2.4 Specifics of Business Process Management in Public Administration

The main difference between the public administrations and private sector are the bureaucratic principles of administrative actions (Becker et al. 2007; Güngöz 2007) which directly affect government processes. Table 3 shows a selection of those principles and several further characteristics of the public sector in comparison to the private sector.

The principles and characteristics which are valid for the public sector constitute special conditions for task fulfillment in public authorities in comparison to private sector organizations (Lenk et al. 2002). Thus, an economically inefficient action cannot be seen as a deficit of the task fulfillment or the management within the public authorities because the public services and actions are defined by binding political aims and are legally regulated. Moreover, for recommendations for the implementation or improvement of the production and provision of public services, the government processes need to consider the binding of actions to specific intents, laws, and welfare. In summary, the several specifics in public administrations (cp. Table 3) seem to influence the implementation of BPM within public authorities. Hence, these specifics are discussed in the following based on the six core elements of BPM (Rosemann and vom Brocke 2014) provide a comprehensive discussion of these elements). Figure 5 summarizes important influencing factors on the core elements of BPM. In addition, the figure depicts that other domains such as manufacturing and commerce reveal further domain-specific influencing factors on BPM.

<table>
<thead>
<tr>
<th>Private sector</th>
<th>Public sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aim</td>
<td>Profit maximization</td>
</tr>
<tr>
<td>Lawfulness of actions</td>
<td>Actions are primarily unbounded but aligned to the organization’s visions and objectives</td>
</tr>
<tr>
<td>Control</td>
<td>Economical market organization</td>
</tr>
<tr>
<td>Market position</td>
<td>Competitive environment</td>
</tr>
<tr>
<td>Organization structure</td>
<td>No established structure; individual to the organization</td>
</tr>
<tr>
<td>Documentation requirements</td>
<td>No explicit documentation requirements</td>
</tr>
<tr>
<td>Customer segment</td>
<td>Mostly heterogeneous</td>
</tr>
<tr>
<td>Product range</td>
<td>Mostly heterogeneous</td>
</tr>
</tbody>
</table>

2.4 Specifics of Business Process Management in Public Administration

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The general, domain-neutral description of the six core elements in the following is based on publications of Rosemann et al. (Rosemann and de Bruin 2005; Rosemann et al. 2006; Rosemann and vom Brocke 2014).

2.4.1 Factor: Strategic Alignment

Strategic alignment establishes a relation between the strategy of an organization and the business processes. It supports the operative alignment of government processes toward strategic objectives of the administration. Thus, the strategic alignment is especially influenced by political aims and the binding of actions to specific intents, laws, and welfare. Strategies and objectives in public administration are deductions of political aims and, at the same time, bound to common welfare. The definition of processes needs to be in line with politically legitimated guidelines and needs to follow the laws, instructions, and regulations of the administration.

As a reason of the increasing pursuit of service orientation, legal regulations as well as the multitude and heterogeneous stakeholders of administrations, especially citizens and enterprises with their different interests, need to be considered during the process design. In addition, the heterogeneity of the service portfolio and the

Fig. 5 Maturity levels for the 48-h-service promise
fact that an organization is horizontally and vertically segmented require a case-by-
case alignment of the processes toward the aims, as all services and organizational
units cannot be analyzed or grasped by a single general approach.

Furthermore, guidelines are occasionally provided for the design of strategies. The European Union service directive (directive 2006/123/EC) (Fontelles and Pekkarinen 2006), for instance, defines some special requirements for the European Union member states concerning the design of administrative processes and management. But state authorities can also determine some propositions for local administrations in certain fields.

To evaluate the strategy and achievement of objectives, the results need to be measured. Frequently, measuring process results in public administrations is difficult as there are no commonly accepted indicators. The lack of a market for public services does not alleviate the problem of assessing process results according to economic principles. Measurements as they were done for the private sector are inadequate, as they aim at profit maximization of an organization and do not consider to welfare maximization.

2.4.2 Factor: Governance

Governance means a systematic leadership and control of BPM through established and relevant decision guidance and processes. As a result of the legal guidelines and the hierarchical structure of the public administration, this factor possesses exceptionally high requirements. Assigning roles and responsibilities often follows clear guidelines due to legal rules and suppresses a wide flexibility. For example, there are special regulations in Germany for data privacy in the social sector, which allows only responsible officials to access certain personal data. Hence, changes in the organization of the BPM are problematic.

To provide standards for the BPM, administrative rules have to be considered. The monitoring of the abidance to rules in BPM by responsible persons is a challenge. Identifying suitable metrics is often a problem. They have to ensure a measurement of BPM capability according to BPM standards, and, furthermore, they have to value the abidance to rules and further conditions.

Decisions for a systematic leadership and control of the BPM need to be bound to central roles and responsible persons in the government hierarchy. On the one hand, this is necessary because of the hierarchy, while on the other hand, there exists a decentralized organization of task fulfillment as a reason of the high level of division of work. Accordingly, super-ordinate instances for systematic leadership and control are necessary.

2.4.3 Factor: Methods

The literature describes a multitude of methods for realizing and supporting BPM in general. Nevertheless, several methods are especially aligned to public
administration or e-Government. During the conception of a process, legal rules can easily be used to reason design decisions. Likewise, the high complexity of government processes and organizational structures in public administrations necessitates special methods and tools for modeling the processes (Palkovits and Wimmer 2003).

Methods for the transfer of process concepts to electronic implementations in the case of e-Government have to consider infrastructural conditions (cp. information technology). The high concentration of decisions in public administration requires the continuance of manual processes. An electronic implementation of the processes often has to be reduced to an electronic support of manual processes. Furthermore, the necessity of documentation of all decisions and occurrences (principle of documentation requirements) during the process implementation through corresponding techniques and systems has to be considered.

2.4.4 Factor: Information Technology

Information technology is necessary to realize the approaches of BPM. In the context of public administration, there result several particularities as the information technology frequently presents itself as heterogeneous and outdated. Accordingly, there result special requirements on information technologies which have a high importance concerning the maturity measurement.

Besides, particularities result from fragmented infrastructures because of the separation of administrative authorities in federal states. The current administration and the accompanying decentralized organization are not motivated by information technological causes, but solely result from the historical development. Therefore, special information technological requirements arise for the management of processes, which have to be executed across the states, administrative levels, and authorities.

Furthermore, there results a multitude of information technological requirements from political requirements or legal guidelines. This is exemplified by the German DOMEA approach (DOMEA: document management and electronical archiving in IT-supported business processes) (KBSt -Koordinierungs- und Beratungsstelle der Bundesregierung für Informationstechnik in der Bundesverwaltung 2005). This standard raises requirements for the implementation of tools and systems for BPM like, for instance, content or document management system.

2.4.5 Factor: People

People represent an important component when realizing an efficient BPM. In public administration, there often exists a high level of division of work and specialization, so that process knowledge is often concentrated in just a few employees. This implies the following consequences: First, approaches to survey the process knowledge require a significantly higher involvement of employees in
order to determine the process steps in detail; otherwise, real “as-is” processes in administration can hardly be determined. Second, actions for reorganization are often strictly limited or require special coaching because of a lack of necessary competencies. New “to-be” processes cannot be successfully implemented. Third, it is often difficult to identify appropriate responsible persons for such processes, which is due to the decentralized organization in public administration.

Because of the structures in public administration so far, the knowledge of methods and technologies for BPM is hardly developed. Hence, in comparison to the private sector, intensive methods for developing necessary knowledge regarding BPM have to be introduced (for a study on the skill set required for BPM please see Müller et al. 2014). The implementation of a process organization in public administration is complicated by the fact that the responsible persons have to be convinced that a higher level of process orientation would be useful.

2.4.6 Factor: Culture

This factor comprises the responsiveness to process changes, process values, and beliefs, as well as the strength of leadership in respect of BPM. Regarding this aspect, there are hardly any particularities in the public sector in comparison to the private sector.

However, the organizational culture is seen as a whole: organizational culture is considered as an amount of assumptions shared by a group of people, which has been invented, detected, or developed by them for solving problems based on the division of work (Schein 1984). Accordingly, hierarchy culture, market culture, clan culture, and adhocracy culture can be distinguished. The organizational culture in public administration is especially affected by a hierarchy culture. Because of the hierarchical organizational structure, it can be assumed that the maturity of the organizational culture in public administration is generally rather low, in this respect. Hence, methods for improving the process maturity as far as the organizational culture is concerned should be considered notably (see vom Brocke et al. 2014; Schmiedel et al. 2014).

BPM maturity models were considered as means for implementing and realizing the 48-h-service promise in public administration. For this purpose, they have to consider the requirements for a 48-h-service promise solution. According to the high amount of specifics of BPM in public administration, they have additionally to consider the particular requirements which arise from the public administration domain (OMG 2008, p. 69). However, most of the existing BPM maturity models seem to be proposed for the application within the private sector. Therefore, Sect. 3 analyzes known maturity models for BPM and public administration.
3 Known Maturity Models for BPM and Public Administration

Numerous maturity models for BPM have been proposed which can be divided into two types of models: models with a comprehensive view on BPM [e.g., (OMG 2008)] and models considering facets of BPM [e.g., (Luftman 2000, 2014)] [cp. here and in the following also (Rosemann and de Bruin 2005; Rosemann et al. 2006)]. The majority of these models are provided as instruments for the assessment of the capability of BPM. Recommendations shall contribute to an improvement of the maturity of BPM and, accordingly, to a higher quality of processes. The main target is to raise the company’s success by an improvement of business processes. Additionally, some authors provide generic tool support for using maturity models (Krivograd and Fettke 2012).

A common basis of various BPM maturity models is the **Capability Maturity Model** (CMM) (Paulk et al. 1993; Rosemann and de Bruin 2005). It is based on the assumption that the maturity level of software development within an organization can be valued at assessed development processes. The CMM defines five sequent maturity levels. Based on these maturity levels, Harmon (Harmon 2004) proposes a more elementary maturity model. More effort was necessary for designing the **Business Process Maturity Model** (OMG 2008) of the **Object Management Group** (OMG). Currently, it represents the largest CMM-based BPM maturity model. Fisher (2004) also proposes a model with five maturity levels. However, he defined different levels as used by CMM and combined his levels with five BPM-critical success factors. A promising approach is the **Business Process Management Maturity Model** of Rosemann and de Bruin (2005). They enlarge the CMM model to three dimensions and consider the six core factors of BPM (Rosemann and vom Brocke 2014). Hereby, the current state of knowledge about crucial factors shall be regarded to a greater extent than in existing models. A more popular model is the **Process and Enterprise Maturity Model** of Hammer (2007). His BPM maturity model consists of two parts, one for assessing process enablers and the other for assessing enterprise capabilities.

A comparison of the mentioned BPM maturity models is provided in Table 4. The definition of the five comparison criteria is based on Hüffner (2004):

- **Scope** criterion distinguishes the application of the maturity model on whole organizations, a business unit or a process.
- **Focus** criterion captures the specialization of the model. Therewith, it is being stated that the application of the maturity model can be either general or focused on a specific domain, like, e.g., the public administration.
- **Comprehensiveness** criterion, it is being distinguished whether the maturity model is designed to measure the “as-is” situation, to determine a “to-be” maturity level, or to recommend actions for achieving a “to-be” level.
- **Maturity level representation** distinguishes between a staged and a continuous representation of the maturity levels. The former describes the fact
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<tbody>
<tr>
<td>Focus</td>
<td>Processes organization</td>
<td>Organization business units</td>
<td>Processes organization</td>
<td>Organization</td>
<td>Processes organization</td>
</tr>
<tr>
<td>Comprehensiveness</td>
<td>General</td>
<td>General</td>
<td>General</td>
<td>General</td>
<td>General</td>
</tr>
<tr>
<td>Maturity level representation</td>
<td>Continuous</td>
<td>Staged, continuous</td>
<td>Staged</td>
<td>Staged</td>
<td>Staged</td>
</tr>
</tbody>
</table>

**Table 4** Comparison of BPM maturity models
that only one organization-wide or process-wide maturity level can be estimated using the model. For the continuous representation, in contrast, a number of maturity levels can be calculated by independently assessing different maturity model factors.

Table 4 shows that BPM maturity models are primarily designed for BPM in general. Domain specifics or particular application contexts are hardly considered. Furthermore, only few models exist which comprise recommendations for the improvement. However, there exist special maturity models for the public administration without a foundation on the CMM model or BPM maturity models. They do not focus on BPM, but on the assessment and improvement of electronic public services. Because of the concentration on technological aid, those models are known as e-Government maturity models or e-Government stage models.

E-Government maturity models can be divided into models with an academic background [e.g., (Esteves and Joseph 2008; Lam 2004; Stamoulis et al. 2001)] and models developed in practice [e.g., (United Nations and ASPA 2002)]. Most of them present themselves as tools for the improvement of electronic public services. They distinguish several maturity levels of access to these services via electronic media (Shackleton et al. 2004). For example, Layne and Lee (2001) differentiate four maturity stages starting with a simple Internet presence of an administration (catalog), through online-based services and forms as well as assistance for transaction (transaction), to vertical Integrated information systems (vertical integration) and overall cross-functional integrated systems (horizontal integration). The majority of the models concentrate on the evaluation of the electronic interface between administration and external stakeholders (focus on interfaces and front end). In most of the cases, to identify a maturity level, the level of technological assistance during the provision of public services has to be valued (focus on technology). Advice and recommendations for raising the maturity level are limited to aspects like the depth of transaction or integration. There are approaches which try to avoid that strong focus on technology, for example, the model of Anderson and Henriksen (2006), but they hardly expand their focus.

In summary, regardless of the multitude of maturity models, the authors do not mention a use case of a BPM maturity model which is adapted to the needs of public administrations in general and the case of 48-h-service promise in particular. However, e-Government maturity models consider the particularities of the public administration domain. Nevertheless, they do not address the BPM within public authorities. Therefore, the following sections introduce a domain-specific BPM maturity model that eliminates the lack of process orientation in existing e-Government maturity models and that considers the particularities of public administration as well as the 48-h-service promise.
4 Design and Development

Based on the mentioned prior work on maturity models, we developed a BPM maturity model for the fulfillment of the 48-h-service promise. This maturity model consists of five maturity levels which reflect the degree of fulfillment of the 48-h-service promise (cp. Fig. 5):

- **Level 1**: “incomplete 48-h-service promise”; no particular actions are defined to fulfill the 48-h-service promise.
- **Level 2**: “managed 48-h-service promise”; some basic actions for the fulfillment of the 48-h-service promise are established.
- **Level 3**: “defined 48-h-service promise”; all necessary actions for the fulfillment of the 48-h-service promise are defined.
- **Level 4**: “quantitatively managed 48-h-service promise”; actions for the fulfillment of the 48-service promise are quantitatively planned, controlled, and monitored.
- **Level 5**: “optimized 48-h-service promise”; all actions for the fulfillment of the 48-h-service promise are permanently and systematically improved.

In order to measure the maturity of a 48-h-service promise of an organization, the proposed maturity model contains five main factors which cover relevant actions and characteristics of the 48-h-service promise:

- **Main factor “Strategy of the 48-h-service promise”**: This main factor consists of aspects which are relevant for a long term plan of action designed to achieve the 48-h-service promise.
- **Main factor “Design of the 48-h-service promise”**: All aspects relevant for the definition and documentation of the implementation of the 48-h-service promise are grouped by this factor.
- **Main factor “Implementation of the 48-h-service promise”**: This factor addresses the realization of the 48-h-service promise.
- **Main factor “Controlling of the 48-h-service promise”**: This main factor includes setting standards, measuring actual performance, and taking corrective action for the implementation of the 48-h-service promise.
- **Main factor “People and culture”**: The people’s knowledge, competency, and willingness for implementing the 48-h-service promise are addressed by this factor.

The utilization of these five factors is based on design decisions during the development process of the maturity model (cp. Sect. 5). The five main factors are further operationalized by 18 factors. Table 5 explains these factors in more detail.

The maturity model defines different objectives, which have to be attained to achieve a particular maturity level for all the factors. By definition, every organization has reached maturity level 1. Table 6 introduces the particular objectives, which have to be achieved to reach maturity level 2.
<table>
<thead>
<tr>
<th>Main factor</th>
<th>Factor</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy of the 48-h-service</td>
<td>Definition of objective</td>
<td>Definition and communication of the 48-h-service promise as a strategic objective</td>
</tr>
<tr>
<td>promise</td>
<td>Definition of objective values</td>
<td>Definition and communication of measures for the 48-h-service promise</td>
</tr>
<tr>
<td>Design of the 48-h-service</td>
<td>Process documentation</td>
<td>Process survey and documentation of relevant government processes</td>
</tr>
<tr>
<td>promise</td>
<td>Definition of basic parameters</td>
<td>Identification and definition of relevant basic parameters for the implementation of the 48-h-service promise</td>
</tr>
<tr>
<td></td>
<td>Definition of actions</td>
<td>Definition of operational actions for the fulfillment of the 48-h-service promise</td>
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<tr>
<td></td>
<td>Definition of roles and</td>
<td>Definition of responsible and operational organizational units for the 48-h-service promise</td>
</tr>
<tr>
<td>responsibilities</td>
<td>Information systems for design</td>
<td>Use of information systems for the design of the 48-h-service promise</td>
</tr>
<tr>
<td>Implementation of the 48-h-service</td>
<td>Resource planning and allocation</td>
<td>Planning and allocation of all necessary employees and material resources for the 48-h-service promise</td>
</tr>
<tr>
<td>promise</td>
<td>Management enforcement</td>
<td>Responsible organizational units enforce necessary managements actions</td>
</tr>
<tr>
<td></td>
<td>Implementation of actions</td>
<td>Responsible organizational units implement all defined actions to fulfill 48-h-service promise</td>
</tr>
<tr>
<td></td>
<td>Implementation of cooperation and communication</td>
<td>Cooperation and communication between all organizational units involved in the implementation of the 48-h-service promise</td>
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<td></td>
<td>Information systems for</td>
<td>Use of information systems for the implementation of the 48-h-service promise</td>
</tr>
<tr>
<td>controlling and communication</td>
<td>implementation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Definition of measures</td>
<td>Definition of measures for the implementation of 48-h-service promise</td>
</tr>
<tr>
<td></td>
<td>Use of measures</td>
<td>Use of measures for the implementation of the 48-h-service promise</td>
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<tr>
<td></td>
<td>Information systems for</td>
<td>Use of information systems for the controlling of the 48-h-service promise</td>
</tr>
<tr>
<td>controlling</td>
<td>controlling</td>
<td></td>
</tr>
<tr>
<td>People and culture</td>
<td>Knowledge and competencies of operational organizational units</td>
<td>Guarantee that operational organizational units responsible for the implementation of the 48-h-service promise possess necessary knowledge and competencies</td>
</tr>
<tr>
<td></td>
<td>Knowledge and competencies of responsible organizational units</td>
<td>Guarantee that organizational units responsible for the management of the 48-h-service promise possess necessary knowledge and competencies</td>
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<td></td>
<td>Willingness to implement</td>
<td>Guarantee that all organizational units accept and adopt the 48-h-service promise</td>
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<tr>
<td>48-h-service promise</td>
<td></td>
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<tr>
<td>Main factor</td>
<td>Factor</td>
<td>Objectives</td>
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<tr>
<td>Strategy of the 48-h-service promise</td>
<td>Definition of objective</td>
<td>48-h-service promise is defined as a strategic objective</td>
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<tr>
<td></td>
<td>Definition of objective values</td>
<td>Measures for the 48-h-service promise are defined</td>
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<tr>
<td>Design of the 48-h-service promise</td>
<td>Process documentation</td>
<td>Sub-processes of the relevant administration process are identified</td>
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<td></td>
<td>Definition of basic parameters</td>
<td>Relevant basic parameters for the implementation of the 48-h-service promise are identified</td>
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<td></td>
<td>Definition of actions</td>
<td>Rough operational actions for the fulfillment of the 48-h-service promise are established</td>
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<td></td>
<td>Definition of roles and responsibilities</td>
<td>Responsible and operational organizational units for the 48-h-service promise are appointed</td>
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<td></td>
<td>Information systems for design</td>
<td>–</td>
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<tr>
<td>Implementation of the 48-h-service promise</td>
<td>Resource planning and allocation</td>
<td>–</td>
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<td></td>
<td>Management enforcement</td>
<td>Responsible organizational units submit proposals for the enforcement of necessary managements actions</td>
</tr>
<tr>
<td></td>
<td>Implementation of actions</td>
<td>Rough operational actions for the fulfillment of 48-h-service promise are implemented in at least 80% of all cases</td>
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<td></td>
<td>Implementation of cooperation and communication</td>
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<td>Information systems for implementation</td>
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<tr>
<td>Controlling of the 48-h-service promise</td>
<td>Definition of measures</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Use of measures</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Information systems or controlling</td>
<td>–</td>
</tr>
<tr>
<td>People and culture</td>
<td>Knowledge and competencies of operational organizational units</td>
<td>Organizational units responsible for the implementation of the 48-h-service promise understand defined objectives and actions and obtain necessary knowledge and competencies for the implementation</td>
</tr>
<tr>
<td></td>
<td>Knowledge and competencies of responsible organizational units</td>
<td>Organizational units responsible for the management of the 48-h-service promise possess basic knowledge of BPM</td>
</tr>
<tr>
<td></td>
<td>Willingness to implement 48-h-service promise</td>
<td>–</td>
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</tbody>
</table>
For each factor, several actions are proposed for implementation, which improves the 48-h-service promise of an organization. For example, the main factor “Design of the 48-h-service promise” contains the factor “Definition of roles and responsibilities”. To achieve the second maturity level of this factor, the objective says that the roles and responsibilities of the management and the implementation of the 48-h-service promise must be defined. The maturity model proposes two actions to achieve this objective:

1. The organizational units responsible for the management of the 48-h-service promise must be defined within the relevant government process.
2. The leading organizational units responsible for the execution of necessary actions to fulfill the 48-h-service promise must be defined.

Additionally, the description of the maturity model contains a deeper explanation for why it is necessary to define the roles and responsibilities of different organizational units for the management and implementation of the 48-h-service promise.

To assess the maturity of a public authority, each factor of the maturity model has to be measured. The first maturity level of each factor is achieved by definition. To achieve the second maturity level of a factor, the first maturity level of this factor has to be achieved and all objectives assigned to this factor on the second maturity level have to be accomplished and so forth.

Typically, a radar chart can be used to visualize the results of a maturity assessment. Such a radar chart consists of 18 axes each representing one factor of the maturity model. Figure 7 depicts an exemplary radar chart visualizing the results of a fictitious maturity assessment.

Please note, because of space limitations, this chapter just overviews some important parts of the maturity model as an example. It is planned to publish the complete maturity model on the Web page http://www.e-government-cc.org/. In the meantime, please contact the first author to obtain a copy of the complete maturity model (Fig. 6).

Compared to known BPM maturity models, our proposed maturity model can be characterized by some important features:

• **Public administration focus**: The proposed model explicitly focuses on the need for BPM in the area of public administration.
• **Purpose-oriented**: The proposed model defines some particular actions and levels for BPM in the context of the purpose of the fulfillment of the 48-h-service promise.

Because of these aspects, we characterize the proposed maturity model as a domain-specific BPM maturity model.
Demonstration and Evaluation

After developing the proposed maturity model, the usability and quality of the maturity model have to be demonstrated via well-known evaluation methods. The public administration environment described in Sect. 2 establishes the requirements which the maturity model must be tested against. Thus, the evaluation comprises the application of the maturity model within the environment offered by public authorities.

Hevner et al. (2004) distinguish five different design evaluation methods, namely observational, analytical, experimental, testing, and descriptive. We used observational and descriptive evaluation methods for the demonstration of the usability and quality of the proposed maturity model.

A descriptive evaluation is typically less rigorous but can be applied during all phases of the development cycle of a research artifact. We used a descriptive evaluation method during the development phase of the maturity model. The designing of innovative artifacts in general and a maturity model in particular is...
an inherently iterative process (Fig. 7). During this process, we developed several design alternatives and tested these alternatives against the requirements mentioned in Sect. 2.

