AGILITY by ARIS Business Process Management

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and 2 Tables

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Preface

Agility and Execution – Organizational Success Through Flexible Business Processes

Only a company which is flexible, agile and responsive will be successful. The secret to success is agility, meaning the ability to quickly adapt company processes. Against this backdrop, IT is of particular importance as it is virtually the machine implementing company processes.

A variety of very different routes – much discussed in the IT world – lead to the goal of agility. The most radical of these is what is called extreme programming. The fathers of extreme programming assume that the user is not actually aware of what he really wants. There would be no sense in planning a solution, because the end user would not understand the plan anyway and, even if he did, he would permanently be making changes to it. This is why the 'eXtreme' programmers see more sense in working on solutions bit by bit and conferring with the end user in the same piecemeal way. This results in a test-driven, thoroughly experimental approach. However, one must concede that this approach does have agility, and it is this agility that one must try to carry over into other IT concepts. For one thing is clear: agility to IT generally means shortening introduction and adaptation cycles.

The concepts for the so-called Service-oriented Architectures (SOA) are taking the same – and in my opinion right – direction. Here, too, small functional building blocks are employed, which are represented by Services as standardized interfaces. These can be flexibly assembled to form entire business processes of an organization. A Service-oriented Architecture starts with a company's processes. As a consequence of service-orientation, new and particularly more flexible ways evolve to carry out the technical implementation of business process requirements in IT. In order to achieve this, business processes must be described formally in order to be understood by the service-oriented IT platforms.

As a result, these descriptions gain a central importance as business process models. Using these operational business process models, software components can be configured flexibly to form solutions. Concentrating on the description of business processes enables the identification of meaningful standardization potential within complex organizations. At the same time, it is possible to react flexibly to changes in requirements. Process models, as well as the explicit consideration of business

rules to manage the variants of business processes, increase the transparency of Business Process Management. This is why *IDS Scheer* as the specialist for operational Business Process Management also considers the topics 'Business Rules', 'Enterprise Architecture', 'Process Governance' or even 'Composite Applications' to be themes for the second half of this decade.

IDS Scheer has succeeded in defining a quasi-standard for describing and steering business processes. We want to work on achieving the same for new topics such as Process Governance. Since all are closely related to Business Process Management, we have the chance of offering an integrated and comprehensive concept which includes consulting, content, methods and tools. Customer feedback is already showing that we are on the right path. Modern and open-minded companies, in particular, are currently discussing their future strategies with us.

Whatever business they may be in and wherever their location is – the secret for successful companies lies in their agility as well as their ability to immediately react to markets. 'Agility' and 'Execution' are the current terms to denote this – and they are more than mere buzz-words. At this point, I would like to go along with eXtreme programmers when I assert that agility is more important than keeping in line with a strict plan – this does not only apply to software but also to companies in general and those consulting them in process-optimization!

Prof. Dr. Dr. h. c. mult. August-Wilhelm Scheer Saarbrücken, February 2006

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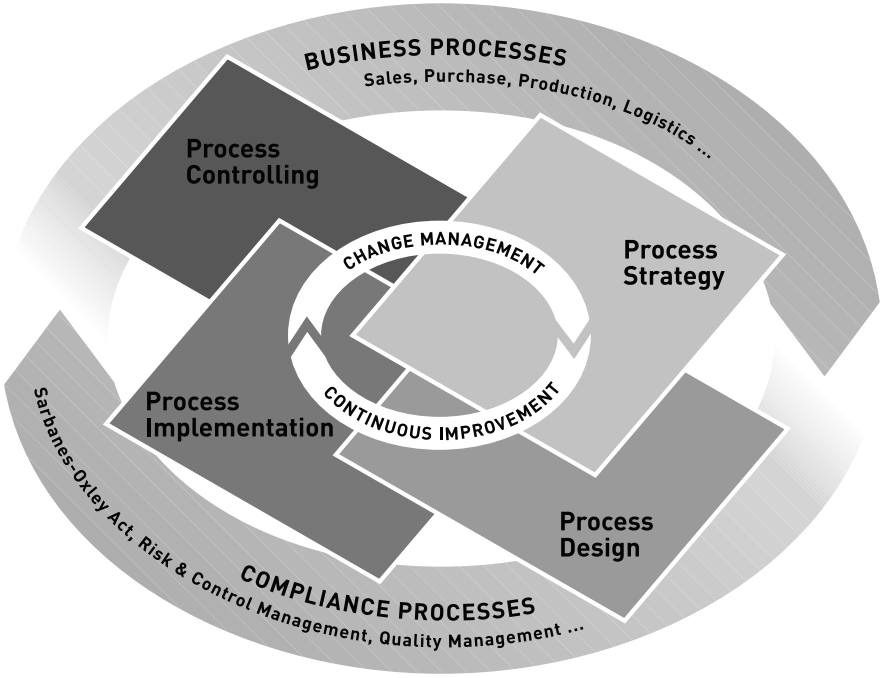
Business Process Lifecycle



ARIS – Software, Method and Instrument

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Herbert Kindermann
IDS Scheer AG

What can and must a software and consultancy company do for its customers? How must the portfolio of services be designed, in order to smooth the way towards more agility and better utilization in the business of customers from a wide range of sectors? What are the unique selling points?

In the software sector, competitor differentiation is through concrete functionality. However, the consultancy sector is, if anything, a 'me-too-market', in which only a few companies have acquired themselves a unique position by having original approaches and innovative products. *IDS Scheer* has not only adopted another, until this day, unique way with its products – with ARIS the company has developed a methodical approach that proved to be a complete consultancy innovation at its launch in 1992. At the first press conference, Professor Scheer stated that it was unthinkable that consultants advise customers on the introduction of modern information systems whilst they themselves are drawing the organization models using paper and pencil. Rationalization and efficient work practices are not only a theme for the customer, but also for the consultancy itself.

What was then computer-aided modeling using ARIS Toolset, has, in the meantime, developed into a comprehensive consultancy package for Business Process Management: ARIS Value Engineering comprises a wide spectrum of expertise, methodology, tools and solutions.

Gradually over the years, the ARIS BPM software has become a method and instrument for consultancy. Robust models, structured processes, semantically clearly defined contents, and pre-configured solutions were developed for each type of project. 20 years experience in consultancy on Business Process Management has flowed into ARIS Value Engineering. As with many products that have

become a brand and developed into an industry standard, the basic idea is elementary: using a simple descriptive language for business content, a knowledge database and software programs, the consultant has at his disposal a construction kit with instructions, which guide him through the complex project. With ARIS, the principle that one requires standards and pre-defined components to enable experiences to be reusable has been carried over to consultancy. At first, the prime interest were the logistic processes in the manufacturing sector, where ARIS was used as a tool for analysis and improvement. However, over the years, an increasing variety of sectors became interested in the business process expertise of *IDS Scheer*. Last but not least, the term 'factory' for back office processes in service organizations made it clear that business process excellence is a primary driver for competitiveness.

ARIS Value Engineering contains over 40 components and modules, numerous sector-specific reference modules and five core tools filled with over 100 sector- and solution-specific standards. This number alone clearly indicates that today's consultancy has outgrown the know-how of a single consultant. Information systems are there to store and distribute knowledge, independent of individuals: in short, to make it reusable. The vocabulary of concepts is totally conformal. In addition to this, there is the integrative methodological concept: the *IDS Scheer* consultant works according to an integrative method and documentation concept. As early as the presentation stage, the customer is shown how his results are documented; he receives a precise idea of what he will receive at the end. Consistency is assured – from the initial outline right through to implementation.

The methodology is important as it ensures that data and information are homogeneous and each finding is integrated easily or can also be modified. Global project teams not only have a common Web interface, but also a common understanding of the business contents that cuts across any differences in language and culture. They all work according to the same semantic principle and with the same tools, thus ensuring that the outcomes of sub-projects match, any time, any place. Transparency and integration are guaranteed throughout the complete consultancy process, which in the ARIS concept is also described as 'lifecycle'.

Closed System for Customer-Individual Requirements

ARIS Value Engineering is a closed system with quality-checked modules and components. The concept is targeted to completely fulfill the customer-individual requirements, whilst simultaneously utilizing the advantages of a standard product. ARIS can be best compared to a modular furniture system, made up of standardized and quality-checked components, which can be assembled in different ways to produce different pieces of furniture. The fundamental principle always remains the same, meaning that one can add to and rebuild at any time.

The development of a business process organization is more complex than building a shelving system: so this analogy can only be used conditionally. However, the basic principle is the same: from the start right through to the very end, one works with identically constructed components, so each module fits with any other module and they can be flexibly combined.

Using ARIS Value Engineering, top decision-makers can define the objectives of the business processes, including success factors and business areas. Then, so-called process owners take over the process models and use them to design the organization's core processes. It is the task of the IT department to use information systems to implement these processes. In the end, performance management ensures that these business processes are checked at the start of defined strategic objectives. ARIS Controlling means that the organization's processes are monitored continually throughout their duration. This is because the tool is directly set up on the application systems. This performance monitoring only supplies meaningful information if strategic aspects are combined with process-oriented and IT-related analysis.

From the Strategy to Controlling and Back

ARIS Value Engineering contains the monitoring tool ARIS Process Performance Manager, the basis of which is a key performance indicator system. This is used to define key indicators used to link the process performance with the controlling aspects of the business. It also enables the process to be continually monitored throughout its duration and triggers an alarm when it identifies hold-ups or deviations from the process model. In this way, customers like service providers always have up-to-date measurements, which also make the processes comparable and can be used as the basis for optimization measures. In this way an organization is able to set up a closed loop within itself, supporting a continual improvement in Business Process Management.

ARIS Value Engineering has developed a user-specific interface, tools and graphics for each phase so that each ARIS user can work in the most optimum environment for him. In order to map his strategy, the manager requires a process map or general matrixes and overviews for the process portfolio. Meanwhile, the designer gets right down to business and considers qualitative or structural process analyses and outlines process flows in order to identify logical weak points such as organization, media or system disruptions.

The thus newly designed business processes are realized in the implementation phase. Using several ARIS tools, such as 'Process-to-Application', this is done as far as is possible automatically and without frictional loss. Even the building up of process competence, thus the conviction and training of employees, is methodi-

cally integrated into ARIS Value Engineering. Thus ARIS is a strategic tool to realize measurable benefits in the processes.

BPM – A Question of the Definition

What ARIS Value Engineering and the ARIS Platform products offer is known throughout the world as BPM, Business Process Management. However, in the meantime, this term is used increasingly to discuss very different activities. In order to prevent misunderstandings, an explanation of the fundamentals is required. The fact is that the term BPM has been diluted substantially by pure technology providers, the likes of IBM, *Microsoft* and *Oracle*. For clarification it is important to differentiate between two types of BPM: the business BPM on the one side and the technology BPM on the other.

The objective of business BPM, which *IDS Scheer* represents, is the implementation of BPM as a management philosophy within the organization. It concerns positioning the company's business processes and the associated performances (costs, time, quantities, resources or also degree of innovation) as central planning and control measurements for the organization's success. In order to do this, both an appropriate organization and technology platform are required. At *IDS Scheer*, this is the purpose of the ARIS Platform. This meta-process platform aids the organization to implement the aforementioned business BPM process, comprising process strategy, process design, process implementation and process controlling. In doing so, the business process landscape of an organization is represented in all four phases.

The objective of the technology BPM, however, is the best possible efficient and flexible automation of selected business processes, e.g. workflow, or, when EAI is concerned, also a flexible (process) integration of various business applications. The main focus of these systems is in the area of execution. Indeed, although these software producers talk about process modeling and process monitoring, this only applies to the process (part) modeling or monitoring to be automated. In order to ensure seamless transition in the execution, the models are very technological and far removed from an operative process model. Even the monitoring is only concerned with pure technology key performance indicators.

There are then, if you will, two instances of the terms design / modeling and controlling / monitoring. One considers BPM from the business viewpoint – this is what ARIS represents – and the other considers it from the technology viewpoint. The not inconsiderable challenge is to link and integrate both these cycles as far as is possible. This is also the background to the close connection between ARIS and SAP – a practical example of this would be how business BPM can be interlocked with technological BPM.

Process Management as a Mile Stone for Service Oriented Architecture (SOA)

The objective of the BPM cooperation between SAP and *IDS Scheer* is to further develop methods and tools for consistent process modeling, which support the SAP Enterprise Services Architecture (ESA). With ARIS for SAP NetWeaver, the technological starting basis is already here.

Using the open integration and application platform, SAP NetWeaver, users, information and business processes can be consolidated, spanning across technology and the organization. In doing so, SAP NetWeaver supports process automation within SAP applications (workflow management). Processes spanning across systems can be integrated and automated using SAP NetWeaver Exchange Infrastructure (XI).

What have been missing up till now are the Business Process Management components. Only these enable the business process of the user to be captured, analyzed, optimized, and then to cross over from this into the implementation of the technical processes. This transformation from business into technology is the central focus of the cooperation between SAP and *IDS Scheer*. In terms of the product, this means the integration of ARIS with SAP NetWeaver. In order to guarantee the transition from business process design into the technological implementation, *IDS Scheer* now has a product, designed in collaboration with SAP, which has already been in use for a year with customers such as the Bundeswehr (the Federal Armed Forces): this product is ARIS for SAP NetWeaver.

The Bridge from Business to IT

ARIS for SAP NetWeaver bridges the gaps between the requirements from the point of view of the business process and implementation using SAP applications. In addition, Business Process Management with ARIS for SAP NetWeaver is already providing the starting basis for the successful switch to future technologies, such as the Enterprise Services Architecture from SAP. The solution contains a comprehensive description of the process architecture, from the business models right up to implementation and configuration of the processes using the SAP Solution Manager and integration with service orchestration models in SAP NetWeaver XI and also the applications with SAP Business Workflow.

However, *IDS Scheer* utilizes even further possibilities offered by the SAP NetWeaver Platform. Since the middle of 2005, the development department has been devoting its time to so-called business applications (composites). These new soft-

ware products are designed to fill the so-called 'white spaces' within the existing SAP landscape. *IDS Scheer* has special know-how in specific industry processes and generic cross-industry processes, respectively, which will now be incorporated into software as a consultancy product. In doing so, in addition to sector and process expertise, customers can also be offered 'ready-made' processes. Initially, it concerns processes from areas and sectors in which *IDS Scheer* has particular strengths and experience values, so e.g. defense and SCM. This truly means that, henceforth, in the context of consulting projects, customers will receive SAP solutions containing supplementary standard software in which parts of their processes or their core processes are already completely represented. Thus implementation of the organization's processes will no longer take place per hand – as still is the case today – but by the aforementioned standard software from *IDS Scheer*, supported by ARIS methodology and tools.

Over the last 3 years, ARIS process expertise, in combination with SAP technology, has also been made accessible to medium sized enterprises. The ARIS SmartPath product is now in demand in Europe and the USA from medium-sized customers from a wide range of sectors. Discussions with these customers (*IDS Scheer* includes almost exclusively companies with more than 200 employees or a turnover of more than 20 million Euro) reveal that the much-discussed IT investment slow-down is being increasingly resolved. However, other than in the past, the companies do not want any IT solution that may fit for the moment, but the latest technology that is also scalable. This is particularly true for areas such as production. Indeed, it currently seems as though, in proportion to total investment, medium-sized firms are spending far more on IT than their larger counterparts. Increasingly, medium-sized enterprises would like software, maintenance and consultancy all from the same source. In doing this, they want to achieve a long-term and reliable basis for planning.

The proportion of stand-alone solutions in such firms is also decreasing, as the networking and integration requirements with business partners are rapidly growing. It is for this purpose that standards are needed. On the other hand, there is a clear requirement for solutions tailored to the customer's needs – indeed this is particularly so when organizations spread across various sectors. By using *IDS Scheer*'s ARIS SmartPath for medium-sized enterprises, business process models from different sectors can be combined so that the software immediately supports the ideal-typical workflows.

Based on the SAP All-in-One as ERP software, this solution enables further requirements of medium-sized enterprises to be met. More and more often, consultants feel under pressure to realize quick win implementations with a high RoI. The investment should see returns after just 30 months. Customers see that this is possible using a business process oriented approach. ARIS SmartPath enables processes to be meaningfully combined with applications. As a result, users can transparently map, analyze and optimize the complex entirety of their organization.

IDS Scheer offers its complete portfolio, with products and consultancy, from the process design right through to process controlling, worldwide in over 50 countries – with offices in 22 countries and long-term partners in around 30 countries. This global presence means that multi-national customers can be sure that *IDS Scheer*'s process expertise is accessible wherever they are active in the world. This will be all the more important when, during 2006, the aforementioned new version of the SAP NetWeaver Platform is released – with ARIS 'inside' – and the resultant possibilities this brings to ensure business process excellence in any organization.

"Over the years the BPM software ARIS has gradually become a method and instrument for consultancy. Robust models, structured procedures, semantically clearly defined contents and preconfigured solutions were developed for each type of project. 20 years of consultancy experience has flowed into ARIS Value Engineering. The principle that standards and predefined components are necessary in order to make experience and know-how reusable was carried over into consultancy with ARIS. At first, the prime interest was the logistic processes in the manufacturing sector, where ARIS was used as a tool for analysis and improvement. However, over the years, an increasing variety of sectors have become interested in the business process expertise of *IDS Scheer*. Last but not least, the term 'factory' for back office processes in service organizations made it clear that business process excellence is a primary driver for competitiveness."

Helmut Kruppke

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Herbert Kindermann

Business Processes Support Growth at BMW Group Financial Services

How the financial services provider empowers employees in subsidiaries to optimize business processes themselves

Nicolas Lacker
BMW Group Financial Services

Summary

With its 'Process Guide', *BMW Financial Services* empowers staff in their subsidiaries to analyze and optimize business processes themselves. The first implementations in the various countries are rapidly showing success and are supporting the *BMW Group* on its course for growth. For their innovative approach, *IDS Scheer* presented *BMW Financial Services* as overall winner with the Business Process Excellence Award in 2005.

Key Words

Business process improvement, enabling process thinking at country level, knowledge sharing

It can take a long time for Business Process Management to prove successful. Moreover, it takes a lot of energy and resources to support the operational departments in process optimization. But we at the *BMW Group* were not going to take this lying down.

Already in 1999, because management anticipated strong corporate expansion, the current *BMW Group* Chief Financial Officer, Stefan Krause, initiated the 'PROCEED' program (Process Centered Division), the objective being to keep up with the pace of business expansion by optimizing and, as far as possible, standardizing the business processes across countries. In line with the *BMW Group* strategy, this approach was based on the largest possible standardization whilst at the same time respecting the country-specific requirements.

From 2000 to 2004, the number of delivered cars actually increased by about 50 percent. Moreover, fewer buyers were paying cash, preferring instead various financing options. Both resulted in a significant increase in contracts in the Financial Services division, which offers its products in 50 countries through 25 wholly owned companies and 25 cooperation agreements. *BMW Financial Services* has two objectives: one, to support dealers in car sales and the acquisition of new customers, and two, to contribute to *BMW Group* profits. This is made more difficult by the fact that, in addition to the increase in volume, there are several more stringent legal requirements which increase the overheads of concluding a contract. Moreover, there is mounting pressure on margins in the automotive financial sector from independent online financial services providers and local banks.

The first results of the PROCEED initiative for process optimization were encouraging. In one country the failure rate in credit financing of cars was reduced from 14.3 to 4.2 percent. In another, the number of processed contracts per employee was doubled. At the same time, however, we found out that, on the one hand, employees had little time to spend on process optimization on top of their operative business, and on the other, that they had difficulties in dealing with a topic perceived as extremely methodical and tool-based. Apart from individual country organizations, in which the project was driven by the management, the implementation proceeded more sluggishly than we had hoped.

This is why, in the PROCEED Team, we thought about a way to motivate the country organizations and put them into the position of analyzing and improving their processes by themselves. Our starting point was that the central team should not be working *for* but *with* the countries. The team defined its own role as 'enabler'. Our main task was to transfer manageable knowledge and concrete examples, such as best practices, from which to learn and produce benefits. In this way we wanted to achieve the best-in-class processes for all customer and dealer-related processes step-by-step. At the heart were all sales activities and operational processes along the financing processes – including dealer relations, contracts implementation, payments, collection processing, and end-of-term, i.e. up to the

point where we provide the customer with his or her new financed BMW. The foremost goals were improving market focus and customer loyalty, increasing internal efficiency, and continually monitoring process quality.

During the period 1999 – 2003, methods, numerous tools, best practices, and templates were developed which, however, proved to be more suitable for process specialists than for operative staff. The core idea was to develop a practice-oriented 'Process Guide' which would examine the existing elements for relevance and usability and organize them such that they may be utilized by any non-process expert. We developed a practice guideline in eight steps, containing concrete, real-life process-examples from the country organizations, and which enabled 'quick wins' and provided the basis for continual process monitoring and optimization. With each process optimization, the knowledge of the Process Guide increases and contributes to the exchange of ideas and experience within *BMW Financial Services*. At the same time, the Process Guide ensured a standardized approach that provided the countries with a common language and enabled local and central measuring of efficiency in the core processes. In a pilot project with the Swiss organization, the process guide was tested for usability and user-friendliness and was enhanced with given elements.

The organization in Switzerland was particularly suitable for such a pilot project. Between 1992 and 2002, the subsidiary achieved substantial growth of an average of 30 percent per annum. The portfolio contained about 45,000 contracts. Due to the high volume of concluded contracts, but also as a result of stricter legal requirements such as money-laundering and consumer credit protection laws, it was increasingly difficult for staff there to cope with the daily business. Although a new IT system was introduced in Switzerland in 2003, the staff was still working based on the old process-flows.

As part of the pilot project, the actual processes in the dealer service center, in customer relationships, in accounts receivables, and in end-of-term were analyzed. After three months, concrete measures for improvement were defined and divided into three different categories: organizational changes that were quick to implement, IT implementation projects, or in / outsourcing measures requiring a strategic decision. The changes included simplifying the application acceptance process, the checks for data completeness, and the extensive automation of receivables management. Unnecessary process steps, from which a new working structure and organization were derived, were eliminated. Added to this, dealers are now also supported in client consulting with checklists and research tools. The Swiss subsidiary also wants to outsource certain services, such as postage or archiving. In the dealer service center, processing times can thus be reduced by 60 percent. Time-savings could also be achieved in the areas of accounts receivables, end-of-term, and in the Customer Service Center. As a result of the newly defined processes, customers now receive a printed version of contract and financing information for their desired car in less than 20 minutes, exactly what customer focus is all

about. The subsidiary also checked given indicators with the aid of the ARIS Process Performance Manager, which provided many very useful insights on the efficiency of the different processes.

With this positive experience in Switzerland, we then set about the roll-out of the updated PROCEED-approach. All *BMW Financial Services* employees can obtain information on the project from the Intranet, download the various elements of the Process Guide, including tools, templates and examples from other countries, and receive support from the central PROCEED team.

With hundreds of pages of documentation plus attachments and templates, the Process Guide proved to be too complex for employees who were already stretched with their daily work. In order to solve this problem and to support those country organizations that had opted for process optimization, the PROCEED project-team set up a training program. Following a kick-off event with a general introduction to BPM, there are four days of practice-oriented training, using concrete sub-process from areas which the country organization wants to improve. Once the target processes for the selected area have been established, the local employees are prepared for the presentation of results to their management.

Within a short period of time, three further country organizations in Asia and Europe were convinced by the success of the Swiss subsidiary and have meanwhile analyzed and improved their processes. This transparency led to the elimination of unnecessary and non value-adding tasks and to an organizational change to many process segments. For large units, automation often promises the greatest potential. For smaller country organizations, the team recommends avoiding IT solutions. The focus here is on reorganizing processes. In one case this led to a significant reduction in the number of clients, whose payments were overdue for more than 30 days. A further country organization was able to increase customer retention by a quarter. Through process analysis, it became transparent in a further subsidiary that in-sourcing entire processes was the most economic solution.

The best result of the project is, however, that *BMW Financial Services* has, on the whole, improved its efficiency, and that the country organizations themselves have emerged from this process stronger and more self-confident. The positive results have meant that employees in the operative sectors have received high praise from management, and that they no longer feel process optimization to be a burden but, rather, an enrichment to their job. They now contribute more to the generation of value than before. The roll-out continues: further country organizations have requested support and training. As the country organizations now have a common language as a result of the process guide, they are able to better communicate on progress and deficiencies using uniform methods and tools, and learn together about how to increase customer satisfaction, efficiency, and process quality.

Owing to BPM, *BMW Financial Services* is prepared for further growth. The share of *BMW* cars financed or leased via Financial Services increased during the last year to 48 percent. By the end of 2005, the portfolio included a total of more than 3.1 million contracts. Global growth confronts both the division and the dealers with great challenges that we are able to address because we use a common language, can act independently, and learn from each other.

Practical Implication and Use of Process Management at T-Mobile Czech Republic, a.s.

Přemysl Filip
T-Mobile Czech Republic, a.s.

Miloš Ungr
T-Mobile Czech Republic, a.s.

František Havel
T-Mobile Czech Republic, a.s.

Summary

The attention devoted to the field of Process Management at *T-Mobile Czech Republic, a.s.* (*TMCZ*) is indisputable. This becomes evident from the fact that it has been integrated into the management style at *TMCZ*.

The aim of this article is to provide a summary of the historical development of Process Management at *TMCZ*, which already started earlier than the official announcement of the objective to implement Process Management principles throughout the entire company. After a short description of the company itself, the focus is centered on the milestones of Process Management at *TMCZ*, the preconditions and reasons leading to the crucial decision taken by top management, and the activities leading to the goal of a process-managed company. Future visions and plans in the field of Process Management are also shortly outlined.

Key Words

Process, Process Management, ARIS, Process Model, Process Improvement

1 Brief Introduction

1.1 Establishment of the Company

On March 14, 1996, the *CMobil* consortium won the tender to become an international partner of *České radiokomunikace* announced by the Ministry of Economics. Eleven days later, on March 25, 1996, the licenses to operate a GSM Mobile Network were ceremonially handed over. On June 23, 1996, a new company called *RadioMobil* was registered with the Commercial Court and started to operate the Paegas mobile network on September 30, 1996. In 2002, Paegas was fully integrated into the *T-Mobile International* organizational structure and, in 2003, the name of the company was changed to *T-Mobile Czech Republic* (*TMCZ*).

Within the scope of its business activities for which it is authorized, *TMCZ* established, and now operates, a public mobile communication network at GSM standard in the 900 and 1800 MHz bands and provides mobile telecommunications services pertaining to this network. The comprehensive character of the provided services lies especially in the extensive range of products and possible combinations thereof.

1.2 General Company Information

TMCZ Shareholders

- 61 % – *CMobil B.V.*
- 39 % – *České radiokomunikace, a.s.*

The international consortium *CMobil*, based in the Netherlands, is controlled by:

- *T-Mobile Global Holding* (92 %)
- *TIM International N.V.* (7 %)
- *PVT, a.s.* (1 %).

Network Signal Coverage

As of the end of 2005, more than 99% of the Czech population and 99,8 % of first class roads were covered.

Customer Information

In the first half of 2005, *TMCZ* became the No.1 Czech mobile operator, and in September 2005 the number of *TMCZ* customers exceeded 4,500,000, which is approximately 10 % more in a year-on-year comparison with 2004. *TMCZ* holds a 51 % market share among key account customers (i. e. major companies) on the Czech market, making it the most popular Czech mobile operator in this segment.

Number of Employees

In December 2005, *TMCZ* had approximately 2,500 full-time employees.

Revenues and Profit

In 2004, *T-Mobile Czech Republic, a.s.* recorded substantial growth in many important indicators. Year-on-year, total revenues have increased by 8% from CZK 24.4 billion to CZK 26.4 billion. EBITDA rose to CZK 11.3 billion, which is 7% more than in 2003, when it amounted to CZK 10.8 billion. Net profits reached CZK 4.2 billion. (The financial results were prepared in accordance with German GAAP). Similar positive growth results are expected for 2005.

T-Mobile Group

Now the *T-Mobile* Group is among the world leaders in mobile telecommunications. As one of *Deutsche Telekom's* four strategic pillars, the company concentrates on advancing its global service portfolio. *T-Mobile* is a key contributor to *Deutsche Telekom's* earnings and revenues. By the end of 2005, subsidiaries and affiliated companies of *Deutsche Telekom Group* served over 130 million mobile customers worldwide.

T-Mobile owns network operators in Germany (*T-Mobile Deutschland*), the United States (*T-Mobile USA*), Great Britain (*T-Mobile UK*), Austria (*T-Mobile Austria*), and the Netherlands (*T-Mobile Netherlands*). It also owns a majority stake in *T-Mobile Czech Republic*, *T-Mobile Hungary* (formerly *Westel*), *T-Mobile Slovakia* (formerly *Eurotel SK*), holdings in Poland (PTC) and Russia (MTS), as well as indirect shares in Belarus and Canada. In addition to these complete and partial ownerships of *T-Mobile* in 10 countries, *Deutsche Telekom* is represented in Macedonia, Croatia, Bosnia-Herzegovina, the Ukraine, and the Philippines.

2 Milestone of Process Management at TMCZ

2.1 20th Century ('Period Before Process Management')

The late nineties were determined by extensive company growth regarding both customers and employees. The milestone of Process Management at *TMCZ* was laid in the years 2000 and 2001. The previous years predominately saw a **non-systematic approach** that can be characterized as follows:

Process Management principles were implemented and concentrated mainly in the Customer Care department, where few teams focused primarily on providing operational support. Requirements were driven mainly by standardizing the output to customers.

Apart from those teams, there were also several specialists in other departments. Process Management principles were also implemented in some selected processes or areas via process improvement projects.

Nevertheless, no unified methodology (such as formats, and rules for approval, language versions, publication, etc.) existed throughout the company, with the exception of specific rules for the Customer Care department that were based on the concrete conditions of that department. In addition, various software tools for process description and management, such as Visio, Word, ABC Flowcharter, PowerPoint, Excel, etc., were used. Lack of internal process specialists necessitated substantial cooperation with external ones, especially from consultancy firms. Therefore, only few process improvement projects per year (e.g. in purchasing, fixed assets, product and customer segment management) were undertaken. The aim was to increase process efficiency and process performance. However, it was the company's top management who selected these processes.

Awareness of Process Management among *TMCZ* employees was low. This is also underlined by the fact that the communication of Process Management principles was mainly directed at the top and middle management of *TMCZ*. Comprehensive training in Process Management at *TMCZ* practically did not exist. Since the role of the process owner was unclear, little cooperation between process owners and process specialists took place.

All these facts were not beneficial to the homogeneity of Process Management inside *TMCZ* and could have brought an adverse impact on the company in the long-term. A great challenge was to gain support from the top management for the broad implementation of Process Management. The success of process improvement projects, which had achieved visible results, thus persuaded the top management and obtained the necessary support.

2.2 21st Century ('Process Management Period')

The introduction of **real consistent Process Management at *TMCZ*** is closely linked with the top management's decision taken in 2001. *TMCZ* announced their plan to implement the principles of Process Management throughout the whole company. The decision was taken to make Process Management one of the key company management styles. This decision was preceded by the unification of methodology and tools for Process Management as a result of the project, in which representatives of all divisional support process teams had participated.

The **motivation** for the above quoted top management decision was founded on the following preconditions:

- concrete and positive experience with the process approach within the company;

- know-how of people dealing with this issue in the company;
- number of repeatable activities across several organizational units of the company.

However, the **main reasons** for the top management's decision, apart from the influence of a highly competitive, saturated market and an ambitious demand from shareholders, which put pressure on increasing company performance, were:

- the significant influence of processes on company costs and profits;
- the substantial effect of processes on product quality and customer services, which eventually affects customer satisfaction;
- the requirement for a comprehensive approach to the management of collaboration between the organizational units involved in many of the company's core processes.

Finally, based on the experience and best practices of world leaders, Process Management leads to better business results than simply managing organizational units. This is natural, since each organizational unit is not isolated but cooperates with others in the company.

The following are among the established or initiated **activities leading to the goal of a process-managed company**:

Communication of Process Management Principles Inside the Company

Widespread communication of the Process Management orientation at *TMCZ* was initiated via email by the CEO, who addressed the company's entire staff. All new employees and managers are introduced to the basic principles of Process Management on *TMCZ* orientation-days or at the beginning of their career in the company. Articles focusing on Process Management, and mainly on its practical implications at *TMCZ*, are periodically published in the internal hard-copy magazine ECHO, or in the electronic version called eECHO. Employees can also find plenty of interesting and useful information on Process Management on the company Intranet. There is a special section in which mainly information on Process Management at *TMCZ*, methodology, and news regarding this topic are made available.

Definition of a Uniform Methodology

- uniform methodology valid for the entire company;
- definition of terms used in Process Management;
- *TMCZ* Process Management scope;
- rules for process model update;

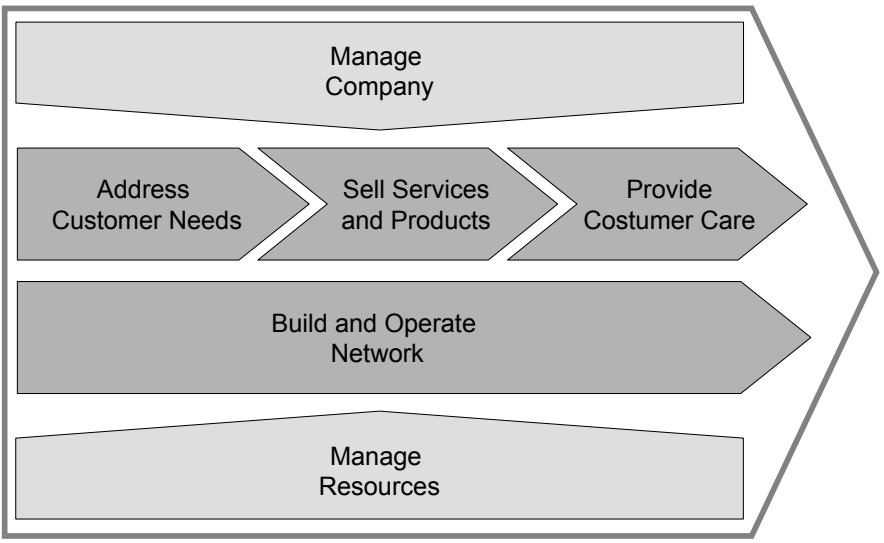


Fig. 1. Process model at *TMCZ*

- definition of the process owner's role (responsibilities, authorities);
- rules for process definition;
- rules for process description, incl. draft preparation, approval, Intranet publication, communication, update;
- rules for process measurement;
- rules for process target setting;
- rules for process improvement;
- description of the process owner's support system (i.e. network of process specialists within the company).

Creation of a Process Model

A process model at *TMCZ* has three levels. It includes six process areas on the first, highest level (see Fig. 1), thirty-three process groups on the second, medium level, and finally, more than 400 processes and their variations on the third level. Since the majority of processes run through several company organizational units, the key characteristic, according to which processes are defined, is process output.

The first version of the *TMCZ* process model was created in 1998 as the result of discussions with the top management. During evolution, process models of telecommunication companies such as *Telecom Italia Mobile*, *T-Mobile Deutschland*

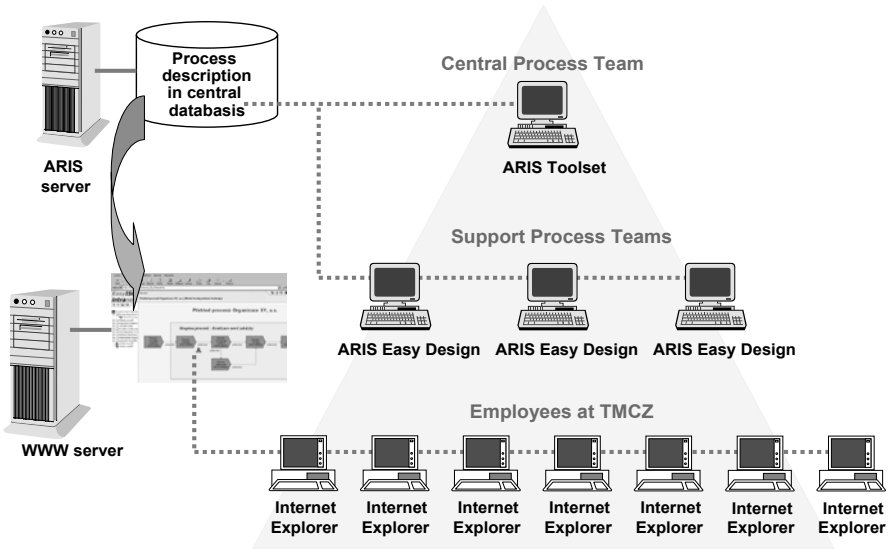


Fig. 2. ARIS Architecture in *TMCZ*

or reference models for telecommunication by *Arthur Andersen*, *Delloite&Touche*, *Cap Gemini*, SAP, among others, were taken into consideration. After defining levels one and two, level three and the process owners were also defined in cooperation with middle management. Level three is regularly updated by adding new processes (e.g. processes in connection with new services) or removing old processes that have been cancelled. Since 1998, the *TMCZ* Process Model, which covers all company activities, is adjusted approximately once or twice a year according to company development and is approved by top management.

Usage of the Central Software Tools ARIS and Process Compass

The software tool ARIS is valid for the entire company. It is centrally administered and has one common server. The ARIS architecture is shown in Fig. 2. Users of ARIS are trained on how to use it on a two-day training course. Two databases are shared by all users, with one serving for process modeling and the other serving for approved processes. ARIS conventions, i.e. rules for modeling and ARIS administration, are the foundations for all closely linked activities in the ARIS background. This tool is customized to suit the needs of *TMCZ* and results in more user comfort for 'modelers' when models, objects, and their attributes are adjusted to company requirements. ARIS enables the automatic generation of paper process documentation, different scripts used for analysis, planning, etc. For the purposes of employees, Process Compass is available on the *TMCZ* Intranet (see Fig. 3). One of the latest activities, that can be mentioned, is the HR link. The aim was the regular synchronization of the organizational structure in ARIS and SAP (see Fig. 4).

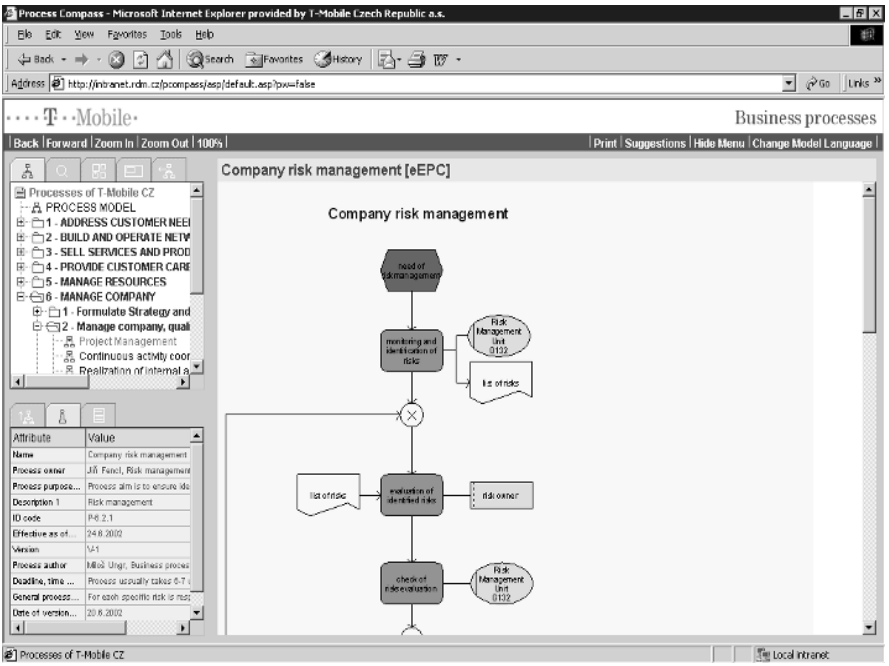


Fig. 3. Process Compass

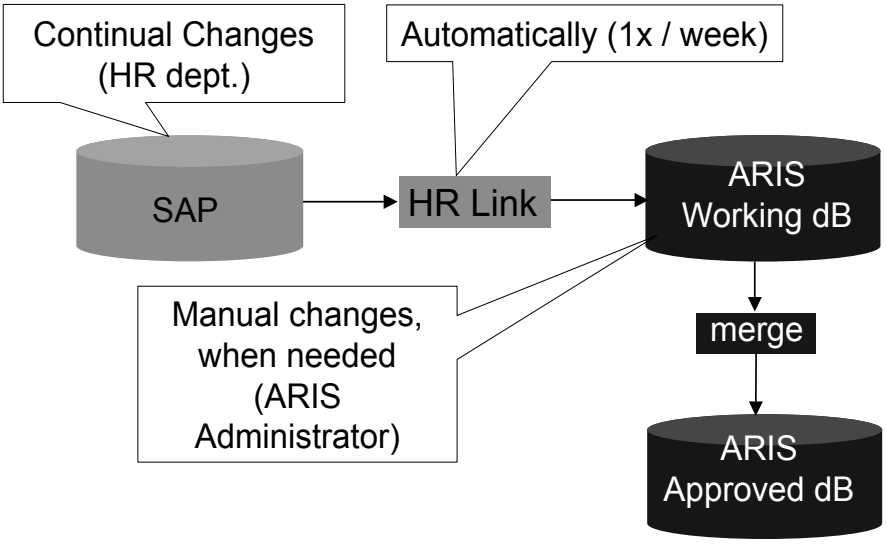


Fig. 4. ARIS HR Link

Comprehensive Training

Regardless of the fact that the basic principles of Process Management are permanently distributed to all employees via internal communication channels, the internal training menu, accessible to all employees, allows the participation in a one-day introduction to Process Management. Process Management forms part of the standardized training offered by the *TMCZ* human resources department and is obligatory for process owners, middle and top management. There is the scheme of two days' training for process owners, one day training for middle management, and half-day workshops for the top management of *TMCZ*. The basic program of this type of training involves informing participants and getting them involved through solving practical situations and case studies in Process Management principles, Process Management at *TMCZ*, improvement and redesign of processes, and problem-solving techniques for teamwork during the continuous optimization of process. At the end, participants practice the redesign of process using a process game. The aim is to show how simple processes can be dramatically improved and shortened.

Process Description, Measurement and Target Setting, Optimization and Improvement

This sequence of steps is in analogy to the well-known Deming's PDCA cycle. The first phase of Process Management has almost been achieved since the majority of processes were described. The second step of process measurement is fundamental for qualified Process Management and is a necessary precondition for realistic target-setting based primarily on facts, not on wishes. Measurement on the lowest level of the *TMCZ* process model (concrete processes) primarily focuses on process frequency, quality of process outputs, process cycle times, or process costs as the crucial measures. ABC costing was implemented on the second process model level across the entire company and on the third process model level in the case of customer service processes. Systematic process target setting, including the alignment of process targets with the company's strategic targets according the principles of the Balanced Scorecard, is currently being implemented. The optimization and improvement of processes represent a huge challenge to each company, and there is inevitably still a large, undiscovered potential for further progress at *TMCZ*. A strong, imperative shift is taking place from the original to the target state.

Definition of the Process Owner Role, His / Her Responsibilities, Rights and Support

The responsibilities of process owners includes process target fulfillment, creating and updating process descriptions, managing process operations in accordance with the approved process description, monitoring process performance, and systematic and continual process improvement. On the other hand, the process owner has the right to approve process descriptions, check and control process fulfillment after approval, suggest process changes. He is also allowed to obtain information related to the process and to solve process-related issues on the manager or director level, or provide information to relevant managers as a criterion for employee

personal target agreements and their evaluation. Support for this key player in Process Management at *TMCZ* is ensured by the so-called process support teams, consisting of process specialists responsible for the description of processes in ARIS, helping, acting as moderators in process participants' meetings, supporting with process improvements, and consulting in various issues related to processes and their management. Those experts are available for each division inside *TMCZ*.

3 Future Outlook

Plans for the very near future at *TMCZ* regarding Process Management are quite ambitious but not unrealistic:

a) to establish systematic and broad process improvement focused on processes with key importance to the company;

b) to make regular use of process reviews as a useful tool and a continual part of process monitoring and improvement;

c) to participate in the *TMO* group process optimization projects;

d) to take part in coordinating at *TMO* group level in Process Management activities;

e) to cooperate inside *TMO* in the field of training, methodology, ARIS software, etc.;

f) to start benchmarking inside the *TMO* group.

4 Conclusion

The reason for the attention devoted to the field of **Process Management at *TMCZ*** is its' **identification with one of the most important tools to achieve strategic goals and an excellent performance**. The main reason, why the company in future wants to deal with business processes on a broader scale, is the fact that the output of well-designed and functional processes are high-quality products and services for the customers of *TMCZ*, both internal and external. This fact increases customer satisfaction as well as loyalty.

Last but not least, there is the aspect of continually improving processes which in the long term will lower costs and maintain profitability in the highly and increasingly competitive telecommunication environment. In cooperation with its foreign partners, especially inside the group of *T-Mobile International*, *TMCZ* responds flexibly to the trends in this area and, significantly, keeps pace with the worldwide standard.

Latest achievements, activities and conference participations prove that, in bicycling terminology, we are with the leaders of pack.

When Giants Learn How to Dance – The Introduction of Process Management to a Health Insurance Fund

Markus Kopetzky
KKH – Die Kaufmännische

Günter Reich
KKH – Die Kaufmännische

Summary

'Health insurance fund = public authority' – is it possible to break up such an equation which has, often justifiably so, been a fixed association in the minds of many people? Is an organizational method, such as Process Management, able to solve challenges of strategic and vital importance?

The market environment within the German public health insurance fund sector ended its deep, long sleep at the end of the nineties and has woken up to dynamism and competition. At the time, the *Kaufmännische* found itself in a whirlpool of above average premium rates, increasing expenditure on healthcare, and stagnating member numbers.

A project was set up which had to prove itself by breaking this vicious circle. The project's eventual success was mainly a result of the method used for business process analysis and optimization, and it undoubtedly influenced the ensuing organizational development to what we today call 'Process Management' within our company.

We have not only returned to economic stability, but have significantly increased our ability to act and react.

Yes, the *Kaufmännische* really can dance …

Key Words

Re-engineering, cost control, Business Process Management

1 The Company

The *Kaufmännische* is the fourth-largest, nationwide statutory (as opposed to private and private-for-profit) health insurance fund in Germany. Our clients receive individual consulting by our qualified staff and, added to this, the *Kaufmännische* distinguishes itself by offering intensive case management in the areas of occupational disability, adjuvants, and hospital care. The *Kaufmännische* is responding to future challenges and is actively taking part in shaping the future by supporting alternative medicine and pilot and research projects. It is also making a concerted effort to develop innovative services. The bi-annual KKH innovations-award has meanwhile established itself as fixed institution in this sector. The *Kaufmännische* also focuses on the promotion of prevention and early diagnosis and, with this in mind, has produced the 'White Book for Prevention'. The extent to which such issues as prevention and early diagnosis are the focus of insurance is highlighted by model experiments such as the project for the prevention of premature births, the scheme to include genetic testing for hemochromatosis within the public health insurance sector, as well as the cardiovascular races which have been taking place on a regular basis since 2004. All aim at promoting the idea of prevention among the population.

The *Kaufmännische*'s 4,300 employees look after the close to 2 million members in 113 service centers, 28 regional centers and 11 centers of excellence, with an additional 740 area managers in 40 sales regions. The *Kaufmännische* has the responsibility not only for the management but also for the active control of a 4 billion euro budget; this also implies the consideration of social and economic aspects – and, in view of the stabile financial situation, the *Kaufmännische* is doing this successfully.

2 From a Project to Process Management

The development of Process Management (PM) at the *Kaufmännische*, as it is today, was not an inevitable, evolutionary result to be achieved by any organization. No, the kick-off was much more profane: it was initiated by the market.

And, as with all such kick-offs, a project aimed at short- to medium-term results was started, initially delaying a long-term master plan. The project began in 2000 and was concluded in 2002. Three years have since gone by. This paper is intended to present the starting point in 1999 and the course and the result of the project, and it will take you down our road of development right through to the present status of Process Management at the *Kaufmännische.*

The period now covers six years. This has allowed us to make statements on trends and on the long-term sustainability of Process Management projects within our organization. Against this backdrop, the development of Process Management can be regarded as a positive side-effect of the study over this period of time, starting with the multi-project.

3 Project 2000

3.1 Starting Point in 1999

All in all, the organization was in a critical situation with increasing premium rates, increasing expenditure on healthcare, and stagnating member figures.

In 1999, the *Kaufmännische* was confronted with a hitherto unknown dynamism of change in the general conditions in Germany. A reformed right of choice in health insurance funds caused the funds to open up to all members of a (statutory) health insurance fund, irrespective of their profession, and culminated in a formerly non-existent competitive pressure among (statutory) health insurance funds. At the same time, there was a general rise in the level of expenditure which led to an additional cost pressure on all health insurance funds.

At the time, we encountered this change with an extremely fragmented branch network that was accompanied by differing, individual processing methods. Prior to the beginning of the project, this historically evolved benefit-processing method was inefficient and function-oriented. We were confronted with a number of uncoordinated sections of responsibility located across 40 branches and several specialist departments in our headquarters and their associated interfaces.

3.2 Objectives and Their Implementation

In order to counter the immense cost pressure and to effectively and efficiently allocate the indemnification expenditure, it was necessary to develop a controlling concept. The priority was to optimize the business processes within the indemnification sector and to establish a process-oriented company organization structure.

At the beginning of 2000, the total project was initiated in form of a cross-sectional organization. This meant that six indemnification areas were selected as the main focus of the project:

- hospital,
- sickness allowance,
- adjuvants (i.e. wheelchairs),
- rehabilitation measures (treatment at a health resort),
- medication, and
- settlement manipulation.

Each of these was supported by the cross-sectional projects

- business process optimization,
- data warehouse applications, and
- controlling.

As a result of this project structure, the function-oriented viewpoints were overcome, barriers were brought down, and an unprecedented atmosphere in interdisciplinary cooperation between

- specialist sectors (specialist knowledge),
- controlling (key indicators),
- organization (process models and coordination),
- IT / data warehouse (process-oriented applications and operating figures),
- branches (practical knowledge) and
- auditing (revision),

based on documented business processes, was created.

The project ran for two years and incurred costs of approximately 5 million euro.

3.3 Solutions and Measures

"The gold lies within the processes." (Dr. Wolfram Jost)

We couldn't have given a more suitable description of the result of this multi-project. The core of the approaches we developed contained an analysis and the optimization of the relevant business processes, as well as their complete reorganization. This led to the development and implementation of new control levers, the elimination of organizational interfaces, and the design of IT solutions.

After developing the target state of the process landscape, the second stage of the project involved organizing the operational structure which led to the establishment of eleven centers of excellence catering for the areas of adjuvants, hospital care and regress.

Text-based job instructions for administrative officers were successively replaced by graphic workflow-representations and a change in paradigms from paper to electronic job-instructions took place.

We created the concept of 'process-oriented application development' for the IT, representing a further success factor in our organization. In addition to a homoge-

nous approach to each respective programming project, this approach specifies the use of modeled ARIS business processes as the foundation for the communication between the respective employee of a specialist department and the actual software developer. The efficiency potential of this approach lies less in the single, individual jobs on behalf of the specialist or the software developer, but rather in the interface, communication, and coordination between the two. As a result of this communication aspect, the implementation speed of programming jobs can now be increased by 25 percent.

These measures and their results are represented visually by means of an example taken from adjuvant processing in Figure 1. Reducing the interfaces by 40 percent cut processing times and, above all, enabled individual tasks to be concentrated and focused on one single objective and thus pool resources.

The business process models, which became the working basis for processing in form of the electronic process instruction (EPI), were communicated via Intranet and thus replaced the existing paper versions of the job instructions. In order to give a first impression of this, we have shown a screen shot as an example for an EPI for processing adjuvants. Now we have reached a point at which hundreds of pages of paper-based job-instructions have been replaced by 120 business process models covering different aggregation levels.

3.4 Technical Implementation

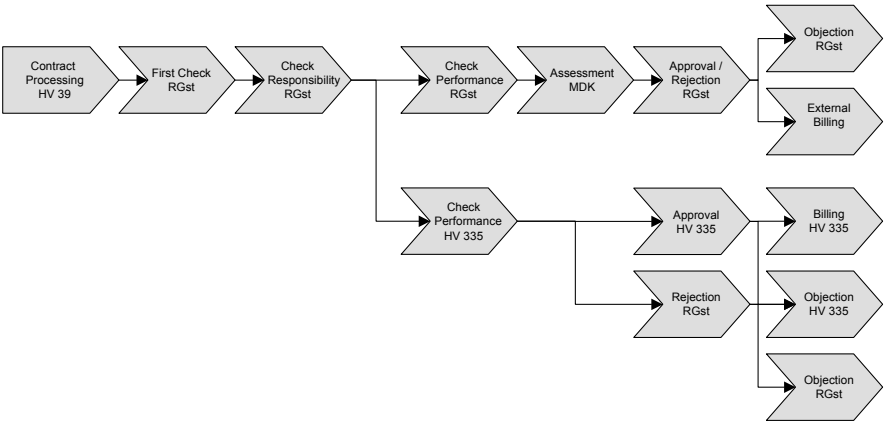
The ‘easy design’ and the ‘tool set’ mode of ARIS 6.2 are used for process modeling. These processes are published on the Intranet in form of Electronic Process Instructions (EPI) using Web Publisher. The ARIS simulation component is used for personnel assessment.

The mass of data in the ARIS environment soon reached such dimensions that performance was compromised. We therefore decided to introduce an *Oracle*-based database. The EPIs are not only the core of instructions for the operative business, but also represent the leading, information-gathering medium for the respective administrator. In order to complete these navigational functions, the respective links to the Intranet (or, rather, to the underlying Content Management System (CMS)) the Internet, to different Web-based applications and information systems (e.g. BRIO), and various Office applications (e.g. Excel) were implemented.

3.5 Project Results

The project has initiated the complete turn-around of the *Kaufmännische* from its historically grown, public authority-style roots to a modern service provider.

Adjuvants process before process optimization



Adjuvants process after process optimization

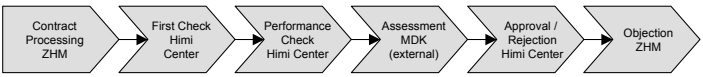


Fig. 1. Adjuvants processing

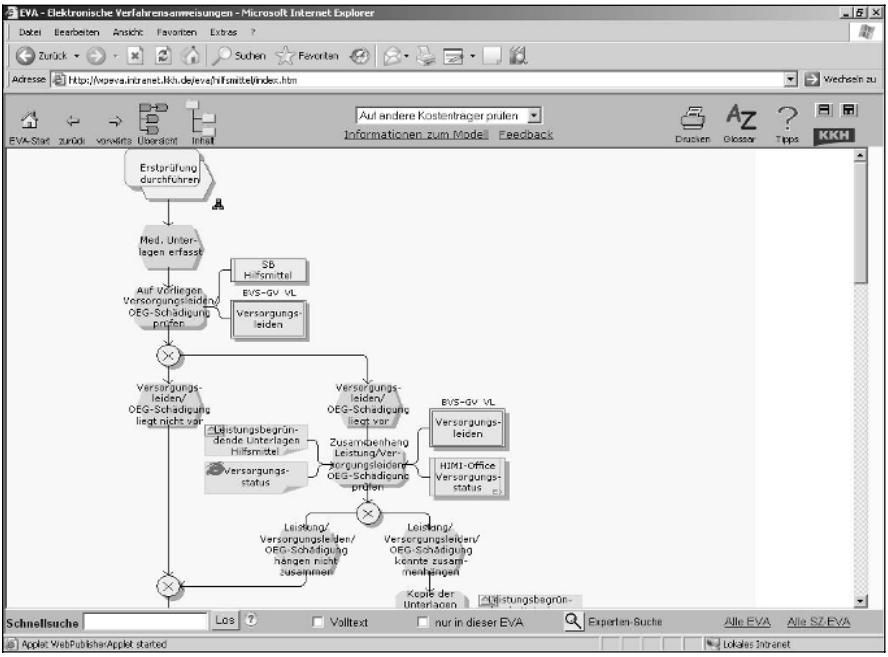


Fig. 2. Electronic process instructions for processing adjuvants

Financial Perspective

The success of controlling indemnity expenditures resulted in savings of several hundreds of millions of euros and culminated in the ensuing reduction of premium rates (from 14.8% to 14.4% as of January 1, 2004, and to 14.1% as of January 1, 2005). It is important here to point out that reducing the premium rates was exclusively financed through our own financial strength and not by means of borrowed capital.

Organizational Perspective

From an organizational point of view, we did not only reduce the number of interfaces within the processes, but we also created a basis for a specified cooperation between headquarter and branches on the one hand, and the specialist departments and application programming on the other. While the reduction of the number of interfaces had a positive effect on the throughput and processing times, the improved cooperation between specialist department and IT, as well as the uniform working basis in form of documented processes, were able to significantly curtail a substantial part of the subsequent application-development projects.

Process Perspective

The project primarily resulted in creating process awareness within the company and inside the minds of the respective decision-makers.

Apart from a more effective adjustment of the most important processes, the basis for actively designing business processes also resulted in improved process performance regarding efficiency, as expressed, for example, by the key indicator for 'throughput and processing time'.

Due to the knowledge and the new design of the business processes, their flexibility could be improved and the time span for design and adaptation respectively reduced. This enabled rapid reactions to actual and anticipated changes in the market and the general conditions surrounding the *Kaufmännische.*

4 Process Management 2005

4.1 The Institutionalized Organizational Unit

The project team 'Business Process Optimization' has become an entity close to the management board and is operating across all sectors. The core responsibilities of this team mainly consist of building up and further developing Process Management within the organizational units and in further supporting and consulting the various projects.

The Consultants

The 'Process Management' team consists of eight employees and has direct access to the management board via the team leader.

The range of responsibilities includes the design and implementation of training, offering comprehensive consulting, further enhancing existing PM methods, as well as reflecting on, and examining, concepts and methods that have not been employed thus far.

Training focuses on different groups and contents, but has been reduced during the course of the years to the benefit of conceptual and consulting services. On the one hand, new business process designers are introduced into the secretive ARIS world and are familiarized with the usage of the software as well as with the fundamental methods and conventions of modeling. On the other hand, there are the users of Electronic Process Instructions. They are primarily made aware of the advantages of electronic mediums as opposed to paper documentation and are subsequently introduced to using the Electronic Process Instructions.

Our consulting portfolio naturally involves concurrent further and new developments of PM methods. We are currently supporting our specialist departments and our projects in the area of process documentation, analysis and optimization. We are also currently examining the opportunities and limitations of the introduction of a comprehensive Quality Management system, the possible implications of process-oriented knowledge management for the *Kaufmännische*, as well as a multi-perspective model for the evaluation of our business processes (key word: 'process portfolio').

Cooperation Guidelines

One of our first achievements was the introduction of 'cooperation guidelines in Process Management'. What initially sounds like a craze for bureaucratic regulation was in reality the greatest removal of hierarchical thought barriers and a directional change of corporate culture toward a more cooperative relationship. For the first time, the roles in Process Management were clearly defined, a factual order was given to 'short-cut the official channels', and an escalation model was developed to counter any arising problems. In addition, the talks held in advance with all parties concerned on the various levels led to everyone thinking about the topic of cooperation within the company, and to attach a certain importance to it. You can see the priority this guideline has by the fact that the releasing authority is the Managing Director.

Training Concept

The training cycle for branch employees poses a particular challenge. The change from the paper-centered world that used to provide the processing instructions to a

technology-oriented Intranet environment was not applauded by all colleagues. There were also reservations about staff at headquarters concerning the proximity to practice and social competence – and, in particular, toward the staff designated to lead the seminars.

Therefore, we had to develop a training concept which clearly highlighted the benefits for the user, created a more integrative seminar atmosphere as opposed to teacher-centered learning, and which underlined the suitability for practical use.

The combination of these requirements led to our so-called 'three-way training method'.

The seminar is structured so that each participant has access to our operational application as well as to the modeled business processes or Electronic Process Instructions. An actual administrative case serves as an exercise using the Electronic Process Instructions and concluding it with the aid of the actual operational system. This trilogy, comprising the presentation of a business process, an actual operational application and practical case, shows the applicability to the daily working routine and removes the greater part of any prejudice or misconception.

4.2 Central + De-central = Cooperation

Headquarters

At the end of the cost control project for indemnity payments, the respective specialist departments were familiarized with the current PM methods. Today, their main task lies in modeling, communication, training, and the permanent improvement of processes. They are being supported by their specialist support team 'Process Management'.

The organizational units, such as the Auditing unit, experienced a fundamental change, e.g. from auditing with filing-orientation to a process- and risk-orientation.

On part of the Controlling department, a concerted effort was made to add the process key indicators to the result key indicators and to establish controls for measures as a further pillar of corporate control.

Branches

The representation and distribution of business processes via the Intranet, and the simultaneous provision of methodical tools such as process variance analysis, is supporting our employees and executives in our branches, enabling standardized, true process-based processing.

The introduction period of new colleagues is drastically curtailed by the representation of processing steps. Savings of up to 40% are often quoted.

At the same time, the insight the individual employees have into their role and their contribution to the total value of the business process under review has positive effects on their self-esteem. The transparency of the activities of all employees participating in the process tangibly increases the understanding for cooperation and interdependence.

A Continual Improvement Process

As we were also confronted with a historically evolved process for making improvement suggestions, we were faced with the challenge of simplifying this process to ensure that proposals or ideas didn't fall at the first bureaucratic hurdle. In a first step, contacts were clearly named, and in order to ensure that no suggestions ended in a black hole of responsibilities, this was accompanied by a fixed progression route.

In a second step we fitted our Electronic Process Instructions with a 'feedback button'. This 'forces' those making a suggestion to write down their proposal in form of process changes and thus consider the larger picture: the chain of effects and dependencies. The suggestions for change are finally directed to the person responsible within the specialist department in the form of a generated e-mail.

The use of the feedback button has three obvious advantages: one is that our colleagues deal more intensively with business processes. Secondly, the number of suggestions that fail to look at the whole context declines in favor of the high-quality suggestions which take a more global view. And finally, reducing the time and effort required submitting a suggestion also leads to 'smaller' suggestions, e.g. making a change to a form, which may have been neglected before due to the effort required.

5 Conclusion

Although public health insurance has not forgotten its social mission and responsibilities, it has arrived in the market economy. This means that some of the players within the market must learn to swim in the deep end and necessitates economic rethinking.

This is also the case with us.

The objective of our search for a cure was delivered to us by our smart employees in the organizational development department: cost control in indemnities.

The project was soon making use of a bagful of Process Management methods. After two years, the project proved to be a success and we were back on the road to economic stability. But this road also brought forth a second, organizational change of direction: Process Management.

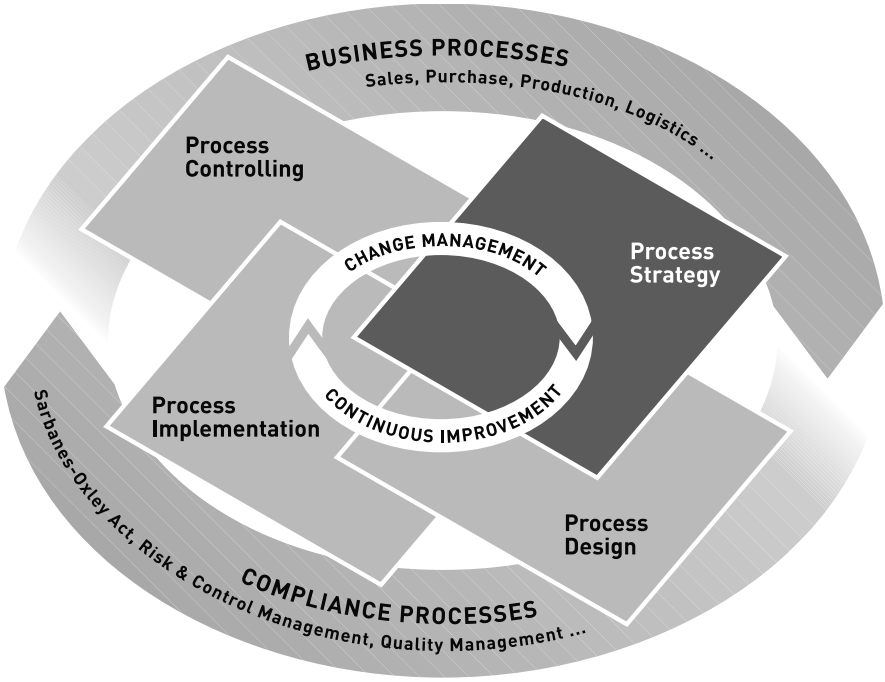
A whole package of methods was developed for the entire organization from the experience and success obtained in the project. It is reflected in training, consulting and conceptual services and is manifest in the Process Management department.

We can conclude that we have more or less reached a level at which the specialist departments have gained an active understanding of Process Management, and the continual process of improvement has gained a certain self-evidence.

We shall therefore not lean back but, from an organizational point of view, rise to political changes and the resulting challenges.

Part II:

Business Process Strategy



From Business to Processes

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Summary

Business Process Management is not only about processes. They merely represent an expression of the business and should only be treated in this context. This treatment, on the other hand, can only occur in close cooperation with the employees of the company, respecting their individual characteristics and abilities. The following chapter will present methods which deal with the following questions:

- Which strategic information is gathered by using which methods?
- How is a business process model designed?
- How are the main focuses of the BPM projects determined?
- How does BPM become authoritative?
- How important is the human factor?

Key Words

BPM, Business Process Management, End-to-End process, management process, business field, business model, business process, Business Process Model, main success factors, main success factor analysis, innovation process, market supply process, process, process objective, strategic objectives, sub-process, supporting process

1 BPM Bridges the Gap Between Business and Organization

"Business Process Management is not primarily about processes!" – a printing error, an oxymoron or sheer blasphemy? None of those! Just a slight change of perspective.

As with every sociological phenomenon, it is important from time to time to look back and reflect on the original ideas behind popular movements. Moreover, 'retrospection' helps you to become conscious of experiences and developments and to draw the necessary consequences. In the case of Business Process Management, this implies, at least enlarging upon or shifting focus in order to adequately consider 'new' elements.

Business Process Management evolved as a subject in the late eighties. In the early nineties, and helped by the works of Hammer und Champy [1,2], it developed to become one of the most widespread management concepts. BPM is based on three core principles:

- Companies often have non-homogenous businesses.
- Different businesses require different organizations.
- The organization is to be focused on market or customer requirements.

