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# Integrated and modular design of an optimized process architecture

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**Abstract:** Global economic integration increased the complexity of business activities, so organizations are forced to become more efficient each day. Process organization is a very useful way of aligning organizational systems towards business processes. However, an organization must do more than just focus its attention and efforts on processes. The layout design has also a significant impact on the system performance. We contribute to this field by developing a tailored process-oriented organizational structure and new layout design for the quality assurance of a leading German automotive manufacturer. The target concept we developed was evaluated by process owners and an IT-based process simulation. Our results provide solid empirical back-up in which the performance and effects are assessed from a qualitative and quantitative perspective.

**Key words:** business process management, process architecture, organizational design, layouting.

## 1. Introduction

The current turbulent business world forces companies to seek new ways of doing business in novel situations. One of the areas mostly impacted by this turbulence relates to the design of appropriate organizational structures. Factors such as increased competition in cost, quality, service and technical change, along with inadequacies of functional structures are pushing executives to reorganize tasks and rethink traditional organizational configurations (Galbraith, 2010).

Therefore, organizations therefore have to focus on redesign, evaluate and management their business models and underlying business processes in order to better meet the rising expectations of customers with respect to the reliability and quality of their products and services. An increased focus on business activities and the alignment of organizational systems towards business processes as a core management paradigm is necessary (Corallo *et al.*, 2010).

Currently, most organizational structures are based either on function or product, with little or no process orientation. Functionally organized companies have difficulties to meet customer needs seamlessly across different functions because it can happen that no one feels responsible to fulfill customer requests (Davenport, 1995).

The same applies for divisionally organized companies, which are typically oriented toward their products. They focus on building market demand for those products they are able to produce, overlooking customer needs and their business relationships. Inefficiencies of the two most commonly present structures as well as emerging business trends place the emphasis on a process-based organization as one of the most promising solutions. The process-based organization is led by the process paradigm, which is focused on the horizontal view of business activities and alignment of organizational systems toward business processes (Corallo *et al.*, 2010).

Business process management and the concept of process-oriented organizational structures are no new answers to the mentioned challenges companies are facing. In fact they have been discussed in research and management literature for the last two decades (Davenport, 1995), (Davenport, 1993), (Hammer and Champy, 1993), (Hammer, 1996). They are the logical consequence of the comprehension, that companies rather consist of processes than products and that business processes represent a core of organizations (Vanhaverbeke and Torremans, 1999).

This paper contributes to this field by designing and developing a tailored process-oriented organizational structure for a business unit of a leading German automotive manufacturer.

The design task becomes a more complex endeavor in environments where organizations have to quickly adapt to emerging dynamic changes (Galbraith, 2010). The highly competitive automotive sector which has an essential need for efficient and effective process structures argues for the choice of this industrial context for this investigation.

However, an organization must do more than just focus its attention and efforts on processes. We argue that a process-oriented view cannot become the only foundation for a modern quality organization. The layout design has also a significant impact on the system performance. Typically, layout problems are related to the location of facilities and divisions (Shahin and Poormostafa, 2011), (Drira *et al.*, 2007). The search of an optimal layout configuration and space utilization plays an essential role for the realization of an efficient quality organization (Spath *et al.*, 2012). That means redesigning a company towards a process-based organization also implies that all activities, which logically belong together in order to create value for the customer, are grouped under one and the same roof. In effort to maximize process efficiency a value-stream-oriented and area-efficient design of an organization should optimize cycle times and material flows. Furthermore, an integrated work environment where divisions are related to a geographic location intensifies the cross-functional workflow management, joint presence and mutual awareness.

Moreover, we consider that it is necessary to put emphasis on a pre-evaluation of the designed concept. Based on a qualitative assessment through interviews with process owners our results show the potential benefits and improvements before the numerous and profound changes to implement a process-oriented organization are made. On the one hand this allows us to secure the acceptance of the people involved and affected by the new organization. On the other hand we consider a critical assessment which leads to further adjustments or the identification of further potentials in the sense of a continuous improvement process. In addition, we evaluated the entire target concept by applying an IT-based process simulation to receive solid empirical back-up with respect to cost and time.

The paper is structured in the following way. In the next section, we present the main theoretical background of process-oriented organizations by a brief literature review. The subject company of our case study is then specified in the subsequent section. The process engineering phases and the design framework adopted are illustrated in the fourth section. Finally the results are presented followed by a conclusion of this work.

## 2. Characteristics of process-based organizations

Organizations are faced with several challenges including managing the alignment between company strategy, goals, structures and business processes. The process-oriented organizational form seeks to attend these needs and recognizes the integrative and aligning nature of processes (Gardner, 2004). To establish a more natural alignment between work and organizational structure than with traditional vertical structures, the process-oriented organization focusses primarily on the horizontal dimension (Vanhaverbeke and Torremans, 1998). Responsibilities are organized as much as possible horizontally as well which leads to a rearrangement of process responsibilities. Responsibilities that thus belonged to multiple managers are then assigned to single process owners (Willaert *et al.*, 2007). The structure of horizontal process management has also been regarded as a specific type of network organizational structure. As there is a mutual inter-relationship between an organization's strategy and its processes, the process-oriented organization can be considered furthermore as a 'natural organization strategy'.

Based on the findings above it can be concluded that the traditional approach of an organizational structure, which sees processes as derived from the overall corporate strategy according to a 'process follows strategy' path, evolves to a new 'strategy follows processes' approach (Corallo *et al.*, 2010).

Process-oriented organizations are characterized by five key ideas that distinguish the organizational structure from traditional ones and clarify the organizational configuration: (1) Process-oriented organizations design and manage end-to-end business processes rather than tasks, (2) they measure and manage process level results instead of departmental efficiency, (3) they think in terms of customer goals instead of localized functional goals (Gardner, 2004), (4) they organize units under core processes and (5) other processes are added to these units minimizing coordination necessities between the units (Corallo *et al.*, 2010).

