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ORIGINAL ARTICLE

Advances in business process management implementation based on a maturity assessment and best practice exchange

Michael Rohloff

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Abstract The paper presents the implementation of Business Process Management in a large international company. The business case illustrates the main objectives and approach taken with the BPM initiative. Central element of the BPM implementation was the development of a process framework which consists of a reference process house (RPH) and common methods for process management across the company. In order to assess the implementation of Business Process Management and the achievements a process management maturity assessment was developed and implemented. The maturity model is based on nine categories which comprehensively cover all aspects which impact the success of Business Process Management. Some findings of the first assessment cycle are pinpointed to illustrate the benefits and best practice exchange as a result of the assessment.

Keywords Business Process Management · Maturity Models · Process Implementation · Reference Modeling

1 Introduction

Business Process Management (BPM) is a management practice which encompasses all activities of identification, definition, analysis, design, execution, monitoring & measurement, and continuous improvement of business processes. Consequently Business Process Management encompasses not only the analysis and modeling of business processes but also the organizational implementation,

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M. Rohloff (✉)
University of Potsdam, August-Bebel-Str. 89, 14482 Potsdam, Germany
e-mail: michael.rohloff@wi.uni-potsdam.de

leadership and performance controlling (Becker et al. 2003). Although it is a well-known and largely used practice there is an ongoing discussion on how to best implement Business Process Management. Due to the comprehensive nature of BPM a variety of different approaches exist (e.g. Business Process Reengineering (BPR), continuous process improvement, workflow management, reference modeling, and implementation of ERP systems or other standard enterprise applications).

Facing the importance and vital role of Business Process Managementfor the transformation and organizational change of enterprises the question arises how different organizations perform in their development of Business Process Management. The notion of maturity has been proposed in other approaches to assess an organizations state in terms of implementing a specific program or the quality of a process.

The Capability Maturity Model developed by the Software Engineering Institute at CarnegieMellonUniversity was one of the first, widely used models (Paulk et al. 1993). This model was originally developed to assess the maturity of software development processes. Over the years it was extended to other domains. The successor is the Capability Maturity Model Integration (CMMI) which aimed to improve the usability of maturity models by integrating different models into one framework (CMMI; Ahern et al. 2004; Chrissis et al. 2006; Hofmann et al. 2007).

At present CMMI provides three model documents for process improvement addressingdifferent areas of interest (CMMI, Forrester et al. 2009; Gallagher et al. 2009): Product and service development with the CMMI for Development (CMMI-DEV), product and service acquisition with the CMMI for Acquisition (CMMI-ACQ), and the service establishment, management, and deliverywiththe CMMI for Services (CMMI-SVC).

Today, CMMI is widely used in practice to evaluate and to improve processes. Depending on the area of interest e.g. development, acquisition or services the CMMI models contain different process areas. CMMI uses standardized question catalogues and evaluation criteria to assess these process areas and to work out the strengths and weaknesses. It helps to define improvement measures and to plan the implementation in an organization. The CMMI introduces the concept of five maturity levels defined by special requirements that are cumulative. The maturity levels are commonly defined for all three models but with defined requirements specific to the process areas.

In recent years a number of maturity models for Business Process Management have been proposed (BPMM, Fisher 2004; Hammer 2007; Hüffner 2007; Lee et al. 2007; Rosemann et al. 2006, 2004; Rosemann and de Bruin 2005; Smith and Fingar 2004). Most of the models focus on only one dimension for measuring BPM maturity and very few applied studies are known. Exceptions are the Business Process Management Maturity Model (BPMM) of the OMG, the Process Audit of Hammer (2007), and the maturity model of Rosemann et al. (2004, 2006; Rosemann and de Bruin 2005).

This paper presents the implementation of Business Process Management in a large international company, undertaken as a corporate, company-wide project within Siemens AG.

The next section outlines the objectives and the overall approach for implementing Business Process Management. A process framework including areference process house and the overall structure and content of the BPM implementation processis introduced.

Section 3 gives an overview of the Process Management Maturity Assessment model which was developed in order to assess and to derive improvement measures for the Business Process Management in the company. Finally, the Process Management Maturity Assessment is compared with other BPM maturity models.

In Sect 4 the assessment process and selected results of the assessments are presented to illustrate some benefits of the approach.

Section 5 summarizes main results and gives an outlook on future research.

2 Implementation of business process management

2.1 The business process management initiative at siemens AG

The Siemens AG is engaged in different business sectors with a very broad and diverse product and service spectrum. It is a global company with regional representations in more than 190 countries (for a short overview see Feldmayer and Seidenschwarz 2005, pp. 124 f.). Over the years the process and IT landscape has developed differently in the business groups and regions. With the Business Process Management activities a redesign, alignment and optimization of business processes is intended. It also supports a better process standardization and utilization of synergies.

Central element of the Business Process Management Initiative was the development of a Siemens Process Framework (SPF 2005) which consists of a reference process house (RPH) and common methods for process management across the company. These activities, with the development of a reference process house in its core, are part of a comprehensive process management initiative (Feldmayer and Seidenschwarz 2005, p. 26).

The initial company-wide activities for process standardization started in 2000 with the E-Business initiative "Generic Business Processes". The primary focus was on the definition of the Supply Chain Management processes based on the Supply Chain Operational Model (SCOR). In the following years the process activities where extended to the Customer Relationship Management and the Product Lifecycle Management. Finally, the activities were taken up and consolidated under the leadership of corporate CIO and the development of a comprehensive reference process house covering all business processes was accomplished (SPF 2005). The primary objective was to leverage synergies and cost potentials with a common organization and process coordination, and the definition of reference processes.