As we can see, BPM primarily has something to do with the business of companies. It is not a coincidence that the word 'business' is the first word in the name. Processes are levers to conduct business in accordance with strategy or to focus the organization in accordance with a public contract. Two examples from consulting practice:

- A market leading chemical company has identified cost leadership as the most important success factor in its business. Product and process costs were the two deciding levers. The production network responsible for product fabrication guarantees low product-costs. The company has therefore decided to concentrate its efforts on creating a high-performance, efficient process landscape. On the one hand, it should simplify and automate the customer's interaction with the company, whereas, on the other hand, it is supposed to assure the necessary stringency in abiding by the agreed business model.
- A European authority has decided to employ business processes as an instrument to implement strategy and to efficiently exploit resources. A business process model was designed for the ensuing activities which reflected the statutory mandate of this authority. Based on this model, various design plans were set up, e.g. zero-based budgeting, optimization in various areas of the organization, or the introduction of a new ERP system.

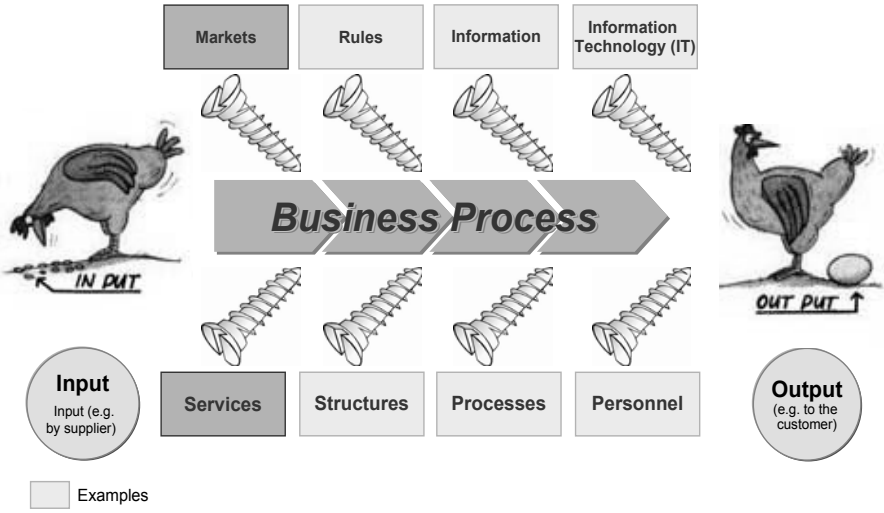

Fig. 1. BPM as holistic function

In public services the question often arises, whether they are able to apply the same methods used in companies with a focus on the market economy. Long discussions have led to the discovery that the only difference lies in the organization's purpose: the one wants to make money, the other wants to fulfill a public mandate. The means to fulfill each respective purpose can be the same in both cases.

In both examples we are not confronted with an abstract treatment of the subject of business processes but with a concrete link to the business and its priorities. This is also where the greatest risk for BPM lies today: to trivialize process handling. It is, of course, demanding to work simultaneously on the company's business model, the processes, the planning and control systems, the rules of conduct, information technology, and the personnel requirements. Quite often, attempts are made to approach the 'process' subject by turning the least critical of these screws. The focus on processes is often the approach chosen in practice at the expense of the results, which are poor – as is the acceptance of BPM and the people working on it. Processes must not be detached from the business!

This implies, however, that we first have to understand a company's business before we begin to define, analyze, let alone optimize its processes. With this in mind, what does it actually mean to understand business, analyze an organization (and its processes), and optimize an organization? How do we bridge this gap between the world of strategy and the world of processes?

2 Understanding the Business

In order to approach the business model of a company, we require terms and analysis techniques from the strategic management. The treatment of strategic questions does not only deliver the necessary information on the company and its environment but also helps us to identify the main points of action and to define priorities. To anticipate any questions: we are still within the sphere of activity of an organizational project. Despite the clear strategic perspective, this is not a strategic project as long as the two associated, fundamental questions are not raised: in which markets and with which products will the company become active?

The following individual questions help us move towards the company's business model and to identify the first areas for action:

- Which markets / customer groups will be addressed with which products?
- Which are the key success factors in the various business fields?
- Which processes are required by the company?
- Where is the main emphasis?
- How will BPM become authoritative?

2.1 Which Markets / Customer Groups Will Be Addressed with Which Products?

Even though this question sounds trivial, in practice there are a number of likely problems which could arise:

- In the case of industrial companies and service providers it is, for example, not clear how customers and markets should be grouped, in order to ensure a differentiated treatment of customers without dramatically increasing the organizational complexity.
- In public authorities the focus is often on the legal mission, with the effect that customer needs and desires are insufficiently respected.

When structuring the business according to customer groups / markets and according to products / services, the result is a business field matrix of the company.

The value of this structure is determined by the following aspects:

- A strategy is usually followed in each of the business fields, and its structured documentation serves as basis for the subsequent work with processes. Dealing with the business in a differentiated way reveals that, for example, an energy supplier requires an order-processing process for large gas customers that can radically differ from that of electricity and private customers.

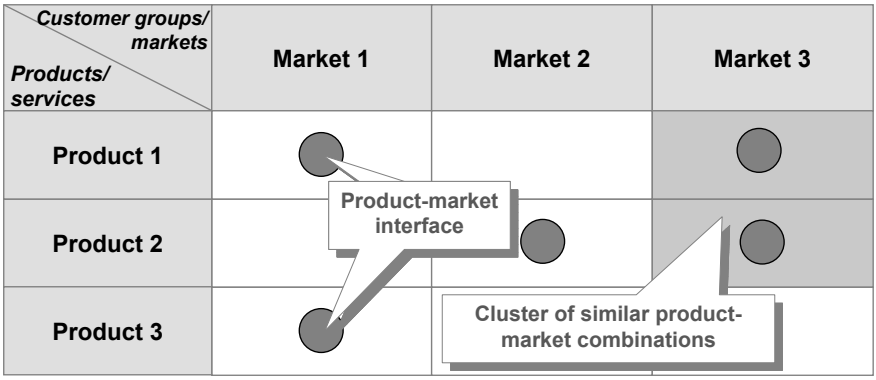

Fig. 2. The business-field matrix

- Similar business processes can be assumed for similar product-market combinations. The business-field matrix can thus be used directly to manage complexity and to identify and structure core processes on the level of key processes.

2.2 What Are the Key Success Factors in the Various Business Fields?

Organizations strive for success just as much as individuals do: the success of profit-oriented companies can easily be defined and measured: turnover, growth, profit, and market share are current and widely-recognized indicators. For public authorities without profit-orientation, this task is a bit trickier: as fiscal measurements cannot serve as a basis, aspects such as citizen satisfaction or public acknowledgement are taken into consideration. Before the actual work on processes can begin, those factors responsible for a company's success in the respective business field, and which are also relevant to the implementation of its strategic objectives, must be identified.

In view of the key success factor analysis, there is much room for discussion on the most important performance attributes, on the ability of the company and its competitors to fulfill them, and on the objective aspired for.

The results of the discussion will not only give a more profound understanding of the business characteristics and the performance of the organization; they also form a solid basis from which to examine and determine the rationality and the prioritization of optimization- and IT-projects. It is only logical to demand that only those projects should be put into practice which have a positive effect on the performance of the company with regard to the key success factors.

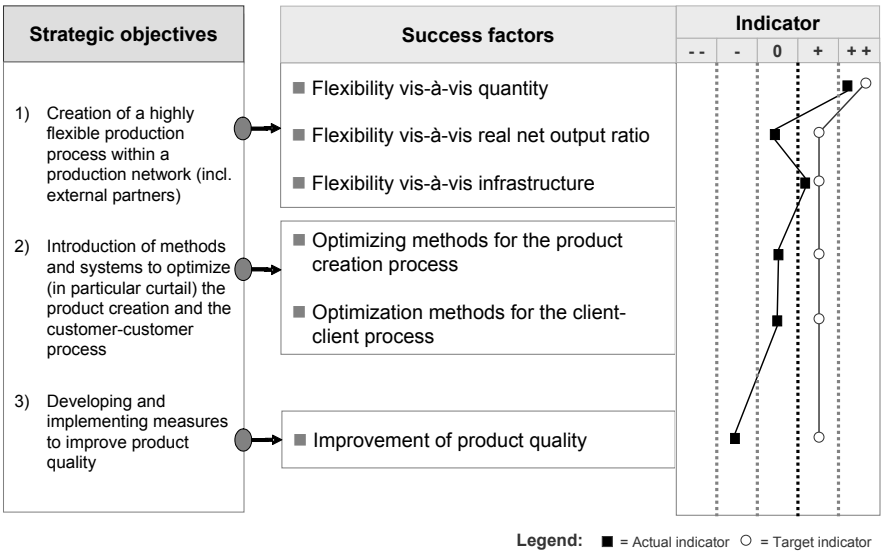

Fig. 3. The analysis of key success-factors

2.3 Which Processes Are Required by the Company?

The findings reached up to this point enable the design of an End-to-End business process model of a company. The term 'End-to-End' refers to a paradox in the history of process handling. In the beginnings of BPM, the process was defined by the few Aficionados as follows: "A business process is a sequence of related company activities with the purpose of generating output. The outset and the result of the business process is the generation of output, which is ordered and accepted by internal or external 'customers'." (Prof. Dr. A.-W. Scheer). Meanwhile, nearly everyone is talking about processes, but in most cases the definition is confined to the action within a department or an ERP module. There is much discussion on the sales, production, or procurement process. In actual fact, it is a clever camouflage for a function-orientation using process terms.

The design of a business process model usually follows a structure that consists of three categories:

- **Management processes:** processes which serve to manage the company and its processes. Examples: strategy development; corporate planning and control; communication.
- **Core processes:** processes leading to results which are associated with the fulfillment of customer or market requirements. They can be divided into market supply and innovation processes.

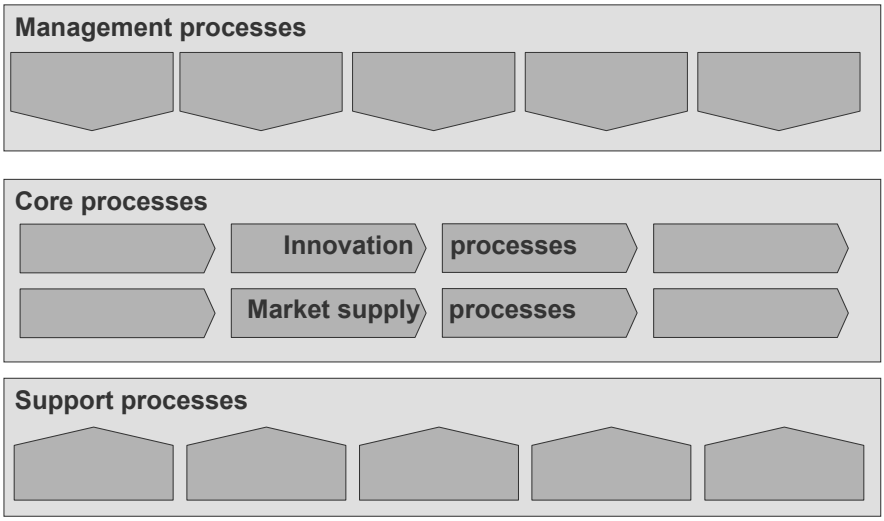

Fig. 4. Structuring the business process model

- **Support processes:** processes which support core processes and are only indirectly connected with the fulfillment of customer needs. The typical customers of support processes are business units and company employees. Examples: Human Resource Management, Infrastructure Management, Finance and Accounting.

While management and support processes show great similarities between different companies, and can be defined using existing reference models, the definition of core processes is based on the compiled business field matrix and reflects the answer to the following question:

> *Which different business processes are required to manage the business from the organizational point of view?*

Although there is no algorithm to provide an answer to this question, experience and the findings from the key success factor analysis, and also the application of the principle to use as many different processes as necessary and as few as possible, are helpful.

Even if processes share segments in the value chain, each process has its own character which must be manifested in the process flows, the structures, and the IT support. This means that process diversity allows a better focus on customer needs, but at the price of organizational complexity. The art is to master the tightrope walk between these effects.

The big advantage of working with End-to-End processes lies in the one-to-one transfer of market and customer requirements onto processes. There is no logical

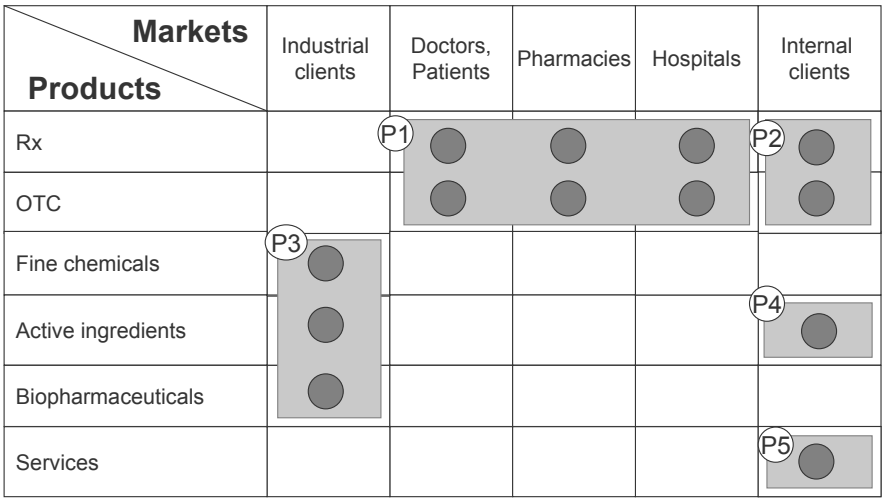

Fig. 5. Derivation of core processes

break between business and organizational layer. Findings and objectives from the strategic analysis can be projected directly onto the processes. Business and process designers find each other again and use one sustainable basis, acceptable to both sides, as the foundation for collaborative work.

In order to complete a business process model, the processes need to be broken down into sub-processes, activities, and, in some circumstances, into individual work steps. The following principles need to be respected when describing processes:

- Although processes help to understand reality, they should not be described in the smallest detail.
- Only what is relevant to achieve the objective, should be mapped.

Using sub-processes, the business process model can be described quickly and expressively. To do this, the following steps are required:

- generic division of market supply processes into sub-processes;
- identification and listing of all possible facets of sub-processes (e.g. just-in-time delivery and prognosis-based delivery for the sub-processes 'procurement');
- positioning the core processes on the morphological box along the respective facets of the sub-processes pertaining to the respective core process.

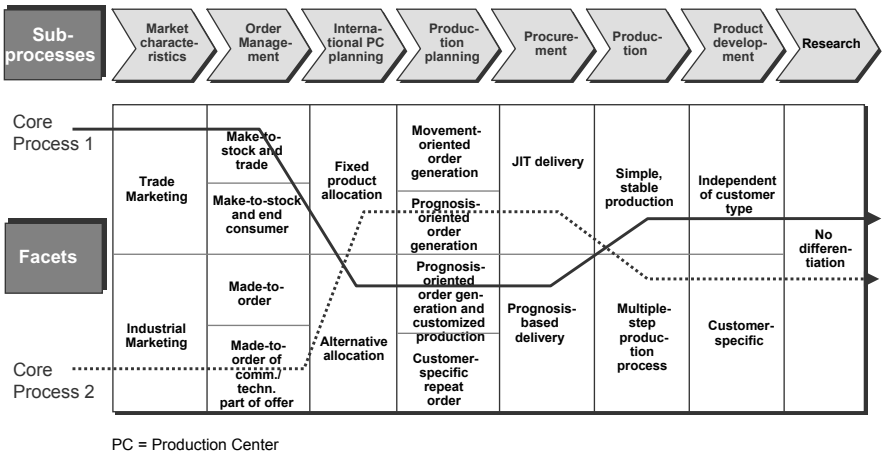

Fig. 6. Depiction of a business model

This method allows a structured and quick entry into process analysis or into the discussion on the IT landscape and its fulfillment of the process requirements. Quite often, it is only by means of such a representation that the actual complexity of the business model becomes transparent.

2.4 Where Is the Main Emphasis?

The business process model often contains more than two dozen processes in all three categories. The description, analysis, and optimization of all processes can exceed the scope of the available resources, budgets, and management attention. This requires a prioritization of processes and pinpointing of those in which there is the greatest requirement for action.

A proven means for carrying out such process prioritization is a portfolio which classifies processes according to two criteria:

- contribution to the fulfillment of the key success factors (KSF) and
- perceived process performance.

The natural candidates for further treatment are those processes which are highly relevant to the fulfillment of the key success factors, but at the same time show low performance. The concentration on those – usually few – processes does not only save resources, which are always tight, but also ensures high project effectiveness. At this point in time, the gap between business model and process world has already been bridged. We have begun with the pure examination of the business model and we are in possession of a list of processes which are to be treated further according to criteria relevant to the business. Only the last question remains to be answered:

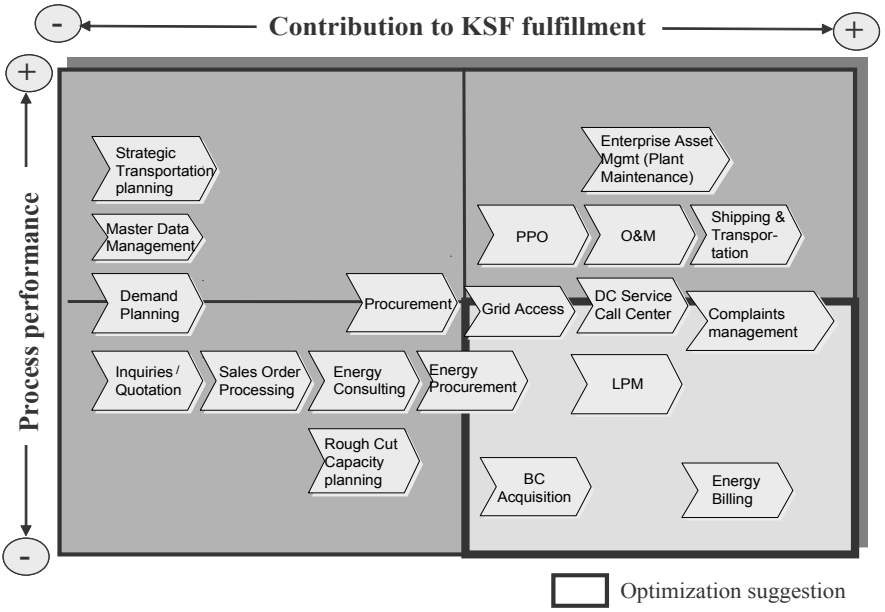

Fig. 7. Process prioritization

2.5 How Does BPM Become Authoritative?

The Olympic ideal can be sufficiently described using terms such as 'higher', 'faster', 'farther' and 'stronger' – however, these are not appropriate for the design of processes. Working on processes initially requires the analysis of an organization. This analysis is reduced to answering the following question:

> *Is the organization capable of reaching its objectives and, if not, why not?*

We thus see that we first require objectives from which to measure the organizational performance. The discrepancy between target and actual state does not only offer the kick-off for a location analysis, but also conveys the scope of the required action.

As we use processes as sorting criteria for the various businesses, it stands to reason to use quantified, measurable process-objectives as measuring rod for organizational performance: delivery time, keeping deadlines, process costs, stocks, customer loyalty, etc. These are divided into the three categories: quality objectives, time objectives, and fiscal objectives. In order to determine the individual target quantities and values, we refer back to the strategic objectives, the results of the key success factor analysis, and to the knowledge on the competitor's performance levels. Only when we have reached the process objectives for the processes under scrutiny are we equipped to approach BPM from the point of view of the business requirements.

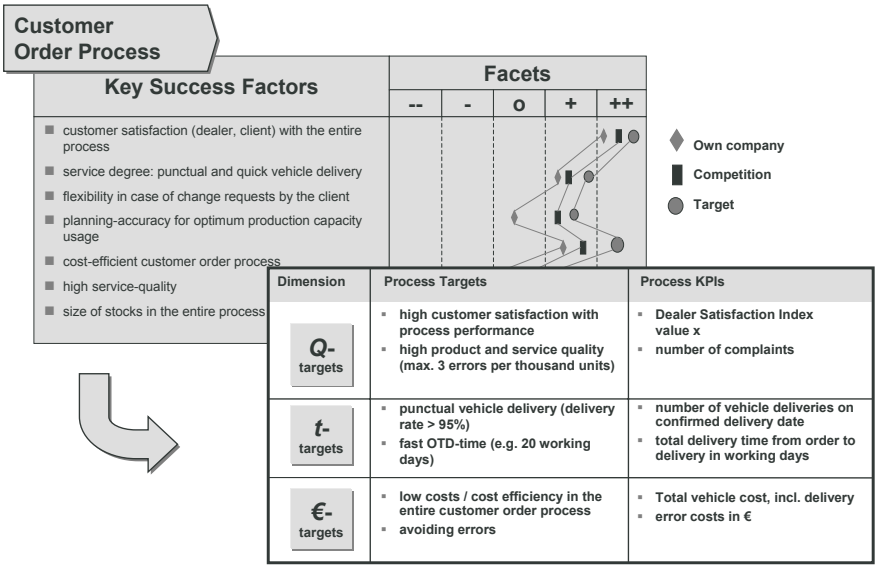

Fig. 8. Derivation of process objectives

3 The Human Factor

The optimization of an organization can be defined as its ability to reach its objectives (see above). To achieve this, we have the same parameters at our disposal as we had earlier, when we looked at the 'error sources': processes, humans, planning and management systems, IT systems, etc. (cf. Fig. 1). Even though processes are among our most important levers, they are by far not the only ones. Only the combination of the right choice of parameters and their intelligent handling leads to success.

We are increasingly faced with situations in which detailed process description is not possible, and can even be counter-productive. The famous, short innovation cycles do not mean anything other than new business ideas and products that are brought to maturity as quickly as possible, only to be given up for the next idea at an even faster pace. Taking up new business ideas does not require a perfect infrastructure that includes processes and systems but humans, who support the business idea and exploit its potential. Moreover, a perfect process landscape which is not 'lived' by employees (for whatever reason) is sentenced to death. And thus we slowly come to the most decisive factor for the success or failure of BPM projects: the human being.

Project work in the nineties was linked with the sobering conclusion that only 20 to 30 percent of BPM projects were successful. The following analysis of the causes

for failed projects has, in many cases, revealed an exclusive focus on processes, IT systems, and infrastructure without paying enough attention to the human factor.

The analysis of successful projects, on the other hand, has shown that these were always linked with a particularly lucky constellation of the key players: management, key performers, teams, and consultants. As a result, consultants have learnt that, over and above their methodical approach (as opposed to next to), people play an important role:

- managerial qualities (cf.: Your favorite Manager);
- innovation and creativity (cf.: saving Apollo 13);
- personal dedication (cf.: the New York fire department on September 11, 2001).

Since then, the attempt has been made, using increasingly professional approaches, to acknowledge these long-recognized facts and accommodate them accordingly – with success. This ought to be a common experience for us all: only when we have sufficient human potential in our projects, we are successful.

Business Process Management is primarily about business and human beings.

Naturally, processes are the backbone of the company and their importance cannot be stressed enough! However, I want to draw attention to the fact that processes are not defined, analyzed, and optimized in a vacuum. Processes are merely an expression of the business. They can, and may, be treated only in this context. This treatment can, on the other hand, only occur in close cooperation with the employees of the company and by respecting their individual characteristics and abilities.

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Business Process Excellence at Royal KPN

Eric Kramer
Royal KPN

Eric Roovers
Royal KPN

Summary

KPN is strongly committed to continue leading the market with quality services, top products, and excellent operational performance. Outstanding Process Management is imperative to our success. This article describes how we enable business success by employing solid solutions for the process life cycle using the ARIS Platform.

Key Words

Process management process, Release Cycle Management, target-group process views

1 Introducing KPN

1.1 Overview

The Dutch company *Royal KPN* offers telecommunication services to both consumers and businesses. The company's core activities are telephony and data services through KPN's fixed network in the Netherlands, mobile telecom services in Germany, the Netherlands and Belgium, and data services in Western Europe. KPN is the market leader in the major segments of the Dutch telecom market. Through *E-Plus* in Germany and *BASE* in Belgium, KPN has number-three positions in the mobile markets of these countries.

As at June 30, 2005, KPN served 7.2 million fixed-line subscribers and 1.9 million Internet users in the Netherlands, as well as 18 million mobile customers in Germany, the Netherlands and Belgium. KPN employed 26,900 individuals as of the same date.

1.2 Strategy

The Netherlands, KPN's key market, continues to be one of the most competitive market places in Europe. KPN has successfully maintained its leadership positions in all key segments. Many competitors are trying to carve a position for themselves by offering new services such as Voice over IP and triple play (Internet, voice and television). In the Mobile business, the offering of mobile data services through Third Generation networks is being accelerated by mobile operators. As the migration from traditional to new services is progressing across the telecommunications spectrum, it is KPN's dual challenge to develop new services as well as to sustain its leadership positions in the 'old' markets.

KPN's long-term success will depend on its ability to satisfy customer needs better than any competitor and to differentiate itself in the consumer's mind. As customers are increasingly looking for access to communication, information, and entertainment in any place and at any time, the boundaries between fixed and mobile communication are disappearing. It is KPN's challenge and commitment to make the customer's experience a fulfilling one with seamless, easy access and user-friendly interfaces.

The customer is of key importance to KPN at all times. Only if KPN manages to maintain customer satisfaction to the highest standards, the company will be able to reach its strategic goals. Progress in this respect has been significant and very encouraging.

New technology offers opportunities to achieve structurally lower operational costs. In addition, new technologies will require less people and different capabilities. Therefore, further restructuring will remain necessary over the coming years. KPN will rise to the challenge of transforming the industry and will not slow the pace of change. Instead, it will lead change from the front and from a position of strength.

Fig. 1. KPN's headquarter in The Hague

2 Initial Situation

Staying at the forefront of market transformation, while running an efficient operation, requires a highly agile organization. KPN has been restructuring its operations and will continue to do so over the coming years.

Many changes KPN has initiated are technology-related, such as the switch to IP technology. But perhaps an even more profound change is the move from a technology- and product-based to a customer-oriented organization. This requires the integration of services and offerings, a strong focus on chain management, and a sound process architecture.

Meanwhile, KPN, like any other company, is committed to complying with regulations regarding transparency and good governance. A number of these regulations, among which is the Sarbanes-Oxley Act, require that information on the company's results is formally authorized, retained, and made auditable.

Running a company on strong customer-orientation, leading the market with top class products and services, and at the same time managing technology and technological skills, is complex. It can only be achieved if one focuses on the most durable, and, at the same time, most flexible of elements in the company – the process.

KPN is introducing chain management and Business Process Management (BPM) throughout the company. Knowing the process and its interfaces to other processes in the chain has become a prerequisite for efficient management and effective control.

Fig. 2. Being able to excel in operational performance, product offerings and customer relations requires superior control

2.1 ARIS Environment

KPN has been using ARIS as its main process-modeling tool since 2000. At first, business units used separate process-model implementations in separate databases. This was in line with the management model at the time when reuse was limited to high-level process architecture. However, this approach has several disadvantages.

First of all, it made it difficult to maintain a single set of modeling conventions and it positively blocked the advent of reuse on more operational process-levels.

Secondly, as the organization was (and is) in constant flux, with business units frequently reorganizing, this meant continuous separating and merging of ARIS databases.

Therefore, in 2004, we started transferring all modeling into a single database. This included remodeling parts of the processes and integrating object libraries. In some cases, business units have decided to entirely rebuild their model tree.

This migration project is now nearly finished. Some twenty databases were united in one development database. Creating one process tree for the entire company opens up many opportunities for comparison, reuse, and improvement of processes.

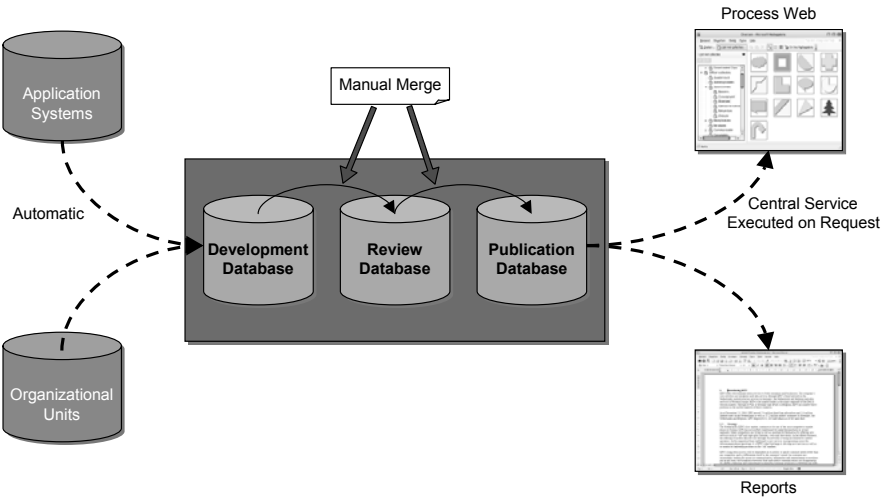

Fig. 3. Original ARIS configuration, with manual merges between phase databases

Creating a single set of databases for the entire company also greatly improved our ability to manage the process tree and the technical configuration.

Meanwhile, and partly because of the above, process-modeling activities have been increasing and intensifying. As the process-driven organization is maturing, more processes are being modeled in ARIS, and they are being updated more frequently. Currently, ARIS is being used by some 150 modelers.

3 The Project

3.1 Project Objectives

Process design has become an indispensable, essential part of business development. Good process descriptions are imperative to prove the company's compliance with regulations and quality objectives. With the demand on the process modeling facilities increasing, we decided we needed to step up the process-design process.

Thus, in mid 2004, we launched a process-excellence initiative in a bid to raise the standards for our business process modeling practice and to gain lasting benefits from structural process optimization. In short, we decided to pursue three objectives:

- enhance models to higher standards;
- ensure modeling for compliance;
- serve end-users with easy-to-use information relevant to them.

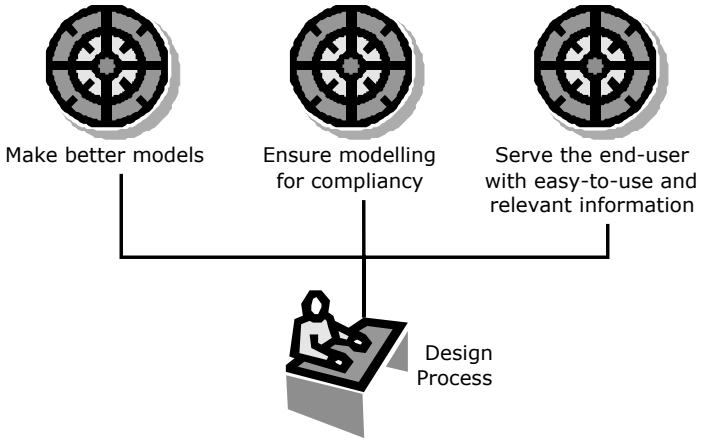

Fig. 4. The three project-objectives

We aimed at achieving several more operational goals:

- Efficiency goals:
  - increase ARIS productivity;
  - increase process information visibility and -use by end-users;
  - ensure 'built-in' regulatory compliancy in the development processes.
- Effectiveness goals:
  - reduce the lead time of the business development;
  - reduce business-development costs;
  - increase process reuse.

3.2 Project Set-up

To achieve the objectives described above, we decided to initiate a program with three tracks.

Track 1 is concerned with the creation of facilities that will improve support of the process design process. We had learned that a number of companies had already introduced ARIS scripts and macros that enabled a more controlled process of developing, reviewing, and releasing process models, collectively known as Release Cycle Management (RCM). We decided to adopt and implement a customized version within the organization.

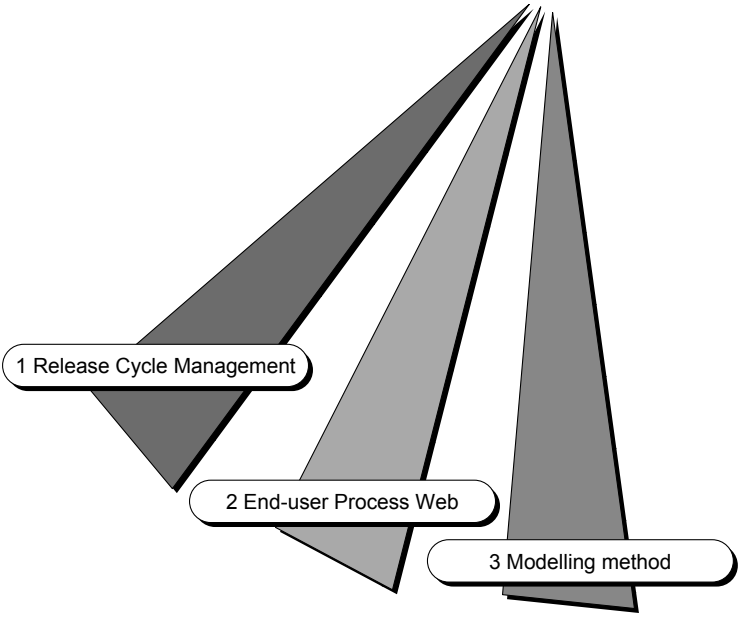

Fig. 5. The project consists of three tracks

We started workshops in the summer of 2004, and expect complete roll-out of RCM in the first quarter of 2006.

Track 2 is concerned with the introduction of an end-user focused, multi-view Process Web. This track is the most important. Being able to provide end users with up-to-date, easy-to-use process information relevant to them is the very reason for the existence of process modeling at KPN.

We already introduced an automated Central Web Publishing Service in 2004. With this service we have standardized the look and feel of published process information, and it makes Web publication skills in the KPN organization obsolete. The features of the next-stage Process Web will further encourage end users to access and use the process information in their daily activities.

Track 3 encompasses the creation of a single, revised modeling-convention set for the entire company. This has meant finding the optimal number of semantics necessary to build the process tree, as well as agreeing on clear-cut definitions of the meaning and the use of model types, object types and attributes.

In the next few sections, more is explained on the objectives and the set-up of the three tracks.

4 Track 1: Process Release Cycle Management

4.1 Objectives

The track to introduce Process Release Cycle Management is founded on three considerations.

First of all, we saw (and still see) an increase in modeling activities. Not only were more and more processes being modeled with ARIS, but the frequency of updating process-descriptions was on the rise as well. Apart from continuous improvements, major process changes are being released every two months, and that was just for one department.

Because the publication of new process descriptions needs to coincide with the roll-out of changes in the information systems, timing of the modeling activities is of the essence. With multiple modelers working on tens of models and hundreds of objects, managing a smooth release-process became increasingly difficult.

In ARIS this meant that the process of singling out and checking the models in scope, merging them from the development database to the review database and from there to the publication database, was running ever more risk of errors. We needed something to ensure that we were only updating those models in the release scope, and we needed a roll-back option. We also needed something that could prevent manual adjustments to models in the review and publication databases.

Secondly, we realized that the same process models, which we used to describe our everyday business with, were increasingly being used to show compliance with various codes and regulations, such as the Sarbanes-Oxley Act and ISO 17799. As a direct consequence of the Sarbanes-Oxley Act, we need to retain any process information that is relevant to Sarbanes-Oxley for seven years.

In other words, we needed an archive that would track process changes through time, so that we would be able to produce all the relevant evidence for any point of time that auditors would want to examine.

Thirdly, to ensure that new or updated processes would be properly reviewed from different points of view and to get formal approval for their release, we needed someone who could coordinate these activities. We named this role the *audit coordinator*.

4.2 Solution

Having recognized these three issues, we initiated a series of workshops to develop a process that we would eventually call Process Release Cycle Management. In these workshops, key players from the operational Process Management, together with consultants from *IDS Scheer* and *Atos Origin*, outlined the requirements for the process and analyzed the impact on ARIS.

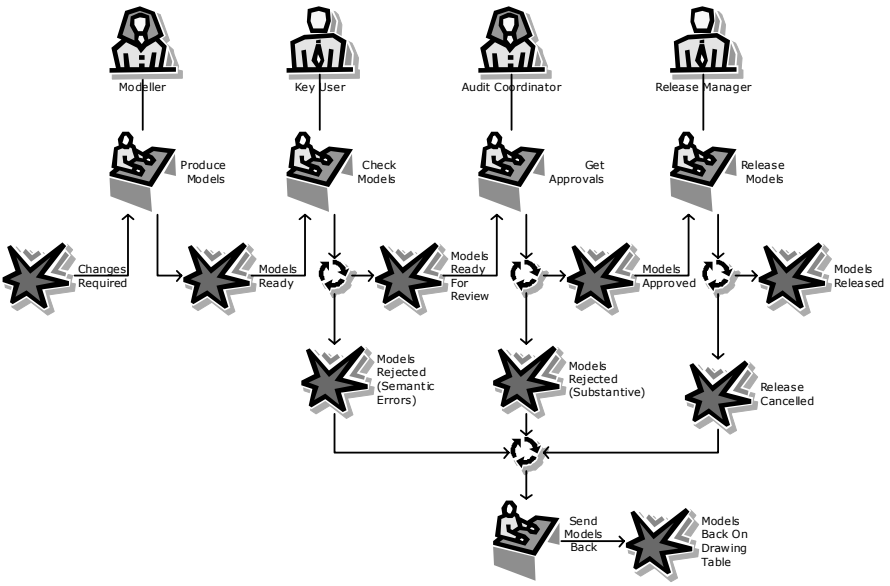

Fig. 6. The Release Cycle Management Process

Inspired by early adopters of *IDS Scheer*'s Release Cycle Management solutions, we set out to develop a process that would meet the three requirements mentioned above, and which would suit the existing governance and management practices within KPN.

We decided on a four-step process, involving four roles:

- produce models – by the modeler;
- check semantics – by the key user;
- arrange review and approval – by the audit coordinator;
- release models – by the release manager.

We configured four databases in ARIS to accommodate the flow of models:

- development database, in which models are produced and checked (semantically);
- review database, in which models are reviewed and approved and subsequently released;
- publication database, to which models are published at their release;
- archive database, to which model versions are copied at their release.

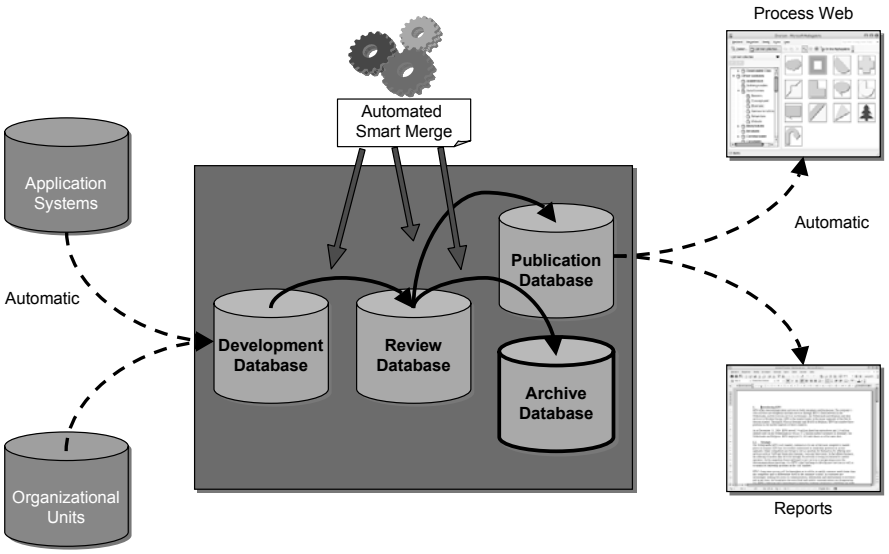

Fig. 7. The ARIS configuration with Release Cycle Management implemented

Development Phase

In the development phase, a team of modelers creates new models and adapts existing models. If previously published models are obsolete and need to be removed from the publication database, the models are marked for deletion by setting a model attribute.

To support modelers in creating models that are correct and comply with KPN conventions, a special report is made available to the modeler. It checks one or more models using a subset of the standard structural rules defined in ARIS and also contains some special checks. For example, the report checks whether any application-system types were used that are not from the official object library.

The key user is responsible for preparing a set of models for the Review phase. Model releases are usually part of some business project, and the publication of the modified processes needs to coincide with the project roll-out. Because of this, we introduced a model attribute called Project, which enables us to group models related to a single project.

The key user prepares a set of models by running a report. This report runs all the required semantic checks and marks the models ready for review. If a model fails a check, it will not be marked ready for review. In fact, if one model fails, all the models with the same project attribute value will fail. This ensures that only complete projects are forwarded to the audit coordinator.

When the report finishes successfully, the key user informs the audit coordinator that the models are now ready for review.

Review Phase

The audit coordinator is responsible for making sure that models affected are properly reviewed and approved. The first thing the audit coordinator does, is to initiate the transfer of all the models that were prepared for review from the development database to the review database.

A special script takes care of that by neatly integrating the models with the existing models in the review database. Because of this 'intelligent merging', there is no need to make modifications to models or objects directly in the review database. In fact, no one (except for the system administrator) has write-access to the review database, the publication database, or the archive database!

Any model that is copied to the review database is subsequently locked in the development database. This is accomplished by moving the model to a special group to which no user has write-access. The models will remain locked until they are released by the release manager, or rejected by the audit coordinator or the release manager.

The audit coordinator himself is not necessarily the one reviewing or approving models. The job of the audit coordinator is to assess which authorities need to approve the model and to collect their approvals. Apart from the process owner who has to sign-off each of his processes, these might include:

- the process owner;
- the risk manager;
- the internal control specialist;
- the quality manager;
- the architecture specialist.

The audit coordinator then marks the models as 'accepted' in ARIS, clearing the way for the release manager to release them at a designated time.

If the audit coordinator rejects one or more models, the models are unlocked in the development database. The modeler is notified of the rejection and the reason for the rejection.

Once the models have been accepted, the release manager is notified that the models are ready for release.

The release manager will release the models at the designated release time, at which point they are automatically transferred to the publication database. A copy is also transferred to the archive database.

The release manager may also cancel the release of one or more models. Just like a rejection by the audit coordinator, 'cancellation' also unlocks the models in the development database. The modeler is notified of the cancellation and the reason for the cancellation.

When the models are transferred to the publication database, the original models in the development database are unlocked and ready for further development.

Deletions

Models that are obsolete follow the same path as changed or new models. The modeler marks a model for deletion, and the key user prepares the model for review. The audit coordinator approves the deletion, which is carried out when the release manager accepts the model. The model is removed from the publication database. A copy of the last model-version is added to the archive database with a marker showing the date of deletion.

4.3 Track Status

The Release Cycle Management facilities were put into operation in the second half of 2005. During the course of 2005 and in the first half of 2006, one by one, all business units within KPN will implement it in their modeling process.

With Release Cycle Management, KPN has a robust and professional modeling process, uniform across the company and facilitated by a tool set that ensures a fool-proof flow of models across databases.

5 Track 2: End-User Targeted Process Web

Making up-to-date process information available to end users is the most important element in the modeling business. Whereas Release Cycle Management is an enabler for good process modeling, publishing the process information is the main reason.

5.1 Standardization

KPN has been using the ARIS Web Publisher module for many years. Until 2004, several business units deployed their own 'Process Web' using the Web Publisher. A lot of business units, however, did not have the technical skills available to create a Web publication suited to their needs.

Therefore, in 2004, we decided to create a Central Web Publishing Service for the whole company. We agreed on a standard look & feel compliant with company style guidelines. We created a customized publication format, and the software was created by *IDS Scheer* and *Atos Origin* to update process Webs by the click of a button. Our Service Desk runs the service to create and update these Process Webs on request.

With this facility, every business unit is still in control over what is published on the Intranet and when it is published, but no longer needs any in-house technical skills to run the publication.

5.2 Model Once, View Many Ways

The new publication facilities still have one significant drawback. We have found that many end users have trouble taking in all the amount of information presented to them. And many users also have trouble finding their way in the process tree.

This is due to the fact that we currently do not differentiate between different types of end users of the Process Webs.

Most employees only need information related to their own activities, such as instructions on which procedure to follow or which form to use. Managers, however, need a broader view of all the activities within a process and of the persons responsible for carrying them out. Risk managers and analysts need additional information on the risks and controls defined in the process. IT-people need information on data inputs and outputs of processes.

To prevent end users from being flooded with information that is not directly relevant to them, we need some kind of filtering. Also, the style in which information is best presented to an end user may vary.

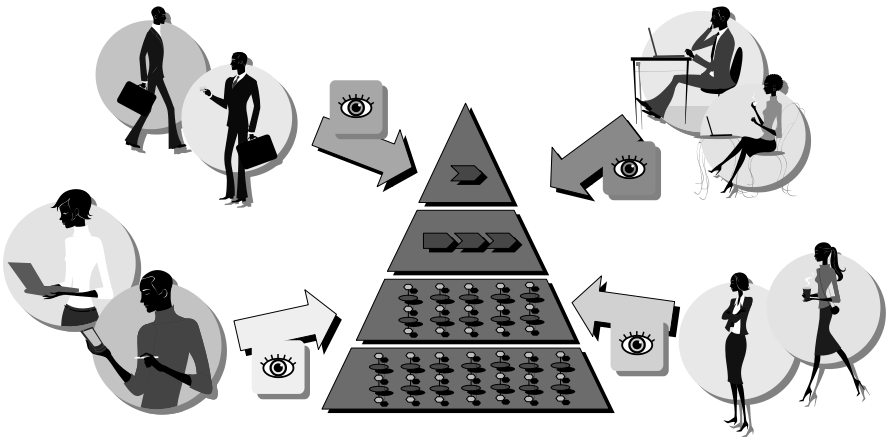

Fig. 8. Model once, view many ways: end-user views on the process tree

We have decided that we need a different approach, one that will provide each type of end user with its own view on the process tree. This approach can best be described as ‘model once, view many ways’.

One view that we have defined uses an ARIS script that automatically creates a simple and effective process portal. If the user clicks onto a process, it is displayed as a textual instruction which has been automatically created from an eEPC. For many users on the work floor, who are not used to reading process diagrams, this way of presenting process information is much more effective than eEPCs.

A second view simply displays the eEPCs but filters out references to objects such as risks, controls, and performance indicators. This view is tailored for the majority of employees on the work floor. Use of the portal-like start page is optional.

A third view is aimed especially at managers. It displays the eEPCs, including information about risks and controls and performance indicators.

The basic idea is, that to communicate the process information to different types of end users, and to communicate it effectively, we need different kinds of presentation. Generally, a view on the process tree consists of:

- a selection of models that contain the relevant information;
- a presentation form;
- a filter on attributes and assignments to other models;
- a layout template;
- a starting point in the process tree.

This concept is central to our Process Web. Our new Central Web Publishing Service will enable us to maintain different publications, each with its own view, targeted at different types of end users and created from the same process tree.

5.3 Track Status

We are now in the process of defining the roadmap to implement the concept of ‘model once, view many ways’. The first major update to the Central Web Publishing Service is planned to be released in the first quarter of 2006.

Further enhancements may require the new ARIS Business Publisher which we expect can help us to further realize our vision. We are therefore coordinating our implementation efforts in relationship with the new functionality of upcoming ARIS releases.

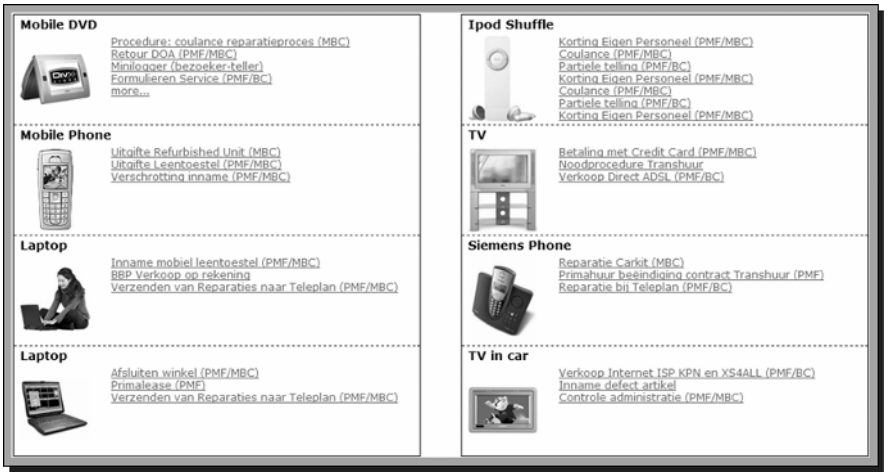

Fig. 9. An easy portal-like interface to find process information: an example of a view created for a specific end-user group

6 Track 3: Modeling Conventions

6.1 Objective

To enable a consistent process framework for all business units, we initiated, as the third track in our program, a complete revision and standardization of our modeling conventions. We took three steps:

- fix definitions, and use of all allowed object types and attributes;
- create a single method-filter for the entire company;
- extend the method filter to include new developments.

6.2 Solution

To achieve a fixed set of definitions, we organized a series of workshops with key users from the business units. They agreed on a single method filter, fixing the use of model types, object types, and attributes.

After having achieved this first milestone, the key users committed themselves to migrating their processes to the new method-filter. Because of previous differences in interpretations of object and attribute definitions, processes had to be remodeled in some cases. For many business units this transition coincided with the migration to the single modeling environment that we now employ.

The filter is subject to changes to incorporate new developments of KPN's use of the ARIS method. The release of a new version of the filter is considered carefully in consultation with the key-user group to ensure a company-wide understanding and knowledge of the upcoming change. In special cases, like in the release-cycle management track, a special temporary filter is used for testing-purposes before incorporating the changes in the live KPN filter.

6.3 Track Status

This track is fully operational. As mentioned earlier, all KPN modelers work with the KPN method-filter and change management is implemented on the ARIS configuration database, securing the KPN filter.

7 Conclusions and Lessons Learned

During the course of the projects that we have described, we have learned valuable lessons, most of which will sound familiar.

7.1 The Natural Pace

ARIS has been operational within KPN for over five years. Process modeling, as such, has been practiced much longer. But only in the last two years, the momentum has developed to make process modeling an integral activity throughout the business.

Companies need to evolve towards a process-oriented organization. Process orientation not only requires other ways of thinking within the company, but will also affect the system of checks and balances. Introducing true Business Process Management (BPM) causes profound changes and is therefore likely to provoke resistance.

We have learned to keep up with the natural pace at which KPN evolves. Requirements like Sarbanes-Oxley can help in the turn-around for a more process-oriented management. The BPM support organization is making sure the tools for BPM are ready and available to benefit the entire company.

7.2 Start Simple, Build on Success

The flexibility and configurability of ARIS are its main assets but can also represent a trap. With all the possibilities for modeling and analyzing the business architecture, it is easy to lose focus.

We have decided to first make sure that a baseline of process descriptions is in place before we move on to more advanced features. Once the baseline is there, and is consistently kept up-to-date through process life cycle management, we will move on to the more advanced uses of ARIS as the need arises.

Before the Sarbanes-Oxley Act, there was no substantial driver to support risk management with ARIS. Now, we are seeing a growing demand to be able to model risks and controls in ARIS. And not just for Sarbanes-Oxley, but also to support operational risk-management.

In general, we have found that as the organization matures and becomes more process-driven, the demands on supporting facilities will, in time, warrant the use of more advanced features of Process Management tools.

7.3 Put End-Users at the Center

Central to our efforts to perfect the Web publication facilities is the notion that the needs of the end users determine what and how we model. The end users are the employees and their managers who run the processes and who also drive change and the optimization of the processes. Feedback from the end users is essential to shape the processes for effectiveness and efficiency.

We need to ask ourselves every time:

- Who are our end users?
- What is their role in the process?
- Which information do they need?
- What do they need it for?

Only then can we decide:

- what to include in our models;
- how to format our models;
- and how to present process information.

Everyone can give an example for a model so complete and perfect in its intricate details, that it positively inundates the end user with information. However correct and complete the process is modeled, if the end user cannot effectively use the information (or validate it, for that matter), the model is essentially useless. This means that the modeler has to try to create his models with the end user's perspective in mind.

However, it is equally important that end users understand what processes are. They need to be able to recognize their own role and activities in the process descriptions presented to them. Without a basic understanding of the way in which processes enable business and shape the organization, it is difficult for end users to provide feedback to the modeler.

To win the commitment of the end users and to ensure their active participation, it is essential to educate them on the principles of the process-orientated company.

7.4 Conclusion

KPN is a company that is committed to its customers, to its shareholders, and to its' responsibilities towards society. Strong Process Management is the key to running a world-class operation capable of maintaining and extending our leading position in the market place.

Process Management requires a thorough understanding of the company's processes and the power to implement changes efficiently and swiftly. To achieve this, the right processes and tools for Process Management need to be in place.

KPN is enabling this by taking a three-step approach:

- Focusing on the people that work within the processes by making sure that Process Management provides them with the necessary and sufficient information to perform their activities.
- Improving on the validity and effectiveness of Process Management by standardizing the Process Management process and providing the tools to develop and release processes quickly.
- Creating a single modeling standard by consolidating conventions and integrating the process architecture.

KPN will continue to build strong Process Management and provide the tools for operational excellence.

Quality Management Handbook on the Web – A Visionary Platform

Jakob Hefele
Ingenics AG

Summary

Owing to a huge increase in sales in 2003, the technical consultant *Ingenics AG* faced the challenge of developing and implementing new structures and processes. Core elements from the *Toyota* production system were replicated onto the *Ingenics* administration. The new management and process culture creates the framework for the orientation towards value-adding activities and striving for continuous development.

The defined business processes are published in a Web-enabled Quality Management (QM) handbook using ARIS products. The platform unites the elements *process view*, *data view* (documents and SAP transactions), and *organizational view*.

By respecting the Best-Practices approach, the QM handbook today represents the central platform for employees, integrating business processes and IT.

Key Words

Re-engineering, cost control, Business Process Management

1 Company Profile of Ingenics AG

Ingenics AG is a technical consultancy company with its headquarters in Ulm. The management board consists of two brothers, Oliver and Jörg Herkommer. The main fields of activity are factory and production planning, logistics planning, and improving efficiency in production and administration. *Ingenics* already has numerous clients, including medium-sized production companies and globally operating corporations. Among their clients are *Schuberth Helme, F.X. Meiller, BMW, DaimlerChrysler, Audi, Bosch-Siemens Hausgeräte, WMF, Eurocopter* and *Lufthansa Technik.*

The company was founded in 1979 as *INPRO GmbH* and renamed *Ingenics AG* in 2001. The transformation into a public limited company was not least a result of strong corporate growth. Since 1999, employee figures have increased by more than 30 percent each year. This development required new structures. Added to this, larger and international projects (e.g. factory planning projects in China) necessitated the design and realization of new processes.

Today*, Ingenics AG* is located in Ulm (headquarters), Munich, Shanghai (China), and Atlanta (USA). In 2004, sales amounted to more than 13 million euro. In 2005, the number of employees exceeded 120. Currently, there are about 110 employees in the consulting business and 10 in administration and back-office.

2 Starting Point

As already mentioned above, large corporate growth required a critical examination and reevaluation of existing organizational structures and processes. As well as the internal corporate view, the external factors on the client's side had also changed. Each year, client contracts became more demanding, and the set tasks became more complex. The planning project for a new factory in China for a well-known car manufacturer is an example of such a new challenge for employees and internal business processes alike. The globalization of projects made increasing demands on the information and knowledge transfer within the project and the corporate landscape.

Therefore, in March 2003, management set up a project to meet the challenges and to develop a suitable business platform for the company.

2.1 Project Goals

The management proclaimed the following vision: "We must succeed in supplying our employees with the necessary input for their work by means of a highly professional knowledge management that will be continually accessible from all over the world."

The following goals were set:

- efficient and specific qualification of new employees;
- corporate processes in line with a best practice approach;
- increasing the quality of processes and services;
- promoting innovation and the concept for continuous improvement (CIP);
- integrating the various corporate functions on one platform.

2.2 Implementation Steps

In order to reach the outlined goals, a project plan was set up in which the set tasks were divided into different phases:

1st milestone (from 2003): new management and process culture;

2nd milestone (from December 2003): Web-enabled QM handbook (first step);

3rd milestone (September 2004 to December 2004): introduction of SAP;

4th milestone (from February 2005): integration of SAP and QM handbook (second step);

The following shows an excerpt from the project. In this, the author concentrates mainly on the following areas:

- new management and process culture;
- Web-enabled QM handbook.

3 New Management and Process Culture

To better meet the future challenges requires setting up clear structures and concentrating on value-adding tasks. This necessitates a comprehensive system within the company, able to envision a relationship between management and process culture. What an employee expects from management is an open attitude and the competent fulfillment of managerial tasks. However, it must be possible for an employee to propose new ideas in the sense of CIP[1] at any time. It is even expected that each individual employee becomes involved accordingly. However, this requires taking a positive attitude towards such proposals in terms of construc-

[1] Continuous Improvement Process (CIP) is the term used for the method developed from the Japanese management principle of Kaizen, i.e. not to bring about positive change in leaps and bounds but through a lot of small improvements.

tive criticism. The open attitude towards improvements and questioning the present status assists the development process of employees and eventually that of the entire company. Unfortunately, such attempts and efforts are only lip service in many companies. This is, because it is among the most difficult tasks to establish a new corporate culture and sustain it.

At *Ingenics*, an Intranet platform was set up that enables each employee to easily submit improvements containing specific implementation concepts online. With this, management succeeded in implementing the CIP within the company as a kind of 'everyday occurrence'. Every week, there are numerous improvement proposals. Last year (2004), there were approximately 170. What is remarkable is that the proposals made by employees are not remunerated as is the practice in other companies. There is no 'compulsory target' on how many improvement proposals must be submitted by each employee. The principle of 'quality before quantity' is clearly in the foreground. At *Ingenics*, the management has worked to establish a corporate culture which enables shared open engagement with the employees to exist. The fundamental prerequisite for this are the *Ingenics* values.

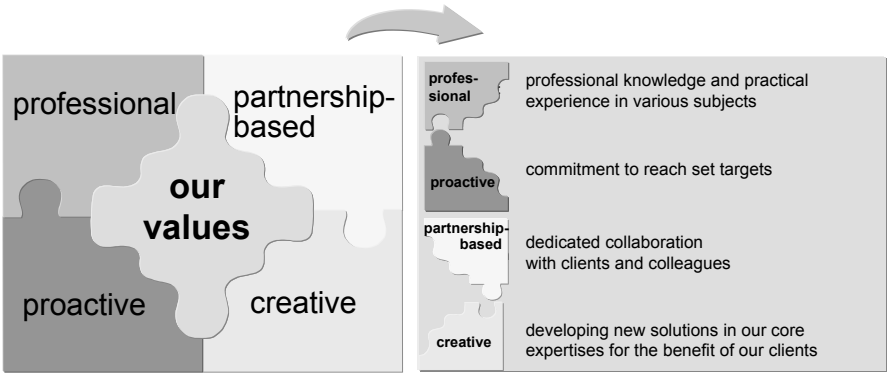

Fig. 1. The four *Ingenics* values

3.1 Toyota's Concept for Ingenics Administration

In the past years one could read numerous publications on the *Toyota* phenomenon. With their TPS (*Toyota* Production System), they achieved worldwide acknowledgement as a benchmark and reference for best practice. Owing to TPS, *Toyota* is very successful in the efficient production of automobiles; however, this does not mean that such principles may only lead to success in a production environment. When the new *Ingenics* office building was designed some years ago, employees thought about which successful concepts could be transferred from the production environment into administration. This gave birth to the '*Ingenics* Production System' or, as they call it at *Ingenics*, the '*Ingenics* Charta'.

3.2 Ingenics Charta

Most successful companies carry out quality management, often without knowing or naming it. The normative part, however, merely represents the framework. Anyone who is confronted with the implementation of process-oriented management systems should consider, whether an integrated option would make more sense than introducing or supplying a quality management system which merely carries a certificate with it.

The aim of *Ingenics* is to achieve record performance: best practice with excellent results inside the company as well as in client projects. In order to reach these goals, the '*Ingenics* Charta' represents the framework for the working methods at *Ingenics*. All employees have a common basic understanding: the Charta links corporate strategy and philosophy to the goal, which is an efficient organization without waste and with market and / or customer focus.

The *Ingenics* Charta may be described as follows:

- it represents the *Ingenics* 'Production System';
- it is applied universally (*Ingenics* office, clients, project work);
- a methodical approach to recognizing and avoiding waste (material, time, knowledge on the office and client side);

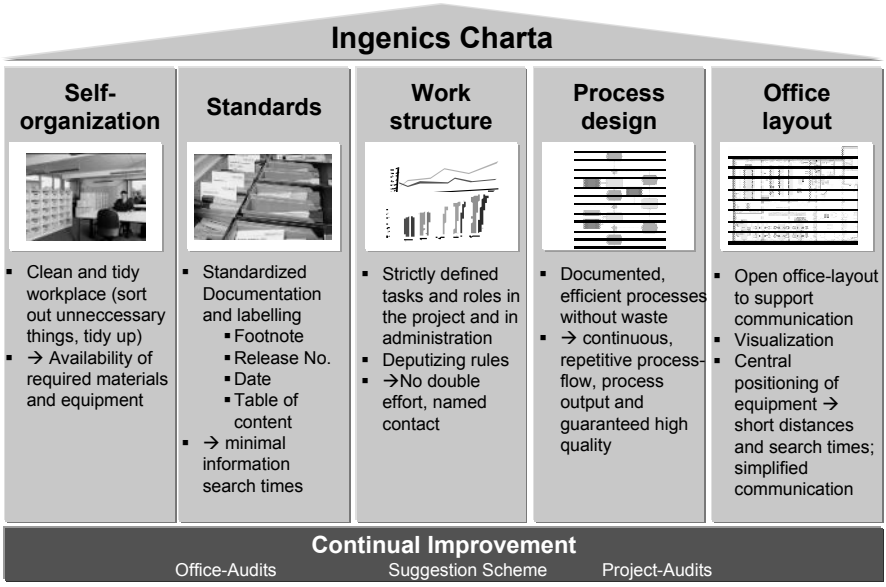

Fig. 2. The five elements of the *Ingenics* Charta

- lean, efficient (work) processes (=reaching process goals with maximum quality and at least possible cost = short throughput times, short working times, high share of 'value-adding tasks');
- smooth functioning of processes, no trouble, knowledge at the client or in the office;
- striving for continuous improvements (CIP).

The *Ingenics* Charta (cf. figure 2) is the '*Ingenics* Production System' and includes the five elements of self-organization, standards, work structure, process design, and office design. The five pillars are soundly anchored to the CIP foundation, which implies that each element bears a constant improvement process. What do the five elements of the *Ingenics* Charta mean in detail, and are there examples?

3.3 Self-Organization

According to this principle, employees are responsible for their individual efficient organization. Everything that is not important (e.g. brochures, documents and other print-outs) are immediately sorted out and disposed of. This saves the workplace and the archives from being cluttered with superfluous things. Further examples are:

- In the evening, each employee must leave a tidy workplace, and on the desk there is nothing to be found except the phone. The same applies to management.
- Each consultant has a small office-box in which to store documents and equipment.
- In administration, the 'Office Kanban' ensures that the consumption of office materials is controlled according to the pull-principle employed in production using Kanban[2].

The examples given can only work with the active participation of each individual employee in terms of self-organization.

3.4 Standards

Standards are important in order to ensure constant quality across the board on a long-term basis. All documents compiled by employees are based on templates including information such as name of author, file name, version, date, and document status ('for information', 'approved', etc.). The standardization enables effi-

[2] The Japanese word for sign or card. It describes a logistical control mode "auto-control system" according to the pull-principle. This principle was introduced at Toyota in 1962.

cient further processing of data and improves data quality. Standards may also be found in other areas. For each meeting, for example, an invitation including an agenda must be sent to all colleagues concerned. After the meeting, the minutes of meeting must be sent to all participants within 24 hours.

3.5 Working Structure

The tasks and roles in administration as well as in projects are clearly outlined and documented. The aim is to avoid the duplication of work and the waste of precious working time.

3.6 Process Design

All work processes must be designed efficiently and any form of waste (Japanese: muda) avoided. These processes are documented in the QM handbook (cf. section 4) and are transparent to each employee. It is the aim to guarantee a constant, uniform process flow and assure high quality.

3.7 Office Design

The workplaces are designed in an open and flexible way. Visualization was implemented throughout the *Ingenics* office, e.g. cupboards and drawers are labeled. The layout of office machinery took into account distances and search times. Thus, there is a 'hole-punch and tagging station' next to every printer / copier.

4 Web-Enabled QM Handbook

Ingenics already has years of experience in quality management and in the documentation of processes and has DIN ISO 9001:2000 certification. The challenge was to transfer the then valid QM handbook from paper format to a Web-enabled user interface in order to make it available in a digital format to all employees worldwide.

4.1 Design and Structure of the QM Handbook

In accordance with the fundamental understanding of *Ingenics,* the business processes are to be divided into three process layers:

1. **Management processes**

   These processes map the strategic, planning, and operative level to be assigned to the management area. Being a management framework, they represent a cross-sectional function to the performance and support processes.

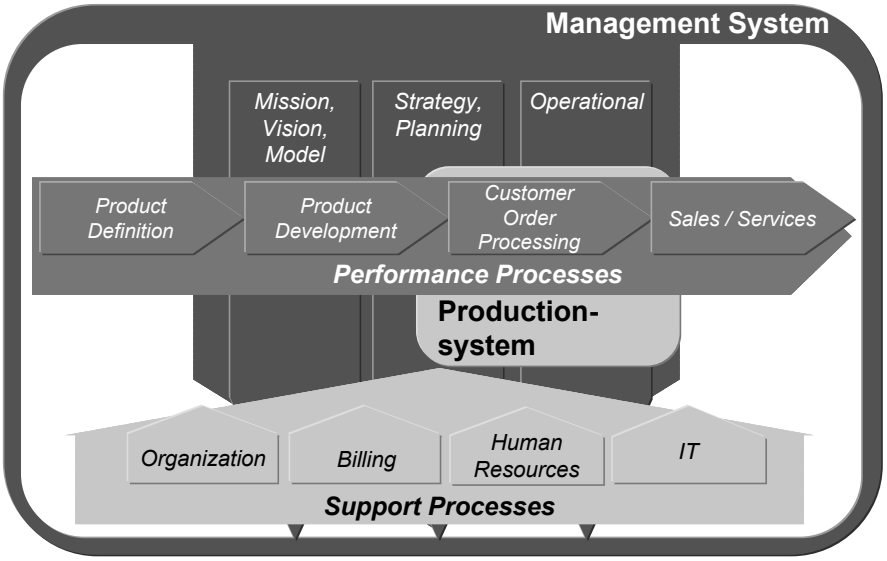

Fig. 3. Example for the mapping of business processes

2. **Performance processes (core processes)**

   This layer maps the core competencies of the company, e.g. product development, order processing, and service. As criteria for differentiation these processes form an important element in competition.