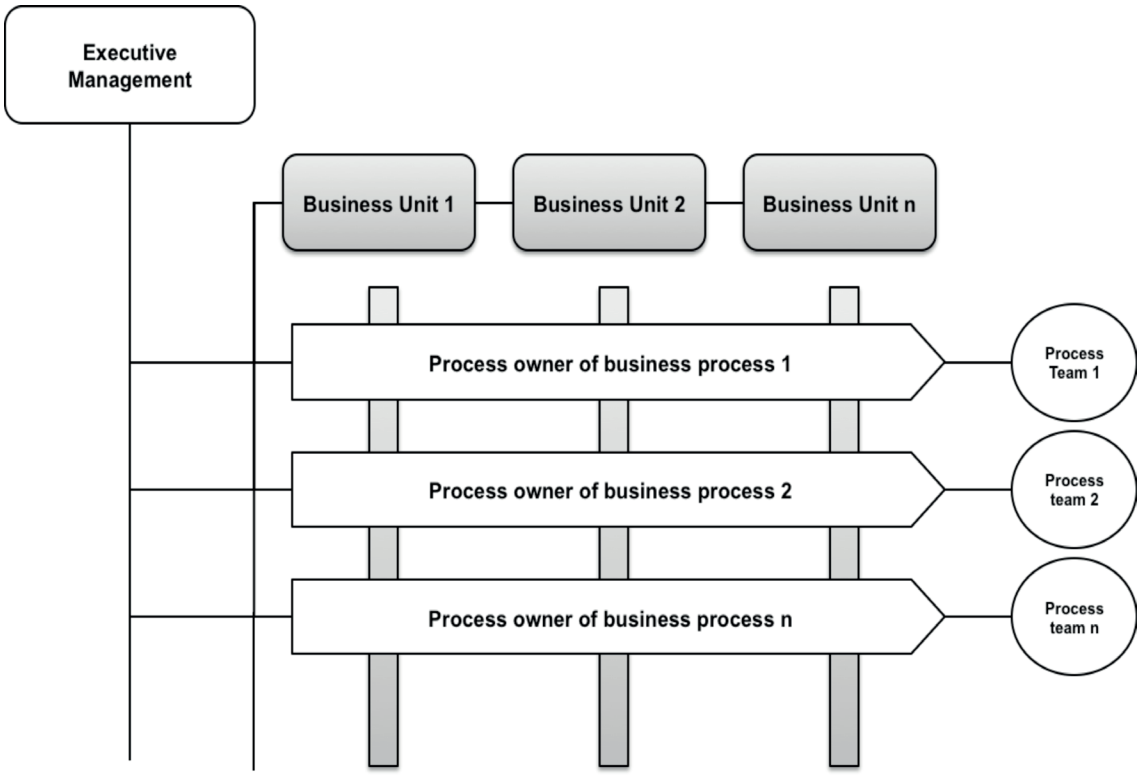


**Figure 1.** Scheme of a process-oriented organization (Source: Wang, 2009).

Many benefits of orienting organizations towards processes can be found in literature. Process-orientation can result in higher organizational performance such as faster cycle times with respect to functional departments that are not 'process-complete' (Corallo *et al.*, 2010). The coordination among people and activities improves and an increased flexibility allows efficient and effective response to market changes. The process structure allows to focus on customer needs, to direct attention towards customers and consequently to gain greater customer satisfaction. Because of resolved boundaries among functional areas and departments, employees are enabled to take a broader view of organizational goals rather than being focused on goals of single departments (Daft, 2012).

It has been emphasized that implementing a process-oriented organizational structure will have no effect if the employees' mentality does not change accordingly. Characteristics of a process-oriented mindset of employees are sharing information, learning with cross-functional knowledge and intra-organizational teamwork. Dysfunctional habits of employees need to be overcome and make place for a culture of cooperation (Willaert *et al.*, 2007).

Although the process-oriented approach enables organizations to reduce administrative effort and eliminate non-value adding work, if properly implemented, it does not necessarily cause downsizing. Rather new roles for current and prospective employees are developed, as new processes provide value to the customer and long-term success (Ostroff, 1999).

It shall be implied that a process-oriented organization applies the concept of business process management (BPM), as an organization is concerned with the management of its business processes when adopting the process-oriented approach. This may include the application of methods such as business process reengineering and process improvement projects. Business process management is not limited to the discovery, design, deployment and execution of business processes, but also includes to a greater degree the interaction, control, analysis and optimization of processes (Kohlbacher, 2009).

It is important to articulate the organizational context where critical processes are part and then to adopt a comprehensive approach to process design and management (Corallo *et al.*, 2010). In this context the process-oriented organization should be defined very thoroughly to avoid possible misunderstanding

and misconceptions. From a process-oriented perspective, outputs consequently flow between processes and not between departments or functional units, as output measures also relate to the business processes (Osterle, 1995).

The process-orientation is not a unique concept, but is better characterized by different levels of maturity that organizations already have in place or strive to reach. The process maturity concept provides a way to business improvement and success (McCormack, 2007).

## 3. Case Study Background

To illustrate the concept of designing a process-oriented organization, we apply these principles on a leading automotive manufacturer from Germany. In particular, we analyze and discuss the case of the quality assurance of gear units which is faced with shorter model cycles, development times and higher customer expectations with constantly changing quality risks.

If these requirements are reflected in the current quality organization significant deficiency become visible through long work paths by historically developed area locations, a lack of process workflow and quality, poor communication and transparency, long reaction times for error-elimination, insufficient error-prevention as well as undefined interfaces and responsibilities.

The efficiency and quality improvement can be reached by overcoming the traditional functional organization structure and reducing complexity with its many coordination and transfer points.

Consequently, a modern process-oriented quality organization needs to be developed by implementing new quality processes and structures within an optimized process architecture.

In future, the examined quality assurance is confronted with challenges such as new requirements by electro-mobility, increased product complexity and project exposure through variant diversity as well as internationalization

To address these challenges, a regional business unit strategy and vision was formulated by the top management that should reflect the future role of the quality assurance. This vision laid the foundation for any further work because for developing a process-oriented organization it is always necessary that management needs to support the process program. Without the support of senior executives, the process idea cannot unfold its full potential (Kohlbacher, 2009). Within the scope of this strategy it was also decided to build a new quality center for the entire quality assurance. The new quality center should be the structural framework for the reliability of all quality processes. The quality organizations from all locations translate and multiply their quality processes into the new quality center.