2.2 Objectives for the business process management initiative

The main objective of the introduction of Business Process Management is to increase the effectiveness and efficiency of all business processes of the

organization. From an operational point of view, process management is about having defined processes, measuring their performance, and improving them incrementally as part of daily business. It is also about defining performance goals for processes "top-down", based on benchmarking results or strategic goals derived from corporate initiatives, and performing major re-engineering activities on processes to close existing performance or cost gaps. Process standards and a common process framework are a fundamental basis for a systematic design and optimization of results, processes, and resources.

Most efficiency and effectiveness problems in an organization have their origin in non-mastered processes. A proper implementation leads to the mastery of processes with regard to lower non-conformance, as well as to high reliability and safety, and results in reduction of process costs, process cycle times, and improvement of quality.

Process standardization affects the strategic levers operational excellence and active management of synergies and supports the vertical and horizontal strategies of Siemens. This is achieved by the cascaded definition and rollout approach of the Process Initiative based on the reference process house. The implementation of Business Process Management based on the Siemens Process Framework results in a number of benefits which where pursued with the Process Initiative.

- Establish a process management community within the business units and regions to coordinate and optimize local, regional, and headquarter process improvement initiatives.
- Provide a common reference framework for supporting and coordinating all process related projects in the business units and regions created by different initiatives.
- Present a uniform appearance to customers and business partners through Siemens wide standardized process implementation.
- Provide standard service levels to the global customers.
- Enable best practice sharing across all business units and regions.
- Provide opportunity for shared services and an improved lean IT landscape through process standardization.

2.3 Process framework

Reference models are increasingly used in industrial practice and leave the area of research (Becker and Delfmann 2007; Fettke and Loos 2007, for reference modeling projects see RefMod). In practice reference models for processes have particular relevance (SCOR, Fettke et al. 2006; Scheer 1994, 2000). For the development of the Siemens reference process house the Supply Chain Operational Model (SCOR) was a fundamental basis.

The Siemens Process Framework (SPF, Fig. 1), with its binding set of methods for the overarching management of processes, provides the basis for a uniform implementation of process management within Siemens. The core component of the Siemens Process Framework is the reference process house (RPH). It contains the definitions of all processes and is structured into the following process categories:

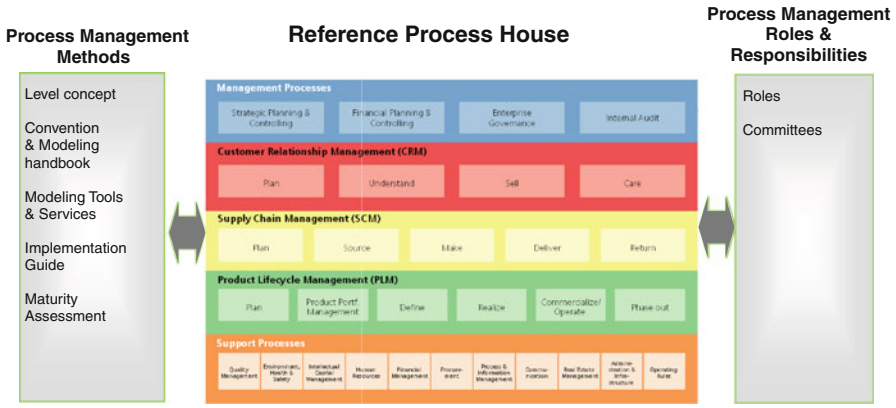

Fig. 1 Siemens Process Framework (SPF)

- Management Processes
- Customer Relationship Management (CRM) Processes
- Supply Chain Management (SCM) Processes
- Product Life Cycle Management (PLM) Processes
- Support Processes

Management processes are "Strategic Planning & Controlling", "Financial Planning & Controlling", "Enterprise Governance" and "Internal Audit" which steer the entire business.

The Customer Relationship Managementis structured into the main processes "Plan", "Understand", "Sell", and "Care".

The main processes for Supply Chain Management are "Plan", "Source", "Make", "Deliver", and "Return".

Product Life Cycle Management processes are "Plan", "Product Portfolio Management", "Define", "Realize", "Operate", and "Phase Out".

Support processes are processes like "Human Resources", "Financial Management", "Process & Information Management" etc. which support the value creating business processes.

These reference process definitions are fundamental for process standardization and provide a stable basis for process management. They are subject to a cascaded rollout and refinement in the business groups and regions.

Incorporating process definitions, guidelines for documentation and modeling of processes, and a binding decision structure for process standardization, the framework is the basis for:

- Configuration and design of specific business processes (e.g. CRM, PLM, SCM) and end-to-end business process chains
- Redesign of processes based on commonly defined standards for to-be processes
- Common language and common understanding of processes
- Realization of the saving potentials identified through

  - faster implementation of standard processes
  - alignment of applications
  - standardization and cost reduction across matrix organization (synergy effects)
- Comprehensive benchmarking and best practice sharing.

2.4 Level concept and modeling conventions

The process management methods of the Siemens Process Framework represent a comprehensive set of tools, concepts, conventions, procedures, and guidelines which are needed for any implementation and operation of process management in the Siemens organization.

Acore modeling concept is the level approach which defines the principles and rules for the definition of a comprehensive process architecture. The ARIS toolset is used for modeling (Scheer 2000). Together with the manual for process modeling & conventions, which describes the ARIS models, notations and naming conventions, the level concept is integral part of the defined methods for process modeling. Clear definitions and rules for the presentation and modeling of processes constitute a consistent documentation and transparency of the processes. Basis of these modeling conventions is a transfer and advancement of the SCOR modeling concept (SCOR) to all corporate business processes.