During the development process, we used two approaches in particular:

- **Expert feedback**: We discussed developed design alternatives with several experts from the domain of BPM as well as practitioners responsible for the modernization of public administration processes and fulfillment of 48-h-service promise.

- **Scenario development**: The aim of the scenario development was the analysis of selected real-world public services in a German state administration in order to estimate the state of the art of fulfilling the 48-h-service promise and to acquire possible means and activities for realizing the service promise. For this purpose, a special public authority that provides social services for citizens of the German state was selected. Within this authority, four of the most requested services were selected for surveying their production and provision processes. The processes were documented in survey forms and event-driven process chains (EPC). The analysis of the processes identified several necessary activities and resources for the implementation and fulfillment of the 48-h-service promise which were analyzed according to the background of the maturity model.

The described evaluation approaches were already applied during the development of the BPM maturity model. Such a “Design to Quality” approach significantly supports the usability and quality of the developed maturity model. However, to further assure and assess the usefulness, we employed a case study as an observational evaluation method.

The already presented maturity model was applied in the context of a project which was to increase the service orientation in a German state administration. This state administration has been continuously improving the quality of their services
for citizens and enterprises. One building block is a faster communication between applicants and public authorities. The aim of the project is to improve the customer orientation as well as service orientation by introducing a 48-h-service promise. Figure 8 unfolds the procedure and the main phases of the project. Main activities of the first phase were concentrated on the conceptualization of the 48-h-service promise. For this purpose, the configuration parameter for a response in terms of a 48-h-service promise was specified. Moreover, while defining the time frame for the 48-h-service deadline influencing factors for releasing the start-event and end-event were specified. Therefore, several activating conditions for the release of a 48-h-service promise measurement as well as conditions which fulfill a sufficient response in terms of the 48-h-service promise were determined and specified during this project phase.

The aim of the second project phase was the analysis of selected real-world public services in the German state administration in order to estimate the state of the art of fulfilling the 48-h-service promise and to acquire possible means and activities for realizing the service promise based on real-world scenarios. This analysis was based on the developed BPM maturity model for 48-h-service promise.

The results of the preceding two project phases were used in the third phase for specifying an implementation concept for the service promise. Based on the consideration that public services and their processes as well as their activities can be managed using the BPM approach, the 48-h-service promise as a new part with special means and activities within these processes can be realized by an adequate BPM. For the purpose of introducing, managing, and improving the 48-h-service promise for the public services of the German state administration, the proposed maturity model was used. Therefore, the maturity model was applied and typical areas for process improvements were identified.

Our experience in using the maturity model shows the following advantages:

- The maturity model helps bridge the gap between domain expert’s view of BPM and its implementation.
- It is suited for communication with users in the domain.
- Because of a focused scope, the application of the maturity model is less challenging.
- The maturity model provides a better support for one particular BPM purpose, namely the fulfillment of the 48-h-service promise in public administrations.

Fig. 8 Project phases
To conclude, according to our findings, a domain-specific BPM maturity model has major advantages compared to domain-neutral BPM maturity models. These experiences are similar to experiences acquired in the context of domain specific modeling (France and Rumpe 2005, p. 1).

In general, it might be argued that the domain-specific development of the proposed maturity model does not make sense because this model might be useful only in one particular organization. However, this argumentation ignores the fact that the developed maturity model is based on requirements gathered at all authorities of a German state. Hence, the model is useful for BPM not only in one particular authority but also in a large class of authorities.

Because of the development process of the maturity model, it can be argued that the model can effectively and efficiently applied by authorities of a German state. According to our experiences and knowledge of particularities of the public administration system in Germany, it will not be difficult to adapt the proposed maturity model to requirements of authorities of other states in Germany. However, today, it is not sure to what extent the developed model can be generalized to the needs of authorities in other countries. From the perspective of BPM, the proposed model does not introduce some particular actions which are typically for Germany. But there may be some national laws in other countries which must be taken into account if the application domain of the proposed maturity model is to be extended.

6 Summary and Outlook

BPM has gained tremendous importance in many industries. In the last few years, public administrations have successfully adopted the idea of BPM as a means for modernization. BPM approaches have much potential for the improvement of efficiency and effectiveness as well as the service orientation of public administrations. One important aspect of service orientation is a 48-h-service promise which was particularly focused in this chapter.

Against this background, there is a need for a maturity model for BPM in public administrations which take into account the fulfillment of a 48-h-service promise. In this chapter, we first analyzed particularities of the domain “public administration” compared to the private sector. Because of important differences between the private sector and public administrations, we proposed that existing maturity models for BPM need to be adapted appropriately to the need of the fulfillment of a 48-h-service promise in the public administration domain. A new proposal was developed which takes into account the fulfillment of a 48-h-service promise in public administrations. Furthermore, the utilization of the model was tested in the context of a project within a particular German state whose authorities want to improve their service orientation in general and to introduce a 48-h-service promise in particular.

We characterize our proposed maturity model as domain-specific because it is adapted to the particular requirements of the fulfillment of a 48-h-service promise
in public administrations. Our experiences in applying the domain-oriented maturity model are very promising. For example, we realized that the domain-specific model helps bridge the gap between domain expert’s view of BPM and its implementation and is suited for better communication with users in the domain.

Even though the experiences of the application are very encouraging, there are further questions that have to be answered by future research:

- Experiences concerning the utilization of the maturity model in public administration by authorities of one particular German state are available so far. In the context of further applications, additional experiences need to be collected to improve the utilization and practicability of the model.
- As in the case of other known maturity models, the proposed model is based on the assumption that an improvement of the maturity degree is fundamentally positive for success. Hence, in the future, it is necessary to intensively investigate whether a higher maturity level always results in a better success of a public administration or whether there are some circumstances, which, in this respect, have a negative impact on success.
- The developed maturity model addresses the fulfillment of a 48-h-service promise in public administrations. A 48-h-service promise is one aspect of a general service promise that today’s public administrations wish to achieve. Therefore, it will be necessary to extend the proposed maturity model accordingly.

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References


While information technology is often the enabler of required process changes, the success of BPM initiatives depends heavily on the contributions, active support, and engagement of all stakeholders. This section divides the human aspect of BPM into (a) the experiences and skills related to processes and process management (people), and (b) overall leadership and the organizational and individual acceptance of BPM (culture).

In this context, questions arise concerning how we can ensure that involved employees proactively initiate and drive process change and accept the proposed process changes, what is the BPM body of knowledge covering the skills required by BPM professionals, what is needed on the human side to enable a process change in the most effective and efficient manner, and what leadership skills are required to ensure that culture becomes an enabler and not an inhibitor of process change. This part of the BPM Handbook explores the role of the human factor in BPM from a variety of viewpoints.

The first two papers in this section focus on the competencies required in order to apply BPM successfully in an organization. In the first chapter, Alexandra Kokkonen and Wasana Bandara introduce the field of expertise in BPM, presenting a comprehensive model of expertise in the context of BPM that consolidates existing theories and related work. In the second chapter, Yvonne Lederer-Antonucci takes a closer look at the design of BPM course curricula. Since many organizations have assigned process-transformation leadership to business analysts, Lederer-Antonucci reviews the role of a business analyst in the context of BPM practice and suggests a curriculum designed to cultivate the skills required to fill the emerging role of the business process analyst.

In addition to skills, various factors resulting from the human perspective must be considered when managing change in business processes. These factors are considered in the next set of chapters. First, Keith Harrison-Broninski introduces human-driven processes, presenting an approach to analyzing and describing processes with a focus on human interactions that facilitates the management of teams, communication, knowledge, time, and plans by taking the role of human collaboration in BPM into account. Interactions and how they can be modeled is the focus
of the chapter contributed by Albert Fleischmann, Werner Schmidt and Christian Stary. Subject-oriented BPM (S-BPM) follows a communication-oriented paradigm and by this presents an alternative to the common activity-centered proposals. The concepts of S-BPM are explained using an exemplary process. The approach is discussed in the context of social BPM and insights into the actual application of S-BPM are provided. In the next chapter Dimitris Karagiannis and Robert Woitsch focus on the critical role of “knowledge” and the intersection between BPM and “knowledge engineering,” contributing to the increasingly important domain of knowledge-sensitive BPM. The authors show how knowledge engineering can be incorporated into BPM, with a particular focus on frameworks, management methods, and deployment initiatives.

Culture is also a crucial element in the relationship between human capital and BPM. In the opening chapter of this section, Theresa Schmiedel, Jan vom Brocke, and Jan Recker introduce this emerging field of BPM research, reporting on three major research projects and providing an overview of the multi-faceted role of culture in BPM. Against the background of a conceptual framework, the BPM-culture model, the authors identify four values essential for BPM initiatives and present a BPM-culture tool with which to measure how well specific organizational cultures support BPM. In order to incorporate cultural effects, change management initiatives supporting BPM need to be considered. This is the focus by Ulrike Baumöl, whose contribution on cultural change in BPM provides an engineering perspective on how to implement change in an organization. The section continues with Jan vom Brocke, Martin Petry, Theresa Schmiedel, and Christian Sonnenberg’s real-life case of the Hilti Corporation, which analyzes the intersection of corporate culture and BPM success. The authors reveal that a cultural development initiative was instrumental in Hilti’s success with a global BPM project.

Both knowledge and culture contribute to the overall creativity of an organization. The phenomenon of the growing competitive relevance of BPM is discussed by Stefan Seidel, Katherine Shortland, David Court, and Didier Elzinga in the next chapter. Drawing from observations made at a leading postproduction studio, Rising Sun Pictures, the authors show how creativity impacts business processes and derive guidelines for management of the creativity-intensive processes that are of major importance to a wide range of industries today.

We conclude the section with two case studies on the role of people and culture in BPM. First, a case study of an Australian transport provider demonstrates the various interdependences among the six core components of BPM structuring the BPM Handbook. In their case Tonia de Bruin and Gaby Doebeli once more highlight the importance of understanding BPM as an organizational approach. Then the chapter by Hugh Peterken and Wasana Bandara reports on BPM in the International Federation of Red Cross and Red Crescent Societies. The case demonstrates the tremendous challenges of BPM in international humanitarian aid
organizations but also its significant contributions. The chapter illustrates how the six core elements of BPM must be integrated and aligned with respect to the specific context of the organization’s internal and external environments.

1. Expertise in Business Process Management
   by Alexandra Kokkonen and Wasana Bandara

2. Business Process Management Curriculum
   by Yvonne Lederer Antonucci

3. Dealing with Human-Driven Processes
   by Keith Harrison-Broninski

4. Subject-Oriented Business Process Modeling
   by Albert Fleischmann, Werner Schmidt, Christian Stary

   by Dimitris Karagiannis and Robert Woitsch

   by Theresa Schmiedel, Jan vom Brocke, Jan Recker

7. Cultural Change in Process Management
   by Ulrike Baumöl

8. How Organizational Culture Facilitates a Global BPM Project: The Case of Hilti
   by Jan vom Brocke, Martin Petry, Theresa Schmiedel, Christian Sonnenberg

   by Stefan Seidel, Katherine Shortland, David Court and Didier Elzinga

10. Business Process Management at an Australian Transport Provider
    by Tonia de Bruin and Gaby Doebeli

11. Business Process Management in International Humanitarian Aid
    by Hugh Peterken and Wasana Bandara
Expertise in Business Process Management

Alexandra Kokkonen and Wasana Bandara

Abstract Business Process Management (BPM) is evolving and organizations are becoming more process oriented. Hence, the need for expertise in BPM amongst practitioners has increased. Existing role descriptions are revised and entire new business process-related roles emerge. Proactively managing Expertise in BPM is essential to unlock the potential of BPM as a management paradigm and competitive advantage. Whilst great attention is being paid by the BPM community to the technological aspect of Business Process Management (BPM), relatively little work has been done concerning the people factor of BPM and the specification of expertise in the context of BPM. To close this gap, this chapter presents a comprehensive model of expertise in the context of BPM, which consolidates existing theories and related work. This model describes the key attributes characterizing “expertise in the illustrative context of BPM” and outlines their structure, dynamics, and interrelationships. Understanding expertise in the context of BPM expertise is a predecessor to being able to develop and apply expertise in BPM effectively. This is the cornerstone of leadership, human capital management, and human resource development in BPM.

1 Introduction and Background

People are at the heart of processes
(Jeston and Nelis 2010, p. 5)

With the rapidly growing emphasis and focus on process improvement activities across the globe, many organizations ask the following questions: What do we know about expertise in the context of Business Process Management (BPM)?
What does our understanding (or lack of understanding) of expertise in the context of BPM mean to the BPM arena?

BPM has emerged in recent years as a management philosophy and discipline centered around business processes, and is continuing to rapidly evolve (Gartner 2008; Rosemann and vom Brocke 2014). Preceding related disciplines included Total Quality Management (TQM) in the 1980s, followed by Business Process Reengineering (BPR) in the early 1990s, and in the mid and later 1990s Enterprise Resource Planning (ERP) (Koch 2001; Jeston and Nelis 2008). In essence, BPM is an old discipline (Verner 2004).

“BPM is considered as an organizational management philosophy; a holistic approach which focuses on the organizational (BPM) capability required to optimize process management practices within the organization” (Rosemann and de Bruin 2005). As such, this approach encompasses the integration, coordination, and management of BPM practices as they are applied across and within key end-to-end processes and the lower level processes that go to support them (Rosemann and de Bruin 2005). Thus, BPM goes beyond mere automation of business processes, or solving business problems; BPM creates value through competitive advantage by responding to consumer changes, market(s), and regulatory requirements faster and more effectively or efficiently than competitors respond.

As BPM has evolved and organizations are becoming more business process oriented, the need for BPM expertise and experience has increased (Rosemann and vom Brocke 2014). Roles, which recognize this requirement, are being introduced in organizations [such as; Business process director; Business process consultant; Business process architect; Business process analyst (Melenovsky and Hill 2006) to name a few]. While great attention is being paid by the BPM community to the technological aspect of BPM [such as van der Aalst et al. (2003)], relatively little research or work has been done concerning the people factor (Rosemann and de Bruin 2005), and expertise and experience component of BPM (BPM Basics 2007; Harris 2007).

The dynamic, complex, and interdependent nature of the business process environment means that business process roles require a breadth of various expertise and experience, ranging from the business itself to the technology concerned. These roles are sometimes referred to as business process expert roles; however, there is little common understanding of what such roles are and the associated expertise. The deficit in focus and research on the people component of BPM (Rosemann et al. 2005, 2007) has resulted in poor understanding of what the term “expertise in BPM” means in practice, its manifestation and application within organizations, or in the implications of the manifestation and application.

The people element, defined as “the individuals and groups who continually enhance and apply their process skills and knowledge to improve business performance” (following Rosemann et al. 2005), is considered a key factor of BPM; as evidenced by the many BPM critical success factor studies (e.g., Raymond et al. 1995; Amoroso 1998; Grover et al. 1998) that specifically state the role of people for the success and failure of BPM. One of the few BPM studies that discuss the people factor in BPM in detail is the Rosemann and de Bruin (2005) and de Bruin’s (2008) model of
Business Process Management Maturity (BPMM). The “people factor” refers to one of the six BPM capability areas identified by de Bruin (2008) in the (BPMM), and it one of the six core elements of BPM considered in this handbook (Rosemann and vom Brocke 2014). A deficit in any one of the six component areas will affect other areas of BPM to some extent, as none of the components operate in isolation. Thus, any deficit in the people factor will invariably affect the other BPM components to a greater or lesser extent. Other BPM-related models that emphasize the people component are Zachman’s Enterprise Architecture framework (Zachman 2007), the Enterprise Business Process Architecture model (BPMEnterprise.com) as well as the study on the skill-set of BPM professionals by (Müller et al. 2014) analyzing a collection of 1,507 BPM-related job advertisements.1,2

While it is widely agreed that experience and expertise in BPM are required at different organizational levels, from operational to executive management levels, there is no common framework in existence, describing the fundamental elements characterizing expertise in the context of BPM. This has resulted in a poor understanding of what expertise in BPM is, and poor understanding of the implications of the dynamics and interrelationships of the elements of expertise in BPM for an organization. This knowledge deficit has contributed to the void in the understanding and managing the implications of expertise in BPM in different organizational areas, and its development. Attempting to address process issues through technology, architecture, data, and processes alone, independent of (or ignoring) the people involved and their expertise, is like “doctors trying to treat humans by only looking at their feet” (Vestey 2006, p. 60).

Even if the organization has their structure optimized, people are the ones who execute the processes and make things happen. Without them you have nothing. (Jeston and Nelis 2006, p. 169)

BPM guidelines for success often provide advice such as: “Establish a robust governance framework that identifies process ownership,” “Appoint a business process analyst to work on each major business process,” “Create a BPM center of excellence,” “Select an experienced person to head the BPM center of excellence (e.g., Hill et al. 2006; Olding and Rosser 2007).” People cannot be appointed to fulfill BPM expertise roles successfully, or create governance around the deployment and management of BPM expertise, or establish a center of excellence consolidating BPM expertise, without first knowing what BPM expertise is meant to be.

1 The other components are Strategic Alignment, Governance, Technology, Methods and Culture (Rosemann et al. 2007).
2 Whilst these are enterprise architecture (EA) models, BPM plays a central role in EA (Pieterse 2005); the two fields may even merge in future (Zsambok and Klein 1997; Stevens 2007). Zachman’s framework considers people to be the “who” component of enterprise architecture, while organizational aspects — people, roles, and functions — are one of the seven components of the Enterprise Business Process Architecture model (BPM Enterprise.com).
This study aims to develop a deeper understanding of what expertise in the context of BPM is, and what the key attributes and dynamics characterizing expertise in BPM are. The focus of this study is expertise in the context of BPM as a holistic concept. This is different in scope from “process expertise” or a “business process expert”; each of these is considered a subset of expertise in BPM. Thus, the term “expertise in BPM” encompasses all forms of knowledge and experience relating to business processes, including the management and architecture of business processes, characteristics of the person(s) involved in the expertise, the level of expertise, and the context in which the BPM expertise is situated. This chapter presents an a-priori model of expertise in the context of BPM, which is the first attempt to characterize the concept of expertise in the context of BPM. The model is a first step toward defining and understanding expertise in a BPM context at both organizational and individual levels. In doing so the improvement of several BPM areas is facilitated.

2 Model of Expertise in the Context of Business Process Management

This chapter is from an overall study that aims to essentially build theory, establishing a meta-theoretical perspective of expertise in the illustrative context of BPM. Theories embody generalization and bring order to a vast array of disparate phenomena, encapsulating the most secure of our knowledge claims (diSessa and Cobb 2004). Expertise is fundamentally concerned with the state of ‘being’ of the entity deemed to exhibit that expertise. This study aims to characterize this ‘state of being’ in the illustrative context of BPM, requiring an innovative approach. The result is an ontology of a meta-model describing the theory of expertise in the context of BPM (Fig. 1).

This ontology of expertise in the illustrative context of BPM, represents a viewpoint on a set of possible domain theories, and may have meaning and application beyond the BPM domain. Several theories, concepts, frameworks and

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**Fig. 1** Ontology as a meta-model describing the domain theory of expertise in the illustrative context of BPM (Adapted from Schreiber et al. 1995, p. 161)
models were required to adequately illustrate the model components, referred to as ‘constructs’. No one theory could adequately describe all the model components and examples required, resulting in the use of multiple theories, and the instigation of ‘theoretical pluralism’. The initial candidate constructs and sub-constructs established from the background literature review, and supported by the study contextualization phase, directed the theoretical scope under review for model building. The actual conduct of multilevel theoretical research is challenging due to the volume of data analysis and collection. Research standards need to recognize the tradeoffs necessary when research work begins in a new area such as expertise in BPM. Finally, multilevel theory development requires clear and precise specification of model constructs. It is acknowledged these construct levels are creations by the researcher, and that the stability of levels of theory can potentially shift over time (Dansereau and Alutto et al. 1984; Dansereau and Yammarino et al. 1999; Klein and Tosi et al. 1999). The model developed in this study characterizing expertise in BPM, is an explanatory type of theory. Explanation of expertise in the context of BPM is provided, though no predictions concerning expertise in the context of BPM are made, nor are there any testable propositions beyond the existence of the constructs and primary sub-constructs of the model itself. The model is essentially an ontology as a meta-model, i.e. a meta-level theory for understanding, used as a high level ‘sensitizing device’ concerning expertise in BPM. This is “theory as enlightenment” (Gregor 2006, p. 624), providing “a set of categories and domain assumptions aimed at clearing away conventional notions to make room for artful and exciting insights” (DiMaggio 1995, p. 391). The model developed is represented via words, diagrams and figures, using constructs to articulate the various key features of expertise in BPM. Statements of relationship are high level and qualitative only, concerning the existence of interaction between model constructs, and their sub-constructs.

The primary goal of the study was to develop high-level characteristics of expertise in the context of BPM referred to as ‘constructs’. Additional characteristics, ‘sub-constructs’ and illustrative examples, were also developed and considered key to establishing the importance and relevance of the model, and enabling an enhanced understanding of expertise in the context of BPM. The initial background literature review explained the importance and relevance of the research focus, including the business background, need for management understanding of expertise in the context of BPM, and hence the overall motivation, aim and goal of the study. It is important to acknowledge at this point the multidisciplinary nature of Expertise in the context of BPM. The ‘total systems approach’ of Information Systems (of which Expertise in the context of BPM is a part), means that no single discipline is adequate to understand issues in the field of Information Systems. “Knowledge and tools from at least computer science and engineering, psychology and sociology, management and anthropology could possibly each contribute when addressing problems in the information systems field.” (Roode 2007). This approach acknowledges the inherently social nature of expertise in BPM (Roode 2007).

A deductive approach (referred to informally as a “top-down” approach) was used to derive the model of expertise in BPM, as an a-priori attempt. An a-priori is
defined as “prior to or independent of experience; contrasted with ‘a posteriori’ (empirical)” (Audi 2001, p. 35). A-priori approach marks a distinct epistemic justification and derivative approach as well as a kind of proposition, knowledge, and argument, that is, the way the concept is acquired (Audi 2001). An a-priori model-building phase was necessary to establish, and enable communication of a thorough understanding of the constituent parts of expertise in BPM, their interrelationships and dynamics. Such a model helps to describe and conceptualize a theory in a structured, holistic manner, aiding the analysis of data. The model building phase was done via literature (Eisenhardt 1989; Chau 1997). Literature “implicitly assumes that there is a true model for a given set of data” (Chatfield 2006). Model building is iterative (Chatfield 2006), hence the model was evolved iteratively as further literature was encountered, and evolved further during the a-priori model confirmatory phase. It is acknowledged that the model developed through this study can be developed further with further research recommended.

The initial topic of interest was identified based on the research topic (i.e., the experience, knowledge, abilities, and aptitude required in BPM). Theories, frameworks, and models related to the research topic were searched across analogous domains, and those that were related were borrowed and adapted in the derivation of the model presented in this paper. The primary literature disciplines chosen initially, as representative of the core aspects of a-priori model-building are as per Table 1.

The literature domains, and why they were selected, are briefly described below. The constructs these descriptions refer to are introduced and described in the next section.

Autopoiesis: “This body of theory concerns the dynamics of living systems, purporting to answer the question “what is the characteristic organization of living systems?” The process of Autopoiesis lies at the heart of the answer” (Department of Computer Science University College London 2008). Autopoiesis was selected as it was considered to describe the living system construct, which was designed to capture the living nature of BPM expertise comprehensively; there is no other comparable theory.

Developmental Management: This domain covers literature relating to developmental management, which was chosen for the creation of the context of the individual person (I-PER-C) primary sub-construct as this provided a comprehensive view of the complete context of the person in a contextual setting. The context of the person cannot be separated from his/her professional context (BPM); therefore, this was a critical area to cover.

Organizational Management: this domain covers literature relating to organizational management, and was chosen to develop the external context of the organization (I-ORG-EC) secondary sub-construct, plus the Living System – Organization primary sub-construct. BPM cannot be separated from the organizational context in which it resides in, hence this is a critical area to include.

