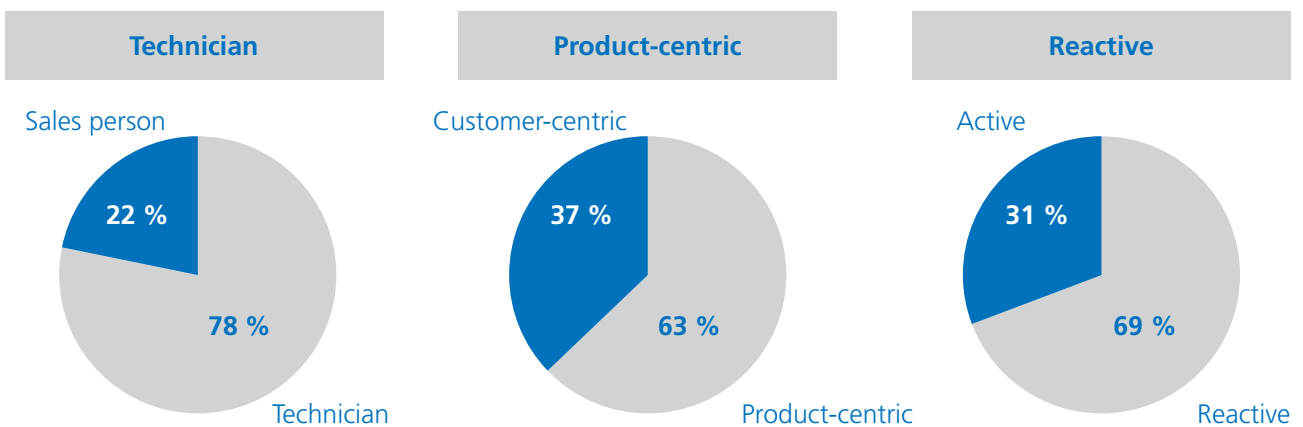


Figure 5: Characteristics of service technicians (MERCURI INTERNATIONAL 2013, p. 10)



**Product-centric:** In the service technician's perception, he himself is primarily responsible for the specific **product or problem** for which he was called. Accordingly, he concentrates on the efficient processing of his orders and has little time and awareness for the other challenges of the customer. This is reinforced by the fact that the time pressure for service technicians is constantly increasing and in many cases the documentation and acquisition of necessary information is too cumbersome. This means that freedom within the process and efficient ways of gathering information must be created.

**Reactiv:** The service technician is usually in a reactive "fire brigade" situation, where he is called by the customer and has to solve the problem as quickly as possible. Because he sees himself as a friend and helper of the customer, he usually lacks the time and awareness that he could sell additional products and services. These additional sales would not only solve the problem, but possibly also the cause.

These three main causes of the more difficult sales activities of service technicians result in five necessary fields of action. These are closely linked and are intended to enable the service technician to increase his sales activities (see figure 6). Not only are far-reaching changes needed in the awareness of service technicians, but also within the entire organization. Only by closely linking departments and processes can the full potential of service be developed in interaction. The following fields of action are derived accordingly:

- **Organization:** In many organizations, the importance of service is subordinate to new business, and this is also reflected in the organization charts of the companies. The importance of service must be increased for more effective cooperation.
- **Processes:** The silo thinking of many companies is firmly anchored in their processes. These are often characterized by the fact that there is little scope for more than the immediate fulfilment of the service order and information has to be fed into a multitude of data systems without any links. The processes must be adapted and linked in such a way that sales activities become an original part of the service.
- **Skills:** The skills requirements of the service technician in many job advertisements and further training offers are often limited to technical expertise and must be adapted to the extended job profile of a proactive sales-qualified service technician.
- **Target system:** A clear target system for the department offers employees the opportunity to better understand the demands placed on them and at the same time to better present their performance in the company context.
- **Incentive system:** The defined requirements must be translated into an individual incentive for the employees so that sales activities are actually carried out.

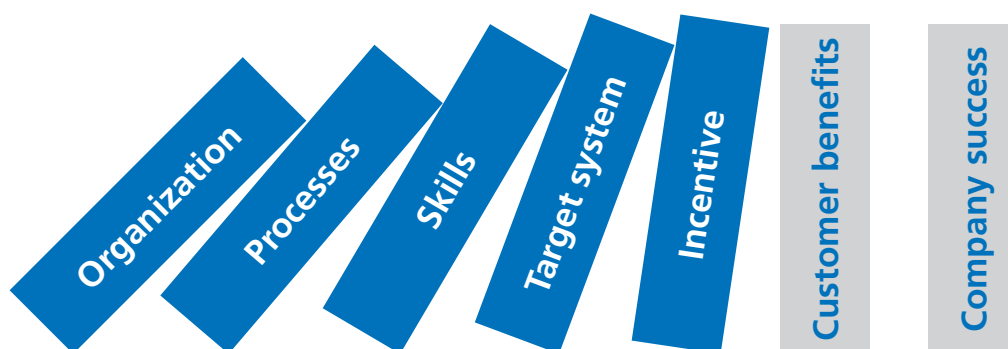


Figure 6: Building blocks of a functioning service organization



### 3 Organization: Creating the right environment for service

The organizational embedding of service in many companies in the mechanical and plant engineering sector has so far been strongly influenced by the product business. With an increase in the share of service sales, the role that service plays within the company will change accordingly. In order for the potential of service to unfold, the service business must be more strongly separated from the product business in organizational terms. The managers of both areas must be anchored at the same hierarchical level so that both areas generate sales and are not added to them as a favor to the respective sales department at no cost or with a large discount. There is certainly not always a suitable blueprint for an organization, as this depends heavily on the size of the company, the product groups sold, the industry and the organization of the customer. Not to be underestimated here is the cultural change that must be undergone in the

company during a far-reaching restructuring. The equalization of the service area goes hand in hand with the fact that it must be established as a profit center and thus, in addition to budget responsibility, must also be given responsibility for achieving sales and profit targets. However, it is important to create a common understanding of culture and goals within the company so that a synchronized strategy can be coordinated between the departments. The aim must be to prevent cannibalization of new or service business. In addition, a proactive sales force lives from the smooth flow of information between departments. Service within companies in the mechanical and plant engineering sector must be established as a further product group (see figure 7). This includes, for example, in-house product managers who develop service packages and suitable products and synchronize these with new business.