The level concept defines the hierarchical structure of the reference process house, the detail per level and the models used. Figure 2 shows the defined level structure for all processes of the reference process house with the assigned modeling elements and deployed ARIS model types. Fundamental principle is to use generic models wherever possible, which are adjusted to specific process requirements only

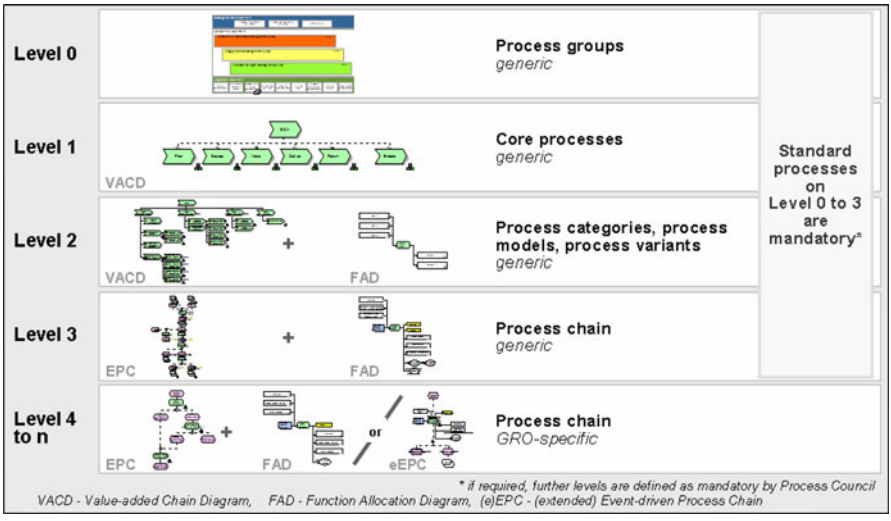

Fig. 2 Level concept and process models

at the level of process description where the business characteristics of the process need differentiation.

The level concept is based on the following levels and modeling features:

Level 0 outlines the framework with the basic structure of the process groups.

At Level 1 the core processes of a process group are represented. The objective is a uniform representation of the generic core processes as a logical sequence (lifecycle approach) within a process group. All core processes of a process group are assigned to one of the three following core process types:

- "Plan and control" covers all planning and controlling activities for the implementation of the "execute" processes. "Plan and control" processes define the requirements for the "execute" processes and steer them in the sense of a control cycle.
- "Execute" processes are targeted on delivering/performing goods and services for the customer. The result can be a product, a system, a solution or a service that serves customer satisfaction. In the "execute" processes the essential process steps for value generation are described.
- Enable processes support one or several plan/execute processes solely within the process group. They can effect on all process level (1−n). Enable processes can interact with other business, management or support processes by input–output relations but may not be connected by process interfaces to them.

In each process group at Level 1 there is precisely one process group-specific plan core process, a process group-specific enable core process as well as a number of execute processes.

At Level 2 the process categories, process models and where necessary process variants are shown for all types of a core process (plan, execute, enable). These model types map the complexity of a core process. The complexity is characterized by different divergent process sequences, different responsibilities and/or specific inputs/outputs depending on business requirement. The criterion for definition of process categories is the existence of significant differentiation characteristics in the process (e.g. customer, target group, complexity). The criterion for forming the process is identical for all execute processes of a process group.

At Level 3 the process elements and events are represented as a process chain. The objective is a more detailed description of the process models and process variants in a logical flowchart of process elements and events. Level 3 allows a uniform understanding of the execution sequences of all processes of the reference process house at a comparable level of aggregation. The ARIS models event driven process chain (EPC) and function allocation diagrams (FAD) are used for modeling the processes.

At Level 4 and lower levels the process elements and events are shown as a process chain that describes the superordinate level in more detail. This is the first stage where reference models can be altered for specific requirements of an organization.

All reference processes of the reference process house on level 1–3 are mandatory for all business groups and regions.

2.5 Process and implementation topics for business process management

Since the reference process house contains all processes it also includes a process for BPM implementation which is part of the support process "Process and Information Management". The process is structured into the following generic process steps (compare Becker et al. 2003):

- "Set Goals" identifies process improvement goals and agrees on goals, costs & benefits for the process.
- "Analyze" the 'as is' process and identifies improvement levers.
- "Define" the target process including interfaces and implementation plan.
- "Realize" implements the target process, evaluates and adjusts the process if necessary.
- "Review" encompasses to assess & approve process performance and to identify improvement potentials.

The Program Management is the overarching process for planning and control of all BPM implementation activities. Figure 3 comprises the generic process steps and main activities for BPM implementation.

Experiences show that business transformations are often a consequence of good process management. Thus, the implementation of process management itself has to be organized as a business transformation program covering all relevant aspects of an organization's development.

These aspects have to be addressed by implementation topics which are dependent on each other with regard to their contents. All these issues are covered by Business Process Management implementation guidelines (see Process Management Implementation Guide 2005). The following gives a short overview on the different implementation topics.

- *Process Management Organization:* Establish process management roles & bodies according to the Siemens Process Framework and assign the responsible persons.