Experience and Expertise: this domain covers literature pertaining to experience and expertise, and was selected as expertise is at the core of the research problem, that is, to characterize BPM expertise.
Table 1  Mapping of literature domains to model constructs

<table>
<thead>
<tr>
<th>BPM expertise model construct</th>
<th>BPM expertise primary sub-construct</th>
<th>Corresponding literature domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living system</td>
<td>Living system-person (l-PER)</td>
<td>Autopoiesis</td>
</tr>
<tr>
<td></td>
<td>Living system-organization</td>
<td>Autopoiesis organizational</td>
</tr>
<tr>
<td></td>
<td>(l-ORG)</td>
<td>Management</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Explicit knowledge</td>
<td>Experience and expertise</td>
</tr>
<tr>
<td></td>
<td>Tacit knowledge</td>
<td>Experience and expertise</td>
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<tr>
<td>Behavioral characteristics</td>
<td>Mind</td>
<td>Applied social science</td>
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<td></td>
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<td>(counseling) experience and</td>
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<td></td>
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<td></td>
<td>Behavioral system</td>
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<td></td>
<td>Spirit</td>
<td>Applied social science</td>
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<tr>
<td></td>
<td></td>
<td>(counseling) naturalistic</td>
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<td></td>
<td></td>
<td>decision making</td>
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<tr>
<td>Context</td>
<td>Context of the person (l-PER-C)</td>
<td>Developmental management</td>
</tr>
<tr>
<td></td>
<td>Context of the organization (l-ORG-C)</td>
<td>BPM organizational management</td>
</tr>
<tr>
<td>Decision making</td>
<td>Situation awareness decision</td>
<td>Naturalistic decision making</td>
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<tr>
<td></td>
<td>action feedback</td>
<td></td>
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</tbody>
</table>

Applied Social Science (Counseling): this domain covers literature relating to applied social science in the counseling field. The “contextualization of self” material was selected to develop the behavioral characteristics construct, as this was considered the most comprehensive approach to this part of the BPM expertise model.

Naturalistic Decision-Making (NDM): This domain covers material related to NDM, including situation awareness and mental model-building. This domain was chosen to develop the decision-making construct of the model, as it reflects the real world nature of decision making in the BPM environment.

BPM: this domain covers literature pertaining specifically to the context of BPM, and was selected because BPM is at the core of the research problem, that is, to characterize expertise in BPM, and was used to develop the context of the organization (I-ORG-C) construct.

These key literature domains themselves were established upon identification of the research focus, and through review of associated literature areas. Hence, each element within the model of expertise in BPM originated from established theory from related disciplines, where they were iteratively integrated into the model, the goal being to build a model of expertise in BPM that was as complete and justifiable as possible.

The next sections present the elements of the model. The derived model of expertise in BPM is complex in nature, having a number of elements, which are represented and discussed throughout the remainder of this paper. First, it is
important to introduce the terms used to depict these different model elements. The main elements (see Fig. 2) are referred to as “constructs.” The secondary elements relating to the constructs are referred to as sub-constructs; these decompose the main constructs. A construct is a variable in a theory (adopted from Analytic Technologies 2008), a “higher-level abstraction from things that cannot be observed or illustrated by specific objects or events” (Ohio State University 2008). It is defined as “an abstract or general idea inferred or derived from specific instances” (Webster’s Revised Unabridged Dictionary 1913a; Princeton University 2008c). A sub-construct in this a-priori model is defined as “a part of the referenced construct” (Webster’s Revised Unabridged Dictionary 1913b).

### 2.1 Constructs of the Model

The model of expertise in the context of BPM is depicted in Fig. 2 and its primary elements, the living system, knowledge, behavioral characteristics, context, knowledge flows, and decision-making are presented below. Figure 2 depicts the model constructs, and their respective primary sub-constructs [for example, the primary sub-constructs of the living system construct, are the organization (I-ORG) and person (I-PER)]. Expertise in BPM exists throughout the organization, going beyond mere technical or functional IT knowledge, or just business knowledge; knowledge itself is only one part of the concept; thus it is a multi-dimensional concept.
2.1.1 Living System Construct

The living system is considered self-organizing, having the special characteristics of life and interacting with its environment (Miller 2008). It is defined in this context as “a composite unity whose organization can be described as a closed network of productions of components that through their interactions constitute the network of productions that produce them, and specify the network's extension by constituting boundaries in their domain of existence” (Maula 2006, p. 229). It is considered to be an autopoietic entity, and is a special case of organizationally closed autonomous systems. The living system construct is made up of two primary sub-constructs; the individual person (I-PER) and individual organization (I-ORG).

Expertise in BPM exists at both the individual person and individual organization level. The concept of collective expertise in BPM, as it relates to the organization, is akin to that of “collective mind” (Hakkarainen et al. 2004). Collective mind is “an approach that emphasizes how highly trained and experienced teams function as if of one single mind. This kind of collective mind has systemic characteristics that cannot be reduced to the sum of individual minds” (Hakkarainen et al. 2004, p. 242). Likewise collective expertise in BPM cannot be reduced to the sum of individual minds and must be recognized at the organizational, as well as personal level.

The Living System – Person (I-PER) primary sub-construct represents the individual person as the entity where expertise resides. Expertise resides in people (Bereiter and Scardamalia 1993), each person being an autopoietic entity (Maturana et al. 1992; Maula 2006).

The Living System – Organization (I-ORG) primary sub-construct represents the individual organization deploying BPM. The organization is also considered to be an autopoietic entity (Maula 2006), though it consists of many individual people which are also autopoietic entities in their own right. The organizational qualities arise or emerge as a result of the ongoing autopoiesis of the living system’s biological components (people) of the organization (Department of Computer Science University College London 2008).

The living system concept is important to expertise in BPM as it reflects aspects of the holistic entity deploying a BPM philosophy. An example is the ability of the organization to sense its surrounding environment and be aware of change in relevant contextual areas such as the task, industry, and macro environment (including economic, technical and social) aspects affecting BPM. Task environment items may include changes in the customer base and activities the specific organization carries out. Interactive processes and communication with the surrounding environment, both internal and external are crucial to disseminate BPM strategy and ensure that governance is occurring and effective, and that processes are optimal. Internal standards are important for BPM governance to be effective. Other aspects concerned with the living system entity from an organizational perspective include experimentation often necessary in BPM to develop new processes and ways of doing things, and information and communication systems.
The living system also reflects the individual person working in the BPM environment; examples of individual people in BPM include employees, contractors, vendors, or customers. Prior relevant BPM experience in areas such as technology, process, governance, industry, and functional area are necessary to varying extents and are also reflected in the living system construct along with personal history relevant to BPM; it is considered to take 10 years on an average to become an expert in any domain. How the person functions overall as a living system affects his/her ability to function in the BPM environment; experience and knowing affect knowledge, interactions affect behavior as do behavioral domains, and language affects communication: an important aspect of BPM given positioning between the business and IT; these aspects are also reflected via the living system construct. The vital role of communication skills in BPM education has been further investigated by Bergener et al. 2012.

2.1.2 Knowledge Construct

Knowledge is defined in this context as “a blend of experience, values, information in context, and insight that forms a basis on which to build new experiences and information, or to achieve specific goals. It refers to the process of comprehending, comparing, judging, remembering, and reasoning. . . . is the uniquely human capability of interpreting and extracting meaning” (quantumiii 2008). Knowledge plays a central role in expertise (Bereiter and Scardamalia 1993), regardless of the specific domain of expertise (Charness 1991; Bereiter and Scardamalia 1993; Selinger and Crease 2006; Chi 2007). Knowledge is considered a key characteristic for two main reasons. Firstly, many other factors may contribute to expertise in BPM but are not essential. Secondly, the behavioral characteristics only explain in part, how knowledge is acquired. “Knowledge is about beliefs and commitment, action, and meaning. Information and knowledge are context-specific and relational; they depend on situations and are created dynamically in social interaction among people” (Maula 2006, p. 66). “The conventional view of knowledge is not only limited to what knowledge includes but it is also limited in its conception of how knowledge is acquired and how it works” (Bereiter and Scardamalia 1993, p. 45). The knowledge construct of the a-priori model is considered to comprise two primary sub-constructs, explicit knowledge and tacit knowledge (Audi 2001) as depicted in Fig. 2.

Within each of these primary sub-constructs are illustrative secondary sub-constructs. Explicit knowledge is considered to be made up of the three illustrative secondary sub-constructs of declarative knowledge (Bereiter and Scardamalia 1993) which is concerned with “knowing about,” explanatory knowledge (Kim 1994) which is concerned with “knowing why,” and procedural knowledge (Cianciolo et al. 2007) which is concerned with “knowing how” (Bereiter and Scardamalia 1993).

Declarative examples include formal knowledge considered to be “negotiable” knowledge in the sense that it arises through processes similar to negotiation, is
something people can negotiate about, and “is negotiable in the sense that it can be
transferred, exchanged, even purchased for money” (Bereiter and Scardamalia 1993), plus “domain knowledge” which is the content of a particular field of knowledge.

Examples relating to procedural knowledge are skills and habit. Skills are the
“ability to do something well, usually gained through training or experience,” or
“something that requires training and experience to do well, e.g., an art or trade”
(Encarta.msn.com 2008c). Habit refers to a regularly repeated behavior pattern “an
action or pattern of behavior that is repeated so often that it becomes typical of
somebody, although he or she may be unaware of it.” (Encarta.msn.com 2008a, b, c). In the BPM domain, these may be technical or process management skills and habits.

Explanatory knowledge is essentially metaphysics or science according to Aris-
 totle, and is defined as “knowledge of why things are as they are” (Politis 2004, p. 33). It is concerned with “knowing why” (KRII 2008).

Explanatory knowledge samples include the work-domain knowledge type,
which is necessary to understand increasingly complex phenomena in the back-
ground of modern society, to provide “a scientific understanding of the world
(Beckham 1999). It appears to constitute the core of work-domain knowledge
(Vicente 1999) that has an essential role in mastering complex socio-technical
systems.” (Hakkarainen et al. 2004, p. 21). It is knowledge that pertains directly
to performing primary work such as a design engineers engineering knowledge,
knowledge of systems, and procedures for performing design work.

Tacit knowledge is considered to be made up of informal knowledge (Bereiter
and Scardamalia 1993) such as common sense and promisingness, impressionistic
knowledge such as judgment, trust (Platts and Leong 2006), and intuition (Bereiter
and Scardamalia 1993), and self regulatory knowledge such as self- knowledge,
beliefs (Zimmerman 2007), and values.

Samples related to informal knowledge are common sense, which refers to
“sound and prudent judgment based on a simple perception of the situation or
facts” (Merriam Webster 2008a), and promisingness which refers to “a kind
of judgment” (Bereiter and Scardamalia 1993, p. 58), and depends on impression-
istic knowledge, distinguishing creative from non-creative expertise (Bereiter
and Scardamalia 1993). According to Bereiter and Scardamalia (1993), knowledge of
promisingness can only come from “deep and long immersion in progressive
problem solving within a domain” (Bereiter and Scardamalia 1993, p. 235). Impres-
sionistic knowledge samples are “judgment,” which refers to a knowledgeable
opinion (Merriam Webster 2008d), trust, which is concerned with reliance “based
on past experience” and faith (wordreference.com 2008), and finally intuition,
which is defined as “quick and ready insight; the power or faculty of attaining to
direct knowledge or cognition without evident rational thought or inference”
(Merriam Webster 2008c).

Self-knowledge refers to “knowledge of one’s self, or of one’s own character,
powers, limitations” (selfknowledge.com 2008). A belief is considered to be a
known in the subconscious, hence the relationship between belief and knowledge
is subtle (wikipedia.org 2008) and is defined as “any cognitive content held as true”
(Princeton 2008a, b, c, d, e). While believers in a claim often state they “know” something, philosophers distinguish between belief and knowledge. Values refers to “beliefs of a person or social group in which they have an emotional investment (either for or against something)” (Princeton 2008a, b, c, d, e), while “self-efficacy” refers to “perceptions about ones capabilities to organize and implement actions necessary to attain designated performance of skill for specific tasks.” (Zimmerman 1989, p. 2)

Explicit knowledge of the internal and external context of the organization, as well as the individual people, in BPM is both essential and broad because of the inherent complexity of the BPM domain. Hence, explicit knowledge of many areas is required to varying extents. Explicit knowledge of the organization includes, but is not limited to the business itself (what is does) and includes geography, industry, company, all aspects of governance (including compliance and regulatory frameworks and procedures), business processes, associated technology such as ERP and BI systems, various business strategies plus the alignment and integration of those strategies, industry strategic direction, functional strategic direction such as key direction in the supply chain/logistics environment, plus the people that constitute the organization. Explicit knowledge of relevant external influences such as political, economic, technical, and socio-cultural is also necessary, as these have a direct bearing on the organization and the people working in the BPM environment. Explicit knowledge alone, however, does not make an expert; tacit knowledge is key to expertise in any domain delineating experts from non-experts, and hence tacit knowledge of all the afore-mentioned areas is also necessary to varying extents in expertise in BPM. Each type of explicit knowledge has a role to play in expertise in BPM; declarative knowledge is concerned with knowing about aspects of BPM such as specific processes, governance, or associated technology. Explanatory knowledge is concerned with knowing why certain external organizational events are occurring, such as changes in economic circumstances, and how they will impact various aspects of the business and strategy. Procedural knowledge is concerned with knowing how, for example how specific technology works and the benefits it can yield for the business through process improvement. All aspects of tacit knowledge also have a role to play in expertise in BPM. Informal knowledge of BPM areas such as processes and technology are no less important than formal knowledge of such areas. Impressions can be a valuable source of knowledge concerning less tangible aspects of BPM such as process attitudes, or values and beliefs. Self-regulatory knowledge is essential for anyone in the BPM field to manage themselves and therefore contribute in an optimal way to the organization and BPM field.

2.1.3 Behavioral Characteristics Construct

Behavior, is defined as “action or reaction of something under specified circumstances, the way a person behaves toward other people, the aggregate of the responses or reactions or movements made by an organism in any situation and
[the] manner of acting or controlling yourself” (Princeton University 2008a, b, c, d, e) in this context. It too plays a central role in expertise regardless of the domain of expertise (Chi 2007; Feltovich et al. 2007; Hunt 2007). Expertise cannot be explained by knowledge alone. The behavioral characteristics component of expertise is key to understanding the utilization of knowledge and interaction with the environment in which the expertise occurs.

Thinking ability, practical sense (Ciancio et al. 2007), and intuition (Haldin-Herrgard 2004) are key components of expertise (Bereiter and Scardamalia 1993), and must therefore be acknowledged and reflected in a model of expertise. Given the importance of the people factor in BPM (Rosemann et al. 2005), which is the context of the a-priori model, behavior is undoubtedly considered a key aspect of expertise in BPM, due to the behavioral characteristics of each person involved in expertise in BPM. The behavioral characteristics construct of the a-priori model is made up of three primary sub-constructs. These are mind, the behavioral system, and spirit (Huitt 2003a, b).

The Mind is “the functioning of the brain to process information and control action in a flexible and adaptive manner” (Farthing 1992, p. 5). The mind is not a filing cabinet; it is impossible to understand the criticality of knowledge to expertise if this “filing cabinet” view is retained, akin to a cook having a well-stocked pantry; it does not say anything about how the cook actually cooks; the pantry is not the cook, and likewise the filing cabinet is not the expert (Bereiter and Scardamalia 1993). The primary sub-construct mind is made up of the cognitive, conative, and affective secondary sub-constructs (Huitt 2001). Examples of the cognitive secondary sub-construct include thinking, knowing, understanding, problem solving, mental resources, and reasoning (Huitt 2006). Illustrative examples of the cognitive secondary sub-construct include volition, will, intention, reason, and persistence (Huitt 1999), whilst illustrative examples of the affective secondary sub-construct include attitude, emotion, predisposition, and feelings (Huitt 2003a, b).

Behavioral System refers to the “Overt action of organism (output of the individual)” (Huitt 2003a, b). The output of the behavioral system is action and displayed behavior. Behavioral system theory recognizes that there is a feedback loop between overt responses (or “behavior”) and resulting stimuli from the environment (Huitt 2003a, b).

Spirit is concerned with “How we approach the unknowns of life, how we define and relate to the sacred” (Huitt 2003a, b). One’s view of spirituality has an important influence on one’s values and self-concept (Huitt 2000). In this regards, also consider the role of culture in BPM as discussed in one of the subsequent chapters of this section (Schmiedel et al. 2014; vom Brocke et al. 2014).

An understanding of the various aspects of BPM such as the business, business processes, industry, company, governance, technology, and external factors, such as political, economic, socio-cultural environment, and technical environment, in relation to the organization and people within it is essential to expertise in BPM. Thinking and problem-solving abilities are also required to deal with BPM challenges such as process design and implementation, or an appropriate governance approach and strategy for regulatory and compliance requirements such as
SOX, IFRS, and GAAP. Ability and mental resources for problem solving are essential in the BPM, given the inherent problem-solving involved in many BPM activities. Sufficient cognitive complexity to handle problems and issues in the BPM domain is also necessary because of the complex and dynamic nature of the domain. Examples are changes to business processes to accommodate internal management reporting, overlaid with technical system, funding, and time constraints; changes to governance requirements can be complex, requiring implementation in a specific and often short timeframe. In BPM, there are often significant changes occurring in parallel in multiple areas, for example, changes to strategy in different functions (invoice to cash, record to report, or procure to pay) which are not always congruent; at the same time, complex governance changes may need to be addressed and therefore have to be understood in relation to the respective strategies and associated technology and processes. Persistence, a further behavioral characteristic, with problem-solving can be difficult in BPM because of ongoing complexity. BPM can require diplomacy because of the “dual” role between IT and the business, hence the need for professionalism. The ability to reason is also essential as many issues in BPM are not straight forward, requiring strong reasoning ability, particularly where conflicts in strategy, technical approach, funding, or timing occur.

Affective elements of behavior are also very important (emotion, attitude, disposition) because of the need to interface with many people in many different business areas, internally and externally, often with varying levels of knowledge and understanding, conflicting views, and priorities in the BPM field. Learning facilitates self-regulation, and is an important aspect of being “expert.” It is crucial in BPM, even at non-expert levels because of the constant change and new challenges and problems to be addressed, particularly in technology areas, and is therefore reflected in expertise in BPM. Spirit is concerned with how unknowns of life are approached, and is important in expertise in BPM as people working in BPM are constantly faced with unknowns and new situations; spirit relates to how these situations are approached. A person’s view of spirituality has an important effect on his/her values and self-concept, which in turn affects how the person aligns with the BPM values of process and action orientation.

2.1.4 Context Construct

Context, is derived from the Latin term “contextere” meaning “weave together” (Brown 1993, p. 493; Encarta.msn.com 2008a) and refers to “ambient conditions; a set of circumstances” (Brown 1993, p. 493), and is concerned with the surrounding facts, situation, and structure (Merriam Webster 2008a) as determining behavior. It is defined in this study as “the circumstances or events that form the environment within which something exists or takes place” (Encarta.msn.com 2008a) including interrelated conditions (Merriam Webster 2008b), and is identified as an important aspect of expertise due to the context dependency of expertise (Bereiter and Scardamalia 1993; Chi 2007; Mieg 2007; Ward et al. 2007), along with other
elements of expertise such as knowledge, behavioral characteristics, decision-making, knowledge flows, and the living system. These interrelated conditions, facts, and circumstances in which the expertise exists have a direct influence on the nature of the expertise. Hence explaining the context of the expertise (i.e., BPM) is crucial to the characterization of expertise in BPM, as it is the circumstance and condition, (i.e., context), of the expertise being characterized.

Contextualism is also a necessary consideration in the development of the model due to the context-dependent nature of expertise; expertise is domain specific (Feltovich et al. 1997; LaFrance 1997; Sonnentag et al. 2007) and the influence of the BPM context. Context is concerned with the relationship between the entity, subject to the context, and the context itself. In the BPM expertise model, this “entity” is referred to, and represented by the living system construct, which resides in the BPM context. In order to understand the relationship between the living system and the context, it is first necessary to outline the context. For this purpose, the BPM context is described from two perspectives. The context construct is made up of two primary sub-constructs, the context of the organization and the context of the person, each of which is further divided into two secondary sub-constructs; the internal context of the organization (I-ORG-IC), the external context of the organization (I-ORG-EC), the internal context of the person (I-PER-IC), and the external context of the person (I-PER-EC).

The internal context of the living system describes the internal conditions, circumstances, and factors affecting the living system. In general, these factors are considered to be at least partially controllable by the living system itself as they are within the boundary of the living system, that is, the boundary of the organization (I-ORG) and the boundary of the person (I-PER). Different internal context factors are applicable to the Individual – Organization (I-ORG) and Individual – Person (I-PER), which describe the domain specific aspects of BPM for the organization and person respectively. Examples of factors affecting the internal context of the organization are strategic alignment, governance, technology, process methods, people, and culture (Rosemann et al. 2007). Examples of factors affecting the internal context of the person deployed in BPM include his/her consciousness, neurosensory system, mind, body, and emotion (Parikh 1999).

The external context describes the external factors affecting the living system. These factors are considered to be largely beyond the control of the living system, and are outside of the living system boundary. As with the internal context, different external context factors are applicable to the Individual – Organization (I-ORG) and Individual – Person (I-PER). Examples of factors affecting the external context of the organization include the task, industry, and macro environments (Morrison 1992) such as political factors, changes to the economy such as interest, taxation, and inflation rates, all of which affect BPM strategy. The external context of the person is affected by the external factors in which he is immersed, such as, the BPM organizational environment, societal, managerial, such as how the persons role is structured and position within the BPM organization, personal, and existential (Parikh 1999) factors.
2.1.5 Decision-Making Construct

Decision-Making is a core construct of the model characterizing expertise in BPM, and is based on naturalistic decision-making (NDM) theory. Decisions are inherent in BPM, for example, strategic, operational and business decisions, and process event and rules decisions, (Goldberg 2008; Taylor and Raden 2008; Goldberg 2009; Greene 2009; Stucky 2009; von Halle 2011). Decision-making is acknowledged as linked to problem-solving, situation awareness and the establishment and maintenance of expertise overall (Salas and Klein 2001). Decision-making is therefore a primary element and inherent part of expertise in BPM, where problem-solving and situation awareness are ongoing activities (Yielder 2001, 2009). The decision-making construct recognizes the complex and volatile nature of decision-making in the real-world BPM domain involving several elements. These elements, include situational awareness and mental model building, which are also recognized as key aspects of expertise (Bereiter and Scardamalia 1993, Endsley 2007; Yates and Tschirhart 2007; Ross and Shafer et al. 2007). A key feature of naturalistic decision-making (NDM) is the contribution to understanding how people handle complex tasks and environments, considering the decision-making phenomena “in the context of the situations where they are found” (Salas and Klein 2001, p. 3).

Given its appreciation and focus on complex environments, NDM is highly appropriate to the BPM domain, which is recognized as being particularly complex and dynamic. Decisions in BPM are rarely ‘one-shot’ with many decisions, requiring iterative discussion and consensus-driven agreement particularly where large investments are required, and in large organizations where multiple stakeholders are involved (Goldberg 2008; Krohn 2011). Time stress is also prevalent in BPM with many decisions executed under time pressure and with direct consequences for the decision-maker (Hill 2007; Owen 2007; Turturici 2010).

The decision-making construct of the a-priori model is made up of four primary sub-constructs. These are situation awareness, decision, action and the feedback loop.

Situation Awareness describes the BPM practitioner’s (decision-maker) situation awareness, and is further categorised into three ‘levels’ as illustrative secondary sub-constructs. Illustrative examples of the situation awareness primary sub-construct are level 1: perception of the elements in a situation, level 2: comprehension of the current situation, and level 3: projection of the future state i.e. mental model building. Decision describes the decision itself in the BPM decision-making process. Decisions are based on inputs received from the BPM decision-maker’s situation awareness. Several types of BPM decision are recognized and represented in the model as illustrative Secondary Sub-constructs of decision-making. Illustrative examples of decision include choices, acceptances and rejections, evaluations and constructions. Action refers to action undertaken in the decision-making process resulting from decision(s) made by the BPM practitioner (decision-maker). Feedback Loop describes the feedback loop in the BPM.
decision-making process, taking its input from the prior action(s) executed resulting from the BPM decision-makers decision(s), providing input resulting from those actions back into the BPM decision-maker’s situation awareness. Learning is an illustrative example of the feedback loop.