Based on this vision, the division of quality management at Fraunhofer Institute for Production Systems and Design Technology was asked to develop an optimized process-architecture for the new quality center in terms of a process-oriented quality assurance. Figure 2 illustrates the simplified macro business process model of the quality assurance. The organization consists of eight core processes.

The first business process, the quality planning process, acts as an interface among all other processes. The quality planner represents the entire quality assurance in simultaneous engineering teams (SET), introduces initial costs and investments for pilot projects, accompanies the zero series and develops security concepts and forecasts. Furthermore the quality planning is responsible for technical reviews and communicates lessons learned into the organization.

The second business process, the quality analysis process, includes the analysis of all national and international complaints from field operation. The claims are initially analyzed according to their cause of error.

For in-depth analysis additional partners, such as laboratories or the acoustic test team are consulted. If the causes of the errors are determined appropriate actions are defined and implemented. Finally, new requirements and lessons learned are submitted to the quality planning.

The spectrum of responsibilities of the quality assurance for purchased parts ranges from securing projects to supplier auditing and evaluation on to the setting of standards and procedures.

The laboratory of the quality assurance offers comprehensive expertise in the areas of materials, supplies and surfaces and gives support in terms of advice, selection, evaluation and analysis in the various phases of product development, production and customer service.

The quality assurance for production parts is monitoring all production orders using product-specific test plans. For this purpose, samples are regularly taken from the production line which are

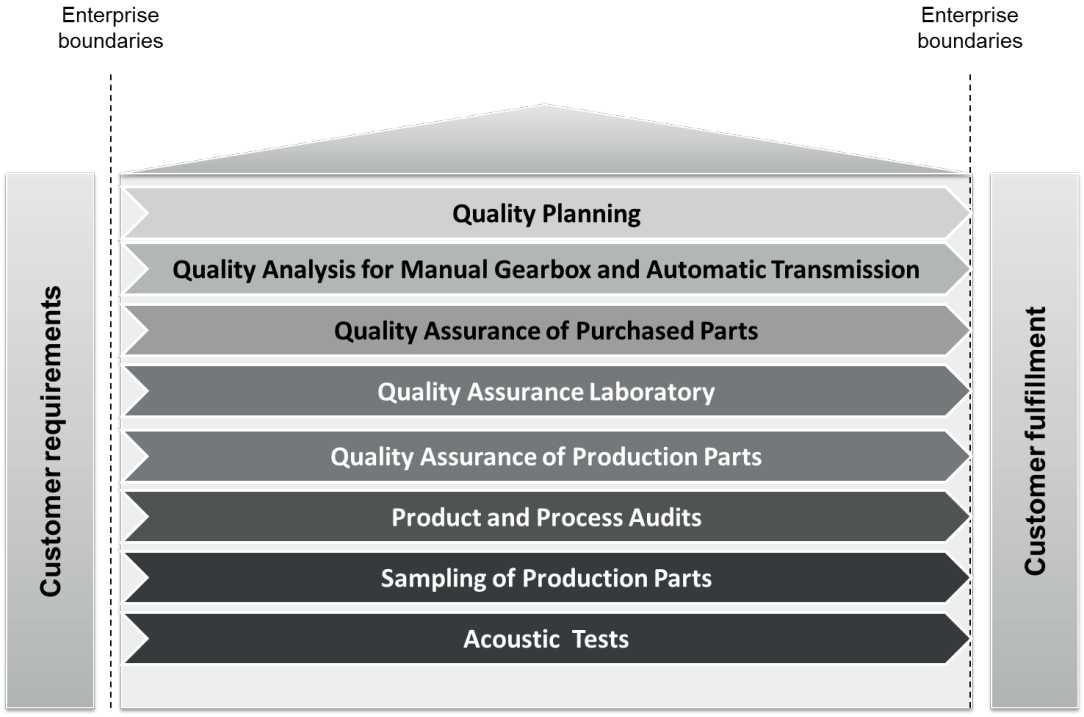


**Figure 2.** Macro business process model of the quality assurance

then compared with the nominal values within the test plans. If a tolerance deviation occurs immediate corrective action is initiated.

Process audit teams determine whether the processes and procedures used comply with the specifications and the requirements. Reasons for process audits are new processes or products before production start, improvement of quality performance on the basis of existing failures or the results of supplier evaluations. Within product audits a sample of finished products is reviewed according to predetermined specifications, drawings, technical documentation, standards and legal requirements. If an audit identifies weaknesses appropriate remedial actions must be scheduled and implemented.

In general, the sampling process refers to the inspection of components or finished gear units to meet specified characteristics. A distinction is made between the first article inspection (FAI) and the subsequent sampling. By regulations such as the ISO/TS 16949 the first article inspection provides evidence that the suppliers' products meet the quality standards required by the customer. A subsequent sampling comprises a re-sampling if production resumes. These can be requested by the quality assurance after an extended interruption of production in order to achieve a re-qualification of the respective product.

The acoustic teams are responsible for evaluating the quality of vehicle components through noise tests. For these investigations, the acoustic vibrations of different gear components are tapped with acoustic emission sensors. Afterwards, the oscillations of the gear unit is evaluated, visualized and documented in an acoustic management system.

## 4. Methodology

Developing a process-oriented organization is a major challenge due to difficulties of its fulfillment in a right way. Therefore, a structured methodology is required which primarily consists of identifying, analyzing and optimizing the core process model of the company – in our case with a specific focus on quality driven activities.