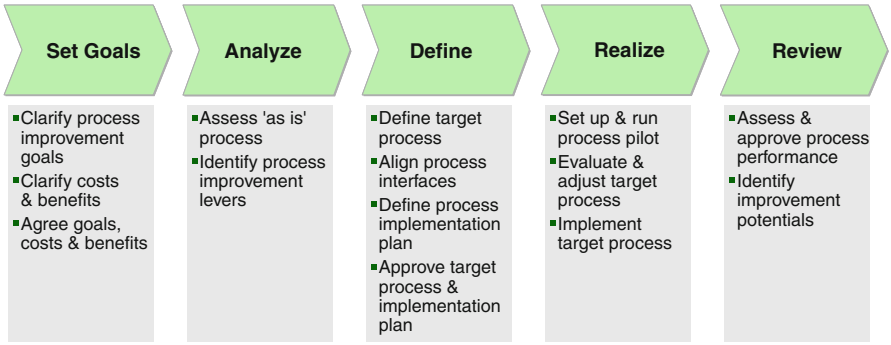

Fig. 3 Process steps for BPM implementation

- *Process Documentation & Standardization:* Develop consistent and organization-wide valid process definitions at least for the portfolio processes. Drive the standardization and alignment of business processes. Establish a process house based on the reference process house and where necessary more detailed process definitions addressing at least the portfolio processes. Initiate process improvement initiatives for relevant processes of the process portfolio covering: visualization of as-is processes as required, derivation of improvement potentials & measures, design & implementation of to-be processes.
- *Process Portfolio& Optimization:* Select, assess, and prioritize the processes which have to be standardized and optimized.
- *Target Setting & Incentives:* Check and amend target setting and incentive systems. Define process harmonization/standardization and process performance goals. Implement process target agreements, define related incentives.
- *Methods & Tools:* Provide standard methods and tools required for the operation of process management and according to the Siemens Process Framework guidelines (e.g. a RPH database and ARIS toolset).
- *Qualification & Training:* Derive competency development measures for the persons involved in process management. Define and conduct target group specific qualification programs. Verify the success.
- *Communication:* Provide target group specific information about objectives, content, roles & responsibilities, and progress of process management to create awareness and support the implementation.
- P*rocess Performance Controlling:* Define key performance indicators (KPI) and metrics for the portfolio processes derived from business goals and strategies. Introduce a continuous KPI-based performance measurement and assessment for the processes.
- *Process Management Maturity Assessment:* Conduct process management maturity assessments of the organization. Derive & implement improvement measures. Repeat process management maturity assessments periodically.

Only if each of these topics are planned and implemented to a certain degree and in a coordinated way, the effects necessary for overall success are achieved. The overall maturity degree of a process management implementation is therefore directly linked to the maturity degree of each of the implementation topics (see next section). In addition, the successful implementation and operation of business processes highly depend on providing a data management and leverage of the business processes and the organization by supporting information systems. Thus, the BPM activities are strongly linked to the development of the IT-architecture. Enterprise Architecture Management accounts for the dependencies between business - and IT architecture, e.g. blueprints are a powerful means to show the application support for business processes.

Of course, the business situation, the cultural environment, and the readiness of an organization are additional boundary conditions which have to be considered in the setup of the content and the timeframe of the implementation program. All these implementation topics are addressed following the BPM implementation process outlined in Fig. 3.

2.6 Process management roles and responsibilities

Essential for a successful BPM implementation is the establishment of a Process Management Organization with defined roles and decision bodies which actively manage and drive the implementation of Business Process Management. The following roles and responsibilities are defined with the Siemens Process Framework:

- Process Sponsors to facilitate and drive BPM
- Process Framework Executive to standardize methods & secure compatibility
- Process Executive to standardize and optimize a process
- Process Owner who is accountable for process performance
- Process Manager who implements and optimizes a process

All these roles and responsibilities are defined and staffed for all business processes. They constitute the Business Process Management Community in the company and drive all implementation topics.

There are a number of Process Sponsors in the management board for the overall Business Process Management Initiative and in the upper management for the respective processes of the value chain. For each of the processes of the reference process house a Process Executive, Owner and Manager is nominated in each business group and region. The Process Executives for each respective process form a community board headed by a corporate Process Executive. In addition to these process specific boards a Process Framework Executive board on corporate level was established. It is in charge for all BPM methods and standards set across the company. BPM experts from various business groupsand regions are members of this board which secures compliance of all BPM activities.

3 A maturity model for business process management

3.1 Model development and objectives for a BPM maturity assessment

A review phase closes the cycle of BPM implementation. Thus, it is important not only to review the performance of each implemented process but also to assess the overall BPM implementation initiative and all BPM related activities. As outlined the Process Framework Executives and its respective board are responsible for development and implementation of all BPM methods.

In order to close the gap and provide methodological support for a BPM assessment an analysis on obtainable methods for an assessment was undertaken based on academic work and industry practice. CMMI was acknowledged as a foremost method in the field providing a comprehensiblestructure anddefined approach for a maturity assessment. However, the CMMI focus is on the process improvement for specific process areas but does not cover a general view of all activities necessary for Business Process Management. At the time of implementing the Process Initiative no holistic process management maturity model existed which would cover all relevant BPM implementation issues outlined in Sect 2. The BPMM

model of the OGM, the maturity model of Rosemann et al. and the Process Audit of Hammer evolved in parallel to the own development of the Process Management Maturity Assessment.

In consequence of this lack of methodological support available at the time, it was decided to develop a BPM maturity model using the CMMI as a conceptual framework. The model, named "Process Management Maturity Assessment" (PMMA), was developed based on the knowledge and experience of the Process Framework Executives, and the involvement of external experts and consultants with BPM implementation experience. Categories relevant for BPM implementation and success were identified and verified against project experiences and documentationof other models. Requirements for the categories were defined and structured questionnaires were worked out for assessment. The resulting maturity model and approach for assessment was tested in selected units. Based on the piloting, arefined model was worked out, all documentation and tool support finalized, andauditors for the PMMA were trained and certified. Finally, the model was rolled out and used for assessment in organizational units across the company (see next section).

The major objective of the PMMA is the identification of need for action and derivation of measures for process management improvement, as well as the identification of requirements for further support. It serves as a driver for the process initiative. The following objectives are pursued with the PMMA approach:

- to assess the maturity of Business Process Management and the processes,
- to monitor the advancement of the process initiative and to derive further fields of actions,
- to reveal the potential for best practice sharing,
- to motivate and increase the awareness for process management among the involved parties.