3. **Support processes**

   These processes chiefly serve the performance processes and in themselves do not generate any advantage for clients. Financial Management and IT departments are vital to the company; however, these two lines have no direct impact on the client's success. They serve to support the performance processes and thus do not generate any value themselves. These processes must be kept lean within a company.

When designing the QM handbook, the structure shown in figure 3 was taken into account when mapping the processes. In this way, process documentation is given a logical structure which offers comprehensible and easy use to the employee.

4.2 Templates and Documents

In everyday business, numerous templates and documents (e.g. letter templates) are used. It was important to the project team to link all document types (e.g. Word, Excel, PowerPoint, PDF) used in the company to the respective process step (activity / function) in the QM handbook. Today, the individual documents are

stored centrally and can be opened by employees from within the process. The great advantage resulting for the company is that employees always have the latest version of a template, and changing the templates hardly requires any effort. The owner of templates and documents is responsible for updating the files, when necessary, and making them available centrally and therefore without redundancy. As file coding (of the old and new file) remains identical, the QM handbook always accesses the latest file version in real-time via the defined link. The individual document clearly indicates the version; old document templates are archived in a dedicated directory by the appropriate owner. This guarantees that everyone works with the most up-to-date document. Old document templates are a thing of the past. Measures are no longer required to inform employees of outdated templates and to 'collect' old, discarded templates (as is still common practice in many other companies). This results in a large time advantage for the document owner and – more importantly – for all employees. The time saved can now be used to carry out value-adding activities.

IT enables every employee to access the QM handbook from all over the world via a browser and to open the desired documents. Particular documents can be found several times when in direct connection with a function (activity). For example, a Word letter template can be used by several departments and employees and can be used for several tasks. However, a link is made each time to the same original document. The Organization department is able to establish by means of a few mouse-clicks, which organizational position is working with a certain document during which tasks (functions). Figure 4 clearly shows the complete referencing of document, activities, and organizational position.

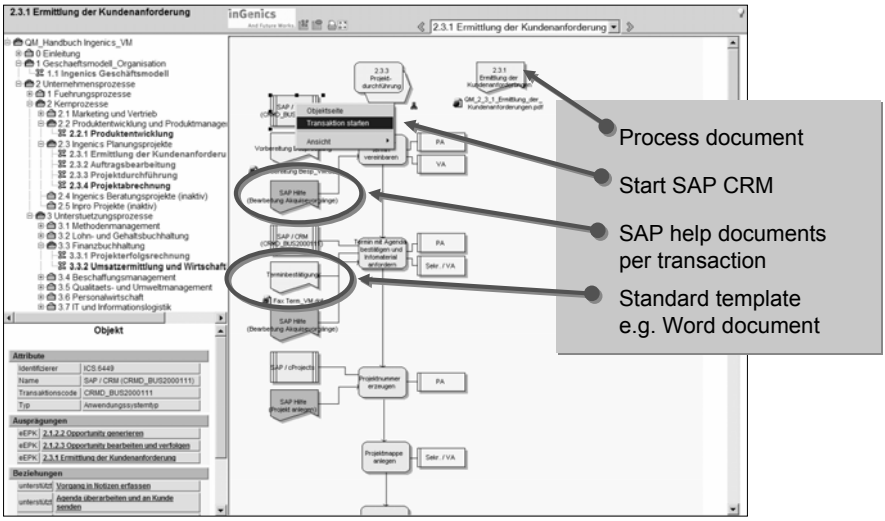

Fig. 4. Web-enabled QM handbook

4.3 Integration of SAP

In order to complete the QM handbook, it was necessary to completely link the ERP system to the process. All relevant process steps (functions) – where the SAP system is utilized – are linked to an SAP transaction. It is thus possible to directly call up the required SAP transaction code from the QM handbook by means of a mouse-click and to open the SAP input screen. In future, it will not be as important for employees to know all transaction codes by heart; they are rather able to work on the basis of this documented process and directly open the SAP input screen when required.

As an aid to employees who need to be trained for the SAP system, or for employees who do not work with the ERP system on a daily basis, a training model in form of PDF files is stored behind the respective transaction. To avoid a great deal of text, screen shots, together with additional graphic elements, were primarily used to indicate input fields. The employee can now access input assistance quickly and directly and can see internal tips within the document. This minimizes incorrect entries into the system from the beginning.

SAP transactions can be started in the same way as documents / templates, which can be accessed from around the world via Web browser. The required work on the system can thus be carried out worldwide. The client merely requires an SAP GUI.

4.4 Connecting Function and Organization

Based on the ARIS conventions, the individual work processes (functions) are respectively linked to an organizational role. This clearly defines which department or position is responsible for carrying out the task. In the QM handbook this information is not only available in graphic form: a mouse-click onto ‘sales clerk’ will list all other tasks relating to this position. This enables a quick identification of workload and possible qualification requirements of a certain organizational position or of a certain employee.

When modeling in ARIS, the relation between function and organization is set out and stored accordingly in a structured form in the ARIS database. This allows the generation of various reports. A requirement defined in the project was to enlist the scope of an employee’s tasks and, in a further step, to derive respective qualification measures from this. The specification was not easy to implement from the technical point of view, as this report did not only need to consider administration employees from Accounts, Sales, etc. but also the *Ingenics* consultants, which are able to fulfill several different functions (project manager, project team member, project owner, etc.). The report script thus had to evaluate a matrix organization (various lines of business and centers of excellence) across several instances down to the people level. With the aid of a special report – unfortunately not available in the standard scope of ARIS – it is

now possible to export the report to an Excel table on the basis of corporate processes and organizational models within a few minutes. The exact analysis can then be easily performed in Excel.

4.5 Organizational Model

As already described, the organizational information can be found in the process model. The relevant position was assigned for each activity. The allocation of activities was uniformly carried out for the entire company. The data basis was so good, that the decision was taken to henceforth map the company organization structure primarily in the framework of the QM handbook and to do without other visualization options. This way of mapping the organization has the advantage that it enables both a top-down view, i.e. from the main organization model to the individual activity in the process model, and a bottom-up view from activity to organizational model.

4.6 A Visionary Platform

By representing various data views and being able to map information in ARIS in a structured way, the company can map the entire organizational structure right down to the process steps. The link always remains in place. The required views, such as documents, IT systems, and organization, can also be linked at process level. ARIS therefore fulfils the scientific and theoretical approach according to Prof. Dr. Scheer as well as, more importantly, giving the company a multifunctional, Web-enabled platform on which all necessary elements are combined in practice. In future, thinking in processes will become increasingly important within the company. With the aid of this 'process platform', the employees receive a visualization of the process way-of-thinking; this offers support in everyday work. The Web-enabled QM handbook can be opened by each employee worldwide.

4.7 Benefits

What benefits arose from the implementation of this project?

The costs for the orientation time of new employees were reduced significantly. For new employees, who generally at the beginning want to absorb information like a sponge, the Intranet in combination with the QM handbook represents a rich knowledge platform. The more the new employee finds existing structures, defined processes, and information, the quicker he / she will integrate into the everyday work routine and thus have no fear of making mistakes or attracting negative attention. As a result of the new platform, *Ingenics* was able to reduce orientation time by 60 percent. Furthermore, employee questionnaires have shown that motivation among employees has increased.

As regards process and service quality, several successes were achieved. On the one hand, search times within the company have decreased by 70 to 80 percent. A standardized file coding and filing system helps the employee to efficiently find information. All required templates can be called up via the QM handbook. The standards set up within the company have not only helped employees but have also had positive effects on information channeled through the process chain. For example, the fact that an employee immediately finds relevant information in the process records of his colleague, could only be achieved by standardizing data and processes.

4.8 Technology

The corporate processes were modeled in their entirety using ARIS[3] Toolset. ARIS enables documenting processes and creating the various document templates as links. The technical interface to the SAP system was created with ARIS for mySAP. ARIS Web Publisher was used to publish process data from ARIS in HTML format. This allows the exporting of data structure and graphic process descriptions, including the respective links. The user interface of the Web-enabled QM handbook can be adapted individually and includes the corporate logo. The QM handbook was made available on the Intranet, from where it can be started, to ensure access by everyone.

5 Outlook

Changing processes within a company is an important topic that will increasingly move into the limelight in the coming years. During the past years, measures to increase efficiency were implemented in areas surrounding production. The administration areas were often not affected.

A current study (cf. figure 5) conducted by *Roland Berger* on behalf of *Ingenics* shows, that 91 percent of companies questioned expect new processes to bring forth measures for optimization and will increase efficiency in administration. Only 50 percent regarded outsourcing as an instrument to success. Companies will therefore have to seriously consider implementing the instrument of process optimization in the coming years.

As this article has shown, continuous process optimization has a strong interrelation with corporate culture. Only those who work on it create the basis for profound, long-term corporate change. Based on this, measures for improvement ensure a constant further development.

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[3] The ARIS product range originates from IDS Scheer AG, Saarbrücken.

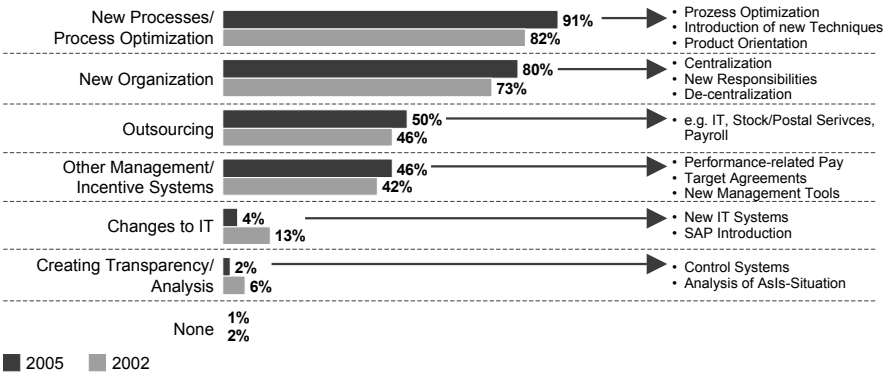

Fig. 5. Instruments for process optimization in administration

Ingenics has DIN ISO 9001:2000 certification. In 2004, the QM system of *Ingenics AG* was rated 'outstanding'. The fact that this success is also noticeable outside the company can be seen from the following positive client response: *Daimler Chrysler* presented *Ingenics AG* with their International Supplier's Award 2004 in the area of global production process and logistics planning. This was the second time in a row that *Ingenics* received this award; after receiving grade 1.7 in 2002, *Ingenics* received grade 1.5 in 2004 (in 2003, this award was not presented).

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New Roof for Austrian Railways Network Provider – The Introduction of Business Process Management at ÖBB Infrastruktur Betrieb AG

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Summary

"The client is king." – a sentence which has been heard so often but the meaning of which has seldom been experienced. Many managers have recognized this 'market loop' within the company and have firmly embedded a customer-oriented approach as an essential element in their corporate strategy. A simple formula can describe what today's management wants to achieve: high customer satisfaction = great business success. In practice, however, it is evident that the successful implementation of such a strategy cannot always be taken for granted. This article comprises a case study of *ÖBB Infrastruktur Betrieb AG* and describes, how Process Management can support consistent customer orientation and can thus exploit sustainable application potential within various areas of the company. The focus is on the implementation of a coherent Process Management method supported by the ARIS product line.

Key Words

Process Management, process organization

1 The Concise History of ÖBB and the ÖBB Infrastruktur Betrieb AG

The Austrian railways, *Österreichische Bundesbahnen (ÖBB),* have their roots in the state railways of the Austrian emperor, the Kaiserlich-Königliche Österreichische Staatsbahnen, which developed with the step-by-step takeover of the railways from the Austro-Hungarian monarchy by the state from 1882 onwards. Today's name was only given to ÖBB on August 5, 1947. During the past decades, ÖBB developed at high speed as a result of the ever-increasing transport requirements of the people. Owing to the central location in Central and Eastern Europe, the ÖBB has meanwhile become a significant supplier of transport services in Europe, carrying more than 276 million passengers and approx. 87 million tons of goods each year, over a railway network stretching over nearly 5,800 km. It is thus an economically prosperous organization.

After wide-ranging political discussions, the legal framework was finally created by the state to gain access to the free market: when the law on the structure of the federal railways came into effect on January 1, 2004, a new era for the railways began.

The ÖBB was split into several public limited companies and limited companies under *ÖBB Holding AG*, which are now acting as privately governed enterprises within a free market. In May 2004, the *ÖBB Personenverkehr AG (passenger transport),* the *Rail Cargo Austria AG*, the *ÖBB Immobilienmanagement GmbH* (property management), the *ÖBB DienstleistungsGmbH* (service provider) and the *ÖBB Infrastruktur Betrieb AG* (infrastructure operation) were founded. The *ÖBB Traktion GmbH* and the *ÖBB Technische Services GmbH* (technical services) followed in June. Finally, the *Infrastruktur Bau AG* (infrastructure construction) was created.

Existing structures were redistributed. This created the necessity for these companies to compete in the market. Since the beginning of 2005, these corporations have been operative. This implies that the forms of cooperation between the different ÖBB corporations must be redesigned and must also, in part, be expressed in form of a contract. Customer and supplier must be defined; the scope of services must be agreed on. *ÖBB Infrastruktur Betrieb AG,* with close to 20,000 employees, takes on a central role at the ÖBB. The ÖBB business segments to date, network, signal and system technology, tracks, energy network, telecom, and facility management, were consolidated. The *ÖBB Infrastruktur Betrieb AG* is responsible for the entire railnetwork, the supply and maintenance of the entire infrastructure, for operation planning and performing marshalling operations, as well as for route allocation and levying toll charges for the use of their infrastructure (rail toll).

Having created the new structures, *ÖBB Infrastruktur Betrieb AG* is now faced with the great challenge of making the changes within the organization transparent to their employees, explaining the changes in goals, and motivating all employees to carry their share and actually 'live' these changes.

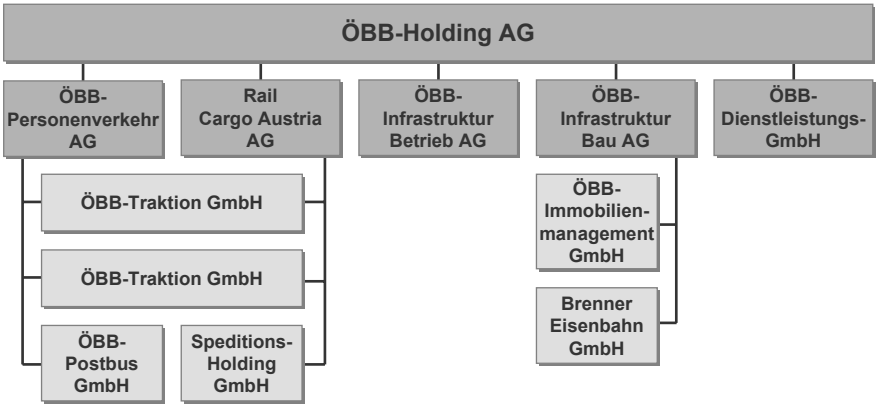

Fig. 1. Structure of *ÖBB Holding AG*

2 The Vision of ÖBB Infrastruktur Betrieb AG

The vision of *ÖBB Infrastruktur Betrieb AG* was outlined in a clear, entrepreneurial goal: to become one of the three leading European rail-infrastructure enterprises in Europe.

In order to reach this objective, the *ÖBB Infrastruktur Betrieb AG* began working on concepts that would enable a smooth restructuring of the business unit organization at an early stage. The *ÖBB Infrastruktur Betrieb AG* recognized that the only way for the enterprise to have a chance of survival in the ever-expanding European market was by means of modern products and efficient processes. It therefore became evident very rapidly, that only a process-oriented direction was able to directly support restructuring.

3 Timetable

In the process of managing the task of converting the *ÖBB Infrastruktur Betrieb AG* from a functional to a process-oriented organization, the management board brought to life the 'Switch' project. In 'Switch', six ÖBB programs were initiated and were to integrate the following areas:

- customers;
- employees;
- finance;
- technology;

- structure;
- processes.

The 'Process' program was particularly there to introduce Process Management to *ÖBB Infrastruktur Betrieb AG* and contribute to the success of other programs.

In the initial phase of collaboration between *ÖBB Infrastruktur Betrieb AG* and *IDS Scheer AG,* we all thought about where the 'Process' program should lead and into which direction we ought to progress it in order to obtain useful results for the organization.

IDS Scheer AG was able to set significant impulses with the aid of its methodical support in structuring the process map created to date. After that, *IDS Scheer* was in the position to set up a roadmap in collaboration with the ÖBB project team, in which the procedure was further laid out. The creation of the roadmap was based on the *IDS Scheer AG* model tree. The core statement of this model is that process modeling as a map of organizational reality should always be purpose-oriented. Fundamentally, there are three topics within the enterprise – organization, IT, and reporting – which are closely related to Process Management. Three main factors had to be respected when introducing and running Process Management:

1. Process modeling: the mapping of processes must serve to bring a demonstrable use for the enterprise. The shape of a well-structured process landscape thus receives a high importance. It should offer an overview for various units within the enterprise, be as complete as possible, and enable the reconstruction of the decision-making process.

A comprehensible graphic representation of processes is a prerequisite for successful communication and for the efficient coordination between the various business units.

2. Project organization: From experience, it is possible to generate savings of up to 70 percent in document expenditure if Process Management is correctly placed within the enterprise. The reason is that cost-intensive duplication of work can be avoided. Therefore, a process representation, which has been created within the framework of documentation, can be utilized for a certification or a reorganization project as well as for the implementation of IT solutions. A neat description of business processes forms the basis for the structure of an integrated management system.

3. Use of tools: The use of an appropriate tool, on the one hand, fulfils documentation requirements, but, on the other hand, it would be desirable to determine the requirements for IT support in a process-oriented fashion. This is exactly what ARIS Toolset enables with its ARIS methodology: comprehensive support from concept generation to the implementation of processes. Moreover, the tool offers the pos-

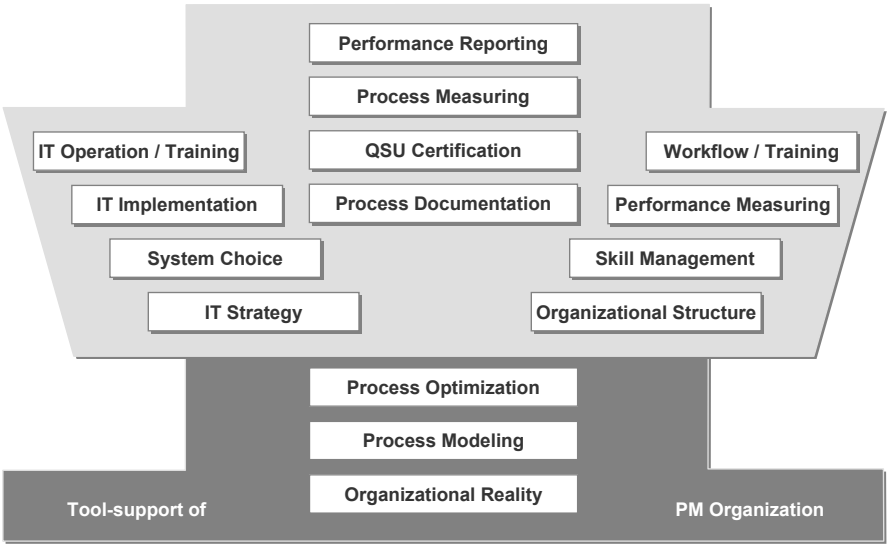

Fig. 2. Potential value of a sustainable Process Management

sibility of process cost calculation, simulation, and process controlling. The main aim is to create a graphic representation, which transparently depicts the business-relevant relationships between processes (business world) and IT (system world) in order to find and implement methods for improvement.

4 "Process Management Is on Track"

ÖBB Infrastruktur Betrieb AG chose *IDS Scheer AG* as partner for a successful implementation because we were able to work out a methodologically sound solution for the implementation of Process Management during the conceptual phase. *IDS Scheer AG* looks back on more than 20 years of experience and is leading the field in the area of Process Management. The company's founder, Prof. Dr. Dr. h. c. mult. August Wilhelm Scheer, has laid out the foundations for work with ARIS in his book called 'Architektur integrierter Informationssysteme' (the architecture of integrated information systems). ARIS Value Engineering (AVE) is a method that has a holistic consulting approach, from corporate strategy to process controlling of enterprises. Using this method, the aim of *IDS Scheer AG* is to gain a deep insight into the roots of several problems – similar to a physician who screens a patient using X-rays. It does not only treat symptoms, but also fights the cause and enables enterprises to gain significant competitive advantage on the market. The implementation of Process Management at *ÖBB Infrastruktur Betrieb AG* was carried out in the following steps and in accordance with this AVE approach:

- introducing clearly defined and thus comprehensible process categories for core management and support processes;
- identifying business processes at *ÖBB Infrastruktur Betrieb AG* using a systematic approach and aided by *IDS Scheer AG* reference processes*;*
- creating a process map of *ÖBB Infrastruktur Betrieb AG* using ARIS Toolset.

The result was a complete, logically structured process map to further analyze business processes at *ÖBB Infrastruktur Betrieb AG*; and it did not contain any duplication. The finished product was then presented to ÖBB. It ought to be mentioned that the core processes are in the front line. Core processes were defined at *ÖBB Infrastruktur Betrieb AG* as those processes which bring the enterprise in direct contact with the customer and processes which generate its sales. This representation expresses customer orientation. There are business processes which are of importance to the entire enterprise. However, there are also business processes which only run at unit level. A sensible representation of both process types represents a challenge to process modeling. The method used by *IDS Scheer AG* allows a logical integration of business processes on various levels in various business units.

Thus, a process which, from the point of view of the enterprise, represents a supporting process (e.g. setting-up production plants) clearly represents a core process to the business unit responsible for the process. This method simplifies the identification and representation of processes, because numerous 'political' discussions within the enterprise on process categorization, which in many cases cost considerable time and money in process modeling, can be avoided. Every unit is able to find itself

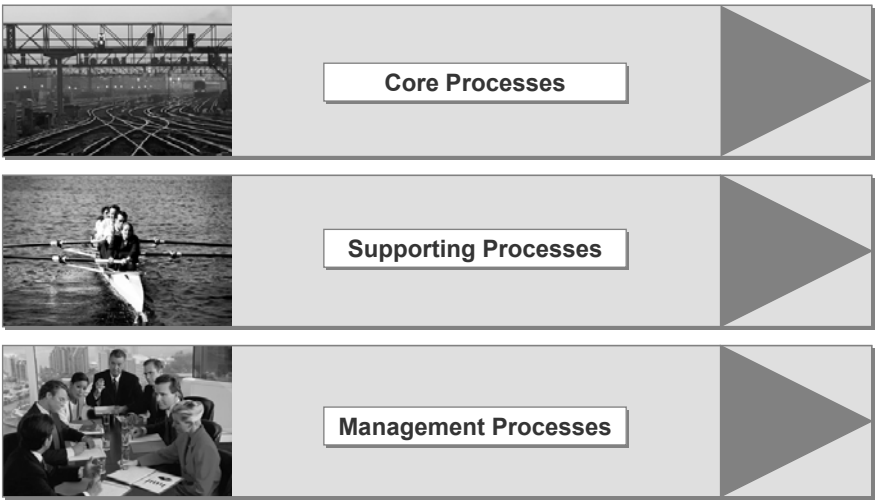

Fig. 3. Entry point of process map *ÖBB Infrastruktur Betrieb AG*

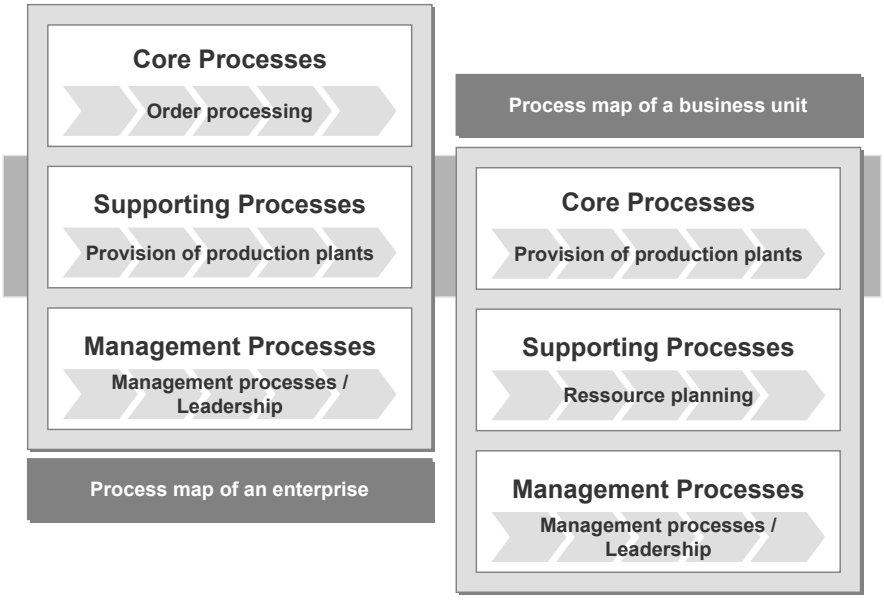

Fig. 4. Example for the interplay between organizational map and unit map

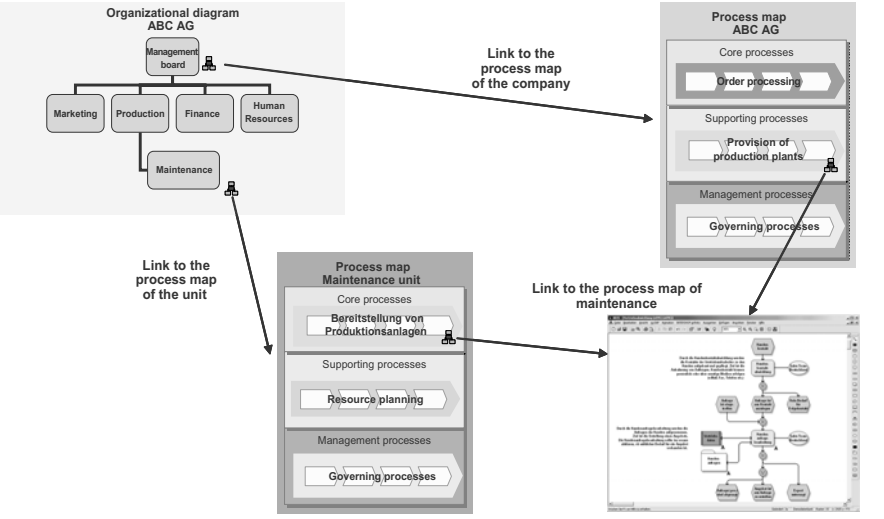

Fig. 5. Navigation system

and its 'own' processes. A further benefit of this method lies in the possibility of constructing a process document system with a purpose-oriented and comprehensible navigation function. Independent of which access is chosen – organizational diagram or process map – the system allows readers to arrive at the same process. To explain this, Fig. 5 gives an example.

5 The Information Platform for Process Management

As this project was first and foremost about establishing a new basic organization and creating receptiveness for new visions, change management for the introduction of Process Management was of great importance. Every single employee should play their part in Process Management in order to reinforce the competitiveness of the enterprise on the market – this is the objective of Process Management at *ÖBB Infrastruktur Betrieb AG*. It is about creating an understanding for the changed situation and about making each of the employees actually see their contribution and the added value important to them – a mission that can only be accomplished by great effort within an enterprise of 20,000 employees. Well-known reasons that impede Process Management projects (e.g. lacking coordination and 'sluggishness' on the part of employees) should be prevented by coupling Process Management with change management. Apart from informing all employees about the objectives and activities of Process Management, making the results available to all employees via a suitable Intranet solution represents an essential factor of success. With this platform solution, the individual operational department can to return to existing material and reuse it for concrete purposes. The platform offers a uniform company language for internal process coordination. It also forms the basis for coordinating the cooperation with new business partners. As a result of the realignment of organizational units of *ÖBB Infrastruktur Betrieb AG,* new interfaces are being created which can only be clearly defined through a clear graphical representation of processes.

6 Conclusion

The introduction of Process Management at *ÖBB Infrastruktur Betrieb AG* is a unique project because of its complexity and variety of requirements arising from new organizational structures, market changes, and new customer structures. The compilation of a process map represents an important success factor for the introduction of Process Management. The process map of *ÖBB Infrastruktur Betrieb AG* now serves as a framework, in a way similar to that of a signpost, for various projects and offers an orientation for finding the solution. Moreover, the process map enables employees within the respective operational units to design their business processes effectively and efficiently on the operative level.

Decisive for the further success of Process Management is the appropriate marketing or the involvement of employees. The active involvement in changes is a major factor for a new common identity for the 'new *ÖBB Infrastruktur Betrieb AG*'. The fact that employees can actively take part in the design often releases unsuspected forces within an organization. Management should not miss this chance. Process Management successfully supports the effort to find solutions for particular questions within the enterprise in a systematic and comprehensible way. In various future projects, the description of processes constitutes a fundamental part of designing and implementing new organizational structures and processes. If it is introduced properly, the benefit of Process Management for an enterprise can exceed all expectations.

Industrialized Sales

Dirk H. Beenken
IDS Scheer AG

Summary

While in both production and administration in recent years a great deal of effort has been invested in process re-engineering, the sales departments of such companies have not been included. At the same time, competition has increased in all fields, as has the demand for more intensive and better quality sales and market development. Using the media sector as an example, this report investigates the changes to be implemented in the re-engineering of processes and structures in order to create a more effective and efficient sales organization.

Key Words

Strategy, organizational development, change management, AVE, BPM, reengineering, management consulting, media business, turnaround

1 Media in Fear of Livelihood

Even in the fifth year of recession, Germany's daily newspapers show no light at the end of the tunnel. At best, the number of people without work has stopped increasing; whole sections of business, such as the market for classified ads, have been lost.

The daily newspaper publishers have adjusted to the new situation, the only comparison being the wave of events which were part of the remodeling of the coal and steel industries.

The potentials for the reduction of costs are exhausted. Reductions of 30 to 40 percent, as in previous years, are no longer possible; on the contrary, many newspaper publishers have reached the minimum where they can still continue to exist as a company, and further cost reductions would mean they could not continue their scope of services and supply.

For the daily newspaper, this is even more menacing due to the fact that they have a large fixed cost burden. Fixed costs for salaries in the editorial and administra-

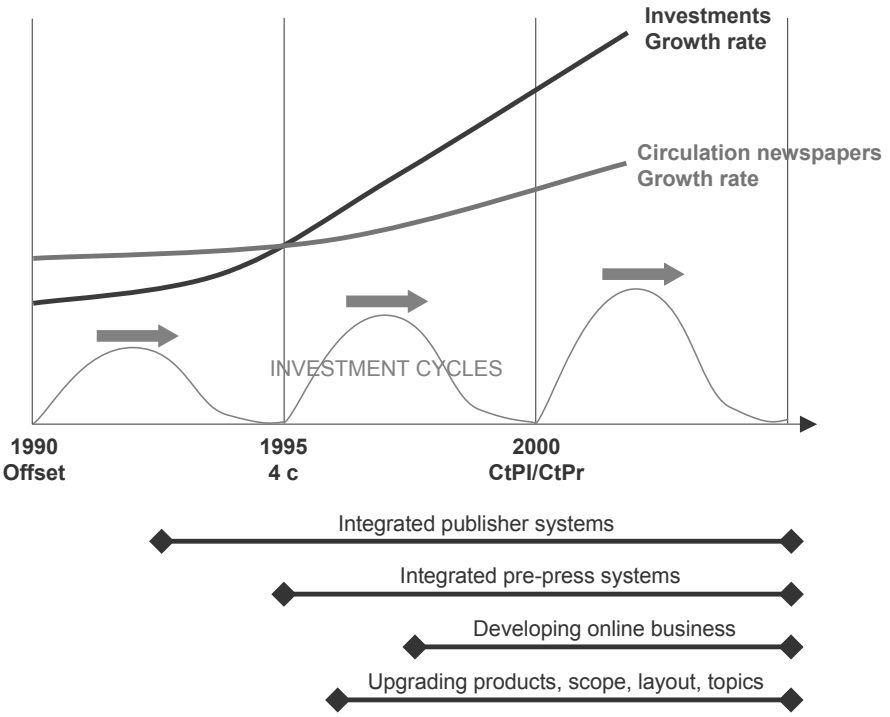

Fig. 1. The necessary investments are growing faster than the editions, investment times are decreasing: the great wave is rolling (source: *IDS Scheer AG*)

tion areas, and considerable costs for the necessary technical infrastructure limit opportunities to further reduce the costs of printing.

Should profits decrease further, a number of German daily newspapers would be in danger of going into liquidation.

2 Cul de Sac: Cost Reduction

"He that wishes to do the right thing for everyone can call nowhere home." It seems to be that this motto can be adopted for the commercial development of the daily newspapers.

Daily newspapers and magazines are surrounded by a host of competitors. The general stagnation of the advertising market has not resulted in fewer suppliers; the opposite is the case, and the result is a greater diversification.

The latest trend points in the direction of specialized titles; their presentation, form, and content are tailored to specific target groups.

The current situation makes it extremely difficult for daily newspapers who do not aim for a specific target group, but who have to cover all the inhabitants of a given geographical area.

On the other hand, daily newspapers are still the media that enjoy the highest level of credibility. Precisely at a time of global change, readers are looking for stability and orientation. All market surveys show that this is a unique selling point for the daily newspapers to satisfy this demand.

Owing to the wider distribution of the daily newspapers, they must remain a credible medium for their readers and at the same time offer target-group advertising for their customers, almost achieving the impossible by 'squaring the circle'.

Highly successful special reports on literature and books in tabloid form, such as those *Die Zeit* publishes, or new forms of classical products such as *Welt Kompakt* or, indeed, books published in monthly installments, as published by the *Süddeutsche Zeitung*, show that this 'squaring' is feasible.

The development, communication, and sale of these new products require specialized and expensive know-how, time and effort, and money.

The necessary resources and required scope must be achieved within the existing organization, a particular challenge for the reengineering of the sales organization.

3 Make 90 Sales Persons from 40 – Process Optimization in Sales

Zeit, *Süddeutsche Zeitung,* and the *Zeitungsgruppe Berlin* are only three examples where the new market-situation demands new avenues to be pursued, using one's own resources to take on the challenge and optimize.

3.1 Sales Activities to Be Planned and Controlled

When one looks at the sales value chain, from the initial contact to quotation, negotiations up to the actual order, the norm is that only about a third ever proceeds to the next phase.

This means that to acquire 10 orders, 30 negotiations have to take place, 90 quotations have to be presented and thus, about 270 contacts made. This does not occur only once, but repeats itself day in, day out. 270 opportunities in various states of maturity, inter-coordinated and optimized – all this to get only 10 firm orders!

Considering that a sales representative for a daily newspaper must achieve approximately 100 new customers a month, he would have to work on 2700 business leads during this time span. For a sales organization of a large daily newspaper employing 50 representatives, this would mean a total of 1,350,000 leads per month.

Process optimization in sales involves enhancing the above-mentioned chain with an organizational and systemized (CRM) Customer Relationship Management, coordinated so that the highest possible percentage of added value is realized throughout the activity chain. Looking at the number of leads involved, it can be seen that an automated, systemized approach is necessary to achieve success.

3.2 Organizing the Division of Work

The activity chain from enquiry, quotation, and negotiation up to the actual order requires a multitude of tasks to be performed successfully.

At a time of extreme pressure caused by high competition, the success of each segment in the sales chain is dependent on requirements that usually only specialists can successfully fulfill.

Direct marketing, publishing marketing / pre-sales calculation specialists, and only a small number of sales representatives are the role players in modern media sales.

To be successful in the sales front today requires team play and activities using many specialists, all of whom must be fully synchronized.

The aim of the company process optimization is not to improve the effectiveness and success of individuals but to create a synchronization of the persons involved so that 40 individuals attain the quality of work of 90. There is no room for the single player in such a synergy-orientated work organization.

3.3 Knowledge and Customer Information Made Readily Available

Efficiency and effectiveness within the market development means, above all, concentrating on the requirements of both the customer and business associates. Using advertising as an example, this applies to the complete sales chain, from the request to tender, negotiation, right up to the order entry. Only if, at every stage in the chain of sales activity, the communication and the work contents are adjusted to the exact requirements of the customer, can a high degree of added value be achieved and unnecessary, unproductive activities be avoided. The whole organization and all staff involved in the sales and service sector must be aware of the needs of the customer and take account of this information. Should this information only be known by the sales representatives, then no synergy effect will be created, and the work of the other members of the organization is therefore not effective.

The ultimate objective of an optimization process in sales is to ensure that all persons involved in the sales-process work in accordance with the exact requirements of their customers with as little non-productive time as possible. To implement a CRM system, and ensure efficient utilization within the complete sales process, involves both organizational and technical measures.

3.4 Increase Added Value

In order to run the customer request through the complete sales supply chain means that many specialized functions must be successfully carried out.

The main function of business process optimization in sales is to critically scrutinize each step, from the customer request to the actual order, and to check if it is necessary at all and, if yes, how each step can be improved upon to increase the hit rate. This applies particularly to the process of advertising administration and production; the production of the daily newspaper products and other publications are for the most unseen by the customer.

This offers the opportunity to reorganize work processes that have nothing to do with the actual sales process along the lines of industrial production processes.

The work sequences and processes are simplified; the aim being that the advertisement can be prepared in an individual manner, irrespective of staff member or his or her situation.

Guidelines are introduced for the actual production and the performance; these are continually documented to ensure repeatability and quality control.

Due to the large number of leads which have to be monitored (40 leads for 1 quote; 50-60,000 for a circle of 50 employees in sales), a continuous improvement can only be successful when a support system is installed, which can provide detailed analysis of a single case and also supply an overview covering the whole spectrum of efficiency within the sales process.

ARIS PPM is an ideal tool to deal with this.

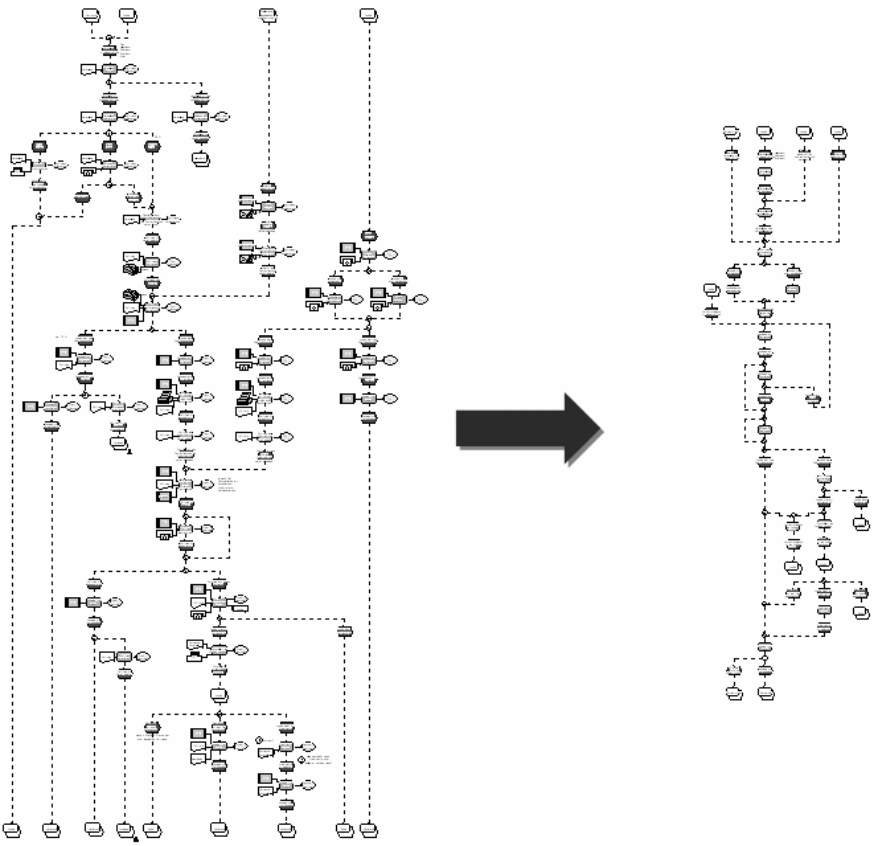

Fig. 2. An example of process engineering in advertising sales in a large daily newspaper; the operations are a lot leaner and more efficient (Source: project work *IDS Scheer AG*)

In order to achieve optimal capacity planning, control processes are installed with which order entries and production output is monitored and data calculated and logged in order to adjust the personnel and work hour schedules appropriately.

This ensures production conforms to requirements and, at the same time, allows optimized production factors to be deployed.

All data relevant to product output is recorded and compared to the plan data. Any variances are analyzed and, if necessary, appropriate modification made.

The production itself is reorganized on the principles of a building block system: the advertisements are produced using pre-assembled (using templates) components that can be combined for an order specifically produced for a customer. Thus optimized processes mean that 80 to 90 percent of the advertisements are produced using such pre-assembled elements or using pre-prepared customer templates.

Due to the fact that a high percentage of the workflow has been standardized and detailed controlling and planning tailored to the actual requirements, a 30 to 40% higher productivity is achieved and thus a greater capacity for sales and customer administration becomes available.

4 Conclusion

Within the framework of the changes in processes in sales, age old traditions have been thrown overboard within a short space of time and the traditional lines, that have existed since Gutenberg, between printing and the sales profession have been removed.

Due to the new introduction of process and structure, the sales departments have experienced a quantum leap regarding profitability and productivity.

A 30 percent cost reduction in sales administration or 40 percent more capacity for sales and customer support, as well as the introduction of new products as a result of administrative savings, are not one-off cases.

The *Süddeutsche Bibliothek* and the encyclopedia projects of the weekly *Die Zeit* show, that publishers know how to exploit the freed capacities for new business.

This process is by no mean concluded.

Management for the senior staff of these companies means 50 to 60 percent project work. Any number of optimization measures means that the last bumps are ironed out, workflows modified, and every technical innovation checked for its organizational potential – and implemented.

Continual improvement has become second nature.

What Business Leaders Can Learn from Jazz Musicians About Emergent Processes

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Summary

Using the jazz metaphor, conventional wisdom suggests that managers (jazz band leaders) should lead knowledge workers engaged in emergent work processes (jazz band members), using plans as guides, becoming experts in the work they're managing, hiding the emergent nature of the work from their customers, and leading charismatically in the face of uncertainty. The authors' research and experience, with both jazz and management, indicates that this conventional wisdom does not capture the essence of what either successful managers or jazz leaders do, since it separates learning from doing the business of emergent work. Instead, successful managers of emergent work focus on conversations, not plans; they rely on and constantly build mental maps of the expertise in their 'bands'; they engage rather than hide from the public, as knowledge about the work emerges, and they lead through making connections, not through charismatic showmanship.

Key Words

Emergent processes, customer engagement, knowledge management, inter-organizational collaboration, shift of leadership

1 Introduction

The concept of 'emergence' in the workplace has been seeping into the management vernacular. Emergent knowledge processes are work processes in which the outcomes are not obvious, so that participants must continuously make sense of their situation and decide, in real time, on the next steps to take. New product development (especially of the revolutionary kind) is the quintessential emergent process as developers iterate recursively between problem-finding and solution evaluation, and increasingly use virtual means to access experts from around the world.

We have observed emergence in such diverse domains as software designs, strategic planning, contracting, project management, knowledge management, organizational change, medical services delivery, credit union customer service, and homeland security. In a software development team at SAP using Wiki technologies, team members make an average of 20 changes to documents each day as their emergent process unfolds. At JPL, knowledge management initiatives focus on storytelling and powerful online search tools that leave knowledge and knowledge-sharing processes unstructured. At *Novell*, their Cool Solutions Wiki emphasizes a focus on customer relationships that are not simply about selling solutions, but which work to develop customer communities in which *Novell* plays a helping role in the customer's unpredictable journey in the marketplace. Even the U.S. Army in Iraq is shifting from a command-and-control hierarchy to a net-centric communication-intensive system for urban guerrilla warfare, pulsating with emergent information and knowledge-sharing as missiles are redirected at the last moment, individual soldiers redeploy resources through chat rooms, and global positioning system (GPS) maps inform squads of which alleys to go down first.

To manage employees engaged in emergent work, a variety of authors have offered a set of principles (Orlikowski, Minzberg, Weick, Eisenhardt). We call these principles 'conventional wisdom'. This wisdom is often informed by metaphors, such as jazz, suggesting that managers of emergent processes should do the following:

- have a plan as a guide
- be an expert in the work they're managing
- hide emergence from the customer
- lead charismatically, especially in the face of uncertainty.

A plan, in this conventional wisdom, is one with objectives about what employees should accomplish. Emergence is managed by allowing the plan to change as conditions change. Since emergence implies breaking rules, conventional wisdom has suggested that only those most knowledgeable about the rules and the reasons for their existence should be given the authority to break the rules. Thus, if managers are to be held accountable for their employees' emergent behavior, the managers need to be experts in the work to determine which rules to break. Conventional

wisdom has also suggested that if emergence is required in a process, customers should be shielded from the process lest the customer conclude that managers are not in control of their business. Customers want control and predictability; sharing the 'messiness' of an emergent process will only increase the customer's anxiety, driving them away to more secure suppliers. Finally, conventional wisdom suggests that the trait most needed by managers in an emergent process is charisma, like a loud, brash jazz leader, or, to switch metaphors, the young lieutenant leading his men up the hill, charismatically shouting "charge!"

Collectively, we have spent years managing companies facing highly uncertain environmental and competitive pressures; leading, listening and playing in jazz bands; and studying managers successful at managing emergent processes. We find that the conventional wisdom, while providing some guidance for managing emergent work, has the problematic side-effect of separating learning from doing. Plans, expertise, customer engagement, and charisma are defined and developed independent from the work being performed. We tell our story of how emergent work is managed using *Entergy Louisiana, Inc*, a public utility in Louisiana.

2 Entergy's Story

It's not a name associated with excitement, innovation, new product or process ideas. It's a public utility in Louisiana. Like other companies in its industry, it did things the same way for many decades, and would have continued in the same vein until one factor in its environment changed radically--ships got bigger. One of *Entergy's* most critical transmission lines – part of the grid for the entire area – runs across the Mississippi River at Mile 89 from the mouth of the river at the Gulf. New Orleans is one mile up river from the power line crossing. New Orleans is also one of the busiest ports in the U.S., with ships constantly going up and down the river from and back to the Gulf.

When the transmission lines were installed over 40 years ago, they were designed to be 175 to 195 feet high above the Mississippi River's mean high water mark, allowing most boats to pass underneath, but requiring the occasional taller boat, such as an aircraft carrier, to pass to one side or the other, instead of down the center, where the lines were at their lowest. The last straw was when a cruise line decided to put New Orleans on their tour stop, disembarking thousands of tourists in the city for weekly short stops – but only provided that they didn't have to stop their ships for the transmission lines every time they came up and down river. *Entergy* needed to de-energize its line every time the large ship came by, resulting in the electric service of 100,000 people, 17 industrial facilities, nursing homes, and hospitals being put at greater risk. Moreover, this process required the time of *Entergy* operations staff to make the switch over, wait for the ship to pass, and then switch back. The public pressure for *Entergy* to do something about their lines was

now extreme, with citizens demanding action in public forums and on radio talk shows. Finally, *Entergy's* president made a pledge to the public: we will solve this problem within 18 months, at a cost of no more than $15 million.

Solving the problem was no simple task. The Mississippi River is very wide at Mile 89: 3,020 feet from transmission tower on the west bank to the transmission tower on the east bank. No one – anywhere in the world – had ever produced or sunk power cables at the volts required, with the necessary insulation, with no splices, at that length. There are levees on both side, and tampering with them could have disastrous results. The land between the River and the levees is similar to a swamp, hardly a place for a construction site. The lines could not simply be laid on the bottom of the Mississippi since they must be kept stationary and there is a strong current. The bottom of the Mississippi is loose sand and gravel, hardly a place to secure critical power lines. Also, there was a concern that a ship's dragging anchor could catch the lines if they rested on the bottom. The Mississippi River is 85 feet deep and because of the soft river bottom, the lines needed to go to a depth 100 feet below the bottom of the river. In these conditions, there could be no splices in the lines since splices would have increased the probability of major problems. The lines needed redundancy, so that power could be switched over to other lines if one failed. There are already natural gas pipelines running under the Mississippi that needed to be avoided during construction. The enormous effort involved up to 40 agencies: *Army Corps of Engineers*, FAA, *Homeland Security*, the *Natural Resources Board*, New Orleans City Council, and the *Rate Commission*, to name a few. The *Rate Commission* had the authority to require *Entergy* to pay for any change to the power lines and to pay customers for any disruption of service.

The clear long-term solution was to bury the lines below the bottom of the Mississippi, but how and who should do it? *Entergy's* technical group had worked on the challenge but focused on the narrowly defined problem that the lines were not high enough. Their suggestion, making the lines higher, was only a short term fix until bigger ships came along. Rob and Paul, relative newcomers at *Entergy* with less than four years each at the company, were assigned to the task. They floated the idea of burying the lines, a solution that would fix the shipping problem once and for all. Only a few at *Entergy* believed it was possible – especially for the $15 million dollar price tag. The company president decided to give Rob and Paul's idea a try.

Rob and Paul may at first glance have seemed unqualified for the task by measures of conventional wisdom. Paul had been an underground pipeline specialist from *Shell* before coming to *Entergy* but had little experience with power cables. Rob was a project manager. He knew nothing about cables, had no previous knowledge of the power industry prior to joining *Entergy*, but he knew how to manage a project and the fundamentals of engineering. Together, Rob and Paul started contacting cable manufacturers, eventually ending up with seven prime contractors who did the job – in 17 (instead of 18) months and for a full million dollars under the president's stated budget. The Project involved innovations for

which 27 patent applications are now on file (for example, how to hold the bundles of cables together to maintain the needed tension and installation). All this happened despite having to obtain no less than 60 permits (each with a different form) from local agencies, any one of which could have said "no".

At each step of the project, Rob and Paul encountered unexpected obstacles. On the West side of the River, their investigation about who owned the land yielded 84 different heirs, each one needing to agree to the right-of-way before construction could begin. They initially relied on *Entergy's* traditional right-of-way procurement practices but quickly learned that this process was restrictive. So Paul and Rob got on the phone, calling heirs as far away as Brazil, in some cases inadvertently starting family feuds about whose daddy gave them the property, asking them to attend a meeting of land owners.

Starting construction presented its own surprises. While the swamp was expected to present some challenges, no one expected that the construction equipment would sink 22 feet. So they brought in 20,000 cubic yards of dirt before they could begin. Project contracts needed to be established with the seven contractors. Paul and Rob quickly determined that *Entergy's* traditional contracting methods wouldn't work for this situation. So they prepared a fixed-price contract that was performance-bonded to the complete $15 million project, for each contractor. This innovation made each contractor responsible for the hand-offs between each other, and accountable for the tight schedule. For example, the cable manufacturer had a representative on site who had the authority to stop the drilling contractor's work if he felt that the diameter of the hole was unacceptable or the type of integrity testing was substandard. In Rob's words, "…we needed to find a new way to get other people to feel the same sense of urgency and responsibility we felt". Contractors agreed to these revolutionary terms so they could be involved in the biggest project of its kind ever attempted. As the project moved forward with this new level of collaboration, people were impressed. Within weeks of the project nearing completion, over a dozen buy-out inquiries came to the contractors.

To reach across the river and sink 185 feet down, the cable needed to be at least 3,700 feet long. Rob and Paul needed to find a manufacturer able to produce such a long cable without splicing. They quickly discovered only four manufacturers in the world had this capability, with only one (in Japan) willing to retool their factory to produce it. Each cable of the eight total was to be so heavy (80 tons) that only one ship from Japan per month could transport it, so timing was critical. When the Japanese manufacturer's customers were concerned about their own orders being delayed by *Entergy's* timing, Paul flew to Japan. By explaining the historical nature of this project, he convinced them to accept delays. When the cable arrived, the truck it was to be transported on required 96 tires. Even then, as truck tried to pull away from the port, the load was so heavy that its transmission broke down and tires blew out. A new truck was brought in. When the cable arrived on the construction site, it needed to be unraveled to feed it into the outer protective

sheath and then finally through the hole under the river to the other side. Laying out the cable required 3,000 feet straight along the river, an area being actively used by a petro-chemical plant. The team negotiated the right to use the area provided they didn't interfere with the plant's ongoing operations in the area. To comply with the agreement, *Entergy* agreed to build bridges over operations so the cable was laid out in the air. When the plant needed their space back a month earlier than originally planned, the project had to speed up. After the cable was fed through to the other side, the 455 termination points needed to be connected to the transmission towers. Typically only one specialist would be required to make the connections, but this would have taken months. So Rob and Paul got on the phone and found the six available specialists in the world (two in England, two in New Zealand and two in Japan) who could come to New Orleans and spend two weeks to finish the project. Since they spoke no common language they quickly learned to speak through hand signals, working around the clock to connect all 455 termination points.

Some would say, even within *Entergy*, that Paul and Rob were incredibly lucky. Every time something went wrong, some fix seemed to be within. The surprise of needing to find 85 heirs to the land was 'fixed' with key phone calls, face-to-face negotiations, and checks. The surprise of discovering that the truck could not haul 80 tons was 'fixed' with a new truck with additional capacity. Was this really luck, or was it carefully managed emergence? We believe the latter.

Did Paul and Rob follow the conventional wisdom in managing the emergence they encountered? We don't see it here. The plan was hardly a plan. In the language of jazz, they had a tune list and a tempo, but not much more. So Rob and Paul set a direction and a collaborative way of behaving, but never developed a traditional plan.

Rob and Paul didn't hide the emergence from the public, contrary to conventional wisdom. They had weekly briefings with the public, went on talk shows explaining progress, and invited the public to look at the construction site. Paul and Rob were enthusiastic and relentless, but not charismatic. One might say they were like the people who got jazz off the ground – pushing forward in spite of constant resistance, motivated by the cause and the belief that all the problems could be worked out.

We argue that Paul and Rob followed four alternative principles for managing an emergent process. We believe these four principles do a better job of explaining how to manage emergence in a way that integrates learning with the business of doing. They are:

1. It's all about the conversation, not the plan
2. Rely on, and constantly build, a mental map of others' expertise
3. Engage the public in the emergence, don't hide it
4. Constantly Shift Leadership

3 Principle #1: Conversations Should Be the Focus

Rob and Paul, being from the Southern part of the U.S., may have a particular appreciation for the value of conversations. They seemed to have an intuitive sense that what people wanted in this process more than anything else was involvement. Rob and Paul engaged the local community in conversations using local talk radios. They started the project by getting on the phone to underground cable manufacturers and asking them about how they might approach the problem, who they might work with, and what might be the possible source of risks. They got on the phone to each of the 85 heirs of the property they were about to dig up and talked with them about the importance of the project to New Orleans. When customers of the Japanese firm expressed concern about their orders being delayed, Paul flew to Japan to have more conversations.

Rob and Paul thought of planning as an ongoing, real-time process as emergent information presented itself. As they went, they engaged others in thinking through options and contingencies, systemic implications, and asking a lot of 'what if' and 'how come' questions. The ongoing planning happened *inside* of conversations as part of the work. Conversations drove the plans, rather than letting plans be the guide for the conversations.

Paul and Rob's intentions in the conversations were, like a jazz leader, to make each person feel they were part of the ongoing learning and creation process. Through these conversations, people came to understand how different alternatives would affect how they worked, as well as the success of the project. When the Japanese cable manufacturer expressed concern about meeting the schedule, Paul didn't simply tell the manufacturer to meet the schedule. Instead, he flew to Japan to have conversations with the manufacturer's customers, discussing why the innovations the manufacturer was developing for *Entergy* would be of benefit to them. In a jazz quartet, the trumpet player is in constant communication (often without words) with the drummer, who is in constant communication with the pianist, and so on. The music will only be as good as the 'conversations'.

Entergy is not the only project in which we've observed the value of conversations to integrate thinking about contingencies as planning in an ongoing emergent work process. For example, when *Novell* merged with an IT consulting firm, Cambridge Partners, initially, the two groups of people spoke such different languages that they were often missing each other's points. The anticipated synergy from such a merger wasn't happening. So they started a process called 'dialogic inquiry', meant to be a new way to have a conversation. Their method involves asking people to explore their assumptions about their common commitments, the emerging needs of the market, and what direction the company needs to take as a result, and to create a joint glossary of terms. They credit this focus on examining how conversations are constructed with breaking down barriers between the two different cultures, learning to brainstorm together, and identifying new market opportunities.

4 Principle #2: Rely On, and Constantly Build, a Mental Map of What Others' Know

Paul and Rob did not have deep expertise on cabling for 230,000 volts of power; the technical people had that knowledge. While the technical people and Conventional Wisdom would argue that this worked to Paul and Rob's disadvantage, we assert the opposite. Precisely because they didn't have the expertise, they had to rely on others. By relying on others, they got others involved in brainstorming solutions, creating synergies among different parties in ways that were not initially anticipated. Because they didn't have the expertise, they didn't try and generate the solution; they let others working under their tutelage generate the solutions. The contractors mentioned the excitement that this created; by brainstorming with the other contractors, they were able to make handoffs smoother. But how does a manager without expertise manage an emergence process? By replacing the expertise with a well-developed mental map of who has different types of expertise. In the cognitive science research literature, having a good mental map of where expertise lies in a team is called 'transactive memory'. This type of memory makes it possible for people in a team to efficiently transact with each other by assigning incoming information to the most knowledgeable experts, and knowing where to turn when specific knowledge is required. Through their conversations (Principle #1), Rob and Paul developed this mental map so that when problems arose, they were able to turn to those who were the most appropriate experts. For example, when they needed specialists in connecting the termination points, they contacted their contractors and rapidly found six specialists.

Jazz bands have often been referred to as high performing organizations, and many are. They get to be this way, in part, by constantly looking for the best suited people. Miles Davis, for example, repeatedly changed his extremely successful bands to bring in new musicians that helped develop new styles and move Jazz to the next level. So while conventional wisdom says 'hire the experts', this principle says it is more important to know what people know, so that their knowledge can be pulled in when an unpredictable situation arises. Peter Drucker once observed that "… you may not know who the best butcher in town is, but your butcher does." Rob and Paul used this principle in finding the people who could find the people, who actually had the knowledge needed to respond to an unpredictable event.

As another example of this principle, Nova Chemicals, a multi-billion dollar company in the field of commodity plastics, has made 'business process innovation' a key element of their management style. Employees are encouraged to continuously create new ideas for business process excellence by asking outsiders to partner with them. This helps to create the mental map of who knows what – not just within the firm, but with outsiders as well.

5 Principle #3: Engage Customers in the Emergence, Don't Hide It

From the very beginning, the public was engaged in the *Entergy* project. The radio talk show call-ins asked the audience to suggest various solutions to the initial problem. Paul and Rob returned to the talk show repeatedly throughout the 17 months to answer more questions and give updates. Paul and Rob held no less than 20 town hall meetings during the course of the project. They attended Commission meetings, City Council meetings, and open houses in neighborhoods. They invited the public to the construction site to see progress. They gave countless tours. They engaged the local politicians in the project. They had a videographer on site shooting movies of the work and sharing them with the public. The operations were as transparent as possible. Thus, the public knew of the construction equipment sinking, knew of the blown tires, knew of all the twists and turns that the process was taking.

Why did Rob and Paul so openly share with the public when Conventional Wisdom says to do the opposite? Rob and Paul believe that without the transparency, *Entergy* wouldn't have been able to get all 60 permits they needed, ranging from crossing bridges with a 80-ton load to carting in 20,000 cubic feet of dirt next to critical levees in the Mississippi River. Rob and Paul also believe that without a close connection to the public, the *Rate Commission* would not consider including the project costs in *Entergy's* rates. Thus, from their perspective, there was a clear need to share. We think, though, there's more to this than need. Since emergent processes cannot be predicted in advance, hiding anything from the customer base runs the risk of hiding critical information that may later need to be shared (such as delayed shipments, changed solution plans, or large trucks moving down major highways containing unrecognizable cargo).

By tightly controlling information sharing, the decision about what to share is in the hands of the manager, thus creating the possibility of actual or perceived manipulation and bias. Any perception of withholding information creates an 'us-vs-them' culture. Paul and Rob, instead, wanted a 'we're on the same team' culture with the public. They wanted the project not to be seen as *Entergy's*, and the project solution not viewed as a way for *Entergy* to resolve their own problem. Instead, they wanted the Mississippi River Crossing Project to be a public works project, a way of helping New Orleans to grow economically, with *Entergy* acting as a partner. Paul and Rob wanted the public not just to know about the project, but get excited about it, feel a part of it, and feel the sense of pride in laying the longest and largest cable system under a major river ever! The local papers picked up on this sense of pride and wrote many articles about being the first city to achieve such a feat. At the end, Paul and Rob threw a party – not for *Entergy* – but for the public. They showed project videos; local politicians spoke, hands-on pieces

from the construction process were displayed; and the public shared in this new pride of New Orleans.

There's another reason for disclosing emergence. If it's tightly controlled, and it leaks out, it appears to be an error, or even a scandal. By revealing the process, it changes the overall 'look' of what's happening – making it seem historic, revolutionary, and interesting. As a result, word of the project will spread through the network of conversations, bringing solutions and innovation from unexpected sources.

Jazz is a seamless connection between players, the audience, the tune, and the emotion they are expressing. African music, as part of African culture and one root of Jazz, does not include the idea of separate performer and audience; rather, all are performing together. Many of the jazz greats talk about being on an adventure with the audience, when not even the leader knows where it will end up. This is the mindset of emergent engagement – inviting the audience to join in the performance as partners.

At *Novell*, the Birds of the Feather Forum at the company's 2003 customer event was an innovation in which, for the first time, senior developers were asked to just talk about where *Novell* and the industry were going. Typically at the company, senior developers were kept out of the customer limelight. But the Birds of the Feather Forum changed all that. Sure, some developers said things about future development activities that in retrospect were probably not the best thing to say, but the open knowledge-sharing exchange between potential customers and developers created a relationship that has inspired both sides. In fact, new contracts have been traced directly back to relationships started as a result of this forum. Moving this Forum to an online wiki is clearly the next obvious step.

IDS Scheer not only develops new ideas and applies them within their clients, they also publish these ideas on their Website and encourages their clients to add to these ideas. This publicity prepares the market for new solutions and also encourages a wide variety of feedback. The result is improved solutions that benefit everyone.

6 Principle #4: Constantly Shift Leadership

Paul and Rob did not go to the construction site each morning with a rousing speech reminding the workers of the value of what they were doing for New Orleans and the State of Louisiana; they didn't pick up a sledge hammer and help out at the drilling site when it looked like the project was going to fall behind; they didn't publicly admonish contractors to work faster and smarter; they don't even look like charismatic leaders. Instead, they felt their role was to encourage others to lead as responsibilities and requirements dictated different leadership needs. They set up a contract between contractors which assured shifting leadership by making contractors responsible for handoffs between project phases. With such

contracts in place, they didn't have to lead contractors; they could let contractors lead themselves.

Constantly shifting leadership is clearly visible in jazz improvisation, as the solo moves from person to person. Far from being chaotic, these shifts occur according to a protocol. The theme comes first, then the variation on the theme. Leadership is passed from person to person like a ball tossed back and forth, at the end of each phrase. Each person builds on what has been done before.

Southern California Edison's efforts to set up Web governance on its employee portal, illustrates role shifting. The system had evolved so that it had multiple owners and lots of contributors. Rather than trying to impose an order on it, the company implemented a jazz-like solution: a sort of 'United Nations' effort in which only the form is managed. The company's Intranet is now a cross-organizational entity, in which leadership of a key section goes to the group that signals it wants to take that role. One of the directors in IT reports: "… it has taken a great deal of flexibility, political empathy, execution, structure, involvement … at times, it seems like good music!" Actually, it sounds like jazz.

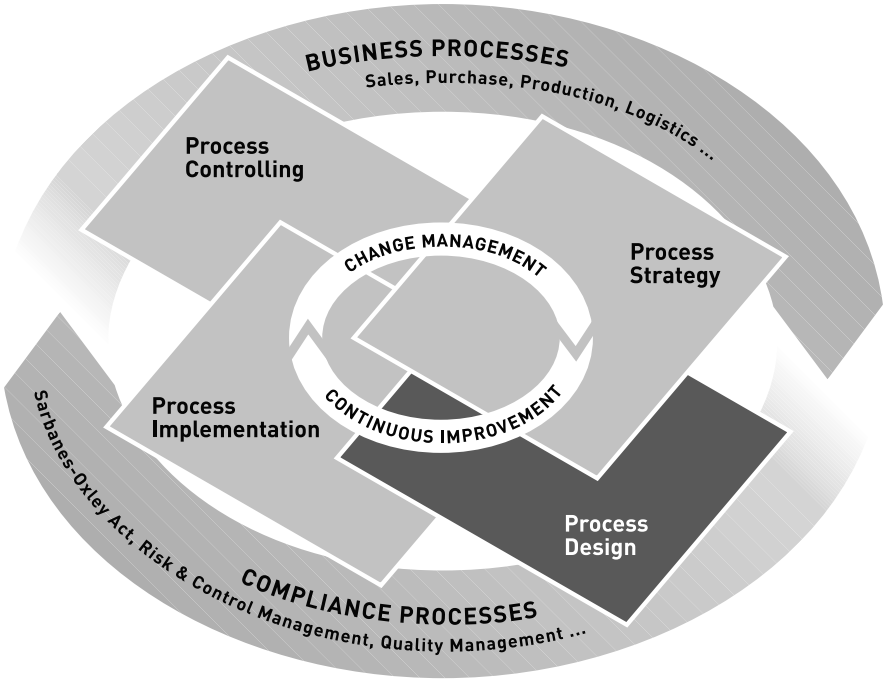
Another example is *IDS Scheer*'s customer lifecycle processes. Once a contact to a prospect is established under the leadership of the Marketing department, the Business Development department takes over the lead and works with the potential client to see what solutions fit best. During that phase, the Business Development department is supported by the Consulting department, delivering expert know how, or company executives, outlining *IDS Scheer*'s strengths as a business partner. Once the appropriate solution is identified and a contract between the parties is established, the Consulting department takes over the lead, making sure that the promised solutions are delivered appropriately, with the Business Development department supporting the Consulting department. Once the solutions are delivered, the Business Development department takes back the lead to ensure a continued partnership with the client, and a long-term success for everyone.