### 4.1. Systematic approach

The description of the project flow begins at a point at which the project objectives have already been formulated and the project scope has been set. The different steps involved in the project plan will be presented in an idealized sequential order according to Hammer and Champy, 1993 and Wagner and Käfer, 2010 (Figure 3). In practice, some overlapping or partial iteration of the phases were necessary especially when new information were generated during the project progress or observations had to

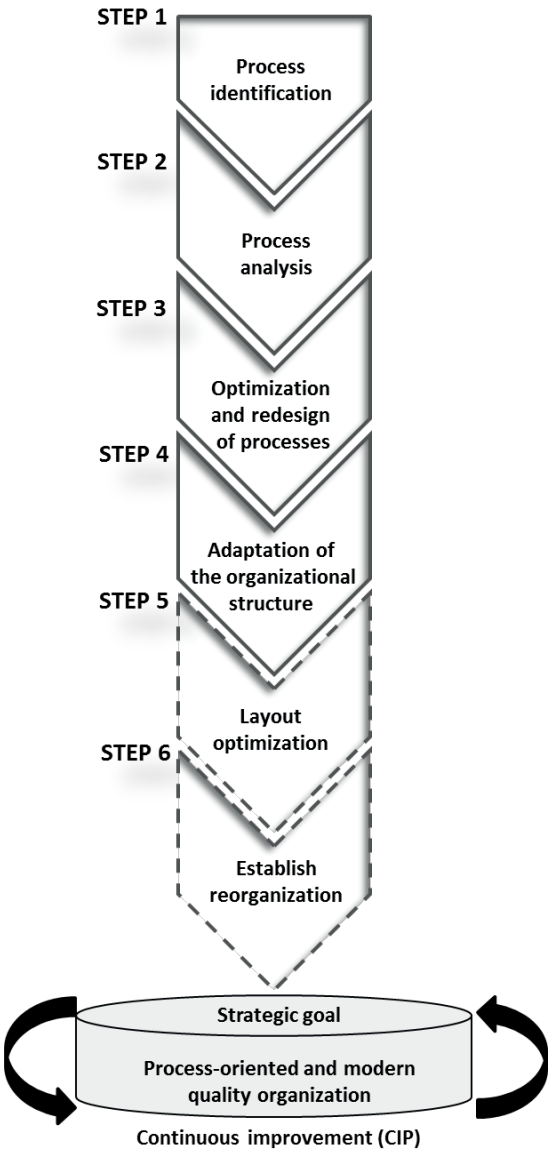


**Figure 3.** Approach in the case study.

be repeated. Furthermore, it should be noted that the project is still running and the last two phases have not been completed. Consequently we cannot provide any practical implications related to these steps yet.

The presented methodology has been carried out continuously within process team meetings (PTM). The multidisciplinary process teams were made up of the process owner and the process team members that can come both from the process and from outside the process. Particularly people from the upstream or downstream processes can often bring valuable ideas into the context of process analysis and process optimization.

#### *4.1.1. Process identification*

Setting up a process-oriented organization always starts with the identification of the core processes of the organization. Depending on the organizational paradigm core and support processes and their relations to each other are defined. The rough structure of the company thus obtained is then brought into a comprehensible and easily communicable form, e.g. by creating a grossly process map as shown in Figure 2. This is used in the following phases of the project as a guideline and as a common basis for communication to all employees if the new organizational structure is underway.

#### *4.1.2. Process analysis*

In the second step the processes were depicted in their actual situation, as it is actually performed by employees. Subsequently we identified existing sources of error, redundant work and similar terms are identified. As a result we developed concrete improvement targets in quantitative and qualitative respects. Then key indicators were determined by which the processes can be measured. It is crucial for the presentation and description of the processes that it is clear and easy to understand even for foreign persons.

An example for the process flow by an audit team including inputs and trigger (e.g. error message), process steps as well as the output of the process (communication of the final report is shown in the figure 4).

Another emphasis of the process analysis and the subsequently optimization is the efficient handling of process contents across company-wide interfaces. An interface is always a connection between two processes. Precisely, it is an event which terminates the starting point at this point and the inbound process is started (Wagner and Patzak, 2007). Necessarily interfaces occur along each organization. But the collaboration of different departments or areas emerge inevitably losses at the interfaces. However, the reduction of losses is the key for the success of the organization. Particularly within the internal communication interfaces should be taken as seriously bottlenecks, that can slow down the flow of information. If blockades occur here, it can have massive impact on the entire company. This results in conflicts of competence, insufficient willingness to cooperate and resource conflicts. In this context the process continuity, process transparency and the process efficiency have central importance.

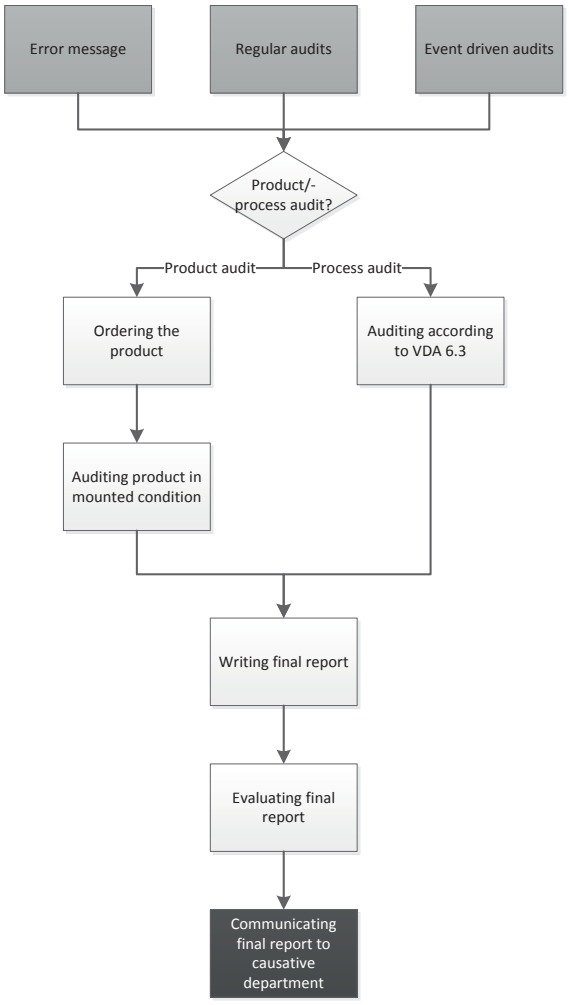


**Figure 4.** Example of a process flow.

A proven method of detecting bottlenecks within the communication and the flow of information between departments is the interface analysis. The evaluation of the interface analysis provides information concerning the current quality status of the interfaces and shows the need for action.