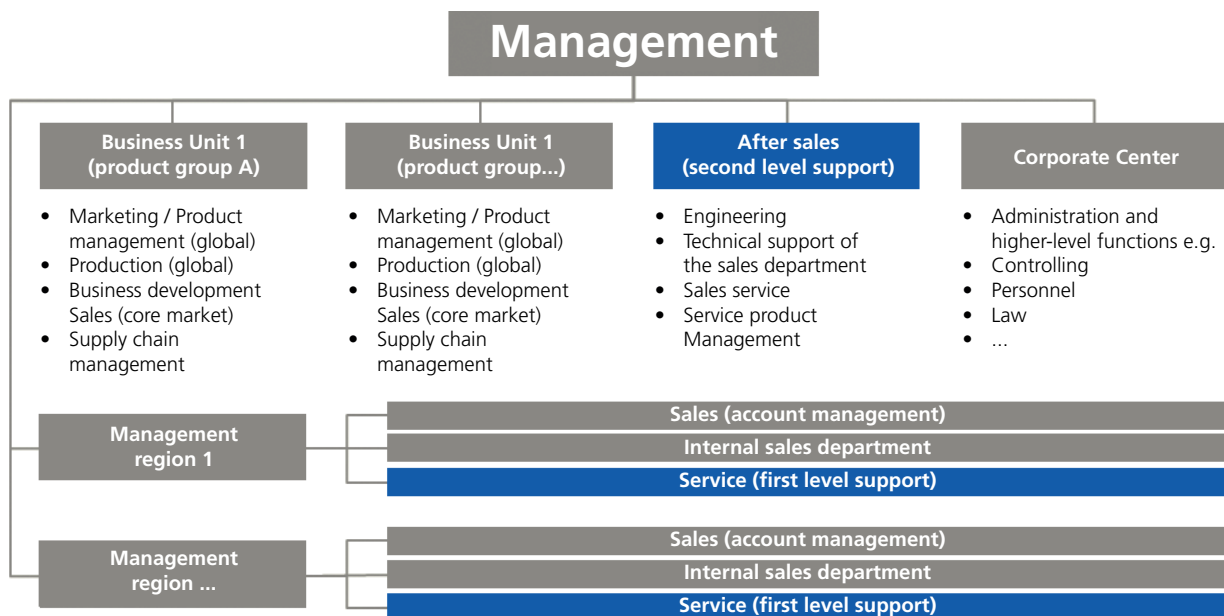


Figure 7: Possible organizational structure in mechanical and plant engineering

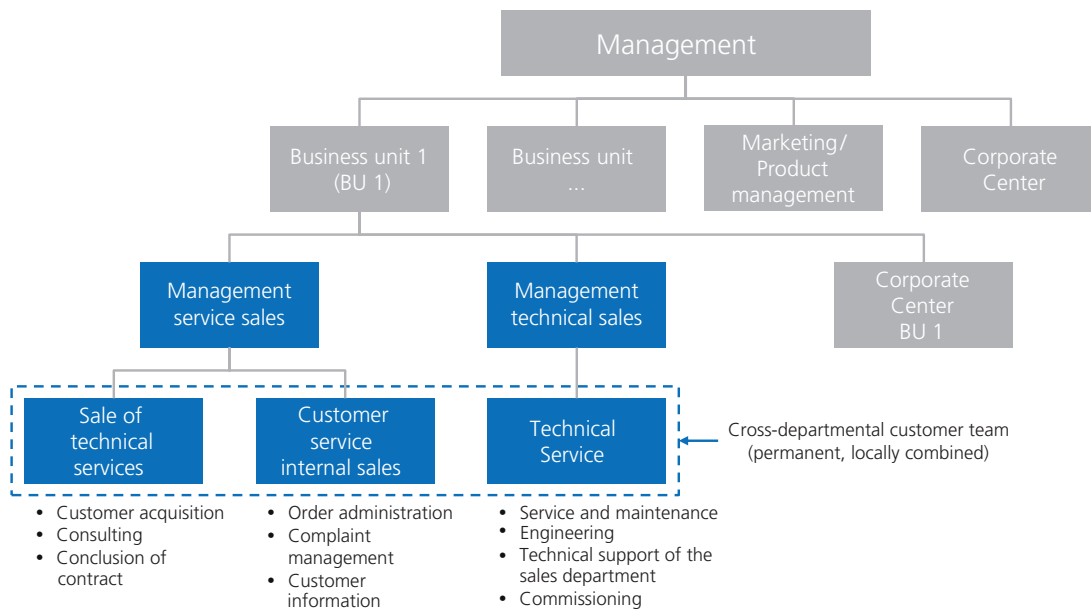


Figure 8: Exemplary organizational structure for a technical service provider

For technical service providers for whom technical service is the primary business area, for example, the alignment of business units according to geographical aspects can play a greater role than for product business (see figure 8). The larger the company, the more likely there are hybrid forms between a product- and geography-based organization chart.

Ideally, the customer does not notice anything of the internal structure of the service provider, as his inquiries and challenges are addressed quickly and competently. Since customer requirements are diverse and can involve many stakeholders, smooth interdepartmental communication, clear responsibilities and clearly defined interfaces must be ensured by the service processes.

## 4 Processes: Identify, organize and design

Information logistics is of particular importance for the generation of information and the proactive approach to the customer. With regard to the quality of the installed base, the following four dimensions are particularly important:

- **Demarcation:** Is the information clearly differentiable and assignable?
- **Data management:** Is the information easily accessible in a common database?
- **Data quality:** Is the information correct and does it contain sufficient detail?
- **Use of the information:** Can the information be used by at least one stakeholder?

The challenge is to integrate both the use and the generation of information process-wise in such a way that it generates little effort and high benefits. The “7 rights” of logistics, which were defined by PLOWMAN in 1964, apply not only to goods logistics but analogously also to the provision of information: The right information (1.) must be available in the right quantity (2.) in the right quality (3.) for the right addressee (4.) at the right time (5.) in the right place (6.) and at the right cost (7.) (see PLOWMAN 1962, p. 2).

For service technicians, many requirements are derived from the following scenarios:

- **Sales Product:** The service technician sells a product / spare part directly to the customer, which he either has with him or can order directly.
- **Sales Service:** The service technician sells a service directly to the customer, which he either carries out directly or can order and schedule directly.
- **Generate Lead (internal):** The service technician forwards a customer inquiry or challenge from the customer to the sales department or another service department.
- **Generate Lead (external):** The service technician forwards a customer inquiry or a challenge from the customer to a company in his own partner network.
- **Generate information (general):** The service technician adds or generates new information, for example in the customer’s technical base.

The information flows of the scenarios are very different, depending on which stakeholder is involved, which product, service or information is generated or sold and how urgent the request is. However, it is not only the generation of information that is important for the service technician’s work, but also the context-based provision of the right information for the technician himself.

To provide the right and useful information, a business analytics solution is a good choice. This supports the service technician in identifying and communicating customer and situation-specific product or service offers flexibly at the customer’s site (LEE ET AL. 2014).

The service technician should forward all recorded information. These are used by the business analytics tool for calculation and can serve as leads for sales. These leads can take different forms; for example, a service call can be generated when the service technician encounters machines on site that require it. Otherwise, the service technician could offer the customer the supply of spare parts or a special service such as customer training or the dismantling of a machine. If the service technician notices outdated machines, he could also generate the lead for a retrofit.

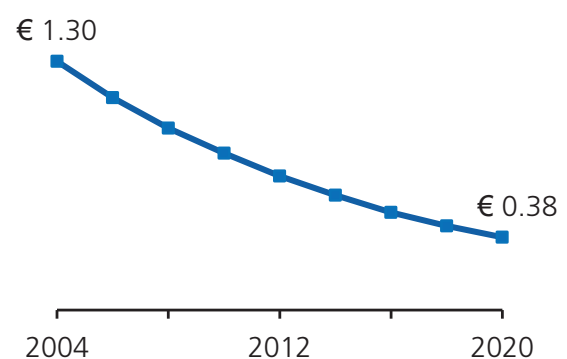


Figure 9: Cost development for IoT sensors (GOLDMAN SACHS (2016), cited in HAVARD 2017)

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The provision of such information requires the collection, processing and intelligent analysis of meaningful data (business analytics). For example, analyses of customer and application-specific operating and environmental influences (e.g. degree of machine utilization, machine settings, number of units produced, drive torque, temperature, humidity) and their interactions with each other (so-called load collectives) can provide early insights into malfunctions, production errors, component wear or optimization needs in the production process. This knowledge in turn provides starting points for concrete and specific product or service offers (e.g. additional modules, spare parts, maintenance contracts). Even unstructured data, e.g. from service logs or documented customer complaints, can be made available for analysis. Against this background, in addition to a purely company-specific data aggregation and analysis, a cross-company aggregation and analysis of data in particular offers potential for identifying product or service offerings. For example, findings on component wear of a machine at comparable customers and load collectives could be transferred to the present, customer-specific machine application scenario (see CHEN ET AL. 2012, pp. 1172 – 1176).

Due to the increasing use of sensor technology in the production process and continuous digitization of processes, a large amount of data can already be accessed today. However, the concrete implementation and execution of business analytics for the provision of customer and situation-specific sales information requires distinctive expertise. Thus, already during data collection decisions have to be made regarding data selection, handling of missing data, conversion of differently scaled data or handling of outliers. The analysis itself requires the selection of the best algorithm for the problem in order to obtain the desired results. Due to the complexity of the analysis, the use of this data has therefore been limited so far (see DELOITTE 2014, p. 5).

Useful data and data sources are:

- **Data from the service:** Which machines does the customer use? Which material does he process in which quantities? What problems do you encounter? Which services does the customer receive and to what extent? To answer these and other questions, e.g. customer machine data, service protocols, contracts etc. can be analyzed.
- **Data from sales:** Are there customers who have similar production processes? How were problems with them solved? Which services have proven successful for them?

To answer these and other questions e.g. machine data of similar customers, customer complaints, sales records etc. can be analyzed.

- **External data:** What solutions do competitors offer their customers? Which products and services are currently in high demand? To answer these and other questions e.g. internet forums, advertisements of competitors, company databases etc. can be analyzed.

A structured process is required to provide this information via a business analytics tool. First, a selection of services is used to identify reasons for buying (causes), which provide the impulse or incentive for the customer to buy (effect). These reasons for purchase must be made measurable by means of characteristics. The characteristics can be specified using various data. An example of the service offer “Maintenance, repair” and the reason for purchase “Regular maintenance reduces maintenance costs” is shown in figure 10 (see p. 15).