3.2 Process management maturity assessment (PMMA) model overview

The assessment of the maturity of all activities related to Business Process Management is an essential element of the BPM implementation process. The "Process Management Maturity Assessment" (PMMA 2006) has its focus on the assessment of the organizational implementation of all Business Process Management activities. In contrast most maturity models solely focus on the performance assessment of a specific business process. The process performance of a business process is addressed as a separate category in the implementation process. In this respect the business process performance measurement is one category among others to be addressed in a BPM maturity assessment. The Process Management Maturity Assessment provides a methodology for a structured analysis and objective assessment of the achieved implementation status of process management (process management maturity). It also supports the compliance with the Siemens Process Framework standards (Feldmayer and Seidenschwarz 2005, pp. 107f.).

The PMMA follows the principle structure of the Capability Maturity Model Integration Method (CMMI) of the Software Engineering Institute at Carnegie

Mellon University but provides a holistic assessment of all areas relevant for BPM based on a comprehensive set of criteria. As an indicator for process maturity, a five step model is applied in the same fashion as the CMMI model. The model consists of nine categories with one to three sub-categories each. The PMMA categories and sub-categories correspond to the implementation topics of the Process Management Implementation Guide and account for the leverage of the business process implementation based on supporting information systems:

- Process Portfolio & Target Setting
- Process Documentation
- Process Performance Controlling
- Process Optimization
- Methods & Tools
- Process Management Organization
- Program Management, Qualification, Communication
- Data Management
- IT-Architecture

For every sub-category, each maturity level 1–5 is clearly defined in a to-be status by a set of criteria. These descriptions, as well as examples for questions and possible deliverables, are combined in worksheets. A tool based on MS-Office products was developed to support the assessment process.

Figure 4 outlines the five overall PMMA maturity levels which consolidate the detailed maturity levels of the categories.

For a sub-category, all defined criteria of a maturity level must be met to achieve the respective level. The overall result of a PMMA will be stated in a maturity level grade (e.g. 3, 2). The pre-decimal position states that 100% of all sub-categories

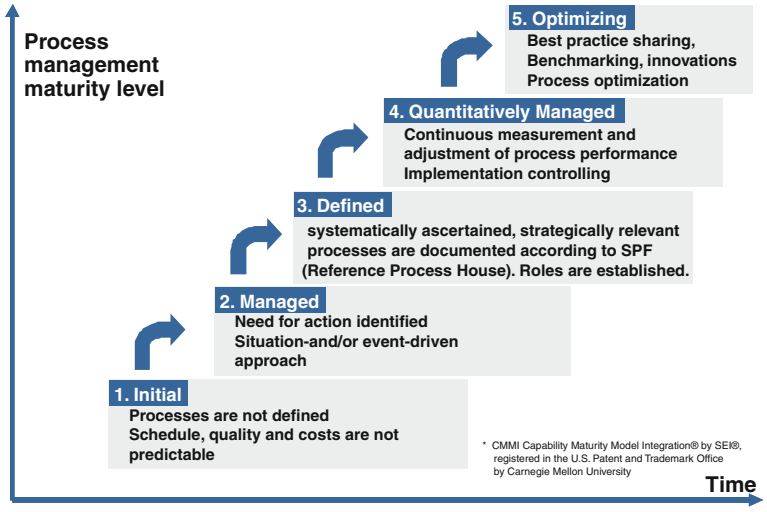

Fig. 4 Overall PMMA maturity levels

fulfill the criteria of level 3 (bottleneck is the lowest value for a sub-category). The decimal place states the percentage of fulfilled sub-categories of the successive level (e.g. 20% of level 4). The achievement of higher levels in sub-categories (e.g. 5) is not reflected in the overall grade.

While the maturity levels of Fig. 4 document the overall assessment and consolidate the maturity assessment of the different categories, a more detailed look on each of the categories is provided by radar screens (see Fig. 9).

Detailed criteria and a set of questions exist to assess the maturity level for each of the categories. The following summarizes what needs to be accomplished for a maturity level 3 in each category:

Process Portfolio & Target Setting: In order to compile a process portfolio, a comprehensible assessment and prioritization of these processes is conducted.

Process Documentation: The systematically ascertained and strategically relevant processes incl. KPIs are documented according to the SPF in the reference process house.

Process Performance Controlling: A systematic procedure to identify KPIs out of the numerous metrics is defined.

Process Optimization: Benchmarks are defined and improvement levers are identified.

Methods & Tools: The process landscape is derived from systematically ascertained major components of the value chain, business strategy and binding guidelines.

Process Management Organization: Responsibilities for processes and process management are established.

Program Management, Qualification, and Communication: The activities for introduction and further development of process management are coordinated systematically by a program and project management.

Data Management: Harmonization/standardization of data content and formats is conducted, clearly defined responsibilities for data definition, content and consistency are established.

IT Architecture: Requirements from process management are definitive for IT target architecture. The migration requirements for the IT architecture are derived from deviations between as-is and target architecture.

3.3 Comparison of PMMA to other maturity models

The proposed Process Management Maturity Assessment advances most of the maturity models which are based on a limited set of criteria, Only the Business Process Maturity Model of the OMG, the Process Audit of Hammer, and the maturity model of Rosemann et al. cover also a broader range of BPM factors. All three models were in progress of development at the time of PMMA development.