During the process analysis and modeling it was determined which interfaces exist within the regarded processes. For this purpose it was specified what data or informations are transferred in which form (e.g. written, oral, one a form, electronically) among the interfaces (Wagner and Patzak 2007).

For the interface analysis, as a systematic approach, a relation diagram was created, which should quantify the divisions interfaces.

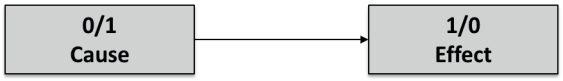


**Figure 5.** Principle of a relation diagram.

By means of the relation diagram, connections can be found, analyzed and evaluated. As a result the most important causes and effects of a issue become apparent and quantified. They provide the starting point to find a solution to the problem (Theden and Colsman, 2002).

Figure 6 shows the superior matrix chart of relations to quantify across divisions interfaces within the quality assurance.

| | DIV 1 | DIV 2 | DIV 3 | DIV 4 | DIV 5 | DIV 6 | DIV 7 | DIV 8 | DIV 9 | DIV 10 | DIV 11 | DIV 12 | DIV 13 | DIV 14 | Σ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DIV 1 | | 4/5 | 1/1 | 5/2 | 3/2 | 4/2 | 2/2 | 1/2 | 3/3 | ---- | ---- | 1/1 | ---- | ---- | 24/20 |
| DIV 2 | 5/4- | | ---- | 7/3 | 5/2 | 6/8 | ---- | 1/1 | 8/4 | ---- | 5/3 | 3/1 | ---- | ---- | 40/26 |
| DIV 3 | 1/1 | ---- | | 0/2 | 0/2 | 4/2 | 1/1 | 1/1 | 1/1 | ---- | ---- | ---- | ---- | ---- | 8/10 |
| DIV 4 | 2/5 | 3/7 | 2/5 | | 1/5 | 9/8 | ---- | 1/0 | ---- | ---- | 0/1 | 2/0 | ---- | 1/0 | 21/31 |
| DIV 5 | 2/3 | 2/5 | 0/2 | 5/1 | | 3/3 | ---- | ---- | ---- | ---- | 1/0 | 3/0 | ---- | ---- | 16/14 |
| DIV 6 | 2/4 | 8/6 | 2/4 | 8/9 | 3/3 | | 1/1 | 1/2 | 1/1 | ---- | 5/4 | 5/0 | ---- | 2/0 | 38/34 |
| DIV 7 | 2/2 | ---- | 1/1 | ---- | ---- | 1/1 | | 1/0 | 1/2 | ---- | ---- | ---- | ---- | ---- | 6/6 |
| DIV 8 | 2/1 | 1/1 | 1/1 | 0/1 | ---- | 2/1 | 0/1 | | 3/0 | ---- | ---- | ---- | ---- | ---- | 10/6 |
| DIV 9 | 3/3 | 4/8 | 1/1 | ---- | ---- | 1/1 | 2/1 | 0/3 | | ---- | ---- | ---- | ---- | ---- | 11/17 |
| DIV 10 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | | ---- | ---- | ---- | ---- | ---- |
| DIV 11 | ---- | 3/5 | ---- | 1/0 | 0/1 | 4/5 | ---- | ---- | ---- | ---- | | ---- | ---- | 0/1 | 8/12 |
| DIV 12 | 1/1 | 1/3 | ---- | 0/2 | 0/3 | 0/5 | ---- | ---- | ---- | ---- | ---- | | ---- | ---- | 2/12 |
| DIV 13 | ---- | ---- | 0/1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | | ---- | --- |
| DIV 14 | ---- | ---- | ---- | 0/1 | ---- | 0/2 | ---- | ---- | ---- | ---- | 1/0 | ---- | ---- | | 1/3 |
| Σ | 20/24 | 26/40 | 10/8 | 31/21 | 14/16 | 34/38 | 6/6 | 6/10 | 17/11 | ---- | 12/8 | 12/2 | | 3/1 | |

**Figure 6.** Matrix chart of relations.

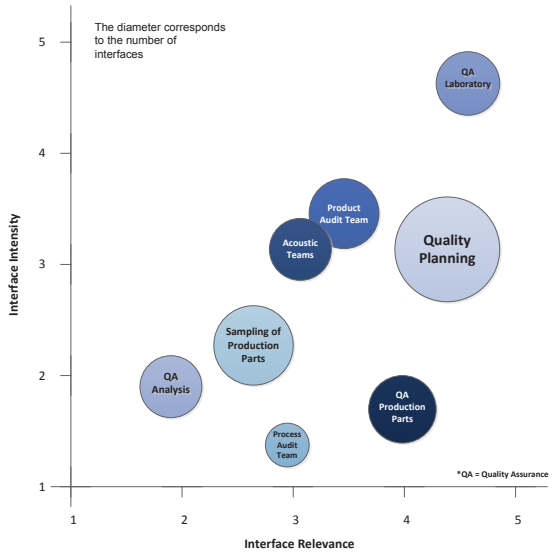


**Figure 7.** Individual Interface Matrix.

As a result the matrix chart of relations shows that the divisions of the quality analysis, quality planning as well as quality assurance purchased parts and laboratories have the most interfaces.

To ascertain the quality of the interfaces, a questionnaire determined the relevance and intensity of the interfaces that occur in daily business operations. With the investigation of the relevance should be determined how decisive the interfaces are for the current routine business. With the investigation of the intensity should be determined how intensive the divisions currently cooperates with other divisions. This specific employee survey measures the quality of the cooperation of various divisions by systematically evaluating the interface partners. In addition this method can show potentials to improve the cooperation between divisions. An individual interface matrix can be created for each division, in which the quality of the interfaces is shown. Figure 7 shows the interface matrix from the view of Quality Assurance Purchased Parts.

### *4.1.3. Optimization and redesign of processes*

The optimization and redesign of the process is the third project step. The focus is on the following question: If we could design the process totally new how would we do it? This question is about profound changes in the dimensions of time, cost and quality issues.