7 Conclusion

We argue that for people to successfully manage an emergent work process, they need to learn while they are doing the business of their work. Doing this through conversations, knowing what others' know, engaging customers, and constantly shifting leadership will enhance learning while performing the work. This can be done using contracts, management-by-walking-around, and shifting task-responsibility matrices. Increasingly with a distributed world of work, this will be done online, with the use of Wikis, RSS feeds, mindmaps, folksonomies, Weblogs, reputation counters, collaborative filtering. As Rob and Paul have shown, leading an emergent process can also make history and be a heck of a lot of fun.

Part III:

Business Process Design



Business Process Design as the Basis for Compliance Management, Enterprise Architecture and Business Rules

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Summary

The flexible methods of the ARIS Platform enable company-wide Business Process Management. By enhancing such methods, new subject areas are continually being developed. In this article you will read how ARIS, based on Business Process Design, can be employed for Compliance Management, the management of Enterprise Architectures, and for the application of business rules.

Key Words

ARIS Design Platform, Business Process Design, Enterprise Architecture, Compliance Management, Business Rules

1 The ARIS Method as the Basis for Company-Wide Business Process Management

The generation of value in all companies is based on business processes. If processes are specifically analyzed and continually optimized, they can be enhanced to become deciding factors for competitive advantage. If the design of processes is, however, left to chance, this will have a negative impact on the companies' balance sheets. In view of this background, companies are increasingly building on proactive Business Process Management in order to adapt their processes to the market.

As represented in Figure 1, successful Business Process Management (BPM) consists of four steps. Building on Business Process Strategy, this is followed by design, implementation into IT, and controlling (measurement and assessment of business processes). Furthering optimization potential should not, however, be a one-off activity. In the medium-term, only a continuous and closed BPM cycle will be able to sustain competitive advantage. In a company where Business Process Management is practiced throughout, ARIS is employed in several organizational units. The products of the ARIS Platform must hence fulfill the different

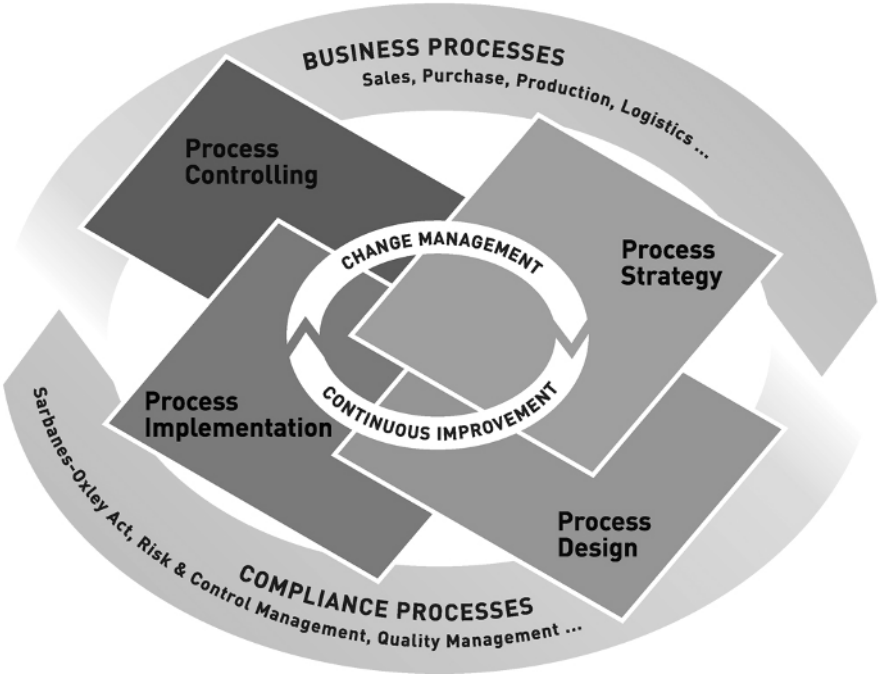

Fig. 1. ARIS Business Process Management

requirements and subject matter of the management level and of the operational and IT departments. While ARIS is used by management to formulate and implement an overall strategy, the operational department optimizes operative processes, e.g. purchasing and sales processes. Among others, the IT department uses the tools offered by the ARIS Platform in order to create and optimize IT development plans. ARIS thus supports a whole variety of application scenarios using specifically defined, fully integrated methods. The highly generic ARIS approach allows the integration of all methods into one central repository. The conceptual strength of this approach is proven by the fact that since the first ARIS versions, the supported topics have been considerably enhanced to meet customer requirements. Even if the various topics each require a different form of representation, the questions on content, which they address, are very similar: Who does what? Which data is in-/output? What is the design of the process structure? Which application software or transaction is being used? The comprehensive methods of the ARIS Platform provide an answer to these questions and are thus the key to flexible Business Process Management throughout the entire company.

2 Business Process Design – Modeling, Analysis and Optimization

Within a BPM cycle, Business Process Design is of particular significance. Companies are enabled to create transparency regarding the current process quality. Using the integrated methods in ARIS, it is possible to ensure a consistent procedure as well as a uniform language for process description. In the design phase, the first step is to make an inventory of the current status. The workflow sequence, the departments involved, and the IT systems employed are all documented. The knowledge on business processes or structures is stored via graphic modeling in the central ARIS database. This ensures that data and models are re-used throughout the company and enables a uniform view of the organization – covering all processes, organizational units, and operational areas.

One of the most significant model types of ARIS is the Event-driven Process Chain (EPC). Using the method of the EPC, the events in a company which lead to the initiation of certain functions which, in turn, set off other events, can be visualized. The individual functions can be associated with the operational organizational units. Figure 2 shows an EPC model documenting the workflow for a customer proposal at a car manufacturing company and designed in ARIS Business Architect. Several elements and relationships of the method visualized in this model are stored in the central ARIS repository. Although the order processing clerk is assigned twice to a function as the performing organizational unit, both elements refer to one single object in the database.

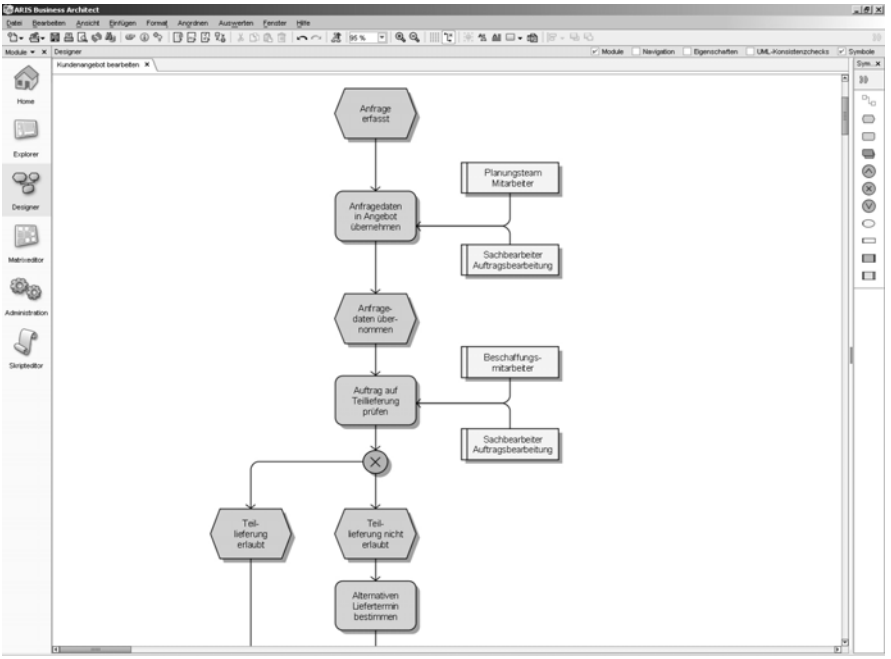

Fig. 2. EPC modeling method in ARIS Business Architect

Moreover, the order processing clerk can be displayed in the organization chart. The re-use of object types ensures the integration of methods within various application scenarios. This allows a number of evaluations, such as: "Which functions are being performed by a company's organizational unit?" By applying this method of process design, it is possible to gather critical information on the actual efficiency of business processes. The utilization of cost centers and resources, as well as the deceleration of processes caused by media and system breaks, are made just as visible as the establishment of best practices, i.e. process variants, which, based on a time and cost comparison, emerge as best of a kind. This enables the detection of organizational, structural and technical weaknesses within processes, and, based thereupon, optimization potential can be determined. The analysis results, in combination with corporate objectives, are the basis from which target processes are derived. These are processes which – implemented in IT – are designed to support the company in generating value.

The ARIS Design Platform enables Business Process Design for a large variety of application scenarios – from quality management to process cost accounting and the implementation of commercial software. As a result of the high flexibility of the methods in ARIS, the scope of the supported areas can be enhanced swiftly. The following will show the application of the described ARIS method to the new business topics Compliance Management, Enterprise Architecture and Business Rules.

3 From Business Process Design to Compliance Management

The generation of value in businesses is increasingly influenced by external government regulations and guidelines such as Basel II, Sarbanes-Oxley Act, and Solvency II. The term Compliance Management indicates the legal compliance of companies and includes the introduction and operation of a company-wide Compliance Management System. Even though neither the Sarbanes-Oxley-Act nor the other laws and standards include final regulations on the shape and the necessary components of such a system, there is, however, one central requirement: to link business processes with risks and controls. The ARIS approach for Compliance Management fulfils this decisive requirement. ARIS enables process-oriented controls independent of the company's organizational units. Risks are identified inside the processes and enhanced by information related to compliance.

ARIS Business Architect creates the basis for monitoring all internal checks. It takes care of the entire documentation of the master-data used by the Compliance Management System, on which the permanent monitoring of controls performed by the ARIS Audit Manager is based. Company processes, hierarchies, organizational structures, and IT systems are documented in ARIS Business Architect, and risks are identified subject to the various legal requirements or regulations on conduct. These risks are described in more detail in various dimensions: most recent assessment date, possible early warning signals, key indicators for risk monitoring with intervention thresholds, controlling processes, emergency processes, and risk owner. The following will give an assessment of risk. Risk analysis comprises risk identification and the assessment of risks according to their damage potential. This assessment supplies the necessary data for the further phases, particularly for the 'To Be' design of controls and risk reporting. In ARIS Business Architect, a definition of measures / controls to minimize risk is made. The allocation of controls to operational risks is carried out by specifying control targets and person(s) responsible for the control process. Finally, tests are determined to examine the introduced controls (including the information on who is testing, what is being tested, how often tests are carried out, in which period tests are carried out, what the scope of the test is, etc.).

Figure 3 shows a financial reporting process model in which a 'Sarbanes Oxley Act' risk (SOX balancing risk 1.1) was identified in one process step. The symbol beneath the element indicates a link to a model.

Figure 4 shows the stored model in which the risk and the associated compliance process are represented in greater detail. The required controls are described in the control source. The test definitions delineate the way in which the required controls are examined. The persons responsible are directly allocated to the test-definitions.

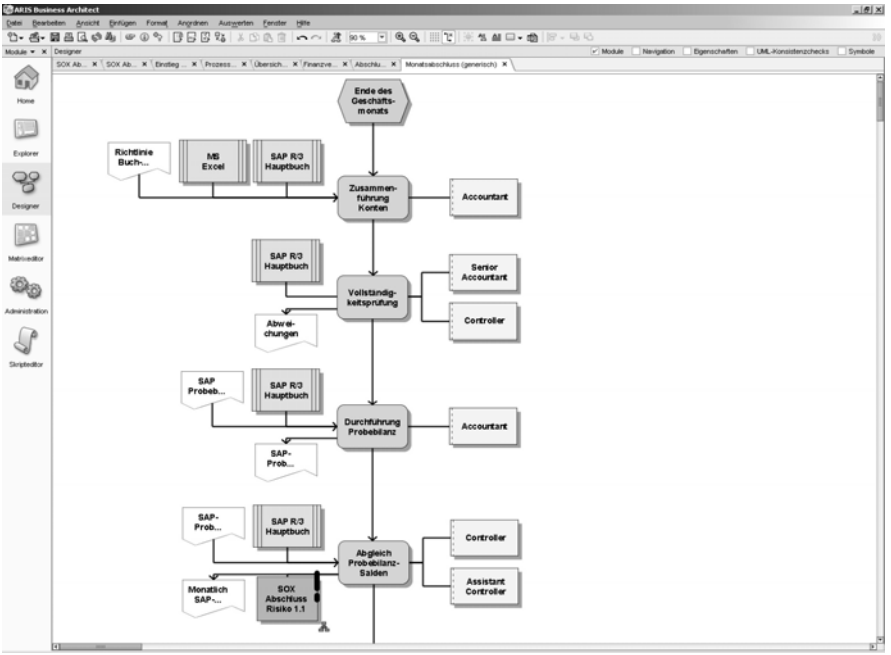

Fig. 3. Risk relevant for Sarbanes-Oxley in an EPC

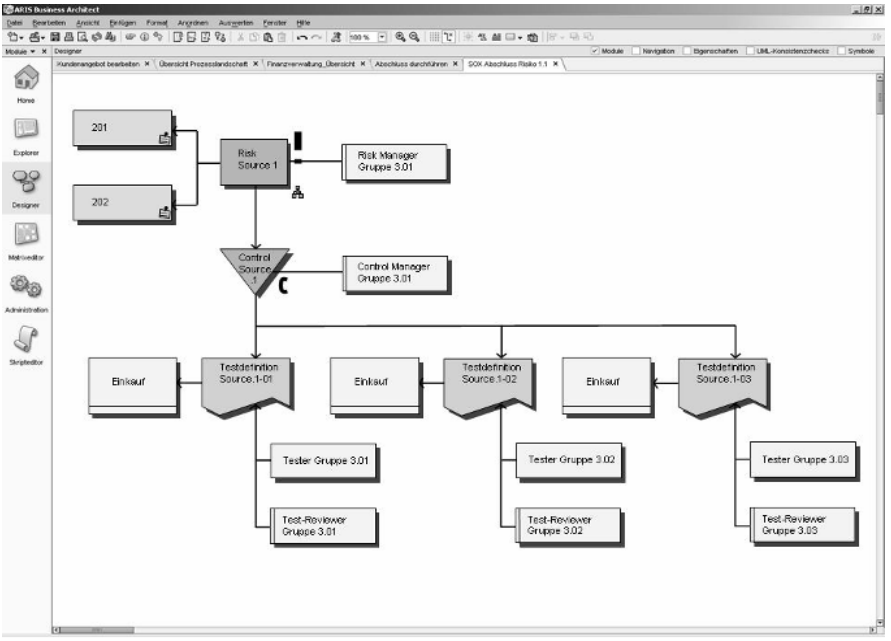

Fig. 4. Detailed representation of a risk

The ARIS Audit Manager guarantees that the appropriateness and effectiveness of internal controls is permanently monitored. After the automatic synchronization of the compliance master-data between ARIS Business Architect and ARIS Audit Manager, the latter organizes the testing process. This is done by following a test workflow which starts by automatically requesting testing officers and ends with a sign-off by management and the preparation of data for external audits. All testing officers are supplied with the necessary information – including guidance through the test and test documentation, as well as on initiating any follow-up actions depending on the test results. Once tests have been closed by the system or the user, they cannot be changed. The processes are documented and logged (to be understood by the management and prepared for audit by an external auditor). All internal controls and their tests are connected with the processes in which risks were located. Each staff member has role-based access to his / her relevant process, risk, and compliance information via a Web-based compliance or risk portal. A 'management view' gives information on the status of testing activities and enables the early recognition of weaknesses within the internal checking system.

All measures undertaken throughout the whole company regarding Compliance Management can be viewed at a glance with the ARIS Audit Manager. Comprehensive analysis functions, such as test case statistics, are made available here. Using the test case statistics, it is possible to, for instance, analyze controls which are not functional.

By interfacing with further operative systems (ERP, DMS, MIS), ARIS enables monitoring and control of a number of operative processes. Alarm and escalation functions indicate defects in the checking systems and optimization potential within the company. As a result of target-oriented, company-wide recording of processes – based on the methods of the ARIS Platform – Compliance Management, regarded by many as a cost driver, can be enhanced to become a strategic competitive advantage.

4 From Business Process Design to Enterprise Architecture

Business processes of modern organizations are based on highly developed, cross-company information systems. Enterprise architectures constitute the most important tool for the documentation, analysis, and administration of such a complex IT environment. They are incorporated within an architecture framework which describes the information required for a complete architecture. The ARIS Enterprise Architecture Solution enables companies to build up, maintain, and optimize organizational architectures based on architecture standards (e.g. DoDAF, C4ISR,

Zachman, TOGAF, TEAF, FEAF and IT City Planning). By linking the methods specific to this framework to the existing ARIS methods and the central archives in the ARIS repository, companies are able to gain a comprehensive overview made up of various views of the organization. The ARIS method for IT architectures is based on an object-oriented approach aimed at re-using architecture artifacts – across all views. The interplay between corporate strategy, business processes, and IT architectures can thus be captured in an optimum way.

The main task of IT is to support and optimize business processes. The IT strategy should therefore be derived from corporate strategy. IT architectures must be integrated, analyzed, and optimized from a business process perspective. The ARIS method for IT architectures therefore starts by recording the respective business processes in ARIS Business Architect. During the design phase, users are able to define core elements of IT architectures, e.g. organizational units, application systems, data, and IT system requirements, according to a process model. In Figure 5, the EPC of a car manufacturer was enhanced by IT architectural elements to produce a detailed customer order. The first function requires access to the SAP CRM system, whereas for the order checking in the second function the clerical worker uses Order Processing SAP R/3. As input he requires product data.

Because of the central archive in the ARIS repository, it is easy to generate the necessary architecture overviews and detailed views following the design phase. Figure 6 shows an IT Process Support Map of a company. This depicts the correlation between company location, business processes, and supporting IT systems.

When an IT system is down, it is possible to quickly pinpoint which critical business processes are affected in which locations and how the fault can be removed as fast as possible. The IT Manager is able to navigate throughout the entire organizational architecture while following the object relationships, and he can make sound decisions based on a comprehensive view of his company and a consistent understanding of methods.

IT standards stored in the repository define target architectures and enable users to compare those to actual architectures. They can then derive migration plans thereof. The ARIS Business Architect in this case supports the collaboration of dispersed teams in terms of the company-wide BPM. The modeled IT architectures can be published on the Intranet or Internet using ARIS Business Publisher, a dynamic publishing component. This enables companies not only to design business architectures but also to build up business architectural portals.

The combination of Business Process Design and IT architectures allows synchronized management in both areas. This integrative approach is of particular importance to the success of Enterprise Architecture Management, as business success and IT landscape have a mutual influence.

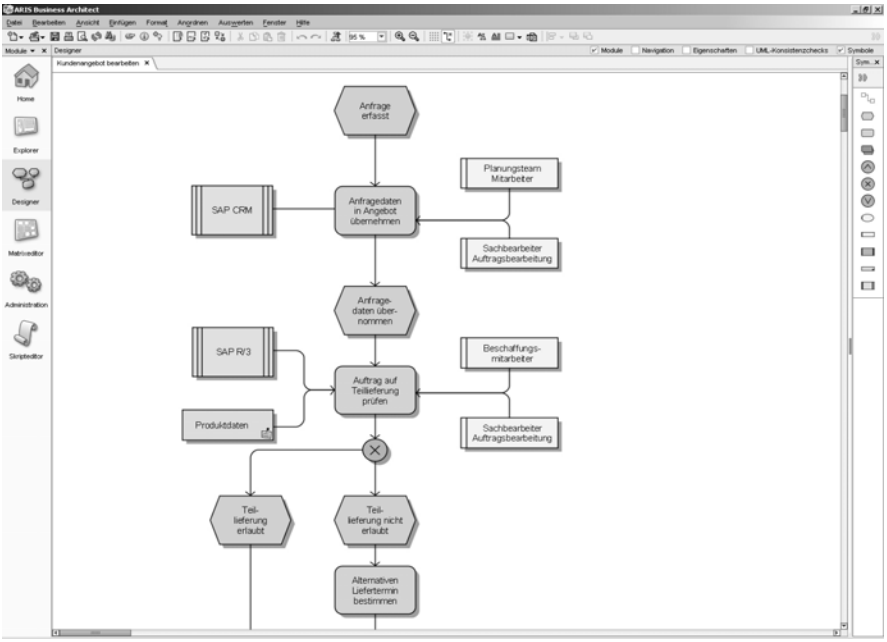

Fig. 5. Enterprise Architecture method in an EPC

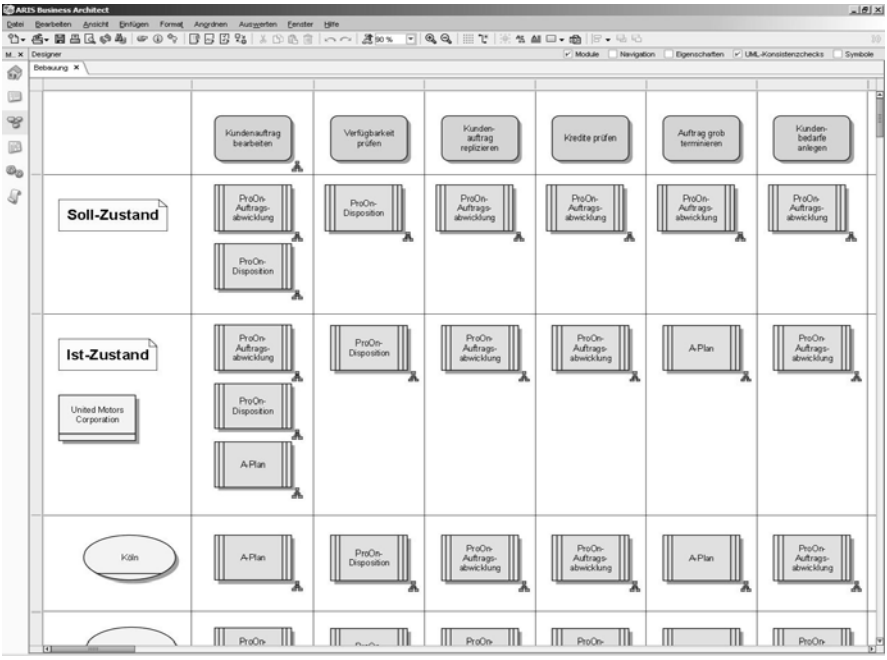

Fig. 6. IT developing plan

5 From Business Process Design to Process Execution According to Business Rules

In general, business rules are guidelines or business practices which design or lead the conduct of an enterprise. Conduct, in this context, means: by use of which processes (how) and which resources (what with) which products are made (what). In this context there is a differentiation between dispositive and operative rules. The dispositive rules have an influence on business process design in line with strategic goals or legal requirements, e.g. Compliance Management. The representation of such rules in the methods of the ARIS Platform has already been outlined in the previous sections. Process orientation, however, does not end with modeling business processes. The optimized business processes must also be transformed into viable applications and executed there. At this point the operative business rules have an effect on Business Process Design and ARIS methodology.

Operative business rules mark out a precise route for the process flow. They define specifications by which a price is calculated or a credit application is approved or denied. Even though these rules are of critical importance to business success, many companies rarely store them in a central repository. Often, these critical rules are located only in the program code of applications, where they are used for execution purposes. These increasingly complex application systems are thus rapidly becoming bottlenecks for new or modified process flows. The business rules to be worked on must be painstakingly identified and manipulated. As they are often distributed over many sub-systems, it is often difficult for the programmer to retain the complete process-relevance. Without, however, a view of the entire system, there is a danger of overlooking interrelationships between rules and thus carrying out erroneous implementations. The extraction of operative business rules from the executing application does not only permit an efficient description of business logic using decision-making tables. The separation of application logic from the actual rule logic also enables a quick modification of rules without having to adapt and test the executing application at great expense. As the changes to the process flow and the changes in the decision cannot be influenced, both can be maintained separately. The actual process flow is thus described independently from the specific rule logic in ARIS Business Architect. The rule logic is then stored at the respective function. Figure 7 shows a function which has been enhanced by a business rule. It is possible to navigate directly into the decision-making table via the business-rule method-object (determine BR application type). There, the rule logic can be modified. The process owner thus does not need to use an external tool for business-rule modification. In ARIS Business Architect, he can work on the process as well as on the associated business logic stored in the background. As all rules are stored in the central ARIS repository, the effects of rule changes can be predicted for the entire system.

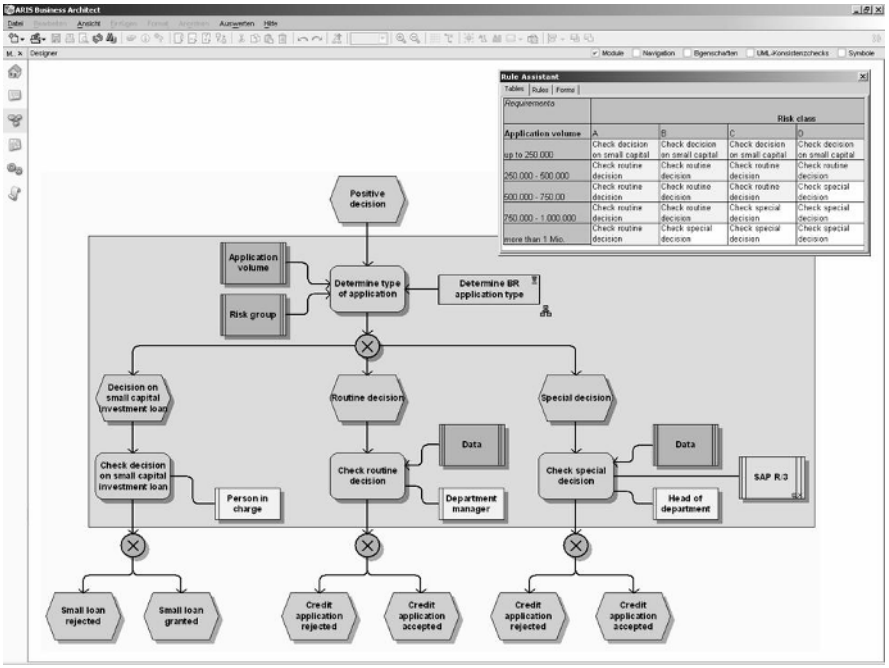

Fig. 7. Business Rule in an EPC

Storing the respective business rule at the respective position in the business model also constitutes a valuable documentation of corporate knowledge. Special analyses and mathematical tests identify incomplete rules or logical errors. This explains the questions and process delays there were in practice until recently, caused by incompletely defined rules. Comprehensive tests and analyses – already during the Business Process Design phase – ensure re-usability on execution level.

6 Conclusion

The flexible methods of the ARIS Platform enable Business Process Management beyond departmental borders and areas of application. Apart from classic scenarios, such as designing operative business processes or process simulations, new business areas are being opened up by enhancing the ARIS method. All methods are integrated in a repository, and, as a result, it is possible to generate a uniform representation of all facets of an organization. The interplay between business processes, IT systems, legal requirements, business logic, etc. has become recordable and controllable. The innovative methodical approach of the ARIS Platform enables organizations to define business strategies, translate them into processes, transfer the modeled processes into IT systems, and build up intelligent controlling. All these are necessary steps for successful Business Process Management.

Process-Oriented Changes in the Slovak Railways

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Summary

The integration of the Slovak Republic into the EU has had a considerable impact on the behavior of business entities willing to implement substantial changes. Railway transport in Slovakia has been experiencing a harmonizing process of business structures with EU rules over the past couple of years. Since 2000, the state-owned Slovak Railways have gradually been transforming into a group of modern, dynamic companies capable of facing and coping with the increasing competition on the European transportation markets.

Since October 2003, *IDS Scheer Slovakia* has significantly contributed to this transformation in the light of process engineering. Together with a team of *ZSSK* internal staff, they carried out an analysis in order to design a new business structure and new processes for two separate passenger and freight transport companies that would be carved out of *ZSSK* (*ZSSK – Železničná spoločnosť Slovensko*, Slovak Railways Transport Company). The project was implemented under harsh time constraints and with high commitment from all team members. The separation was brought into effect as of January 1, 2005.

Key Words

Business process analysis, pusiness process redesign, business process implementation, Change Management, ARIS

1 First Division of the State-Owned Railways

Following a financial analysis and an appraisal of trends and because the transportation services were in need of development, the Slovak Government approved a transformation and restructuring project for the unitary state-owned enterprise ŽSR (Slovak Railways) in 2001.

The main objective of this project was to reverse the critical financial state of the Slovak Railways and create conditions in which it could sustain its position in the transportation sector. Being a large, state-owned railways enterprise, it was difficult to make a case for state subsidies and to promote better cost-effectiveness. Actual competition within the transportation sector was low. However, there was a high risk of potential social implications if uncontrolled changes were undertaken.

The other major goal of the project was to create the basic conditions for the liberalization of transportation services on the railway transport route. This would facilitate the separation of the infrastructure operation and maintenance from the provision of cargo and passenger services and other business activities, which would take place in line with EU guidelines.

The project culminated in the establishment of the state-owned joint stock company *Železničná spoločnosť, a.s.* (*ZSSK*) on January 1, 2002, by separating a portion of the property of the original Slovak Railways. The rights and duties concerning transportation services according to the applicable Slovak legislation, as well as a total of 21,000 employees and assets of a book value of SKK 29bn, were transferred to *ZSSK*. ŽSR remained in charge of operation and maintenance of the railway network in the Slovak Republic.

The process of dividing ŽSR was in itself a big success. Despite enormous pressure from creditors, there were many achievements, particularly in the financial consolidation of the newly established *ZSSK*, which occurred without substantial operational problems. However, there were still some negative aspects, including high production overheads and low productivity and liquidity. The reason for this was that the transformation had proceeded at too fast a pace, and the change management team had not sufficiently prepared a methodological approach. Measurable goals for the change were missing, the executive management did not sufficiently identify with the objectives of change and its method of implementation; there was a low level of communication, and insufficient professional preparation of the whole team. The necessary training, team work support, feedback, and risk and resistance analyses, etc. were also lacking.

Besides, the transformation took place in an environment of social tension. The trade union headquarters was criticizing the insufficient involvement of the State in discharging the railways enterprise's debts and the lack of funds earmarked in the state budget for passenger transport services in the public interest. Moreover,

they criticized the fact that the overall State transport policy respecting EU recommendations was lacking.

Therefore, at the turn of January and February 2003, the trade unions called for a three-day unlimited strike to protest against the restrictions on the employment of regional railroads because of improper State transport policy and insufficient support for the transformation.

2 Preparation of the Project of the Process-Oriented Change of ZSSK

During 2003, *ZSSK's* financial results worsened due to overall changes in the Slovak economic environment, which induced its Board of Directors to take the decision to implement essential changes in the system of corporate governance. Restrictive measures to reduce costs by some millions were no longer sufficient, as there was a strong need to seek solutions to save several hundred millions a year. Moreover, the trends of the financial results in the passenger transport sector were alarming. The scissors were opening ever more dramatically. So, in order to avoid the mistakes of the past, when substantial changes were undertaken without sufficient analysis and preparation, the Board of Directors decided to commission a consistent, comprehensible economic and process review and to clearly define the required changes based on the outcome of such a review.

The fundamental strategic goal set by *ZSSK* for 2003, was to establish a system to ensure the constant improvement of performance and competitiveness, whereby the company's position within the transport sector would also improve at the same time. The Board of Directors recognized that the prerequisite for the achievement of such a goal were: a detailed process analysis of the current status, the optimization of the business structure and the governance system to improve the efficiency of the overall organizational and BP structure, as well as the establishment of transparent and clearly defined processes throughout the company.

2.1 ZSSK Process Analysis and New Business Structure Design

The Board of Directors resolved to achieve this fundamental strategic objective step by step. This would make it possible to check the impact and effectiveness of particular steps from time to time. The first task, referred to as the '*ZSSK* Process Analysis and New Business Structure Design', was implemented by teams composed of *ZSSK* staff and *IDS Scheer* consultants. They ensured that the key employees – process sponsors and owners from the divisions and specialized units – were very much involved throughout the duration of the project. The managing team was in charge of the project and operated using work teams in line with *IDS Scheer* methodology. The entire project lasted 5 months, from October 15, 2003, to March 15, 2004.

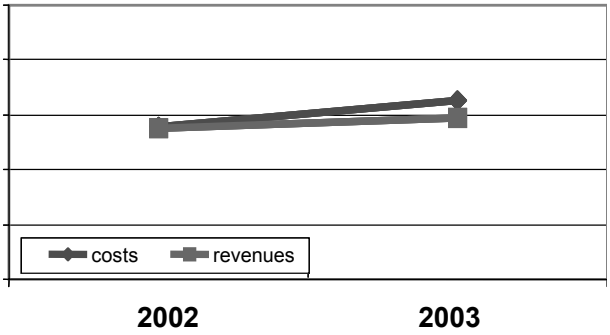

Fig. 1. Costs and revenues for cargo transport

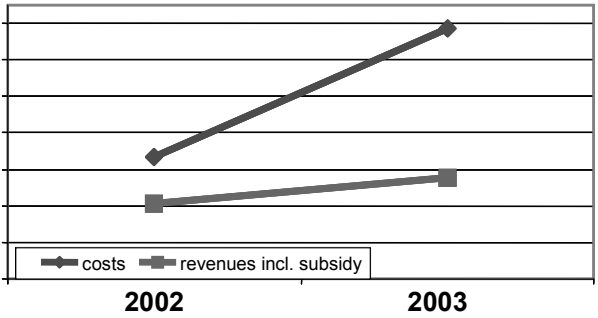

Fig. 2. Costs and revenues for passenger transport

The *IDS Scheer* team of consultants and its individual members found it vital to become well-acquainted with the internal environment of the company and the manner in which it operated. This applied, even though the team comprised experienced consultants who had participated in similar projects in other companies, as each company, and above all its corporate culture and willingness to accept changes, differs. This is why the project was split into two stages – an analysis of the current status and the design of the targeted arrangement.

The analysis of the current status was aimed at mapping consistently and becoming familiar with the existing processes from different perspectives. The analysis first focused on the staff – the most important aspect of the company. The aim was to find out what problems employees faced and what their expectations were as regards solving the problems identified. Furthermore, they were asked whether they were inclined towards change. The aim, however, was not to identify those 'found guilty' but to seek opportunities and suggestions for improvement. The problems which concerned employees most are listed below.

The results of the analysis served as a basis to review the processes and the method of corporate governance.

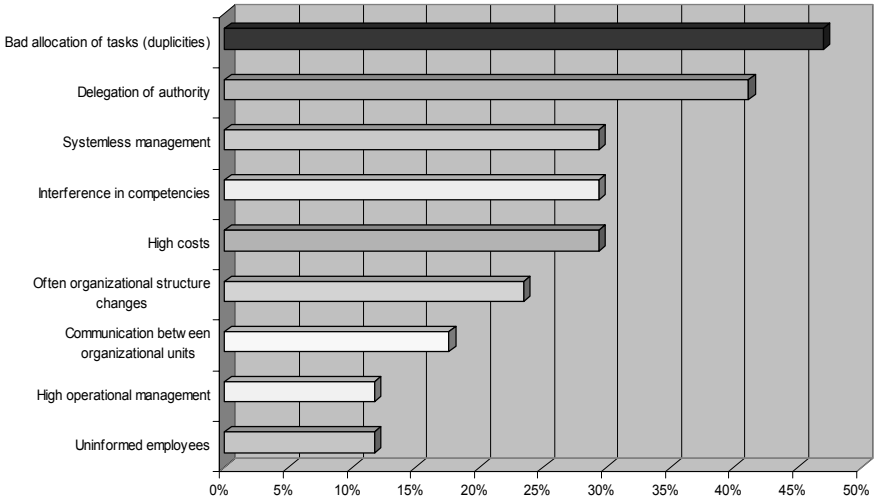

Fig. 3. Governance assessment by the staff

All existing processes identified were broken down into three groups:

- main processes – required to fulfill the company's mission and to add value for the benefit of external customers;
- managing processes – define frameworks for company operations;
- supporting processes – provide internal customers or main processes with inputs (by using external resources without jeopardizing the company's mission) that can be reached by using external resources without the company's mission being jeopardized (internal resources are employed where risks need to be eliminated or where it is more economical).

The particular processes have been described in detail, so it is now possible to identify and analyze the way in which they are managed in the company. The analysis suggests that there is potential for improvement. The processes had deficiencies in terms of logistics, alternatives, (both external and internal) customer satisfaction, and, above all, processes and IT support were fragmented within the organization. Areas with the highest improvement potential include: Change Management, transport planning, transport realization, Customer Relationship Management, HR management, procurement and logistics, as well as rolling stock maintenance and repairs.

The findings identified were incorporated in the design of the targeted status, where attention was paid to interrelations in the targeted 'To-Be' processes arrangement as well as to basic designs for the future 'To-Be' organizational structure.

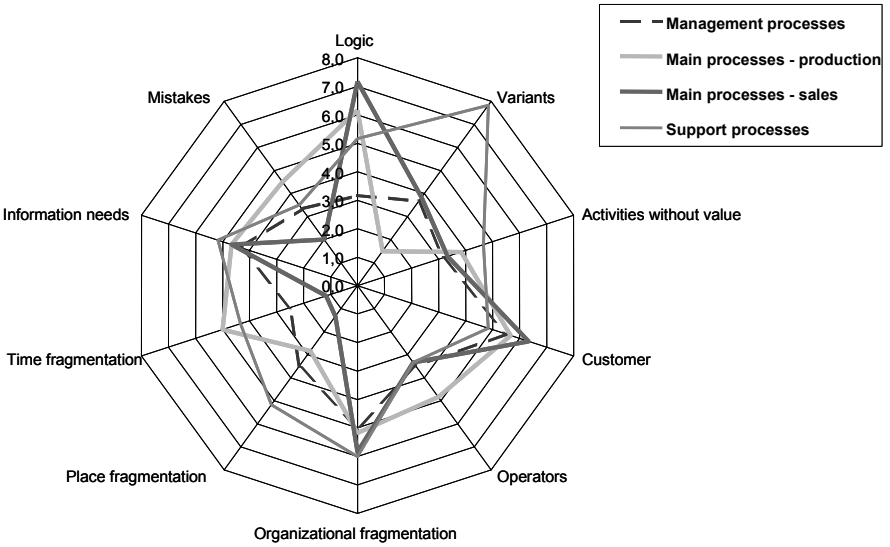

Fig. 4. Analysis of potentials for the improvement of processes

The other part of the project included creating three alternatives of process models with the business structure in the form of Y-shaped model process maps for the new companies. For both companies, the two branches of the Y-shaped model divided the main processes into those rendering services to customers (trade) and those serving to secure the services rendered to customers (operation). The individual groups of processes in the Y-shaped models are also divided according to time – from development processes in the upper part to realization processes in the lower part. Even though the first idea came up with one Y-shaped model during the analysis and designing process, it resulted from the owner's intentions that passenger and cargo transports required separate Y-shaped models – separate subjects, separate business models.

The design of the targeted 'To-Be' status concept also included an analysis of the economic impact of the Change implementation. The analysis showed that the change itself had a cost-saving potential totaling several hundred million Slovak crowns. This was a strong argument to continue with the project.

2.2 ZSSK Change Project

The submission of the process analysis' final report and the new business structure design by *IDS Scheer* was followed by plenty of debate. Those promoting the proposed changes included, above all, senior managers and employees of the headquarters, and those opposing them ranked among the middle management staff. These particularly included managers with strong traditional managing methods.

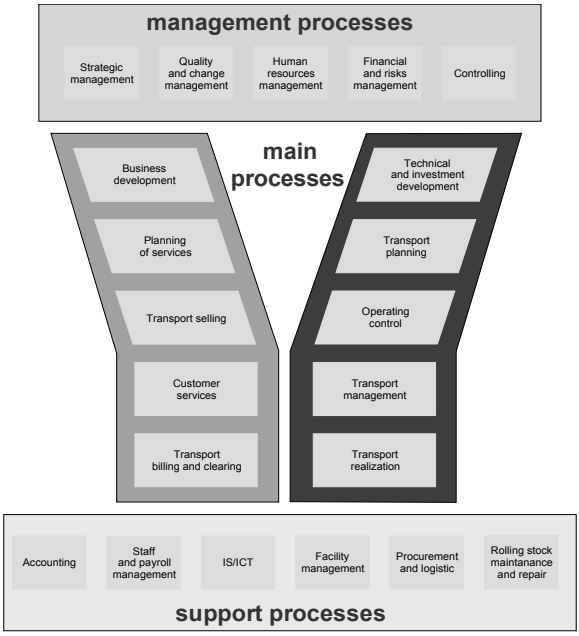

Fig. 5. Y-shaped model of process structure for cargo transport

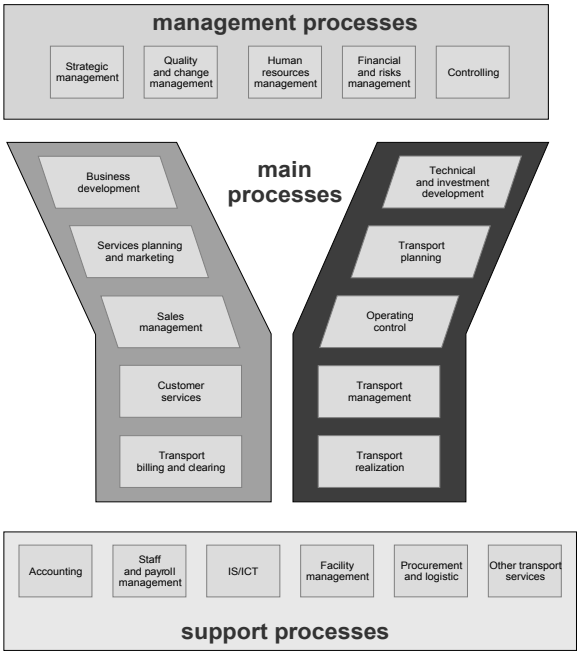

Fig. 6. Y-shaped model of process structure for passenger transport

It is well-known that railway-people all over the world pride themselves on traditions. In order to break the opposition and win support for the continuation of the project, it was necessary to create a coalition of strong players and sponsors. The devotion and conviction to implement substantial changes by using the submitted designs won the day and, in May 2004, the Board of Directors decided and recommended the Government to proceed with the transformation of the company and the implementation of process-based management.

Such a proceeding required swift preparation of the implementation phase as well as appropriate methodology that would cover all dimensions of change in such a large company. That was a moment when the strength and conviction of the management showed. A concept for the *ZSSK* Change Project was developed, and a position of internal change manager, vested with full powers and confidence for the implementation of substantial changes in the running of the company's business, was established; apart from that, a strong internal team for the implementation of the *ZSSK* Change Project was created.

At the beginning of July 2004, the Slovak Government adopted a resolution which required that actions be taken swiftly. The economic split of the company into passenger transport and freight (cargo) transport companies was planned by the Government for January 1, 2005, and the entry of an investor into the freight transport company for sometime during 2005.

The kick-off meeting for the *ZSSK* Change Project was held on July 1, 2004. Its main agenda included a master plan for the change of *ZSSK*. The master plan contained the composition of the coalition which would manage the project, project objectives, a change management strategy, the composition and duties of 22 implementation teams formed according to process groups (more than 220 people were directly involved during the design phase of the project), a communication plan, and an implementation schedule for process engineering and change.

The Prosci (Colorado, USA) Change Management methodology was applied to manage the *ZSSK* Change Project.

The fundamental objectives of the Change Project were:

- the separation of processes and setting up separate viable companies for passenger transport (*Železničná spoločnosť Slovensko a.s.*) and freight transport (*Železničná spoločnosť Cargo Slovakia, a.s.*);
- to maximize process performance, strengthening competitiveness, and sustaining a significant position in the transport market;
- to optimize the use of resources in both new companies and obtain cost savings of approx. SKK 1.3 to 1.45bn by 2006 (using 2003 as reference base) in the following areas:

- reducing the headcount by 1,000 to 1,500 employees, thus saving an aggregate of SKK 300 to 450m in labor costs;
- optimizing the rolling stock operation and maintenance with savings of SKK 300m in passenger transport and SKK 400m in freight transport;
- savings of SKK 300m as a result of optimizing operating processes in both new companies.

The Change Project was divided into three basic stages:

1. Preparation of the Change Project
   1.1. Developing a strategy to manage Change
   1.2. Constituting managing bodies for Change (steering committee, change management team, 22 implementation teams)
   1.3. Developing a sponsorship model
2. Change Management
   2.1. Developing plans to manage the Change (Master Plan, communication plan, training plan, budget, implementation schedule)
   2.2. Modeling and seeking optimum business process model solutions
   2.3. Implementation of the Change
3. Change Project support and strengthening
   3.1. Collecting and analyzing the feedback
   3.2. Bottleneck diagnosis and coping with resistance
   3.3. Correction of decisions first taken
   3.4. Motivating the staff involved in the Change Project and celebrating partial achievements

2.3 Process Engineering in the ZSSK Change Project

Process engineering applied in the *ZSSK* Change Project was based upon analysis and results of the previous project. It was essential to design complete process structures for the passenger and freight transport companies with detailed process models and organizational structures for both companies. Afterwards, it was necessary to verify the suitability of the designed processes.

The processes identified in the previous project were described in more detail. For each of them, the activities required to implement the process were established. The activities were associated with input and output documents / data and applications which needed to be secured, and process roles that were to be performed by the employees. The picture below shows the principle of hierarchical segmentation of a process model.

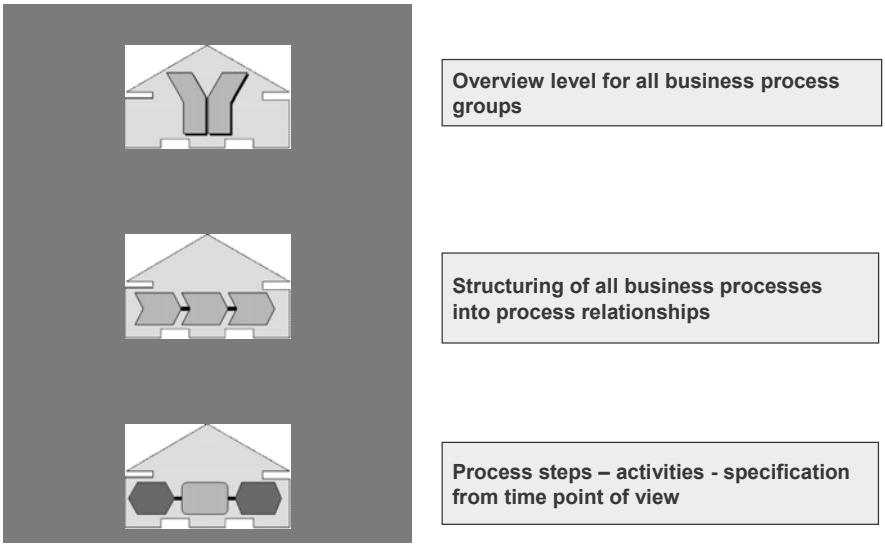

Fig. 7. Principle of hierarchical segmentation of 'To-Be' process models

After the target processes' design had been finalized, we could proceed to form the organizational structures of both companies. The organizational arrangement was designed on the basis of a process model. Processes were allocated to each organizational unit for which it should be held accountable. The organizational structure thus created resulted in:

- decreasing the number of management levels from five to three;
- creating the preconditions for an overall streamlining of the company by preventing duplication of activities and eliminating redundant activities;
- creating a basis for the introduction of continuous performance improvement by initiating management according to key performance indicators.

The formation of the organizational structure was followed by the preparation of implementation tests aimed at examining the designed process models and coordinating the activities of the organizational units.

2.4 Results of the ZSSK Change Project

Despite the time constraints, the project team managed to carry out the division of the company on schedule by applying a process by process approach and implementing the principles of process-based management. As of January 1, 2005, the two new companies, *Železničná spoločnosť Slovensko, a.s.* and *Železničná spoločnosť Cargo Slovakia, a.s.*, came into existence and assumed all the duties of the

joint predecessor. The project itself was very tough but, at the same time, it confirmed that substantial changes could be effectively carried out in large companies by using and applying the instruments and methods of process engineering, while implementing the principles of process-based management, the basis for a verified methodology to manage change.

Pros

- As early as the stage of Process Analysis and New Business Structure Design, areas with potential savings after the implementation of process-based management were identified, increasing confidence in the project.
- The process model was developed in three alternatives, preparing the company's management for alternative approaches of its division.
- *ZSSK* was divided using the designed process models.
- By gradually involving a greater number of employees in the process of designing the targeted state, the project-management team managed to broaden the existing coalition; without their commitment during the process, the implementation of change would have been impossible.
- Team members gradually identified with the significance and purpose of process-based management. They also succeeded in overcoming the resistance and opposition by most opinion-forming leaders.
- Significant support was received by the senior management of the company.
- A process center in both of the new companies was established with the aim of further developing the use of process know-how.
- Organizational structures were created which corresponded to the principles of process-based management and the designed process models.
- Process owners were identified and put into a position in which they can, and must, control costs by ensuring the efficiency of processes and that of the utilization of the company's assets.
- Significant support was won from a great number of employees at the headquarters by means of internal media, establishing a group of regional line communicators, and by visiting the regional managers and organizing regional workshops to discuss and find solutions for specific problems of a given location.
- Considerable elimination of functional line management.
- Elimination of redundant activities.
- Creating solid foundations for informal team work and intra-company communication.

- Starting to change the corporate culture into a customer-oriented (centric) one.
- Creating solid foundations for the system of continuous improvement processes by applying the BSC (balanced scorecard) and KPI (key performance indicator) methods.

Cons

- A great workload under considerable time constraints forced the project team to concentrate on essentials and solve details at a later time (based on the resolution of the Slovak Government).
- An information vacuum occurred concerning processes which, for time reasons, were not defined and described.
- No implementation tests were performed before the company division had taken place; testing was carried out from January 1, 2005 onwards.
- Some managers associated themselves with the principles of process-based management to be applied in real life but without negative impacts on the functional status and benefits they had enjoyed until then.
- Some processes had to be implemented by employees who had not taken part in designing the targeted state. As a result, their acceptance of the processes designed was somewhat slow.
- Rumors and alarming information was disseminated by employees opposing the implemented project; as the project was implemented under tight time constraints, there was not enough time left to counteract such negative phenomena.
- There was a lack of information and communication support which was to be provided by the middle management staff to operating workplaces.
- Operational problems were solved, disregarding the existence of an accepted and implemented process model in both companies.

Work to Be Done After the Split of the Company

- Finalizing and refining the process models based on findings from the running operation while respecting the principles of process-based management.
- Handing over the processes to their owners, including a process owner guideline which includes a detailed description of inputs, outputs and activities that must be ensured for the requirements of the processes defined.
- Re-optimization of processes and of the company's organizational structure.
- Phased migration of the position and role of the Process Center to represent a quality and change management department in both companies.

- Communication between the Process Center and process owners, and revision of processes implemented in the regions, including the adoption of remedial measures during the feedback-collection phase.
- Consolidation of the basic processes and functions of both companies after the split (approximately 6 months).

3 Conclusion

During the last four years of continual changes within the companies providing railway transport in Slovakia, different Change implementation procedures were verified. At the time this article was written, it was impossible to make a comprehensible assessment of the impacts of the implemented changes. However, it can be unequivocally stated that process engineering has contributed to the implementation of the changes with a considerable added value, thereby increasing the quality and transparency of the entire business process. Already at the design stage, the process models enabled views on the Change in terms of strategy, economics, processes, and personnel to be consolidated.

Railways enjoy an extraordinary position in every country. In order to implement Change, it was necessary to amend the relevant legislation and so gain the approval of parliament. The coalition of Change also succeeded in satisfying this requirement.

Another relevant factor which had a bearing on the implementation itself was the width of the communication channel. There was a strong need to keep communicating. This factor is even more important when considering the railways as a traditionally conservative company environment with an eventful history, and which has always been more than just an employer. The process changes were hence associated with the necessity to revise the corporate culture and rearrange priorities. All of this required the preparation and launch of a training program which involved the major part of the staff.

Despite the fact that the split of the company is reality from an economic point of view, the changes cannot be expected to be definitely over before the corporate culture changes in terms of accountability, ownership, delegation, responsiveness, and customer-centricity have been achieved and modifications to the information systems have been finalized with the full implementation of the controlling and internal market within the company.

The overall progress in the Change project proved that the original goals are achievable (the majority of them have already been achieved) and that the project is, and will be, successfully accomplished. Both restructured companies are fully operational and the system of continuous business process improvement is in place.

Success Formula for the Regulated Economy – Certitude Through Compliance Management

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IDS Scheer AG

Summary

Companies must ensure their compliance with increasingly complex requirements and regulations in their daily processes and must also be in a position to lay bare this compliance. This article is a short description of the very diverse and comprehensive subject of Compliance Management. As with all business areas, efficient IT is absolutely essential for Compliance Management. However, it can also be said that in a successful compliance project the IT is only as good as the concept upon which it is based – the compliance strategy. Read, how a company-wide compliance strategy supports companies: a) in turning the seemingly cost-driving factor of compliance into an important building block of strategic corporate governance; b) in exploiting the synergies arising from the link between Business Process Management and Compliance Management; and on how to integrate this subject seamlessly into the BPM approach of *IDS Scheer*.

Key Words

Audit, COBIT, compliance, Compliance Management, Compliance Management Architecture, compliance strategy, Corporate Governance, COSO, Deficiency Management, ICS, internal control system, control management, control test, regulated economy, risk management, risk and compliance portal, Sarbanes-Oxley Act, sign-off, SOX

The times are long gone in which a company was able to concentrate on its internal processes. The business relationships with partners, suppliers, and customers are at least of equal importance. Increasingly, there is a further factor which plays a strong role in influencing business autonomy: stricter external regulations. Relevant guidelines and requirements must be implemented within corporate structures, and their compliance must be guaranteed.

In order to do this, it is essential to identify the affected processes, integrate necessary checks into the processes, and monitor their execution. The compliance with such regulations is summed up by the term Compliance Management. This also

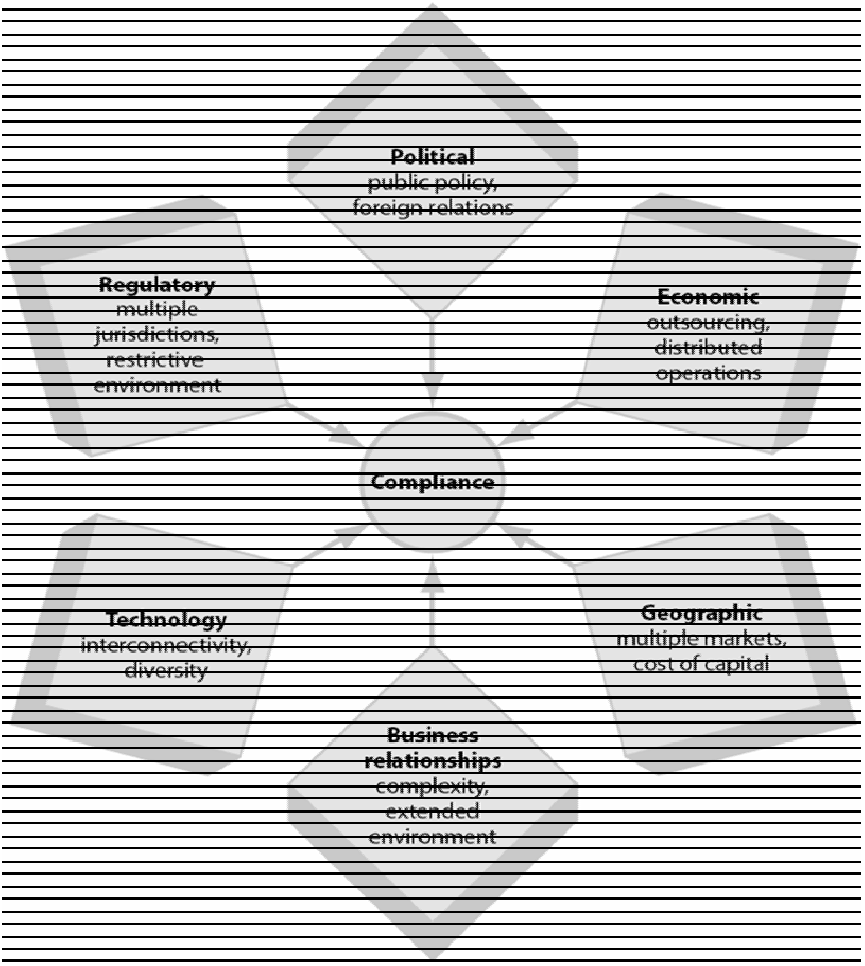

Fig. 1. A variety of compliance requirements vis-à-vis corporations (Source: Michael Rasmussen with Laurie Orlov and Samuel Bright: Business Complexity Challenges Compliance, Forrester, 14 July 2005)

includes the introduction and operation of a company-wide Compliance Management System. IT is meanwhile able to comprehensively support companies in their efforts to become 'compliant'. Process-oriented software solutions enable the efficient implementation and operation of solutions which fulfill the requirements of a whole variety of current and future regulations.

1 Increasingly Complex Requirements

Basel II, Sarbanes-Oxley Act, Solvency II, GwG, KonTraG, MaRisk, Corporate Governance, ISO norms – behind all these catchwords and acronyms are guidelines with which companies must increasingly comply. This great variety of laws and regulations instigates just as many and diverse requirements. It is in the interest of the companies themselves that they comply with these requirements – on the one hand, so as to not violate legal principles and, on the other hand, to meet industry-specific quality requirements that guarantee competitiveness. These requirements result in risks at various points of the business processes. The fundamental question companies are faced with at this point is: How can these risks be eliminated and how can it be assured that the legal requirements are being complied with?

Many laws also require that internal control systems be auditable. This implies that controls must be documented comprehensively and concurrently, and processes and responsibilities must be defined so that shortcomings can be rectified in a coordinated fashion. The same applies to the approval of documents and auditing periods. Moreover, the review data must be prepared at different points in time for specific target groups, e.g. external or internal auditors, or management.

2 Introducing the Right Compliance Strategy

For all these tasks, it is of strategic importance for companies to introduce a central compliance strategy and an efficient compliance organization. This allows the consolidation of various efforts in a Compliance Management System and to thus facilitate an efficient usage of all synergies arising from human resources, data, IT, and existing knowledge.

Many companies have taken initial steps in the right direction. Individual legal requirements and checking systems have been drawn up for individual corporate units. In most cases these, however, do not have access to a uniform data basis or – even worse – have no common concept. Using a decentralized approach, spot solutions were thereby created in various units and using different IT supporting systems that are mutually incompatible and thus cannot be uniformly evaluated.

First and foremost, it is important to create more awareness of Compliance Management that spans across the entire organization. Some companies still shy away from the control systems, which need to be established, and question the financial expenditure. The great majority, however, are meanwhile talking about the benefits: increased process discipline, improved risk management and a stronger awareness of the fact that that compliance constitutes a permanent prerequisite for business. The debate was initiated by the Sarbanes-Oxley Act (SOX) in the United States in 2002, which placed a broad spectrum of requirements on corporate governance as well as on accounting. The law, which orders the auditing and measurement of the effectiveness of internal control systems and accounting processes, had global effects: companies around the world had to swiftly adapt and, since 2002, had to spend more than the initially estimated 14 billion US dollars in order to meet the strict legal directive.

3 Unnecessarily High Compliance Costs

According to an AMR questionnaire involving more than 200 companies, enormous expenditure was expected to fulfill all compliance requirements. Besides the expenditure on SOX, AMR estimates that a further 75 billion US Dollars will be spent on compliance measures before 2009.

Such high costs arise because companies act in the aforementioned, inefficient manner. Compliance Management can only pay off when the opportunity is taken to optimize and harmonize processes and to establish an efficient organization with clearly defined goals, integrated methods, and coordinated systems. Companies that decide on this approach will enjoy significantly lower costs and, generally, the additional benefit of optimizing and applying best practices within the processes. Compliance therefore becomes a catalyst for improvements and even for a completely new perspective within enterprises.

As compliance requirements in part overlap, a comprehensive architecture is needed that covers several aspects. For software-based solutions, this implies that they must be able to simultaneously implement the requirements of several sets of rules. There are various key components that form the basis for a technical compliance-architecture. These fundamentally include process management and test workflows, alert functions, and management dashboards and analyses.

4 From Cost-Driver to Competitive Advantage

According to AMR, now is the right time to plan a compliance architecture which lends sustainable support to the entire business processing and is easy to handle. There are three good reasons for this:

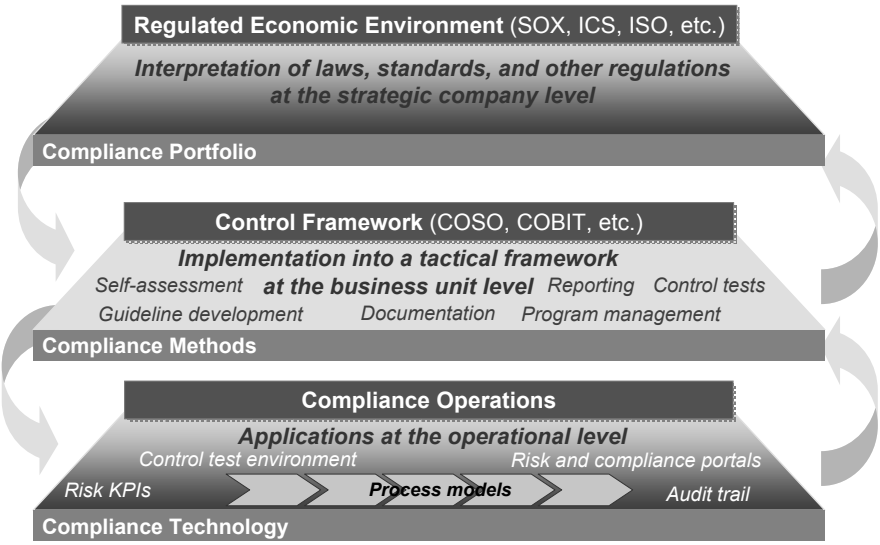

Fig. 2. Integrated Compliance Architecture

1. Agility: companies must be able to react swiftly to a number of new legal requirements. If expensive and long-winded reaction-times, which deviate from the core business, are not desired, preventative measures should be taken at an early stage. Seen from a different perspective, nothing in companies is experiencing faster changes than processes, and nearly every process brings with it new risks which need to be embedded within an integrated compliance architecture.

2. Cost efficiency: some companies have recognized that they either make a single investment now, or accept that they will always be faced with recurring costs. Clever planners take into consideration that applications and technologies used for the various initiatives must be reusable and interoperable.

3. Competitive advantage: a somewhat greater discipline resulting from compliance measures has a positive effect on the entire enterprise. Enterprises that react faster than their competitors and efficiently implement compliance measures will achieve cost savings and a quick increase in profits.

5 Well Prepared? The Tasks of Holistic Compliance Management

How does company-wide, uniform, and thus secure Compliance Management work in practice? To answer this question, one should first consider its main tasks. Among those are:

- to define rules, laws and regulations which the company must comply with, or by which it feels obligated;
- to define requirements resulting from these laws for the individual company, and deriving a corporate policy;
- to define corporate units and processes affected by these requirements;
- to integrate a compliance organization within the corporate organization, and to define targets;
- to define and ascertain concrete risks which result from these requirements within the corporate processes;
- to define suitable measures / controls to minimize risk;
- to define tests to examine whether measures to minimize risk are being complied with;
- to define and introduce testing, escalation, and release hierarchies;
- to enable test documentation, analyses, reports, and the preparation for internal and external audits.

6 Comprehensive Controls! Reassuring Answers to Urgent Questions

When *IDS Scheer* supports its clients in their Compliance Management, this is always based on a particular concept: the integration of standard tools using individual methods. This makes Compliance Management transparent, effective and proactive.

Transparency is created because all compliance master-data, regulations and requirements on the company, the affected processes, risks, measures relevant to compliance, and internal audits are clearly represented using models in the ARIS Process Management software.

The **effectiveness** increases, as all this information can be communicated throughout the company, and specific to different user groups, via a risk and compliance portal, which makes it intelligible for employees.

Efficiency arises from the integration of regulations and requirements into the continuous improvement process using ARIS. In the end, both initiatives win.

The process becomes **proactive,** because all regulations and requirements are known and can be immediately used for process design and implementation.

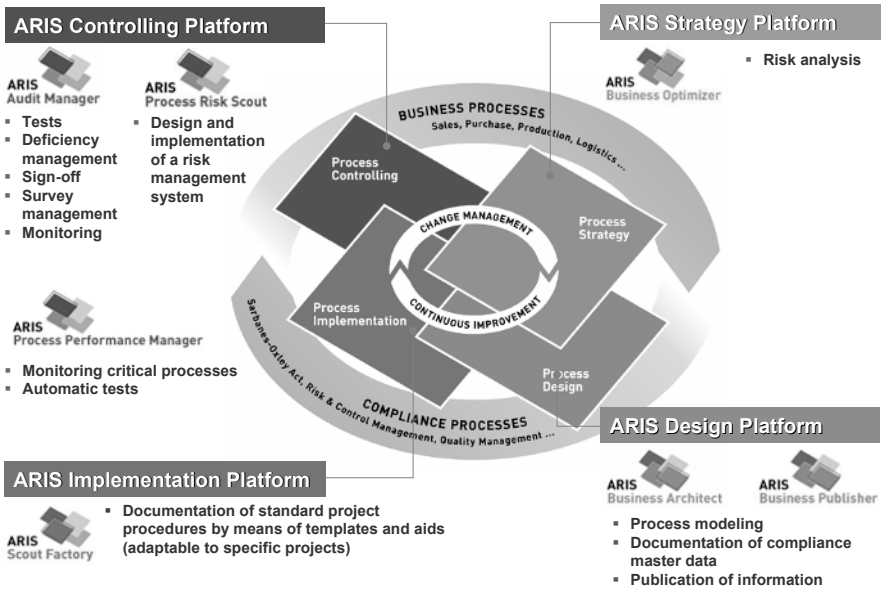

Fig. 3. ARIS Compliance Management Solution

In projects, experts from various industries always fall back on a set of tools as well as knowledge, which allow the quick and effective implementation of Compliance Management systems for a whole variety of targets. Based on a proven standard, the consultants produce a consolidated package to put together the best possible solution for a company from a combination of ARIS Platform, the particular methods for Compliance Management, and best practices gained from project experience – irrespective of whether the company is taking a more centralized or decentralized direction.

