



**AN APPROACH TO ASSESS THE IMPLEMENTATION OF  
BUSINESS PROCESS MANAGEMENT IN ENTERPRISES**

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# AN APPROACH TO ASSESS THE IMPLEMENTATION OF BUSINESS PROCESS MANAGEMENT IN ENTERPRISES

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## Abstract

*Business Process Management is an important management practice for business transformation and organizational change. This paper presents a Business Process Management implementation approach in a large international company. It introduces a process management maturity assessment which was developed to assess the implementation of Business Process Management and the achievements. The maturity model is based on the assessment of nine categories which comprehensively cover all aspects which impact the success of Business Process Management. Some findings of the first assessment round 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 Modelling*

## 1 INTRODUCTION AND RELATED WORK

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 modelling of business processes but also the organizational implementation, leadership and performance controlling (Becker et al. 2003, Schmelzer/ Sesselmann 2008, p. 7f.). 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 modelling and implementation of standard enterprise applications).

Facing the importance and vital role of Business Process Management for 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.

A prominent and widely used model is the Capability Maturity Model developed by the Software Engineering Institute at Carnegie Mellon University (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. Today the Capability Maturity Model Integration is an approach for the assessment and improvement of product development processes in general. A number of additional maturity models were developed which cover other areas like the CMMI Acquisition Model (CMMI-AM) or the People Capability Maturity Model (P-CMM) for personal management and development to name a

few. Today, CMMI is widely used in practice to evaluate and to improve (software) development processes (CMMI; Ahern et al. 2004, Chrissis et al. 2006, Foegen et al. 2007, Hofman et al. 2007).

CMMI uses standardized question catalogues and evaluation criteria to assess an organizations product development process 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.

In recent years a number of maturity models for Business Process Management have been proposed (BPMM; Fischer 2004, Lee et al. 2007, Rosemann et al. 2006, 2004, Rosemann/ de Bruin 2005, Smith/ 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 and the maturity model of Rosemann et al.

Rosemann et al. identified five factors which are perceived as covering and characterizing BPM (Rosemann et al. 2006, 2004, Rosemann/ de Bruin 2005, Hüffner 2007). In the progress of defining the model these factors have been restructured and renamed by Rosemann et al. and are finally defined as

- 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 support and enable BPM
- People: Competencies of people involved in BPM
- Culture: Common values towards BPM and process change

At the 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 and service deployment and delivery
- Domain Work Performance: product and 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 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 for Business Process Management is not covered in this model.

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. It introduces a process framework including a reference process house and the overall structure and content of the BPM implementation process.

Section 3 gives an overview of the Business Process Management maturity model which was developed in order to assess and to derive improvement measures for the Business Process Management in the company. The assessment process and some results of the assessments are presented to illustrate some benefits of the approach.

## 2 IMPLEMENTATION OF BUSINESS PROCESS MANAGEMENT

### 2.1 The Business Process Management Initiative

Siemens 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 an overview see Feldmayer/ Seidenschwarz 2005, pp. 124 f.). Over the years the process and IT landscape has developed differently in the respective business units and regions. With the Business Process Management activities a redesign, alignment and optimization of business processes and a better process standardization and utilization of synergies was intended.

A 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 [Feldmayer/ Seidenschwarz 2005, p. 26, Schmelzer/ Sesselmann 2008, p. 241-252]. 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 were 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.

Reference models are increasingly used in industrial practice and leave the area of research (Becker/ Delftmann 2007, Fettke and Loos 2007, see the overview in Brocke 2004, p. 393f., for reference modelling projects see RefMod). In practice reference models for processes have particular relevance (e.g. SCOR, Fettke et al. 2006, Scheer 1994). For the development of the Siemens Reference Process House the Supply Chain Operational Model (SCOR) was a fundamental basis.

The Siemens Process Framework (SPF, figure 1), with its binding set of principles and definitions for the overarching management of processes, provides the basis for a uniform implementation of process management within Siemens. The core component of the SPF is the Reference Process House (RPH). It contains the definitions of all Business, Management, and Support Processes down to the agreed level of detail. The Reference Process House is structured into the following process categories:

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

These generic process definitions are fundamental to process standardization and provide a stable basis for process management. They are subject to the 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 Siemens Process 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 and alignment of applications
  - utilization of synergy effects
- Comprehensive benchmarking and best practice sharing.