We used the following principles as a lever for the redesign (see also figure 8). These principles include the assignment of multiple process steps to an organizational unit, the abandonment of low value-added tasks, the parallelization of process steps, the appropriate use of information technology and considering the possibility to transfer tasks to other companies.

### *4.1.4. Adaptation of the organizational structure*

To anchor the redesigned processes in the company, it is required to adapt the organizational structure. In our case we identified and designated new process owners, tried to flattening the hierarchy and initiated the creation of interdisciplinary process teams. The interference in the organizational structure was only made with intensive stakeholder involvement.

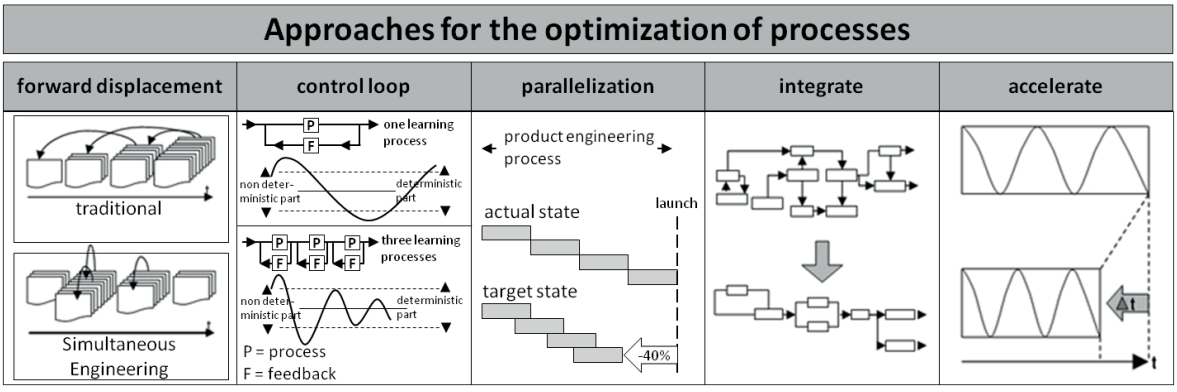


**Figure 8.** Approaches for process optimization (Source: TCW).

### *4.1.5. Layout optimization*

Naturally, a redesign of the workplace is not necessary for each reorganization project. Based on the decision to build a new quality center for the entire quality assurance exceptional circumstances therefore exist in our case. Especially the current situation through long work paths by historically developed area locations requires a new layout configuration and space utilization. That is the reason why we argue that a process-oriented view cannot become the only foundation for a modern quality organization. We plan to group all quality driven activities, which logically belong together in order to create value for the customer, under one and the same roof.

An optimal design of physical layout is an important issue in the early stage of system design. The layout design has a significant impact on the system performance in terms of costs, workflow, cycle time and productivity. It is stated that a good facility layout contributes to overall efficiency of operations and can reduce up to 50% of the total operating costs (Shahin and Poormostafa, 2011), (Drira *et al.*, 2007).

In this context, another determinant that is often underestimated is the space distance, which affects both the amount of communication and the flow of information. According to a study by the MIT, communication beyond limits of responsibility and departments is a big help for generating successful ideas. But the inhibition to start a conversation already exists as of 30 meters space distance – at this point even telephones and elevators seems to be "killers of communication" (Ehrlenspiel, 2009). In order to assure an interdisciplinary and more intensive work flow management as well as improved agreements, joint presence and mutual awareness, it is essential to create integrative workplaces that are interlinked to each other.

To address these challenges we applied the value stream method and principles of factory planning according to Spath *et al.* to achieve optimal arrangements of resources in connection with the best possible use of space (Spath *et al.*, 2012). Based on the qualitative and quantitative interface analysis these divisions were located close to each other which have been especially intensive interdependencies and interactions to ensure an effective and efficient implementation of daily business operations and internal processes. Further the parts and material flow were also optimized.

Another part of the analysis was the determination of the future space requirement for the entire quality

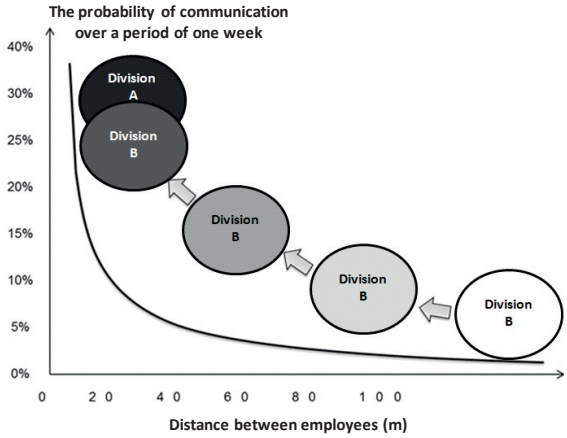


**Figure 9.** Communication among employees depending on their physical distance (Source: Ehrlenspiel 2009)

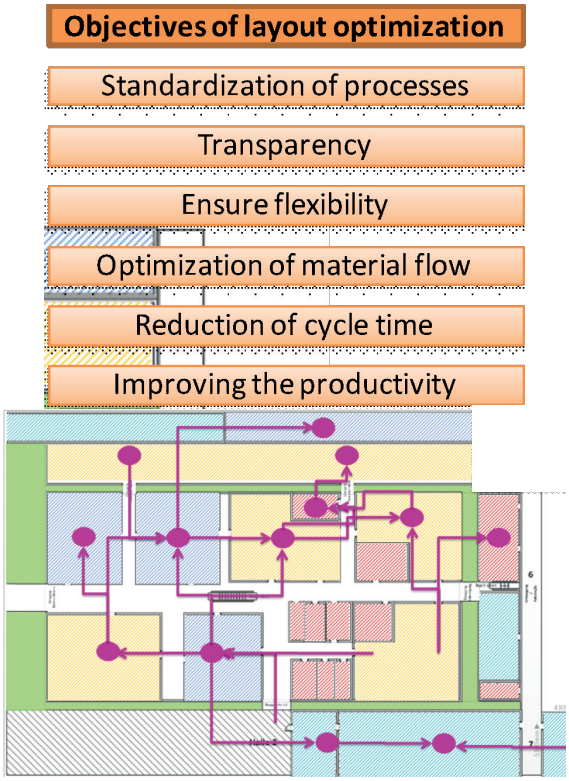


**Figure 10.** Optimized layout of the new quality center (macro view).

assurance. The analysis was based on the information provided by the process owners, future increasing staff capacity (+10% max.) including service providers and students. We also considered the DIN 4543-1 for work surfaces that corresponds to the current state of the art and requires a minimum space of 10m² per employee. As a result, a future necessary space requirement of 18274m ² could be determined, which is an increase by 18.4% (see figure 11 below).