For the individual data, it must be defined from which data source they originate, whether they are available, and if they are not available, which data source is required for this.

The central challenge within the framework of the business analytics tool is the selection of a suitable algorithm. In the context of service and product recommendation, the so-called XGBoost is a very useful algorithm, which is also applicable in open source software, such as KNIME. The XGBoost is an algorithm based on the decision tree that can calculate multiclass forecasts and is implemented in KNIME. The name XGBoost stands for “eXtreme Gradient Boosting”. It is an algorithm for supervised machine learning within a decision tree. With XGBoost, target variables can be more accurately determined by combining several simpler and weaker models and making estimates. The target variables are the individual service and product offers or the recommendation of these offers. Machine learning generates knowledge from existing data and experience. Rules and regularities are found from which recommendations for action can be derived. A big advantage of XGBoost over other algorithms is that it can give several recommendations at the same time, also as a ranking. A classical decision tree, on the other hand, only calculates one recommendation (see CHEN and GUESTRIN 2016, pp. 785 – 787).

An algorithm should in principle be **correct**, universal, efficient and simple. Correctness is given when the result of the algorithm corresponds to reality (data). **Universality**

| Service offer: Maintenance, preventive maintenance, inspection |                             |                               |                           |        |                |                    |                                 |
|--|-----------------------------|-------------------------------|---------------------------|--------|----------------|--------------------|---------------------------------|
| Reason for purchase  | Characteristic              | Data to be used               | Data source               | Origin | Data available | Data not available | If not available:               |
|  |                             |                               |                           |        |                |                    | What is needed to get the data? |
| Regular maintenance reduces maintenance costs                  | Replacement of wearing part | Plant availability            | From the service          | MES    | X              |                    |                                 |
|  | Functional tests            | Wear tools                    | External                  |        |                | X                  | MDE                             |
|  |                             | Cost ratio maintenance/repair | From the sales department | CRM    | X              |                    |                                 |

Figure 10: Data compendium using the example of the “Maintenance and repair” service

requires that an algorithm be adaptable to different scenarios. **Efficiency** is achieved through short runtime and **simplicity** through good readability, validation and adaptability. In addition, there are special criteria that the algorithm should meet in order to be used in practice. The requirements of an algorithm for given data differ depending on the method. Logistic regressions, for example, calculate with dichotomous dependent variables, while neural networks require a large amount of data to be able to train themselves. The handling of missing values must also be considered. In addition, the algorithm should be easy to interpret, on the one hand to meet with acceptance among service employees and on the other hand to show comprehensible arguments for a purchase. For this it is additionally advantageous if the algorithm is comprehensible. In order to use a sales service tool successfully, the effort of the calculation must not be too high. This means that a selected algorithm can be applied and evaluated even by an inexperienced employee after a short training period. Therefore, it must also be possible to use open source software such as KNIME for the calculation.

A final criterion is the benefit of the algorithm. It depends on the extent to which the evaluation provides exactly the output that is needed and how accurate predictions are made. A cluster analysis, for example, divides a data set according to criteria that have not been determined beforehand and will deliver a very imprecise result that

requires interpretation, whereas a neural network calculates very precise recommendations for action (see GÜTING and DIEKER 2018, p. 5f.).

In addition to the interchangeability and standardization of the information flow through algorithms, which offer great advantages, the personal level must never be neglected. Especially in service, the customer not only buys man-days or spare parts, but also implicitly a good feeling, because he is convinced that the contact person can solve the problem in the best possible way. It is therefore important to consider not only qualifications, geographical proximity, etc. but also staff constancy within the disposition process.

# 5 Skills: Job requirements service technician

The tasks for and thus the demands on service technicians and service engineers are manifold. They range from the classic (dis)assembly, repair and commissioning of machines to customer training and the development of customer-specific individual solutions. For a competence development and qualification of the service technician, a requirements analysis, the derivation of measures as well as the implementation and subsequent iteration in practical operation are necessary (see figure 11). Currently, the job advertisements for service technicians primarily focus on technical skills. In many cases, this ignores softer skills that are necessary for sales, such as customer-oriented work. As the job profile of service technician changes, their knowledge and skills must be adapted and expanded accordingly. The knowledge atlas of ERPENBECK and HEYSE offers an overview of possible knowledge (see ERPENBECK and HEYSE 2007). These are assigned to the current and extended tasks of the service technician in the following table.

The development of the service technician's skills must be supported by appropriate measures. This includes the following examples:

- **Create incentives:** Competence development is closely linked to employee motivation. For example, measures to promote skills are problematic for unmotivated employees. Since appropriate incentives are of outstanding importance not only for

competence development but also for the operational implementation of the service process, reference is made here to the two following chapters "System of objectives and indicators" (see p. 19 ff.) and "Incentive system" (see p. 23 ff.).

- **Hiring experts:** One way to create the competencies within the department is to hire a suitably qualified person. An exemplary job description is shown in figure 13 (see p. 18).
- **Offer training courses:** Sales competencies can be learned by anyone. The basis for this is an honest interest in the customer and knowledge of the service portfolio of the own company. By mixing different forms of learning (presence, on-line, etc.), content can be taught at low cost and at the respective pace of the learner.
- **Playbooks:** Playbooks are a good way of anticipating typical customer questions and suitable answers and having them "in the field". As practical guidelines for action, they offer the opportunity to make the knowledge of experienced sales staff and product managers available to a large number of employees in a simple and understandable way.
- **Mentoring:** Direct 1-to-1 instruction of the service technician by a sales representative is the most effective way to impart knowledge. However, in most cases it is only useful in combination with other development measures, as mentoring usually involves a great deal of time and effort.



Figure 11: Competence development of service technicians



| Task   | Necessary competences   | Responsibility/ Powers  | Objective   |
|--|---|---|---|
| Assembly, installation and commissioning of machines   | <ul style="list-style-type: none"> <li>o Self-responsibility</li> <li>o Holistic thinking</li> <li>o Mobility</li> <li>o Systematic-methodical approach</li> <li>o Analytics</li> <li>o Expertise</li> </ul>                              | Traditional activity of a service technician  | <ul style="list-style-type: none"> <li>• Smooth operation for the customer</li> <li>• Immediate and problem-free use of new machines</li> </ul>   |
| Maintenance, repair, inspection of machines and plants                                       | <ul style="list-style-type: none"> <li>o Holistic thinking</li> <li>o Mobility</li> <li>o Ready for use</li> <li>o Problem-solving ability</li> <li>o Systematic-methodical approach</li> <li>o Analytics</li> <li>o Expertise</li> </ul> | Traditional activity of a service technician  | <ul style="list-style-type: none"> <li>• Guarantee optimal function</li> <li>• Minimize downtime</li> </ul>   |
| Customer service   | <ul style="list-style-type: none"> <li>o Readiness to help</li> <li>o Result-oriented action</li> <li>o Problem-solving ability</li> <li>o Consulting capability</li> <li>o Expertise</li> </ul>  | Responsibility for the maintenance and care of customer relations                                   | <ul style="list-style-type: none"> <li>• Primary technical contact</li> <li>• Comprehensive support of the customer in all technical questions (focus on plant optimization)</li> </ul> |
| System trainings and instruction of customers in the use of the products, managing workshops | <ul style="list-style-type: none"> <li>o Readiness to help</li> <li>o Mobility</li> <li>o Goal-oriented leadership</li> <li>o Communication strength</li> <li>o Expertise</li> </ul>  | Responsibility for the maintenance and care of customer relations                                   | <ul style="list-style-type: none"> <li>• Primary technical contact</li> <li>• Comprehensive support of the customer in all technical questions (focus on plant optimization)</li> </ul> |
| Participation in the development of individual solutions for the customer                    | <ul style="list-style-type: none"> <li>o Holistic thinking</li> <li>o Innovativeness</li> <li>o Problem solving ability</li> <li>o Expertise</li> </ul>   | Upgrading of the job profile by integrating opportunities for development and scope for action      | Satisfying customer needs by using the knowledge of the service technicians   |
| Documentation of the data collected in operations in a service analytics tool                | <ul style="list-style-type: none"> <li>o Discipline</li> <li>o Energy</li> <li>o Conscientiousness</li> <li>o Interdisciplinary knowledge</li> </ul>  | Responsibility for the collection of information  | Facilitating the acquisition of new orders  |
| Support in generating new orders, supported by a service analytics tool                      | <ul style="list-style-type: none"> <li>o Ready for use</li> <li>o Initiative</li> <li>o Acquisition strength</li> <li>o Interdisciplinary knowledge</li> </ul>  | Assumption of part of the responsibility for own future assignments through independent acquisition | Exploiting the sales potential on the basis of customer proximity and trust   |

Figure 12: Tasks and necessary competencies of the service technician



## Service technician (m/f/d)

**Topic:** Service technician / service engineer for worldwide use in mechanical and plant engineering

**Start:** Immediately

**Area:** Service Management

**Task definition:**

As an important contact person for the customer, you are responsible for the competent and reliable execution of the tasks at hand. In addition, you will be able to respond confidently to the customer's requirements and have an open ear for his current challenges. Your self-image as a customer-oriented solution provider and your curiosity about current technical developments will help you to stay up to date.