2.1.6 Knowledge Flows

Through knowledge, we relate to ourselves and to our context. There is no “self” existing separate from our knowledge. “Past experience has made you what you are, and knowledge is an aspect of who you are.” (Bereiter and Scardamalia 1993, pp. 45–46). In recognizing expertise as a process, there is recognition of transactional activity and movement involved. Knowledge flows are applicable to both the person (I-PER) and organization (I-ORG). As a person draws on his/her sensing and perception of his/her environment plus his/her memory to draw knowledge and bring it to the person’s decision making process, so does an organization through the collective sensing and memory of its constituent people (see Fig. 3).

In BPM, sensing helps the living system, whether an organization or person, to acquire, create, and improve knowledge in relevant areas such as process management and governance, and coordinates the person or organization (living system) with their internal and external environment. For example, sensing aids the coordination of the organization and its external economic factors such as exchange rate fluctuations or changes in industry direction. Both the individual person and organization have memory, comprising shared beliefs and norms affecting the BPM culture, memory of procedures such as BPM methods and processes, plus routines, scripts, and artifacts.

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Fig. 3 Overview of relationship of model constructs and knowledge flows of sensing and memory in a living system (I)
2.2 Emergent Property of Expertise in the Context of BPM

The term ‘emergent property’ has been established for the model characterizing expertise in the context of BPM, to describe the emergent property of the complete system of expertise in the illustrative context of BPM. The emergent property of a system is a recognized concept in systems theory. Expertise in the context of BPM is considered to be a system in this study, with an emergent property (EP). Key aspects of the EP identified in literature are the Dynamic Nature of the Constructs and Construct Interactions, Flow, Levels of Expertise in BPM, and Learning. These apply to both the Person (I-PER) and Organization (I-ORG) recognizing the multilevel nature of the model and unit of analysis. The key aspects of the EP identified initially were (1) dynamic nature of the model constructs and construct interactions, (2) levels of expertise, (3) flow, and (4) learning. These components are in constant motion, resulting in a continually changed state of expertise in BPM. Through the study confirmatory phase several further aspects of the EP were identified resulting in respecification of the emergent property of the model.

2.2.1 Dynamic Nature of the Model Constructs and Construct Interactions

The recognition of the dynamic nature of the constructs of the model characterizing expertise in the context of BPM is important, due to the inherently dynamic nature of expertise itself (Bereiter and Scardamalia 1993; Gasson 2005). The dynamic nature of each construct and its reciprocal interaction with the other constructs are also acknowledged. This study does not aim to complete an exhaustive study of the interactions between every combination of constructs; however, it does provide an overview of the dynamic nature of the constructs and their interactions identified in expertise in BPM. Each model construct identified (Living System, Knowledge, Behavioral Characteristics, Context, Knowledge Flows and Decision-Making) is constantly changing. They are continually in motion and are not at any point completely static. In the case of the Living System, each sub-construct is in motion, whether a person (I-PER) or an organization (I-ORG). For example, where a person’s BPM experience is constantly changing and evolving, their nervous system and cognition also evolves. Likewise, the organizations identity constantly changes as the organization’s perception of its environment changes. The organization’s overall knowledge changes as the knowledge of each constituent person changes. The model constructs interact with each other continually, compounding the change occurring in expertise in BPM. This is demonstrated in the model through examination of the illustrative secondary sub-constructs, where areas of relatedness are apparent. For example knowledge, is a construct itself, also appearing as an illustrative secondary sub-construct of the Living System person.
primary sub-construct. Procedural learning and pattern learning are examples of the illustrative secondary sub-construct of Knowledge, Procedural Knowledge. The illustrative secondary sub-construct of Knowledge, Self-Regulatory Knowledge is closely linked to the Behavioral Characteristics secondary sub-construct of ‘feedback loop’, which involves feedback of behavior to the regulatory system reflected in the Behavioral Characteristics construct and facilitates learning. The Behavioral Characteristics construct is closely aligned to the Context illustrative secondary sub-construct internal context (I-PER-IC), with all three primary sub-constructs having direct alignment to the internal context of the person. At a higher level of abstraction, the Living System construct is related to its context, by knowledge (Cianciolo and Matthew et al. 2007) which is demonstrated in the a-priori model by the Knowledge construct. The constructs continually interact with each other generating mutual reciprocal change, resulting in a change in the state of Expertise in BPM.

2.2.2 Levels of Expertise

The concept of ‘levels of expertise’ is concerned with the proficiency of expertise (Dreyfus 1997, 2006; Chi 2007). Knowledge penetrates all aspects of expert functioning, and is not just a mental library that the expert consults. The level of proficiency of expertise is considered to change over time as the overall degree of expertise increases, usually through increased practice and experience. However, the level of expertise can also decrease as knowledge in a domain moves, or the domain itself fundamentally changes; expertise has to constantly adapt and change. The concept of ‘levels of expertise’ is relative; expertise is not an absolute state. Nor is it a fixed or irreversible state. Expertise in BPM is complex with many variable components, each one of which is constantly changing. Therefore the overall level of expertise in BPM of the BPM practitioner and organization changes continually. As a result, over time, a person’s level of expertise in BPM may change. For example, their explicit knowledge becomes outdated. This potentially affects all aspects of the BPM domain, particularly contextual areas such as technology which changes relatively rapidly. In expertise in BPM the overall level of expertise is multi-dimensional, with each model constructs varying. Likewise, the congruency of the interaction of the constructs varies, also affecting the overall level of expertise in BPM. Whilst experts in the BPM domain may be considered the ‘best’ at a particular point in time, this status of ‘best’ may be short term, unless the expert constantly changes and evolves. Experts are considered to spend a proportionately high amount of time performing qualitative analysis; in the BPM domain time is often limited for analysis and decision-making due to the nature of the BPM environment, thus the qualitative analysis aspect of expertise may not be particularly prevalent in expertise in BPM.
2.2.3 Flow

Flow is an important concept in expertise in BPM concerning the overall state of the person (I-PER), and in turn the BPM Organization (I-ORG) composed of people. The ‘flow’ concept is “a metaphorical description of the rare mental state associated with feelings of optimal satisfaction and fulfillment” (The American Academy of Political and Social Science 2005). Flow is an “ecstatic state” (Farmer 1999) experienced by those who have attained a level of expertise (Hakkarainen and Palonen et al. 2004), (Bereiter and Scardamalia 1993). The key implication of ‘flow’ for expertise in BPM is the recognition that people need to be in an optimal emotional state to experience flow. If people are struggling with anxiety, boredom, worry or apathy in their work, they are unlikely to achieve a state of flow, not reaching their full potential output for the organization creatively or practically. This doesn’t mean that if the BPM practitioner is not in a state of ‘flow’, that they will not produce meaningful output, it means that output is not likely to be the best possible that the practitioner could produce. The correct and optimal placing of employees in BPM roles is important for both the employees and the organization, requiring an appropriate employee recruitment and placement program. Human resource development (HRD) and human capital management (HCM) are therefore important potential use of the model. Succession planning of BPM roles is also important to ensure people with the appropriate expertise in BPM attributes are developed and placed correctly to meet foreseen organizational needs. The recognition of people with a natural tendency towards a ‘flow’ state in the BPM domain can point to appropriate placements and succession planning paths. Flow, whilst an abstract and qualitative concept, is important and potentially valuable as it helps point to psychological attributes the person needs to exhibit working in the BPM domain, if they are to be or attain what would be described as an expert level of expertise in BPM.

2.2.4 Learning

Learning refers to “the cognitive process of acquiring skill or knowledge” (Princeton University 2008d); “(1) the process of acquiring knowledge, attitudes, or skills from study, instruction, or experience. (2) the knowledge, attitudes, or skills acquired” (Australian Government; Department of Education 2008), and can be defined as “a change in the state of knowledge” (Maula 2006, p. 14) of either a person or an organization. It is based on the codification and diffusion of knowledge about objective reality, and is dependent on the continuous creation of conflicts between old and new knowledge (Maula 2006). Learning is an important concept in expertise (Bereiter and Scardamalia 1993; Hakkarainen and Palonen et al. 2004) in any domain. The emphasis in expertise in BPM is on knowledge and a change of state of that knowledge. As the knowledge construct interacts with the other model constructs, change is considered to occur in each of the other constructs resulting in a change in the overall state of expertise in BPM.
Management and innovation literature considers learning to be an attempt to retain and improve competitiveness, productivity, and innovativeness. Overall learning for organizations is an integrative concept unifying various organizational levels of analysis: individual, group, and corporate (Maula 2006). “Learning is a dynamic concept that emphasizes the continually changing nature of organizations” (Maula 2006, p. 13). For both the person and the organization, learning can be regarded as a cyclic action starting from experience, and continuing through reflective observation, abstract conceptualization, and experimentation. However, the learning process itself is different at the individual person and organization levels (Maula 2006), as an organization is made up of several individual people each person undergoing his/her own learning process.

Each of the model constructs identified (living system, knowledge, behavioral characteristics, context, decision-making and knowledge flows) are constantly changing; they are in motion to some degree and are not at any point completely static. The constructs also all interact with each other continually, thus compounding the overall degree of change in expertise in BPM occurring.

2.2.5 Respecification of the Emergent Property

The additional aspects of the emergent property identified during the study confirmatory phase are Authority and Empowerment, Business Partnering and Relationship Management, Change, Experience, Creativity and Innovation, Ownership and Accountability, Self-Regulation and Timing.

Authority is recognised in literature as an important aspect of expertise (Brewer 2006; Collins and Evans 2006; Goldman 2006), whilst empowerment is recognized as an important element for BPM practitioners (Miers 2010; Harrison-Broninski 2011). Authority and empowerment was identified as a crucial aspect of Expertise in BPM. That is, those individuals with expertise in BPM must have the appropriate level(s) of authority and empowerment to exercise their expertise in the BPM environment to be effective. Relationship management is recognized as an important aspect of professional expertise (Yielder 2001, 2009) and essential in BPM (Behara and Mahajani et al. 2010; Sharp 2010; Tregear 2014, Vincenti 2010). Business partnering creates a rationale form of “mechanic solidarity” (Durkheim 1997), taking a new approach to achieving business objectives, potentially increasing competitive advantage (Porter 1985) through cooperation. Business partnering has gained momentum in global businesses as “a medium for achieving significant revenue growth” (Doz and Hamel 1998). Partnering in BPM requires all BPM partners to transform their businesses in terms of relationships, behaviors, processes, communications and leadership; no participant can succeed without the other. Experience is recognized in literature as a critical as a critical component of expertise in any domain (Seifert and Patalano et al. 1997; Sonnentag 2000; Ericsson 2007), and notably in professional expertise (Yielder 2001; Hakkarainen and Palonen et al. 2004; Butterworth 2007; Kellog 2007; Yielder 2009) as found in BPM Creativity is recognized in literature as a personal characteristic and as
essential to expertise. Experience was addressed as part of the ontological foundation of the study. Innovation is recognized as essential to BPM (Howard 2009; Miers 2010), and enables creativity in BPM (Tregear 2014; Harrison-Broninski 2011). Creativity and innovation in BPM are driven by BPM social networks (Fingar 2010). Ownership refers to “the state or fact of being an owner” (Princeton University 2010b) inferring the owner ‘has’ and ‘controls’ that which they own. Accountability refers to “responsibility to someone or for some activity” (Princeton University 2010a, b) and is an important aspect of governance as well as professional expertise (Yielder 2001, 2004, 2009). Ownership and accountability also addresses all ownership influences on expertise in BPM such as process ownership and accountability as identified in the Context construct of the model. The context of expertise in BPM directly affects that expertise, therefore all constructs and sub-constructs of the Context construct contain elements which require proactive ownership. Time is an aspect of the overarching theory of the model, systems theory, and an underpinning theoretical concept of the Emergent Property. Time is also recognized as an important aspect of professional expertise (Yielder 2001, 2009), particularly in the BPM field (Webb 2011).

3 Model Applicability

The primary proposed applications of the model of expertise in the context of BPM are professional education and development, human capital and talent management, business integration, and leadership and business decision making. In the field of professional education and development, the model can assist with developing an alternative understanding of learning in BPM, and as a comprehensive framework to aid the development of BPM curricula to specific scenarios ensuring all aspects of expertise in BPM are considered and addressed appropriately. It can assist to understand what knowledge is required in certain BPM scenarios; by applying the detailed description of the knowledge construct (as per the BPM model presented). This provides both a high-level manageable view and a detailed, granular view of the actual knowledge required. As a comprehensive framework the model can provide a base to consider the skill sets required for BPM professionals in different scenarios and roles. The model can also be used to develop a greater understanding of what people do in their roles through explicit characterization of the BPM expertise involved and required, and will need to be developed ongoing. The approach to professional development in BPM must be continuous and integrated ongoing, opposed to ad hoc isolated training events. Expertise in BPM is a form of human capital and therefore of real value to the organization. It is an asset and must be managed as such; this can be achieved significantly more effectively through detailed characterization and management of the BPM expertise components required. The characterization of expertise in BPM is also directly applicable to recruitment, employee placement, succession planning, and organizational restructuring where a deeper understanding of expertise in BPM is required to
manage these functions and processes effectively. Business integration, as in the case of mergers and acquisitions, involves the coming together of two or more organizations, and the combination of the BPM expertise of those organizations. In order to manage the transitional process, a deep understanding of the expertise in BPM of the organizations pre- and post-integration is required, to develop transitional strategies and roadmaps. Business integration can occur internally too with the same detailed understanding of BPM expertise required, for example where companies are globalizing and merging organizations internally. Business integration, whether internal, or external through mergers and acquisitions, has horizontal as well as vertical structural implications, as the boundaries of operational, tactical, and strategic management layers are shifted in the formation of the end state BPM organization.

4 Summary

No known or published work has been done to establish the attributes characterizing expertise in the context of Business Process Management. This study’s aim is to understand how the attributes of expertise in the context of BPM are described and defined, and to show in principle, how such details can be applied in practice for better BPM skills development, deployment, and overall BPM project success.

This chapter presents an a-priori model of expertise in the context of BPM, which is the first attempt to characterize the concept of expertise in the context of BPM. This a-priori model consists of six primary elements, namely living system, knowledge, behavioral characteristics, context, and decision-making, plus an overall emergent property (EP). The model is a first step toward defining and understanding expertise in a BPM context at both organizational and individual levels. In doing so several the improvements of several BPM areas is facilitated. In particular, improved BPM education and ongoing development, enhanced human capital and talent management in BPM, more effective business integration such as acquisitions and mergers, and improved BPM leadership and decision making.

The presented a-priori model is not without its limitations. The study domain is essentially new, and primarily theory based. Research in expertise in BPM is particularly immature; hence, there is not much to build on, but to borrow from analogous domains. This does not mean the study has no theoretical foundation; to the contrary it has a large theoretical foundation and has used a range of established frameworks, to derive and support the presented model. This study aims to characterize expertise in BPM and validate that characterization, drawing heavily on referent domains to establish the initial set of candidate attributes and the dynamics and interrelationships thereof. The primary data collection, analysis, and synthesis were conducted by a single researcher, which can be prone to researcher bias. One of the potential limitations is the researcher’s search for all possible pieces of literature related to the research focus. This can easily be influenced by the researchers’ prior preconception and background. The range and volume of
available literature available are vast and constantly changing. A review of literature of this nature can only be deemed complete, at a given point in time.

A number of further research tasks has already been planned to address these limitations and to extend the current research results. As explained earlier, this chapter is the preliminary results of the first phase, among a study design of three phases. This literature based a-priori model will be extended with further theories and concepts that capture the multilayered, dynamic nature of expertise in the context of BPM. The second phase of the study will validate the model with empirical evidence from case organizations, further re-specifying the model. In the final phase, detailed guidelines will be derived on how to apply the demystified concept of BPM expertise for the progress of BPM projects and tasks in organizations.

Practitioners can apply the study results across many contexts: professional education and development in BPM, human capital and talent management in BPM (and also for human resource strategy change), business discipline and governance development and deployment, and business integration, to name a few. Academia can apply this a-priori model for future research related to expertise in BPM and expertise in general. The overall study outcomes can help derive a detailed research agenda for future research on expertise in BPM which can assist in addressing some of the current gaps in the discipline. Further operationalizing the model of expertise in BPM; testing the relationships between the different constructs in the model and how they interact; testing the causality with other constructs and expertise in BPM [as an independent variable (i.e., the relationship with BPM success) and a dependent variable (i.e., the relationship with constructs like effective training, employee motivation, and self-regulation)]; and deriving means of achieving expertise in BPM are some examples of further research that can occur using the results of this study.

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Abstract  As organizations continue to focus on improving and managing business processes, the ability to acquire and cultivate the appropriate skilled workforce has remained a challenge. While Business Process Management (BPM) was once defined in terms of tools and technologies, it has emerged as a discipline encompassing a broad spectrum of organizational practices. As a result, the skill-sets for BPM endeavors of today’s organizations have gone beyond the automation of processes to encompass a wide variety of strategic, technical, and people skills that are difficult to find in today’s professionals. Many organizations have assigned the process transformation leadership to existing business analysts who find that they require additional training and education. This chapter reviews the role of a business analyst within the context of BPM practice and suggests a curriculum designed to cultivate skills for the emerging business process (BP) analyst.

1 Introduction

Business Process Management (BPM) practices continue to gain attention and adoption by organizations worldwide (Palmberg 2010; Wolf and Harmon 2010). The focus on well-defined processes across entire value chains marks the beginning of organizational success. However, the key to sustaining that success lies in the ability to create value through effectively managing, orchestrating, communicating, and transforming business processes across the organization. These efforts require a plethora of skills and abilities (see Müller et al. 2014) that many organizations find difficult to fill and cultivate (Antonucci 2006; Hadfield 2007; Hill et al. 2006; McCoy et al. 2010). Current needs and predictions for process-related skills and capabilities continues to intensify (McCoy et al. 2010). In fact recent surveys...
indicate that the lack of BPM training and professional development has a correlation to the inability of organizations to successfully accomplish enterprise objectives (McCoy et al. 2010). The broad BPM skill requirements needed for successful BPM deployment remains the barrier in this correlation (McCoy et al. 2010). This continues to give rise to interest in and need for a BPM curriculum that addresses the cultivation of the business process (BP) professional.

In response to the shortage of BPM training and education, offerings of BPM certifications from professional organizations, such as ABPMP, BPTrends, The BPM Council, OMG, AIIM and BPMInstitute, along with several companies, such as SAP AG, have continued to emerge (aiim.org; sap.bpx.com; abpmp.org; bptrends.org; bpmcouncil.org; omg.org). In the year 2008, ABPMP introduced a general model curriculum for BPM professionals representing the first attempt to define comprehensive education requirements for the BPM practice (ABPMP Education 2008) with an update in 2009 (ABPMP 2009). As the BP discipline continues to change, the need for effective BP professionals has intensified. Consequently, in an effort to respond to industry interests and needs, an increase in BPM corporate training, certificates and university education programs continue to emerge with variations of business and information technology (IT) focus and coverage (Bandara et al. 2010; Recker 2012; vom Brocke 2011). A majority of the current BPM training and education offerings are now available in several modes such as online, on-site or are deployed using a blend of online methods with prearranged “face-to-face” meetings either on-site or via online meetings.

While BPM was once defined in terms of tools and technologies, it now is widely accepted as a discipline encompassing a broad spectrum of holistic end-to-end organizational practices (Hill et al. 2006; Niehaves et al. 2012; vom Brocke and Sinnl 2011). The current practices of BPM have broadened in scope from the business process reengineering (BPR) initial goals of achieving performance breakthroughs through eliminating non-value added operational process steps (Khalil 1997) to a more complex continuous optimization of end-to-end business processes involving the integration of both IT and business practices (Hill et al. 2006; vom Brocke and Sinnl 2011). BPM success now requires the roles of traditional IT to be more business and process focused and for business roles to be more technology savvy (McDonald 2007). This extends to BPM curriculum where narrow focused course offerings on specific areas such as IT architectures or automation of business processes, do not represent the holistic view of planning for, leading and managing end-to-end business processes that require attention to specific organizational capabilities such as culture, governance, change management issues, process, measurement and technology (Hammer 2007; Rosemann and deBruin 2005; Vaanholt 2008). Therefore BPM curriculum and training needs to include broad BPM knowledge and business expertise combined with IT skills (Antonucci and Goeke 2011; Seethamraju 2012; vom Brocke 2011).

In recent years there has been increased pressure for business professionals to produce faster and more informed business decisions, resulting in the need to extend BPM activities to include increased intelligence and analytics (McCoy et al. 2010). Furthermore we are seeing the convergence of technologies such as
cloud, mobile, big data, and social media (Howard et al. 2012) which has also impacted BPM practices such as the emergence of social BPM and cloud-enabled BPM Platforms (McCoy et al. 2010). Just as BPM practices continue to evolve it is important for BPM curriculum to adjust in order to meet the skill demands of the changing BPM environment.

A few years ago a global effort to define BPM certification requirements based on current practices of BPM emerged with joint efforts and partnerships between industry professional groups and universities. Several of these efforts have resulted in the deployment of a common BPM training (BPTrends.org, butrain.com, BPMInstitute.org, OMG.org), providing some direction toward BPM certification and education. The academic community has recently recognized BPM as important for inclusion in both business and IS curricula as noted by the AACSB, an accrediting body for business schools (AACSB.edu) and by education arms of AIS (Association for Information Systems) and ACM (Association for Computing Machinery) in their joint curriculum guidelines for IS curriculum (Topi et al. 2010). While there has been an increase in BPM topics within university curricula (Recker 2012), the deployment of these topics have been largely integrated within a limited number of courses, with others merely adding process topics to existing information systems courses or attempting to cover many BPM topics in one course, thereby not addressing the holistic discipline of BPM. Very few universities offer a comprehensive curriculum coverage of holistic BPM practices from both the business and IT perspectives that embody the wide variety of strategic, technical, and people skills required for BPM success (Fingar 2006; Bandara et al. 2014; Seethamraju 2012; vom Brocke 2011). The BPM academic community has recognized a deficiency in unified and comprehensive BPM offerings and therefore have organized initiatives to further clarify and share BPM academic knowledge and offerings. As such recent collaboration initiatives among various educators have emerged such as the BPM Academic Initiative (http://www.signavio.com/en/academic.html) and the Process Knowledge Initiative (http://www.processknowledge.org) (Recker 2012).

As organizations continue to focus on improving and managing business processes, the ability to acquire and cultivate the appropriate skilled workforce has remained a challenge. Consequently, several organizations have assigned the process transformation leadership to existing business analysts expecting that these analysts would have the required BPM knowledge¹ (Bandara et al. 2007). Recent findings indicate that business analyst competencies form a foundation for BPM deployments (Sonteya and Seymour 2012), however there is evidence that the responsibilities of a business analyst in the context of BPM differ, requiring additional training and education (Mathiesen et al. 2011). While this chapter’s focus is upon the business process analyst skills and curriculum, it is important for the BPA to understand the end-to-end skills and responsibilities needed for

¹ Kokkonen and Bandara (2014) delve into this topic by exploring what it takes to develop BPM expertise.
successful organization wide BPM in order to effectively facilitate between business and IT (Sonteya and Seymour 2012). If we define BPM as a discipline focusing on end-to-end business processes, we must also examine related holistic end-to-end skills otherwise we are perpetuating silo based thinking and operations. As such, an examination of end-to-end BPM skills and related positions will be discussed first followed by an overview of a related holistic curriculum. The role of a business analyst within the context of BPM practice is highlighted with a curriculum outline designed to cultivate skills for the emerging BP analyst. The objective for this curriculum is to provide a guideline for both individuals interested in furthering their BPM knowledge, and for program designers to develop a basic common body of knowledge for BPM. This curriculum is based on industry practices and skill needs of BPM professionals (Melenovsky and Hill 2006), the efforts of ABPMP (2008), and several current offerings of BPM curriculum by both industry (BPMInstitute.org; BPTrends.org) and universities (Bandara et al. 2014; bentley.edu; gsu.edu; bpm-education.org; howe.stevens.edu; QUT.edu.au; widener.edu; wu.ac.at). Individuals may use this to help them identify appropriate BPM training and education offerings. This will also benefit educational institutions and industry training programs by providing a standard for developing their own curriculum.