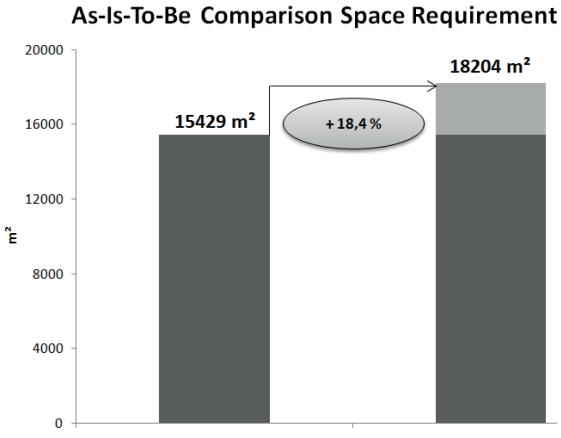


**Figure 11.** Space requirement of the new quality center.

Furthermore, working surfaces requirements were added which should ensure the process implementation, such as the necessary air condition, gas and N2 supply, parts elevators, ensuring vibration-free space and the installation of drains and suction equipment.

#### *4.1.6. Establish reorganization*

Crucial for the success of the entire reorganization is the successful implementation of the new organizational structure and the acquisition of optimized processes. For the smooth transition from rehearsed processes to unfamiliar processes, all employees must be made aware of the importance and relationships within the organizational structure. In addition, it is important to keep the motivation of all involved high so that inevitable difficulties and coordination problems could be overcome. A consistent communication strategy with a concrete set of measures is essential to achieving these goals.

By implementing new processes and structures – especially with bigger changes - it is recommended to choose a procedure in multiple steps (Wagner and Patzak, 2007):

- „Dry run“: discuss new processes and structures with all participants with the objective of detecting potential weak points and eliminating them.
- „Wet run“: test run for a definitive period of time and within a definitive area. Deviations from the plan should be documented and afterwards discussed with the person in charge. It is necessary to eliminate weak points before implementing the final target process.
- Implementation: effective and stepwise installation and implementation of the process in the day-to-day business. Here it is also necessary that the implementation is attended by a responsible person.

## 5. Results

After the analysis and the development of the process-oriented organizational concept we put emphasis on a pre-evaluation based on a qualitative assessment by performing interviews with process owners. This should ensure the acceptance of the people involved and affected by the new organization. Therefore the target concept was presented to all involved process owners and teams during several workshops. The aim of these workshops was to review and discuss the target concept with regard to its structure and its process logic. This joint discussion led to some reasonable and necessary adjustments that should be incorporated into the concept aftermath. Beyond this the workshops ended with general agreement for the new process architecture and layout concept. In the next step we asked about potential benefits of the created target concept. A total of 16 process owners were interviewed. Multiple responses were permitted. The answers of the interviews were analyzed and classified leading to the following results:

- 14 respondents stated that by applying the new process-oriented concept, the quality processes will become more efficient e.g. the errors within the process are minimized and non-value-adding activities are better identified.
- 12 respondents reported that the new concept could lead to optimized interfaces through better transparency aswell as clear structures and responsibilities that terminate many unclarities.
- 11 respondents stated that they expect an optimized communication within the organization which can be partly attributed to the gained transparency.
- 10 respondents reported that process orientation would encourage cross-functional workflow management between all involved departments.
- Nine respondents referred to the fact that the error prevention should be facilitated and strengthened in order to yield higher customer satisfaction and an improvement of product quality.
- Eight respondents stressed that they expect better cooperation through joint presence and mutual awareness which in turn leads to higher employee motivation and satisfaction.

- Another eight respondents stated that establishing process teams would lead to an increased team spirit. Interdisciplinary relationships will be transparent and promote understanding of the colleagues.
- Six respondents highlighted the fact that coordination within the error-cause-analysis between purchased and manufactured parts would be improved.
- Five respondents reported that the new organizational concept allows the exploitation of synergies.
- Four respondents stated that the optimization of structural-institutional conditions such as the dissemination of information lead to reduced duplications and frictions.
- Four respondents stated that they expect improved cycle times.

Figure 12 also shows the identified potential benefits of the new process architecture.

In addition, regarding the newly-developed organization in connection with an optimized layout design, we evaluated the entire target concept by applying an IT-based process simulation. Objective by using this tool was to simulate potential benefits before and after its implementation with respect to cost and time. This allows us to provide solid empirical back-up in which the performance and effects can be assessed from a quantitative perspective.

Exemplary, the fault elinimination process as the most representative and important process in which all divisons of the regarded quality assurance are involved was analyzed and evaluated. The process owners responsible were asked about the following factors to state a representative before-and-after assessment. Considered and assigned to individual process steps, the following factors were included :

- machining times,
- handling times,
- waiting periods,
- probabilities of occurrence of processing cases and
- interfaces of the divisions involved in the fault elimination process

To determine the average cycle time 1000 complaints were simulated with respect to the current state and the new process architecture and layout.