In detail, the following tasks are to be processed:

- Assembly, installation and commissioning of machines or plants, as well as their maintenance, repair and inspection
- Customer service and maintenance
- Execution of system training and instruction of customers in handling the products
- Management of improvement or requirements workshops, as well as participation in the development of individual solutions for the customer
- Documentation of the data collected on customer deployments in a service analytics tool
- Support in the generation of new orders, supported by a service analytics tool

**Requirements:**

- Technical expertise (mechanics, electrics)
- Strong problem-solving and diagnostic skills
- Very good knowledge of German and English, written and spoken
- Safe handling of IT applications
- Committed, team-oriented and independent way of working

If you are interested, please send us your documents (short cover letter, curriculum vitae, certificates) in digital form to the e-mail address provided.

**Contact person:**

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Figure 13: Sample job advertisement for a service technician in mechanical and plant engineering

## 6 Target system: Making performance measurable

Strategic goals describe a targeted state of the company. Concrete measures are needed to achieve this state. These are summarized in an action plan and synchronized between the stakeholders. For this purpose, we first define the strategic goals, which are then concretized for the individual departments and translated into corresponding concrete target agreements for employees.

### Formulate strategic goals

The challenge in formulating targets is to select the right targets and to limit their number to a number that allows a meaningful allocation of resources. As a rule, five to eight strategic goals are assumed, which can be processed in parallel. Strategic goals within a company are best derived using SWOT analysis. In this analysis, both the characteristics (strengths, weaknesses) of the company as well as the market and technology environment (opportunities, risks) are taken into account; from this, fields of action and a target vision can then be reliably derived.

The SWOT analysis is carried out in workshops, in which all participants should actively participate. The group of participants should consist of both internal and external staff. The involvement of external parties (consultants, customers,

suppliers, etc.) who know the market environment well ensures an objective view of the company and external impulses can be used for the further development of the company. Furthermore, moderation is of decisive importance for the workshops' success. Especially the search for strengths and weaknesses is often used to clarify a possible "blame issue" between departments or stakeholders. This is not conducive to the joint development of strategies. The task of SWOT analysis is not to clarify differences within the company and between individuals.

It is important here that the objectives are not formulated in such a concrete way that they represent instructions for action. The goals should describe the desired final state of the company after the process and not define the way there in detail. If targets are set too concretely, this reduces the scope for action of the employees concerned. Consequently, specificities and developments in implementation cannot be sufficiently addressed.

Another important aspect is that the middle management level (e.g. heads of department) must be involved in the concrete definition of the goals of their department. In order to achieve this, the overriding corporate goals are broken down and concretized jointly for the various departments.

|          |               | Internal                                    |  |
|----------|---------------|---|--|
|          |               | Strengths                                   | Weaknesses   |
| External | Opportunities | What opportunities arise from my strengths? | Which weaknesses do I have to minimize in order to be able to take advantage of opportunities? |
|          | Risks         | What risks can I cushion with my strengths? | Which weaknesses do I have to minimize so that my risks remain controllable?                   |

Figure 14: Structure of the SWOT analysis

Company goals can be presented in concrete terms with the help of the balanced scorecard (BSC). It depicts the complexity of a company via the four target dimensions of **finance**, **internal processes**, **learning & development** and **customers** (see figure 15). It thus forms a regulatory framework that enables better

control of the company. For the BSC, the objectives within the four dimensions mentioned above are formulated in concrete terms and backed up with key performance indicators. The targets should meet the five “SMART” criteria (specific, measurable, attractive, realistic, timed).

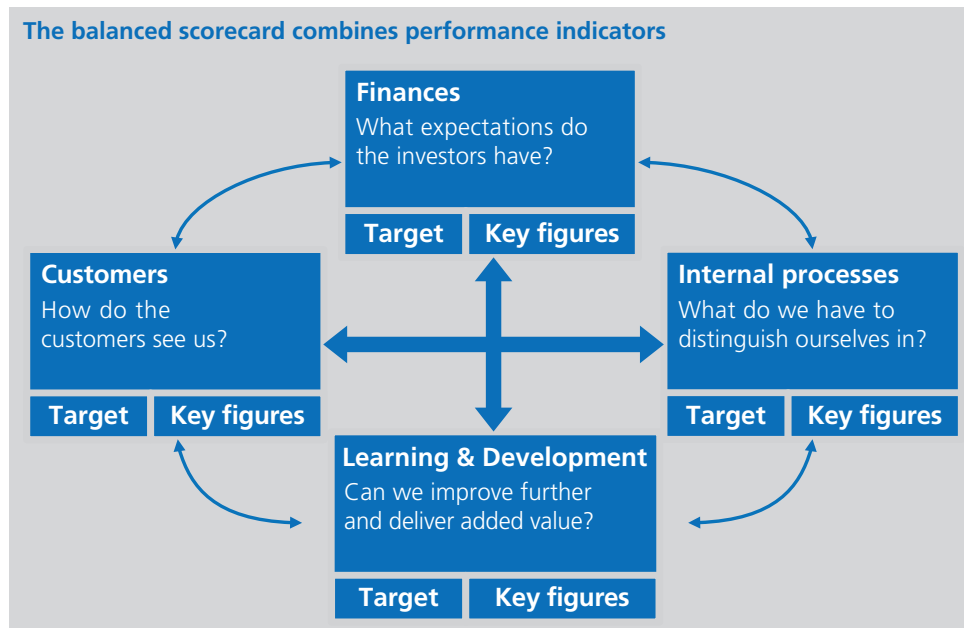


Figure 15: Structure of the balanced scorecard

For the BSC, the goals within the four dimensions are formulated in concrete terms and backed up with key figures. The objectives should meet the five “SMART” criteria (specific, measurable, attractive, realistic, timed).

Care should be taken to ensure that the key figures do not consist solely of financial indicators. The reason for this is that financial indicators always show developments with a delay, as they are usually available downstream of the actual cause. However, process, customer and development indicators can be used to supplement these. There are countless key performance indicators that are more or less meaningful. Figure 16 (see p. 21) shows a selection of service-relevant key performance indicators to illustrate the range of possibilities.

EA good selection of key figures is crucial for effective management of the company. To make the objectives tangible for all departments and to synchronize them between departments, separate Balanced Scorecards must be created

for each department. This process is called “cascading”, as it builds on the BSC at the next higher level and is then concretized for the individual departments.