The required skill-set for BPM practice includes a wide variety of strategic, technical, and people skills that encompasses both business and IT knowledge. Before an organization can obtain or develop a skilled BP workforce, they must understand the required activities for BPM success, followed by the identification and alignment of appropriate roles and positions. The next section identifies the current tasks and roles associated with BPM practice highlighting tasks of BP analysts engaged in that practice. Using these identified tasks, a BPM curriculum is presented.

2 Understanding the Roles in Current Business Process Management Practice

There have been many attempts to categorize the tasks associated with BPM practices (Paim et al. 2008). Most of these studies are based on the activities and transformation practices required in BPM practice. Several recognized variations of BPM practice life-cycles exist with a majority including (1) process planning and strategy used to direct (2) analysis, design, and modeling of business processes, that drives the (3) configuration of business processes, leading to the implementation of processes and (4) process execution, creating processes instances that can then be (5) monitored and controlled, providing (6) feedback for process refinement and continued process performance analysis, leading to additional (7) analysis, design, modeling, and so forth as depicted in Fig. 1 (Scheer et al 2004; Vaanholt 2008; OMG 2008). In addition, studies have identified successful BPM practices that need to be supported by simultaneous management activities throughout the life-cycle
while maintaining balance and integration of process initiatives between business and IT (DeFee and Harmon 2004; Dreiling et al. 2005; Fisher 2004; Hammer 2007; Rummler and Brache 2004). Figure 1 illustrates some of these management activities such as establishing appropriate process responsibility, sponsorship, governance, and process measures. This broad integration of business and IT in successful BPM activities is further delineated by the integration of processes focused on what the organization does and how to efficiently and effectively accomplish them as illustrated in Fig. 2 (Antonucci and Goeke 2011). Appropriately defined BP positions are needed to correspond to these interacting practices and activities.

The most comprehensive effort at identifying BP positions and tasks has been led by practitioners. Melenovsky and Hill (2006) defined BP positions and their associated tasks for both business and IT. Based on the best industrial practices of four leading organizations, they defined four key BP positions: (1) BP director; (2) BP consultant; (3) BP architect; and (4) BP analyst. Each of these positions was further described and associated with primary tasks and titles (roles) (Melenovsky and Hill 2006). The validity of these role definitions and reported activities of each role are in question as the study only involved four organizations. A recent study was able to validate these tasks and positions, finding significant agreement from 111 BP professionals in addition to verifying that the reported activities were assigned to the appropriate positions (Antonucci and Goeke 2011). Furthermore it was found that although there was large agreement of the four BPM positions, there were some variations in agreement with the BP analyst responsibilities among middle managers yet executives and staff agreed with the BP analyst responsibilities (Antonucci and Goeke 2011). Other studies have also indicated differences in specific BP analyst responsibilities (Mathiesen et al. 2011; Sonteya and Seymour

Fig. 1 BPM practice life-cycle and threaded success factors

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2 Hammer (2014) provides a general discussion on what Business Process Management is about and what BPM activities should be generally considered. Burlton (2014) provides a methodological framework and demonstrates how these high-level activities should be broken down into more fine-grained BPM activities in order to successfully implement business strategies by means of BPM. To account for the governance aspects of BPM, Markus and Jacobson (2014) and Spanyi (2010, 2014) provide a general introduction into governance in BPM. vom Brocke et al. 2014 present 10 principles of good BPM.
2012) with a common finding that the BP analyst needs to have an understanding of both the what and how of BPM in order to communicate, lead and integrate between business and IT and between process levels in the organization.

While there still needs to be further studies to identify and verify the appropriate activities for BP positions, these roles and activities are used as a basis for the proposed curriculum.

According to Melenovsky and Hill (2006), the BP director, BP architect, and BP consultant are higher-level positions primarily supporting strategic activities, whereas the BP analyst has an operational focus relating closely to the daily support of BPM practices. Table 1 summarizes the position descriptions and activities of the BP director, BP architect, and BP consultant as noted by Melenovsky and Hill (2006). Table 2 summarizes the BP analyst position description and activities, listing the current titles in columns 1 and 2 as noted by Melenovsky and Hill (2006). Further analysis of the BP analyst position description and activities...
identified in process maturity studies (Hammer 2007) revealed skills and knowledge areas required for each activity as indicated in column 3 of Table 2.

These activities indicate that the BP analyst does in fact require a plethora of skills. These skills involve both management and IT knowledge as they relate to business processes with significant communication ability. Although the BP analyst role is more operational, this role is very central to the success of BPM in an organization. The BP analyst must possess the abilities to communicate, lead and champion the BPM efforts within the organization (Sonteya and Seymour 2012) and as such needs to understand and integrate with other BPM roles. The requirements in terms of communication skills are further examined by (Bergener et al. 2012). In total, the curriculum for the BP analyst needs to encompass a

<table>
<thead>
<tr>
<th>Process positions</th>
<th>Process activities</th>
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</table>
| **Business Process Director**: a senior level position who builds and sustains a process-managed organization | Gains consensus on new process concepts  
Builds coalitions to move process improvement forward  
Presents a vision to organization including benefits and challenges of being process driven  
Identifies the business performance and incentive metrics, ensures continuous sustained improvement across the organization  
Establishes process related policies, standards, governance and methodologies. Adopts a process culture |
| **Business Process Consultant**: a mid- or high-level position who helps process owners better understand opportunities for process improvement and business transformation | Builds a business case for process orientation and continuous process improvements  
Good at gaining consensus among diverse groups of process stakeholders, good at facilitating resolution across functional areas  
Responsible for change and project management  
Makes recommendations to process stakeholders regarding correct approach to achieve process improvement objectives  
Understands methodologies, such as lean and six Sigma |
| **Business Process Architect**: a mid-level or high-level position who helps develop principals and descriptions of high-level future states and guidelines for creating business processes | Supports senior leadership with process strategies  
Conducts research to keep abreast of process trends and makes recommendations when to adopt emerging process standards  
Part of enterprise planning  
Understands business strategy  
Ensures standardization on process definitions, notations and communications |
<table>
<thead>
<tr>
<th>Business process analyst</th>
<th>Knowledge area indicates need</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Position description</strong></td>
<td><strong>To understand business</strong></td>
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<tr>
<td></td>
<td><strong>To communicate to both business and IT-level personnel</strong></td>
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<td></td>
<td><strong>To model end-to-end processes</strong></td>
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<td></td>
<td><strong>To communicate end-to-end processes</strong></td>
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<td></td>
<td><strong>To analyze business processes</strong></td>
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<td></td>
<td><strong>To be able to assign appropriate measures to processes</strong></td>
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<td></td>
<td><strong>Ensures that changes to process environment are carried out;</strong></td>
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<td></td>
<td><strong>To work with IT to ensure that technology infrastructure is aligned for process changes [technical knowledge]</strong></td>
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<td></td>
<td><strong>To communicate with business and IT areas of organization the process changes and reasons for the change [relationship management, communication]</strong></td>
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<td></td>
<td><strong>To help business process participants understand and accept changes</strong></td>
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<td></td>
<td><strong>To understand how to deploy effective change management and change implementation methods</strong></td>
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<tr>
<td><strong>Reports to process owner and IT development department</strong></td>
<td><strong>For communication skills</strong></td>
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<td></td>
<td><strong>For IT knowledge</strong></td>
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<td></td>
<td><strong>To understand business relationships</strong></td>
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<td></td>
<td><strong>To understand the integration of IT and business</strong></td>
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<tr>
<td><strong>Activities</strong></td>
<td><strong>To understand process modeling techniques</strong></td>
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<td></td>
<td><strong>To have ability to document end-to-end processes</strong></td>
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<tr>
<td></td>
<td><strong>Document business processes through modeling</strong></td>
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<tr>
<td>Role</td>
<td>Responsibilities</td>
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<td>---------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
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<tr>
<td>Demonstrate to process owner the opportunities for best in class</td>
<td>To understand end-to-end process integration</td>
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<td>process orchestration and control</td>
<td>To identify potential improvements to business processes</td>
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<td></td>
<td>To identify and design process controls</td>
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<tr>
<td></td>
<td>For communication ability of process and technical knowledge to both technical</td>
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<tr>
<td></td>
<td>and nontechnical managers</td>
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<tr>
<td>Liaison or relationship manager between business community and</td>
<td>For collaboration and negotiation ability concerning the communication of</td>
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<tr>
<td>departments</td>
<td>business process potential and operations across the organization</td>
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<td></td>
<td>To be able to work in and with teams</td>
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<td>Perform continuous reviews to align process orchestration with</td>
<td>For understanding of end-to-end business processes</td>
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<td>changing business conditions</td>
<td>To monitor, control, and change business processes</td>
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<td></td>
<td>For ability to identify when processes need changing and propose improvements</td>
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<td>Maintain and share process knowledge</td>
<td>To understand how to maintain a process repository</td>
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<td></td>
<td>To understand how to communicate business processes across the organization</td>
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<td></td>
<td>To understand how to make business processes visible across the organization</td>
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<td></td>
<td>To cultivate and maintain a shared vision and understanding of business processes</td>
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<td></td>
<td>across the organization</td>
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<tr>
<td>Show process stakeholders how to identify and solve process</td>
<td>To understand how to measure and analyze business processes</td>
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<tr>
<td>challenges, analyze performance metrics</td>
<td>To identify key metrics of processes for performance analysis</td>
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<tr>
<td></td>
<td>To transform business processes using process performance techniques</td>
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</tbody>
</table>

(continued)
<table>
<thead>
<tr>
<th>Business process analyst</th>
<th>Knowledge area indicates need</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensure coordination between IT organization and process owners</td>
<td>To understand how to model and communicate various views of business processes to include both business and IT views</td>
</tr>
<tr>
<td>To understand the integration of IT and business within a business process</td>
<td></td>
</tr>
</tbody>
</table>

Current titles

- Business analyst
- Process and data manager
- Analyst
- Systems analyst
- Process engineer
- Process developer
- Process analyst
- Lead analyst
- Senior advisor
- Process designer
3 Business Process Analyst Curriculum Description

The following proposed curriculum is designed to cultivate the skills and activities required of BP analysts during BPM practice as depicted in Fig. 1. While the model BPM curriculum efforts of ABPMP (2008) provided an initial framework for this curriculum, research findings of BP analyst roles and positions along with several current offerings of BPM curriculum by both industry and universities were used to identify the resulting curriculum. It is recognized that the BP analyst is a central role to BPM needing an understanding of both the what and how of BPM as depicted in Fig. 2 in order to facilitate and integrate appropriately between business and IT and between process levels in the organization. The BP analyst does not operate in a silo, knowing how to collaborate with other BP positions is paramount for BPM success. Therefore the BP analyst needs an understanding of the skills and responsibilities of typical organizational roles related to BPM. As such the proposed curriculum includes a broad spectrum of courses that not only focus on BP analyst related activities but also on the overview of other BP position activities with the goal of providing the BP analyst with a holistic BPM education.

This curriculum provides assistance to organizations in developing an educated staff that understands the holistic nature of BPM for successful BP transformation. Individuals from both business and technical areas of the organization can use this curriculum to identify skills needed to strengthen their knowledge of BPM practices. Colleges and universities have a consistent challenge of remaining competitive in light of business practice changes; this curriculum serves as a framework to help develop comprehensive BPM programs.

Figure 3 represents a depiction of the general courses and a suggested sequence. The first course in the curriculum, BPM foundations (BP00), is recommended for all participants whether they are in an industry training program or college course. Regardless of the program scope, this first course should be a prerequisite for all other courses. The next level of courses represents the primary practices of the BPM life-cycle; this includes process planning, strategy, and governance (BP01); process analysis (BP03); process modeling (BP02); process design (BP04); process implementation (BP05); and process analytics, measurement, control, and compliance (BP06). BP01 is included as a core course due to its importance for BPM practice success. The recent emphasis on process analytics and process change management throughout the BPM life-cycle is the primary reason for a core course to include analytics as it relates to BPM (BP06) and additional course content to expand on implementation needs of change management methods (BP07). It is recommended that the BP analyst understands how to accomplish and manage the activities of this life-cycle. For this reason, these courses are recommended as core courses for the BPM curriculum. The third level of courses described in Fig. 3 represents advanced topics for both IT and management related to the deployment and management of BPM. These courses include business process systems and architectures (BP11);
process transformation and innovation (BP12); and sustaining the process-driven organization (BP13). While these three courses involve activities typically carried out by higher-level BP positions (as in BP12 and BP13) or more technical positions (as in BP11), it is recommended that the BP analysts further their knowledge in these areas. For this reason, these courses are recommended as electives. Similar to the ABPMP BPM model curriculum, the project or internship course (BP30) is recommended as a capstone course to allow the participants opportunity to apply their newly obtained knowledge of BPM practice. There are several other advanced courses that can be added to the list of electives such as the one depicted in Fig. 3, that is, process technologies and methods (BP21). These advanced courses can be a continuation of other courses listed such as advanced process modeling. The following section provides a detailed list of these courses, their descriptions, learning objectives, and suggested topics.

The integration of business and IT practices that are embedded into this proposed curriculum has merit for enhancing existing MBA or graduate programs. Several of these courses could be extracted to create a BPM track with the existing graduate degree program. Similarly an undergraduate program could adopt portions of this proposed curriculum to enhance their existing curriculum.

### 3.1 Course Descriptions

The course descriptions in this section are intended as a guide to be used by individuals tasked with developing BPM curriculum. The scope and emphasis of coverage will vary among organizations based on their strengths and desired focus.
Table 3  Suggested learning objectives and topics – business process management foundations: general overview and principles

<table>
<thead>
<tr>
<th>Learning objectives</th>
<th>Suggested topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand the principles of a process and various process types</td>
<td>Introduction and overview of BPM: understanding BPM topics, terms, and issues</td>
</tr>
<tr>
<td>Understand the basic concepts and issues of BPM</td>
<td>What is a process? Process versus function</td>
</tr>
<tr>
<td>Understand the criticality and centrality of BPs as a value driver</td>
<td>What is a BP?</td>
</tr>
<tr>
<td>Understand a distinction between process-oriented, process-centric, and process-driven organizations</td>
<td>What is BPM?</td>
</tr>
<tr>
<td>Understand the roles process management, strategy, change management, process analysis, process redesign, process improvement, process architectures, and BPM systems in BPM practices</td>
<td>What is the value of BPM to an organization? Benefits?</td>
</tr>
<tr>
<td>Understand BPM best practices and methodologies</td>
<td></td>
</tr>
<tr>
<td>Understand the principles of process management</td>
<td></td>
</tr>
<tr>
<td>Understand the BPM maturity factors and levels</td>
<td></td>
</tr>
<tr>
<td>Understand basic BPM management and measurement techniques</td>
<td></td>
</tr>
<tr>
<td>Understand the issues, risks, and success factors of BPM practices</td>
<td></td>
</tr>
<tr>
<td></td>
<td>What is a BPM system?</td>
</tr>
<tr>
<td></td>
<td>Who are the BPM players in the market?</td>
</tr>
<tr>
<td></td>
<td>What is meant by “a Process-Centric Organization”?</td>
</tr>
<tr>
<td></td>
<td>What is business process automation?</td>
</tr>
<tr>
<td></td>
<td>What are business rules?</td>
</tr>
<tr>
<td></td>
<td>What are the management issues and success factors involved with BPM?</td>
</tr>
<tr>
<td></td>
<td>Examination of process performance controls and metrics</td>
</tr>
<tr>
<td></td>
<td>Introduction to BPM practices and success factors</td>
</tr>
<tr>
<td></td>
<td>Where do you start? Understanding the BPM practice</td>
</tr>
<tr>
<td></td>
<td>Identifying end-to-end processes in an organization</td>
</tr>
<tr>
<td></td>
<td>Levels of BPM maturity and factors</td>
</tr>
<tr>
<td></td>
<td>What is a process audit and how is it used?</td>
</tr>
<tr>
<td></td>
<td>Principles of process management</td>
</tr>
<tr>
<td></td>
<td>What is involved in developing a BPM strategy – an overview</td>
</tr>
<tr>
<td></td>
<td>Identifying stakeholders and process owners</td>
</tr>
<tr>
<td></td>
<td>The role of a process governance system</td>
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<tr>
<td></td>
<td>The importance of change management in BPM – people issues</td>
</tr>
<tr>
<td></td>
<td>Process management and project management</td>
</tr>
<tr>
<td></td>
<td>Process implementation issues</td>
</tr>
<tr>
<td></td>
<td>Risk factors in BPM</td>
</tr>
<tr>
<td></td>
<td>Standards</td>
</tr>
</tbody>
</table>

(continued)
### Table 3 (continued)

<table>
<thead>
<tr>
<th>Learning objectives</th>
<th>Suggested topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing frameworks for BPM</td>
<td>Introduction to systems, architectures, tools, and trends</td>
</tr>
<tr>
<td>Implementation issues</td>
<td>Overview of organizational roles and responsibilities involved in BPM</td>
</tr>
</tbody>
</table>

### Table 4  Suggested learning objectives and topics – process planning, strategy, and governance

<table>
<thead>
<tr>
<th>Learning objectives</th>
<th>Suggested topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand the process-driven organization; strategy, leadership, management, and governance structure</td>
<td>Overview of BPM strategic issues</td>
</tr>
<tr>
<td>Identify how the strategy, structure, culture, governance system, human resource management system, and the IT need to be aligned</td>
<td>Understanding process management value</td>
</tr>
<tr>
<td>Understand how to align processes with corporate strategy</td>
<td>Understanding and developing a process-centric organization; formulating a process vision</td>
</tr>
<tr>
<td>Identify and understand the need for a BPM Governance Board to oversee the process transition</td>
<td>Business process strategy formulation</td>
</tr>
<tr>
<td>Understand the fundamental differences between managing functions and managing processes</td>
<td>Considerations of a process-based approach to BP change management</td>
</tr>
<tr>
<td>Develop the process vision</td>
<td>Strategic, tactical, and operational considerations in a BPM framework</td>
</tr>
<tr>
<td>Align business and IT goals</td>
<td>How to plan for cross-organization acceptance and implementation</td>
</tr>
<tr>
<td>Fundamentals of team building and leadership for process teams. Specific communication, coordination, and collaboration issues are addressed</td>
<td>Process management frameworks</td>
</tr>
<tr>
<td>Identify and deploy appropriate project management methods for managing process initiatives</td>
<td>Partnerships and business process outsourcing</td>
</tr>
<tr>
<td>Understand the organizational issues in BPM</td>
<td>The process-oriented organization</td>
</tr>
<tr>
<td>Understand the customer focused process</td>
<td>Process ownership and stewardship</td>
</tr>
<tr>
<td>Understand how to link corporate strategy to business processes</td>
<td>Process-oriented roles and responsibilities</td>
</tr>
<tr>
<td>Understand how to develop a business case for BPM deployment</td>
<td>Leadership and communication skills for the process manager</td>
</tr>
<tr>
<td>Strategic planning for process change</td>
<td>Strategic planning for process change</td>
</tr>
<tr>
<td>Understanding process improvement</td>
<td>Understanding process improvement</td>
</tr>
<tr>
<td>Six Sigma, scorecard, and other techniques</td>
<td>Six Sigma, scorecard, and other techniques</td>
</tr>
<tr>
<td>Understanding and planning for BPM Key Performance Indicator (KPIs) (knowing what and where to measure)</td>
<td>Understanding and planning for BPM Key Performance Indicator (KPIs) (knowing what and where to measure)</td>
</tr>
</tbody>
</table>
BP00 – Business Process Management Foundations: General Overview and Principles

This course is an introduction and overview of BPM. The concepts, fundamentals, methods, and strategies required for managing holistic end-to-end business processes are introduced.

This course provides a foundation for concepts, terminology, and issues related to the practice and sustainment of BPM, providing a common language for subsequent courses. Suggested learning objectives and topics for this course are detailed in Table 3. It is recommended for those who are new to BPM or have had little exposure to BPM practices in recent years.

BP01 – Process Planning, Strategy, and Governance

Organizations strive to create value for its customers through optimal performance of end-to-end business processes. These processes determine how the organization designs, makes, sells, delivers, and services its products and services. This course overviews strategies and methods of managing and governing business processes.

The topics in this course directly relate to the activities of the BP director, BP consultant, and BP architect positions as noted by Melenovsky and Hill (2006) as their primary activity is supporting strategic activities. However, the BP analyst should have the knowledge of the topics in this course in order to effectively design and deploy processes within the strategic framework of the organization.

Many organizations struggle with obtaining leadership buy-in to end-to-end BPM (Spanyi 2010). As a result, several organizations have approached Business process initiatives on a small scale, working ‘middle-out’ or applying BP analysis, modeling, and improvement efforts to one process or within one area of the organization. Success with these smaller initiatives can then be used to obtain attention of organizational leadership. In this type of ‘middle-out’ strategy of BPM deployment, the BP analyst role is extremely valuable in communicating the progress of these small-scale BPM initiatives to leadership and assisting their understanding of BPM value.

Making processes explicit, focused on end-to-end business processes with the approval of leadership and strategic direction is the key to successful BPM. The role of the BP analyst is central, one of integration and communication. Appropriate BPM education and training is needed to assist in the cultivation of leadership and communication skills needed in BPM positions (Goeke and Antonucci 2011). In this regard, Bergner et al. have suggested a course design for training communication skills in BPM education (Bergener et al. 2012). They present design principles on how to train agile communication skills in global virtual settings.

As the central role in BPM deployments, the BP analyst needs to collaborate with other BP roles and operationalize the strategic objectives. Suggested learning objectives and topics are included in Table 4.

3.1.1 Business Process Modeling, Analysis, and Design

The development of successful end-to-end business processes involves techniques of analyzing and designing processes supported by BP modeling methods. As such,
the following three courses can be combined into one or two courses depending on the focus of the desired program. If the courses are combined, it is recommended that an advanced process analysis, modeling, and design course be added to the curriculum to dive deeper into the techniques. The process analysis, design and modeling of business processes are key activities to the overall success of BPM in that the knowledge and understanding of organizational business processes helps advance business process initiatives throughout the organization from identifying process bottlenecks, implementing process improvements, assisting in process communication and training to evaluating strategic focus and assisting in transformation and innovation endeavors. Therefore the following courses are highly recommended for the BP analyst and their respective suggested learning objectives and topics can be found in Tables 5, 6, and 7.

**GP02 – Process Modeling**

Process modeling should occur at various stages of the BPM practice cycle and also at various levels of detail. This course introduces current BP modeling methods and techniques practiced today. Models for both the business and IT professional are presented and explained. There is an emphasis on graphical models to document existing and renewed processes. Several popular modeling techniques are explained and used including Business Process Modeling Notation (BPMN).