End of 2007 the Object Management Group (OMG) released the Business Process Management Maturity Model (BPMM). It is a model to assess the maturity of business process management. The model is structured into five process area threads:

- Organizational Process Management: foundation and development of process management
- Organizational Business Management: planning, steering and resource allocation at enterprise level
- Domain Work Management: management of product & service deployment and delivery
- Domain Work Performance: operational level of product & service delivery and support
- Organizational Support: all supporting activities for controlling the core activities

BPMM defines objectives for each process area thread. This is supplemented by practices how to reach these objectives. Overall the BPMM offers a variety of recommendations for a Business Process Management implementation. On the other hand it leaves some deficiencies in areas like process organization and process accountability. The important role of IT support is not covered in the BPMM model.

The other two models cover a similar range comparable to the PMMA but with a different clustering of the impact factors. Rosemann et al. identified the following factors which are perceived as covering and characterizing BPM (Rosemann et al. 2006, 2004; Rosemann and de Bruin 2005; Hüffner 2007):

- Strategic Alignment: Alignment of process management to strategic objectives
- Governance: Organizational implementation of BPM and responsibilities for assigned tasks
- Methods: Methods for all BPM relevant tasks
- Technology: Technologies e.g. I&C which supports and enables BPM
- People: Competencies of people involved in BPM
- Culture: Common values towards BPM and process change

Hammers Process Audit is based on the Process and Enterprise Maturity Model (PEMM) which was developed in cooperation with a number of companies (Hammer 2007). Hammer identified two distinct groups of characteristics that are needed for a good performance of business processes in order to perform exceptionally well over a long period of time. Process enablersaffect individual processes and determine how well a process is able to function. The enablers are:

- Design: how the process is to be executed
- Performers: the knowledge and skills of the people involved
- Owner: the senior executive responsible for the process
- Infrastructure: the systems that support the process
- Metrics: the measurements used to track the performance of the process

In addition a company must also possess or establish organizational capabilities that allow the business to offer a supportive environment:

- Leadership: Senior executives who support the process
- Culture: Emphasis on a customer focus, teamwork, and willingness to change
- Expertise: Skills and methodology needed for process redesign
- Governance: Mechanisms for managing complex projects and change initiatives

Figure 5 maps the nine categories of the Process Management Maturity Assessment with the BPM Maturity Model of Rosemann et al. and the Process Audit of Hammer. All five factors of the Rosemann and de Bruin model can be mapped to the nine categories of the PMMA. Both other models explicitly address culture as an impact factor which in the PMMA model is partly addressed in terms of qualification & training.

Hammer emphasizes the process management organization and people issue by addressing performers, owner and leadership as separate factors. At least on the high level clustering of enablers and capabilities Hammer does not identify the strategic alignment of processes to strategy and business as an issue. In all, the comparison gives evidence that all three models cover the essential impact factors for Business Process Management Success.

The mapping can be only a rough indication of the range of factors covered by the models on a high level. A detailed analysis of the underlying criteria and questions for assessment provided they are made public available would show the common ground, possible differences, and additions.

4 Maturity assessment: Initial study and findings

4.1 Approach to PMMA execution

In addition to the workout of the PMMA, a qualification and training program was set up to build a pool of certified assessors who can conduct the PMMA. A roadmap

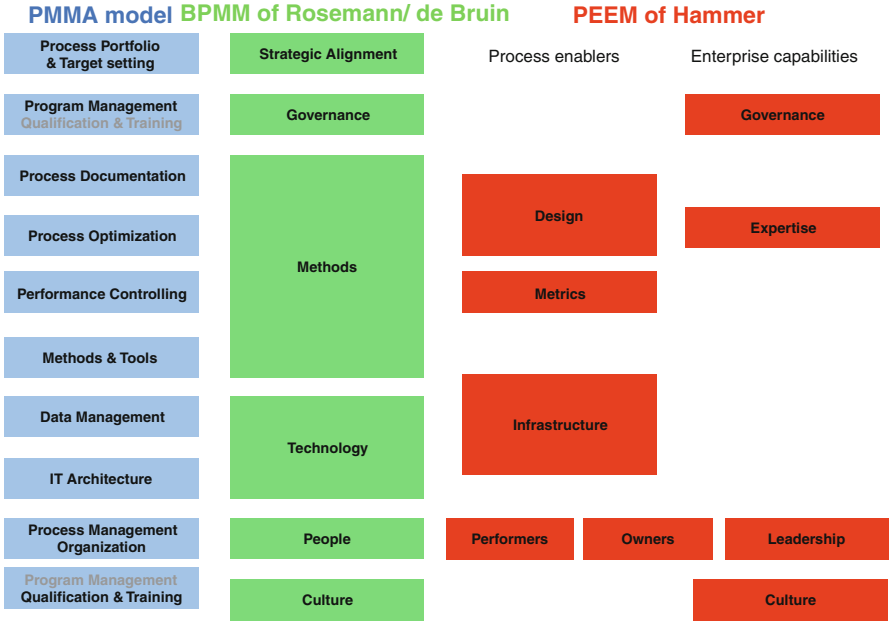

Fig. 5 PMMA Mapping to BPMM and PEMM Maturity Model

was defined when to assess each organizational unit, eventually covering the entire organization. It is planned to repeat the PMMA once a year to track and drive the improvement.

Between two and 3 days are required to prepare, conduct, and evaluate the process management assessment for a particular unit under review (see Fig. 6). The PMMA is conducted based on interviews with the management of the units, the Process Owners and Process Executives for the Business-, Management & Support Processes.

Each interview, based on a structured questionnaire covering requirements for all nine categories of BPM, takes about two hours. The consistent method and controlled approach conducted by certified, unit independent assessors supports a uniform and unbiased assessment. The analysis is followed by a documentation and discussion of the results with the interview partnersof the assessed unit. The feedback is starting point for the initiation of necessary actions.