#### Concretize targets for departments

The procedure for concretizing the goals for the individual departments is analogous to the procedure for the entire company (combination of SWOT and BSC). Here, too, a SWOT analysis is useful at the beginning in order to be able to address both department-specific strengths and weaknesses as well as external opportunities and risks. Especially when creating the BSC for the service department, a focus must be placed on the customer, internal processes as well as development, since potential challenges must be identified quickly. Especially in service, the most important customer interface, challenges with products and market changes become visible very fast. A quick and level-headed reaction, which can only be reliably chosen on the basis of the right information and indicators, is necessary.

| Key Figure                                | Formula   |
|---|---|
| <b>Finances</b>                           |   |
| Growth service revenue                    | $\frac{\text{Service revenue in DoD}^1}{\text{Service revenue in BP}^2} * 100$                      |
| Growth existing customer revenue          | $\frac{\text{Existing customer revenue in DoD}}{\text{Existing customer revenue in BP}} * 100$      |
| Growth new customer revenue               | $\frac{\text{New customer revenue in DoD}}{\text{New customer revenue in BP}} * 100$                |
| <b>Customers</b>                          |   |
| Development of customer numbers           | $\frac{\text{Customer number in DoD}}{\text{Customer number in BP}} * 100$                          |
| Customer penetration                      | $\frac{\text{Customer revenue}}{\text{Maximum possible customer revenue}} * 100$                    |
| Customer churn rate                       | $\frac{\text{Number of customers lost in OP}^3}{\text{Average customer base}} * 100$                |
| <b>Internal processes</b>                 |   |
| Time for tender preparation               | $\frac{\sum (\text{time}(\text{request}) - \text{time}(\text{tender/rejection}))}{\text{requests}}$ |
| Offer acceptance rate service technicians | $\frac{\text{Number of orders achieved}}{\text{Number of tenders made}} * 100$                      |
| <b>Learning &amp; developing</b>          |   |
| Employees' sick rate                      | $\frac{\text{Total number of sick days}}{\text{number of tariff working days}} * 100$               |
| Employees' turnover rate                  | $\frac{\text{Number of employees leaving in OP}}{\text{Total number of employees}} * 100$           |

Figure 16: Examples of key performance indicators in service (extract)

<sup>1</sup> Date of determination

<sup>2</sup> Base period

<sup>3</sup> Observation period

### Target agreement for employees

For the target agreement of the individual employee, specific goals must be defined and weighted among each other with regard to the incentive system. These individual goals serve as an aid for the employee in answering questions such as “What are the focal points of my work” or “Where is the current strategic focus of the company or my department?” (see figure 17).

In order to establish a link to the company and departmental context, it is a good idea not only to reward individual performance, but to create overarching incentives that are oriented towards the entire company. For this purpose, targets for employees can be selected from the balanced scorecards of the company and the department, which are also included in the individual target agreement. The job profile and the hierarchical level of the employee have an influence on the relationship between personal goals and overarching goals. The higher the person is positioned in the hierarchy, the more individualistic goals must take a back seat.

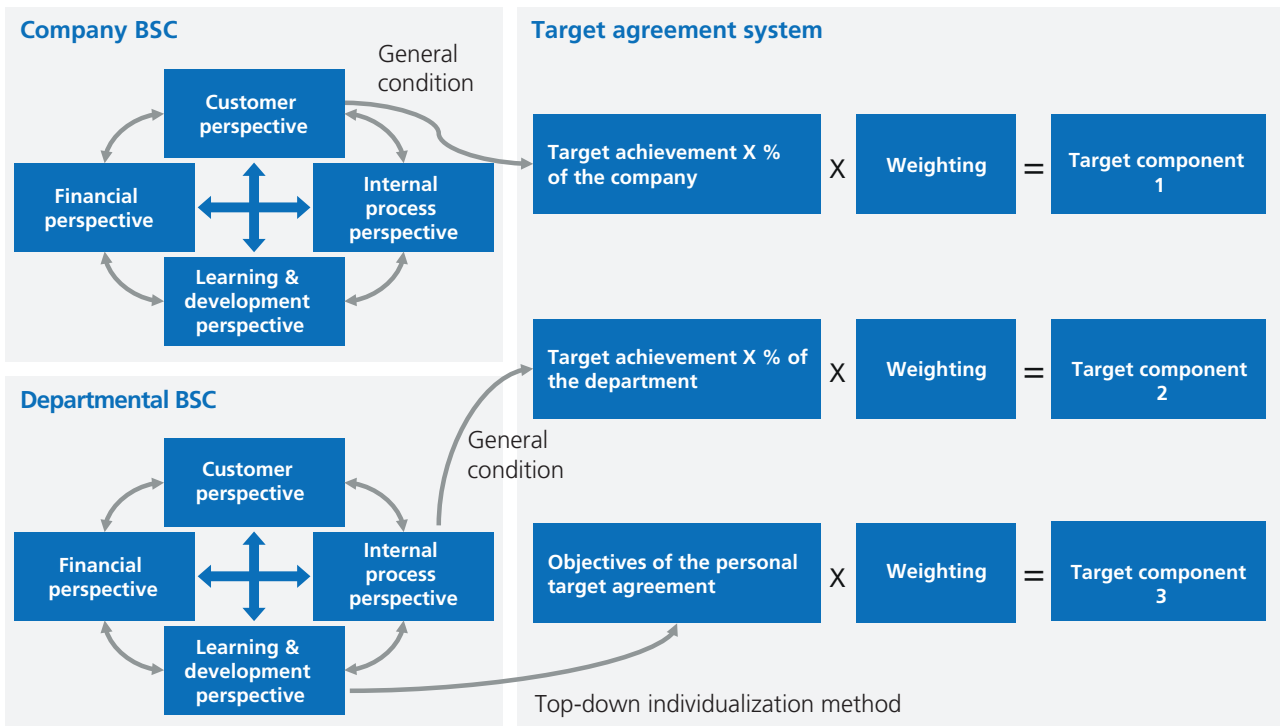


Figure 17: Transfer of company and departmental goals into an individual target agreement

## 7 Incentive system: Motivating employees

The motivation of the service technician represents a significant success factor for all activities to be performed. There are two types of motivation:

- **Intrinsic motivation:** This form of motivation is triggered by an inner urge, which expresses itself, for example, in curiosity and perfectionism. The more complex and responsible the activity to be performed, the more important this form of motivation becomes.
- **Extrinsic motivation:** This form of motivation is caused by an external influence, which for example consists of additional financial incentives or the promise of a promotion. This form of motivation involves the challenge that the external influence is quickly taken for granted and loses its motivating effect (habituation).

Both forms are dependent on a whole range of influences. Two important components are the nature and framework conditions of the activity to be carried out.

Metaphorically speaking, motivation represents the electrical power of human action. The higher the own drive (current) and the external stimulus (voltage), the higher the quality of the work done (electrical power). As in electrical engineering, the resistance of the task plays a decisive role here: whether reactive power is generated or the motivation to increase the quality and quantity of work is harnessed.

In order to understand motivation and incentives in a corporate context, the two models of MASLOW and HERZBERG are suitable. The two models describe and explain simplified human needs and motivations in a hierarchical structure. In figure 19 (see p. 24), the MASLOW pyramid of needs is compared with the HERZBERG model. The three lowest levels of the MASLOW needs pyramid cover the so-called deficit needs (basic physical care, personal security, social relations). These needs must be met for an individual to feel satisfied. Only then do the two growth needs follow. Growth needs include appreciation needs (social recognition, status, money, power, career) and, at the top of the pyramid, self-realization (recognizing and developing one's own potential). In contrast, HERZBERG's two-factor theory divides needs into hygiene factors and motivators. Hygiene factors are the basis for well-being and depend mainly on the type and conditions of employment. At HERZBERG, the actual motivation begins at the level of MASLOW's value and represents an extension of the current status quo (hygiene factors). Motivation expresses itself in the chance of promotion or special personal success experiences. For motivation in the corporate context, therefore, there are a number of incentive options that can be used to motivate employees (see figure 20, p. 25). Those primarily stimulate the extrinsic motivation. However, cultural aspects such as self-responsibility, personal growth etc. also increase intrinsic motivation.