The process management methods of the SPF 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 units. With the description of all roles and responsibilities required for effective process management the SPF provides a blueprint for the organization of process management in the respective business groups and regions. It ensures clear communication and decision processes.

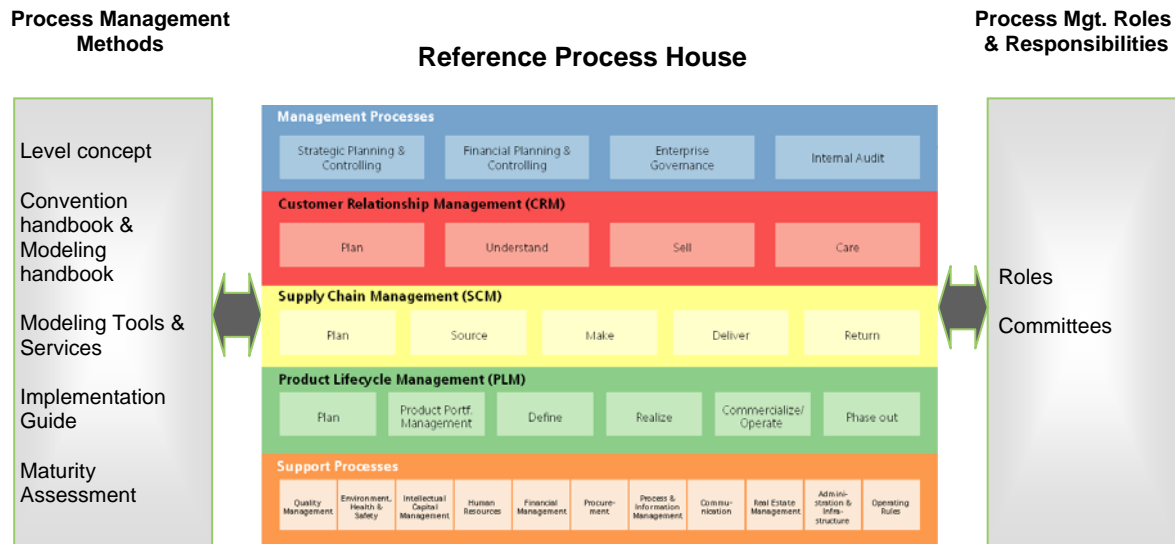


Figure 1. Siemens Process Framework

The main objective of the introduction of Business Process Management is to increase the effectiveness and efficiency of all value creating 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 were 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 & coordinating all process related projects
- 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.

## 2.2 Process and implementation topics for Business Process Management

Experience shows that business transformations are often a consequence of good process management. Thus, the implementation of Business 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 addressed by guidelines for BPM implementation (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.
- **Process Portfolio:** Select, assess, and prioritize the processes which have to be standardized and optimized.
- **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 and the management and support processes. Establish a process house based on the Reference Process House with organization-wide binding 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 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 the objectives assessments periodically.
- **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 tools).
- **Communication:** Provide target group specific information about objectives, content, roles & responsibilities, and progress of process management to create awareness and support the implementation.
- **Qualification & Training:** Derive competency development measures for the persons involved in process management. Define and conduct target group specific qualification programs. Verify the success.
- **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.

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). 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 contents and the timeframe of the implementation program.

The process for process management is structured into the following generic process steps (compare Becker et al., Schmelzer/ Sesselmann 2008): Set Goals, Analyse, Define; Realize, and Review. The process is part of the support process "Process and Information Management" of the Reference Process House. All implementation topics need to be addressed in each of the 5 generic process management steps resulting in the overall structure and content of the BPM implementation process.

Figure 3 comprises the overall structure and the holistic view and comprehensive content of a BPM implementation process. All topics need to be addressed by a BPM maturity assessment.