<table>
<thead>
<tr>
<th>Learning objectives</th>
<th>Suggested topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognize the importance and benefits of process modeling</td>
<td>What is BP modeling?</td>
</tr>
<tr>
<td>Understand how to develop a common language for describing business processes</td>
<td>What is a model? What are the benefits to modeling?</td>
</tr>
<tr>
<td>How to model business processes using BPMN notation for analyzing current processes and designing an improved process</td>
<td>What does it represent?</td>
</tr>
<tr>
<td>Understand other process modeling methods such as Swimlanes and Event Driven Process Chains (EPC)</td>
<td>Physical/logical/essential models</td>
</tr>
<tr>
<td>Understand how to model the Enterprise Business Architecture using methods of process decomposition and mapping to include several sub-process levels and various organizational views, including the business, process, technology, and data models</td>
<td>Process modeling techniques and methods</td>
</tr>
<tr>
<td><strong>BPMN</strong></td>
<td><strong>Swimlanes</strong></td>
</tr>
<tr>
<td><strong>EPC</strong></td>
<td>Developing a common language throughout the organization</td>
</tr>
<tr>
<td><strong>Types of process model views: business, IT, and data</strong></td>
<td>Levels of process models</td>
</tr>
<tr>
<td><strong>Process decomposition and process mapping</strong></td>
<td>Process modeling notations and techniques</td>
</tr>
</tbody>
</table>

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**Table 5** Suggested learning objectives and topics – process modeling

<table>
<thead>
<tr>
<th>Learning objectives</th>
<th>Suggested topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognize the importance and benefits of process modeling</td>
<td>What is BP modeling?</td>
</tr>
<tr>
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<td>What is a model? What are the benefits to modeling?</td>
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<tr>
<td>How to model business processes using BPMN notation for analyzing current processes and designing an improved process</td>
<td>What does it represent?</td>
</tr>
<tr>
<td>Understand other process modeling methods such as Swimlanes and Event Driven Process Chains (EPC)</td>
<td>Physical/logical/essential models</td>
</tr>
<tr>
<td>Understand how to model the Enterprise Business Architecture using methods of process decomposition and mapping to include several sub-process levels and various organizational views, including the business, process, technology, and data models</td>
<td>Process modeling techniques and methods</td>
</tr>
<tr>
<td><strong>BPMN</strong></td>
<td><strong>Swimlanes</strong></td>
</tr>
<tr>
<td><strong>EPC</strong></td>
<td>Developing a common language throughout the organization</td>
</tr>
<tr>
<td><strong>Types of process model views: business, IT, and data</strong></td>
<td>Levels of process models</td>
</tr>
<tr>
<td><strong>Process decomposition and process mapping</strong></td>
<td>Process modeling notations and techniques</td>
</tr>
</tbody>
</table>
This course is recommended for anyone desiring to model and/or document business processes and is a primary activity of the BP analyst.

**BP03 – Process Analysis**

This course is an introduction to the skills and techniques required to analyze current business processes and identify improvement potentials for effective and efficient processes. There is an emphasis on the process analysis techniques and tools required to improve process performance. This involves the documentation of the current process in order to identify opportunities for process change and utilize measurement techniques for evaluating outcomes. This course overviews various
process analysis methods for all levels of the organization. Appropriate process modeling techniques are explained and aligned with process analyses.

This course is recommended for those who want to learn how to analyze and discover organizational processes.

**BP04 – Process Design**

This course is an introduction to the skills and techniques required to design new processes or to redesign and improve existing processes. There is an emphasis on BP design techniques and methods required to improve performance. Modeling methods are used to scope and document the renewed process.

**BP05 – Process Implementation and Use**

BP implementation is the bridge between design and execution. This course is designed to help the participant understand the issues and procedures necessary to implement a renewed process design into a set of documented, tested, and operational sub-processes and workflows. Various enabling technologies for BPM are introduced along with the techniques for process automation. Management issues associated with process automation are examined such as change management.

While there are many challenges of implementing business processes, the challenge involving change management has received intense attention in recent years and as such should be emphasized in implementation topics (vom Brocke 2011). Therefore the topic of change management and leadership as it applies to BPM can be expanded into a separate course (Table 8).

**BP06 – Process Analytics: Measurement, Control, and Compliance**

The monitoring, controlling, and compliance of automated processes are critical to process improvement. In addition, the appropriate use and understanding of real-time analytics can significantly improve and dynamically manage business processes. This course explores performance monitoring and analyzes methods of
business processes in order to uncover potential problems, making continuous process improvement and regulatory compliance possible. The goals of adaptability and agility can only be attained if processes and products are measured, monitored, and analyzed. Various types and methods of analytics are emphasized.

There has been an increased need to extend BPM activities to include increased intelligence and analytics in order to assist in faster decisions for all levels of management (McCoy et al. 2010). The ability to develop and operationalize process metrics for the purposes of monitoring, controlling and predicting is emphasized in this course. An advanced course in process intelligence may be added as an elective to focus on specific methods related to process intelligence and process agility (Table 9).

BP11 – Business Process Systems and Architectures

Several BPM technologies, systems, and tools have emerged in the market in recent years. This course examines these various BPM technologies, information technologies, systems, tools, and architectures in supporting business processes.

The BP analyst will benefit from this course by gleaning the understanding and knowledge of technology infrastructures designed to not only implement end-to-end processes but also to align business strategy to IT within a process framework. Furthermore the recent advancement of Social BPM introduces an important addition to this course in terms of understanding the type of social media systems utilized and new implications of BPM deployment. Social BPM could be introduced as an additional elective course depending on the depth and breadth of topics desired (Table 10).

BP12 – Process Transformation and Innovation

The primary focus of the course is on the integration of BP-based knowledge and skills for creating a holistic understanding and application of process innovation strategy and methods for organizational process transformation. This course aims to equip students with the state-of-the-art theory and techniques in business process strategy and innovation in order to increase successful participation in transforming traditional business processes into innovative business processes and managing it.

This course is highly recommended for the BP analyst in order to further their understanding of the alignment between strategy and process improvement (Table 11).

BP13 – Sustaining the Process-Driven Organization

Once the organization has been able to achieve process transformation, the organization faces the challenge of sustaining the process-driven state. The key to long-term benefits from BPM is the ability to build a process-awareness culture coupled with long-term transformation practices in order to sustain the competitive advantage of a process-driven organization. This course introduces the methods, strategies, and techniques currently used in successful BPM practices for sustainment.
The focus of this course is on the ability to create an organizational culture of process-centric activities. The methods in this course are highly recommended for the BP analyst since their role would be included in many of these activities but also be responsible to communicate the requirements of these activities to various members of the organizational community (Table 12).

Table 9  Suggested learning objectives and topics – process analytics: measurement, control, and compliance

<table>
<thead>
<tr>
<th>Learning objectives</th>
<th>Suggested topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify types of process metrics</td>
<td>Overview of the importance of process performance measurement in formulating and attaining operational and strategic goals</td>
</tr>
<tr>
<td>Understand and deploy the alignment of process metrics with process strategy and models</td>
<td>Deploying a process improvement strategy</td>
</tr>
<tr>
<td>Understand methods of metrics analysis</td>
<td>Performance measurement and management techniques</td>
</tr>
<tr>
<td>Identify relevant reference models</td>
<td>Use of reference models for best practices and KPIs: Supply Chain Operation Reference-Model (SCOR), American Productivity &amp; Quality Center (APQC), Capability Maturity Model Integration (CMMI)</td>
</tr>
<tr>
<td>Understand balanced scorecards</td>
<td>Measuring process maturity – the process audit</td>
</tr>
<tr>
<td>Understand business activity monitoring (BAM) techniques</td>
<td>Types of quantitative and statistical techniques in business intelligence, simulation, and forecasting</td>
</tr>
<tr>
<td>Understand methods of measuring process maturity</td>
<td>Operational metrics for business processes</td>
</tr>
<tr>
<td>Design and utilize dashboards and mash-ups as reporting tools</td>
<td>The link to strategic key performance indicators</td>
</tr>
<tr>
<td>Understand how to use business intelligence as the basis for reporting and analysis of business processes</td>
<td>Issues involved in measuring, monitoring, and controlling inter-organizational processes</td>
</tr>
<tr>
<td>Understand methods of process control</td>
<td>Measuring performance and designing of a performance management system</td>
</tr>
<tr>
<td>Understand the role of process monitoring in compliance with regulations</td>
<td>Designing and implementing BPM key performance indicators</td>
</tr>
<tr>
<td></td>
<td>Process managing and monitoring</td>
</tr>
<tr>
<td></td>
<td>Understanding and developing balanced scorecards</td>
</tr>
<tr>
<td></td>
<td>BAM</td>
</tr>
<tr>
<td></td>
<td>Measurement, diagnosis, and improvement</td>
</tr>
<tr>
<td></td>
<td>Technologies for process analytics</td>
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<td>Dashboards and mash-ups</td>
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<td></td>
<td>Types of analytics</td>
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<tr>
<td></td>
<td>Reporting or business analytics – utilization of historical information for reporting</td>
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<td></td>
<td>Data mining analytics – data trend analysis</td>
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<tr>
<td></td>
<td>Predictive analytics – determining future decisions and actions based on trend analysis</td>
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<td></td>
<td>Business rules and process analytics</td>
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</tbody>
</table>
A BP project or internship is recommended after a student has completed the BPM coursework in order to apply and practice his/her newly acquired BPM practice knowledge.

### Table 10  Suggested learning objectives and topics – business process systems and architectures

<table>
<thead>
<tr>
<th>Learning objectives</th>
<th>Suggested topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have a basic understanding the types of BPM systems</td>
<td>Evaluate BPM software and BPM suites</td>
</tr>
<tr>
<td>Understand integration and interoperability issues among intra- and inter-organizational business processes</td>
<td>Overviews of the types of BPM systems</td>
</tr>
<tr>
<td>Develop an understanding of workflow management systems</td>
<td>BPMS and workflow management systems</td>
</tr>
<tr>
<td>Understand the current BPM technology architectures and standards</td>
<td>Process-as-a-service</td>
</tr>
<tr>
<td>Understand the role of enterprise services architecture and service-oriented architecture for BPM enablement</td>
<td>Cloud based BPM</td>
</tr>
<tr>
<td>Be able to analyze current organizational BPM maturity, identify maturity state goals of organization, and develop a transition plan for achievement</td>
<td>Social BPM</td>
</tr>
<tr>
<td></td>
<td>Integration and interoperability of intra- and inter-organizational processes</td>
</tr>
<tr>
<td></td>
<td>Introduction to the BPM technology architectures and standards</td>
</tr>
<tr>
<td></td>
<td>The role of enterprise services architecture and service-oriented architecture for BPM enablement</td>
</tr>
<tr>
<td></td>
<td>BPM tools and trends</td>
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</tbody>
</table>

### Project or Internship

A BP project or internship is recommended after a student has completed the BPM coursework in order to apply and practice his/her newly acquired BPM practice knowledge.

### 3.1.2 Additional Advanced Courses and Proposed Tracks

The proposed curriculum strives to integrate the business and technology aspects of BPM practices. Depending on the focus and emphasis of the desired program,

### Table 11  Suggested learning objectives and topics – process transformation and innovation

<table>
<thead>
<tr>
<th>Learning objectives</th>
<th>Suggested topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Be able to apply continuous improvement techniques such a Lean and Six Sigma to process initiatives</td>
<td>Continuous improvement techniques for process transformation</td>
</tr>
<tr>
<td></td>
<td>Lean, SixSigma</td>
</tr>
<tr>
<td>Understand and apply simulation techniques to process transformation</td>
<td>Process simulation</td>
</tr>
<tr>
<td>Understand the role of BPM innovation in achieving organizational strategy</td>
<td>BPM innovation methods</td>
</tr>
<tr>
<td></td>
<td>Organizational strategy achievement through process innovation</td>
</tr>
<tr>
<td></td>
<td>Develop a process transition plan for improvement</td>
</tr>
<tr>
<td>Be able to analyze current organizational BPM maturity, identify maturity state goals of organization, and develop a transition plan for achievement</td>
<td>bỏ qua BPM, xác định các mục tiêu tổ chức, và phát triển kế hoạch chuyển đổi</td>
</tr>
</tbody>
</table>
advanced courses and additional courses may be included in the curriculum. One area for advanced course work would be in the area of technologies and methods as described in the following paragraphs. The addition of an advanced process analysis, design, and modeling course would be a consideration of a program designed to enforce these practices. Additional business focused courses related to BPM practices could include change management or project management as they apply to BPM.

**BP21 – Process Technologies and Methods (Advanced Course)**

This is an advanced course that investigates process technologies, systems, and methods in more depth. This course focuses on the technical and implementation aspects of BPM in order to develop process-awareness information systems. It includes an examination of process intelligence enabling technologies and support of business rules by technology. Attention is paid to process interoperability integration within and between organizations.

While this course has a technical focus, the BP analyst can benefit from this course by gleaning a deeper knowledge of technologies available that enable BPM (Table 13).

### 4 Limitations and Discussion

The proposed BPM curriculum addresses the need for a holistic and cross-functional business process orientation (Seethamraju 2012). The question of how to structure curriculum to address this need remains. Despite the fact that many

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<tr>
<th>Learning objectives</th>
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<tr>
<td>Understand the critical aspects an organization needs to sustain the benefits of BPM</td>
<td>Reviewing success and risk factors in BPM practices, implications for sustainment</td>
</tr>
<tr>
<td>Over time</td>
<td>Building organizational communities of practice</td>
</tr>
<tr>
<td>Understand the role of process agility in sustainment</td>
<td>Deploying change management practices</td>
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<tr>
<td>Be able to analyze and deploy appropriate change management methods – people in the</td>
<td>Methods for building a process-awareness culture</td>
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<td>process</td>
<td>Preparing and implementing process change methods for enabling technologies and systems</td>
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<tr>
<td>Understand techniques and strategies for building a process-awareness culture</td>
<td>How do you know when you have achieved process agility?</td>
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<td>Understand how to achieve business process communities of practice throughout the</td>
<td>Understanding and identifying the potential for BP outsourcing to improve process performance</td>
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<td>organization</td>
<td>Developing and cultivating appropriate process skills and positions</td>
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<tr>
<td>Understand methods for technology change implementations</td>
<td>Development of a process sustainment plan</td>
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<td>Identify the potential for business process outsourcing</td>
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<td>Understand methods and techniques to develop and cultivate appropriate process skills and positions</td>
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Development of a process sustainment plan
business schools have begun to integrate BPM topics into their courses, a need for comprehensive curriculum to address the BPM practice and skills shortages persists (McCoy et al 2010; Seethamraju 2012). Many colleges and universities have focused on ERP, process modeling and systems architecture as they relate to BPM however have not addressed other areas of BPM such as process governance, leadership and culture. Therefore their curriculum has only included portions of the BPM discipline, perpetuating a narrow discipline focus (AACSB.edu) and missing the broad BPM focus of holistic capabilities and enablers of BPM (Rosemann and deBruin 2005; Hammer 2014). The emphasis on process analysis, design, modeling and monitoring continues to be central to BPM providing the knowledge necessary for not only efficient operations but also organizational improvements, agility and efficient strategies (Seethamraju 2012). Curriculum that is focused on ‘how to do’ BPM at the operational level tends to include utilization of ERP systems, process modeling, analysis and mapping. It is important to recognize BPM as a discipline and as such needs to include ‘how to lead and sustain’ a process oriented organization. Therefore a BPM curriculum focus needs to be expanded from an emphasis on process analysis and modeling to holistic process management (Seethamraju 2012).

The proposed curriculum was based on the combination of BP analyst role definition research and several existing BPM courses, curriculum, and training programs from various universities, executive education institutions, and professional organizations. As BPM is an evolving discipline, there is a lack of consensus on the content in the available BPM curriculum. In addition, process skills and associated positions vary in organizations, typically favoring either the business view or IT view of an organization with a lack of available research that identifies

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<tr>
<td>Explore and understand advanced technologies that enable BP deployment</td>
<td>Investigate advanced technologies that enable BP deployment</td>
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<tr>
<td>Understand service-enabled process management and interoperability</td>
<td>Service-enabled process management and interoperability</td>
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<tr>
<td>Obtain an in-depth understanding and use of Enterprise Resource Planning (ERP) systems for process implementation</td>
<td>In-depth analysis and use of Enterprise Resource Planning (ERP) systems as an enabler of process implementation</td>
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<tr>
<td>Understand technologies required to develop process intelligence</td>
<td>Analysis and use of process automation technologies</td>
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<td>Understand technologies available to support business rules</td>
<td>Process intelligence systems</td>
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<td>Understand the technologies and issues of process integration and interoperability in intra-and inter-organizational environments</td>
<td>Business rules engines</td>
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<td>BPM cloud platforms</td>
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<td>Process integration and interoperability in intra-and inter-organizational environments</td>
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and verifies the role and activities required for holistic end-to-end BPM practices (Antonucci and Goeke 2011). These issues of existing limited BPM curriculum and lack of content consensus contribute to the main limitations of this curriculum proposal.

The primary goal of this curriculum is to integrate business and IT practices needed to develop and cultivate BP analysts. The typical MBA or business school curriculum currently lacks this integration (Fingar 2006). It can be debated on whether to have more emphasis on business or on technology depending on the outcomes desired by the organization. As such, there could be variations of this curriculum. For example, a more technical college or university may opt to include advanced courses in technology and implementation. Similarly, executive training can tailor this curriculum to a desired level of emphasis. Deployment of this curriculum is recommended to be either on-site or a scheduled on-line meeting time. Several of the proposed courses require a high level of interaction between participants to enforce concepts and learning, making a self-paced on-demand e-learning method difficult.

Organizations will ultimately benefit from a holistic end-to-end BPM curriculum with educated and knowledgeable BP analysts. Executive training, universities, and colleges can use this curriculum as a foundation for planning and deploying comprehensive BPM programs designed to cultivate skills for the emerging BP analyst.

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Recker J (2012) How was school today? BPTrends, March

Rosemann M, deBruin T (2005) Application of a Holistic model for determining BPM maturity. BPTrends, February
Dealing with Human-Driven Processes

Keith Harrison-Broninski

Abstract Current BPM deployments focus on routine work and low level knowledge work, lacking integration with higher level knowledge work such as research and development, marketing, complex sales, services delivery, complex problem resolution, organizational change, new initiatives and other strategic management activities. To gain full benefit from operational improvement via a process approach, higher level knowledge work must also be brought under process control and integrated with lower level operations (For a report on the evolution of BPM also see Harmon (2014) in the first volume of this Handbook). However, this requires a new approach to process management – one that not only has the right balance of structure and flexibility, but that also allows collaboration across internal and external organizational boundaries. As a solution, this paper presents a means of describing adaptive, collaborative human-driven processes, and supporting them with software, that streamlines interactions between colleagues to reduce costs, focuses on goals to be more effective, and improves organizational memory by tracking work, keeping the knowledge and re-using best practices. The approach is based on the theory of Human Interaction Management (HIM), which facilitates the management of teams, communication, knowledge, time, and plans. HIM also shows how to automate processes involving human collaboration across organizational boundaries of any kind. HIM can be introduced into the enterprise, and integrated with both organizational strategy and mainstream BPM, via supporting Human Interaction Management System (HIMS) technology and an associated change management methodology, Goal-Oriented Organization Design (GOOD).
1 Introduction

Current mainstream BPM practice derives from techniques developed throughout the twentieth century to improve business operations, starting in the 1910s with Scientific Management (Taylor 1911), then continuing in the 1930s with Statistical Quality Control (Shewhart 1931), developing in the 1950s and 1960s into Total Quality Management (Deming 1950; Ishikawa 1968), and resulting by the 1980s in Lean Manufacturing (Ohno 1988) and Six Sigma (Harry 1988), which were subsequently combined into a unified methodology Lean Six Sigma (George 2002). All these techniques were designed for the improvement of routine and repetitive work, typically production processes such as manufacturing.

This background is reflected by the notations developed to support process analysis, of which the latest, and the current de facto standard in everyday practice, is BPMN (Object Management Group 2011). All such notations assume that a process is essentially a set of operations that control the movement of inputs from one state to another until they result in outputs, typified by the assembly of a product in a factory or the handling of an insurance claim by low level knowledge workers. Modern process notations allow parts of the process to take place in parallel, and elements of the process to be grouped together, resulting in the formal treatment of a process as a concurrent, hierarchical, finite state machine.

While it may appear to be possible to adapt such techniques and notations to handle collaborative, adaptive human work, there are serious limitations that become apparent very quickly. Higher level knowledge work such as research and development, marketing, complex sales, services delivery, complex problem resolution, organizational change, new initiatives and other senior management activities not only requires the right balance of structure and flexibility, but also must allow collaboration across internal and external organizational boundaries. These requirements introduce new dimensions that are not catered for by mainstream BPM notations. Consider, for example, the following questions, which someone might ask when presented with a BPMN diagram describing a collaborative, adaptive process in which they are expected to play a part.

What are my goals and responsibilities? A swim lane is simply a grouping of activities – it is not an organizational role, with associated contextual information. Fundamental aspects of knowledge work (acceptance of responsibility, capabilities, personal characteristics, and so on) are quite literally out of the picture. This is a particular problem with regard to delegation of assigned work.

How do I know what is required from my deliverables? With only a task description to go from, a knowledge worker has no idea on what basis their work will be reviewed, or even by whom, meaning they cannot understand the criteria

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1 As to the relation between Process Management for Knowledge Work also see the chapter of Davenport (2014) in the first volume of this handbook. The role of people is also highlighted by Hammer (2014) and further conceptualized by Rosemann and vom Brocke (2014) in the first volume.
that will be applied to approve it. Similarly, a diagram shows no indication of the policies, regulations and other constraints to which their work must conform.

Does everyone in this process have appropriate skills, experience, and personality type? A diagram provides no information about who is involved, so gives the false impression that collaborative work is somehow independent of the people carrying out the activities and of their interactions.

What if I need help? If producing specific deliverables turn out to be too much work in the time available, the assigned person may need to work with someone else – but a diagram offers no means to achieve this. For example, there is no way to add more players of a certain role in a BPMN process, or more generally, adjust the resource levels assigned to a work package. It is hard even to imagine how the notation could be extended to support the notion, as the formal principles on which BPMN is based do not support such a concept. Yet human resource planning is fundamental to the management of collaborative work.

What if I need to discuss matters with colleagues? To prepare deliverables a worker may need to discuss them with colleagues prior to submission, in a structured way – but a process diagram does not allow the depiction of interactive, multi-party communication channels (only one-off messages sent from one pool to another as part of a workflow). Message flow in BPMN, for example, is limited to a single, one-way sending from one pool to another. The sending can be repeated if the appropriate looping constructs are used, but it is very hard to depict message flow between more than two parties, and any attempt to reproduce the flexible manner in which people exchange messages is doomed to failure. Mainstream Business Process Management System (BPMS) software typically deals with this limitation by treating message exchange between colleagues as outside the work process itself – i.e., as an ad-hoc activity on which no structure can (or needs to) be placed. In other words, what is perhaps the most fundamental aspect of knowledge work – human interactions – is relegated to floating around under the organizational radar, in an unmanageable backwater.

What if work additional to that shown is necessary to prepare my deliverables? A deliverable is often just the tip of the iceberg compared to the research, evaluation, and analysis that underpin it, and such associated activities tend to be hard to predict in advance – a process diagram does not allow these activities to be created and adjusted, or recognition to be gained for the mental work involved in carrying them out. This not only hinders but also demotivates knowledge workers.

What supporting information do I need, and where can I get it? Knowledge work typically relies on a variety of associated reference materials, but a process diagram shows only activity inputs and outputs – meaning that knowledge workers struggle to identify the necessary resources, to determine what form they are in, where to find them, and how to access them (e.g., to obtain the account details for their organization’s subscription to a technical journal containing relevant articles).

These are only examples of the sort of questions that mainstream BPM notations fail to answer. The result of this failure is that critical processes involving collaborative, adaptive human work are poorly managed by many organizations, as shown in Fig. 1.
At the top of Fig. 1 is a grid of the different process types within a single organization, showing the technique appropriate to support each process type:

- Step-by-step work in which the sequence of steps can be predicted – for example, manufacturing, licensing or order fulfilment – is generally described using a flowchart-based notation (such as BPMN) and supported using Business Process Management or Workflow systems.

- Step-by-step work in which the steps and their sequence adapt to the situation at hand – for example, claim processing, medical diagnosis or invoice discrepancy handling – is generally described again using a flowchart-based notation but this time supported using Case Management systems.

- Work in which deliverables are provided through collaboration rather than each person carrying out steps individually, but is nevertheless predictable – for example, laying an oil pipeline or building a power station – is generally described using a Work Breakdown Structure and supported by Project Management systems.