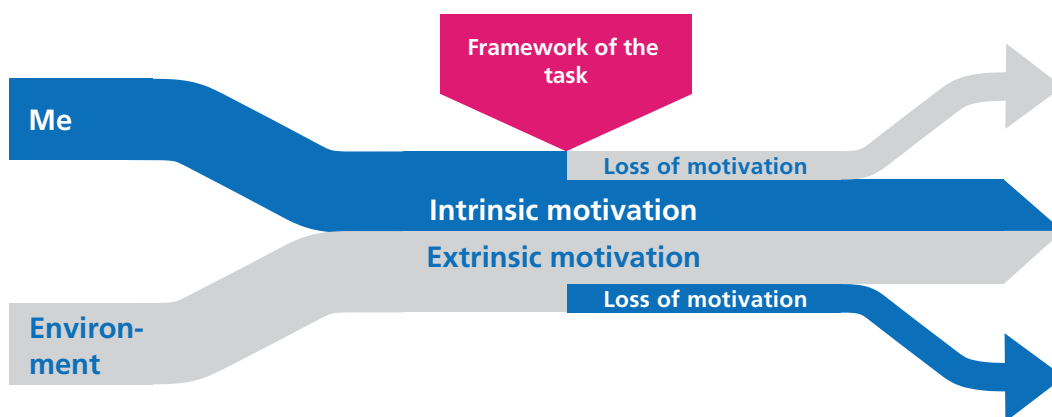


Figure 18: Motivation as a driver for service fulfillment

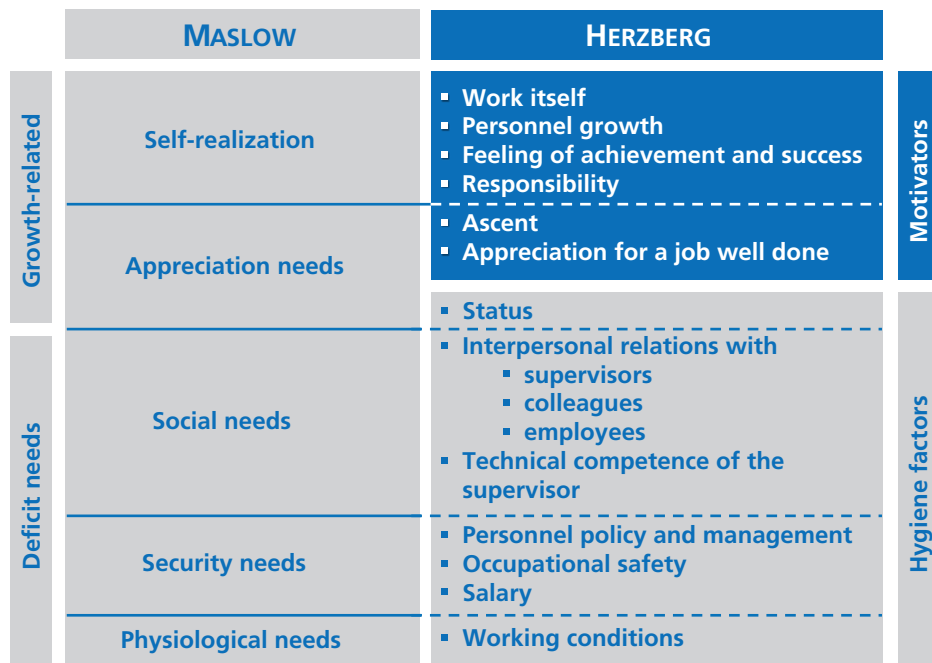


Figure 19: Comparison of the motivation models of MASLOW and HERZBERG (OWN presentation following DAVIS 1967, p. 37, quoted from STEINMANN ET AL. 2005, S. 561)

### Turning incentives into motivation

Analogous to motivation, incentives are also divided into two groups: material incentives and immaterial incentives. Due to the visibility of material incentives, they are more firmly anchored in the consciousness of most people, as they are evidently more clearly definable and can be directly assigned, for example, to a key figure. However, every employee also experiences immaterial incentives, which are reflected in his or her status, for example. Neither of the two possibilities should be neglected by the company and both should always be established in a combination in the company's daily business.

**Intangible incentives** are an important pillar of the company, as they create and take up cultural conditions that can also be used for knowledge management. Figure 19 illustrates why, for example, a good feedback culture is a factor in personnel management that should not be underestimated. Correct and constructive feedback contributes enormously to the personal maturity and character stability of the employee. This feedback culture also has a positive influence on the relationships and the employees' need for security. The resulting transparency makes it easier to classify and relate current events. It is important to observe a number of principles to ensure that

the feedback discussion does not miss its mark and does not turn into the opposite (see figure 21, p. 25).

Intangible incentives can be presented and set transparently using key performance indicators. Recognition can grow with good results, measured by key performance indicators. However, there is a fine line between creating recognition on the one hand and exposing employees on the other. There is not always a clear and direct relationship between the results and the quality and effort of the work done to achieve them. Particularly for service technicians, a large number of (insusceptible) factors play a major role, so that services are often not easily comparable. Therefore, in many areas it makes more sense to award the best and leave the end of the ranking open, as this can otherwise lead to a bad corporate climate.

A good approach, for example, is to use special competencies of employees for knowledge management. Thus, an expert in a certain subject area can be perceived externally as an expert in that area. His status is thus enhanced regardless of the organization chart. A feeling of appreciation arises when this expert can help a colleague out of a difficult situation. At the same time, opportunities like these strengthen the team spirit and cooperation of the entire company.



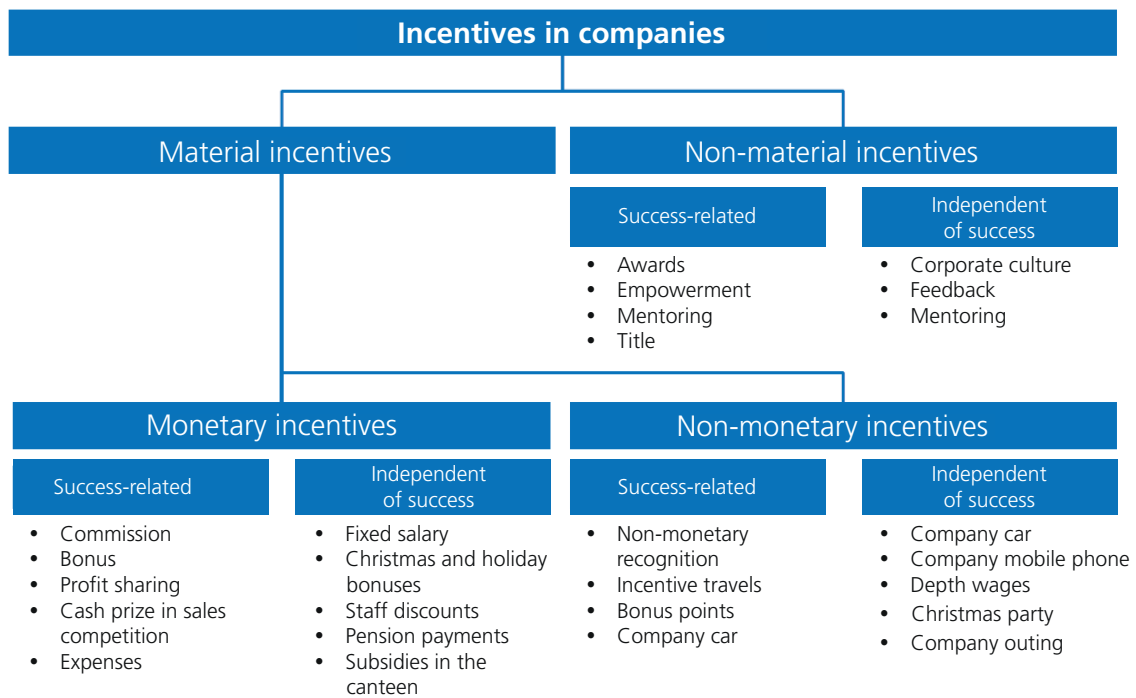


Figure 20: Classification of incentives and incentive types (KRAUME 2013, p. 31)

**Material incentives** are often used in companies and especially in sales, as a simple link can be established between the target achieved (measured by a key figure) and the bonus. A key figure is translated into a bonus using a previously defined metric. In the example in figure 22 (see p. 26), the fixed salary of € 32,000 is supplemented by variable remuneration. The bonus is defined at € 8,000 for a one hundred percent

achievement of the target. The goals can come from different scorecards and be weighted differently. The share of variable remuneration should be a maximum of around 20 percent so as not to deprive the employee of the security of his or her fixed salary. The fixed salary is converted into a premium. The simplicity of the calculation and the direct link between the contribution margin and the commission essentially contribute to its dissemination.

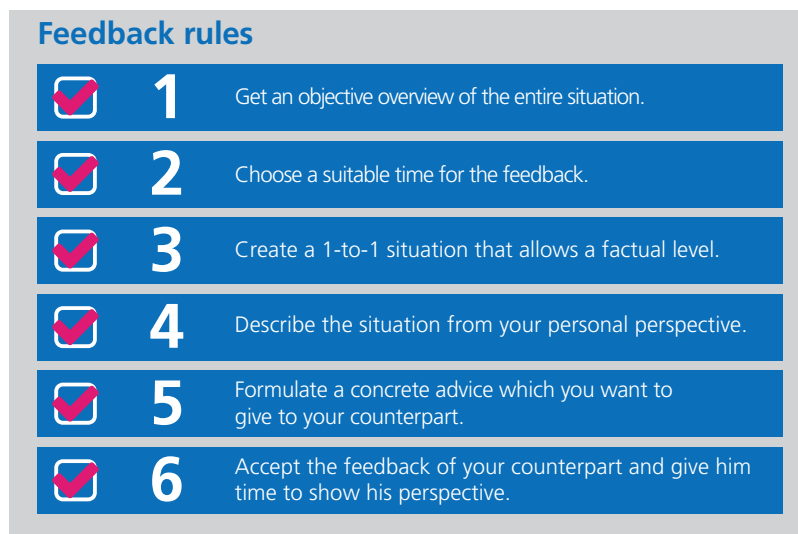


Figure 21: Rules for a successful feedback discussion

A good way to strengthen the ability to work in a team within the company and a department is to make a share of the bonus dependent on the achievement of company or departmental goals. However, the focus should be on the individual goals, as this provides a direct feedback of one's own work to the premium.