7 Universal and Integrated

The ARIS Compliance Management solution embraces all required areas and comprises all objectives of result and quality optimization. It consists of several components, the interplay of which is explained in the following section.

The basis for monitoring all internal audits is formed by using the process modeling software ARIS Business Architect. The entire documentation of master data from the Compliance Management system takes place here, forming the basis for continuous monitoring of the suitability and effectiveness of the internal audits using ARIS Audit Manager. A decisive feature of an effective auditing system is also secured here: linking business processes with risks and reviews. More precisely, risks are identified in processes and subjected to audits. These audits are, in turn, linked with audit tests.

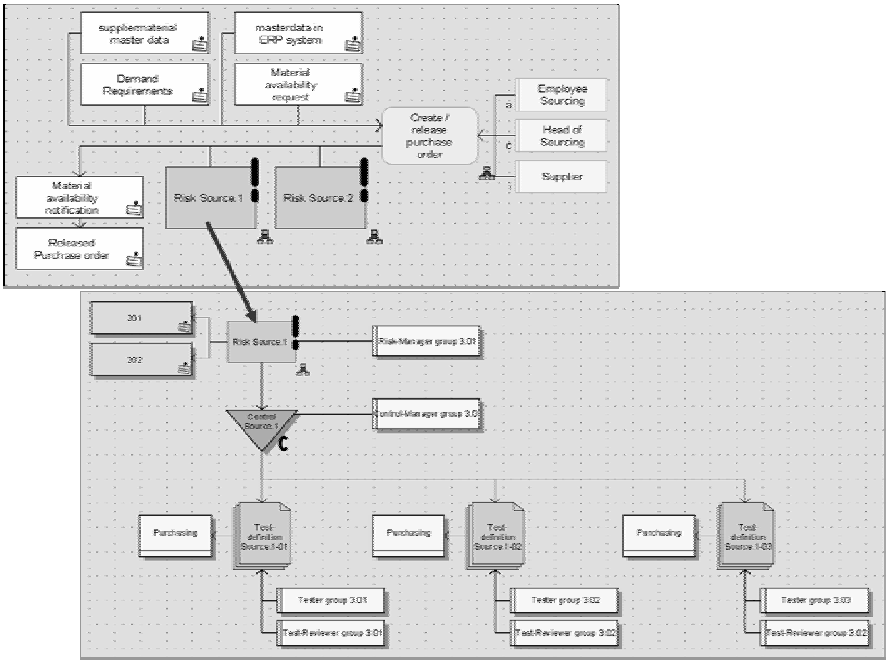

Fig. 4. Compliance master-data in ARIS Business Architect

Following the automatic synchronization of the audit and test data by ARIS Audit Manager, it organizes the execution of testing using a workflow. This starts by automatically requesting those responsible for the tests and ends with a sign-off and the preparation of data for external audits.

The test workflow-system ARIS Audit Manager supports testers with all necessary information and guides them through the test and its documentation. It also initiates necessary actions depending on the test result.

The audit tests must be carried out according to the principles of the so-called 'dual-purpose test': the audit must be judged by its suitability and its effectiveness. Tests closed once, or tests which were not carried out in time or which have as a result that certain audits are not effective, will automatically initiate a deficiency management process. This ensures that the person responsible is automatically informed and initiates measures to ensure that the functioning of the internal auditing system is restored. All processes are documented and logged by the system, so that they are intelligible for management after the sign-off process and can also be prepared for external audit without great time and cost.

A major requirement is to link up the audit system with the relevant processes. The ARIS Compliance Management solution fulfils this requirement. All internal

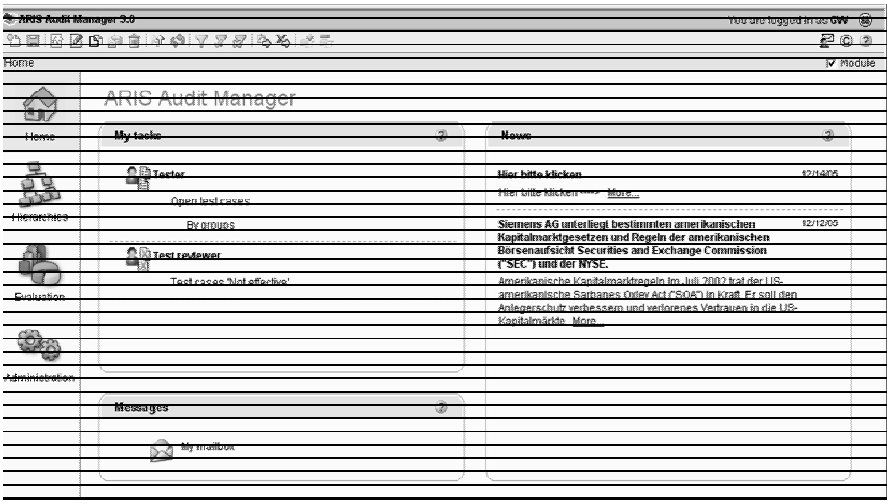

Fig. 5. ARIS Audit Manager

audits and their tests are linked with processes in which risks were located. Via a compliance or risk portal, all employees have role-based access to the process, the risk, and the compliance information relevant to them. This allows them to gain information on the necessary test information, risk data, or emergency plans with a single mouse click.

The facility of processing self-assessments based on integrated questionnaires (i.e. an ARIS Coso questionnaire) or controlling the distribution rights and authorizations within application systems in daily business ('Authorization Workflow', combination of authorizations carrying risk), allows the implementation of the correct and adequate audit for risk.

At any given time, a management view gives a detailed overview of the status of test activities and also enables weaknesses in the internal control system to be identified in good time. In addition, all the tests carried out are evaluated by a second instance for execution and quality. In this way, auditable, consolidated documentation for all completed tests can be automatically generated at any reporting time and without any significant additional time and cost. These can be approved and published by the management.

New processes or process modifications are immediately assigned within the organization's process architecture, handled appropriately regarding issues relevant to compliance, and can be immediately transferred to the portal and test environments.

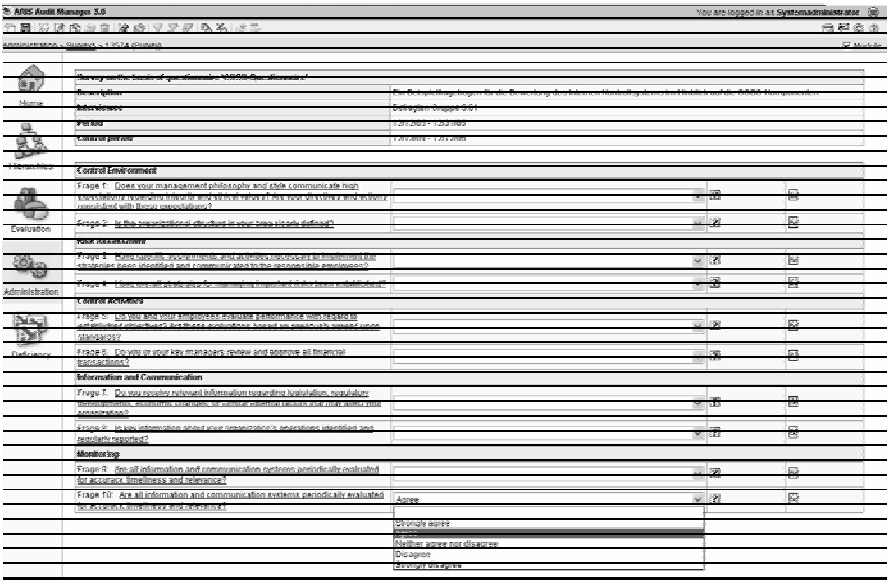

Fig. 6. Example for a questionnaire in ARIS Audit Manager

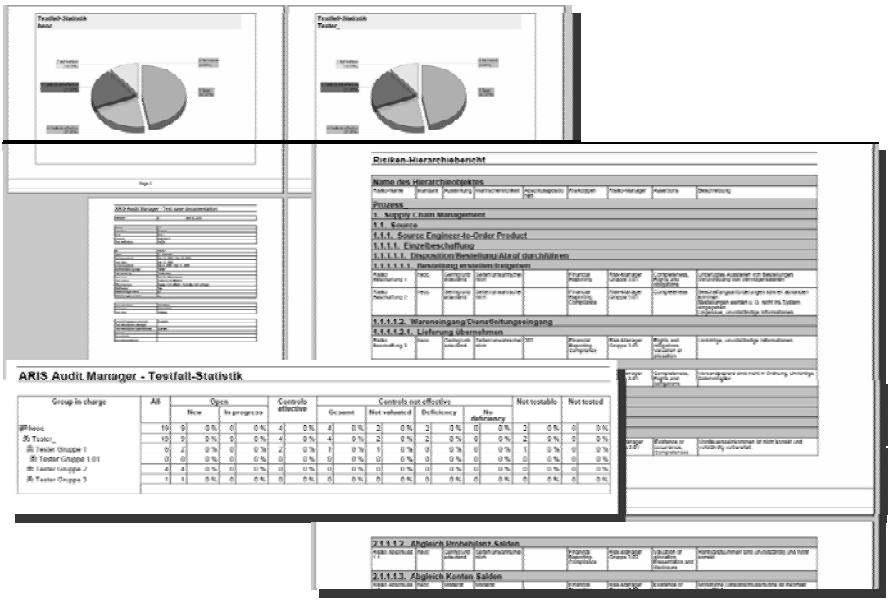

Fig. 7. Reporting in ARIS Audit Manager

8 More Certitude Through an Integrated Compliance Management Approach

In this way, the specter 'compliance' – viewed by many as a pure cost driver – becomes an important building block in strategic corporate management and the tool for increased, long-term competitiveness. Optimized and consolidated business processes, transparent organizational structures, and an efficient internal control system that can react quickly and flexibly to changing requirements – these building blocks give the management the certainty that all the necessary standards and statutory requirements are adhered to. Last but not least, these building blocks also rebuild the stakeholders' trust in the financial reporting.

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IOP – Intelligent Order Processing

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Summary

"Every customer is an e-customer!". The *BASF AG* 'Plastics' business units have made a big step towards this goal by developing and successfully rolling out 'IOP'- Intelligent Order Processing. IOP solves the 'double order-entry' problem, resulting in high customer acceptance – a genuine win-win situation for *BASF* and their customers.

Key Words

Optical Character Recognition (OCR), e-Commerce, integration, Business Processes, order, recognition, SAP, semantics, document analysis

1 Company Profile

BASF is the leading chemical company in the world: 'the' Chemical Company. Its portfolio includes chemicals, plastics, refining products, pesticides, and fine chemicals, as well as crude oil and natural gas. *BASF* is a reliable partner, offering intelligent solutions and high-quality products and helping its clients in nearly all industries to be more successful. *BASF* develops new technologies and uses them to open up additional market opportunities. It combines economic success with environmental protection and social responsibility, and makes a contribution to a future worth living. In 2004, *BASF* achieved sales of more than 37 billion euro with around 82,000 employees. *BASF* is quoted on the Frankfurt stock-exchange (BAS), as well as in London (BFA), New York (BF), Paris (BA) and Zurich (AN). For further information visit the *BASF* Website www.basf.de.

2 The Challenge

The declared goal of *BASF AG* is to take on a leading role in e-commerce for marketing their products. Customer benefits and the optimization of supply chain processes are the most important aspects of this. *BASF* has therefore built up its own portals (e.g. www.plasticsportal.com) and market place co-operations at an early stage. It succeeded in reaching a top position in the chemicals industry, with the e-commerce share of the total business reaching more than 20 percent in 2004. In some organizational units the e-commerce share is even far beyond 50 percent.

Despite all efforts, many clients are, however, not prepared to place their orders using a portal. The main reason for this is that the order already exists in electronic form within the client's ERP system, and clients refuse to enter this data manually into the supplier's portal ('double order-entry' problem). This observation has been substantiated through customer interviews carried out by *BASF*.

To directly connect ERP systems is still very costly and does not achieve sufficient return on investment. This particularly applies to small and medium-sized companies. Cross-industry communication standards are still not sufficient. This is why many customers send their order chiefly by fax; then it is entered manually into the *BASF* SAP system.

The orders from different customers often include the same data, i.e. order number, date of order, number of items / amount, and item name. However, the location of such data within the document differs considerably from case to case. The individual authors of a business document take the liberty of designing their own layout. Looking across borders, there are cultural differences which – despite globalization – are fervently being defended. Software designed to extract data from business documents will need to handle such differences intelligently. Despite all scientific progress in the area of artificial intelligence and document analysis, a one hundred percent automatic recognition is not yet technologically

one hundred percent automatic recognition is not yet technologically feasible. This is why, if a capturing solution is to be accepted by the user, the use of the best available technology is essential. At the start of the project, there was no functioning system available on the market. The IOP project's objectives were: to combine process automation with the benefits of e-commerce; to provide a system able to transfer orders coming in via fax or e-mail completely, error-free, and largely automatically into the *BASF* ERP system; and to electronically archive the orders.

The aim was to offer maximum benefit to the customer, requiring no adaptation of processes, order formats, or order behavior on behalf of the customer. Order visualization and tracing / processing via the *BASF* portal offers customers all advantages and functionalities of e-commerce.

3 Evaluation Phase

Two classic recognition strategies were evaluated during a long pilot phase:

3.1 Recognition Based on Linguistics

In linguistic processes the first step is to convert the entire content of a document into digital format via Optical Character Recognition (OCR). The semantic recognition module tries to recognize the document's content from the position and meaning of the individual words. This process can be explained using the example of a flight reservation. If there is a sentence on a document stating, "Please book a flight from Hamburg to Munich.", then it is very likely that the departure airport follows the word 'from' and precedes the word 'to'. It is also very probable that the departure airport is mentioned before the arrivals airport.

3.2 Freeform Recognition

In freeform-recognition the sequence of characters is analyzed and geometrically interrelated. This approach is easily implemented when working with field types. A field type, e.g. the *date* field, searches a predefined zone in the document under analysis for any *date* information. The zone can either be the size of the entire document or as small as the entry field in a form. First, Optical Character Recognition (OCR) is carried out within the predefined zone. Then, the system looks for syntactical structures which may be attributable to a date.

Many parameters control the search: whether only a German orthography, an American, or, indeed, any orthography should be allowed; whether the month should be written numerically or using its full name; or whether only a limited timeframe is permitted for the date. All this can be set using parameters and has an influence on the search process. The standard setting of parameters is to find all information on the *date*.

OCR results are never free from errors. Bad templates, low image quality, or dirt may lead to individual characters being incorrectly recognized – or not at all. These potential sources of errors are taken into consideration. The OCR can, for example, convert '0' (number) into an 'O' (capital letter). The recognition modules, in turn, can correct this error, e.g. when searching for a date. For frequent data types such as *date*, *amount*, or *address*, recognition modules have prepared field types. Types of data specific to the application, such as an order number, can be modeled using so-called 'regular expressions'.

As a rule, there are several dates mentioned on one document, but only one is of interest to the search, i.e. the order date. Combined field types, such as the key-value field, serve to further limit the search. A phrase or a key word may serve as key (possibly from a longer list), and the already known date-field serves as a reference value. The recognition module searches for these specified phrases and selects a date which is located close to this phrase. If several options on the document could be relevant phrases or values concerning the date, the program chooses the most plausible hypothesis. The field type 'first-of' checks a row of hypotheses and chooses the first appropriate one. In combination with the key-value search, formidable search processes can be carried out quickly and simply.

During the pilot phase, it rapidly emerged that the 'plug-and-play' solutions readily available on the market were entirely inadequate to suit the needs of a complex industry such as the plastics industry. Adapted recognition and business rules must be defined in order to increase recognition rates to an acceptable level. Furthermore, a comprehensive integration of recognition modules into the data world of master-data and historical order-data is indispensable.

Although semantic recognition strategies surprisingly delivered good results at high speed, the demarcation of the hypotheses became increasingly blurred with the rising number of customers because of the increasing information density. Therefore, the free-form recognition approach was decided upon.

4 The Solution

This section describes the system currently operating at *BASF*. It has several thousand customers from across a great variety of industries and processes a transaction value of several hundred million euros each year.

- The customer sends an e-mail or a fax.
- The orders are transferred from the fax server to processing without changing format.
- The Ultimus workflow-component controls, monitors, and documents the following process steps.

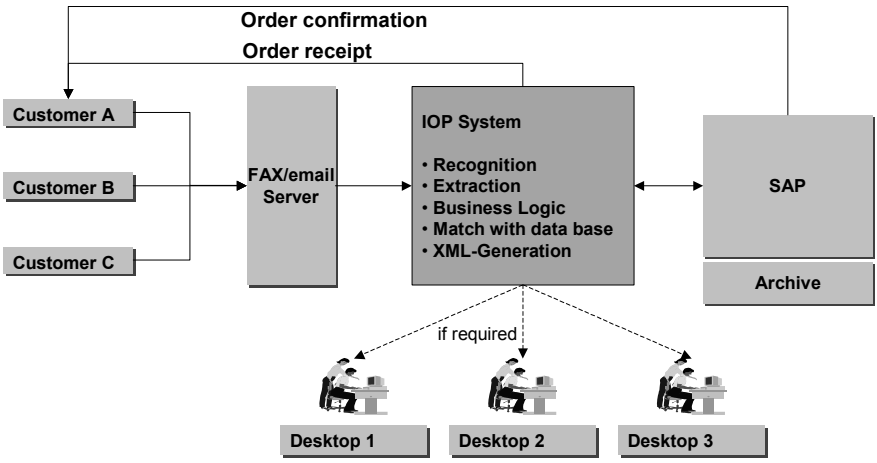


Fig. 1. Process diagram 'Intelligent Order Processing'

- The contents of the order documents are extracted via OCR.
- In the validation step this data is then matched with the customer's order behavior. If there are any deviations from the archived data, or if the OCR delivers incomplete sets of data, they are intelligently enhanced and automatically returned to *BASF*'s back-end system as a complete order. In the case of larger deviations, the order is transferred to a refinishing point, where any corrections can be undertaken with minimal effort and supported by the system.
- The order is transferred as an XML document (eXtensible Mark-up Language) to the middleware component.
- The XML document is converted into Idoc format (Intermediate Document) and enriched with additional data to ensure an error-free order generation in the *BASF* backend system (SAP).
- Finally, a confirmation is sent to the internal sales department via e-mail, stating the successful order generation.
- A qualified fax order confirmation can be sent to the customer, if desired.
- The order is archived in the CommonStore and can be retrieved directly from the ERP system by the sales department via an IOP button.

4.1 Integration into Existing Portals

IOP meanwhile is ranked on the same level as other e-commerce transaction channels. Approximately 25 percent of all orders in the plastics segment are processed via this channel. The system is strategically linked to the portals *BASF* offers.

The client thus receives an Order Response Mail to confirm the order, which also includes the *BASF* order number. Clicking onto the order number directly leads the clients to *Order Tracking* at www.plasticsportal.com, where they can view their order status.

4.2 Light Integration Without Additional Costs – The Customer Is Satisfied

The IOP system is ideally suited for use as 'light integration' into the ERP systems of customers and *BASF*. The back-end system on the customer's end generates an order in PDF format and sends the order via e-mail to *BASF*. In this process IOP takes on the function of an intelligent translation tool. There is no more classic mapping of customer and supplier data such as in EDI interfaces. The adaptation at the customer's end merely requires a few minutes. The following section presents an integration solution at *Tyco Electronics*, Belgium.

Tyco uses a Kanban system. The material consumption during production is determined by scanning the information on the packaging material of the plastic granules. The information is automatically transferred to the ERP system. If the ERP system detects that stocks have fallen below the minimum level, the ERP system generates an order which is transferred to the *BASF* IOP system via e-mail, processed, and then fed into the *BASF* SAP system. As a rule, manual intervention is not required.

Tyco Electronics is extremely satisfied with this 'light system integration'. Eddy De Vriese of *Tyco Electronics* says, "How much quicker can e-commerce be?"

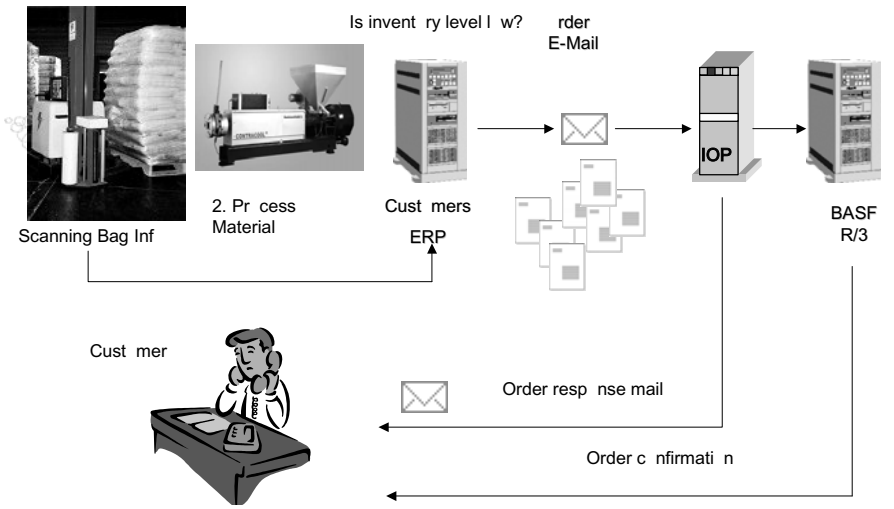


Fig. 2. Integration of a customer's ERP system based on Kanban using *BASF AG*'s IOP

4.3 The Next Generation

Recently, processes such as 'ART Adaptive Read Technology' by *Océ Document Technologies*, Constance (Germany) have become available. This software actively learns from examples about how and where the required data may be found on documents with various non-standard layouts. The software is currently being integrated into the IOP system. ART implements learning by example. A data input employee captures data from a business document by clicking onto the respective position on the scanned image. The software 'watches him doing this' and records the result in a special database. If a similar document is processed afterwards, ART recognizes this and finds the required information by intelligently matching the learned example with the document to be processed. Opposed algorithms are required to match a document with a large number of learned examples – quickly and error-free. This is why ART proceeds in two steps: first, a very fast algorithm determines the examples that could be relevant. This reduces the number of examples from some hundreds or thousands to about a dozen. In the next step, each of these examples is checked against the document in question. The algorithm works in a similar way to a human being.

The general structure of a document is taken into account just as much as the similarity of certain textual elements and very precise individual data such as sender addresses. In the last step, the elastic-match function comes in. The textual and graphic elements surrounding the required information are transferred from the exemplary document to the document under analysis. Smaller layout diversions are accounted for intelligently. Rule-based and example-oriented processes may be combined and run according to the voting process. Each document is processed by rule-based software and by ART. There are therefore two results, whereby

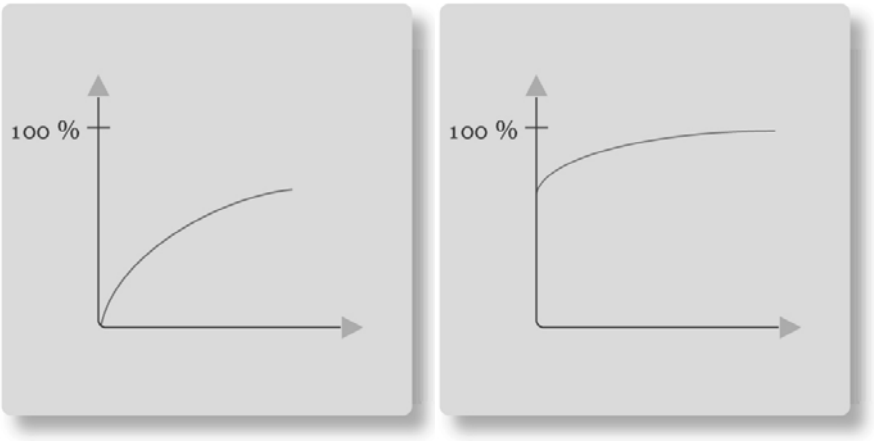


Fig. 3. Performance of example-oriented recognition (a) with voting (b)

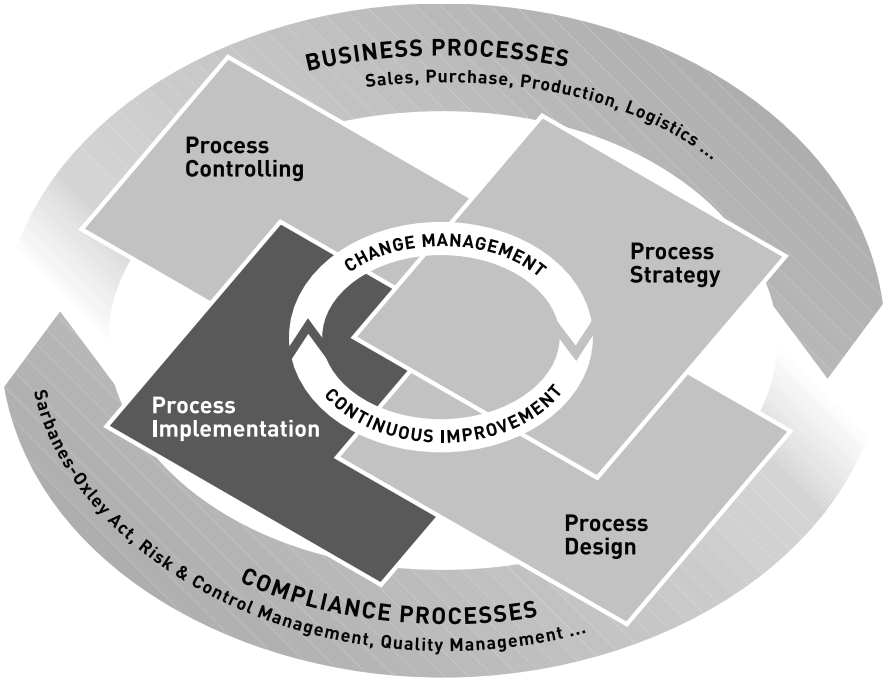
the ART result could also be ‘empty’. In the voting-process these results are now combined with each other. If only one of the processes has obtained a result, the case is clear. If both processes have delivered the same result, this can be passed on with high certainty. If different results are presented, Voting can either determine the correct result following specific voting rules or can contribute to avoiding recognition errors by rejecting and returning the case.

5 Conclusion

Using the IOP (Intelligent Order Processing) system developed by *BASF*, the company has succeeded in integrating business processes which has resulted in significant customer benefits. IOP solves the ‘double order-entry’ problem which had disrupted the process. Customers can continue to use their usual order formats and optimize their own processes. The system offers a ‘light integration’ option which customers can implement at minimal expense. *BASF* has recorded cost reductions of approximately 80 percent in order entry. This is a real win-win situation.

Part IV:

Business Process Implementation



Business Process Implementation – More than Just Implementing IT

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Summary

The implementation phase is often considered to be a separate discipline for IT specialists only. In the end, however, it is this phase which represents the fundamental challenge: this is where it shows whether the realization of the concepts produced in the previous strategy and design phases is actually successful, with the result that an improvement in processes has actually taken place. Consequently, the key to success lies in a neat, methodical approach, which seamlessly translates into the actual workmanship – with and without IT. Such a methodology is presented here using a concrete example for the implementation of SAP solutions. Service-oriented Architectures are currently an area emphasized in IT implementation and are treated separately in this article. The example reinforces the fact that it is not primarily about the introduction of technology but about realizing improved processes.

Key Words

Application Management, applistructure, ARIS Value Engineering (AVE), ARIS Value Engineering for SAP, Business Process Platform, End-to-End, Enterprise Services Architecture (ESA), Enterprise Services Repository (ESR), full service, continual improvement, Service-oriented Architecture (SOA), ARIS for SAP NetWeaver

1 From Swift Implementation to Systematic Success

1.1 The Spectrum of 'Implementation'

Implementation means much more than just performing adjustments to IT systems. Processes should be realized consistently to ensure that the previously envisaged strategic and tactical objectives are achieved. Consequently, the plan includes all organizational changes, the rearrangement of operative processes, and often the change of processes within the applied IT systems. When talking about IT systems, reference is made not only to the tools labeled explicitly as 'Business Process Management' systems (workflow systems, among others) but, above all, to the systems that are used within the processes. In most cases we are thus confronted with a heterogeneous environment which requires an even more careful design method so as to unfold the full, lasting effect of the implementation.

There is also a great spectrum of IT implementations. New implementations of systems by a manufacturer, in which completely new processes are designed and created from scratch, are becoming increasingly rare. Instead, the past years have seen a rise in the number of consolidation and harmonizing projects, in which (particularly following mergers and acquisitions of companies) complex IT and process landscapes have been consolidated and harmonized. A regular implementation task of many companies is to efficiently upgrade their existing software. When changing to new solutions from a different software manufacturer, existing processes are replaced by new ones as a result of external forces or by the need for better process support. In this case, the aim is to remain as close as possible to the standard of the new system to be introduced, so that investments pay off quickly and lastingly. For, since the advent of *Service-oriented Architectures (SOA)*, in which the more flexible interplay between so-called services (often implemented as Web services) are substituting the rigid processes of today's monolithic systems, technically focused implementations are encountered quite often. In a first phase, companies merely create the technical conditions for SOAs, such as portal environments or the integration of existing systems into an Enterprise Application Integration (EAI) platform that is able to work with Web services. Only on this basis are the first Service implementations able to ensure that mission-critical processes can be uniformly processed throughout the company within an otherwise heterogeneous landscape (cf. section 3).

Particularly the subject of realization or, rather, implementation is seen as a constant companion in catering for processes: there are always small corrections to be undertaken in processes. This can be the case because an update from a software supplier must be installed into the system, or because certain sub-processes are to be adapted as part of a *continuous improvement process.* This is particularly the feature of so-called *Application Management* which has been steadily gaining ground during the past years. Application Management is the term for a combi-

nation of operator services for applications and the operative maintenance of application systems throughout their entire life cycle (thus also often called application lifecycle management). In such a case Application Management is outsourced to a service provider who, in a service level agreement, takes over responsibility for reaction-times and quality. Often, Application Management goes hand in hand with the outsourcing of hardware. For a combination of such services, the term *full service* is frequently applied.

1.2 Tasks and Objectives of the Implementation Phase

Business Process Management (BPM) today is an indispensable concept, particularly in the implementation of IT systems. Although, in future, a maximum of IT integration and flexibility will be attainable by the use of so-called (Web) services[1], no operating IT system will be conceivable without BPM.

The aspects of the implementation phase mentioned in the section above are nearly always realized in combination with each other. The task of the implementation phase is therefore to establish the new target processes within the organization. In order to do this, the company organization structure must, on the one hand, be adapted in line with the processes and the necessary process accountability [Process-to-Organization (P2O)], while, on the other hand, optimum IT support [Process-to-Application (P2A)] must be guaranteed for the new business processes. Information technology, in particular, is increasingly gaining importance as an instrument for implementing process optimization. The individual steps follow the established implementation plan during the design phase and are monitored using milestones to ensure an optimum implementation. The ARIS Value Engineering (AVE) model includes the following implementation tasks:

- adaptation of the company organization structure;
- changing process flows;
- changing / introducing IT systems;
- monitoring measures;
- building up process skills.

The aim of this phase is to focus the business processes on the objectives and key success factors of the individual business areas, and to establish an effective and efficient process organization. The following aspects in particular have to be achieved in a successful implementation:

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[1] See below for further information.

- transparency of all measures;
- process-related, non technical solutions;
- re-usability of solution segments;
- implementation consistency;
- consequent pursuit and support of objectives (cf. also the chapter on business process controlling);
- consistent documentation.

1.3 Aspects During Implementation

The business process implementation phase begins by adapting the company organization structure. In a first step, a business process owner, who is responsible for the effectiveness (setting objectives) and the efficiency (reaching objectives) of the business process and its implementation, is assigned to each business process. The introduction of continuous business processes does not necessarily require the nullification of the functional organization and the establishment of a pure process organization, but requires a high level of willingness to change and ability to implement such changes. This process must be supported by targeted change management activities and structured workshops in order to establish transitional forms, when necessary. As concerns implementation, quoting Alfred Chandler is always relevant, "Structure follows process and process follows strategy."

In a second stage, the business process owners are responsible for establishing the target processes within the organization, procuring and allocating resources for the processes, as well as assuring an optimum process flow. During the coaching approach, the know-how transfer between process consultant and process owner is ensured and further process skills are built up within the company. Moreover, the development from process to organization (P2O) is driven by state-of-the-art project management.

When implementing business processes, it is important to ensure an optimum IT process support. In this case IT should be understood as 'enabler' and not as 'driver'. The subject of process-to-application (P2A) does not only mark the general task, in this case to effectively and efficiently support business processes through information technology, but it also marks the change in application development of both standard and customized software. Object-oriented software architectures, UML, and (Web) services are technical facets of this change. Without the respective process knowledge and detailed process description, modern application systems could no longer be operated. A further important component of the implementation phase is the permanent monitoring according to the milestones defined in the implementation plan. This is ensured by tight project management.

1.4 Benefits

The benefits of a successful implementation can be summed up as follows:

- business processes are adapted to objectives and key success factors;
- the company organization structure are geared towards business processes;
- effectiveness and efficiency of IT increase;
- company flexibility and competitiveness are increased;
- project success is assured.

2 ARIS Value Engineering for SAP

2.1 Overview

In *ARIS Value Engineering (AVE)* the consistent focus on the objectives of the individual phases and the work packages, which methodically build up on each other, ensure a smooth and consistent information transfer to the next respective stage. This has already become evident in the previous articles – and, above all, in the examples shown – for the preliminary phases. Using the example of implementing SAP systems, the following sections present the enhancement of the ARIS Value

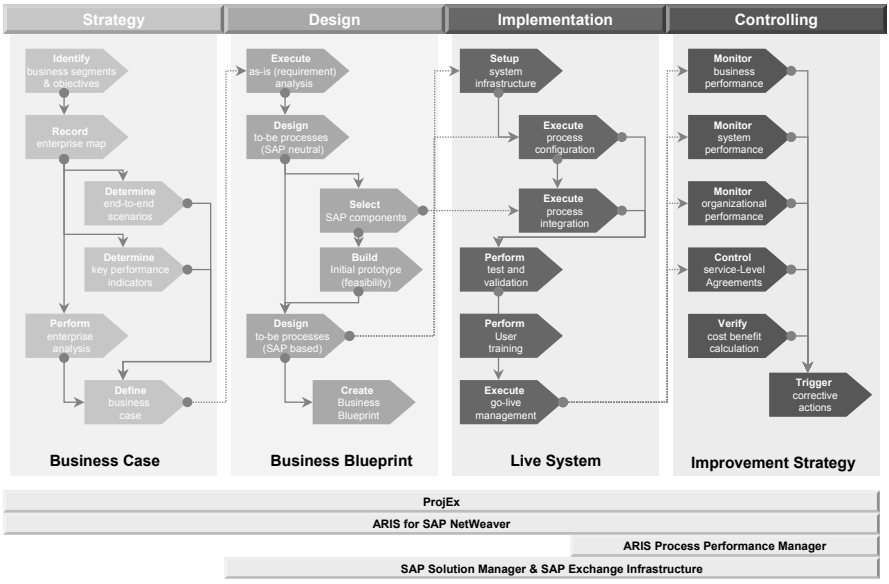

Fig. 1. ARIS Value Engineering for SAP roadmap

Engineering Method, which links the AVE concept with the particularities of an SAP-based IT implementation. The term *ARIS Value Engineering for SAP* (AVE for SAP) implies a straightforward continuation of the consistent path towards process improvement. A large part of the methods and concepts used for this can easily be transferred onto other IT solutions.

The particularity of AVE for SAP lies in the fact that, within the strategy and design phases, certain methods are already being used which significantly support work during the implementation phase (cf. Fig. 1).

Therefore, the focus on the so-called 'End-to-End' processes is particularly important – from the customer's point of view – i.e. they are to be regarded as processes which are closed in themselves. From this point of view, so-called End-to-End scenarios, such as order-to-cash, evolve, which emphasize the holistic view of the implementation phase. The sub-processes in these scenarios are thus assessed by the way in which they optimally support the entire process improvement. This, in turn, occurs according to the defined key performance indicators. Only those scenarios which promise success are marked for implementation and are represented in a business case. When designing, these results are again taken up and refined for the purpose of a business blueprint.

2.2 From ARIS Models to the SAP World

The peculiarity of AVE for SAP lies in the fact that processes are initially designed neutrally during the design phase but then concretely focused on the SAP context. This is best explained by Diagram 2.

The neutral representation of processes is made more concrete by the use of explicit SAP content. This is where ARIS for SAP NetWeaver™ is employed, which enables a direct interplay with the SAP component SAP Solution Manager™ and the SAP Exchange Infrastructure™. Using this combination, the SAP processes are, for example, made available in ARIS and replace or specify neutral objects within the process models.

Step by step an early image develops from the abstract description in ARIS of what will be put into practice during the SAP implementation. The added value of this approach lies in the fact that the view, missing in the SAP world, on the organization and on the steps which are not supported by SAP within the processes can only be consistently enhanced by using ARIS (cf. the white SAP functions and the green, manually performed functions in the following diagram in Fig. 3 on the left). In SMEs, in particular, the use of reference processes that accompany the defaults in the affected systems can generate a significant added value which, among other things, is expressed by a shorter implementation time.

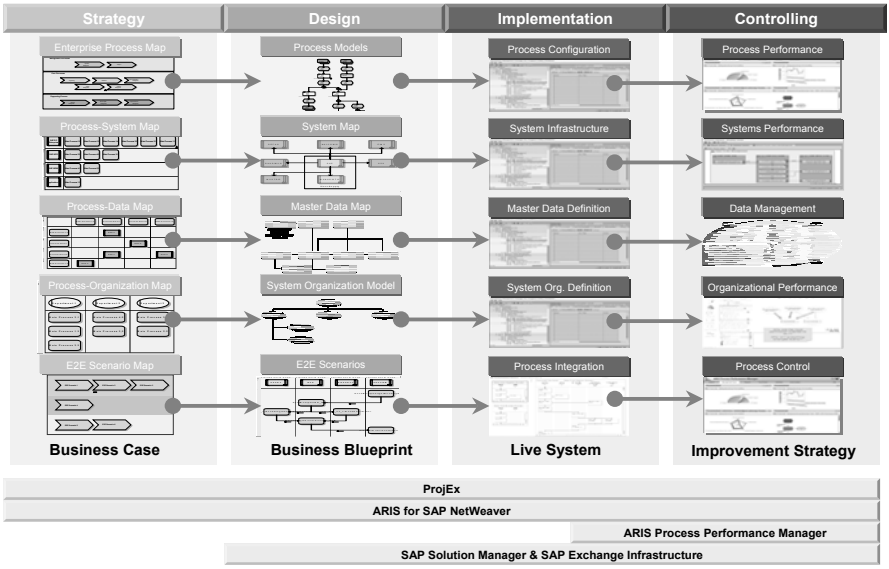

Fig. 2. ARIS Value Engineering for SAP working packages

Due to the fact that the interfaces between ARIS and the SAP components are laid out bi-directionally, changes can be carried out in both systems. As ARIS has the more detailed view onto the same processes, work during the design phase should be carried out in ARIS. Above all, ARIS enables the view of the main End-to-End scenarios and the superordinate key indicators. As depicted in the previous diagram in Fig. 3 on the right, the description of a function, which includes the transaction to be employed by users in their corresponding role, can be broken down. Such a representation goes beyond the implementation view of the operative IT systems. Role definitions for portals as well as authorization / authentication profiles can be generated from the different ARIS models using ARIS reports. These include:

- assigning people to roles;
- assigning functions and transactions to respective roles;
- (not represented here) also elements assigned to the roles, such as
  - data elements from the Knowledge Warehouse of the SAP Solution Managers™ and
  - key performance indicators;
- etc.

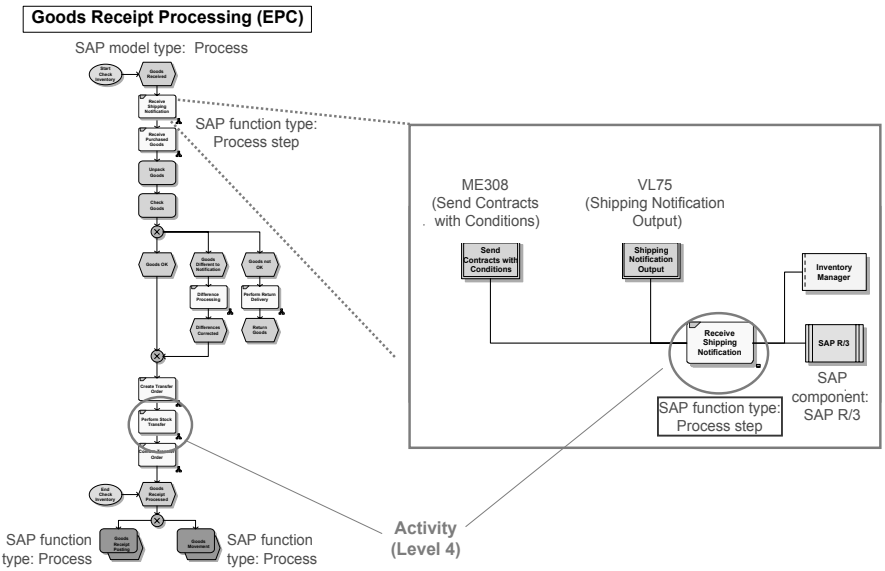

Fig. 3. Procedure in SAP-related modeling

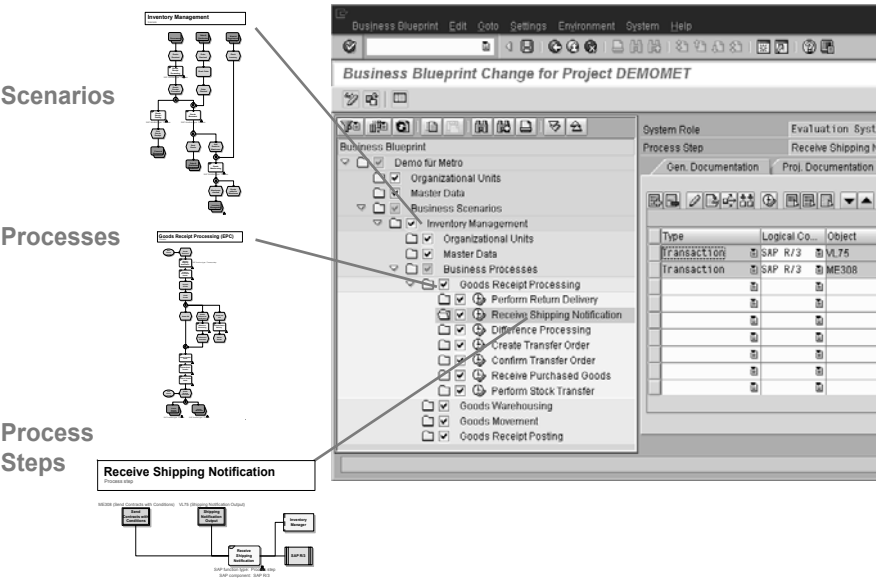

Fig. 4. Configuration of SAP systems based on ARIS information via SAP Solution Manager

Consequently, the definition of a portal can be directly derived from the models or consistently completed in the models. If, beyond this, the definition of key performance indicators in ARIS models is carried out in line with SAP, this information can be directly used for a business information warehouse (SAP BW™) project. As part of a project, an interface was implemented between ARIS and SAP BW in order to immediately reap the benefits.

2.3 From Model to Operative System

Finalizing the SAP implementation is realized through the interplay between ARIS for SAP NetWeaver and SAP Solution Manager™ or the SAP systems connected therewith (cf. the following diagram). The configuration of transactions and the customization of the individual systems are carried out by the Solution Manager. Process reference is thus never lost at any time. The configuration of the integration of the various systems via SAP Exchange Infrastructure™ (SAP XI) is also implemented together with ARIS. However, SAP XI consists of two modeling levels, of which only one can be modeled using ARIS. This lies in the technical nature of the respective second modeling level. However, consistent models for these technical models, which have been extracted from SAP XI and imported into ARIS, can also be stored in ARIS.

This consistent procedure is continued in the areas of testing, user training, and operation. Thus, test scenarios, which correspond with certain paths through the ARIS processes, can be created using ARIS for SAP NetWeaver™ and SAP Solution Manager™, whereby testing takes place in a reproducible and well-documented fashion. During training, and with the aid of illustrative ARIS models, the system's end users can understand how processes should flow. Due to the integration with the SAP Solution Manager™, they are then able to skip directly from the models into the respective transaction. Later on, when the end users, for example, post error messages from the system, they will re-encounter these representations and terms, as the process descriptions from the ARIS models also form part of the error messages. These are then solved together with their full service provider or they do it themselves using SAP.

ProjEx, a specially developed project management procedure by *IDS Scheer* applied in every *IDS Scheer* project, secures this procedure by monitoring the appropriate milestones and supporting all of the processes.

2.4 The Difference

As opposed to conventional implementations, the procedure AVE for SAP creates a new picture that is no longer shaped by the generation of information, only for this information to be 'manually' reused. For example, a Balanced Scorecard was

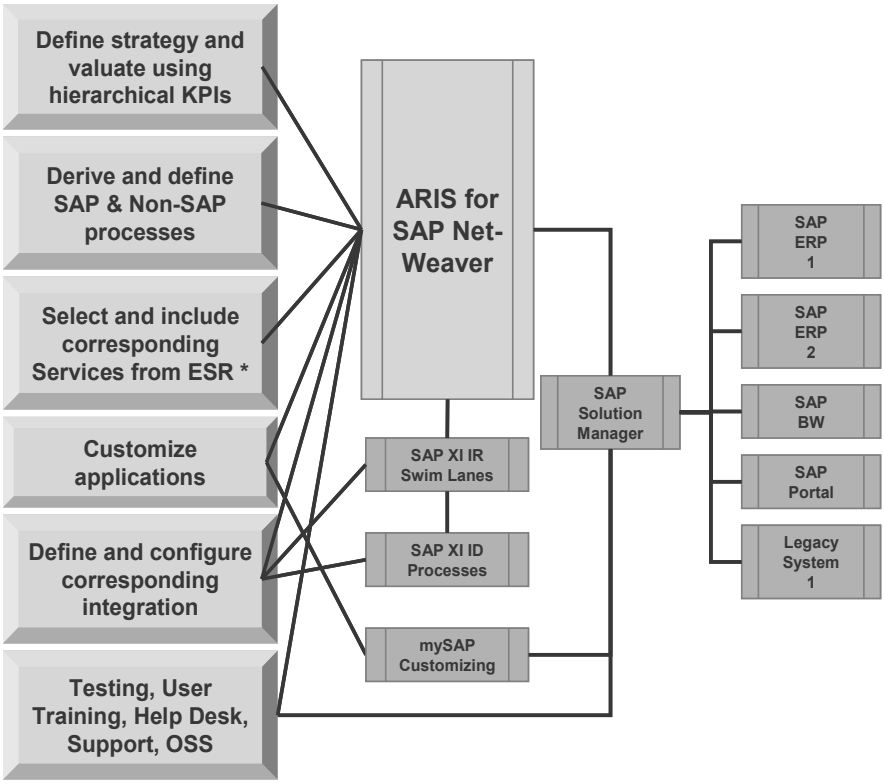

Fig. 5. Consistency in ARIS Value Engineering for SAP

* *Enterprise Services Repository, see description in the following section*

created in Excel (which belongs to processes in a modeling tool) for a PowerPoint presentation on strategy, only then to be replaced by a Word concept during implementation. This serves to customizing experts as a guideline, but has rarely been implemented as such. In exemplary cases, customizing itself was documented in Excel. What remained in this method was a whole pile of documents which were more or less far removed from the actual implementation.

What, in contrast, is always available with AVE for SAP is a consistent image from strategy to the operating systems. The entire documentation is stored in ARIS and the SAP Solution Manager™, and thus enables a detailed view right down to the actual transaction (cf. Fig. 5; the point marked * will be explained in the following section).

3 New Ways in Service-Oriented Architectures

3.1 Status of Technology

Service-oriented Architectures (SOA) have been around since the nineties. In SOAs, only the so-called orchestration of individual services (i.e. the interplay with other services – those created in-house, and such services provided by software companies) constitute an application. The highly flexible orchestration is a result of the acceptance of standardized interfaces between the services, which are based on a so-called process engine. Only since SOA arrived with the use of Web services in 2000, has this form of architecture experienced the decisive breakthrough. For, with this change, it was easier to answer the important question of standardizing interfaces and interoperability for globally-minded companies. Not least, the high degree of Internet usage in companies is a deciding driver for this maturity. This trend was supported by the rapidly advancing standardization in the description of (Web) services and interfaces and by the appearance of the respective development environments.

At the same time, software companies producing standard software have started using SOAs in their new generation of products. Suite-producers such as SAP and *PeopleSoft* (now *Oracle*) have either created products based on the respective standards, such as Enterprise Application Integration systems, portals, and data hubs, or have built up third party products as an integral part of their product strategy. Accordingly, the distribution of these categories of products within the companies employing this software is quite high and is steadily increasing. Technology manufacturers themselves are rounding off the portfolio of developing environments and technological platforms for SOA. In the meantime, pioneers among the companies employing the software are confronting the question of where, and in which form, they can implement services, and they are already building the first pilot projects.

Meanwhile, software manufacturers are concentrating their efforts in a further phase. Those platforms, which are today technologically oriented, will, according to analysts such as *Gartner Group*, be further enhanced during the coming years. In addition to technology for building SOAs, they will then also offer the respective content, i.e. their services, which the manufacturers make available to companies, so that they can build applications on them. In general, reference, this context, is made to *applistructure* (application plus infrastructure) or *Business Process Platform*. SAP has already announced its Business Process Platform for 2006, on which the future application offer will be based. Suite manufacturers will then have to supply the respective configurations with the user interface in addition to the services, so that customers can replace the existing functionality of today's suites.

3.2 The Route to SOA

Analysts are not aimlessly talking about Business Process Platforms or process engines in the context of SOA. Services and purely technological platforms alone offer no added value to companies. The added value rather lies in the following points:

- greater scope of code reusability;
- easier roll-out of existing functions as well as low maintenance costs for code;
- greater degree of process standardization;
- simultaneously, higher flexibility than in existing suites;
- easier integration of different products;
- easier collaboration with business partners.

There is thus a consensus that, in order to manage the services portfolio and to appropriately represent the orchestration of processes as well as all relevant relationships between data, the route to successful SOAs leads across a comprehensive process approach. In this context, the analysts of Forrester Research talk about a business service model and refer to the analogy of existing modeling approaches. After all, the main aim is for the quantity of services employed to be:

- consistent;
- easily comprehensible;
- and easy to use (in particular, when they are to be used as shared services).

The key thus lies in Business Process Management, which continues right into the area of software engineering if there is the need to modify or upgrade the number of services. In this case, the route described in section 2 should be continued consistently. The challenge lies in determining methods, which make it easy to represent and administer the conventionally implemented parts within the process portfolio together with the parts implemented in a service-oriented way.

3.3 SOA in the SAP Environment

ARIS Value Engineering and AVE for SAP are both prepared for the SOA route. Fig. 5 already gives an indication of the parallel between both worlds (SOA and conventional). SAP, which calls its SOA strategy *Enterprise Services Architecture (ESA)*, will publish their service repository [called *Enterprise Services Repository (ESR)*] in a first version during 2006, making it available to the SAP community. As

a result of the close collaboration between SAP and *IDS Scheer* (ARIS is the BPM modeling tool of SAP in their Business Process Platform, with which Enterprise Services are defined), the ESR will also be available in ARIS. For users of AVE for SAP (using ARIS for SAP NetWeaver™) it will thus be immediately possible to plan the change into the ESA world using these models. This is because the End-to-End processes in ARIS are available on all viewing levels and are also evaluated on the basis of key performance indicators. The variants employed are just as much represented as are the process steps, which are currently not supported by IT systems. This benefits the approaches concerned with the identification of service 'candidates'. Moreover, SAP has chosen a cruder granularity for their enterprise services. This results in appropriate and meaningful services that are highly visible in the End-to-End view.

For an even more successful change to, or route to, services, those interested must gain a better understanding of the added value of the services on offer. Moreover, this includes the question on where a service is able to offer the greatest benefit. Added to this, there is the question of which future service could better fulfill the requirements which have not yet been met. Apart from the evaluation of the existing processes by means of their models, questions arise which are best answered in the first two AVE for SAP phases – strategy and design. As some questions also concern the further product strategy of SAP, there will be a common offer by SAP and *IDS Scheer* for the so-called ESA Adoption Program (cf. Fig. 6). It is about a

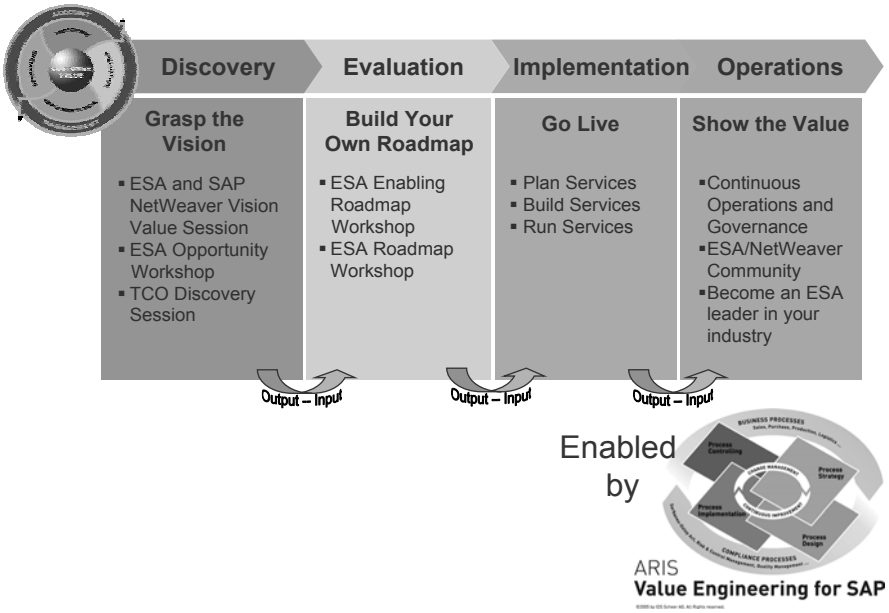

Fig. 6. Employment of AVE for SAP on the way to SOA / ESA

mixture of classic AVE workshops, paired with profound knowledge on ESA and their importance, particularly in connection with the respective industry-specific requirements of a company. These workshops evaluate the realistic potential for the change to ESA, identify possible candidates for the employment of the first services, and outline their technical implementation.

Finally, a schedule for SOA / ESA is put forward (based on a company's fitness), according to which the company will achieve the revealed potential in the best possible and most efficient way.

Thus, each company will have its own rhythm when employing the Business Process Platform which, in the end, can be mainly derived from the benefits resulting from the change to ESA. As a rule, this results in an incremental way that follows the benefits.

3.4 More Than a Problem of Technology

The way to SOA will be predominately signified by the handling of the corresponding organization and the processes and their governance (all of which needs to be learned) rather than by worries about the SOA technology, Web services, or middleware. Often, today, the role of the enterprise or application architect is missing in the context of services. It is therefore recommended to introduce a new role to the company. A 'service architect' must have a wide-ranging influence in order to change the respective processes. He must not only consider the services but also the interplay with existing applications, which themselves offer service interfaces. The integration of processes, not of interfaces, will thus be the main issue. Moreover, the dynamics of the process landscape will require increased attention.

Due to the global character of shared services, the deployment of virtual teams and the teamwork itself are important tasks for the responsible project and team managers. Next to technical expertise, the social component is becoming increasingly important, as a diffused environment also requires a lot of confidence in the other partners. This, in itself, involves a convivial collaboration. Finally, the collaboration with the full-service partner will continue to develop. Accordingly, the design of milestones and their evaluation must take this fact into consideration by aligning them more according to the (collaborative) End-to-End processes and the corporate goals, rather than to particular project segments (e.g. production).

4 Conclusion

It shows, yet again, that an outstanding implementation cannot be measured according to the implementation speed but rather by its quality. And quality itself is reflected by the realized processes. Particularly in the area of Service-oriented Ar-

chitectures, it becomes apparent that it is not primarily about the introduction of technology; in reality, it is about the implementation of improved processes. The demonstrated AVE approach and, in particular, also AVE for SAP are equally suited for standard software and for future SOA environments, because they are based on this realization. A system landscape pertaining to these environments will emerge, based on a consistent focus on objectives and processes, with the respective consistent documentation. If, moreover, the design also includes the entire controlling concept as shown in Fig. 2, the measured actual processes from ARIS Process Performance Manager will lead to a consistent view of the processes and the implemented changes.

Only an approach of this kind will enable control over an increasing complexity, on the one hand, and, on the other, will allow the efficient change to new technologies such as SOA without having to start from scratch.

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Building an Integrated Performance Management System for Process-Oriented Operation Management

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Summary

The Unterweser Nuclear Power Plant (UNPP) has built up a Performance Management System (PMS) that has been implemented in form of an all-embracing control system. It is based on target values and pursues a clear strategic direction. An integrated management concept was required to implement the PMS using a coordinated tool landscape which would efficiently assure the achievement of the various corporate goals. The uniqueness lies in the continuity of the solution across all phases of the improvement cycle. The integration of all solution components, in particular, using ARIS PPM from the IT perspective and including the derivation of measures and their monitoring from the organizational perspective, ensures the efficiency of the management system. The implementation has been concluded for all operational management processes and all relevant processes of organizational management as a whole. The control system itself has a flexible layout and is controlled and modified regarding effectiveness and suitability on an annual basis. The results of the PMS are made available to all employees via various information channels (Intranet, reports; screens in the entrance area).

Key Words

Performance Management System (PMS), management concept, control system, key indicator system, key indicator cockpit, nuclear power plant, maintenance, process orientation, ARIS PPM, process-oriented management

1 E.ON Kernkraft – Unterweser Nuclear Power Plant (UNPP): A Short Outline

E.ON Kernkraft (EKK) operates six nuclear power plants in Bavaria, Lower Saxony, and Schleswig-Holstein and owns shares in a further five. The nuclear power plant Würgassen in North-Rhine Westfalia has been shut down and has been in the process of being dismantled since 1995. The nuclear power plant Stade, in Lower Saxony, was shut down in 2003. EKK, with its headquarters in Hanover, is therefore the largest privately-owned nuclear power company in Europe. The installed net performance of all plants, including the shares held in commonly owned nuclear power plants, totals more than 8,500 megawatts (MW). EKK operates and has full ownership of the Unterweser nuclear power plant, which is located 10 kilometers south of Nordenham on the lower Weser. In September 1979, the nuclear power plant began commercial operation. Using a pressurized water reactor, it generates a net performance of 1,345 MW and thus makes a significant contribution to the safe and environmentally safe power supply in Germany.

Up until October 2004, the plant produced more than 230 billion kilowatt hours. To date, this production performance has not been achieved by any other nuclear power plant in the world. In the years 1980, 81 and 93, the power plant in Unterweser was world production champion. Since operations began, the UNPP has attained an average availability of nearly 90 percent. In international terms it is thus among the best of all water pressure reactors. The high availability is also proof of the reliability and operational safety of the power plant as well as of the high technical standard and the expertise of its staff. UNPP, with its 320 employees, has considerable influence throughout the entire region. The purpose of the nuclear power plant in Unterweser is the generation of electricity. It is among the so-called base-load plants that operate around the clock. Base load is the amount of electricity which must be made available day and night without disruption or change in load. The highest priority of the Unterweser nuclear power plant is the safe operation of the plant. All measures and activities are based on a safety philosophy, the aim of which is safeguarding humans and the environment.

Table 1. Technical data of the Unterweser nuclear power plant

Gross performance:	1,410 MW
Net performance:	1,345 MW
Therm. performance:	3,900 MW
Power generation 2004 (gross):	10,220 GWh
Availability 2004:	87.38 %

2 Requirements for Process-Oriented Operation Management

Operation management in nuclear power plants was changed over the past years as a result of momentous influencing factors:

- liberalization of the electricity market (market price, company mergers);
- transition into a processing industry.

In this increasingly difficult environment, the quality of operation management must be continuously increased in order to remain competitive. Therefore, management has to be supported by a management system which offers methods and tools to reach the strategic goals. Process orientation was to be the fundamental principle of this management system, during the construction of which the following problems were encountered:

- detecting weaknesses in company processes at an early stage was not possible without tools;
- many analysis and optimization projects are one-off and thus contradict the principle of a continuous improvement process;
- the surveying and optimization methods chosen in such projects are too costly for permanent use;
- a data survey is often carried out manually and therefore, as a rule, does not interface with operative systems. This leads to a low-quality, out-of-date database, on the basis of which no reliable decisions may be taken.

The Unterweser nuclear power plant therefore decided at an early stage to build up an integrated Performance Management System (PMS). The PMS was realized as an integrated control system, which was constructed according to a clear strategic focus based on the targets of *E.ON* nuclear power. The following sections describe PMS as an integrated and comprehensive management system, as well as the methods employed and their implementation.

3 Principles of the Performance Management System

PMS defines the execution and management structures required to attain the corporate goals.

The basic principles of the PMS are:

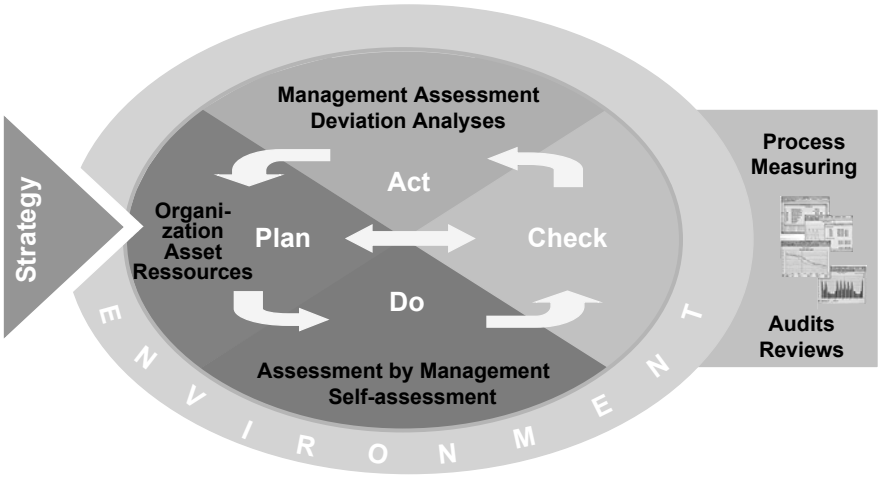


Fig. 1. PDCA method

- process orientation, taking into account the operation management as well as the organization of PMS itself;
- equilibrium on all levels (goals, key indicators, measures, etc.);
- management by objectives.

The integration concept of the management system is ensured by the holistic application of the 'Plan-Do-Check-Act' (PDCA) method (cf. Figure 1). At the UNPP, corporate strategy and the included targets form a basis for all phases. Its influence, however, becomes most evident in the planning phase where the concrete implementation takes place. Furthermore, the method employed in the UNPP is marked by distinct controlling during the execution phase. All phases are permeable and allow cross-connections and short-cuts.

As regards implementation, it is important to consider equally all performance-relevant aspects (security, quality, costs, risk, time, …) during all phases of the method. All relevant processes defined in the process model are taken into account here. The implementation is thus complete with regard to all processes of the Operation Management System.

The basis is a central process repository (cf. Figure 2), which is structured according to the individual phases of the PDCA method.

The aim is to achieve continuity of the PMS solution beyond all phases of the improvement cycle in order to guarantee permanent optimization of corporate processes.

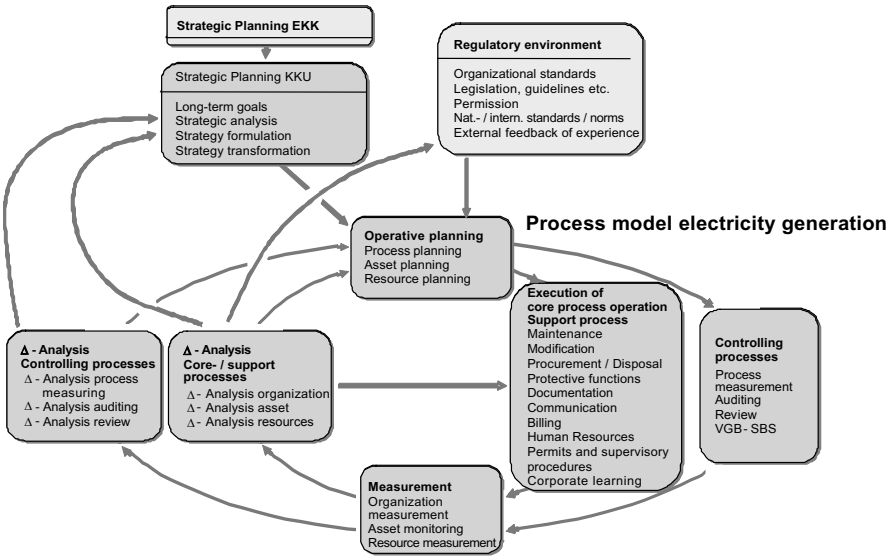


Fig. 2. PMS process model

The management system itself is of flexible design and is reviewed and adapted on an annual basis with regard to its effectiveness and suitability. From an organizational point of view, it is crucial that management information is considered systematically. The aim is to provide the operative staff with management information using processes in order to implement the idea of a learning organization. This also includes institutionalizing the derivation and monitoring of measures by means of regular management assessment and employee target agreements.

The integration of the PMS components must be supported by an integrated tool landscape. In addition to the central process repository, process-controlling and reporting must be automated as far as possible according to the PDCA method. Moreover, the process owners are provided with individualized analysis options and trend analyses. Simple enhancements enable the monitoring of additional processes which ensure the future flexibility of the entire system. The results of PMS are also made available to all employees via different information channels (Intranet, reports, and monitors in the entrance area). This assists the entire transparency of PMS and highlights its value and background. It is the only way in which to encourage all employees involved in the processes to change their behavior – also at execution level.