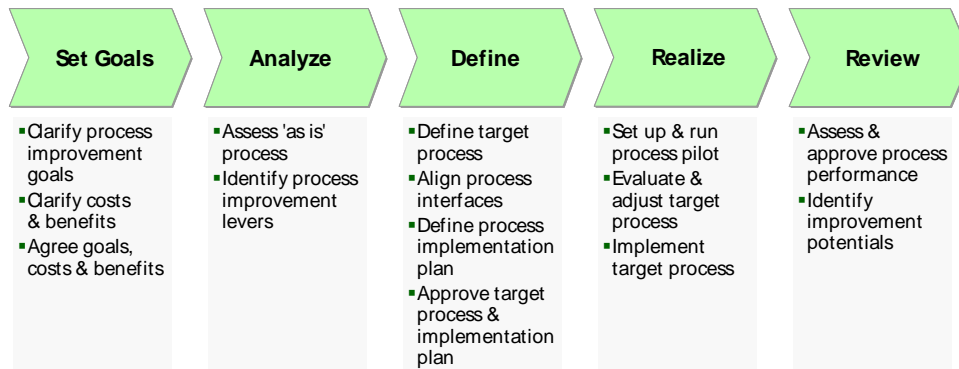


Figure 2. *Process for Process Management*

### 3 A MATURITY MODEL FOR BPM

#### 3.1 Process Management Maturity Assessment (PMMA)

The assessment of the maturity of all activities related to Business Process Management is an essential element of the BPM implementation process. The so-named “Process Management Maturity Assessment (PMMA)” 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 Business Process Management (process management maturity) and the compliance with the Siemens Process Framework (SPF) standards (Feldmayer/ Seidenschwaz 2005, pp. 107 f., Schmelzer/ Sesselmann 2008, pp. 337 f.). The major objective of the PMMA is the identification of need for action and derivation of measures for Business 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 like management, process drivers, and users.

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 section 2. The BPM model of the OGM and the maturity model of Rosemann et al. evolved in parallel to the own development of the Process Management Maturity Assessment (PMMA).

The PMMA follows the principle structure of the Capability Maturity Model Integration Method of the Software Engineering Institute at Carnegie Mellon University (CMMI) 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 PMMA 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 (see section 2):

- 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 3 outlines the five overall PMMA maturity levels which consolidate the detailed maturity levels of the categories.

Maturity Level	Criteria Catalogue
5 -----> "Optimizing"	<ul style="list-style-type: none"> <li>■ Processes are analyzed, optimized and adjusted to changes in market requirements systematically</li> <li>■ Benchmarking and Best Practice Sharing are used continuously in order to identify improvement potential</li> <li>■ Methods for mistake avoidance are used</li> </ul>
4 -----> "Quantitatively managed"	<ul style="list-style-type: none"> <li>■ Continuous measurement and adjustment of process performance (quality &amp; quantity)</li> <li>■ Process management is subject to a systematic maturity assessment (continuous PMMA)</li> <li>■ Implementation controlling of initiatives with top+ degrees of implementation</li> </ul>
3 -----> "Defined"	<ul style="list-style-type: none"> <li>■ The process landscape is derived from systematically ascertained major components of the value chain, business strategy and binding internal/external guidelines.</li> <li>■ In order to compile a process portfolio, a comprehensible assessment and prioritization of these processes is conducted</li> <li>■ The systematically ascertained and strategically relevant processes incl. KPIs are documented according to the SPF in the reference process house of the GROC, a KVP is established</li> <li>■ Responsibilities for processes are established (roles, committees)</li> <li>■ Rules and methods of the process management are defined and implemented</li> </ul>
2 -----> "Managed"	<ul style="list-style-type: none"> <li>■ Need for action identified/project manager entitled</li> <li>■ particular processes in the GROC are harmonized/standardized</li> <li>■ Deployment of process management as needed</li> <li>■ Situation- and/or event-driven approach</li> </ul>
1 -----> "Initial"	<ul style="list-style-type: none"> <li>■ Processes are not defined – ad-hoc approach</li> <li>■ Success depends on certain specialists</li> <li>■ Schedule, quality and costs are not predictable</li> </ul>

Figure 3. Overall PMMA maturity level

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 fulfil 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 a higher level (e.g. 5) in any sub-category is not reflected in the overall grade.