Various models can be used to calculate the individual components of the premiums. The application depends on one's own experience and the type of indicator to be achieved. In the case of the commission often used in sales, there is a percentage calculation of the premium, which is usually linked to a form of contribution margin (see figure 23, p. 27). As a rule, between one and five percent of the contribution margin is converted into a premium. The simplicity of the calculation and the direct link between the contribution margin and the commission essentially contribute to its dissemination.

Disadvantages for the company are, for example, the open design of the commission. On the one hand, services are rewarded immediately without a certain minimum service

being required. On the other hand, the bonus is not capped at the top, which can lead to the employee being rewarded for circumstances to which he may not have actively contributed. For example, a lucky coincidence could contribute to the fact that he has sold beyond all measures. These "reward circumstances" have two main dangers: Envy could arise among colleagues and the employee could get used to the high salary without having a chance to achieve it again. This could lead to medium to long-term dissatisfaction and thus demotivate him. To compensate for these disadvantages, so-called performance corridors can be defined and stored with premium curves (see figure 24, p. 27). Within the performance corridor, the premium rises with increasing performance. Outside the benefit corridor, the premium remains constant, regardless of the amount of the benefit. The calculation is only slightly more complex than the percentage calculation. However, it can be used to eliminate the disadvantages of the commission model.

A further advantage of this approach is that within the performance corridor, every improvement leads to a significant increase in the premium and thus the motivation in the performance corridor is significantly increased.

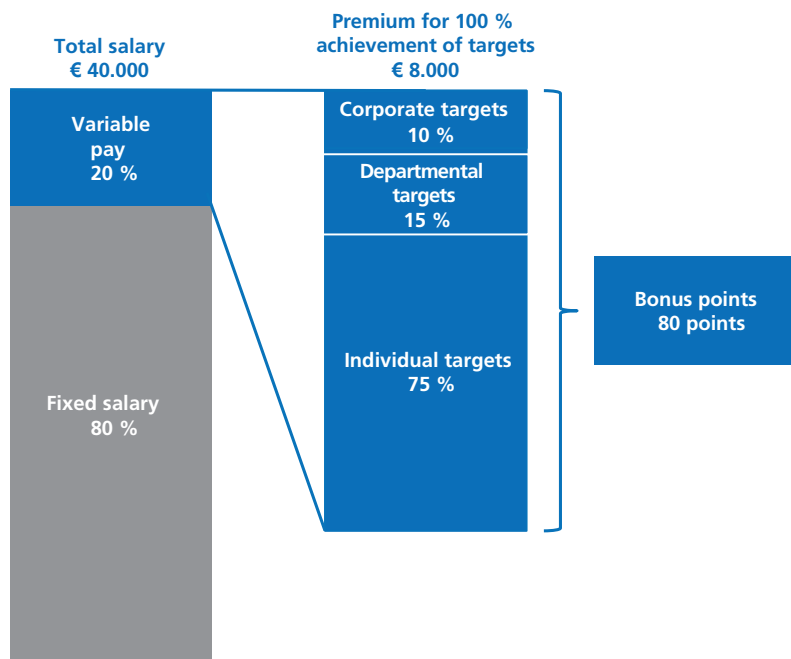


Figure 22: Exemplary remuneration components for service technicians

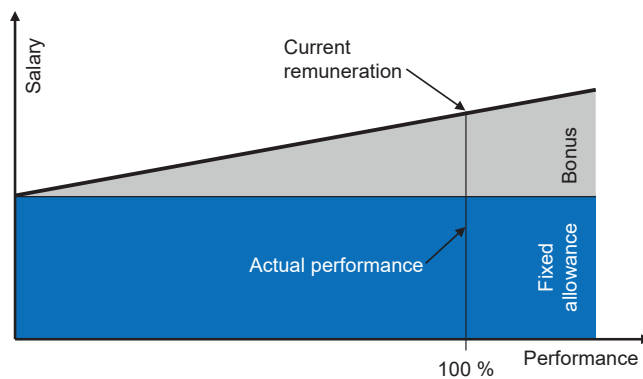


Figure 23: Commission-based salary composition

When creating an incentive system, care should be taken to ensure that not too few and not too many targets and bonus components are chosen. A good number is between five and eight components, because on the one hand you can concentrate on this number without losing track of the situation, and on the other hand problems in one component do not lead to a total loss of the entire bonus. Of course, the curves and the performance corridor must be set sensibly for each component and the weighting between the components must also be balanced.

A still relatively uncommon form of bonus payment (especially in small and medium-sized companies) is the possibility of payment via a bonus point system (see figure 22, p. 26). The monetary bonus is converted into or supplemented by bonus points, which can be exchanged for goods or services in an online shop.

This has several advantages for the company:

- **Motivation:** By bundling procurement, price advantages can be ensured; therefore the price paid by the company is lower than the value of the bonus perceived by the employee.
- **Invoicing:** As the billing is done via the provider, the financial accounting can be relieved, as a monthly invoicing can be done for example.
- **Duties:** The platform character makes it possible to provide simple advantages in taxation for employees (see tax advantages for non-cash benefits).
- **Liquidity:** The bonus points are redeemed throughout the year, thus ensuring that the burden on the company is equalized.

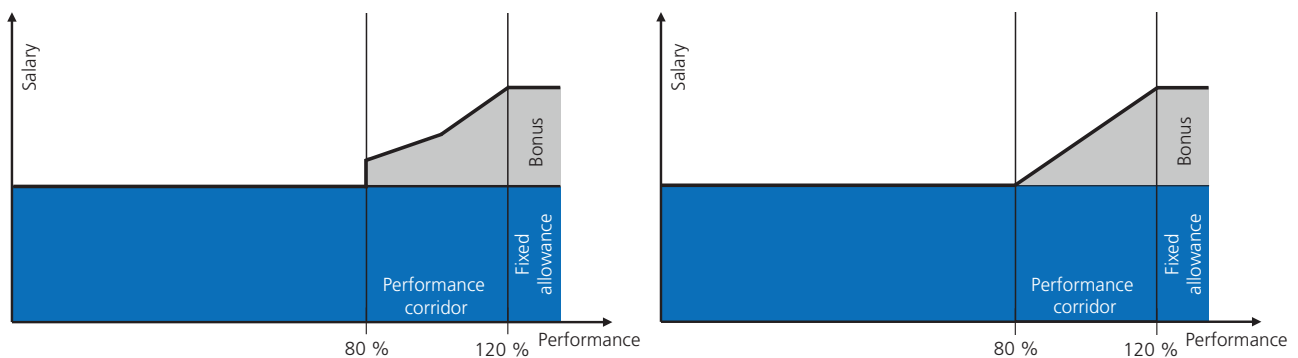


Figure 24: Content composition taking into account the performance corridor

Of course, setting up a premium system is very costly; it can be taken over by service providers, of whom there is now a whole range on the market. Some examples of such providers are listed in figure 25.

Particularly in a personnel market that is increasingly characterized by a shortage of skilled workers, it is important to create differentiation through a variety of

incentives and to achieve a diversification of employer offers.

However, the central driver for performance and innovation is ultimately still the corporate culture. If the employee does not feel personally valued by colleagues and superiors, the monetary incentives can be as great as they are. They do not promote sustained motivation.

| System provider                         | Homepage   |
|---|--|
| Benefit One                             | <a href="http://www.benefit-one.de">www.benefit-one.de</a>           |
| Buben und Madchen GmbH                  | <a href="http://www.bubenundmaedchen.de">www.bubenundmaedchen.de</a> |
| Concore GmbH                            | <a href="http://www.concore.de">www.concore.de</a>                   |
| Edenred Deutschland GmbH                | <a href="http://www.edenred.de">www.edenred.de</a>                   |
| Incentivus                              | <a href="http://www.incentivus.de">www.incentivus.de</a>             |
| Magmapool Sales & Marketing Services AG | <a href="http://www.magmapool.de">www.magmapool.de</a>               |
| VOK DAMS                                | <a href="http://www.vokdams.de">www.vokdams.de</a>                   |

Figure 25: Examples of bonus point providers

## 8 Conclusion

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The transformation of the service technician into the customer's most important contact person and the company's most important sales channel requires a sustainable change of the entire company. But the effort is worth it. This insight has already reached many companies, but there is often a lack of a clear idea of how much such a change challenges

existing structures. A fundamental change of the company is only possible if all levels and departments recognize the necessity and have a clear idea of their future corporate culture. It is not enough to write down the new values of the company on a piece of foil, each employee must be able to understand and accept his or her own future role.