4 Procedure for the Introduction of a PMS

Implementation was carried out in several stages. First of all, the total concept for PMS was developed. This included:

- strategic focus;
- process models and methods;
- process contents;
- technical components;
- organizational components.

Individual organizational and technical components of PMS were implemented in several steps. In a first step, both strategic focus and operation control had to be systematically linked. To do this, a system using key indicators was developed and structured in form of a Balanced Scorecard (BSC), whereby significant modifications were made to meet the requirements of a nuclear power plant. In the BSC, all operative targets, measurands, target values, and activities of the Unterweser nuclear power plant were compiled and then their content coordinated. These were subsequently broken down in a two-step process onto all downstream management levels. This ensured that all major targets and catalogs of measures of the Unterweser nuclear power plant were coordinated and documented in the BSCs. A continuous controlling concept was implemented by choosing the most important targets / activities from the BSCs of the respective operational departments, including the concrete agreement on objectives for managers.

In the following step, the components of PMS and the fundamentals of Process Management were enhanced to form an integrated management system. The main aim was to interlink the already existing components to form a complete system, thus improving the transition between the individual phases of the management system, and to fully utilize the synergy effects of the various phases (cf. Figure 3). The aim of the integrated PMS was to support a comprehensible and continuous

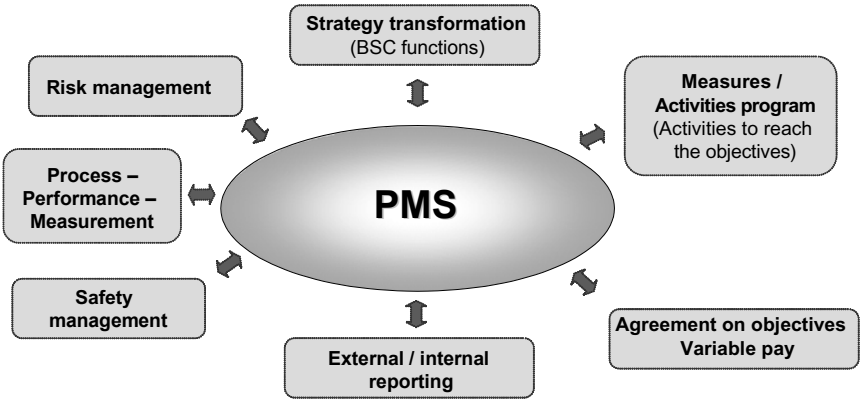


Fig. 3. Components of the Performance Management System

improvement cycle on the various organizational levels. This enables the UNPP to optimally fulfill its company purpose in line with strategic goals – electricity generation.

Process Performance Management in PMS monitors all important process flows and therefore represents a substantial part of the implementation of the entire UNPP control system.

The *IDS Scheer AG* tool ARIS Process Performance Manager is employed to continually measure process performance.

5 Process Monitoring Using PMS

PMS consists of a number of technical components which work together in an integrated fashion. The basis is formed by a process model used as central repository. It contains a description of the processes relevant to operation (cf. Figure 2). Key indicators are created for these processes, which consider all aspects of operation management and are broken down according to operational departments in order to monitor them.

The key indicators contained in PMS are administrated in the SAP Business Warehouse (SAP BW), where definitions and activity data (target / actual values, alert monitoring limits) are stored for each key indicator. The elementary raw data, however, is not stored there. SAP BW is thus employed as display, administration, and definition component. The actual values from the operational level are provided or calculated depending on whether the process is carried out by a DP system. Key indicators or processes not previously processed by IT are gathered in a manual, monthly survey using an Intranet entry system, which directly stores the results in SAP BW. ARIS PPM carries out the process survey and data procurement for the DP systems employed by the UNPP – Operation Management System, Document and Process Management System, and SAP. This data is automatically transferred from ARIS PPM into SAP via configurable interfaces in order to make all results uniformly available to SAP BW. New key indicators merely require an additional configuration of interfaces between SAP BW and ARIS PPM.

The operation of these systems is performed by IT services provider *E.ON IS*. The data from the application systems at the various sites is automatically captured and is made available to ARIS PPM via data transfer. ARIS PPM is operated in an *E.ON IS* DP center. Access is enabled via protected HTML links from within the Unterweser nuclear power plant. In general, the system can also be made available to other *E.ON* locations. Administration and customizing of applications is performed remotely. On the information and presentation levels, users can access HTML evaluations using a management cockpit. For further analyses, it is possible to skip into the analysis component of ARIS PPM.

Figure 4 (below) shows the plan of an IT system structure. The advantage of the represented architecture is that processes are quickly mapped and easily enhanced and that the profound analysis facilities of ARIS PPM can be utilized.

The characteristic feature of ARIS PPM – as opposed to a data warehouse – is the premeditated structuring of the data extracted from the operational systems into predefined process structures. Using this, the performance of the ongoing business processes can be measured automatically. The efficiency of the organizational processes based on the measured PMS key performance indicators (KPIs) can thus be evaluated. This is the idea of proactive process controlling.

On the other hand, users on a global level are presented with a uniform interface to access and view simple key indicators (Figure 5). The decentralized, manual entry of key indicators is possible and can also be expanded.

Using an implemented feedback component, process members or leaders of an organizational department were able to contribute to management assessment by making comments or suggesting improvements (Figure 6).

ARIS PPM gathers data for all processes supported by workflows and processed via BFS and DMS / VMS. For processes, which are not supported by workflows, the entry of key indicators is performed manually. An overview of processes and their measurement are shown in Table 2. Approximately 100 key indicators are already being determined for those processes which can be realized. Analysis options are currently being examined for the SAP processes. The key indicators for processes form part of the incoming information for management assessment.

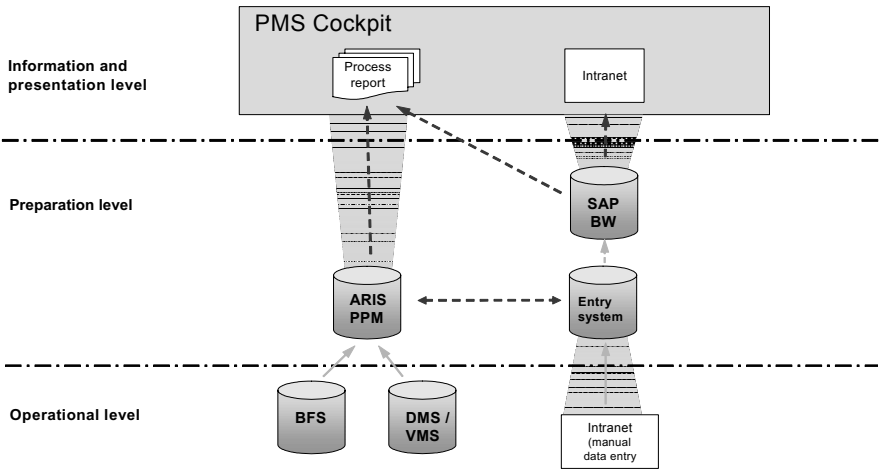


Fig. 4. IT system structure of process monitoring

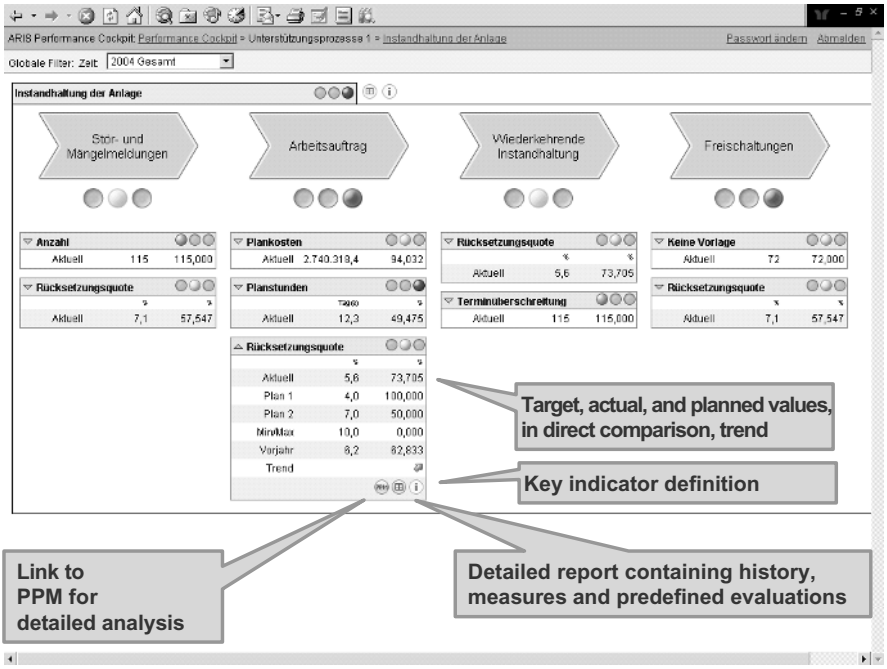


Fig. 5. PMS Cockpit

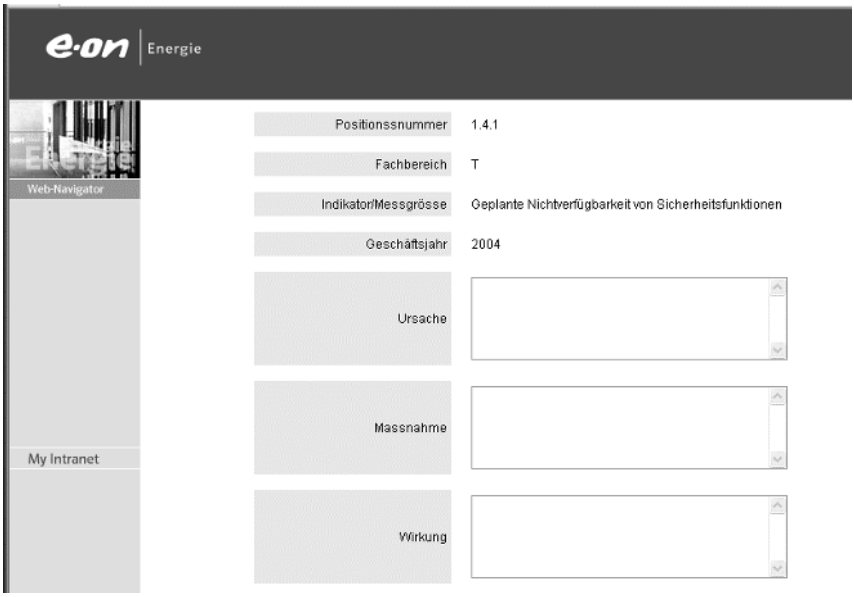


Fig. 6. Input mask for feedback-entry

Table 2. Implementation status 'process measurement'

Processes	Modeling	Workflow	Key indicators electronic	Key indicators manual	Number of key indicators
Plant operation	X	-	-	X	7
Task	X	X	X	-	12
Recurring check	X	X	X	-	10
Failure / trouble report	X	X	X	-	12
Clearing	X	X	X	X	9
Experience feedback	X	X	X	X	7
Human factor	X	-	-	X	4
Requirements, conditions	X	X	X	X	6
Ray protection	X	-	-	X	6
Environmental protection	X	-	-	X	3
Emergency protection	X	-	-	X	1
Procurement	X	-	-	X	10
External communication	X	-	-	X	3
Documentation	X	-	-	X	5

6 Supervising PMS

The task of supervision is to carry out the strategy-conception process and to map these strategies onto planning. Added to this, it analyzes results and reports. Therefore, supervising PMS is first and foremost an organizational component.

Apart from reports, the analysis options provided by the monitoring platform are also used for supervisory purposes. As a result, the comparison between the target and actual status is evaluated, and possible measures are derived from this. These measures serve to reach the set performance targets, which also take into account external influences. Target values are those defined during the planning phase as 'To-Be' values for a monthly and an annual period. Measures can also consist of modifying the values and contents determined during the planning phase.

Supervision decides on the execution or suspension of measures under performance and cost aspects. Such decisions are based not only on key indicators and their trends but also on all other information supplied by the controlling level, including audits, comments, and feedback. Information on past measures and their effectiveness are of particular interest for analysis purposes. Therefore, supervision also has the task of continually monitoring measures and documenting these in context with risks and key indicators. Supervision in the Unterweser nuclear power plant is implemented in levels according to the principle of management assessment (cf. Figure 7). Using the controlling data, the heads of organizational departments carry out controls themselves on a monthly basis. The targets reached by PMS are assessed and, if necessary, corrective measures are initiated. Manage-

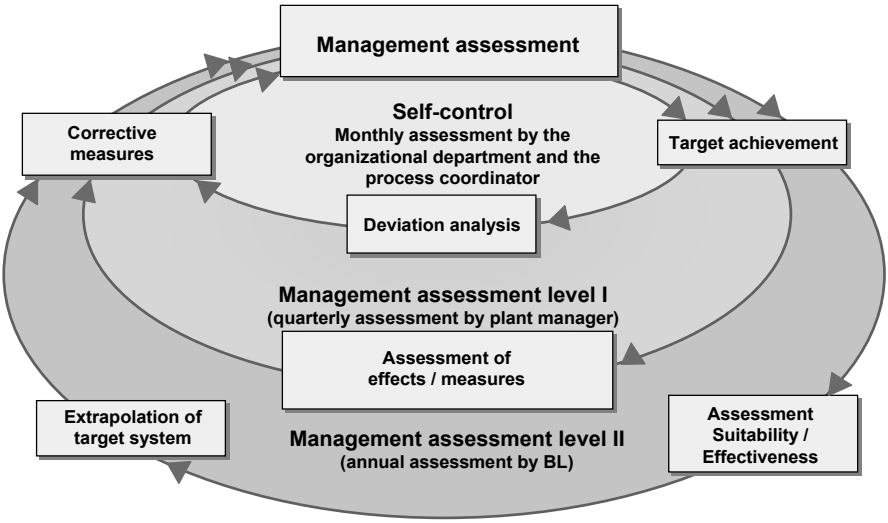


Fig. 7. Management assessment in the UNPP

ment assessment in Level I is usually carried out on a quarterly basis by the plant manager in status talks with the heads of organizational departments. This ensures that targets are reached and that PMS is effective across organizational departments. The management assessment in Level II is carried out annually by the plant manager and the second management level. In this case, the suitability, appropriateness, and effectiveness of the PMS, as well as the attainment of the annual targets, are assessed and the targets for the following year agreed upon.

It is possible to reprioritize and reassess key indicators in PMS. This can be implemented quickly due to the flexibility of the IT system structure. In preparation for management assessment, management receives a detailed ARIS PPM evaluation (a so-called *management view*) for all process key indicators of PMS where set targets were not reached.

On the basis of these detailed analyses, the deviation analysis is simplified for the managers concerned. When necessary, further analyses can be required to establish the causes.

7 Process Analysis Using ARIS Process Performance Manager (ARIS PPM)

ARIS PPM enables the interactive generation of process analyses using process key indicators. In order to map a process key indicator, a *favorite* is formed in ARIS PPM. A *favorite* represents a standard analysis, which is handled like a

browser bookmark and can be stored and recalled at any time. Favorites are the starting point for analyses and can be refined by adding analysis criteria (dimensions) and filter settings, etc. The possibilities on offer in ARIS PPM are shown in the example of the key indicator for 'Terminverfolgung Stör- und Mängelmeldungen (STM)' (deadline tracking of fault and defect reports).

The process 'Stör- und Mängelmeldungen (STM)' (fault and defect reports) registers faults and defects in the plant and tracks their removal. Deadlines are set for their removal and (non-)adherence monitored using ARIS PPM.

The analysis is accessed – as mentioned previously – via a favorite. In the following diagram the favorite 'STM_04.1 Anteil Terminüberschreitung' (share of non-adherence to deadlines) is depicted for the 'fault and defect reports (STM)' process. In the data window the number of processes is shown in percent on the y-axis. The x-axis shows whether or not a deadline of the predetermined resolution deadline has been exceeded. In 2004, 90.7 % of 'fault and defect reports' were settled to plan, and in 9.3 % of STMs the removal deadline was exceeded (cf. Figure 8).

The question on the length of time by which a deadline was exceeded arises: according to the analysis, non-adherence to deadlines lies within a period of between 1 and 14 days. Using further detail (cf. Figure 9), one can see that of the 9.3 % of STMs exceeding the deadline (cf. Figure 8) approximately 83 % exceeded the deadline by less than 3 days. In 16.2 % of the cases, the deadline was exceeded by more than 3 to 7 days, and only in 0.7 % of the cases the deadline was exceeded by more than 7 days.

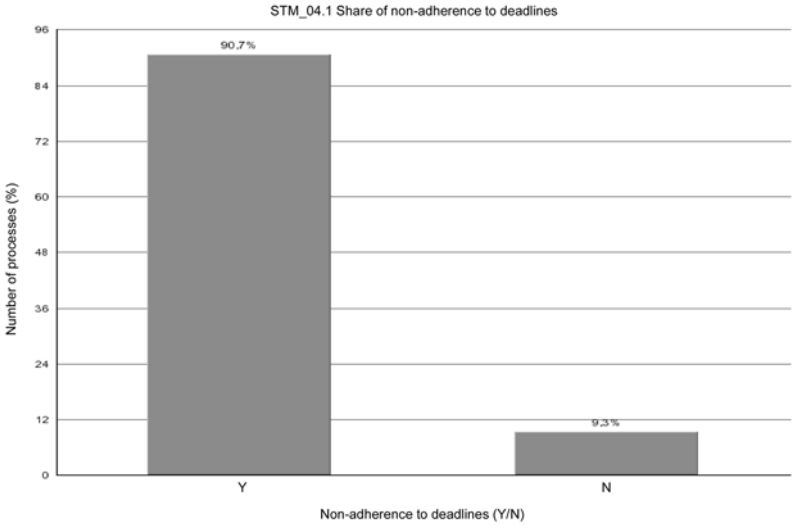


Fig. 8. Share of non-adherence to deadlines for fault and defect reports

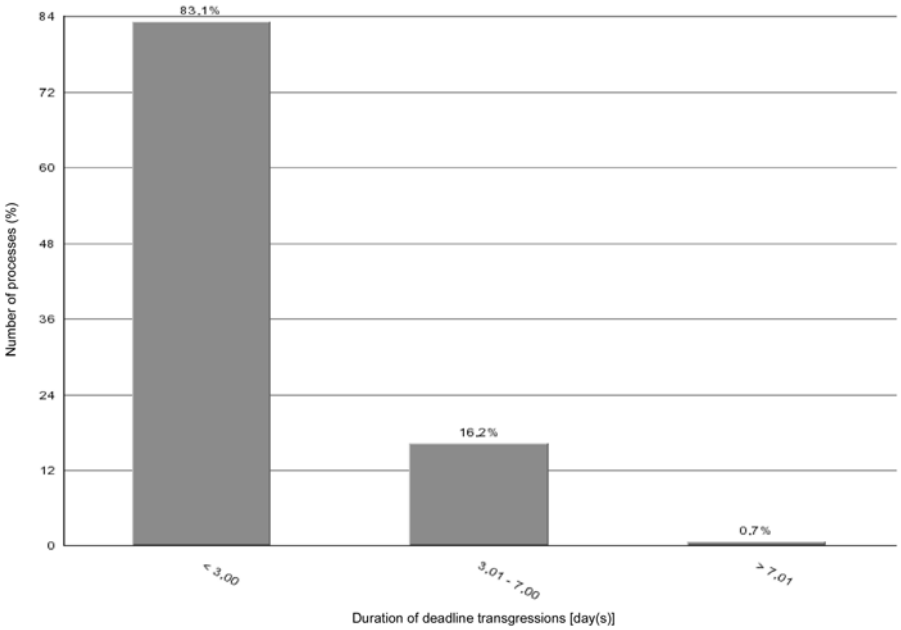


Fig. 9. Detailed analysis of the duration of deadline transgressions

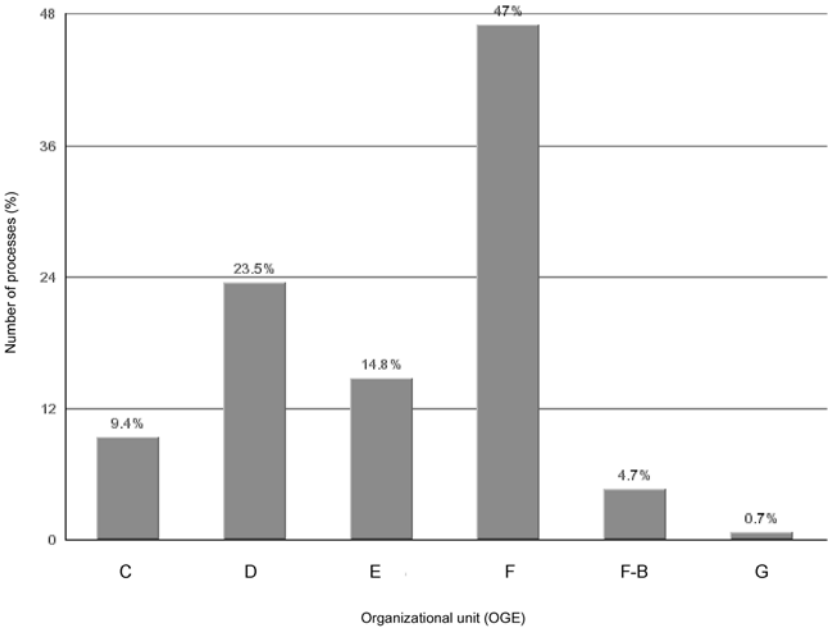


Fig. 10. Organizational units causing fault and defect reports

For each ‘fault and defect report (STM)’, there is an organizational unit which is accountable for the STM and its removal. The question now arises, whether there are organizational differences in processing STMs, and whether there are organizational units that exceed deadlines more than others.

The analysis (cf. Figure 10) reveals differences in distribution and a cumulation of deadlines being exceeded in OGE F. The reasons for this can now be examined, particularly with regard to and in comparison with OGE C. The aim of this is to copy more efficient work methods or attain a better distribution of STMs in the sense of a work stockpile. Evidently, the greatest optimizing potential is in OGE F at 47 %. The causes within this organizational unit can be determined or presented after analysis and in time for the next management assessment. It is very important, in this respect, to be able to concretely address the person or department causing the failures with objective figures. This will prompt them to examine the deviation analysis and find an appropriate solution.

Furthermore, the question arises which procedural systems are affected by the STM non-adherence to deadlines. All processing systems in the UNPP are identified using plant identifiers and are grouped across various stages to form components and component groups.

As a rule, an analysis is refined via the various hierarchical system levels (cf. Figure 11). The bulk of STMs, where deadlines are exceeded, can be found in the system marked T and Y at a rate of 30.4 % (cf. Figure 11). What is the distribution like inside the T-System?

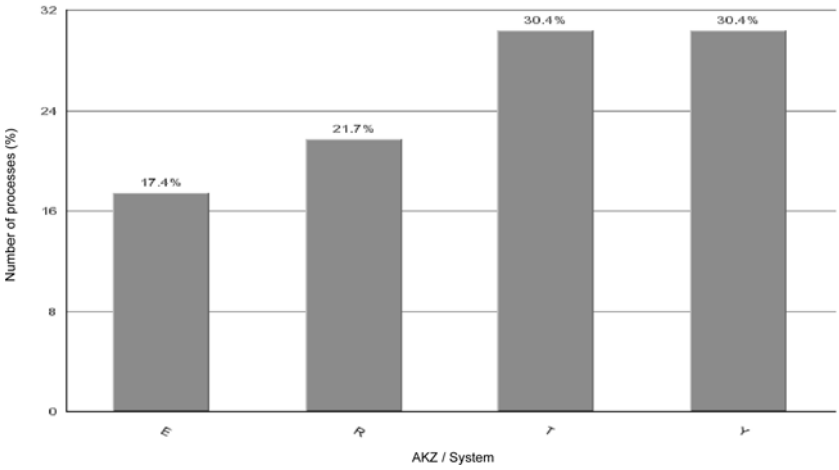
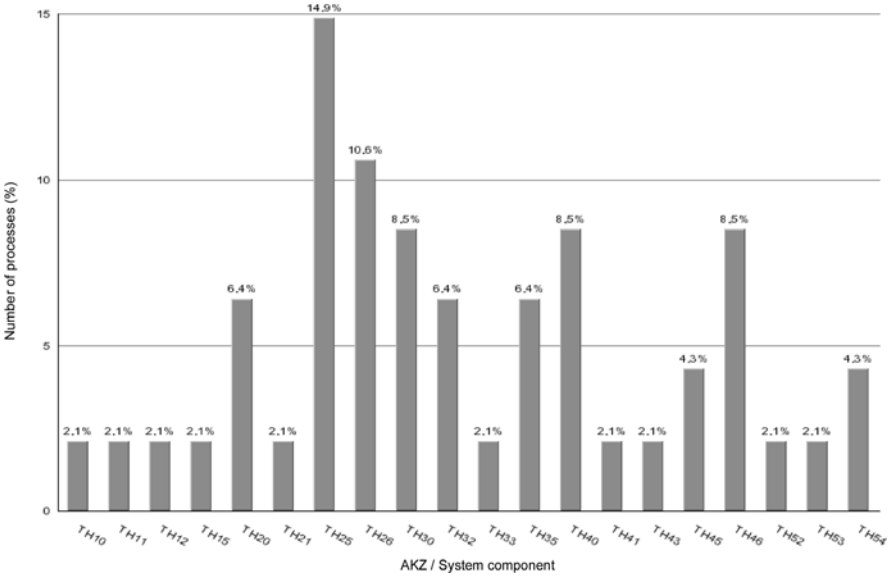


Fig. 11. Affected systems



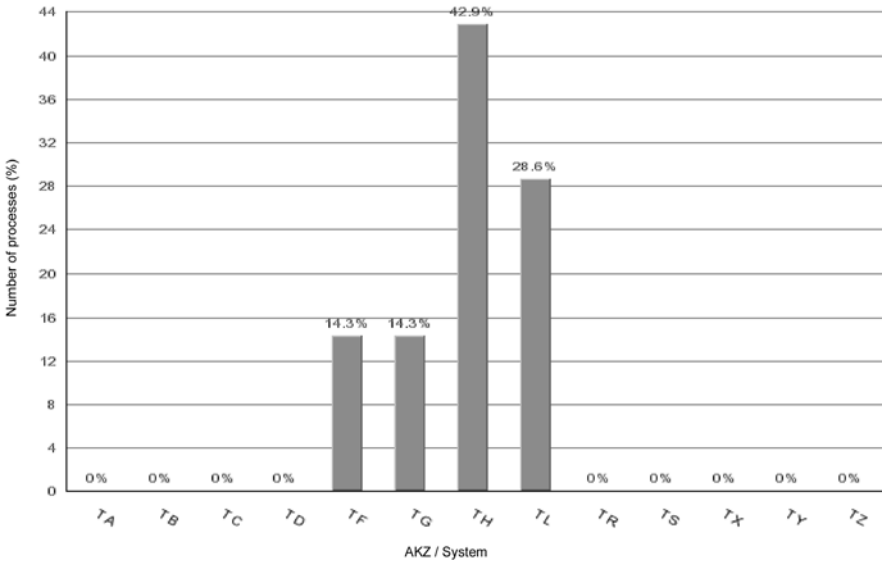


Fig. 12. Distribution inside the T-System or TH-System

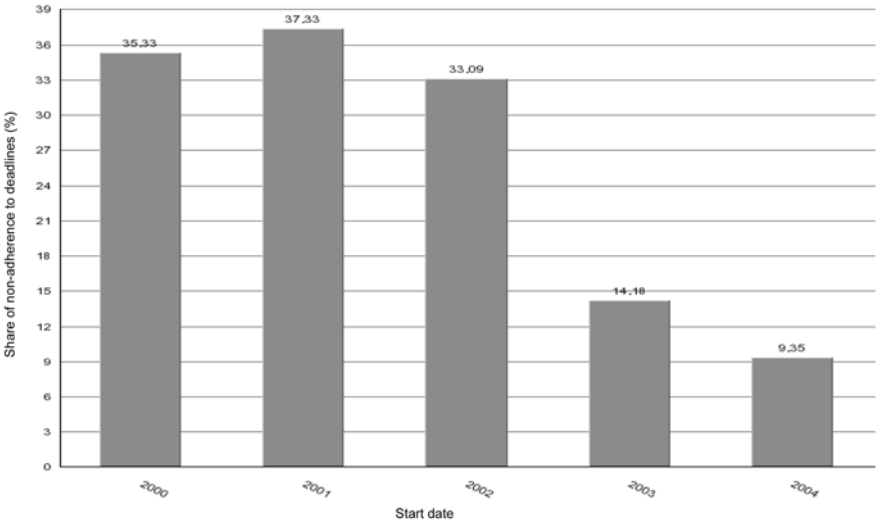


Fig. 13. Trend from 2000 to 2004

As becomes evident from Figure 12, the main focus in the TH system is at approximately 43 %. Within the TH-System, the focus in the sub-system TH25 lies at approx. 15 % and in TH26 at approx. 11 %. In these cases it should be determined why these deadlines could not be met. A possible cause could be missing spare parts for the component in question. In this case, adapting the stock-keeping strategy could effectively remove deadline problems. This example clearly shows that by means of such analysis individual weak points can be removed systematically. This gains more importance when considering that stock-keeping is a costly area and the optimization therefore offers a large financial potential.

The introduction of ARIS PPM enabled regular tracking of the removal of STMs in the management assessment. The trend from 2000 to 2004 shows a steady decrease in deadlines being exceeded. The rate of about 37 % maximum in 2001 could be reduced to approximately 10 %. In 98.4 % of STMs, the removal occurs within a 3 day tolerance.

The example of tracking fault and defect reports impressively shows that, by using ARIS PPM, the deadlines met when resolving the STMs were improved significantly. This implies a quality gain for the STM process.

8 Assessment and Benefits of PMS

PMS ensures a constant assessment and improvement of relevant processes for plant operation management regarding safety, efficiency, and effectiveness and

ensures that corporate goals are achieved. The degree of automation of the control system is very advanced with system-supported monitoring covering seven core processes, among which are all processes of the Operation Management System.

The security level of the plant was significantly increased by process monitoring. Weak points could be detected at an early stage. The effect of the initiated measures can easily be assessed. Therefore, the PMS also fulfils the task of an early warning system. Meeting deadlines when working on important processes could also be improved by about 15 %. The transparency of targets achieved by PMS is showing effects. An employee survey shows that more than 85 % of employees feel well-informed on the safety- and economic efficiency targets of UNPP.

The PMS is a supervisory system, which carries out the entire performance assessment of the nuclear power plant. Measurability in this case plays a crucial role, because only this ensures objective supervision and control. The PMS thus forms the basis for a constantly recurring management process used to guide the organization into the right direction. From the UNPP point of view, the development of PMS has created an integrated monitoring and control system which enables the efficient management of the plant. A good performance of operating processes has become a decisive competitive factor.

Integrated Manufacturing Execution Systems – Yesterday, Today and Tomorrow: From Systems Integration to Comprehensive Optimization of Business Processes

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Summary

Today, the optimum management of complex production plants requires a complex data processing network connecting the logistic, technical and economic world. Consequently, systems integration projects, in which such IT systems are installed, take up a central position. At the same time, these Manufacturing Execution Systems (MES) – here also called Operation Management Systems – represent integration projects, which primarily focus on business processes between the Process Control System level and the organizational management level and involve several different systems. Looking at the history of integrated Operation Management Systems at *Bayer AG*, this article will give an example of the gradual convergence of Process Management systems and Enterprise Resource Planning (ERP) – also called Organizational Management Systems here. It will become evident that a consistent data model is of crucial importance for the horizontal and vertical integration of all systems within an organization. In order to achieve maximum optimization, the business processes must be represented appropriately. As an example of a modern, recipe-based, and fully-integrated Operation Management System, we will examine order processing inside a state-of-the-art, multi-operational company. Finally, we will give an outlook on the future development of Operation Management Systems.

Key Words

Operation Management System, vertical integration, chemical and pharmaceutical producers

1 25 Years of Operation Management Systems

1.1 Trial and Learning Period (1975–1985)

The first Operation Management Systems at *Bayer* were set up in the mid seventies within a 'divided' world. On the one hand, the central computer science department developed inventory management and disposition systems on the IBM host, while, on the other hand, the process control engineering department was constructing decentralized systems in the era of process control computers. In this early phase, these two departments unfortunately never joined forces or took a consolidated approach. However, it was recognized that the prepared data had to be transmitted from the process control computers to the (quasi) central calculation department[1] of *Bayer AG* at least at the end of every month and quarter. This took place using the then current RJE (Remote Job Entry) technique. RJE is reminiscent of the punch card era, because job control cards, being process control information, had to be stored in the files to be transferred in an 80 byte format. The host was then able to identify in which way to process this data (Figure 1).

At the time, local applications, already developed as part of individual projects, covered material flow control, process data analysis, plant occupancy, and statement of quantities. Links to process control and automation systems were implemented in a handful of projects. These projects were driven forward by individual project engineers from the central engineering department and by forward-thinking managers in the chemicals and pharmaceuticals sector.

These individual solutions, however, were unable to achieve any significant breakthrough. There were always limitations which were not only of a technical nature. Nevertheless, this trial and learning phase did provide a lot of findings beneficial to the further development of Operation Management Systems. It became clear to those concerned that they were caught in the middle. To the left and right, data redundancy was building up and business process chains ended up either in a black hole – or, with a bit of luck, on paper.

In the case of one client in the production sector, we were horrified to find out that three specialist departments had installed software packages, each of which requiring recipes as their master-data record. There had been no coordination whatsoever between these departments and resulted in completely separate installations with absolutely no intercommunication.

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[1] At this point in time, each plant at Bayer AG was running their own calculating software on their host.

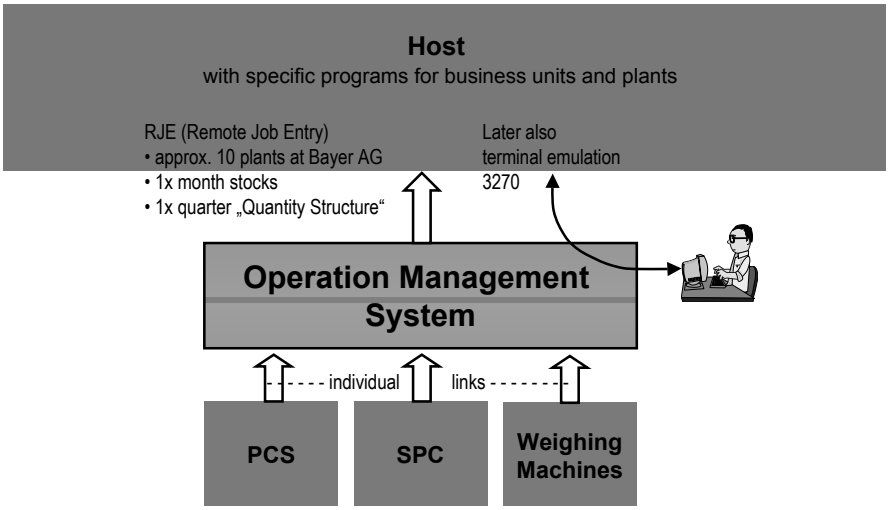

Fig. 1. Typical configuration taken from the learning and trial phase – isolated interfaces between Process Control Systems, Stored Program Control or other equipment on the process control level, such as weighing machines, and the Operation Management System

1.2 Creative Collaboration 1985 – 1997

The findings obtained in the trial and learning phase sound banal when looked at from today's point of view:

- an all-embracing IT concept must be developed for the organization;
- a consistent, cross-organizational data model must be developed;
- and the underlying business processes must be looked at and supported in their entirety.

To turn these findings into a creative design process, it was necessary to establish a close link between the technical and the business-oriented IT departments. Of course, two completely different worlds and viewpoints clashed: on the one hand, the process control engineering, decentralized view and, on the other, the historically-oriented, centralist point of view. A third group from the organizational management department, formerly located in the central area of group planning, also joined and was able to contribute considerably toward finding a holistic approach and, when necessary, taking over a conciliatory function in the design process.

With united efforts, the *Informationssystem Produktion* (production information system) (ISP) was designed and implemented. The ISP covered parts of what we today term as Enterprise Resource Planning (ERP) as well as a significant part of the Manufacturing Execution System (MES). The host-based functions of ISP –

production planning, inventory management, warehouse management, and the interfaces to other ERP subsystems – represented the lion's share of the ISP and were designed by the central Computer Science department (Figure 2).

The *Operation Management Systems* team, then part of the central engineering department, was in charge of the link to the production and warehousing plants and often also to the installed Process Control Systems and warehouse and transport controls. During the period between 1988 and 1993, the ISP basic software modules *production control* (Produktionssteuerung, PST) and *warehouse automation* (Lagerautomation, LAT) were developed in-house. Both systems were implemented and operated on the same platform (Unix, *Oracle*, graphic user interface, TCP/IP-based standard interface software).

The LAT system (not shown in Figure 2) closed the gap between the host-based warehouse management, the individual controls in the high-rack warehouse, and transport facilities belonging to the plant (pharmaceutical production). LAT is still actively running in seven plants – also with, among others, an SAP WM interface.

As with LAT, PST was based on a solid data model. As we had resolved to simplify communication with the ERP and the PLS world, data modeling proved to be a large-scale, creative design process for the three above-mentioned departments. The recipe and production release models by far formed the major part.

All models were designed using a CASE tool for creating data and function models and provided the basis for the PST application. The main framework of PST consists

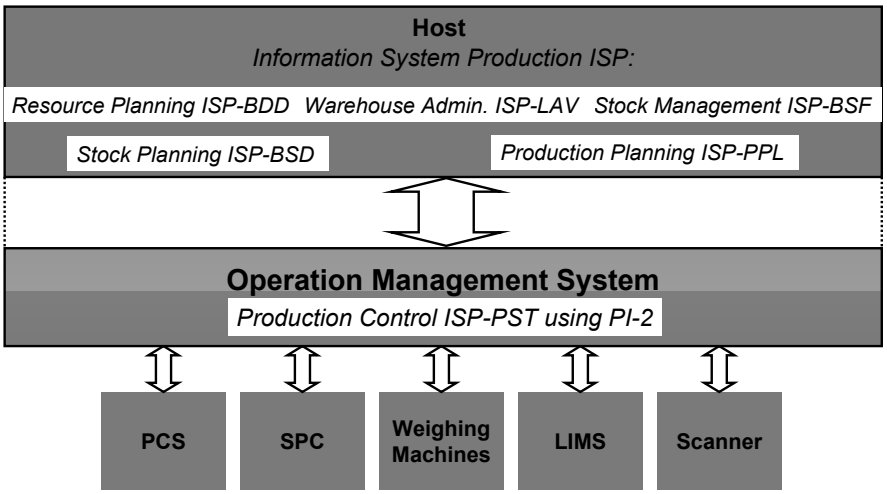

Fig. 2. The in-house *production control* standard serves as an integrated interface for the systems supporting production

of four core functions: recipe administration, detailed planning, documentation / evaluation and material flow control. From 1991 onwards, a development co-operation was formed with *IDS Scheer AG* for the 'detailed planning' module. The graphic planning table for process industry PI-2 emerged as a common development. Right up and into 2000, a total of 12 businesses were equipped with the organizational management system PST.

1.3 Transitional Phase 1997 to the Present

At the end of the '90s, there was a growing trend away from in-house standards towards standard products available on the market. As a result, *Bayer AG*, as well as other companies, decided to implement SAP R/3 throughout the entire group. In the initial planning phase of the SAP R/3 implementation in ERP, we planned and implemented the interface of PST with SAP R/3 (Figure 3) in order to secure our investment in the PST systems within the various production plants. We have meanwhile been able to implement this link at 12 plants.

From the data modeling point of view, there were no significant problems in the implementation of the interface between SAP R/3 and PST. This was because the recipe modeling within PST was based on a similar data model used in SAP PP/PI, for we had already used the same standardization source as in SAP PP/PI when modeling the recipe in PST. However, technical problems did arise when converting the recipe from PST to SAP R/3, as SAP R/3 does not provide for a recipe interface for external systems.

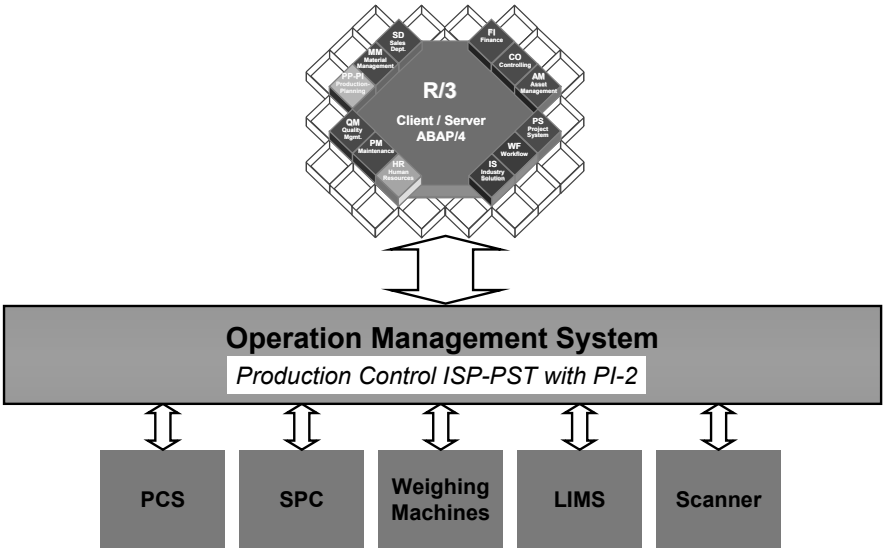

Fig. 3. The in-house production control standard interfaced with SAP R/3

This hurdle, too, was taken in cooperation with our development partners at *IDS Scheer AG*.

Our latest findings have revealed that we will continue operating this ERP / MES combination in the twelve remaining installations at least until well into 2006. Some installations will probably even run up to 2010, which would suggest a running time of 15 years.

Apart from the continued use of the in-house product PST, the advancing development of SAP R/3, such as the new modules for detailed planning, is leading to an increasingly large functional scope of PST or of other MES tools that can be covered by the ERP system. On the other hand, the standard software for Process Control Systems is continually being enhanced and is already able to take over a significant part of the functionality from the MES level. Particular highlights are the more attractive tools for recipe management. From the data processing point of view, one could metaphorically talk about converging worlds. This approach has had significant consequences for the design of the MES level.

The current situation can be summarized as follows: SAP R/3 has established itself as a quasi standard for ERP systems. There are a number of established brands that offer software products for Operation Management Systems. Many individual components, which are normally not easily interconnected, are available, however, (often only in form of a tool set) even though they have certified interfaces.

For Operation Management System projects at *Bayer*, the primary task is to design, customize, enhance, and harmonize standard software to form vertically and horizontally integrated systems. Often, enhancements are composed of elements taken from the in-house module construction kit, which are then integrated into the standard software. This enables business processes to flow continuously without paper interfaces. Particularly in investment projects, the 'Operation Management Systems' component acts as an integrator. This is, because the aim is to obtain an integrated IT system for different users in association with several partners for the interfaces. Therefore, the tasks related to Operation Management Systems are gradually moving towards project management. An example for this is given in the following section.

First Step into the Future

About five years ago, the future started at *Bayer*. An integrated Operation Management System for a multi-purpose plant in the life-science business was to be planned and implemented without the in-house development PST.

The special challenge for the Operation Management System within this multi-purpose plant is that production plant and pilot plant are located side by side. In the production plant, complex batch processes must be processed, whereas the

foremost interest of the pilot plant is process development. At maximum capacity, approximately 200 sub-lines need to be scheduled and incorporated into the material logistics of the plant. The Process Control System containing 6000 PLT points – PCS7 with Batch flexible by *Siemens* – is the executing instrument for the Operation Management System and delivers data for many business processes and evaluations.

We invited 6 potential suppliers to tender for the Operation Management System described in [2]. We were looking for a prime contractor. At the time, SAP R/3 was already firmly established at *Bayer* in the ERP sector. APO by SAP was among the favorites, but was still being examined. As regards the PLS level, the decision had already been made during the PCS7 project with Batch flexible. The following implementation requirements were listed in detail in a comprehensive specification. These included:

- the functions already available in SAP R/3 must be utilized when possible, i.e. also within the MES section; recipes should only be created and distributed from one master source, i.e. Batch flexible.
- data exchange spanning several systems, particularly in the recipe and process release area;
- high-performance (detailed) planning tools;
- IT support for material supply via the packing management and control system;
- cross-system, batch-oriented evaluation and archiving of process data.

Three suppliers presented a somewhat decentralized solution under SAP R/3 with their standard products. Of the second group of suppliers, who wanted to use as much of the SAP R/3 functionality as possible, only *IDS Scheer* intended to utilize APO[2]. We had now found our candidate for the area surrounding SAP, but what about the environment surrounding PLS – the connection of Batch flexible and PCS7? Given the nearly 10 year long cooperation with *IDS Scheer AG,* we knew that they had no expertise in this area. We therefore stepped back from our original plans of finding a 'prime contractor for the MES' and chose *Siemens* as a second partner.

With this partner, too, we had a long history of collaborating on common projects. The consequence was, of course, that we now had to take over the entire technical and organizational coordination ourselves.

What had been implicated during the tender phase became apparent after the first conceptual meetings: we would never reach our goals using only the standard

[2] This was understandable, because *IDS Scheer* had been involved in developing APO.

products available on the market. We had to find solutions to bridge the following gaps (marked in red in Figure 4):

- conversion of the Batch flexible recipe into a planning recipe;
- recipe interface with SAP R/3;
- planning campaigns and campaign chains beyond buffer containers
- handling unit management on site (the SAP R/3 version 4.6B – without handling unit – is being employed)

As expected, the greatest challenge was the recipe design (Gaps 1 and 2). On the one hand, our partner *IDS Scheer* could tell us which recipe data was required by SAP R/3 (it wasn't so obvious for the APO, because the function *container resource* was still in development!), and, on the other hand, our partner *Siemens* was able to show what data Batch flexible was able to deliver. The delivery degree of the basic data for the recipe was astonishingly high (90 – 95 %).

Because an expansion of the Batch flexible standard was unrealistic, we designed a middleware. The solution for the recipe interface with SAP R/3 was implemented in this middleware. We were able to find a similar solution for this interface in our PST installations (cf. above). In a strategic development project with SAP, we were able to expand *campaign planning using buffer resources* in the APO to an acceptable work-around solution, thus closing Gap 3. The above mentioned Gap 4 is being closed by our in-house development '*Bayer* barcode system' [3], which contains a packing management system.

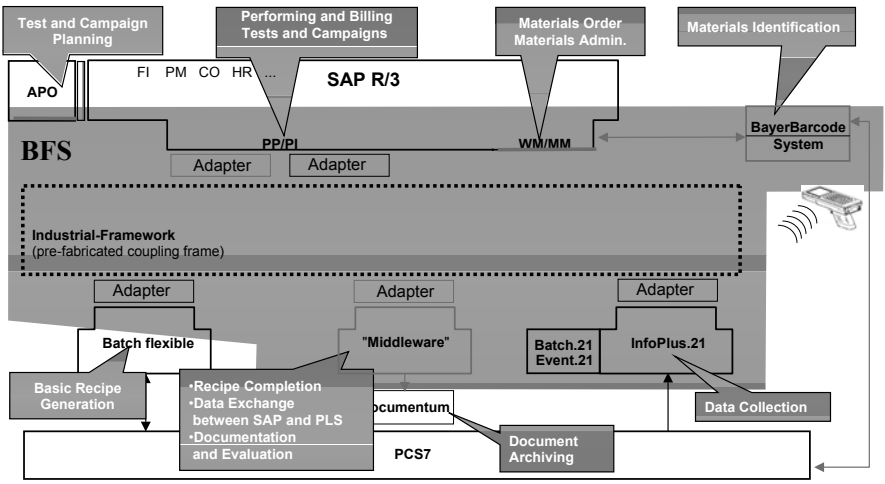

Fig. 4. Operation Management System inside a multi-purpose plant

An additional challenge within the project was that the following standard products were still in the respective development and trial phase: Batch flexible, Simatic IT Server (including some adapters) and APO. The described system configuration has been in operation since May 2002 and has accompanied the comprehensive commissioning phase of the multi-purpose plant.

2 Outlook: Opportunities and Challenges

In line with the pending replacement of the Process Control Systems installed during the `80s, increased investment in MES solutions is expected over the coming years. Reasons for this are, among others, that there is an increased demand for business data in the ERP systems, and that, not only at *Bayer AG*, process optimization offers an answer to the product change from specialties to commodities.

Furthermore, one can assume that the ERP and MES levels will continue to converge. But as the systems involved have somewhat different requirements as far as response times and availability are concerned, it is important to ensure that no useful interfaces are lost within the system architecture. Moreover, it can be expected that working methods associated with quality assurance – such as in the GMP environment within the pharmaceutical industry – will continue to spread to other sectors.

Increasingly, particularly in the process industry, business processes have been recognized as a factor for gaining competitive advantage. Therefore, suppliers of MES solutions are finding themselves in an area of tension between a management willing to change and historically grown process flows within the businesses. In order to support the individual business processes using standard solutions, the MES solution provider should make a standardized definition of the individual functions at MES level and then customize individual solutions from this. The best-of-breed approach, often favored in the past, must be seriously questioned here. For, the solutions based on this approach are still subject to failure, either because the user interfaces are not uniform, or because there are functional gaps or overlaps, or due to high maintenance costs. Moreover, businesses don't always need to receive the most comprehensive solution, because their requirements are not so high in all the functional areas.

On the whole, there will be no off-the-shelf MES solution available in the near future, at least not for the outlined environment. However, it is already evident that in MES projects designing, customizing, and harmonizing standard software to form integrated systems is in the foreground. Particularly in investment projects, the MES component takes on an integrating function. Often, the overriding objective of the project is to provide an integrated IT system to many different users in association with several partners for the interfaces.

The tasks concerning organizational management systems are moving in the direction of project management. But in future, the design of recipes will play the prominent role in multi-substance plants with a large number of process releases. This applies to the replicable, recipe-driven production as well as to the improved planning- and cost display.

The multi-functional recipe containing the data views *control*, *planning* and *costs* is long overdue in this environment. It is desirable for ERP and MES suppliers to collaborate in the coming years. Regrettably, there aren't even any promising first signs on the horizon.

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Hawaiian Tropic Sizzles with Integrated mySAP All-in-One Solution

Jean Rogers
IDS Scheer AG

Summary

With a mySAP All-in-One solution from *IDS Scheer* Small and Midsize Enterprises (SME), *Hawaiian Tropic* shines in the competitive international sun care product market.

For *Hawaiian Tropic*, being a David to the Goliaths of sun care products takes ingenuity, hard work and the power of a mySAP All-in-One solution. As the only privately owned international sun care brand manufacturer in a hot market, *Hawaiian Tropic* vies for shelf space with the products of industry giants, such as *Schering-Plough's* Coppertone label and *Playtex's* Banana Boat brand.

Hawaiian Tropic, also known as Tanning Research Laboratories (TRL) Inc., faces this heavy competition for its *Hawaiian Tropic* brand, as well as its private-label sun care products sold by major retailers, pharmacies and supermarkets.

To remain competitive, the Florida, US-based company knew it had to improve inventory management, production schedules and customer satisfaction. That's why, two years ago, the 500-employee company chose a mySAP All-in-One solution from *IDS Scheer* SME, a SAP Business Partner and vertical solution reseller (VSR). ARIS SmartPath for Consumer Products / Cosmetics set them on the path to success.

Key Words

ARIS SmartPath for Consumer Products / Cosmetics, mySAP All-in-One

1 Mergers and Mayhem

"With ARIS SmartPath, we've improved our inventory turn by 26 percent over the last year," says Steve Swanson, Vice President of Information Technology. "An integrated view of the business increases our visibility into inventory, production and financial activities, allowing us to make faster business assessments and respond swiftly and more personally to customer needs."

The results are clear; over the past two years, good business decisions and the mySAP All-in-One solution have helped the company outpace industry growth. In fact, *Hawaiian Tropic* grew its market share by 11 percent in 2003 alone.

Hawaiian Tropic's efforts to improve efficiency began in 1999, after purchasing its primary distributor in Kentucky. The merger resulted in disparate systems between the two companies across all business operations and problems ensued. "Just getting an inventory report meant compiling information from two different systems, each with different nomenclature," Swanson explains. "It was just a mess."

Hawaiian Tropic's own highly-customized legacy system was outdated and required repetitive data entry processes. With more than 125 product formulations and 400 different types of ingredients involved in manufacturing, human error was unavoidable. With no materials requirement planning (MRP) functionality, there was only limited control over inventory, which included 500 *Hawaiian Tropic* and 500 private-label SKUs, as well as about 7,000 different materials needed to make the 36 million sun care products the company sells annually.

By 2001, it was clear the company needed to integrate and optimize the supply chain management systems of both companies. "We had no visibility into inventory at our main distribution sites or in any sales offices that held inventory," says Swanson. "An employee had to spend a full day to determine stock status. With so much capital tied up in inventory, we needed faster access to information to meet customer demands. As a seasonal business, timing is everything."

2 A Smooth Transition

After reviewing many top-tier software vendors, *Hawaiian Tropic* chose the mySAP All-in-One solution from *IDS Scheer* (Plaut Sigma Solutions at the time). This fixed price and fixed timeline solution for the consumer products / cosmetics industry would manage all aspects of a seasonal business – from production forecasting, after-season returns, shelf-life expiration, and quality control to unit management and billing.

"For a fixed price, we bought a complete, proven SAP solution that lowered implementation risks," says Swanson. Decision makers also liked *IDS Scheer*'s big bang approach to implementation, which leveraged SAP's rapid implementation methodologies. This model requires 30 percent less time and costs 40 percent less than traditional approaches.

With a highly seasonal business model and 80 percent of its sales occurring within a six-month period, *Hawaiian Tropic* executives didn't want to wait, and didn't. Within six months, the mySAP All-in-One solution was launched in the company's main manufacturing facility and four sales and distribution locations.

Bill Jennings, *Hawaiian Tropic's* executive vice president, confirms the benefits of quick deployment: "Companies our size don't have the luxury of long, complicated implementations that require armies of consultants or internal staff. The prepackaged mySAP All-in-One solution offers all the functionality we need right out of the box to load the system quickly and successfully."

3 Timing Is Everything

With two full years under their belts, *Hawaiian Tropic* talks openly about how the *IDS Scheer* solution makes life easier and business better. For example, Swanson says inventory managers can determine stock location in about 20 seconds and analyze the data in several different ways. "The information is there, it's reliable, and it's processed the same way each time, so we can make faster decisions," he says. "Better inventory control frees up working capital, allowing the company to leverage that capital in other areas that advance the business."

Quicker access to better information also gives *Hawaiian Tropic* a competitive advantage. "We have better control of and visibility into inventory. We're building closer to forecast than ever before because the system takes our sales forecast, nets our on-hand inventory, tells us what to build, when to build it, and what to have available at certain times. Managers have information at their fingertips they never had before, so they can run the business instead of analyzing data all day."

As an example, Swanson says a major retailer contacted the company about running a special promotion for the July 4th holiday. "By using mySAP All-in-One data, we were able to quickly identify four SKUs that were readily available to cover their promotion. It turned out to be a very good deal for us. That's one advantage to being a small to midsize business; our competitors aren't as nimble as we are."

Other benefits include closing the monthly books in 10 days, versus 45 days. The company also reduced accounting staff amidst a period of rapid growth, redeploying them to support other key areas of the business.

4 A Sunny Forecast

European users also tap into the system now to view product availability. Handheld devices also tie into the solution to streamline inventory and shipping processes. Further, the company leverages the software's profitability analysis features, as well as *IDS Scheer*'s help desk services.

Hawaiian Tropic's experience with SAP and SAP Business Partner *IDS Scheer* has been overwhelmingly positive. "SAP's track record and commitment to the SMB market convinced us that mySAP All-in-One was the right solution for us," says Swanson.

"*IDS Scheer* deals with SMBs all the time and really understood our needs and business processes from order to shipment," he continues. "Their close work with us throughout the implementation process is really paying dividends now. Our internal team has the knowledge needed to fully leverage the functionality of the solution. The *IDS Scheer* team was a perfect fit for us."

Aligning the Core Logistics Processes of the US Army with SAP

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Summary

The US Army is using the ARIS Business Suite and the SAP Solution Manager to manage its implementation of the Single Army Logistics Enterprise – one of the largest SAP ERP system implementations to date. For the US Army, this approach enables the Army's transformation from a supply-based and often stove-piped logistics enterprise into an integrated, streamlined, responsive distribution-based enterprise that delivers 'the right support to the warfighter in the right place, at the right time, and in the right quantities.'

The article describes how the involved projects are utilizing ARIS and SAP Solution Manager for the management of this complex implementation. The development and use of End-to-End scenarios ensures that the implementation is executed via a process-centric methodology rather than from a component-driven approach.

Key Words

Enterprise Architecture, Solution Architecture, SALE, Alignment, End-to-End Scenarios, ERP Implementation, ARIS for SAP NetWeaver

1 Introduction

The Department of Defense (DoD) has tasked the US Army to develop an integrated Army Logistics Enterprise that delivers 'the right support to the warfighter in the right place, at the right time, and in the right quantities.' In order to realize this objective, the US Army is implementing one of the largest SAP Enterprise Resource Planning (ERP) System landscapes ever deployed.

The baseline for the implementation is the Single Army Logistics Enterprise (SALE) Architecture. The SALE defines and documents the end state for an integrated solution across all Army Logistics business functions and processes, including alignment with field and national programs, initiatives, and systems across the enterprise. The SALE simultaneously delivers both the Enterprise Solution Architecture required to address the technical complexity of the solution and manage its implementation within the Army logistics domain, as well as the descriptive Architecture that adheres to the Department of Defense Architecture Framework, (DoDAF) a methodology used to integrate architectures across the DoD. Embedding the Solution Architecture inside the Descriptive Architecture reduces the complexity, and increases the effectiveness, of managing the architecture and the subsequent solution implementation.

The core of the SALE Architecture consists of the standard software solution mySAP Business Suite. The Architecture for this implementation has been developed using the SAP Solution Maps as a reference. Functions that have to be executed in SAP are represented using objects from the SAP Solution Maps.

The US Army intends to construct the SAP components of the SALE via three ERP projects: The Logistics Modernization Program (LMP) for the National Army, the Global Combat Support System – Army (Field / Tactical) (GCSS-Army (F/T)) program for the Field Army, and the Global Combat Support System – Army (Product Lifecycle Management plus NetWeaver) (GCSS-Army (PLM+)) program. GCSS-Army (PLM+) will serve as the broker for technical information between the integrated logistics environment and all external business partners to the Army Logistics Enterprise. The primary challenge facing the SALE implementation is achieving true integration, because the three projects started at different points in time and they are implemented in different increments. In the case of LMP, the project started prior to the finalization of the SALE concept.

Figure 1 depicts the extended US Army Logistics enterprise, a value chain that extends 'From Factory to Foxhole', and illustrates how the three SAP projects within the SALE are key enablers of attaining an integrated Army logistics environment.

A member of the Strategies, Architectures and Standards Group (SASG) working directly for the Deputy Army Logistics Enterprise Integration (DALEI), *IDS Scheer* is supporting the implementation together with Enterprise Integration Incor-

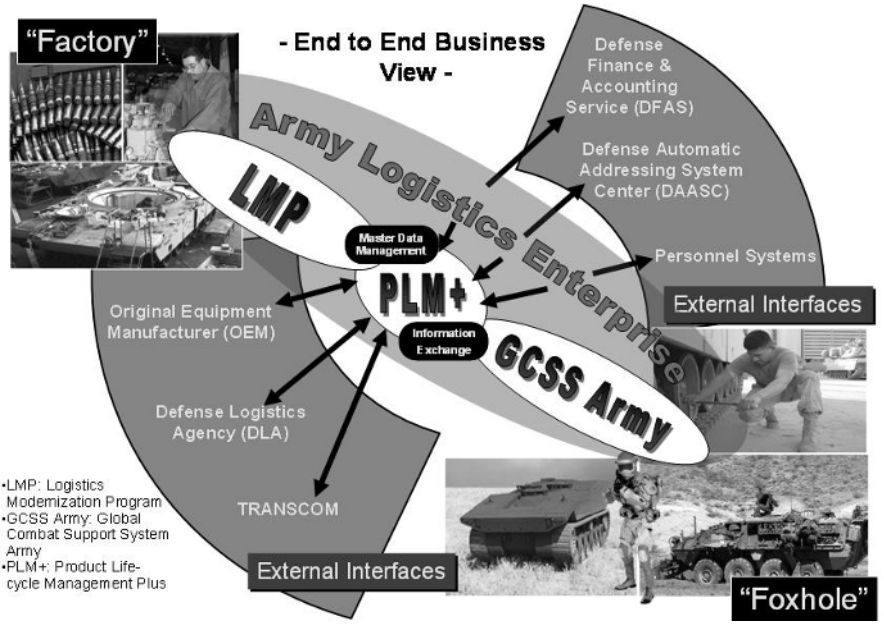

Fig. 1. Single Army Logistics Enterprise (SALE)

porated (Eii), the leading provider of architecture-driven enterprise integration solutions, its partner in the United States for the Public Sector. The two companies initiated support activities in March 2003 by conducting what is commonly referred to as the 'SALE Study', in which the companies developed the 'To Be' architecture that would deliver the DoD vision for a truly integrated logistics enterprise. Since then, *IDS Scheer North* America and *Eii* have also supported the U.S. Army Reserve Command, U.S. Marine Corps, U.S. Air Force and U.S. Army Judge Advocate General's Corps and the Department of Defense (DoD). *IDS Scheer* and *Eii* are also currently supporting the implementation of SAP within the U.S. Navy and the U.S. Army National Guard.

2 Solution

2.1 Defining Business Processes in the Solution Architecture

The SALE Architecture was developed during the original SALE Study, and consists of four hierarchical levels that describe the Army's logistics processes. Figure 2 depicts the high-level framework of the SALE Architecture, the center of which displays the core logistics processes.

While this high-level framework across all business domains is obligatory, it is the lower levels of the architecture that are most critical to the implementation effort,

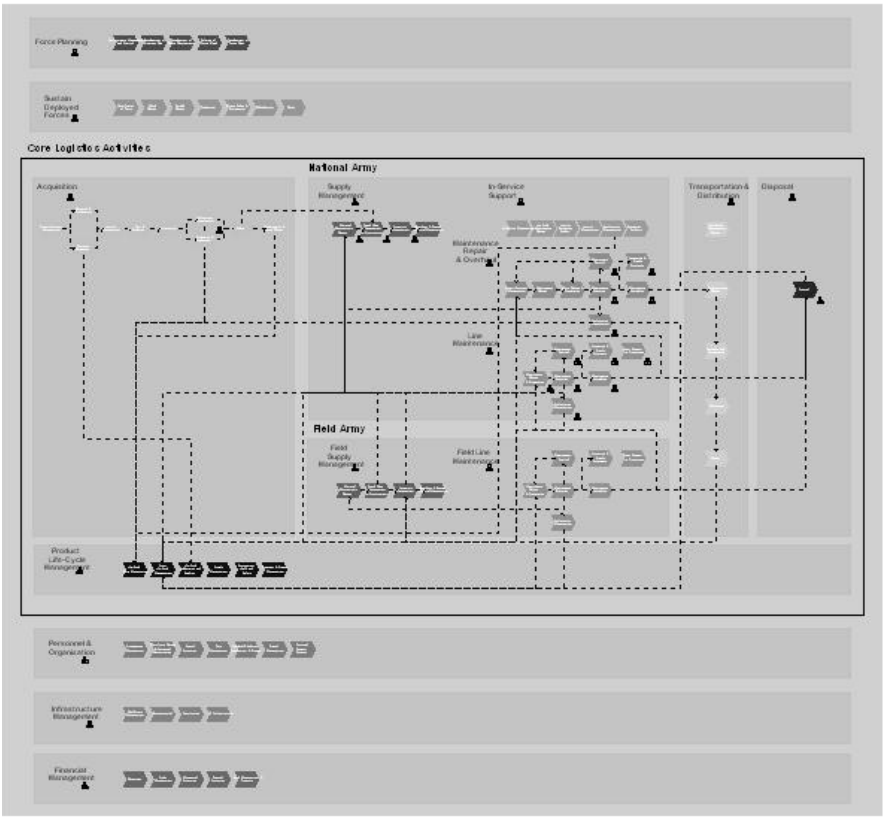

Fig. 2. Level 2 of the SALE Architecture

as these levels are scoped and updated during the blueprinting phase of the project. Because activities during the blueprinting phase are focused on capturing those logistics processes enabled by the SAP solution, an additional approach to capture those processes starting and / or ending outside of the core ERP solution is required. This approach is called the End-to-End (E2E) Scenario approach, and serves to illustrate not only how business processes flow across the functional areas within and beyond the logistics enterprise, but also how business processes flow across both SAP and non-SAP components. Figure 3 depicts the concept of E2E Scenarios within the US Army enterprise.

E2E Scenarios are conducted for mission critical and / or high transaction volume processes. ARIS (Architecture of Integrated Information Systems) models describing theses processes are developed during a series of E2E Scenario Workshops. Participants in the workshops include the Army Subject Matter Experts (SMEs) and Business Area Leads (BALs) who also support the implementation teams, as well as stakeholders representing other Army organizations – for example, Finance

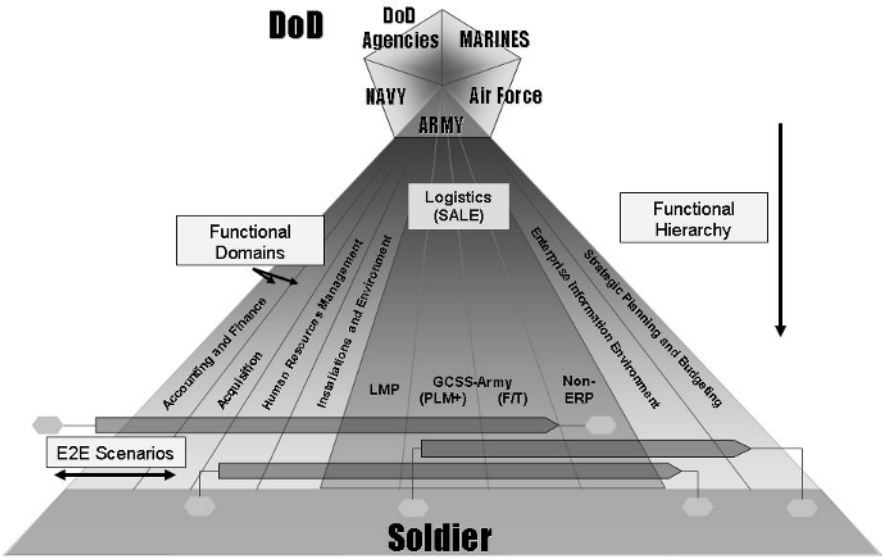

Fig. 3. E2E Scenarios of the extended Enterprise US Army

and Transportation – that are not directly involved in the implementation, but are impacted by it. In addition to capturing accurate End-to-End descriptions of business processes that require coordination across multiple entities across the SALE, the workshops also produce additional benefits that enhance the SALE implementation effort. For the first time, Army stakeholders from different organizations are leveraging the open forum provided though the E2E Scenario workshops to collaborate effectively, to define and optimize the integrated Army logistics processes of the future. Each E2E Scenario needs to get approval from the Business Process Council (BPC). This collaboration has resulted in not only the development of future processes, but also the early identification and resolution of potential system and organization integration issues, activities that help to mitigate some of the risks associated with the implementation.