While the maturity levels of figure 3 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 figure 6). Detailed criteria and a set of questions exist to assess the maturity level for each of the categories. Table 1 summarizes what needs to be accomplished for a maturity level 3 in each category.

<b>PMMA Scope</b>	<b>PMMA Content of Maturity Level 3</b>
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 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, 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, clearly defined responsibilities for data definition, content and consistency.
IT Architecture	Requirements from process management are definitive for IT target architecture. The migration requirement for the IT architecture is derived from deviations between as-is and target architecture.

Table 1. PMMA categories and maturity level 3 achievements

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 (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.

### 3.2 Maturity Assessment: Initial study and findings

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 was defined when to assess each organizational unit, eventually covering the entire organization. The PMMA is designed to be repeated once a year to track and drive the improvement.

Figure 5 outlines the execution steps for a PMMA: Between two and three days are required to prepare, conduct, and evaluate the PMMA. The PMMA will be conducted based on interviews with the head of the units, the Process Owners/ Process Executives for the Business, Management & Support Processes, and the Process Framework Executive.

The initial assessment analyzed 14 organizational units from some business groups and regions.

The PMMA result can be documented in a radar chart showing the level achievement for each category. Moreover, with the help of PMMA highlights and lowlights for each category, suitable actions can be derived and initiated to improve the implementation status of Business Process Management (process management maturity).

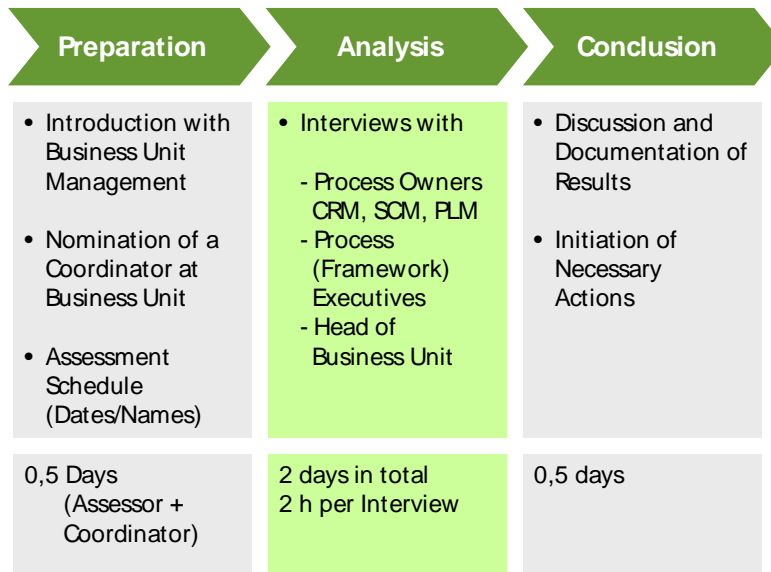


Figure 4. PMMA execution steps

The results for the analyzed units show an overall maturity level ranging below maturity level 3. Although all units participated in the Process Initiative and have implemented Business Process Management the figures show that it is quite some effort in terms of time, resources, and people involved to achieve organizational performance. Also, one has to keep in mind that due to the method of measurement the overall maturity level cannot be higher than the lowest maturity level in any category.