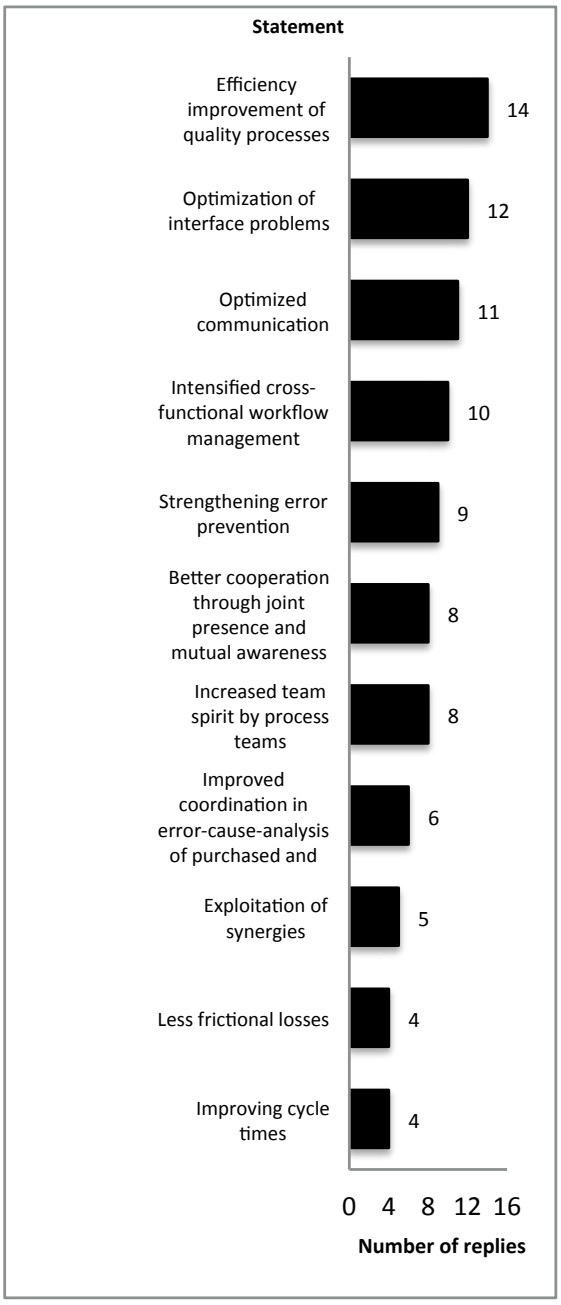


**Figure 12.** Potential benefits of the new process-oriented quality organization.

Result of the simulation of the fault elimination process was a reduction of the average cycle time from 5.7 days to 5.1 days, which is a share of approximately - 12%..

Using the cycle time as our reference value, we could also simulate the potential savings in process costs. On the basis of the process cost rates available to us we could determine a reduction of process costs up to 24%.

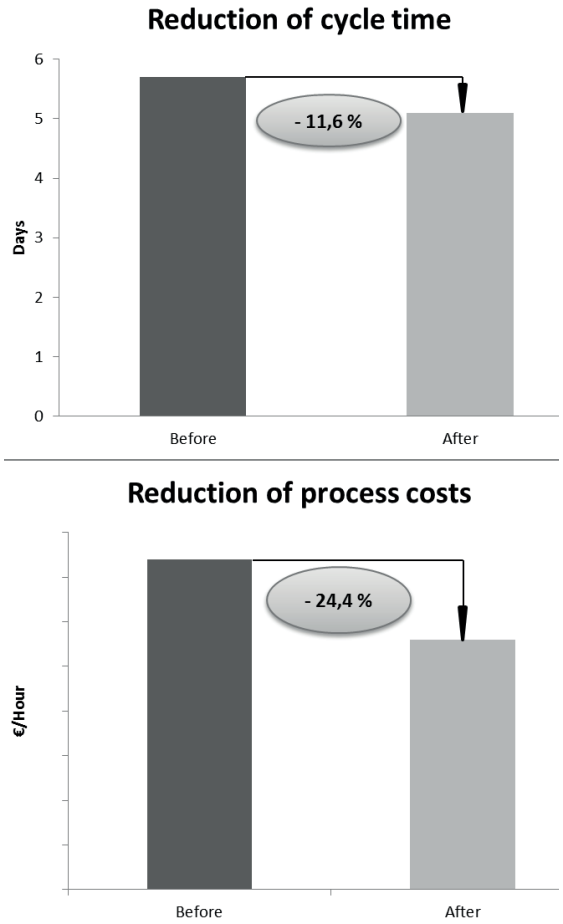


**Figure 13.** Results of process simulation.

## 6. CONCLUSION

Global economic integration increased the complexity of business activities, so organizations are forced to become more efficient each day. Process organization is a very useful way of aligning organizational systems towards business processes. It can effectively help the organization to establish a spirit of collaboration, continuous improve processes and customer satisfaction (Wang, 2009). Managing companies through a process-based approach are well recognized by academicians, consultants, and practitioners in the process management literature and in many corporate contexts (Hernaus, 2009).

Unfortunately, there is a clear lack of quantitative studies that investigate the links between individual process organizations and non-financial performance measures. In addition, most of the existing studies treated process orientation as a single measure (Kohlbacher and Weitlaner, 2011). According to Hernaus a better understanding of the process-oriented organizational concept should be investigated in practice more thoroughly (Hernaus, 2009).

In this paper we contribute to this field by designing and developing a tailored process-oriented organizational structure for the quality assurance of a leading German automotive manufacturer. We present a structured methodology that primarily consists of identifying, analyzing and optimizing the core process model of the company. The feasibility of the proposed method which has led to an appropriate and comprehensive target concept was evaluated by process owners who were asked about the potential benefits of the new process-oriented quality organization. The effects most often reported include increased efficiency of quality processes, optimization of interfaces and communication and improvements within the cross-functional workflow management.

Another purpose of this paper was the search of an optimal layout configuration and space utilization for a new quality center. We argue that it plays an essential role for the realization of an efficient quality organization. Therefore we developed a detailed value-stream-oriented and area-efficient layout design that should maximize process efficiency and optimize cycle times as well as material flows. By evaluating the concept using a process simulation and process cost analysis we can provide solid empirical back-up in which the performance and effects can be assessed from a quantitative perspective through financial and non-financial indicators. Our results show that the new process architecture and layout have the potential to reduce cycle times up to approximately 12% and minimize process costs up to 24%.

So far, there are two open issues in this project that we plan to address in the future.

First, we plan to further investigate the potential benefits of the process-oriented organization to provide more practical implications related to this approach. Finally, we plan to provide a concrete set of measures and monitoring mechanism to support those activities which are necessary for an appropriate implementation of the new organizational concept.

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