Figure 4 depicts one example E2E Scenario. Each scenario is described in a Column Event-driven Process Chain (EPC) model. This is one of the model types required to perform the synchronization between ARIS for SAP NetWeaver and SAP Solution Manager (see below).

Each column represents a system. The function objects used in the model represent process steps. They are either SAP functions (called 'Process Steps') extracted from the Solution Manager Business Process Repository (BPR), non-BPR SAP functions, or manual / non-SAP functions. The SAP functions in the model carry significant information within their object attributes, including the SAP Transaction Codes that are used to execute the functions and the SAP modules.

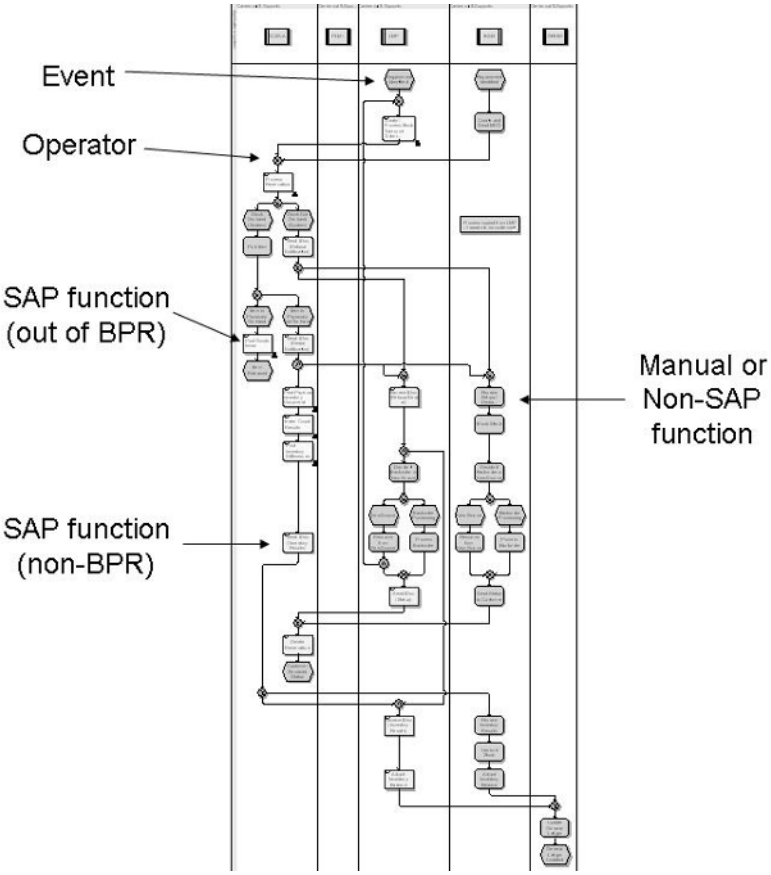

Fig. 4. Example E2E Scenario

Pre-Configured SAP functions are available in ARIS for SAP NetWeaver after performing the initial synchronization from the Solution Manager BPR into ARIS. Using SAP functions out of the BPR is advantageous to implementation teams because the object attributes are already maintained. New SAP functions can be created and existing SAP functions can be extended or scoped.

2.2 Aligning Business Processes in Architecture and SAP NetWeaver

The US Army is using ARIS and SAP's Solution Manager – part of Software Lifecycle Management within the next release of SAP NetWeaver– as the two tools for managing the integrated implementation.

Figure 5 depicts the interaction between the two tools. The E2E Scenarios and the process breakdown in functional areas are documented in ARIS and are synchro-

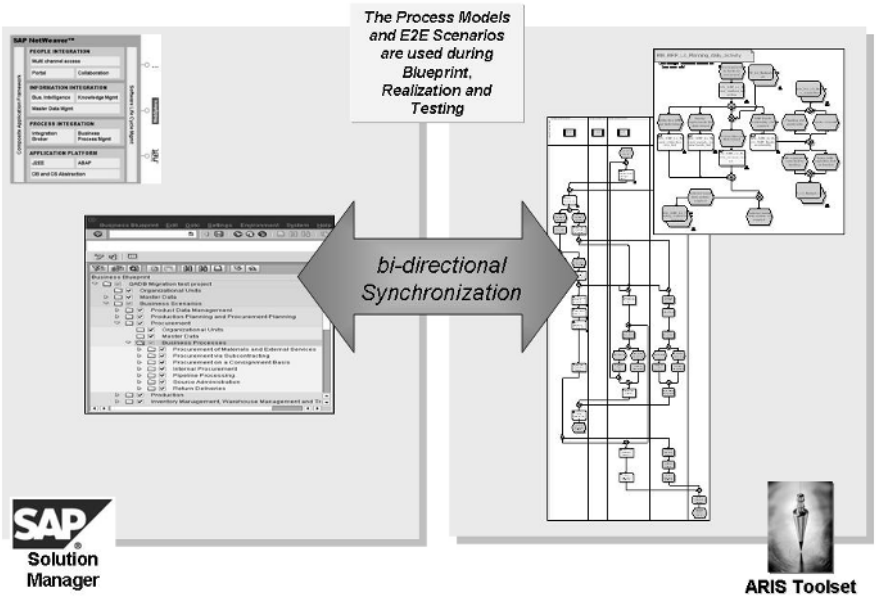

Fig. 5. Synchronizing Processes and E2E Scenarios Between ARIS and SAP Solution Manager

nized into Solution Manager. The synchronization is bi-directional, and is performed whenever necessary in order to maintain content integrity and accuracy within both ARIS and SAP environments.

Within SAP Solution Manager, the process breakdown supports the Business Blueprinting and the Realization; the E2E Scenarios support the Integration Testing phase of an implementation. Within ARIS, the E2E Scenarios provide the complete process overview to the implementation team and support end user training initiatives. The process models are embedded within the three-level hierarchy of Solution Manager: Scenarios, Processes and Process Steps.

While ARIS is the leading tool for performing process design, as well as for process documentation during the Business Blueprinting phase, either ARIS or Solution Manager or both can be used to link to the documentation derived from implementation activities. During the blueprinting phase, the process steps are scoped to reflect the specific SAP Transactions that execute the process steps in the application. Realization is then executed through Solution Manager. To support this objective, the process steps are linked to the transaction codes in the Implementation Guide (IMG) that are needed to configure the system. During the integration-testing phase, the process steps are again linked to the transactions in the application.

Using ARIS and SAP Solution Manager for the management of complex implementation projects is the most effective and efficient way to achieve enterprise integration. This new process-centric approach to manage an ERP implementation is superior to traditional efforts conducted along functional lines because it maintains a continual alignment between enterprise business processes and the implementation environment.

3 Conclusion

Future DoD military campaigns, including the ongoing Global War on Terrorism, will demand highly flexible, responsive, agile, and collaborative fighting capabilities, which can only be realized by transforming the DoD support capabilities along the same lines. The US Army is using the ARIS Business Suite and the SAP Solution Manager to manage its implementation of the Single Army Logistics Enterprise – one of the largest SAP ERP system implementations to date. For the US Army, this approach enables the Army's transformation from a supply-based and often stove-piped logistics enterprise into an integrated, streamlined, responsive distribution-based enterprise that delivers 'the right support to the warfighter in the right place, at the right time, and in the right quantities'.

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From Business Process to Application: Model-Driven Development of Management Software

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IDS Scheer

Summary

Management applications serve an essential purpose: they are there to optimally support the business processes of a company. Insufficient consideration of this in a software development project would, at best, lead to second class results and, at worst, to failure. This article shows how to integrate classic business process design into a software development project as an elementary component using ARIS UML Designer. The result is a completely model-based and integrated approach for the development of management applications: from business process analysis right through to system design.

Key Words

Specification analysis, application development, code generation, business process analysis, MDA – Model-driven Architecture, MDSD – Model-driven Software Development, P2A – Processes to Applications, software development, system design, UML – Unified Modeling Language, ARIS Implementation Platform, ARIS UML Designer, transformation

1 Overview

While modeling in software development has hitherto been employed rather hesitantly and often only for (post) documentation of some aspects, it has long established itself as standard in the operational departments of many companies. Model-based capture, monitoring, and the continuous optimization of business processes have become indispensable for gaining and ensuring competitive advantage. With the introduction of *Model-driven Architecture* (MDA) by OMG and their more pragmatic alternative *Model-driven Software Development* (MDSD), the modeling topic has recently gained increasing value in software development.

There are already some publications available on the integration of business process analysis and object-oriented software development (e.g. [3]), which are generally characterized by the fact that the modeling methods used in software development are carried over into business process modeling. This article presents an approach which proposes integration based on classic business process modeling commonly used in operational departments of companies.

Figure 1 shows the procedure for Model-driven Software Development, including the relevant business processes and using a template-based code generator [2].

The business processes are captured in the form of a business process model and serve as basis for the specification analysis. This results in models that are independent of the selected system architecture and of the implementation platform.

System design is based on the analysis model and the application family selected to generate the code. The application family determines the system architecture and the UML profile. Assisted by the application family, the code generator transforms the design model into source code and other artifacts, a part of which must be manually implemented. What exactly is generated from the design model is determined by the application family templates. Ideally, it is the templates which will create a dependency from the implementation platform, so that the design model merely depends on the system architecture.

There are already a number of publications (e.g. [5]) covering the subjects of system design, code generation, and implementation. Many developers, however, are not familiar with the subject of business process modeling. Therefore, this article will concentrate on how to derive an object-oriented analysis model from a business process model.

2 Business Process Analysis

From the software development point of view, business process analysis mainly serves the communication with organizational units and as a basis for the specifi-

cation analysis of the software to be developed. From the point of view of the organizational units, software development is only one of many application scenarios for business process analysis (e.g. [1]). Further application scenarios are, for example, business process optimization, the introduction of ERP systems, process cost accounting, or ISO 9000 certification.

In practice, ARIS has established itself worldwide as a quasi-standard for business process modeling. One of the core diagram types in ARIS is the event driven process chain – in short, EPC. The EPC visualizes the way in which events in a company lead to the initiation of certain functions which, in turn, can again be followed by events. One can allocate, inter alia, the executing organization units and the data to be processed to the individual functions.

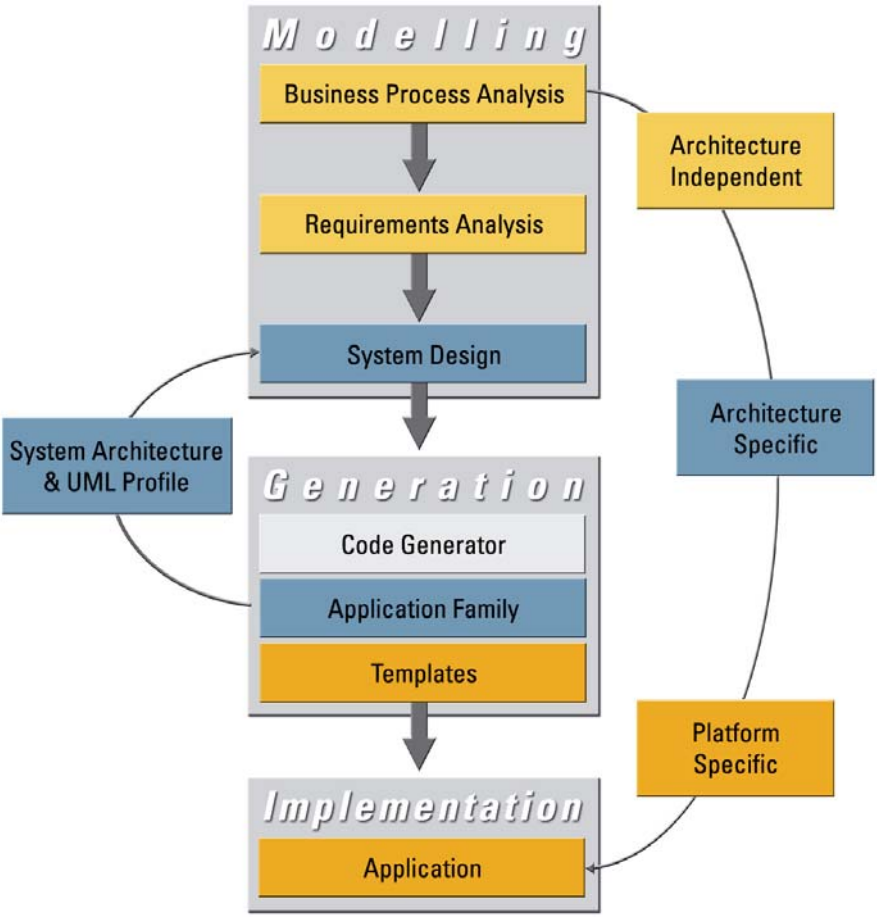

Fig. 1. Model-driven development of business management applications

The EPC in Fig. 2 shows how a reservation for movie tickets is checked in the call center of a large movie theater chain. All elements and relationships visualized in the diagram are stored in a database. Therefore, the call center agent in this example is depicted twice as an executing organizational unit of a function. However, in the database this position constitutes only one single database element. This enables a number of analyses such as, 'Which functions are carried out by an organizational unit in the company?' and is also a prerequisite for linking business process and specification analysis.

The following arguments speak for the use of ARIS for business process analysis in software development:

- ARIS offers a model-based description of all aspects of a company in a central database. This creates graphic models that can be checked for consistency and entirety much more easily than a collection of Word documents or PowerPoint slides.
- The ARIS methodology, as opposed to UML, is equally comprehensible for employees in organizational units as well as for software developers. It promotes communication between participants and is therefore ideally suited as a basis for a common specification analysis.

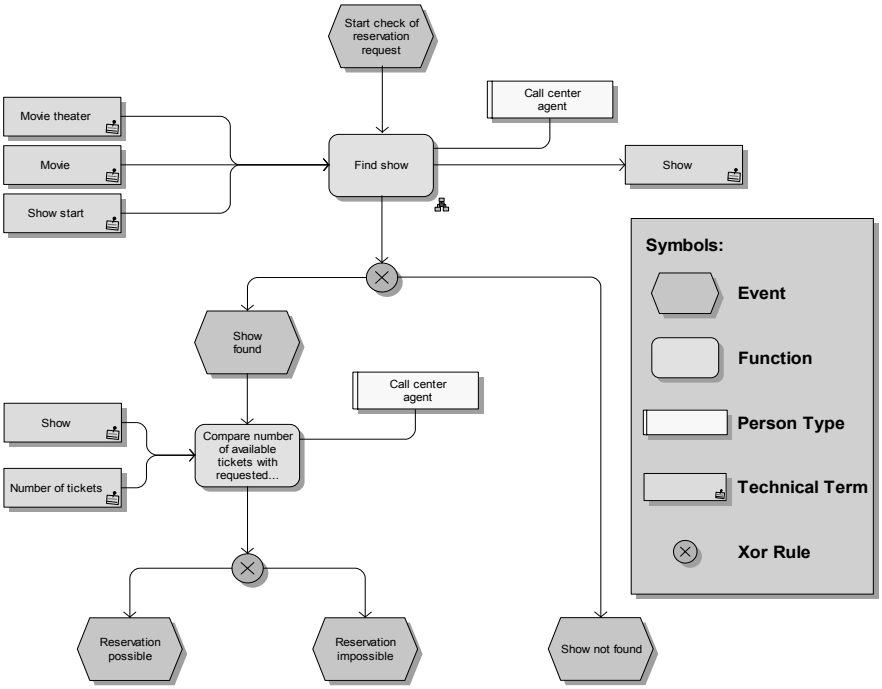

Fig. 2. Event-driven Process Chain (EPC)

- The organizational units model their own business processes and thus take up a more active role in the software development process.
- Often, there is already a detailed business process model available in companies that has been developed using ARIS. In this case, the specification analysis can begin much earlier.

3 Specification Analysis

In the same way that ARIS has established itself as a modeling method for business processes, UML has established itself in the environment of object-oriented software development. The challenge is to integrate both modeling worlds and to link them in a methodical and meaningful way. The following section presents two complementary ways of deriving a UML analysis model from a business process model.

3.1 Use Case Model

To begin with, all the functions to be implemented in the software system are first identified in the business processes. These functions are considered in the UML world as use cases and are copied into a UML application case diagram. ARIS provides a pre-defined transformation for this purpose, which additionally determines all organizational units attributed to this function and integrates them as UML players into the use-case diagram.

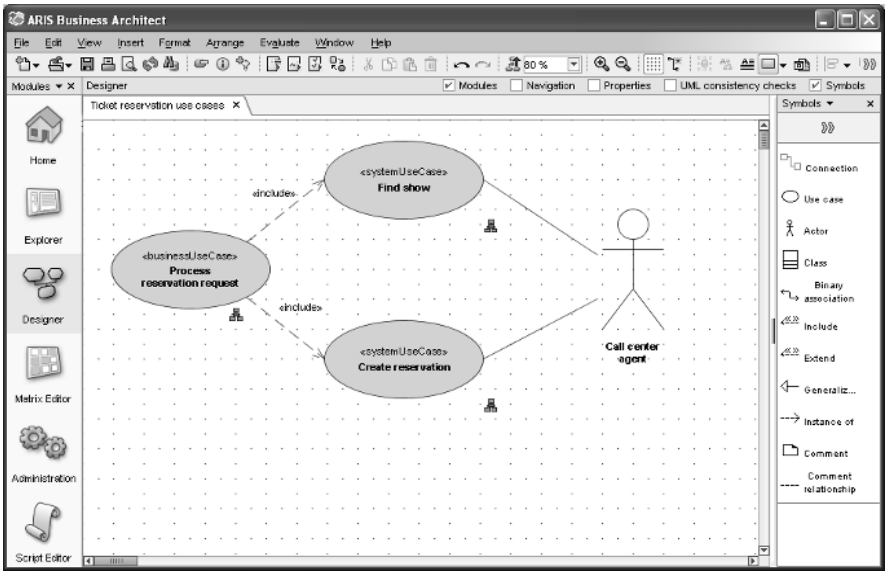

Fig. 3. System and business application cases

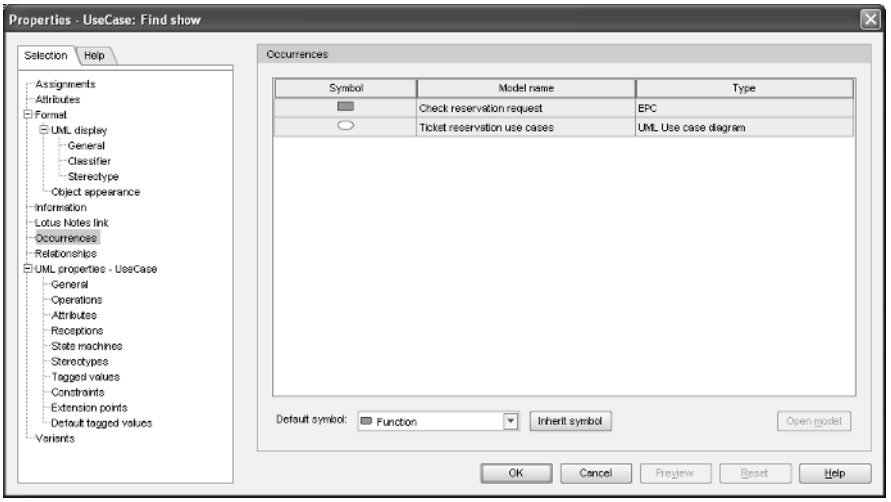

Fig. 4. ARIS features of the function 'search show'

Fig. 3 shows the result of such a transformation. IT-relevant functions are stereotyped as system use-cases ('systemUseCase'). In addition, the diagram also includes the superordinate business process as business use case ('businessUseCase'). The link icons in Fig. 3, to the right below the use-cases, imply that they are refined by further diagrams.

It is essential in this transformation that no new elements are generated; rather, the existing elements within the business process model are being reused. This is made clear by the attribute dialogue of the function 'search shows', as shown in Fig. 4. One can recognize that this function is visualized in the EPC as well as in the UML application-case diagram. The advantages of this integration are obvious. If, for example, the function in the business process model is renamed, the new name will automatically appear in the UML application-case diagram. Furthermore, this enables an easy, bi-directional navigation between corresponding contents in the business process and the UML analysis model.

4 Analysis Classification Model

Another point of departure for the specification analysis is represented by the in- and output parameters of the EPC function – the so-called technical terms – shown in Fig. 2. When modeling business processes, these are usually bundled in a model for technical terms in order to ensure their uniform use throughout the entire project.

In the specification analysis these technical terms are examined as to which of them belong to a technical classification and which are more likely to be technical

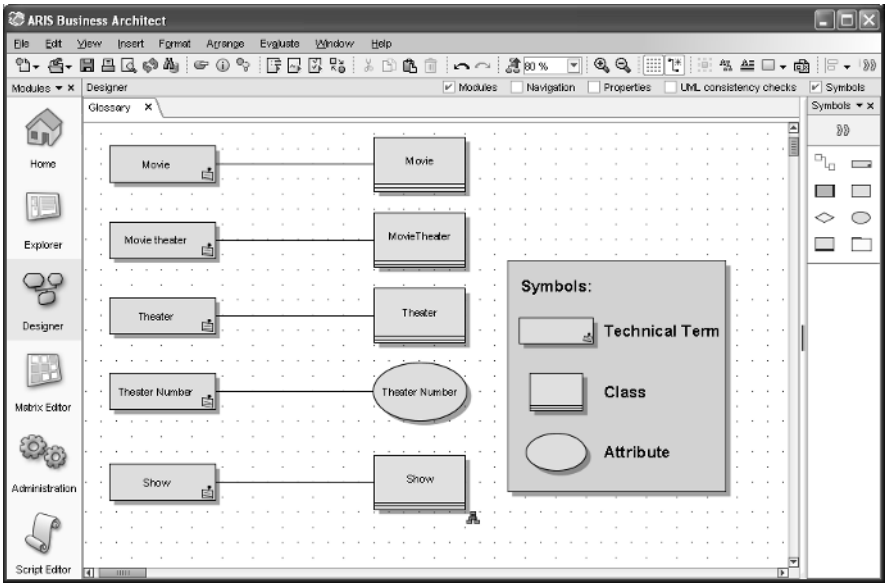

Fig. 5. Technical term model, showing the technical classification and attributes

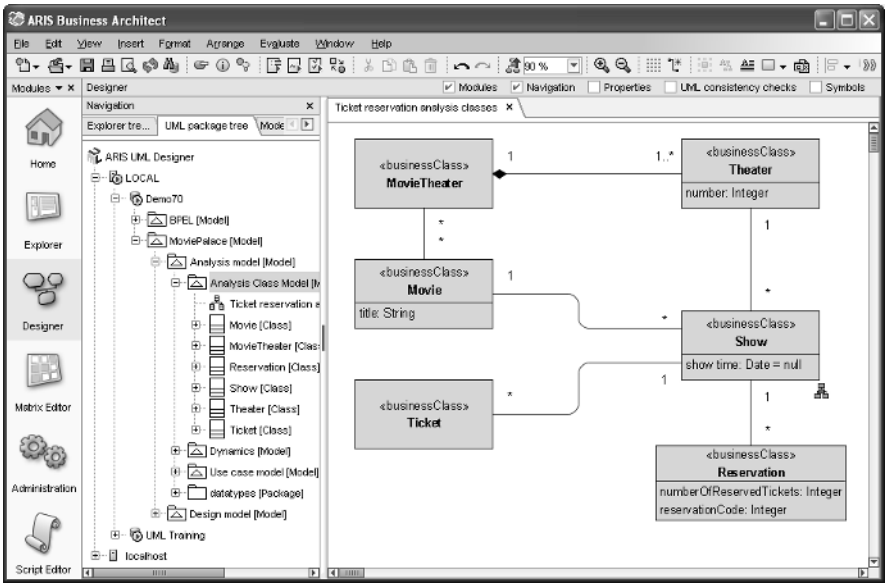

Fig. 6. Analysis classification diagram

attributes. The technical classifications and attributes determined in this way are positioned in the same diagram and linked with the respective technical term. Fig. 5 shows a screen shot of such a model for technical terms. Here, too, transformations are made available with the aid of which these steps can be automated.

In the next step, the technical classifications are copied into a UML class diagram in order to assign the respective technical attributes and are correlated using binary associations. The result is shown in Fig. 6. The technical classifications can now be enriched by further technical attributes and operations. Deriving the analysis model from the business process model takes place in close cooperation between the operational unit and the IT department. While, for example, the operational unit is in a better position to judge which EPC function and technical term is actually relevant for the software under development, the object-oriented analyst is able to decide whether a technical term belongs to a technical classification or to a technical attribute. The participation of the operational unit is also helpful when elaborating the UML analysis model, as it is in a better position to judge how the individual technical classifications are associated with each other.

ARIS UML Designer enables a link between UML and classic ARIS modeling by basing both modeling methods on the same object model. For UML modeling, a UML object model is merely superimposed onto the common ARIS object model. In order to work on the UML elements, a specific UML characteristics dialogue (cf. Fig. 7) and a classic ARIS characteristics dialogue (cf. Fig. 8) are provided. Apart from the list of occurrences shown in Fig. 4, this dialogue also includes a list of all relationships the element in question has with other elements and thus enables the navigation from the UML element to the linked ARIS element (in the example shown in the diagram from technical classification to technical attribute).

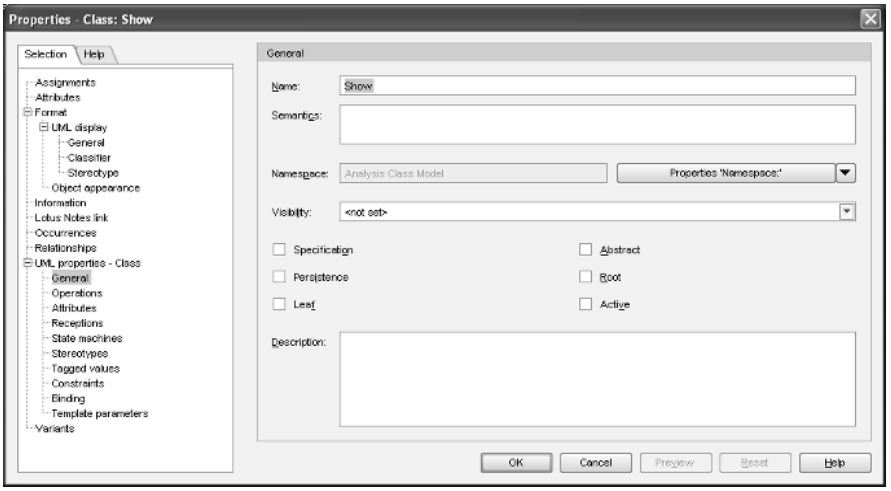

Fig. 7. UML attributes of the analysis classification ‘Show’

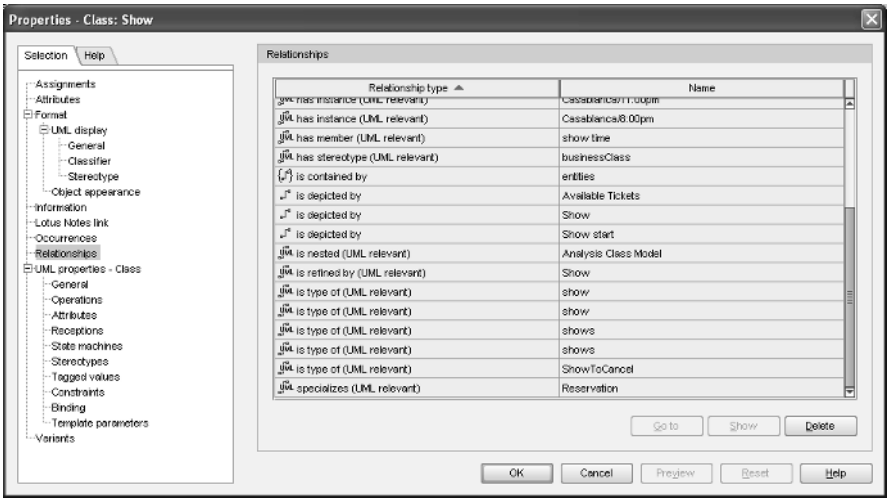

Fig. 8. ARIS attributes of the analysis classification 'show'

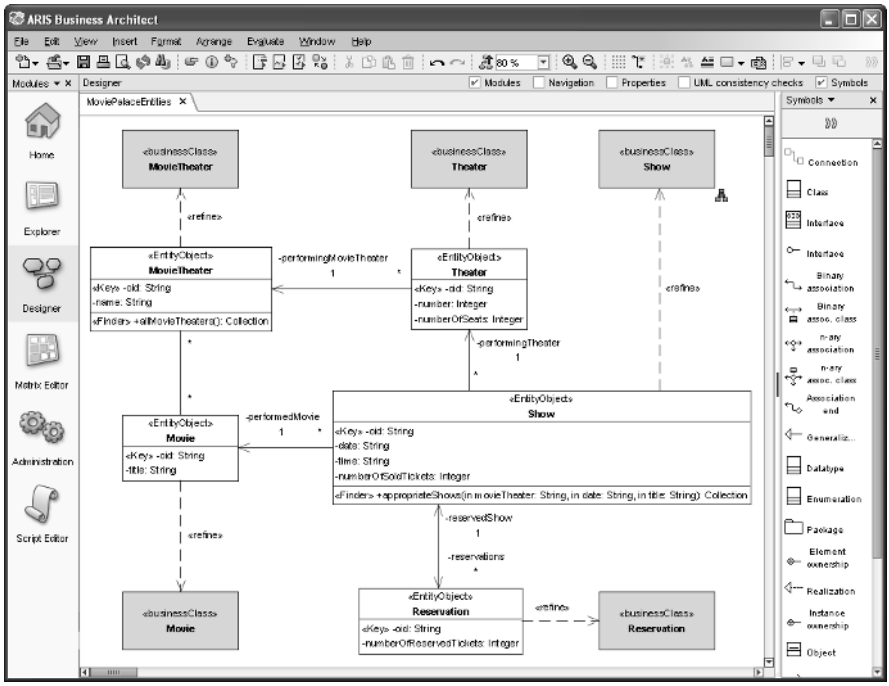

Fig. 9. openArchitectureWare-Plugin

Apart from the presented options to link classic business process modeling with UML modeling, there are several more that exist. For example, EPC functions can be reused as UML operations or UML activities (ActionState), EPC events can be reused as a trigger for status transitions, or ERM attributes can be reused as UML attributes.

As a rule, the link between both model worlds is made either by reusing a business process element as UML element or by linking it to a UML element. Moreover, there is the possibility of refining technical elements by using UML diagrams. In all cases an easy, bi-directional navigation between both model worlds is guaranteed.

5 System Design and Generation

The UML analysis model serves as basis for a design model, based on which codes are generated. ARIS UML Designer offers two options to interface code generators: via XMI interface or integrating them via plug-ins. The latter have the advantage that the code generation can work directly on the internal UML object model and thus there is no diversion over the file system. The current version offers users a respective plug-in for the open source generator openArchitectureWare [2] (cf. Fig. 9) and an SDK (software development kit) for the development of proprietary plug-ins.

6 Conclusion

Business process analysis is essential for the success of software development projects in the business management environment. If this takes place based on models, the specification analysis can occur on the basis of a formal business process description. Moreover, if the business process analysis takes place using methods with which the operational departments are familiar, this leads to a more complete and technically consistent business process model.

The technical integration of business processes and UML modeling enables a derivation of the UML analysis model from the business process model by using transformations. The methodical integration moreover guarantees a link between the respective corresponding model contents and enables bi-directional navigation between both model worlds. MDA and MDSD distinguish themselves by the fact that changes should always be carried out on the abstraction level which semantically corresponds with the change. In business management applications, this often concerns the business process level.

ARIS UML Designer is a consistent and integrated solution, which covers all aspects including classic Business Process Modeling, object-oriented analysis and design, and code generation.

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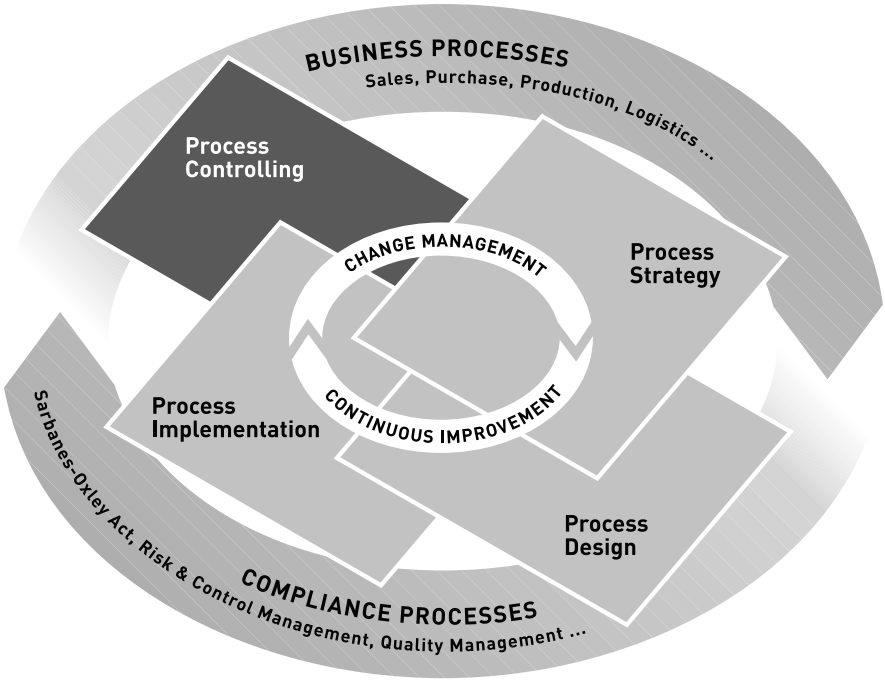
Part V:

Business Process Controlling



Monitoring, Analyzing and Optimizing Corporate Performance – State of the Art and Current Trends

Helge Heß
IDS Scheer

Summary

What can methodology and system support, which is designed to assist comprehensive and continuous analysis of company performance, look like?

This article will demonstrate what requirements lead to an amalgamation of Business Process Management and traditional Business Intelligence approaches and the resultant new opportunities that arise from this. It will highlight the utilization of the ARIS Controlling Platform components that visualize the performance of a company and analyze early indicators relating to success factors. New topics such as RFID and Compliance Management are integrated into this context.

Key Words

Business Activity Monitoring (BAM), Business / Corporate / Enterprise Performance Management (BPM / CPM / EPM), Compliance Management, corporate governance, Corporate Social Responsibility (CSR), IT service management, key performance indicator (KPI), Process Performance Management, organizational performance, process mining, process portal, relationship capital, RFID, right-time monitoring, Service Level Agreement (SLA)

1 From 'Business Intelligence' to 'Corporate Performance Management'

The term 'Business Intelligence (BI)' was coined by the *Gartner Group* in 1993. At the time, it was used for describing methods and tools employed to evaluate corporate data in order to ensure a better support for decision-making. The BI market is associated with software solutions such as data warehouse systems, OLAP systems, report generators, etc, which extract data from operative applications and calculate and visualize key indicators.

Over the past years, the market for BI software has grown more rapidly than the market for commercial applications or system-oriented software. Nearly all ERP suppliers have added analysis functions to their software.

Despite the undeniable success and great technological progress, many BI projects have been criticized, because, regardless of the often high expense, the actual information requirements of the user were not met. Consequently, there was a build-up of isolated blocks of information and data 'graveyards'. The actual goal during current projects was often lost from sight; the collection and analysis of corporate data has become independent. The question, what decisions were required in order to continually increase corporate performance, often took a back seat.

Over the past years, new terms such as Business / Corporate / Enterprise Performance Management (BPM / CPM / EPM) have become the focus of attention. They may, in essence, be used synonymously and are partly picking up on well-known methods and approaches while, at the same time, adding new aspects. All these terms are based on the close connection between monitoring and analysis, on the one hand, and Business Process Management on the other. (cf. Scheer, Jost 2005). If the analyses and metrics are intended to increase process efficiency with regard to corporate goals, then it is obvious that the data-driven collection of key indicators without reference to processes is insufficient for this approach. Traditional Business Intelligence approaches will experience a significant re-orientation in the coming years. A new generation of analysis and performance management tools will gain importance and Business Intelligence and Business Process Management will merge (cf. Heß 2005a).

2 Early Indicators – Structural Analysis Instead of Visualizing Key Indicators

Everyone involved in business must face the question of what distinguishes their products or services in the various markets and makes them more successful than those of competitors.

2.1 Critical Success Factors

Financial success, in the end, is often a consequence of high customer satisfaction that can either result from the product offer itself or from other factors such as high quality of service. Apart from these obvious strategic factors, additional aspects have emerged in the recent past, which have become strategically important to the company. (cf. Figure 1):

- Compliance Management: legal and regulatory requirements (e.g. Sarbanes-Oxley-Act, Basel II, etc.) force many companies to build up expertise and resources in risk management.
- Corporate Social Responsibility (CSR): defined by the EU commission as "a concept, which serves companies as a basis for integrating social and environmental interests into their activities on a voluntary basis and into interrelations with stakeholders." As society is demanding the acceptance of responsibility in this respect, the pressure is mounting on companies to develop adequate concepts (cf. Prahalad 2003).

It is obvious that, in the end, these aspects are the result of operative business: value is generated in business processes, so that the compelling pre-requisite for business success (documented in key financial indicators, good corporate govern-

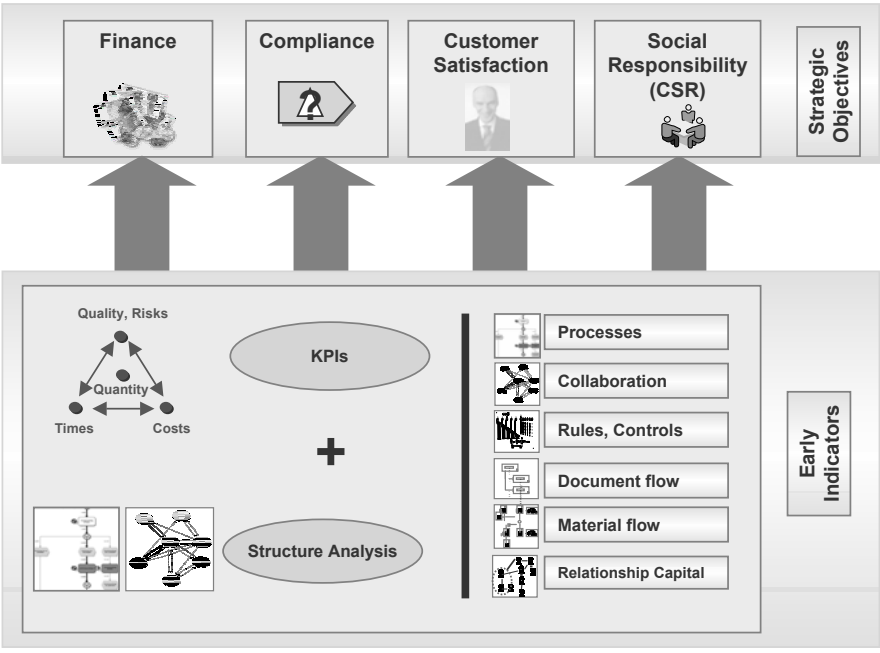


Fig. 1. Correlation between strategic goals and early indicators

ance, etc.) is efficient Process Management (cf. Scheer 2004). In short: in order to make profits, it is essential to design the relevant core processes of the company as efficiently as possible with regard to cost, quality, and time criteria. The aim is to achieve high customer satisfaction and exploit cost saving potentials. Process Management is a continual task, based on the well-known control system 'Process Design' – 'Process Implementation' – 'Process Controlling'.

Besides processes, further aspects require analysis in order to monitor early indicators crucial to the achievement of strategic goals:

- Collaboration: How efficiently do organizational units and teams work together?
- Rules and compliance: Will laws and regulations be complied with?
- Document flow: How efficient is the handling of data and documents?
- Material flow: How efficient is the physical flow of goods and products, which runs in parallel with the information flow in production-oriented organizations?
- Relationship capital: How is the value of the company's external relationships developing (to clients, partners and other stakeholders)?

Of course, the expertise and dedication of their employees is of crucial importance to some companies; this is also mirrored in the classic structure of a Balanced Scorecard. The assessment and analysis of this aspect will, however, not be of further interest in this article.

2.2 From Key Indicators to Structural Analyses

Nearly all traditional BI approaches are based on a reduced view: typically, a data model is constructed using the relevant objects (entities, relationships, attributes) of the organizational section; key indicators and dimensions are attributed to these objects in order to address questions such as:

- Which product achieved the highest increase in sales during the first quarter?
- Which are the most important customers for product A in region B?
- etc.

Essentially, there is a link between these questions and the key financial indicators of the company.

Despite the fact that the visualization of key indicators has reached an acceptable level, and the familiar data cubes can be rotated efficiently on all sides and analyzed in depth – in nearly all cases these key indicators and operations based there-

upon are not sufficient to make real progress towards early indicators and the actual causes for errant developments (cf. Heß 2004). The explanation lies in the dynamic structures of the company, i.e. there is a necessity to visualize and analyze the above mentioned aspects: process structures, communication relationships, rule compliance, material and document flow, etc.

Figure 2 shows a functional overview of Corporate Performance Management. Having extracted the relevant data from the operative systems, there is a need for system functions to observe the current status ('what is happening now?'); as a rule, this is called Business Activity Monitoring (BAM). The traditional management by key indicators (definition, calculation, visualization) naturally continues to have its justification. Reporting functions are employed to send the generated analyses to the appropriate addressees using different formats. Dashboard and cockpit functions serve the preparation of key indicators for the individual user groups and to make them available to users in an aggregated form through portals. Because respecting compliance rules and assessing risks are closely connected to company processes, it makes sense to further consider the compliance with rules and regulations in conjunction with performance management.

The analysis of structures and processes, communication relationships, etc., in combination with the appropriate mining algorithms, now actually makes it possible to pinpoint the causes for the lack of performance and determine optimization potential ('why did it happen?'). This often influences the management of optimization measures.

Moreover, the subject of Corporate Performance Management includes the traditional functions of (often financially driven) corporate planning, 'what-if' analyses and forecast functions ('what will happen?').

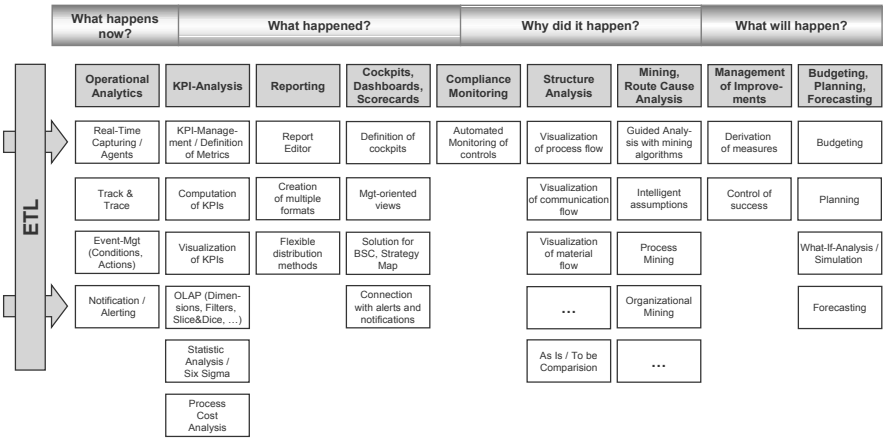


Fig. 2. Functional overview of Corporate Performance Management

Process Structures

Using the modeling components of the ARIS Platform (ARIS Toolset, ARIS Business Architect), processes within a company can be defined. The following questions often arise: what do the actual processes of a company look like? Where are the differences to the modeled target processes?

At one time, comprehensive analyses of the actual status were carried out (through interviews, first person reports, etc.) in order to find an answer to these questions. Now, the analysis of the current status can be carried out automatically – and on a comprehensive and permanent basis – as opposed to performing one-off spot checks (cf. Heß 2005b): ARIS Process Performance Manager (ARIS PPM), as part of the ARIS Controlling Platform, is able to generate a graphic description of each individual process (e.g. customer order no. 12345, order date September 2, 10:23 a.m.) within the company. The data required for this process is extracted from the operative systems involved in the process. Often, the number of events is so great (e.g. telecom operators or retailers with several hundreds of thousands of processes per day), that the evaluation on the individual process level only makes sense in case there is an escalation. In order to identify optimization potential in a large number of processes, ARIS PPM offers the option of representing any number of process instances in a compressed manner (e.g. 'all customer orders with

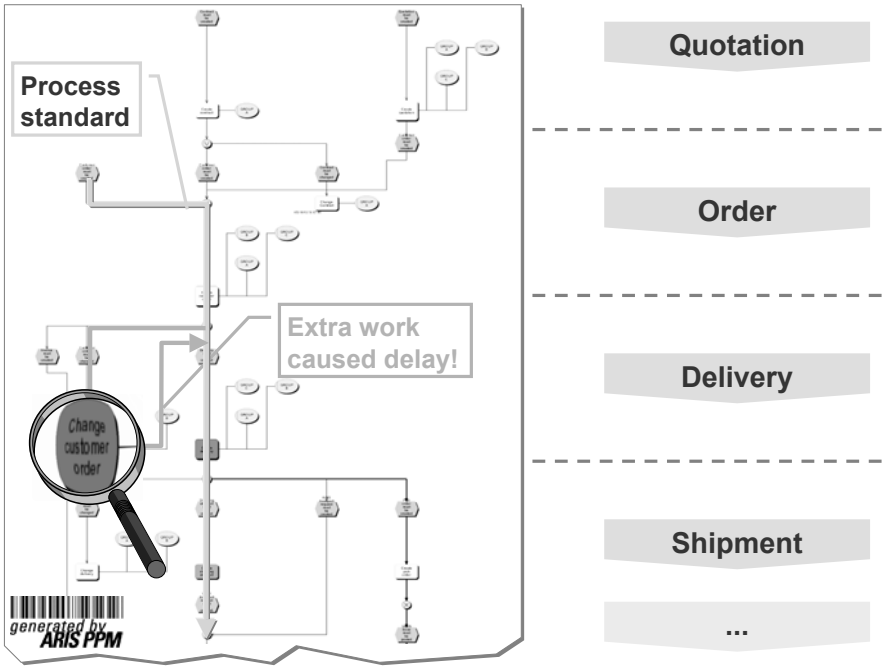


Fig. 3. Generating process models on the basis of actual company processes

complaints during the past fortnight in the southern region') in form of a graphic process chain. The commonality of the underlying individual processes in such condensed process chains can be identified, since the probabilities of all the paths that have been used are calculated and standard paths and exceptions marked accordingly in the graphic model (cf. Figure 3).

As the process models, in this case, are not created manually, but are generated dynamically on the basis of real process data, this is also referred to as 'reverse modeling'.

Organizational Structures

As with the differentiation between target and actual processes, organizational charts often merely represent the distribution of responsibilities within the company. However, they are not suited to analyze the actual communication relationships and connections. Yet, this is particularly relevant in companies where know-how and the division of labor prevail, because often the cause for long throughput times, high cost, or lack of quality lies in the fact that teams and groups do not collaborate effectively (cf. Cross, Parker 2004). In addition to the process view, a 'view' focused on the organization is also interesting to pinpoint optimization potential. (cf. Figure 4).

As in the process view, ARIS PPM is able to represent which teams collaborate with each other and how often, and what the processing and idle times are ('communica-

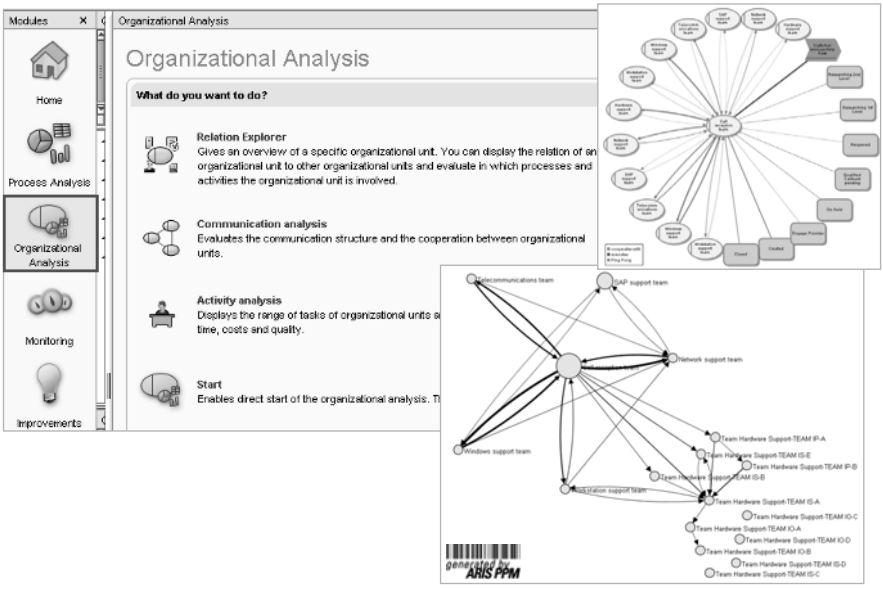


Fig. 4. Organizational analysis as module of ARIS PPM

02- Who does what?

Number of activities / Organizational unit (start)[fine]	Function: Researching 2nd Level	Researching 1st Level	Reopened	Qualified Callback pending	On Hold	Engage Provider	Customer Complaint	Created	Closed	Result
Team Callannahme-TEAM 1-A	123	86	1	169	185	16	0	615	379	1.574
Team Callannahme-TEAM 1-B	26	51	1	59	30	5	0	79	60	311
Team Callannahme-TEAM 1-C	21	39	0	2	20	1	0	54	51	188
Team Callannahme-TEAM 1-D	12	74	0	83	21	1	0	106	110	407
Team Callannahme-TEAM 1-E	7	11	0	7	8	0	0	27	21	81
Team Callannahme-TEAM 1-F	87	48	0	88	91	5	0	363	206	888
Team Hardware Support-TEAM IO-A	15	13	0	25	8	6	0	37	39	143
Team Hardware Support-TEAM IO-B	15	24	1	13	8	2	0	48	89	200
Team Hardware Support-TEAM IO-C	9	4	0	9	8	4	0	17	17	68
Team Hardware Support-TEAM IO-D	3	9	2	15	19	2	0	11	27	88
Team Hardware Support-TEAM IP-A	5	15	0	32	17	4	0	54	39	166
Team Hardware Support-TEAM IP-B	3	7	0	15	6	1	0	53	20	105
Team Hardware Support-TEAM IS-A	18	89	2	78	15	46	2	44	148	442
Team Hardware Support-TEAM IS-B	29	7	0	47	6	1	0	101	113	304
Team Hardware Support-TEAM IS-C	18	30	0	5	3	0	0	30	45	131
Team Hardware Support-TEAM IS-D	32	8	0	47	5	1	0	86	90	269
Team Hardware Support-TEAM IS-E	53	22	1	67	13	0	0	119	167	442
Team Netzwerk Support-TEAM PM-A	64	52	4	66	15	14	0	15	100	330
Team Netzwerk Support-TEAM PM-B	28	50	0	27	6	11	2	1	35	160
Team SAP Support-TEAM FE-A	0	4	0	10	8	0	0	4	17	43
Team SAP Support-TEAM FE-B	6	18	0	44	18	1	0	22	48	157
Team SAP Support-TEAM U-A	3	0	0	0	0	1	0	3	4	11
Team SAP Support-TEAM U-B	1	0	0	1	0	0	0	2	2	6
Team SAP Support-TEAM U-C	0	3	0	14	17	0	0	50	14	98
Team SAP Support-TEAM U-D	6	11	0	1	6	0	0	27	25	76
Team Telekommunikation-TEAM 2-A	18	48	1	78	2	0	1	9	25	182
Team Telekommunikation-TEAM 2-B	2	1	0	10	3	0	0	0	5	21
Team Telekommunikation-TEAM 2-C	21	18	0	17	2	0	0	0	0	58
Team Windows Support-TEAM M-A	30	97	2	153	5	1	2	0	28	318
Team Workstation Support-TEAM A-A	52	83	0	136	67	30	0	147	167	682
Result	707	922	15	1.318	612	153	7	2.124	2.091	7.949

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Fig. 5. Actual analysis of relationships between teams and activities (created dynamically)

tion analysis'), or, how often what activities were performed by which groups ('activity analysis') (cf. Figure 5).

At this point it is also important that analyses are carried out automatically and, in doing so, are continually and dynamically updated. They should also require no further input data than that used for the process analysis.

Data and Documents

Apart from the pure control flow and the manner of communication, the way in which documents and data are handled can also lead to high inefficiencies. Typical

questions to be answered when looking at avoiding data redundancies, transmission errors, and high idle times are, for example, the following:

- How much data flows / how many documents flow into a process?
- Who processes which document and how often?
- How often is a document altered?
- When is which input required?
- In which formats is information made available?
- What are the idle times of a document before it is processed further?
- Which documents are related with each other?

This information can also be established, visualized, and analyzed automatically.

Material Flow

The introduction of new technologies in the RFID (radio frequency identification) sector gives rise to a series of interesting questions, because products and objects carrying an RFID chip generate a process event in each chip-reader. The way in which logical information flows are studied can now be applied to the real transportation of materials and goods, as this data is made available at an increasing number of measuring stations via RFID (cf. Figure 6).

The parallel view of both aspects is particularly interesting in order to find out, for example, how often order delays were connected with delayed or incomplete deliveries by the supplier.

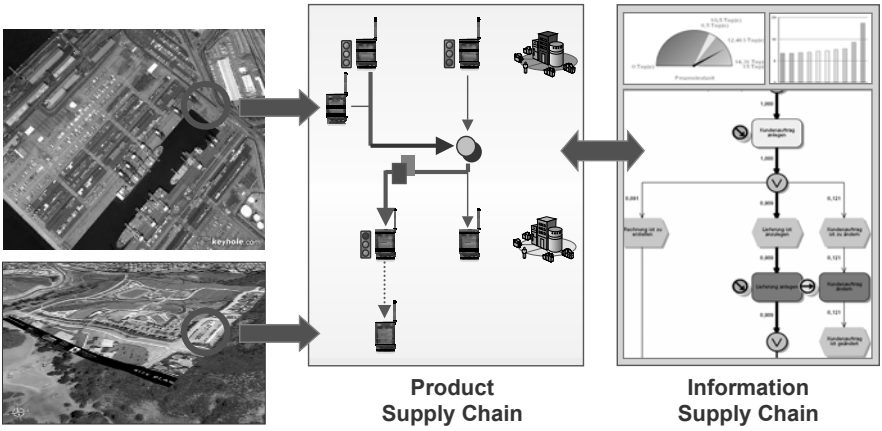

Fig. 6. Visualization and analysis of materials transport

2.3 Pattern Recognition – Process Mining and Organizational Mining

It is the duty of a process owner to detect structural weaknesses. In companies where several hundreds of thousands of processes are dealt with each day this is difficult, since problems are lost in the total volume, e.g. as a result of data compression and the calculation of averages in the respective analyses. It is therefore essential to handle such process information using special analysis methods. Techniques from data mining are increasingly used for the analysis of process data (cf. Van der Aalst, Weijters 2004) in order to establish data patterns. These reveal problems regarding time, costs, or quality (for example, there was a high number of alterations to insurance applications acquired by a particular insurance broker during the previous four weeks in the Munich area – it is possible to initiate a very detailed cause study from here). This can now be transferred to the above mentioned aspects, i.e. just as this is done with process data and structures, such approaches can be applied to organizational aspects, document and material flow, etc.

3 Trends and Current Developments

3.1 Right-Time Monitoring

The central question for each analysis concerns the required degree of up-to-dateness.

This, of course, cannot be answered generally but depends on the individual business process or on the scenario under scrutiny. A plant engineer, for whom processes with throughput times spanning months or even years are not unusual, has different requirements than a service desk clerk, who needs to assess the priority of a call within seconds. It is important to synchronize the speed of business processes with the analysis of events and information; the term ‘right-time-monitoring’ is more appropriate than ‘real-time-monitoring’, which could suggest analyses within milliseconds.

In general, two optimization cycles can be distinguished (cf. Buytendijk, Wood, Geishecker 2004): the analysis of historical data is necessary to allow conclusions on weak points and optimization potential. Moreover, process owners have short-term information requirements when problems in current processes must be detected and removed (cf. Figure 7). The benefit of such an analysis is even greater, the quicker the relevant information can be extracted from the actual event, and a suitable reaction or decision can be derived. This means that the close and rapid connection to the system, in which the actual event is occurring, plays a decisive role. Taking it a bit further, it can be said that, by turning this into an operation, problems can be largely anticipated before they occur.

A crucial functional requirement at this point is to incorporate a messaging and alert system, which ensures that addressees are instantly informed via suitable channels. Figure 8 shows the surface of ARIS PPM as regards monitoring.

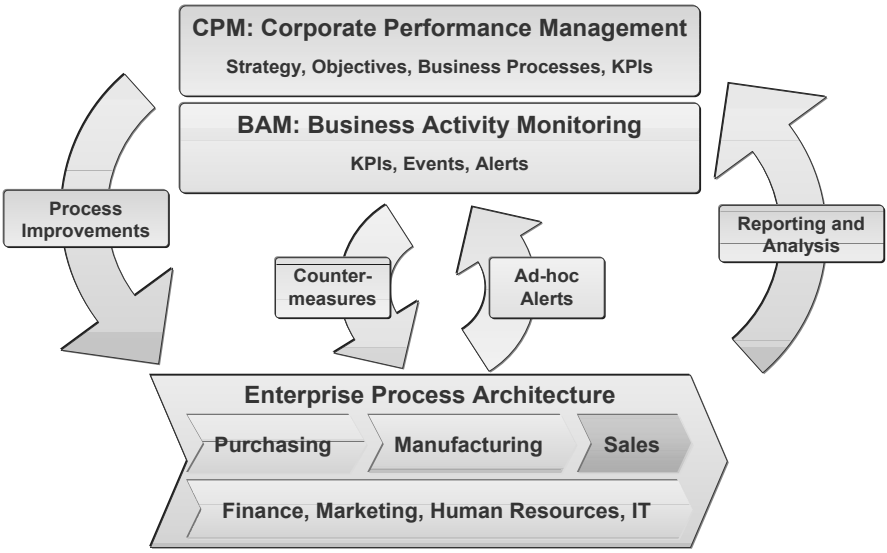

Fig. 7. Short-term and medium-term optimization cycle (according to *Gartner Group*)

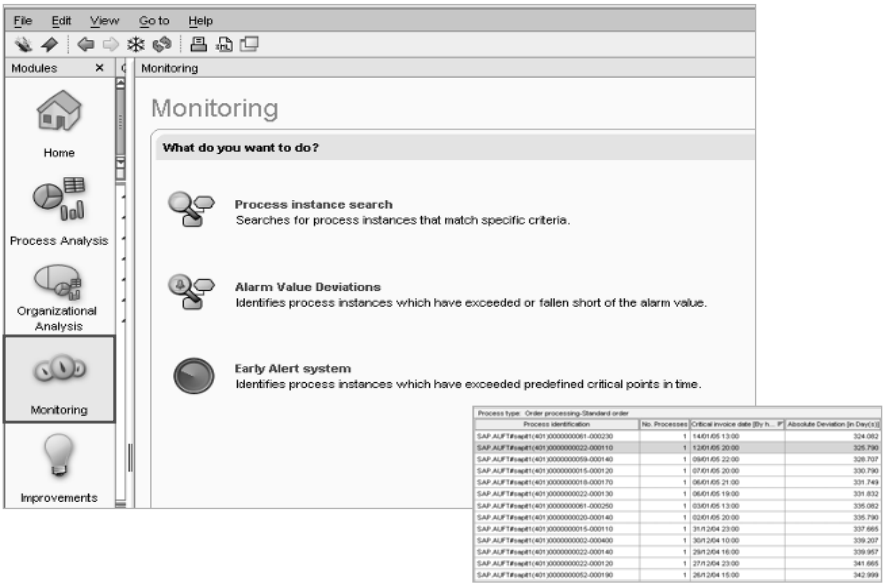

Fig. 8. Monitoring-surface of ARIS PPM

3.2 Compliance Monitoring

The subject of corporate governance is having a strong influence on business autonomy. This is a result of stricter external regulations, the requirements of which must be implemented into corporate structures. This is done by identifying the processes concerned, analyzing risks, integrating the necessary control mechanisms into the processes, and monitoring their execution. The ARIS Audit Manager is able to offer comprehensive support to companies in this respect and enables an efficient introduction and operation of a cross-company Compliance Management system able to meet the requirements of various present and future regulations. Process descriptions, which have been extended by risk information, serve as input for the ARIS Audit Manager. This forms the basis from which the audit process can be controlled.

Many companies are forced to spend a lot on actually carrying out process controls. The question therefore arises, whether the approaches of Corporate Performance Management can also be applied to this case in order to gain control over costs and work more efficiently. If each process instance can be observed and evaluated as described above, the obvious question is, how many process controls, required for compliance reasons, can be carried out automatically and for every individual process instance. Typical controls, such as checking the separation of duties or the compliance with minimum and maximum times, can be carried out automatically if there is access to the information relevant to the process.

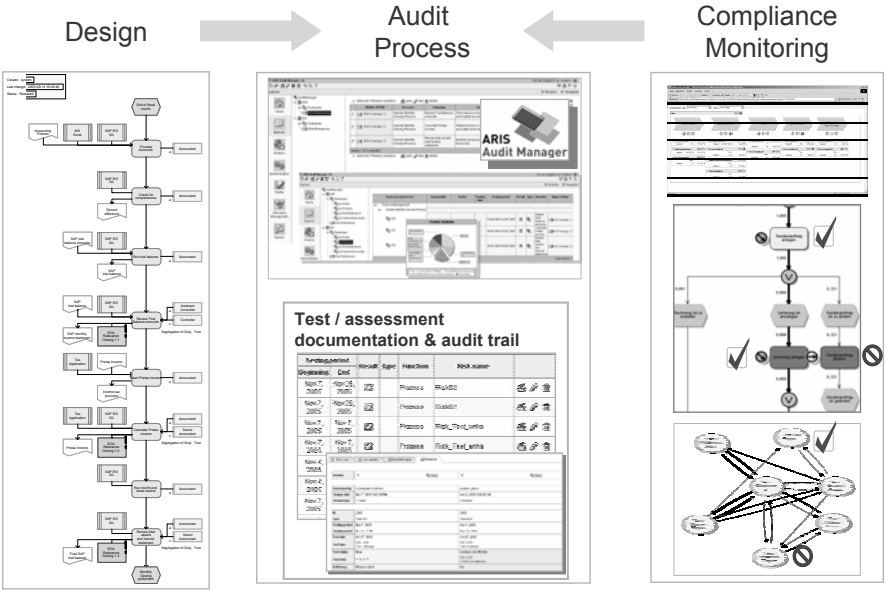

Fig. 9. Management if the audit process with input from Design and Monitoring components

It will be exciting to see whether these two issues – performance management on the one hand and Compliance Management on the other – will benefit from each other.

3.3 IT Service Management and Business Performance Management

The role of IT in companies is subject to constant change. Today, IT managers are measured by the contribution the available IT budget makes to the optimization of critical factors for success and customer satisfaction. Apart from constant cost control, it is among their duties to position themselves as business-oriented service providers and highlight the interaction of their IT processes with the company's business processes. Moreover, they need to show what effects IT problems have on running business processes in order to, for example, assign priorities during escalation and error recovery. Conversely, during the analysis of weaknesses the process owner may want to see whether IT problems were part of the cause. This implies that performance monitoring within the company must combine strategic aspects with process-oriented analyses, on the one hand, and analyses in the IT vicinity, on the other, in order to ensure a comprehensive view. Consequently, Service Level Agreements (SLAs) as a description of the service and performance agreements between service provider and client receive a different focus on the basis of objective, quantitative criteria. If, at one time, more technical key indicators formed part of the basis of SLAs (system availability, etc.), today, there is greater emphasis on business processes: many companies sign agreements with their service providers, which are based on business and process-oriented key indicators.

Fig. 10. Business process portals with ARIS

3.4 Process Portals

How do performance management solutions present themselves to the user? How can users be reached in operational departments? How can publishing processes on the Intranet succeed in attracting users to utilize them as significant tools for their daily work?

If performance management and Business Process Management converge, access options and system and tool interfaces must be presented in an integrated way, i.e. the analysis of metrics and the publication of process models can no longer be separated from each other here, either.

Figure 10 shows what such a solution may look like. The user has 1) the view of information showing the key data relevant to his or her requirements; 2) a view of the respective processes, organizational structures, etc. in the middle section; and 3) has access to the documents and information directly connected with his currently running processes in the lower section.

4 Outlook: Performance of Unstructured 'Processes'?

Particularly in highly developed economies, the trend towards knowledge-intensive jobs that require a large amount of communication will increase. A highly-skilled employee will only spend a fraction of his daily working time on structured information-sources along clearly pre-defined processes.

What are the implications of this on Performance Management and Business Process Management? Have these topics now become invalid?

The answer is 'no', but the main emphasis of the issues will shift: instead of fixing a clearly structured process and tight reporting relationships, the task will be at the heart of controlling networks and relationships. It must be ensured that independent teams and organizational units collaborate efficiently. The ability to visualize and analyze communication networks will gain importance (cf. Figure 11).