4.2 Results of the assessment

The initial assessment analyzed 22 organizational units in the business groups and 29 in the regions in 2006 based on the standardized PMMA approach. The results for the analyzed units of the business groups in Fig. 7 show an overall maturity level ranging below maturity level 3. The same applies for the units of the regions (Fig. 8).

At first sight it seems to be surprising that all units performed below maturity level 3 although all units participated in the Process Management Initiative and have implemented Business Process Management. However, it shows that it is quite some effort in terms of time, resources, and people involved to achieve organizational performance. Secondly, it gives evidence to a critical non biased assessment of the units. Also, one has to keep in mind that due to the method of measurement the

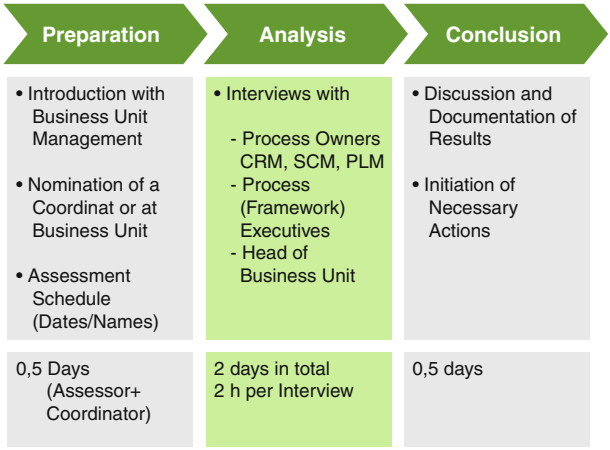

Fig. 6 PMMA execution steps

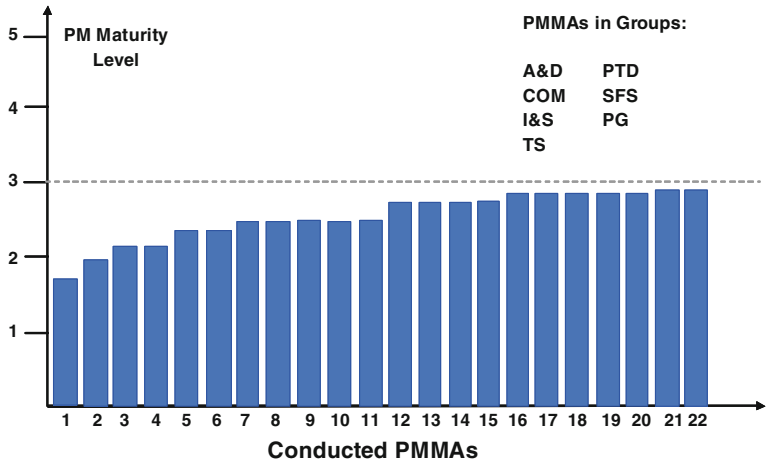

Fig. 7 PMMA assessment for analyzed units of business groups (consolidated excerpt)

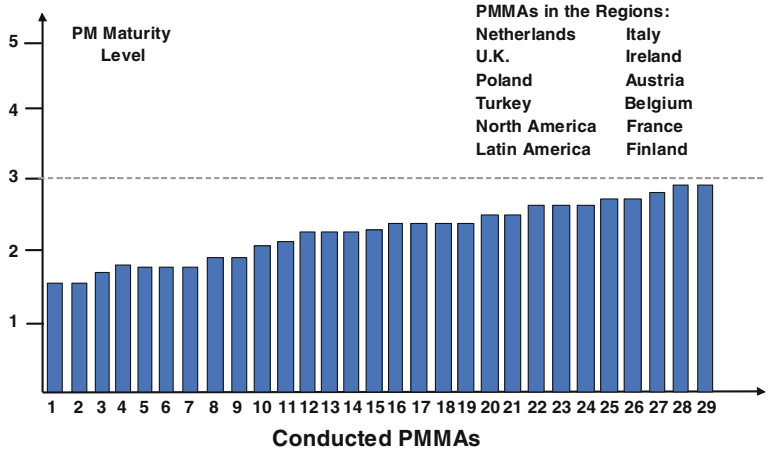

Fig. 8 PMMA assessment for analyzed units of regions (consolidated excerpt)

overall maturity level cannot be higher than the lowest maturity level in any category.

Radar charts provide a more detailed view showing the level of achievement for each category. Figure 9 shows the assessment for two selected units providing insights in strengths and shortcomings; e.g. one organizational unit is quite strong in Process Portfolio & Target Setting (level 4) and in Process Management Organization (level 5) and the other in Process Documentation (level 5).

The Process Management Maturity Assessment is not aiming for a ranking of the organizational units but for transparency of the BPM implementation in order to stimulate a best practice exchange among the organizations.

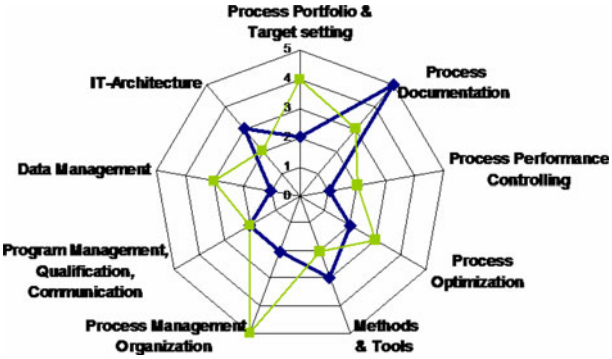

Fig. 9 Detailed PMMA for different categories (example for two units)

In general, most CMMI based maturity models define five maturity levels and associate a higher level with a higher maturity and a better performing organization. Crawford (2001) argues that this can be a misleading interpretation. An organization should aim for a particular maturity level in relation to its organizational strategies and objectives. A detailed view on the implications of the current maturity level based on the identified shortcomings and weaknesses is proposed in order to derive strategies for improvement.