- Work that is both collaborative and adaptive – which may in fact represent a very large proportion of organizational activity, since it includes areas such as research & development, marketing, complex sales, services delivery, complex problem resolution, merger & acquisition, and organizational change – is generally not described in any formal way but rather using documents and illustrative diagrams. As a result, it is not supported by specific systems, but rather left to fend for itself in a minefield of workplace technologies such as email and content management systems.

Fig. 1 The process gap
Figure 1 shows how this problem and the resulting technology support gap exist not only for collaborative, adaptive processes within a single organization, but for collaborative, adaptive processes that cross organizational boundaries – as they typically do.

To remedy the situation, the theory of Human Interaction Management (HIM) was developed to streamline interactions between colleagues to reduce costs, allow focus on goals to be more effective, and improve organizational memory by tracking work, keeping the knowledge and re-using best practices (Harrison-Broninski 2005a “Human Interactions – The Heart And Soul Of Business Process Management”). A HIM “Plan template” – i.e., a set of Stages in which people play Roles to provide deliverables – is a natural, intuitive way to structure adaptive, collaborative work. Further, if a process is implemented as a HIM “Plan” via a Human Interaction Management System (HIMS), its participants can use different HIMS servers – or even regular email – to work together in a structured, manageable way across professional, geographical and organizational boundaries.

However, for many people it is hard to distinguish the different types of work process. Where exactly should one apply each type of process description technique, and use each type of technology? It can be particularly difficult to separate adaptive work processes into step-by-step and collaborative, since even adaptive processes that are step-by-step typically involve multiple people (each carrying out their own set of steps).

A simple solution is to use an analogy to classify “adaptive” processes as either “step-by-step” or “collaborative”. Consider what happens when you build a Lego model as compared to what happens when you cook a stew. When you’ve completed a Lego model, you can still see the parts – and each part is the same as it was when you took it out of the box. With a stew, you can detect (most of) the ingredients by tasting it – or even just looking at it – but you cannot disassemble the stew into its components.

In other words, the constituents of the stew have been changed by the process of cooking, into something new – something that is quintessentially to do with that particular stew, and the chemical reactions that took place during cooking. A sea change has taken place, into something rich and strange. It may or may not be possible to repeat the sea change on future occasions – and the ability to do so is part of the learning curve a chef goes through. But one thing is sure – you cannot undo the sea change for a specific stew, and isolate each ingredient in its original form.

Making an analogy with human work, collaboration between the people (typically members of a virtual team) who carry out an adaptive process changes the original elements of that process irrevocably.

So this is how to tell the type of an adaptive work process: once it is complete, can you look back and identify what took place as being exact sequences of steps copied from standard templates? Or have the virtual team members used the original template processes as illustrative guides rather than prescriptive instructions – changing, repeating, adding and omitting steps as required by the situation at the time, based on their skills, experience and collective judgement? If the step sequences are identical to their original templates, your adaptive process is
“step-by-step”, and you could consider using a BPM or Case Management system to support it – as long as it all takes place within a single organization, that is. If on the other hand your process changes the template steps – or involves multiple organizations – then you are in the territory of HIM and its supporting technology the HIMS.

In a HIM process, as John Seely Brown said, “processes don’t do work, people do” (Brown and Gray 2005). BPM, Case Management and Project Management are about tasks. HIM is about virtual teams – and, depending on the scale, often about what might be thought of as virtual enterprises. Many projects, programmes, initiatives, ventures, or other collaborative efforts involve people from multiple organizations, with multiple professions, in multiple locations. Effectively, each such effort results in the creation of a dedicated virtual enterprise – and the management structures required to ensure that a virtual enterprise achieves its desired goals are non-trivial.

The UK healthcare advisory organization The King’s Fund (www.kingsfund.org.uk) provides a useful discussion of the issues associated with such a virtual enterprise, which it terms an “extended enterprise”, in its analysis of 12 pilot projects between 2008 and 2011 to introduce new technology into UK health and social care (“the WSDAN sites”). In particular, the authors explain how the issues are not simply those of communication (i.e., data sharing) but more widely of collaboration (i.e., purposeful interaction):

When organizational and, by implication, individual goals are different, how can they be brought into equilibrium? It is not enough to settle on standards; what is needed is a different way of conceptualizing the combined services so that data could flow from one service sector to another (possibly incorporating user-held data), and be used to the benefit of users, patients, and other stakeholders. One approach might be to view integrated social and health care as an example of an extended enterprise – a loosely coupled, self-organizing network of organisations that combine their services to provide new products or services to a specific market (Ross et al. 2006). This, perhaps, largely describes the current relationship between telehealth and telecare projects and their commercial partners and collaborators at the 12 WSDAN sites – it certainly describes those sites that are involved in forming social enterprises, trading arms and other service configurations. This arrangement, however, lacks the ability to answer the questions, ‘What should the objective function of this enterprise be? Who is responsible for delivering quality of outcomes and for managing budgets? How can such responsibilities be enforced?’

It is not uncommon to ask the first two questions, but the third is often neglected. The third question, however, is critical, and should be asked before any telehealth/telecare equipment is deployed in someone’s home, because its answer leads to the programme’s governance structure. In their landmark paper on the theory of the firm, Jensen and Meckling (1976) view the organisation as nothing more than a nexus of contracting (both implicit and explicit) relationships that, among other things, control individuals and help to ensure that individual and group activities meet the needs of stakeholders. The contractual relationships are important because they make explicit who the stakeholders are, and the limits and types of individual and groups activities that serve stakeholder interest.

Jensen and Meckling write that this view of the firm is not limited to corporations, but to any organisation:

This includes firms, non-profit institutions such as universities, hospitals, and foundations, mutual organisations such as mutual savings banks and insurance companies and co-operatives, some private clubs, and even governmental bodies such as cities, states, and
the federal government, government enterprises such as . . . the Post Office, transit systems, and so forth.

So, the data management problems that the WSDAN sites face highlight a larger problem concerning the overall governance of their programmes.

(Giordano et al. 2011)

This governance problem is not limited to healthcare, or to the public sector. It applies in all walks of life. Whether you are organizing a small town festival, laying an oil pipeline, or sending a rocket to Mars, you need to “make explicit who the stakeholders are, and the limits and types of individual and groups activities that serve stakeholder interest.” In other words, you must find a way to show who is involved and what each person is responsible for. Until you do this, there is little chance that the responsibilities will be enforced appropriately and hence that people will deliver what is required of them in order to meet the goals of the effort.

This is a process-related question, but not one that can be solved using traditional BPM or case management techniques. Stakeholder responsibilities cannot be helpfully described or managed using flowchart notations or by assigning tasks in isolation. Rather, it is necessary to depict in a simple way:

1. The overall goal and sub-goals of the collaborative effort
2. The stakeholders in each sub-goal (i.e., those with an interest in achieving it)
3. The nature of each stakeholder’s involvement – in RACI terms, whether they are Responsible, Accountable, Consulted or Informed

In the Human Interaction Management approach to collaborative work, these items become a Plan containing Stages, Roles, Activities and Deliverables:

1. A Plan represents a collaborative activity with shared high-level goals.
2. A Stage represents a sub-goal of the Plan. If you are included in a Stage, then you have an interest in achieving it, so you will receive its outputs and be on in its messaging channel. The current status of each Stage represents its progress (“Not Started”, “Started”, “Completed”, “Cancelled”, “Issue Raised”, and so on).
3. A Role is a Plan-specific job title. The Roles assigned to you define your responsibilities in each Stage that you are included in. You use a Role to contribute to the work of each such Stage, or simply influence Stage progress via messaging.
4. An Activity is how a Role contributes Deliverables to a Stage. An Activity may have inputs, such as the outputs (i.e., deliverables) of other Activities or reference materials to support its execution. If an Activity is just for review purposes, there may be no outputs as such – review comments can be submitted via Stage-specific messaging.

The Stages, Roles and Activities may well change during the life of a Plan, as the Plan owner responds to circumstances by adjusting the way the work is to be carried out, often in response to advice and suggestions from other Plan members. A Plan is typically made from a standard template, and then evolves throughout its life – and the final version of the Plan can then be re-used as a template if desired.
In the remainder of this paper, we show how to introduce HIM into the enterprise, and integrate it with both organizational strategy and mainstream BPM via an associated methodology, Goal-Oriented Organization Design (GOOD). The following sections present:

- Some example HIM Plan templates;
- An overview of HIM theory;
- Description of the supporting HIMS technology;
- The supporting change management methodology, Goal-Oriented Organization Design (GOOD);
- A case study of enterprise HIM usage;
- Conclusions drawn.

2 Example HIM Plan Templates

Figure 2 shows an example Plan template illustrating how the HIM approach can be used to run a transformation programme for a local authority via the Agile methodology Scrum:

As captioned on the screenshot, on the left hand side you can see the various Stages (sub-goals) of the work. The first two Stages are Scrum-specific, and run throughout – to manage the Product and Spring Backlogs respectively (i.e., the work required overall and in the current Sprint). Each of the other Stages is specific to a service area of the local authority, and contains artefacts relating to that specific aspect of the overall change programme.

Also as captioned on the screenshot, on the right hand side you can see the Roles involved in the currently selected Stage – in this case, Manage Sprint Backlog. In this Stage, only the Scrum Master has work to do:

- “Prepare Next Sprint”, which delivers the Sprint Backlog
- “Manage Burn Down Chart”, which delivers the Burn Down Chart (the work remaining in the current Sprint).

The other Roles in this Stage are the Product Owner (typically the executive with responsibility for the change programme), the Programme Office (the administrator for the change programme) and people with responsibility for different aspects of the change programme (planning, risks, issues, change, finance and configuration). None of these have work to do in the selected Stage, but are included in it so that they have visibility of the Sprint Backlog and Burn Down Chart, and can contribute to the Stage by receiving and sending messages on its channel.

The other Stages have specific Roles and Activities of their own, out of scope here due to space restrictions.

Figure 3 shows an example Plan template illustrating how the Human Interaction Management approach can be used to streamline a commercial Sales Bid – typically a pressurized undertaking with a tight timescale:
Here the selected Stage is “Create Opportunity”. At this point, the lead has been qualified as worth pursuing, and the Nominated Sales Lead has the responsibilities to assess the client, arrange a follow-up meeting and record progress on the CRM system.

The Lead Owner has no deliverables in this Stage, but will follow progress closely and may contribute advice throughout the Stage.

There are other Roles in this Plan – Sales Manager, Technical Expert, Commercial Authority, and so on – but none of these are included in the Stage “Create Opportunity”. The responsibilities of these Roles are specific to other aspects of the work (i.e., other sub-goals) so they only see what is of interest to them. In other words, they are not deluged with unnecessary messaging in the usual way.

Returning to the public sector, Fig. 4 shows an example Plan template for managing the case of a Youth Offender. This work typically involves many different parties, and is subject to rigorous legal and ethical constraints, which means it must be managed with great care:

The screenshot shows the work required to supervise a disqualification order, which has deliverables from the Case Manager and Crown Prosecution Service Liaison, with the Youth Offending Team Manager involved only in a supervisory capacity. In order for the CPS Liaison to do their work, they use the deliverable from the Case Manager, the “Concerns About Breach”.

Fig. 2  Plan template for a Scrum project
At the start of the case it will not be known whether or not this Stage is necessary at all, but by default all Stages in a Plan are optional, as are all Activities and production of all deliverables. The Plan indicates rather than prescribes the work required to meet the goals of the effort overall. As the work progresses, it will become clear exactly what should be done, and the best way in which to do it.

A Human Interaction Management approach guides those involved to work in a structured way that is amenable to management, while allowing them to use their skills and experience to determine the most efficient and effective route through the work.

3 Human Interaction Management Theory

HIM is a formal theory of processes that extends, alters and re-frames ideas originally developed in the early 1980s (Holt et al. 1983) and subsequently associated with Role Activity Diagrams (Warboys 1989; Ould 1995; Warboys et al. 1999). The mathematical foundation of HIM draws on and unifies petri nets and the pi-calculus (Harrison-Broninski 2005b “Managing Process Change? Easy as Pi (and Petri)").

The theory of HIM shows how to describe processes so as to facilitate effective, efficient management of teams, communication, knowledge, time, and plans (the “5 Principles of HIM”).
A further concern of HIM is to provide software support for processes involving human collaboration, including those that cross organizational boundaries, which it does via the definition of a new kind of software system – a Human Interaction Management System (HIMS). A HIMS is not a centralized server managing the progress of concurrent, hierarchical, finite state machines (like current mainstream BPM software), but rather a means to manage distributed objects. A HIM process is a set of objects (known collectively as a “Plan”), of which copies are owned by each player in the process. Each player does work in the process using their own HIMS, which uses messaging to ensure that their own copy of the Plan is synchronized with the copies held by their peers.

Note that it is possible to take part in an HIM process without using a HIMS – as long as one player is using an HIMS, the others can collaborate via email, for example, and the sole HIMS instance will still ensure that the work is structured according to the Plan definition for all players.

3.1 The 5 Principles of HIM

HIM analyses collaborative work processes in terms of their inner structure rather than from their external manifestation in terms of particular communications. Rather than being based on a specific aspect of human collaboration such as
messaging or document sharing, HIM is based on five fundamental features of human-driven processes, the “5 Principles of Human Interaction Management”. As an organization is effectively a manifestation of long-term human collaboration, the “5 Principles of HIM” apply equally to organizations and to any other form of project or venture. The five principles are discussed below, along with their implications for any modelling framework that aims to capture human collaboration.

(1) **Team building**: To create effective teams, it must be clear who is involved in a particular process, and what each person brings to the table. As a starting point, the identity, skills, experience, and personal characteristics of each person must be captured. It is then necessary to define each individual’s responsibilities, and negotiate his/her commitment to accepting these responsibilities.

A *modeling framework for collaborative, adaptive human activity must contain Role and User objects, both as types and as instances of those types.*

(2) **Communication**: If people are to manage their interactions with others better, their communications must be structured and goal-directed. Within a process, there must be specific channels of communication for different purposes, each of which unifies messages transmitted via a variety of means (email, text message, FAX, voice-over-IP, etc.).

A *modeling framework for collaborative, adaptive human activity must contain Interaction objects representing interactive, multi-party communication channels.*

(3) **Knowledge**: Organizations must learn to manage the time and mental effort their staff members invest in researching, comparing, considering, deciding, and generally turning information into knowledge and ideas. The people responsible for creating and managing this knowledge must be able to control its usage and distribution.

A *modeling framework for collaborative, adaptive human activity must contain Entity objects that can be created, versioned, and shared in a structured way.*

(4) **Empowered time management**: Humans may not sequence their activities in the manner of a software program, but there is always structure to human work, which must be understood and institutionalized so that it can be managed and improved. This means empowering people to choose and/or create their own work activities from an appropriate range, guided by understanding of organizational context (so that they can aim to deliver maximum value) and restricted by business rules that prevent contravention of applicable policies and standards.

A *modeling framework for collaborative, adaptive human activity must contain Activity objects that can be marked up to enable validation and control.*

(5) **Collaborative, real-time planning**: Human activities are concerned often with solving problems, or making something happen. Such activities routinely start in the same fashion – by establishing a way of proceeding. Before you can design your new widget, or develop your marketing plan, you need to work out
how you are going to do so – which methodology to use, which tools are required, which people should be consulted, and so on. In other words, process definition is an intrinsic part of the process itself. It takes place via negotiation between all involved parties, and is not a one-time thing but happens continuously throughout the life of the process.

A modeling framework for collaborative, adaptive human activity must support creation, update and deletion of objects and their user interfaces as part of the work process itself.

The HIM modelling framework includes objects of over 30 different types, and provides a diagrammatic notation to depict them, as shown in Fig. 5.

However, most HIM users never use this object model or even know of its existence. Rather, they create, use and manage Plan templates in a simple, intuitive way by dealing with Stages, Roles, Activities and Deliverables.

HIM also provides guidelines on use of the approach, by identifying a number of patterns resulting from the five principles. Some of these patterns are described in following sub-sections.

### 3.2 REACT and AIM

The REACT and AIM patterns shown in Fig. 6 underlie any form of human activity (collaborative or not) – taken together, the REACT and AIM patterns describe all human working behavior. The patterns capture the way that people respond to assignments, fulfill responsibilities, achieve goals – the way they “react” to the work they take on. REACT and AIM help simplify complex situations, as the
patterns can be repeated, overlapped, and nested in order to reduce any work assignment to the same fundamental elements.

REACT has five elements:

(1) **Research**: Map out the terrain, investigate the principles, talk to those in the know, locate potential threats, and so on, in order to gain information from external sources, and turn it into personal knowledge. The external sources may be close at hand – members of a “community of practice,” for example. Alternatively, information may be acquired from an impartial expert in the field, a textbook, or a search on the Web. The details are different every time, but the principle is the same. Before you can start to work on something, it is only common sense to find out what you are getting yourself into.

(2) **Evaluate**: Step back and consider the knowledge thus acquired. Internalize it, in a sense, by making connections between different opinions or facts. Once you have discovered the general lay of the land, you need to familiarize yourself with it. You may need to carefully read a pile of papers on your desk, or to mull over some advice that you do not yet understand. This element of REACT may take minutes or years, but it is crucial – there is no point doing an investigation unless you make an effort to take on board the information you gathered.

(3) **Analyze**: On the basis of your new-found understanding, decide on an approach to the problem. In general, the approach you settle on may result partly from applying logic to reduce the problem to more manageable sub-problems – and
partly from an intuitive judgment on what feels “right”. The balance varies both with the type of problem and with the type of person trying to solve it. However, you arrive at a conclusion, though the decisions made at this point are not necessarily a final say on the matter – they are simply a way forward for now; enough to let you proceed further with the work in hand. Sometimes it is hard to be sure whether you are doing the right thing, so you might choose a way forward that hedges our bets – following multiple paths at the same time, in the hope that at least one will work – or decide only on the first few steps, and leave decisions about other steps for later. But you have to make some kind of decision at this point, at least on how to start.

(4) **Constrain**: Divide the work into separate chunks, and organize them. This may be simply a matter of deciding an approximate order to do them in, or it may be a huge task involving all the techniques of project planning: dependency and impact analysis, critical path definition, resource allocation, budgeting, contingency planning, and so on. However, you are dealing with human-driven processes here – in which people rarely do things in the order laid down, and rightly see it as part of their work to determine how things should proceed. So, this part of the REACT pattern is not about defining workflows, in the sense of ordering activities into strict sequence – rather, it is about chunking the work into separate Stages, each with its own sub-goal.

(5) **Task**: You have determined how to break the work into Stages, put Roles in each Stage with Activities and Deliverables, and assigned the Roles to appropriate people (typically including yourself), so now all those concerned can get on with the tasks at hand. For a large programme, doing the work may involve many different people and organizations working together to deliver a complex product or service.

The first part of REACT, *Research*, can be further broken down into a sub-pattern AIM, which describes any research activity. Similarly to the way REACT describes human work in general, AIM describes the particular activities of information discovery.

(1) **Access** discovery services: Decide where you will go to obtain information, and obtain any necessary authorization. This might be permission to contact someone, login details for a database, or funds to use some kind of finder agency.

(2) **Identify** resources required: From the above-mentioned service(s), choose resources likely to be of interest. At this point, you will have only cursory understanding of their content – what matters is that they seem likely to be useful.

(3) **Memorize** information obtained from particular resources: It is important to focus on committing information to memory, even if the information is only the outline of an idea you will use later on. Unless you have memorized information gathered during this first element of REACT, it is no use in the following element, *Evaluate* – you cannot synthesize ideas you have forgotten, or need to look up in order to understand. This element of AIM is all about internalizing the ideas in question.
3.3 Stage

A “Stage” (originally known in HIM theory as a “Collaborative Transaction”) is an archetypal structure for describing a phase of collaborative work. The structure includes two separate interactions, one for discussion about the work of the Stage and one for controlling the status of the Stage. A Stage includes Activities divided among several Roles. Stages can be nested, may run in parallel and their status is controlled ultimately by the Plan owner (although other Plan members can make provisional changes of certain kinds to the status of a Stage).

3.4 Levels of Control

Levels of Control refers to a natural division of responsibility and authority between strategic, executive, and managerial Roles. In brief, strategic control is about identifying goals and measures; executive control is about identifying key roles and interactions; management control is about constructing, implementing, supporting, and reporting on an executable process.

4 The Human Interaction Management System

Implementation of HIM in an enterprise environment (i.e., design, execution and management of business processes according to HIM principles) is facilitated by software support from a Human Interaction Management System (HIMS), for which the reference implementation is HumanEdj (Role Modellers 2012b “HumanEdj User Guide”). The aim of a HIMS is to facilitate collaborative, adaptive human work without forcing people to follow a set of predetermined steps rigidly. By bringing human collaboration into a unified and supportive process context, the HIMS promises to make knowledge work genuinely more effective. Integration of a HIMS into enterprise architecture is shown in Fig. 7.

4.1 Speech Acts

A HIMS helps people to see the bigger picture of a process and understand their responsibilities within it. This calls for suggestive rather than prescriptive process description and support: a HIMS provides support and enforces basic control on behalf of the organization, providing an indication to people of what they are expected to do then letting them learn collaboratively how best to meet their assigned goals.
A key aspect of this collaborative learning derives from autopoietic theory (Maturana and Varela 1973), which asserts that communication is founded not on transmission of information but rather on transmission of intent. Research in biology shows that the purpose of animal communication is largely about synchronizing the behavior of parties. This understanding has been adopted in business via the classic “Conversation for Action” (CfA) pattern (Winograd and Flores 1990), in which communication between people and organizations is structured in terms of a small set of request/response pairs – request/promise, offer/acceptance, and report/acknowledgement.

However, many business people have found the traditional use of speech acts in CfA too rigid for practical use. Hence, HIM generalizes the approach by allowing a much broader and less restrictive set of structured communications. HumanEdj, for instance, provides full support for speech act theory (Austin 1962; Searle 1969), according to which a communication act is not only composed of content but also, and at least as importantly, of an intention. HumanEdj permits business people not only to share data and documents, but also to make a wide range of assertions about the status of Deliverables and Stages. For example, the creator of a Deliverable can specify its intended usage as a draft for review, as a submission for approval, as
having known issues that need to be addressed, or as having one of various other statuses.

In general, a HIMS suggests actions rather than prescribes them, allows not only for communication but also for action, does not assume that all communication is direct and does not prevent tangential discussion – i.e., unexpected interactions that go beyond the conversation originally expected. This permits processes to evolve via a collaborative learning process. The HIMS provides helpful structure by modelling work formally as a process, but retains a light touch by allowing people to work according to their judgement at the time.

4.2 Cross-Boundary Processes

A key aspect of human collaborative work is the common necessity to include people from multiple organizations, location and disciplines. Hence a HIMS such as HumanEdj has a distributed peer-to-peer architecture, more akin to a Multi-Agent System than to a workflow or BPMS engine. Participants in a Plan may belong to different organizations and use different HIMS servers, since each HIMS automatically synchronizes the Plan states for its users via a messaging technology such as email. This also makes it possible to participate in a Plan using only a standard email client.

Plans may also generate sub-Plans, for instance in order to carry out the details of a public process as distinct private processes.

4.3 Continuous Improvement of Collaborative Work

Plan templates are used to generate Plans for projects, initiatives, ventures, etc. – i.e. executable business processes that may cross organizational boundaries. Each Plan is configured appropriately for the requirements of the situation, and the participants themselves adjust the configuration throughout its life, as they collaborate to evolve the definition of the Plan instance in response to external circumstances and internal progress.

Hence a Plan acts not only as a mechanism for learning but, once complete, as a source of learning materials. Plan instances from a repository show how other people dealt with problems of a certain type, and new Plan templates may be created from successful Plan instances (or parts thereof).

With regard to assessment of learning results, Plan instances are self-monitoring – they include automatic feedback mechanisms both within the Plan and across Plans to higher management levels. Taking part in a Plan instance in itself both measures and provides evidence of achievement. Plans may also use external services to provide:
4.4 Semantic Mark-up

Information within a Plan instance automatically has semantic mark-up, as do all communications between participants. This mark-up can be sent to external services to help streamline data harvesting and analysis.