This applies to internal communication as well as the relationships with customers, partners, and other stakeholders. Typical issues are:

- How are our development teams in Germany and Eastern Europe collaborating?
- What are the consequences if Mr. Y leaves our company?
- What 'value' does our relationship with company A have?
- In which way have our contacts with company A changed over time?
- Who has the best relationship with company A?

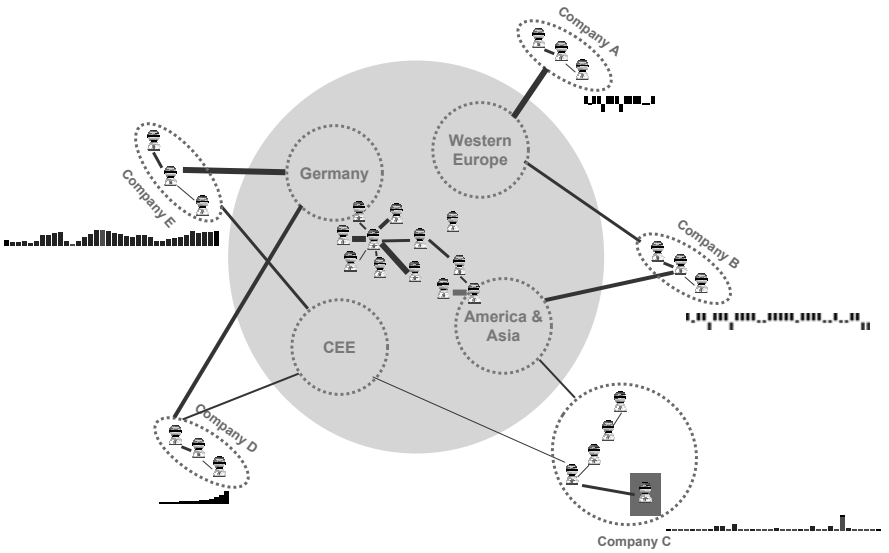

Fig. 11. Visualization and analysis of communication networks – inside and outside

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Closed Control Cycle for Business Process Management on the Credit Suisse Securities Platform

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Summary

Credit Suisse, a global financial services provider, is currently reengineering its securities platform. For this purpose, the individual applications are transferred into a process- and service-oriented IT architecture. It is noteworthy that the process models developed in a team-effort by Business and IT are being employed directly for process-driven order processing. The 'Auftragsmanager' (order manager), developed within *Credit Suisse,* carries out the actual controlling and monitoring tasks. Implementing the ARIS Process Performance Manager (ARIS PPM) completes the Business Process Management control cycle. Our motivation for re-engineering is our conviction that efficient Process Management relies on transparent processes throughout the entire Process Management control cycle, including design, the straightforward execution by IT systems, and analysis and optimization. Alongside the account of the conceptual and technical implementation of the control cycle, the benefits for operations will be illustrated in a case study on stock market transaction processing.

Key Words

Service-oriented Architecture (SOA), process control, process analysis

1 Project Description

1.1 Company Profile

The *Credit Suisse Group* is a leading financial services provider operating on a global scale with its headquarters in Zurich. It offers comprehensive financial consulting, banking products, as well as the *Winterthur* brand insurance and pension solutions to private clients and small to medium-sized businesses. In the investment banking segment it supports global institutions and organizations, statutory corporations, and private clients as an intermediary to the financial markets. The *Credit Suisse Group* is quoted as nominal shares (CSGN) in Switzerland and as American depositary shares (CSR) in New York. The group has approx. 62,000 employees worldwide. On September 30, 2005, it was managing assets totaling 1,404.6 billion CHF.

1.2 Starting Point

The major part of *Credit Suisse*'s securities business is processed by Securities Operations in Zurich. In this case, the individual business units of the *Credit Suisse Group* are clients of the services provided. Clients can therefore either be individual business units of *Credit Suisse* or so-called independent private banks, each of which has its own individual market presence, such as the Privatbank Leu in Zurich. Typical services are safekeeping and administrating securities, administrative tasks such as dividend payments, or clearing and settling security transactions.

The project described here is called *'Auftragsmanager' Introduction* and is aimed at modernizing the IT platform for the securities business, which is of central importance to the entire *Credit Suisse Group*.

The increasing influence of technology on the financial services sector during the past decades, growing competition, and the resulting pressure to automate business processes have prompted organizations to develop vast IT solutions. At *Credit Suisse* the mainframe-based platform processing the securities business is such a solution. This platform ensures the safekeeping and administration of the entire securities stocks and is used to process all securities transactions, including stock-market purchases or incoming and outgoing securities orders.

Such a platform naturally presents a highly complex entity. It processes the securities business from within a globally operating universal bank with access to all important capital markets; each of them characterized by local market characteristics and regulations. Knowing that the securities processes and the required banking know-how are decisive factors for competitive advantage, *Credit Suisse* launched a large-scale program (SEC 2000) to modernize its securities platform. The cross-company introduction of the 'Auftragsmanager' plays an important role in this.

1.3 The Aims of a Control System for Business Process Management

Technical reengineering is at the heart of this program. This involves transforming applications, which over the years have grown to form a monolithic entity, into a decoupled architecture. By first modeling process flows within the different programs, they become transparent before they are actively employed to control IT services. At the end of the project, 22 applications involving a maximum daily volume of 150,000 executed processes, equivalent to approx. 5 million instantiated functions (IT services), will have been reengineered.

Technical reengineering of the securities platform meets the requirements for continual Business Process Management.

The clearly defined aim of the project is to establish a closed control cycle for all securities processes. The control cycle begins where processes are modeled as Event-driven Process Chains (EPC) using ARIS. They are then transferred into the 'Auftragsmanager' via an ARIS interface (cf. Figure 1).

The 'Auftragsmanager' directly uses the process models to actively control and supervise the individual securities orders. Information from the 'Auftragsmanager' relevant to the process, as well as individual information from a process database relevant to the order, is automatically transferred to the ARIS Process Performance

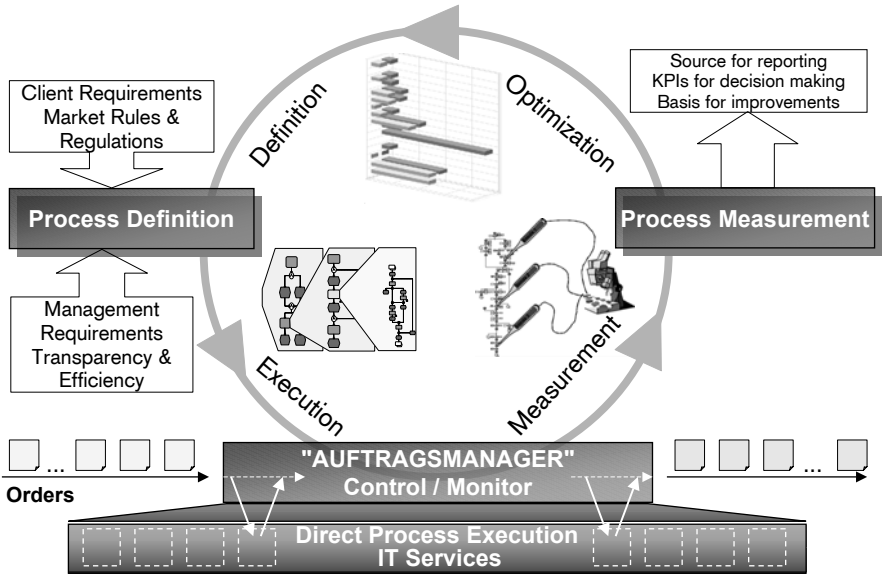

Fig. 1. Closed control system for Business Process Management

Manager (PPM) on a daily basis. In ARIS PPM, volume and performance of the processed transactions are continuously analyzed. If the displays in the performance cockpit show deviations in key performance indicators (KPI), which identify processes that are not running optimally, the processes in question are subjected to a thorough analysis examining the main influencing factors on performance and defining appropriate measures. In turn, the effectiveness of these measures is monitored. This creates a closed control cycle for Process Management, which ensures continual, reliable, and high-performance processing of securities transactions.

1.4 Key Project Figures

The project *'Auftragsmanager' Introduction* began in 2001. The total cost amounts to approximately 10 million Swiss francs. It was preceded by the actual development project for the 'Auftragsmanager'. As processing the securities transactions via the 22 applications involved must be permanently guaranteed, the 'Auftragsmanager' has not been implemented throughout the securities platform in the form of a big bang, but rather gradually. The current value of the business case underlying the project is positive after 5 years with regard to investments made.

However, the business case only takes into account the beneficial effects from the IT perspective. These mainly stem from decoupling the programs and processes, the reuse of IT services, and the improved controllability of the system complexity. As, at the beginning of the project, the decision had not yet been taken on how the control cycle would be closed, all benefits arising from analyzing and optimizing half of the control cycle were treated conservatively and were consequently not quantified. Further on in this article, some examples will demonstrate the great advantages of process performance measurement. In general, we can conclude that identifying and extracting the process flows from the program codes has regained the previously limited transparency of the flows of automated process steps. Owing to this transparency, it is now possible to carry out automated measurements of the processes from front to end, determine performance using key indicators, identify underlying driving factors of performance, and continually implement process improvements.

1.5 Examples of the Benefits Gained from the Project

The advantages of the closed control cycle can be divided into the benefits of process-driven order processing and the benefits of Process Performance Management.

Benefits from Process-Driven Order Processing

- There is a new way of collaborating between Business and IT departments. The common definition of processes produces the necessary transparency for both parties to ensure an efficient collaboration. While Business is able to aggregate these processes right up to the value chains for the upper management, IT is using them as a basis for further refinement until the functions correspond with IT services in their granularity. Both parties are thus provided with a common, End-to-End tool in form of process models to express and precisely coordinate their requirements. New requirements, in particular, can be implemented much more efficiently and effectively.
- The ability to process the securities product range with a maximum degree of standardization and production volume, fully automated, in real-time and with a 23/7 (1 hour maintenance window) availability, is new. This is particularly important for a globally operating bank.
- There is now an option to assign priorities for the execution of the individual process models. These priorities control the speed in which they are processed.
- Concepts have been created which now allow processes to be executed flexibly either on the business case level or at client level. For example, the process is carried out on the business case level as long as the underlying data concerns all clients. As soon as client-specific process steps follow, the level can be changed down to client level and vice versa. This enables processes to be laid out flexibly to meet business requirements (e.g. analyses) as well as optimally utilizing the available system capacity.

Benefits from Process Performance Management

- Volume Reports, which previously had to be generated laboriously and at great expense each month using semi-automated table calculation solutions, were replaced (e.g. cost settlement between business units with the aid of Service Level Agreements (SLA)). Today, some of these reports can already be flexibly generated at the touch of a button.
- The exact measurement of the segment of orders processed using Straight Through Processing (STP) represents a further advantage. Using (manual) exception-handling, it is possible to identify the number of – and the reasons for – orders.
- The processing cost for the different securities transactions varies in size due to their heterogeneity and complexity. Owing to the process analyses which enable a fine differentiation into product classifications, a job productivity measurement, for example, is performed today within the delivery unit in a way in which it has never been possible before.

- Process running times can be continually measured. This ensures that the quality requirements relating to time, as defined in the SLAs, are monitored. The orders that do not comply with the SLAs are then examined for the causes. These could be overly long idle-times within the individual organization units; however, using process mining analyses, more profound reasons can also be identified.
- By tracing the processes which were aborted before conclusion, it is possible to determine the orders cancelled during running time. Previously, it had not been possible to measure the amount of work expended on such orders.

2 Technical Solution

2.1 Business Process Execution

The Process and Service Oriented IT Architecture

At the heart of the process and Service-oriented IT architecture are the individual IT services and a generic component used to execute process control and monitoring. For this, *Credit Suisse* developed and implemented the 'Auftragsmanager' in 1998.

It is unique because the process models defined in ARIS are transferred unchanged to the 'Auftragsmanager'. Necessary changes to the process models can only be carried out in ARIS. It is intentional that the 'Auftragsmanager' itself does not provide any such functions. Therefore, it is mandatory that the process models are kept up-to-date in ARIS.

Decoupling applications is one important objective of the new IT architecture, and this aim is achieved by implementing an asynchronous communication between IT Services and the 'Auftragsmanager'. Such interactions are today based on a message-oriented middleware. Building on this, frameworks are made available in order to save the application developers from having to deal with the details of the middleware. They are thus able to concentrate on designing and implementing the actual business functionality. Based on this, Service-oriented Architecture (SOA), the 'Auftragsmanager' itself consists of several components. These were implemented on the basis of the middleware framework, analogous to IT Services, and are each responsible for a defined area of functionalities.

The Auftragsmanager

The central component of the 'Auftragsmanager' is the engine, which receives the incoming messages from Services (e.g. initiating a securities settlement) and initiates the subsequent Service. Based on the EPC method, the basic functionality can be described as follows:

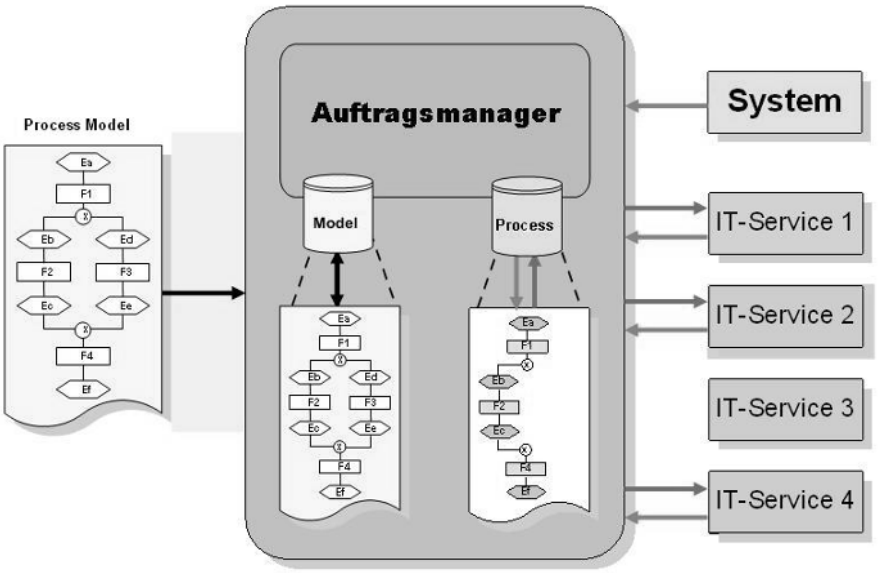

Fig. 2. Process control via the 'Auftragsmanager'

- The 'Auftragsmanager' receives event messages from completed IT services and initiates the sequential function according to the underlying process model.
- IT services, which were initiated by the 'Auftragsmanager', send an event message to the 'Auftragsmanager' after completion.

The process data processed by the engine is stored in a relational database. In addition, they are replicated in separate tables and stored in an optimized form for Business Process Monitoring (BPM). The positions located in the IT and Operations area executing services and processes can view this data via a Web application.

Apart from this basic functionality, the 'Auftragsmanager' also employs concepts used to visualize or process relationships between individual processes:

- 1:1 relationships: in order to manage the complexity in process modeling, ARIS knows the concept of a depository in which a further process is stored in a function. As a result of cross-application process modeling, this concept is used extensively. The 'Auftragsmanager' provides the necessary functions in order to delegate control to the subordinate process. At the end of this, process control is handed back to the primary process.
- 1:n relationships: the 'Auftragsmanager' provides the necessary functions to enable processing of so-called 'bulk transactions' (a business case, e.g. an in-

crease in capital, triggers several client-related processing or settlement processes). The 1:1 relationship is enhanced, because several subordinate processes must be activated and monitored.

The actual monitoring of the active process completion is taken over by a standalone controlling component, which is cyclically activated. The following lists some of the monitoring tasks carried out by this component:

- The throughput times of all active services are examined for non-adherence to deadlines. This can be configured individually for each service. When the deadline is exceeded, the responsible service staff-member is alerted.
- If there is no reaction to the alert within a given time (this time may also be configured), the service staff-member is given a reminder.
- In addition, scheduled functions can be triggered, e.g. archiving an order after ten working days.

Exception-Handling

Error situations in IT services and in controlling ('Auftragsmanager') are cancelled out using the middleware's back-out concept and the frameworks involved. Processing can thus continue during short-term technical failures. Errors within the applications and processes are registered in the 'Auftragsmanager' and administrated via the user interface. Once the problem has been solved, the responsible position is able to restart the failed service. The appropriate service- and process-staff are also provided with specialized functions in order to limit the extent of the error. Depending on cause and effects of the error, the process flow can be interrupted as follows:

- A defined process: an identified process is interrupted (via user interface).
- A defined process model: all processes pertaining to a certain process model are interrupted. The process is interrupted immediately before the sequential function is activated within the process concerned.
- A defined service: all processes, which are about to trigger the service in question, are interrupted.

After the cause of the trouble has been removed, all interrupted processes are released again. This functionality is also of great advantage for the software migration process in order to control the activation of new processes and / or services. As the central exception-handling is located in the 'Auftragsmanager', several functions (e.g. intermediate storage of messages) connected to the 'Auftragsmanager' are implemented only once and are available to all applications (service providers) involved.

Additional configuration parameters enable the staff responsible for services and processes to design the exception-handling individually within their area of responsibility. It can thus be defined who is to be informed in case of an error or which exception process (also visualized as process model!) should be initiated. For order-processing within the STP environment, an individually configured exception-handling has proven to be one of the most important success factors next to high system-availability and performance, because it enables handling of individual as well as of sizeable amounts of processes.

Scaling and Prioritizing Concept

The 'Auftragsmanager' is scaleable to ensure that the large volumes of securities processing can be dealt with. The scaling concept has been successively built up and refined with the ever increasing processing volumes since 1998. Primarily this includes instantiating and paralleling the engines. The partitioning of the central database, and the associated allocation of one database partition to exactly one engine, avoids mutual lock-outs due to simultaneously competing accesses to the database. An upstream component takes over the dispatching task for incoming messages and ensures an even load distribution across the individual engines. This component is also responsible for sending broadcast messages. These are particularly necessary in exception functionalities and are passed on to all engines (e.g. interrupt all processes belonging to a process model – cf. exception-handling).

The processing volumes vary significantly during the course of a day and can only be planned for with difficulty for certain transactions (e.g. stock-market transactions). Other transactions are event-driven (e.g. increase in enterprise capital), others again are cyclical, e.g. end of the month or quarter. To provide system resources directed at coping with peak loads would be difficult to predict and hardly justifiable from the cost perspective. Therefore, we introduced the concept of message prioritization. During the processing bottlenecks in the IT services or in the 'Auftragsmanager', time-critical processes receive priority, e.g. a bank client is waiting online (or at the service desk!) for a statement of the securities transaction he has just performed. By prioritizing certain transactions, the processes, which are not time-critical, are automatically given a lower priority. Indicators for high-priority cases are – apart from client proximity (cf. above) – also SLAs, e.g. concerning daily activities. The exception functionalities enjoy highest priority (as described above), as they must have immediate access in order to minimize the ensuing error costs.

2.2 Business Process Measurement

The Process Performance Manager is used to analyze and optimize processes.

Data Delivery

In the current setup, data delivery to ARIS PPM takes place once a day during the maintenance period of the 'Auftragsmanager', as no process changes occur during this time, i.e. processes are stopped. The changes made to the individual processes, which are respectively allocated to a completed transaction, are stored in the database of the 'Auftragsmanager' together with their affected events and executed functions. However, not all processes from the database are delivered to ARIS PPM; only those which have been changed in the meantime, i.e. since they were last supplied to ARIS PPM.

From the ARIS PPM perspective, it is also possible to provide the respective changes in defined blocks containing several events and functions in the so-called event format. As a result of the high process volume, this is not carried out at high-performance since the appropriate point for each step must be found within the process.

The individual processes are also enriched with the required order data. The order data can be different according to process type; this is because there are different requirements for the analysis, i.e. the data required for a stock market process is different to that of a delivery process.

Sometimes the operation-relevant analyses are only possible with the aid of order data, as only this makes differentiations within a process possible. Buying and selling stocks is, for example, carried out using the same process model but can be distinguished according to transaction type. Respective performance standards can thus be defined according to the transaction type.

Key Indicators and Viewpoints

Key indicators can be defined for each process type. A key indicator is defined by, for example, counting the number of certain functions and events or looking at the period between events and functions. The definition of key indicators forms part of the ARIS PPM configuration. For each process type, there is a definition specifying which key indicator is calculated and which order data is displayed.

The key indicators are defined from the operation point of view. Since the analyses requirements were not always accounted for during process modeling, some key indicators can be calculated only with the aid of interdependencies, e.g. that a function may only be counted if another has not been carried out.

The defined key indicators are already calculated and the order attributes prepared during import. The import is an exclusive function, as are all other database accesses. For this reason, the various process models cannot be imported simultaneously, even though they will be exported to different files.

User Access

Users have access to ARIS PPM surface via Web browser. No additional software is required.

Access to the individual process types can be restricted to user level, so that only authorized users can perform the respective analyses.

In order to perform business-relevant analyses, the key indicators can be logically connected to the order data. A relevant analysis could be, for example, the number of orders approved per department and person or the period from capture to settlement per transaction type. This is the so-called 'view'.

Users are able to generate ad-hoc reports via the Graphic User Interface (GUI) and also work with pre-defined favorites. A *favorite* is a 'view' which is stored so that it can be reused. *Favorites* can be made available to other users. This has the advantage that they only need to be prepared once.

In addition, *favorites* for daily analyses can be pre-prepared for the cache directly after their import in order to minimize access times. Less frequently needed analyses (e.g. monthly), however, should not be pre-calculated on a daily basis because of performance reasons in the cache.

Management views can be used to provide users with predefined views of several *favorites*. Management views are created from defined *favorites*. It should also be ensured that users can only analyze data which is intended for them. A 'view' labeled 'Management View' can be used in this context, because the *favorite* cannot be changed.

2.3 Process Optimization

The modeled processes can be optimized using ARIS PPM. There is the possibility of reconstructing the EPCs from the ARIS PPM view. In this case, not the modeled process but only the actually executed processes are used as a basis for ARIS PPM, and are aggregated to form an EPC. Events and functions which have not been executed are not represented in the EPC. By comparing this with a process modeled in ARIS (cf. Figure 2), it is possible to determine to what extent deviations exist, e.g. paths not followed.

The execution probabilities show how often the individual processes have actually followed particular paths (cf. Figure 3). Using this, Business as well as IT can check how processes are carried out.

The ability of continuously measuring and analyzing processes according to their performance creates the necessary transparency for sustainable process optimization.

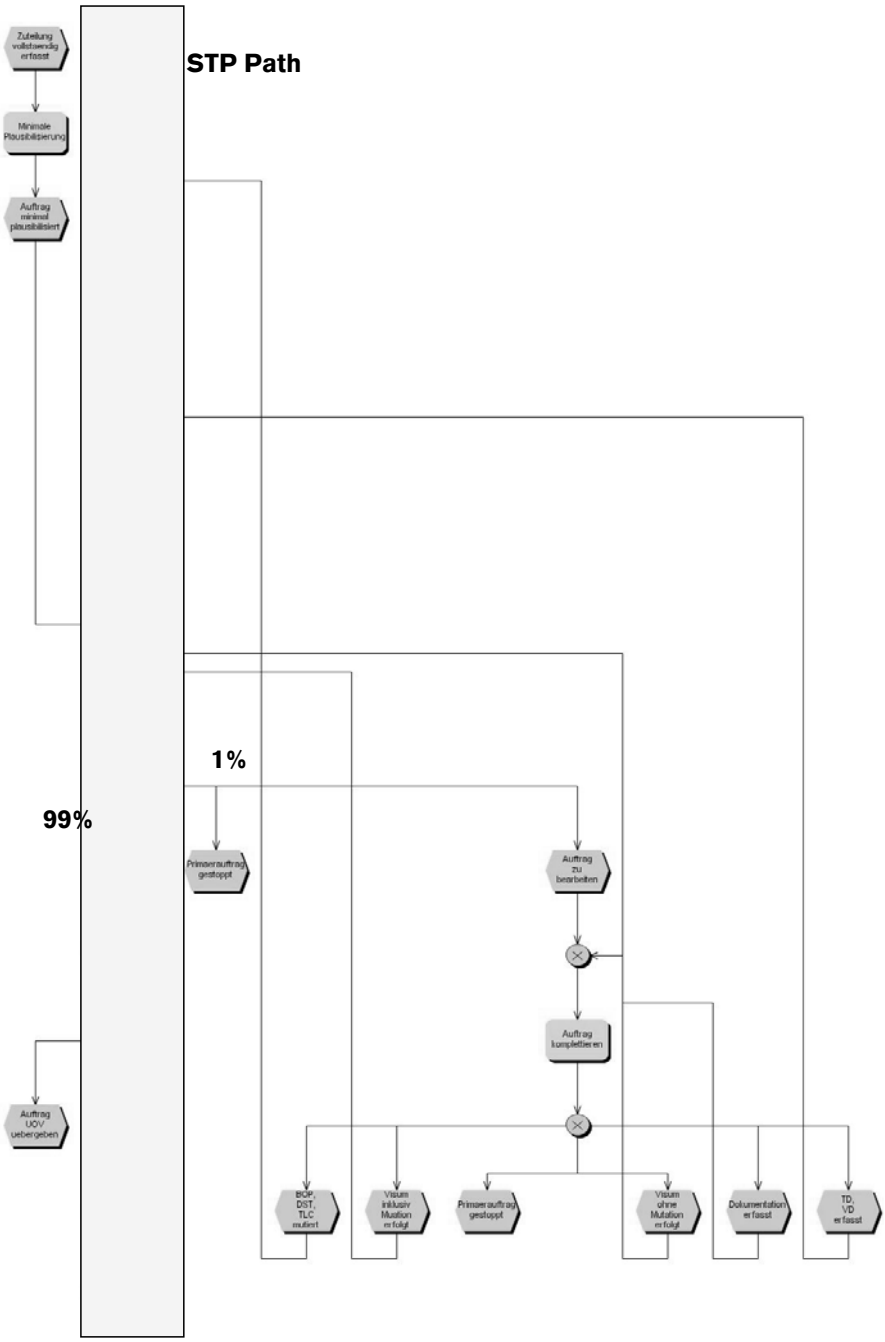

Fig. 3. Paths followed and the Straight Through Processing (STP) rate

3 Case Study: Stock Market Transaction Processing in Securities Operations

Changing stock market processing in August 2004 bore several risks. It is a sensitive process in which delays and system interruptions always directly affect customers. Furthermore, the workload of this process with up to six-digit transaction figures per day is significant. Under these conditions the entire existing processing workflow was analyzed and reorganized in line with the actual business processes. This was done by consistently applying ARIS Toolset as well as the 'Auftragsmanager'. Primarily, the requirements and processes pertaining to the various processing positions had to be respected and this meant turning away from the old monolithic IT applications towards controlling the business processes. ARIS PPM is used as the analysis tool, the functions of which are able to perform several standard analyses (throughput times, processing times) as well as specific analyses (multiple activation of functions, daily activity reports analyzing the successful procedure at the daily end-of-business, etc.).

In summary, the closed control system must cover the following aspects:

- reorganizing the processes into processing steps within the processing points; the actual IT environment had to be disentangled.
- the option of re-generating orders upon data mutations must be secured. This means that, in an exceptional case, if order data has been manually edited, the process can be automatically enriched with new data. The great advantage of this is that one can continue to work on the same process whereas, before, the process would have had to be aborted and a new order entered.
- reducing manual interventions / mutations in third party systems;
- multiple utilization of program modules;
- process analysis beyond the individual processing steps must be guaranteed;
- audit requirements must be taken into consideration and fulfilled;
- easy handling of the new tools employed for users and support teams;
- integration of the automated securities infrastructure located downstream from stock market processing (e.g. printing output preparation) into the process to be monitored must be guaranteed (cf. process storage Figure 4).

As opposed to the generated process model (cf. Figure 3), the trade settlement process model shows every possible path, as opposed to only the actual paths taken.

Based on the ARIS process, the stock market orders are controlled and monitored by the 'Auftragsmanager'. The applications on the mainframe were redesigned and now have standardized interfaces to the 'Auftragsmanager'. This means that the process control logic is guaranteed by the 'Auftragsmanager' based on the ARIS process – and not by the applications. During end-of-day processing, the order data from stock-exchange orders and the data from the 'Auftragsmanager' are exported to ARIS PPM. Only this enables the ensuing analyses of processes.

Measuring points were defined as a result of the processes definitions. Several different analyses can be generated using standard key indicators (e.g. number of assigned orders) based on these measuring points and the order data imported in ARIS PPM from the productive orders.

The role concept and the respective analysis variants are represented in ARIS PPM in stages:

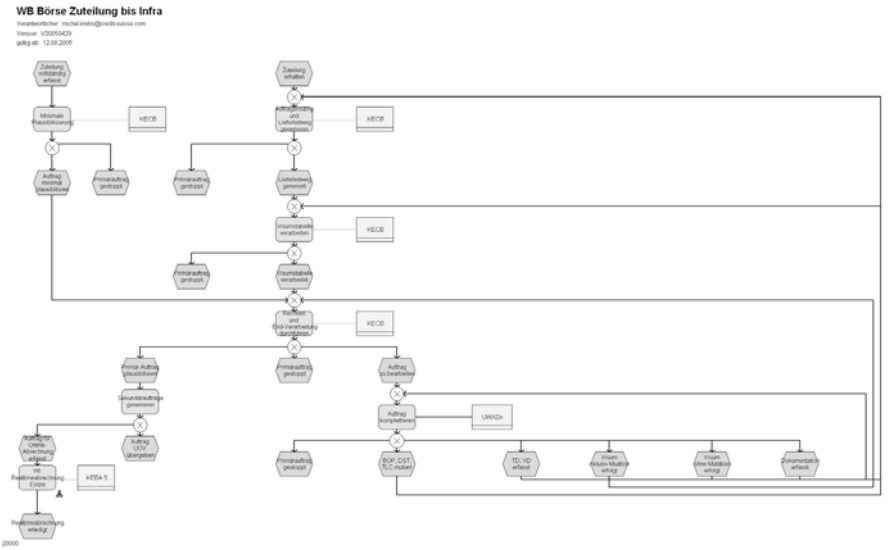

Fig. 4. Modeled stock-exchange flow chart

- Line Management Management-Views / report addressee / recipient
- Support teams Analysis functions / report author / creator
- Specialists Analysis functions / report author / creator
- Auditing positions Management views / report addressee / recipient

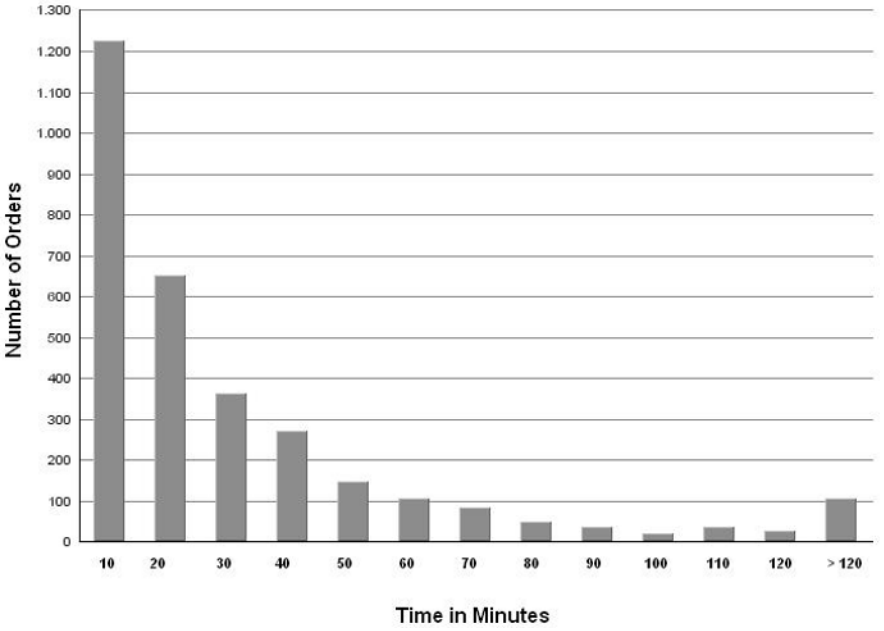

Fig. 5. Distribution of the processing times for manual interventions (daily)

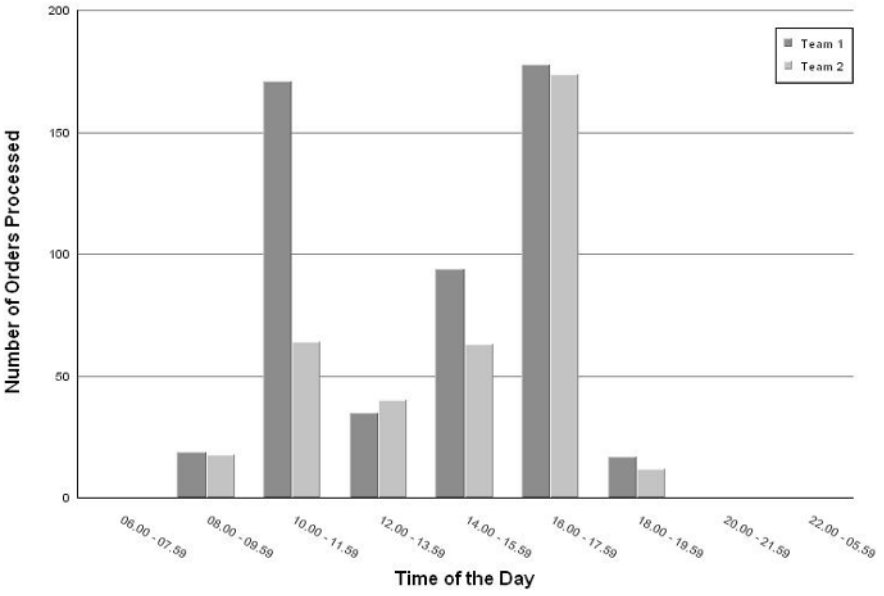

Fig. 6. Time span 06.00 – 21.59 (daily)

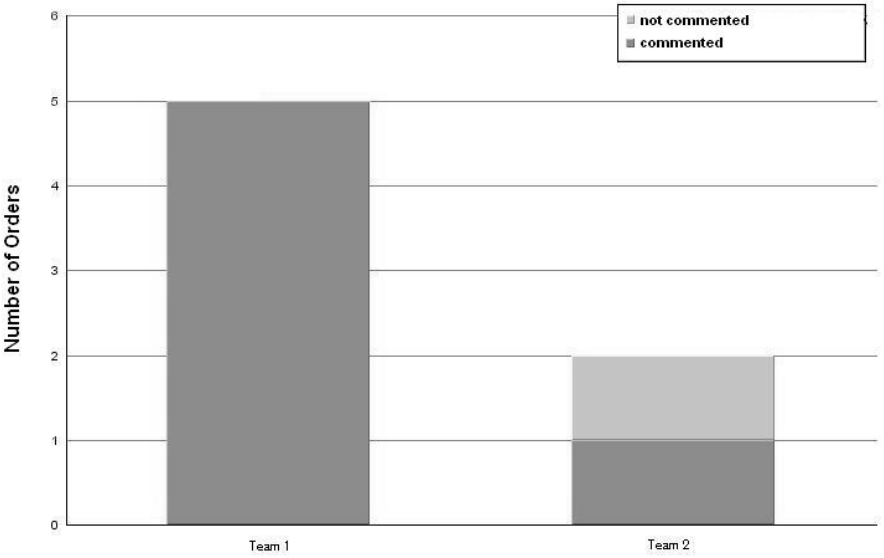

Fig. 7. Orders failing same-day processing

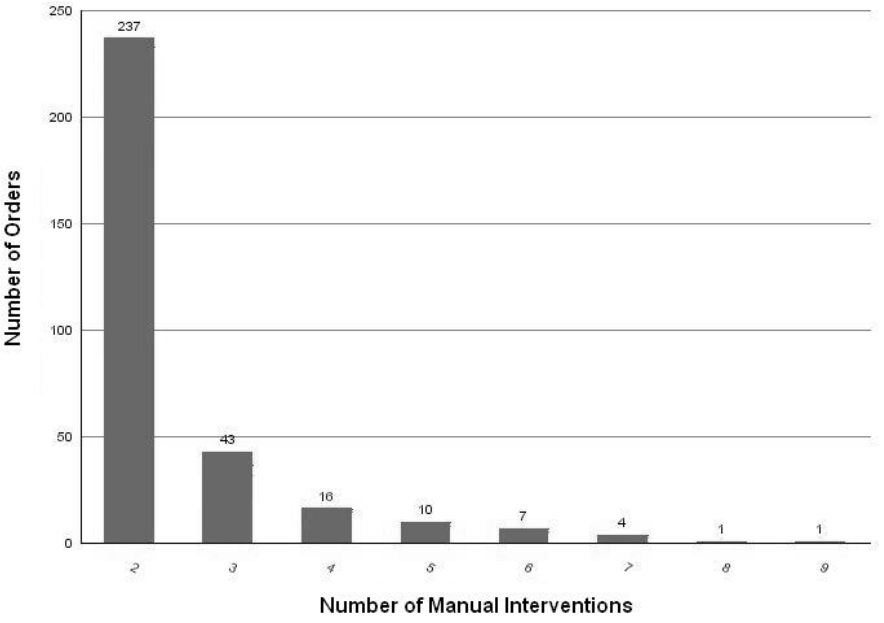

Fig. 8. Orders with multiple manual interventions

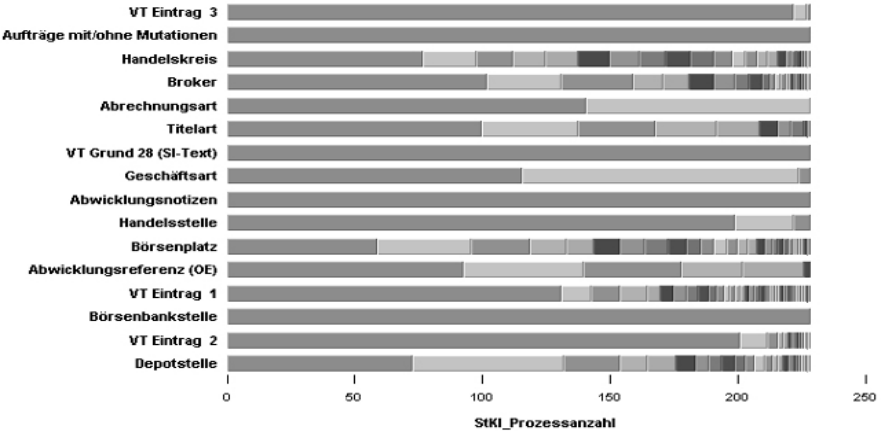

Fig. 9. Assessment diagram for optimizing the STP rate

3.1 Standard Analyses

The *line management* needs to know how long manual order-processing takes from the point of entry and at which times of day the load peaks.

As far as *auditing* is concerned, it is imperative that the daily same-day-processing at the end-of-business can be documented within the service standard.

These three types of analysis are used in Securities Operations as diagram, process stage table, and cross-classified table. This is because the respective addressees have different information requirements.

The standard analyses can be customized and utilized for specific analysis purposes using filter functions and the visualization facilities of dimensional values.

3.2 Special Analyses

A totally different analysis approach is chosen for the optimization of STP processes.

Using this analysis option, orders, which have run through a certain function several times (loops within the process) before they finally arrive for settlement, can be isolated by the *support team*. If there is a certain accumulation of similar orders, this could be an indication that further action needs to be taken.

By means of this assessment diagram, *specialists* can compare specific order data. The behavior of the number of orders concerned can be determined by making concrete changes to, or selecting, control values. Conclusions can then be drawn

on the existing optimization potential regarding the STP rate. This optimization potential can lie either in the ARIS business process, the mainframe application, the operative processes, or in the qualification standard of the respective processing positions.

All these analyses are made available to each respective user in either the daily, pre-calculated and cached views or as normal views.

4 Conclusion

The business process for securities transaction processing can be monitored using ARIS PPM based on the underlying ARIS processes. The findings and data gathered are either used to fulfill audit requirements or for the continuous improvement of IT process flows. Using the control cycle, specific analyses can be carried out flexibly and quickly and can be made available to other users.

From Process Efficiency to Organizational Performance

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Summary

In a lot of organizations and lines of business, efficiency and productivity not only depend upon well-structured processes and the best possible IT-support, but increasingly rely upon optimizing the communication between participating teams and groups. This article highlights the way in which these organizational interrelations may be analyzed and visualized in order to increase organizational performance.

Key Words

Corporate Performance Management, Process Performance Management, KPI, process mining, organizational performance, Service Level Agreements, social network analysis

1 Corporate Performance Management – Processes and Organization

Over many years, Process Management was closely linked with the observation of well-structured processes and the respective company organization structure. However, in many lines of business the way in which work is performed and distributed among employees is experiencing change. The importance of traditional reporting methods is dramatically decreasing inside organizations with increasingly flat hierarchical structures and knowledge-driven processes: if one wanted to exaggerate, one could say that traditional, static organizational charts have very little to do with real added-value processes. Instead, networks – often invisible from the outside – are establishing themselves and are significantly influencing the performance of organizations and companies. The key persons within these networks, who, owing to their professional or social skills, ensure that an effective cooperation takes place, are often not those at the top of the organizational charts. This applies to the processes requiring profound knowledge, e.g. research and development, and increasingly also to traditional core processes, e.g. order processing and services.

During the past years, selecting and introducing suitable IT systems was emphasized in many optimization projects. However, what has been – erroneously – neglected is that efficiency depends a lot upon what the communication and the informal relationships between the individual participants and teams actually look like. Very often, work allocation and coordination is not rigidly regulated but is negotiated and agreed upon within the teams and networks. As a result, the boundaries between structured and well-documented processes and ad-hoc processes vanish in many companies. Often, part of the processing is supported electronically using mail, groupware, document- and content management systems. However, such activities are neither documented nor connected to structured data, e.g. an ERP application.

When optimizing the business and analyzing processes, it is therefore not only relevant to look at the sequence of activities and analyze it using key performance indicators (KPI), but also to consider the following aspects, which are increasingly gaining attention:

- Organizational analysis: who is working together with whom?
- Analysis of data and document relations: how are which data and documents being used within the process?
- System support analysis: how and which IT systems are employed?

A survey of this information does not give a static view but one that changes dynamically during the course of time, i.e. it is modeled in a similar way to the target

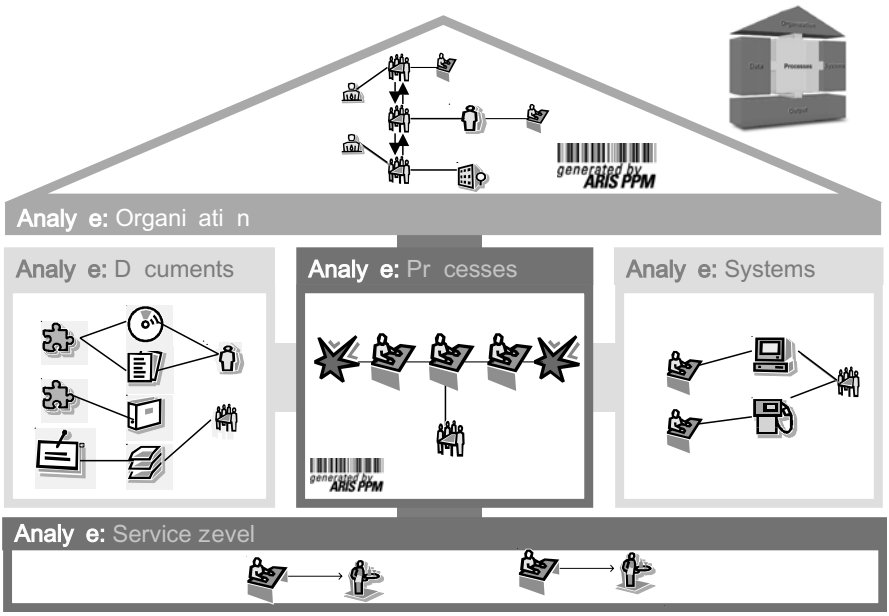

Fig. 1. Extending the process analysis

process and can be compared with the actual (dynamically changing) processes. This analysis request also applies to the organizational, data / document, and systems view (cf. Figure 1).

In order to answer the question on how departments and staff work together in real life and where communication can be improved, questions such as the following need to be answered:

- Which organizational units / positions carry out which activities? (How often? What is the quality like? What are the throughput and idle times? What costs are incurred?)
- Which units work together closely? How often do organizational units O_1 and O_2 work together on the same process instance? Where are frictional losses between departments? Where do bottlenecks arise?
- Which employees and positions form bridgeheads for communication with other departments? Who carries particular know-how and who is a specialist? Who requires which training?
- Is a department running to capacity? How can savings be made on personnel costs?

These activities and communication analyses, on the one hand, highlight the interrelationship between organizational units and employees; on the other hand, the connection between company organization structure and working on a process becomes transparent. The actual relationships between teams and groups can be monitored in a similar way as the analysis of the target processes, which are generated via ARIS PPM from the data of the underlying IT systems. 'Relationship', in this case, may stand for *collaboration, delegation, information, reporting, checking,* etc. Moreover, it becomes apparent, which processes involve an organizational unit and for which segments it is responsible. Visualizing these relationships is a major prerequisite to highlighting the communication taking place when working on a process, and being able to analyze and optimize it.

2 History and Field of Application for the Analysis of Organizational Networks

The idea of viewing and visualizing the communication and interaction between persons and groups is not new; during the past decades many articles have been published on this issue using the generic term of 'social network analysis'. In sociology and psychology there are numerous examples for the application of such techniques. During the past years, the popular-scientific publications of Gladwell, who is engaged in determining which role social networks play in spreading ideas and trends (cf. Gladwell, 2000), and Buchanan, who shows which similar rules are followed by nature and social structures (cf. Buchanan 2002), have attracted much attention.

Curious applications are, for example, those which employ such visualization techniques for the examination of football matches and the combinations between players and parts of the team. (cf. Figure 2).

The focus of interest, when talking about optimizing the efficiency of companies, is the application on the analysis of teams during their work on processes and process flows. Typical scenarios, for which an organizational analysis may give valuable indications, are post-merger integrations, the accompanying reorganization projects, the integration of new employees, personnel development, and staffing projects – even up to the cooperation with external partners (cf. Cross, Parker 2004; Kilduff, Tsai 2003). The following section highlights the specific application of these methods and techniques using a call center environment as an example.

'Communities of practice' (often operating on a global scale) have established themselves in many large companies and have a large bearing on how knowledge and innovation processes are dealt with. It is particularly interesting to observe which typical patterns and roles emerge in the organizational analysis: Metrics can help identify teams acting either as central links within the organizational network or as peripheral specialists. It often emerges that high-performance teams or staff

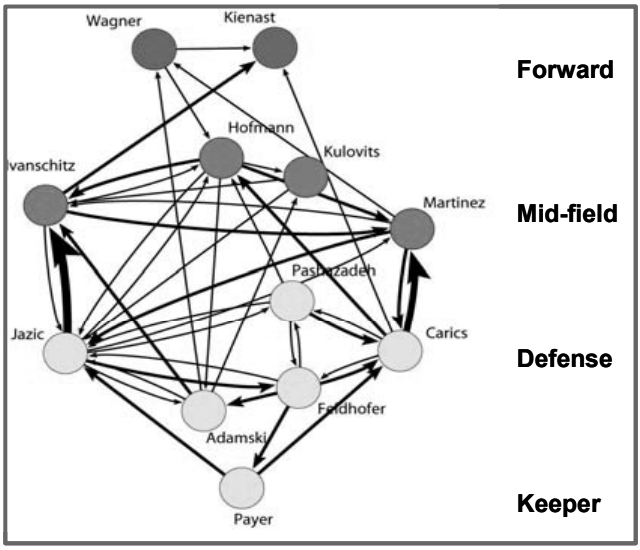

Fig. 2. Analysis of the football match Rapid Wien v Sturm Graz, December 7, 2003 (cf. Katzmair 2004)

members do not necessarily distinguish themselves by greater individual expertise, but that they, above all, have a much more diversified network inside as well as outside the company.

3 Application of ARIS PPM for the Purpose of Organizational Analysis

With the ARIS Process Performance Manager (ARIS PPM), *IDS Scheer* offers a software solution tailored to suit the requirements for controlling and analyzing business processes. Using a patented process, data is gathered from the operative systems, cross-system processes are automatically reconstructed, and reference numbers relating to these processes are calculated. It is possible to conduct an extensive online-analysis of the reference numbers and represent the measured processes in form of EPCs. These are unique features of this system. ARIS PPM is successfully performing process analysis for clients from a wide range of businesses.

These process analyses mainly involve the determination of process and functional KPIs (throughput times, frequencies, costs, adherence to deadlines, and quality guidelines) as well as the representation of the actual process flow in form of an EPC diagram. Figure 3 shows a screen shot of an EPC which was generated automatically by ARIS PPM from the measured processes. It depicts the actual process flow together with the actual probabilities and the measured KPIs.

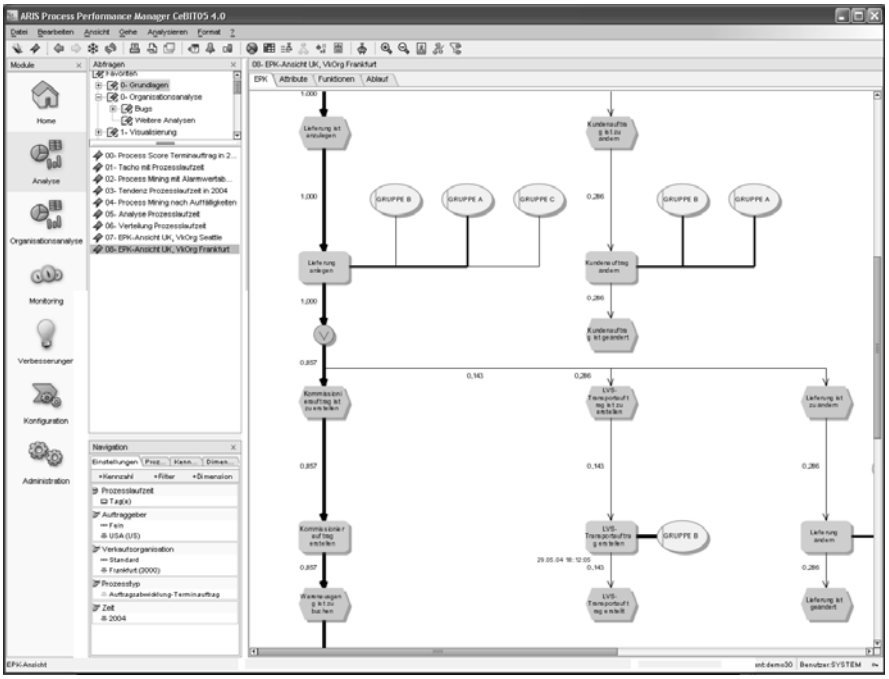

Fig. 3. Screen shot of a process model automatically generated by ARIS PPM

From version 4.0 onwards, these process analyses will be extended by another tool. The new software module 'organizational analysis' allows a 'look behind the organizational charts'. To do this, the information on the executing organizational units is evaluated within the process instances by analyzing the relationships between organizational units or between organizational units and activities.

The benefit from such analyses and the evaluation potential of the tool will be presented in the following section using the example of a call center. In an IT call center, employees experiencing problems with technical systems are able to ask for help. Typical examples range from easy requests, e.g., "I have forgotten my password.", to more complex tasks, e.g. data recovery or urgent problems such as the non-availability of an operating system.

The department is organized such that the call is answered centrally, and simple requests are solved immediately. These activities, including query acceptance, form the so-called first level support ('researching 1st level'). More complex problems are passed on to various specialist teams (network support, Windows support, SAP support, etc) ('researching 2nd level'). Before the request is passed on, it should be classified as accurately as possible to ensure that the appropriate specialist can be established promptly. Under certain circumstances, the specialists

may then engage an external company, e.g. hardware support in case of a hardware defect on a system ('engage provider'). Apart from these problem-solving steps, there are also some interim steps such as 'call-back pending'.

In order to monitor the process and organizational performance, the two relationships or relations, 'Who does what?' and 'Who delegates to whom?' are considered as an example for the process.

3.1 Who Does What?

This relationship examines the correlation of organizational units and activities. During each stage of the process, KPIs relating to time, cost, and quality are determined. An individual cost-unit rate and staff-capacity data is stored for each team. The processing time is determined by the function. As a result, we are able to establish process costs – for each individual function as well as for the process as a whole – and the costs, deployment, and capacity utilization of the organizational unit. The analysis front-end enables an easy and interactive evaluation of the KPIs and also calculates a 'performance profile' for the respective organizational units (cf. Figure 4).

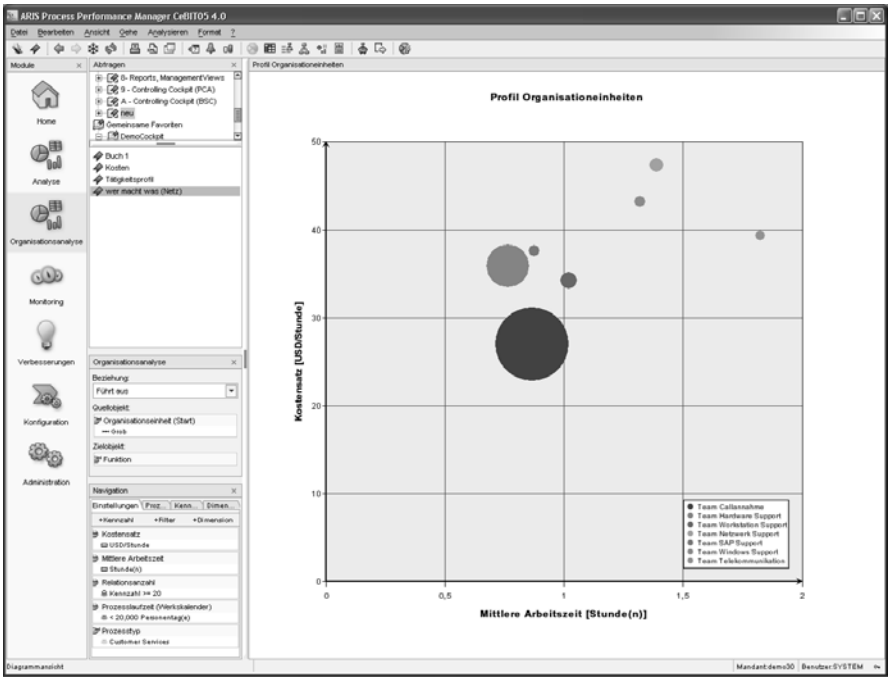

Fig. 4. Example of a performance profile of the organizational units

The collected data can then be analyzed and compared according to all sorts of criteria (dimensions), as is standard in ARIS PPM (i.e. point in time, incoming request channel, urgency level of the request, etc.).

3.2 Who Delegates to Whom?

In order to ensure adherence to the SLAs (Service Level Agreements), it is extremely important to forward the query correctly, based on its content, to the appropriate specialist teams. Each delegated call requires a familiarizing period with the problem, and should someone then conclude that he is not the correct recipient, valuable time and capacity have been lost. Therefore, a large number of call center managers are intuitively convinced that many delegated calls slow down the process and jeopardize the SLAs. Using the ARIS PPM communication analysis tool, intuition can be turned into fact by means of measurement.

To conduct this measurement, each process stage is searched for potential delegations: each time organizational unit A completes a function and the sequential function is carried out by another organizational unit B, a 'delegation' from A to B has taken place (cf. Figure 5). This relationship is stored in each process stage and can be enriched with any KPIs (e.g. 'communication time', i.e. 'How long does it take for B to take up the job after A has finished?').

The simplest KPI on the frequency of such a communication relationship is already sufficient to gain an initial insight on the influence of communication on process performance. Figure 6 distinctly shows the correlation between the running-time of requests (x-axis) and the communication frequency (y-axis). Processes lasting up to one day are, on average, delegated to another team in only 65% of cases. Processes lasting three days have a delegation rate of 190%, i.e. there are, on average, two delegations per process (organizational breaks).

Things become exciting when the communication aggregate is calculated over many requests. ARIS PPM is able to aggregate the relationships as well as all other KPIs and present them in form of a communication network (cf. Figure 7). Here, we can see how the actual collaboration is presented visually (e.g. all requests for which the solving time is less than a day). The organizational units are represented by the yellow ovals, as is usual for the graphic visualization of business processes. The arrows represent the communication, whereby the 'thickness' of an arrow indicates how often the respective communication takes place. However, the arrow thickness can visualize not just the frequency but also every other KPI available for this correlation.

This form of visualization produces an entirely new quality of analyses for process behavior: Figure 8 shows the measured communication structure between the teams for fast and slow processes. It becomes apparent that in slow processes the

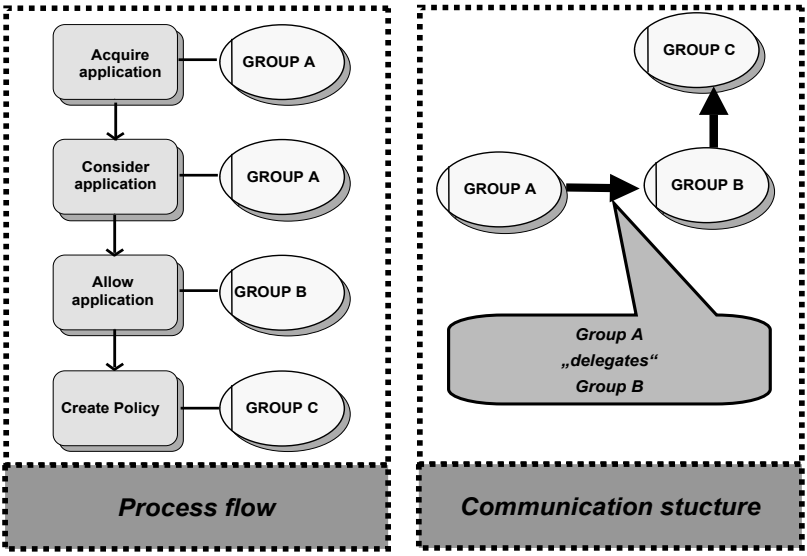

Fig. 5. Definition of the communication relationship 'Who delegates to whom?'

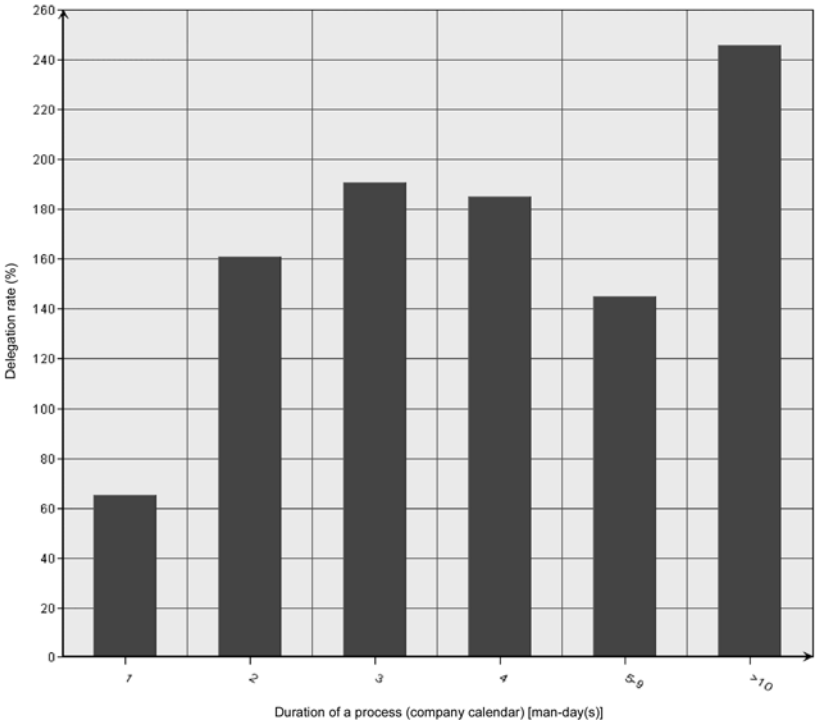

Fig. 6. Correlation between delegation and the duration of a process

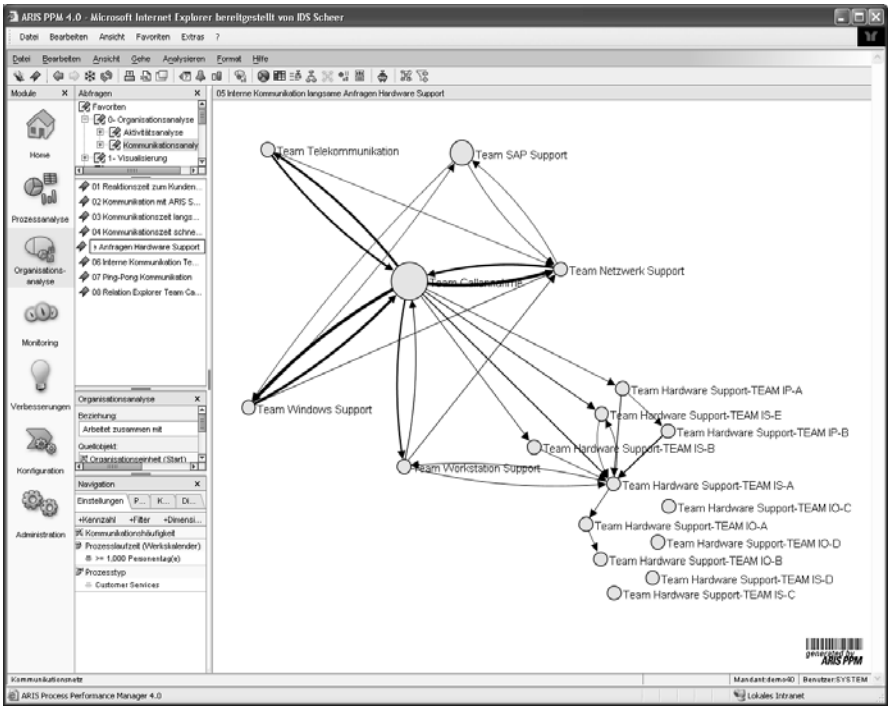

Fig. 7. Communication network in ARIS PPM

Fig. 8. Communication structure in slow processes (left) and fast processes (right)

communication structure is much more 'chaotic'. Often, the requests of specialist teams (e.g. network support) must be delegated to other specialist teams (e.g. Windows support). It is particularly disadvantageous when specialists themselves re-route the queries instead of sending them back to the initial acceptance team to point out that they had wrongly classified the request in the first place. This means that the acceptance team is unaware of the problem, with the result that there is no learning experience.

3.3 Organizational Hierarchy

Previous models have left out an important aspect of the organizational structure: the hierarchy within the organization. Employees are organized in groups. These groups form teams or organizational units, which in turn can be grouped according to the company organization structure.

In ARIS PPM this aspect is accounted for by placing the organizational units into a hierarchical system. This enables an analysis of the communication relationships in various degrees of detail – even simultaneously on various levels. The call acceptance team, for example, is composed of several groups. A simple mouse click onto the communication network visualizes the communication within the team.

3.4 Relation Explorer

The previous analyses have always referred to a certain aspect of communication and the organization. If the system is to serve as an information system on organizational units, a central analysis function is required in order to give a comprehensive outline of tasks, performance, and communication relationships.

This feature is offered by the Relation Explorer (cf. Figure 9) in ARIS PPM. It shows all relationships for a selected organizational unit. This quickly generates a profile of the organizational unit and enables a comparison between the actual, measured behavior and the expected behavior.

4 Outlook

The 'Organizational Analysis' module in ARIS PPM opens up a new chapter in controlling business processes and managing organizations. The data made available to communication flows within the company offers a large potential for increasing efficiency. Communication barriers can be specifically identified and dismantled. When restructuring the organization, it can be determined whether or not the employees are aware of their new roles and also whether they accept them. Not least, the efficiency of training can also be established.

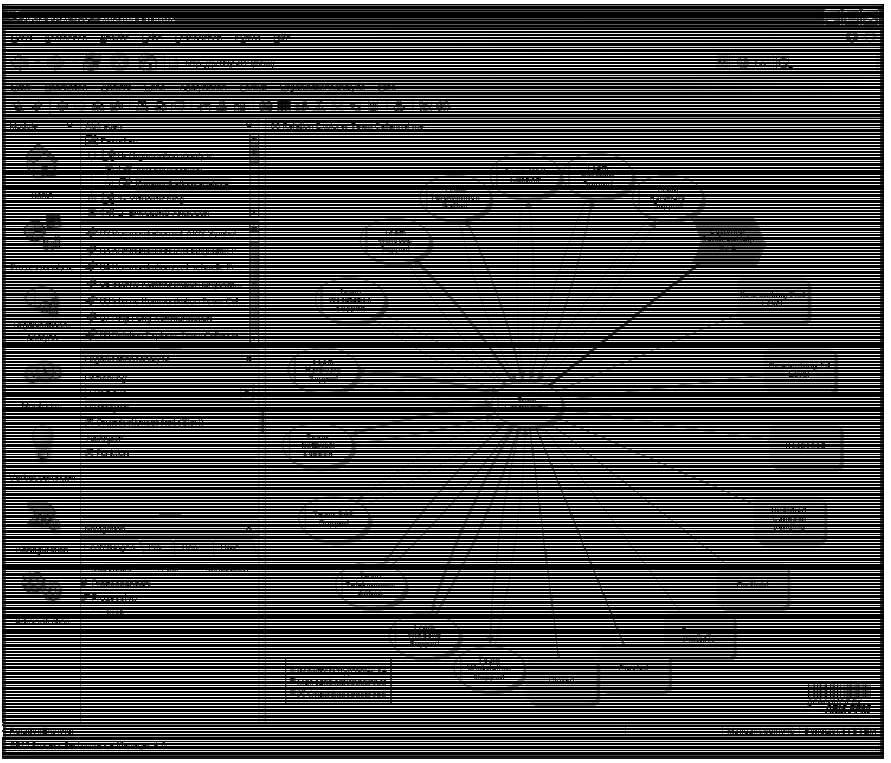

Fig. 9. Relation Explorer

The process and organizational analysis therefore covers two important aspects required to control an organization for the purpose of corporate performance management.

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