The assessment results gained with limited effort provided a reasonable transparency on the BPM activities and performance of the assessed organizational units. Overall, the assessment helped the organizationsunder study to learn from one another in terms of good and poor performance by understanding the performance of an organization and the underlying reasons. In the case of Siemens it helped to identify best practicesin BPM within the company which could be adopted by other organizational units in order to improve performance. Of course this depends on an open culture and BPM community which sees the opportunities of this approach for best practice sharing opposed to a pure ranking instrument. This was supported by an environment based on sustainable attention to BPM issues over a period of years due to the Process Management Initiative. The company internal use of a uniform method was an additional advantage.

Table 1 summarizes some strengths and weaknesses for the different categories revealed across the assessed organizational units.

Hence, in addition to radar charts showing the level achievement for each category highlights and lowlights for each category and suitable actions can be derived and initiated to improve the implementation status of process management (process management maturity). Overall the assessment helped to advance BPM implementation based on a best practice exchange among the involved organizational units.

The PMMA study was conducted in a considerable number of units. The company internal focus provided for a uniform implementation of the PMMA which made the assessments comparable. Siemens is like a holding and due to the diversity of the organizational units in the company which are like individual businesses and different in nature, findings can possibly be transferredto other companies and organizations.

Experiences with the first assessment cycle were promising in terms of acceptance and use of the PMMA as well ascoverage of BPM impact factors.

Table 1 Strengths and weaknesses in the BPM categories

Category	Strength	Weakness
Process Portfolio & Target Setting System	Specific tools, e.g. scorecards, as basis for deployment from business strategy	No systematic deployment of process portfolio individual training necessary objectives are often monetary
Process Documentation	Process description contains all relevant information (e.g. Input/Output, Interfaces)	Sometimes lacking parts (milestones, metrics or interfaces)
Process Performance Controlling	Milestones and metrics are defined and used for controlling of most processes	No integrated measurement system; focusing on process cost drivers to be enhanced
Process Optimization	CMMI assessments in PLM process benchmarking with internal and external partners	Organizational obstacles for end-to-end process optimization (interfaces!)
Methods & Tools	ARIS often in use several process management methods are used (e.g. Six Sigma)	Process description not based on RPH or at least level 4 processes not linked to RPH or documented in ARIS. level concept/conventions not used
Process Management Organization	Process management roles are defined; organization is process oriented	Process responsibility not clearly defined; no systematic job rotation between roles
Program Management, Qualification, Communication	Process management reports directly to BU head; communication plan regarding process management	Roadmap for migration to SPF is missing; no qualification plan available; no internal communication
Data Management	Responsibility for data content and format defined; necessary measures are set up	No mechanism to check data quality or integrity; no alignment with process landscape; too few resources
IT-Architecture	Requirements of process management are fully covered; migration measures derived	IT architecture not defined, nor communicated—process to derive the to-be it-architecture not defined

The conducted PMMA did not reveal any uncovered BPM impact factors and confirmed the result of the pilot implementation. Furthermore, this meets with the results of the comparison with the other BPM maturity models.

In terms of efficiency the well-defined approach and structured questionnairewith clearly defined requirements for the categoriesin combination with the trained assessors reduces the effort for conducting an assessment. All this contributes to the perception of ease of use. Also, the results of the PMMA meet the objectives set for the maturity assessment (see Sect 3) which contributes to the perceived usefulness (Moody 2003; Davis 1989). Despite the situation that the use of PMMA was obligatory for the organizational units involved in the BPM Initiative, it was well accepted.

An additional positive effect of the assessment was an increased awareness towards Business Process Management. The Process Management Maturity Assessment is regarded by management and employees as an important part of the overall BPM implementation process in the company. It underlines the importance of coherent Business Process Management activities for company performance.

Besides the results and benefits for the organizational units under study, the experiences with the assessment cycle show that the well-structured and standardized approach of the PMMA based on the proposed maturity model and assessment process can be transferred with little effort to other organizations. Supplemented by training and a pool of certified assessor an assessment for an organizational unit can be conducted in about 3 days.

5 Summary and outlook

Business Process Management is an important management practice for business transformation and organizational change. This paper outlined the implementation of Business Process Management in a large international company, undertaken as a corporate, company-wide project within Siemens AG.

The paper introduced a Process Management Maturity Assessment (PMMA) which was developed to assess the implementation of Business Process Management and the performance of organizations in this respect. The maturity model is based on the assessment of nine categories which comprehensively and entirely cover all aspects which impact the success of Business Process Management. The assessment results provide a detailed analysis which helps to identify strength and weaknesses and to compare the performance of organizations. Thus, it provides a sound basis for best practice sharing.

The PMMA is based on the principal structure of CMMI using defined maturity levels. A limitation of the CMMI approach is the consolidation of criteria to a single maturity level which may result in misleading interpretations. It is therefore recommended to have a detailed view on the assessment and maturity level of each of the nine categories in order to derive a more differentiated picture for improvement measures and best practice exchange, like it was outlined in the example from the case study.

The PMMA was developed to suit the BPM implementation approach which in parts, like the Siemens Process Framework, is company specific. However, the PMMA approach proved to cover all relevant factors for Business Process Management and can be adapted with little effort to a maturity model for general use. This could go in hand with a detailed cross check with the criteria and questions of the maturity model of Rosemann et al., the Business Process Maturity Model of the OMG, and the Process Audit of Hammer.

Overall experiences using PMMA for the assessments are promising in terms of acceptance and use. The PMMA fits into the overall BPM implementation process in the company and provides an important link to Business Process Management success.

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