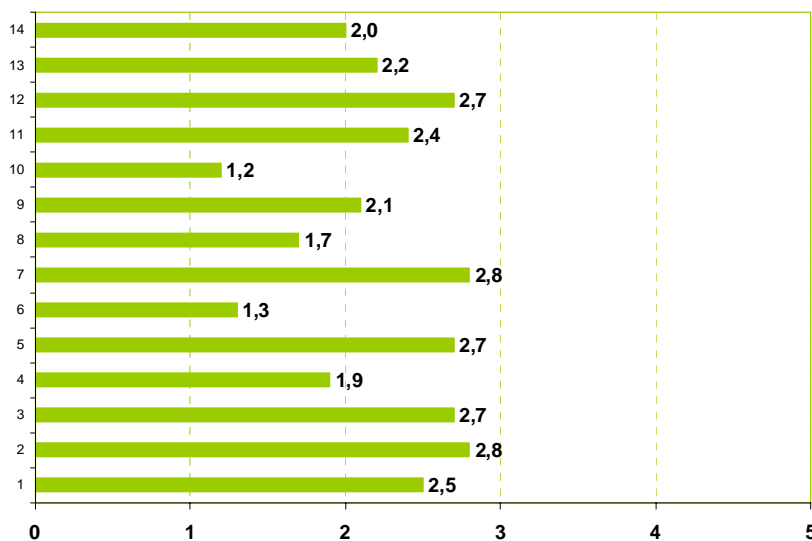


Figure 5. PMMA assessment for analyzed units (consolidated excerpt)

A more detailed view is provided by a radar chart showing the level of achievement for each category. Figure 6 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).

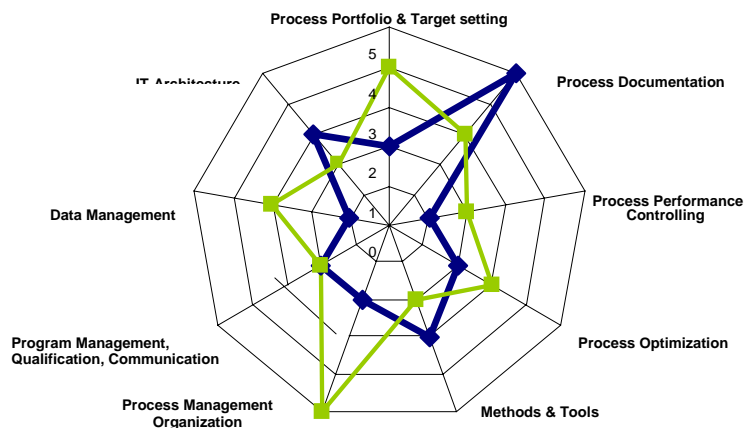


Figure 6. Detailed PMMA of different categories (example for two units)

Category	Strength	Weakness
<b>Process Portfolio &amp; Target Setting System</b>	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
<b>Process Documentation</b>	Process description contains all relevant information (e.g. Input/Output, Interfaces)	Sometimes lacking parts (milestones, metrics or interfaces)
<b>Process Performance Controlling</b>	Milestones and metrics are defined and used for controlling of most processes	No integrated measurement system; focusing on process cost drivers to be enhanced
<b>Process Optimization</b>	CMMI Assessments in PLM Process Benchmarking with internal and external partners	Organizational obstacles for end-to-end process optimization (interfaces!)
<b>Methods &amp; Tools</b>	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
<b>Process Management Organization</b>	Process Management Roles are defined; organization is process oriented	Process responsibility not clearly defined; no systematic job rotation between roles
<b>Program Management, Qualification, Communication</b>	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
<b>Data Management</b>	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
<b>IT-Architecture</b>	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

Table 2. Strengths and weaknesses in the BPM categories

The assessment provides a detailed analysis which helps to identify strength and weaknesses and allows to compare the performance of organizations in a differentiated manner and provides a sound basis for best practice sharing. Table 2 summarizes some strengths and weaknesses for the different categories revealed across the assessed organizational units.

Organizations can learn from one another in terms of good and poor performance by understanding the performance of an organization and the underlying reasons. What proved to be Best Practice can be adopted by other organizations in order to improve performance.

## 4 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 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 and the maturity model of Rosemann et al. cover also a broader range of BPM factors. Both were in progress of development at the time of PMMA development. All five factors of the Rosemann et al. model can be mapped to the nine categories of the PMMA. 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.

Since the PMMA is based on the principal structure of CMMI using defined maturity levels, structured questionnaires and work sheets, it is easy to use and an assessment for a respective organizational unit can be undertaken in a limited timeframe. A limitation of the CMMI approach is the consolidation of criteria to a single maturity level which may result in misleading interpretations. It is recommended using 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 business case.

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. and the Business Process Maturity Model of the OMG.

Overall experiences using PMMA for the assessments are promising in terms of acceptance, ease of use, and coverage of BPM impact factors. 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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