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## 9 Checklist for service change

- | <input type="checkbox"/> Organization   | <input type="checkbox"/> Processes                                 | <input type="checkbox"/> Skills                                   | <input type="checkbox"/> Target system                                   | <input type="checkbox"/> Incentive system       |
|---|--|---|--|---|
| <input type="checkbox"/> Equalization of service with new business                | <input type="checkbox"/> Record current processes                  | <input type="checkbox"/> Derive functional requirements           | <input type="checkbox"/> Identify strengths and weaknesses               | <input type="checkbox"/> Questioning culture    |
| <input type="checkbox"/> Establishment of the service as a profit center          | <input type="checkbox"/> Evaluate information flow                 | <input type="checkbox"/> Determine required capacities            | <input type="checkbox"/> Weighing up current opportunities and risks     | <input type="checkbox"/> Adapt incentive system |
| <input type="checkbox"/> Establishment of the service as a product group          | <input type="checkbox"/> Define target processes                   | <input type="checkbox"/> Define steps                             | <input type="checkbox"/> Define fields of action                         | <input type="checkbox"/> Diversify incentives   |
| <input type="checkbox"/> Promoting communication between new business and service | <input type="checkbox"/> IT technical support for actual processes | <input type="checkbox"/> Take steps                               | <input type="checkbox"/> Linking targets with key performance indicators |   |
|   |  | <input type="checkbox"/> Consider competencies in the disposition | <input type="checkbox"/> Specify target agreements                       |   |

## 10 Bibliography

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- CHAKRAPANI, C.: Eliciting and Analysing Customer Complaints. Juni 1991. <http://www.chuckchakrapani.com/articles/PDF/91060555Chakrapani.pdf> (Link zuletzt geprüft: 31.01.2020)
- CHEN, H.; CHIANG, R. H. L.; STOREY, V. C.: Business Intelligence and Analytics: From Big Data to Big Impact. In: MIS Quarterly 36 (2012) 4, S. 1165. <https://pdfs.semanticscholar.org/f5fe/b79e04b2e7b61d17a6df79a44faf358e60cd.pdf> (Link zuletzt geprüft: 14.01.2020)
- CHEN, T.; GUESTRIN, C.: XGBoost. A Scalable Tree Boosting System. In: Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining - KDD ,16, San Francisco (CA) 2016, S. 785 – 794. <https://www.kdd.org/kdd2016/papers/files/rfp0697-chenAemb.pdf> (Link zuletzt geprüft: 14.01.2020)
- DAVIS, K.: Human relations at work. 3rd revised edition. McGraw-Hill, New York 1967.
- DELOITTE (HRSG.): Data Analytics im Mittelstand. Die Evolution der Entscheidungsfindung. München, 2014. <https://www2.deloitte.com/content/dam/Deloitte/de/Documents/Mittelstand/studie-data-analytics-im-mittelstand-deloitte-juni-2014.pdf> (Link zuletzt geprüft: 14.01.2020)
- DIN SPEC 91345: Referenzarchitekturmodell Industrie 4.0 (RAMI4.0). DIN Deutsches Institut für Normung e. V., DIN SPEC 91345:2016-04. Beuth, Berlin, April 2016.
- GÜTING, R. H.; DIEKER, S.: Datenstrukturen und Algorithmen. 4., erw. u. überarb. Auflage. Springer, Wiesbaden [u. a.] 2018.
- HAVARD, K.: Low cost IoT will redefine the consumer purchase path. Econsultancy Blog, 19.06.2017. <https://econsultancy.com/low-cost-iot-will-redefine-the-consumer-purchase-path/> (Link zuletzt geprüft: 31.01.2020).
- HERZBERG, F.: The motivation to work. Wiley, Hoboken (NJ) 1959.
- HEYSE, V.; ERPENBECK, J. (HRSG.): Kompetenzmanagement. Methoden, Vorgehen, KODE® und KODE®X im Praxistest. Waxmann, Münster [u. a.] 2007.
- KRAUME, D.: Materielle nichtmonetäre Anreize im Vertrieb: Experimentelle Analysen von Gestaltungsdimensionen. Kovac, Hamburg 2013. – Zugl.: Münster, Univ., Diss., 2013.
- LEE, J.; KAO, H. – A.; YANG, S.: Service Innovation and Smart Analytics for Industry 4.0 and Big Data Environment. In: Procedia CIRP 16 (2014), S. 3 – 8. <https://reader.elsevier.com/reader/sd/pii/S2212827114000857?token=EBC061C247F4F7C58E20AABCE265EE7613A4AD88C5E6AB058FC2D0C22ED5F2283E8AB18B2C07DCA85F3463E06A59B098> (Link zuletzt geprüft: 14.01.2020)
- MCDERMID, C. D.: How money motivates men. In: Business Horizons, 3(1960)4, S. 93 – 100.
- MERCURI INTERNATIONAL (HRSG.): Wie vertriebsorientiert ist der Service in Deutschland? Der aktuelle Status der Kunden- und Verkauforientierung bei Servicemannschaften. [https://mercuri.de/wp-content/uploads/sites/2/2018/09/mercuri\\_international\\_-\\_service-studie\\_wie\\_vertriebsorientiert\\_ist\\_der\\_service\\_in\\_deutschland\\_2009-2013\\_0.pdf](https://mercuri.de/wp-content/uploads/sites/2/2018/09/mercuri_international_-_service-studie_wie_vertriebsorientiert_ist_der_service_in_deutschland_2009-2013_0.pdf) (Link zuletzt geprüft: 14.01.2020)
- PLOWMAN, E. G.: Elements of Business Logistics. Stanford University, Graduate School of Business, Stanford 1962.
- STATISTISCHES BUNDESAMT (HRSG.): Produzierendes Gewerbe: Beschäftigte, Umsatz und Investitionen der Unternehmen und Betriebe des Verarbeitenden Gewerbes sowie des Bergbaus und der Gewinnung von Steinen und Erden. Fachserie 4, Reihe 4.2.1. Dez. 2018. [https://www.destatis.de/DE/Themen/Branchen-Unternehmen/Industrie-Verarbeitendes-Gewerbe/Publikationen/Downloads-Struktur/beschaefigte-umsatz-investitionen-2040421177004.pdf?\\_\\_blob=publicationFile](https://www.destatis.de/DE/Themen/Branchen-Unternehmen/Industrie-Verarbeitendes-Gewerbe/Publikationen/Downloads-Struktur/beschaefigte-umsatz-investitionen-2040421177004.pdf?__blob=publicationFile) (Link zuletzt geprüft: 14.01.2020) [=2018b]
- STATISTISCHES BUNDESAMT (HRSG.): Volkswirtschaftliche Gesamtrechnungen: Anlagevermögen nach Sektoren. Arbeitsunterlage. Wiesbaden, 27.08.2018. [https://www.destatis.de/DE/Themen/Wirtschaft/Volkswirtschaftliche-Gesamtrechnungen-Inlandsprodukt/Publikationen/Downloads-Vermoegensrechnung/anlagevermoegen-sektoren-5816101187004.pdf?\\_\\_blob=publicationFile](https://www.destatis.de/DE/Themen/Wirtschaft/Volkswirtschaftliche-Gesamtrechnungen-Inlandsprodukt/Publikationen/Downloads-Vermoegensrechnung/anlagevermoegen-sektoren-5816101187004.pdf?__blob=publicationFile) (Link zuletzt geprüft: 14.01.2020) [=2018a]
- STEINMANN, H.; SCHREYÖGG, G.; KOCH, J.: Management. Grundlagen der Unternehmensführung; Konzepte, Funktionen, Fallstudien. 6., vollst. überarb. Auflage. Gabler, Wiesbaden 2005.



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