5 Goal-Oriented Organization Design

Each key element in a HIM process has a direct equivalent in the Business Layer of the ArchiMate® 2.0 Architectural Framework (Open Group 2012; Role Modellers 2012a “HumanEdj FAQ”). However, this alone is not enough to ensure full integration of HIM processes into enterprise architecture, which requires a structured, manageable approach. Hence introduction of HIM into the enterprise, and its integration with both organizational strategy and mainstream BPM, is facilitated by an associated methodology, Goal-Oriented Organization Design (GOOD) (Harrison-Broninski 2009, 2011). GOOD differs from mainstream BPM methodologies in being derived formally from an underpinning set of consistent principles, i.e., those of HIM.

GOOD supplies a step-by-step method for applying HIM patterns to human work, by starting from a basic observation – that the primary value delivered by humans to an organization lies in their ability to collaborate, adapt, and innovate as required to deal with changing and unexpected circumstances. As described earlier, human-driven processes are not precisely repetitive – rather, they typically evolve during usage, as the participants repeatedly collaborate to agree on next steps.

Hence, GOOD emphasizes effectiveness over efficiency. Human work should not be managed using the measures of waste and cycle time typically applied for improvement of production processes. Rather, people at all levels of an organizational hierarchy must have some leeway to judge for themselves the most effective actions according to circumstances. Hence, GOOD focuses on enabling structured partial decentralization of management authority while ensuring continued alignment with strategic organizational goals.

In particular, GOOD supports process and service development, maintenance, and improvement via governance processes – human-driven processes defined using HIM notation, and inter-related via HIM levels of control. GOOD governance processes apply quality techniques drawn from HIM principles – metrics and
indicators that measure the effectiveness of a process by tracking how well it makes use of the humans involved.

Full description of the GOOD methodology is out of scope for this paper, but an overview is provided in Fig. 8.

6 Human Interaction Management Case Study

To illustrate how HIM supports adaptive, collaborative processes, considered below is an innovative company whose products are improvement programmes that it delivers to public sector organizations. The management structure is flat and staff members are encouraged to propose, seek internal funding for, and implement new improvement programmes on a regular basis. While the culture has resulted in innovations beneficial to their customers, and consequently in growth, the company struggled to make its operations profitable. It was not possible to optimize or even
obtain the cost of sales, given the complex way in which improvement programmes were created, sold, and delivered. It became necessary to standardize and monitor customer-facing operations.

The company expected to continue its previous success with standardizing back-office administrative processes using traditional workflow techniques. However, standardization of customer-facing operational processes met with resistance from staff, who were accustomed to using their skills, experience and judgement to adapt their working approach to each customer engagement. Hence, there remained wide variance across the organization in the way that core customer-facing and internal processes were carried out.

The solution required a means of process standardization that provided indicative rather than prescriptive processes (i.e. processes that could be adapted flexibly during execution), and that supported the harvesting of innovative ideas into new products (i.e. improvement programmes). The company used HIM to develop Plan templates for core operational processes including:

- **Sales Funnel.** Developing a sales lead into a new customer engagement.
- **Product Delivery.** Implementing an improvement programme for a customer.
- **Non-Standard Product Development.** Developing a custom improvement programme for a customer.
- **Standard Product Development.** Turning a custom improvement programme into a standard off-the-shelf product offered to all customers.

Shown in Fig. 9 below is a HumanEdj “Grid view” of the Plan template for the Sales Funnel process. Across the top are the Roles in the process, which in an actual Plan would be assigned to named people. Down the side are the Stages in the Plan template. The numbering is only suggestive, since the Stages may be carried out in any order, and they often run concurrently. HumanEdj Stages are used to represent sets of related goals, helping to ensure that people focus on objectives and thus work effectively.

During the lifetime of a Plan, the Stages are assigned statuses by the Plan owner, such as “Started”, “Completed”, “Cancelled”, and so on. Different Roles belong to different sets of Stages. Any documents, data or messages created in a Stage are visible to all the Roles in that Stage and only to those roles. Here we see the emphasis on mental work that is critical to learning (and a core principle of HIM), via deliverables identified and recognized as a natural part of Plan execution.

Two Activities in particular are to be noted:

1. “Initiate Non-Standard Product Development” in Stage “Develop Opportunity”, which involves the creation of a new sub-Plan for developing a custom improvement programme, if required. The sub-Plan will be based on a standard Plan template, adapted as required. If the standard Plan template is adapted, the new version may itself become a standard Plan template for use by others. The creation of the sub-Plan not only draws on organizational knowledge about custom improvement programme creation, but may well contribute to it by addition of a new special case. Here we see how the creation of a particular
sales proposal contributes to evolving organizational structure, since the way in which it was done is automatically made part of enterprise knowledge management.

2. “Initiate Delivery Plan” in Stage “Await Decision”, which involves the creation of a new sub-Plan for delivering the improvement programme. The Plan template used for this is created as part of the proposal and adapted for each customer engagement. As above, creation of a sub-Plan for a particular Delivery may well result in an adapted Plan template that can be re-used for future Deliveries of the same type. This creation of one Plan from another is typical of HIM, and can be used at any level in an organization to align operations with strategy.

Statistics from the Delivery sub-Plan are used together with statistics from the Sales Funnel Plan itself (shown for an example template in Fig. 10) and any sub-Plan for Non-Standard Product Development to generate accurate total cost for provision of the improvement programme to the customer, and hence to create a price that ensures the engagement returns a profit (or a deliberate loss).
By explicitly associating the different aspects of customer engagement with one another, the organization is making its customer-facing operations and their internal relations visible. This means not only that senior management can learn to manage the processes as a unified whole (and hence improve the way in which the organization operates), but also that new staff can learn what the organization actually does and how they fit into it. These means of learning are fundamental enablers as the organization grows, since geographical expansion means that teams are increasingly virtual and operational staff includes more and more sub-contractors rather than employees.

Further opportunities include passing on the benefits of HIM to client organizations in the form of Plan templates that support their resulting change management initiatives and help to develop their future strategy. The company has effectively started the latter already, by creating Bottom-Up Plan templates for core operations. Next steps include building a Process Architecture to represent their domain of interest, defining vision and mission at multiple levels via a Business Motivation...
Model, developing understanding of their stakeholders, and creating Benefits Profiles for the changes that they plan.

7 Conclusions

The current inexorable trends toward outsourcing, partnering, and subcontracting as the fundamental means of doing business in a globalized economy mean that it is critical to support decentralized, cross-boundary processes in which humans collaborate to reach shared goals, adapting en route in order to meet complex, changing business needs.

To deal with such processes, a new analysis paradigm is required for high level knowledge work – one that is based not on state machines in which the process is a clockwork mechanism that moves from stage to stage, controlled centrally by a single engine, but rather on object models where a process is a set of objects in different domains, whose interaction and synchronization are controlled collaboratively by agents acting on behalf of each player. This new paradigm is what HIM notation and the underpinning HIM semantics provide.

On an everyday level, the different types of knowledge work process can be understood by means of an analogy – comparing Lego and cooking. Both may involve multiple model-makers or chefs. The critical difference lies in the interaction between constituent elements (bricks and ingredients, respectively):

1. A Lego model is always exactly the sum of its original bricks – it can be disassembled at any time, since the bricks remain unchanged by usage.
2. Cooking fuses ingredients into something more than the sum of their parts – into new flavors and textures, generated by a non-reversible chemical process.

Similarly, flexible, innovative business processes (“adaptive” processes) are of two kinds:

1. A process amenable to analysis via BPM or Case Management techniques is a collection of pre-defined fragments – in exactly the same way that a modern software application is a bundle of pre-built components and/or services.
2. A process required a HIM approach, on the other hand, uses fragments only as a starting point – as the process unfolds, the participants shape the collection of fragments into something uniquely and holistically suited to the situation at hand.

Case studies (Harrison-Broninski 2011) make it clear not only that BPM and Case Management practitioners who deal with knowledge work focus exclusively on the first kind of process, but also that many such people only see processes of the first kind. Processes of the second kind are the elephant in the room – the hidden bulk of the iceberg, unsupported by mainstream techniques and tools. This hidden bulk conceals a huge amount of business-critical knowledge work, as shown in Fig. 1.
A HIMS meets the need for software support of collaborative, adaptive human work by having a basis in what Gartner Inc. calls “design-by-doing”. In its BPM Cool Vendors 2012 report, Gartner Inc. said that “design-by-doing” exemplifies the trend towards social BPM, noting that the ability to “do, then plan” – that is, to alter plans quickly and easily as time progresses and the overall goal evolves, and then reuse plans as new templates – will be useful to teams that need to collaborate on the fly, and then learn from their successes and failures (Cantara et al. 2012).

Flexible, innovative processes are currently high on many organizations’ radar. So it is worth understanding the difference between Lego and cooking, and applying the analogy to adaptive work processes. Buildings are made of bricks, but organizations are made by teams – and modern teams are usually virtual. To support collaborative, adaptive human work across a virtual enterprise, new techniques and new tools are required – HIM and the HIMS.

A key benefit from taking the HIM approach to a virtual enterprise is that it requires no training, process skills, or technical aptitude in order to understand what is going on and take part effectively. The simple intuitive approach makes it immediately clear to everyone involved what their own responsibilities are – and if they are interested, what the responsibilities of other people are. As the Plan evolves, and responsibilities change along with circumstances, the updated Stages, Roles and Activities ensure that everyone stays on the same page.

Further, it is not necessary to use specialized software. A Plan must be created via a Web browser by its owner (usually by customizing a standard template in a HIMS), but can then be used by others via standard email. The invitation message to join shows the outline of the Plan, and after that deliverables and messages can be sent and received via email messages in the usual way. Even if no-one but the owner ever uses a Web browser to do work, all deliverables and messages will be stored in the correct Stage via the owner’s copy of the Plan, and in due course will be archived when the owner marks the Plan complete.

In effect, taking a HIM approach to collaborative work allows virtual enterprises to be created and managed with close to zero technical or administrative overhead.

The global economy is undergoing a sea change. To operate efficiently and effectively in a globalized economy based on an explosive proliferation of niches, one must abandon the hopeful notion that all business processes can be defined once then run thousands of times with only minor change. One must create an operational environment in which change is not only possible, but structured, encouraged, and aligned with strategic objectives.

This means taking a much richer view of “process” – a view in which people, communication channels, knowledge, time, and plans are all managed along with the activities that are more easily visible – across multiple domains that include not only you and all your trading partners but also your customers. Bottom–up empowerment is not enough. Top–down control is not enough. Organizations need an enterprise management framework that supports both, at the same time, using the same approach.

In the twenty-first century, improving routine processes using current mainstream BPM and Case Management techniques only brings you up to the level of
your competitors. To stay ahead, and stay in the game, you need to improve the human-driven processes that cannot be fully planned in advance – and do it on enterprise scale. This requires a new approach – HIM, the HIMS, and GOOD.

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Subject-Oriented Business Process Management

Albert Fleischmann, Werner Schmidt, and Christian Stary

Abstract  Business is increasingly characterized by interactions among responsive stakeholders rather than the functional decomposition of work. The subject-oriented approach to BPM (S-BPM) is considering this requirement by sending and receiving messages enveloping functional task accomplishment. Subjects represent the information processing entities in a business process. They communicate with each other in order to coordinate their work by exchanging information which is contained in so called business objects.

Subjects are embedded into some organizational and technical environment. Agents assigned to subjects (people or technical equipment) execute the actions defined in the subject specification. Business objects can be implemented as information containers or any tangible goods which are transported between agents. This separation of logical model and its implementation increases the flexibility of business processes management, as revealed by several academic and industrial S-BPM projects. Finally, the structuring of processes models as interacting entities facilitates coordinating business process management activities.

1 Introduction

The hidden paradigm behind modeling business processes in an enterprise is based on Ford’s and Taylor’s idea of sequencing activities and taking the best in class approaches (Taylor 1911; Ford and Crowther 1922). It has once proven to be suitable for the mass production of goods. While the paradigm is still the basic design assumption for shaping business processes, the environmental and social basis for enterprises has changed significantly. Business has moved from mass good production to massive personalized services and goods, where customers can place
unpredicted change requests nearly at any time. The fact that such events occur
unpredicted does not mean they occur rarely. Research on principles of good BPM
has therefore identified the context-awareness (as the ability to be sensitive towards
the nature of different business areas) as a key principle for BPM (vom Brocke et al.
2014). In volatile environments, as given in the current situation of the economy,
the exception to the ‘ideal path’ is likely to become basically the routine. How the
reaction to such unpredicted events looks like is shown by the inflationary usage of
emails, instant messages, phone calls and meetings. It seems that communication is
about to become the new paradigm (Fleischmann et al. 2013d).

Putting massively personalized services on top of complex products asks for new
architectural structures. Ford’s hidden paradigm fails to master the resulting archi-
tectural complexity due to the lack of the concept of “communication”. Rather,
Luhmann’s sociological understanding of systems as communicating entities has
the potential to become the novel perspective on business operation (Berghaus
2011). Luhmann considers an organization as comprised of communication, the
smallest organization being the communication between two information
processing entities. Such a perspective is grounded on abstracting from concrete
actors in the first step, while putting them into their particular context when
detailing communication acts. Hence, it allows a stakeholder perspective while
preserving coherent organizational behavior (systemic perspective).

Subject-oriented business process management (S-BPM) follows this kind of
communication-oriented paradigm: Each functional step in task accomplishment is
framed by communication acts including relevant business objects. This concept
allows overcoming several deficiencies of traditional, activity-based Business Pro-
cess Management (BPM) approaches in a business world which is increasingly
characterized by unpredictable events.

The S-BPM approach has been evaluated in several industrial projects and
application domains, among them:

• IT-service management: FI-TS, an IT service provider with around
500 employees in the banking area, has specified its service order and delivery
process in S-BPM. In order to implement that process they have used an existing
tool suite (Konjack 2010). With the solution automatically generated from the
process specification several hundred process instances are handled a month.
FI-TS estimates that they could reduce their execution time by more than 20 %.
• Customer knowledge management: NEC has developed a detailed methodology
for BPM based on S-BPM which allows managing the development and main-
tenance of very complex processes in large organizations (Nakamura
et al. 2011). NEC estimates that could reduce their execution time for several
processes by more than 70 %.
• Incident management: The Swiss Telecom has implemented several processes
with S-BPM. An incident management process is used by several partners of
Swiss Telecom. In Walke et al. (2013) details can be found about an iPhone
order process. This solution allows customers to order on their own and without
the assistance of a contact center agent of Swisscoms hotline. The process was
modeled with a S-BPM modeling tool, out of that modell a workflow is
generated automatically, access to various data bases is added manually and some adaptions were made to the user interface. For monitoring the data recorded by the workflow engine are used and to create some reports ARIS PPM is used. Some much more details can be found on the presentation recorded at the S-BPM ONE 2013 which is available on Youtube (see Walke et al. 2013).

Beyond that, S-BPM is also in the production and evaluation phase at several German car manufacturers,¹ and service providers, among them TILAK, an Austrian health care provider. In the latter case, S-BPM has been embedded prototypically into a systemic approach to organizational development (Augl 2012). When transforming existing patterns of communication to contextual collaboration different professionals within (health) expert organizations need to negotiate and agree on interactions empowering the organization for high-quality patient care.

Essentially, S-BPM subjects serve as “boundary objects” for the coordination, translation and creation of shared meaning. In this way, models become accessible to discussion, validation, negotiation, and change, finally, shortening traditional BPM life-cycles and leading to an open BPM life cycle (Fleischmann et al. 2013c). However, the active participation of actors needs to be ensured. In the Austrian health care project, members of a special care unit managed to develop novel communication patterns for daily scheduling of physicians. The newly established processes contribute significantly to increased performance of the special clinic and the entire health care organization. Although the complexity has been enriched enlarging the scope of planning (now including teaching duties of staff), timely access to relevant data has been established and overall transparency of the planning process has be increased. In the following sections we introduce the S-BPM approach along some fundamental business requirements. In Sect. 2 we motivate the paradigm change from activity/function-oriented approaches to communication-oriented ones, as it enables a more flexible approach to modeling, and thus to BPM. In Sect. 3 we focus on the core activity in BPM, namely targeted modeling. S-BPM supports starting either from scratch (like in function-oriented approaches), or from a generic multi-party scheme by restricting general behavior sequences to task-specific behavior specifications. The latter bridges the gap to executing business process models, as the generic scheme provides complete, i.e. ready-to-execute behavior models. Executable subjects represent agents encapsulating subject behavior. Consequently, in Sect. 4, we address architectural implementation issues. S-BPM decouples modeling from organizational and technical implementation while preserving a coherent process execution scheme. In the second part of this section we tackle handling instances of business models in concrete organizational settings. Both, decoupling organizational and technical implementation from modeling, demonstrate the effectiveness and efficiency of S-BPM implementations, and lead to a clarification of roles in BPM (cf. Fleischmann et al. 2012a). In Sect. 5 we conclude the chapter by wrapping up the introduced concepts, and sketching current and future research activities.

¹ Because of company internal reasons it is not possible to mention the companies, the projects and results.
2 Business as Dynamic Collaborative Communication Processes

In this section we lay ground for S-BPM by discussing the cooperation and communication pattern between the involved parties and corresponding IT and communication systems. In addition, we address agility with respect to behavior – processes need to be defined in a flexible way to give people executing these processes some autonomy in their decision making. We elaborate the concept of S-BPM and its features using an example illustrating the most important capabilities. Further features like multi-subjects, process networks etc. are described in (Fleischmann et.al. 2012b).

2.1 Subject-Driven Business Processes

Subjects represent the behavior of an active entity. A specification of a subject does not say anything about the technology used to execute the described behavior. This is different to other encapsulation approaches, such as multi-agent systems.

Subjects communicate with each other by exchanging messages. Messages have a name and a payload. The name should express the meaning of a message informally and the payloads are the data (business objects) transported. Internally, subjects execute local activities such as calculating a price, storing an address etc.

A subject sends messages to other subjects, expects messages from other subjects, and executes internal actions. All these activities are done in sequences which are defined in a subject’s behavior specification.

Subject-oriented process specifications are embedded in a context. A context is defined by the business organization and the technology by which a business process is executed.

Subject-oriented system development integrates established theories and concepts. It has been inspired by various process algebras (see e.g. Hoare 1985; Milner 1989, 1999), by the basic structure of nearly all natural languages (Subject, Predicate, Object) and the systemic sociology developed by Niklas Luhmann (an introduction can be found in Berghaus 2011). According to the organizational theory developed by Luhmann the smallest organization consists of communication executed between at least two information processing entities (Berghaus 2011). The integrated concepts have been enhanced and adapted to organizational stakeholder requirements, such as providing a simple graphical notation, as detailed in the following sections.
2.2 **Subject Interaction and Behavior**

We introduce the basic concepts of process modeling in S-BPM using a simple order process. A customer sends an order to the order handling department of a supplier. He is going to receive an order confirmation and the ordered product by the shipment company. Figure 1 shows the communication structure of that process. The involved subjects and the messages they exchange can easily be grasped.

Each subject has a so-called input pool which is its mailbox for receiving messages. This input pool can be structured according to the business requirements at hand. The modeler can define how many messages of which type and/or from which sender can be deposited and what the reaction is if these restrictions are violated. This means the synchronization through message exchange can be specified for each subject individually.

Messages have an intuitive meaning expressed by their name. A formal semantic is given by their use and the data which are transported with a message. This means in S-BPM there is only the concept message in contrary to speech act theory. In speech act theory messages can have a basic semantic like request, response etc. For instance, the FIPA-ACL Communicative Act library consists of 22 communication acts or performatives (e.g. see Billifemine et al. (2007), p. 19). Moreover, these communication acts can be emulated by the basic messages used in S-BPM. In a layer below the communication structure, according to the interaction behavior of each subject, is described. Figure 2 depicts the behavior of the subjects “customer” and “order handling”.

In the first state of its behavior the subject “customer” executes the internal function “Prepare order”. When this function is finished the transition “order prepared” follows. In the succeeding state “send order” the message “order” is sent to the subject “order handling”. After this message is sent (deposited in the input pool of subject “order handling”), the subject “Customer” goes into the state “wait for confirmation”. If this message is not in the input pool the subject stops its execution, until the corresponding message arrives in the input pool. On arrival the subject removes the message from the input pool and follows the transition into state “Wait for product” and so on.

The subject “Order Handling” waits for the message “order” from the subject “customer”. If this message is in the input pool it is removed and the succeeding function “check order” is executed and so on.

The behavior of each subject describes in which order it sends messages, expects (receives) messages and performs internal functions. Messages transport data from the sending to the receiving subject, and internal functions operate on internal data of a subject. These data aspects of a subject are described in Sect. 2.3. In a dynamic and fast changing world, processes need to be able to capture known but unpredictable events. In our example let us assume that a customer can change an order. This means the subject “customer” may send the message “Change order” at any time. Figure 3 shows the corresponding communication structure, which now contains the message “change order”.

Due to this unpredictable event the behavior of the involved subjects needs also to be adapted. Figure 4 illustrates the respective behavior of the customer.

The subject “customer” may have the idea to change its order in the state “wait for confirmation” or in the state “wait for product”. The flags in these states indicate that there is a so-called behavior extension described by a so-called nondeterministic event guard (Fleischmann et al. 2013a, d). The non-deterministic event created in the subject is the idea “change order”. If this idea comes up, the current states, either “wait for confirmation” or “wait for product”, are left, and the subject “customer” jumps into state “change order” in the guard behavior. In this state the message “change order” is sent and the subject waits in state “wait for reaction”. In this state the answer can either be “order change accepted” or “order change rejected”. Independently of the received message the subject “customer” moves to the state “wait for product”. The message “order change accepted” is considered as confirmation, if a confirmation has not arrived yet (state “wait for confirmation”).

Fig. 1 The communication structure in the order process

Fig. 2 The behavior of subjects
If the change is rejected the customer has to wait for the product(s) he/she has ordered originally.

Similar to the behavior of the subject “customer” the behavior of the subject “order handling” has to be adapted.

We have only captured the basic elements of S-BPM in this section. In order to model complex process systems, processes can be connected with each other in order to build networks. Describing these networks is a straightforward task, since the message mechanism as explained above can be used on the network layer, too. A precise and complete definition of the semantics of all S-BPM modeling elements can be found in the attachment of (Fleischmann et al. 2012a). The complete formal semantic specification as an abstract state machine (Börger and Stärk 2003) has only 9 pages. Due to this precise and formal specification, S-BPM models can be automatically converted in executable code (see Sect. 4).
2.3 **Subjects and Objects**

Up to now we did not mention data or the objects with their predicates, in order to get complete sentences comprising subject, predicate, and object. Figure 5 displays how subjects and objects are connected. The internal function “prepare order” uses internal data to prepare the data for the order message. This order data is sent as payload of the message “order”.

The internal functions in a subject can be realized as methods of an object or functions implemented in a service, if a service-oriented architecture is available. These objects have an additional method for each message. If a message is sent, the method allows receiving data values sent with the message, and if a message is received the corresponding method is used to store the received data in the object (Fleischmann et al. 2013d). This means either subjects are the entities which use synchronous services as implementation of functions or asynchronous services are implemented through subjects or even through complex processes consisting of several subjects. Consequently, the concept Service Oriented Architecture (SOA) is complementary to S-BPM: Subjects are the entities which use the services offered by SOAs (cf. Sneed et al. 2012).

![Diagram: Subjects and Objects](image)

**Fig. 5** Subjects and objects
This section motivates and details the use of standard-sentence semantics for the representation of business processes, either starting from scratch (constructing models), or from generic interaction patterns (restricting interactions according the organization of work). S-BPM originates also from the observation that humans, when structuring and describing their observed reality, use subjects, predicates, and objects. Each of them can be mapped to natural language entities. As already indicated above, the subject represents the active element, the predicate the action and the object is the entity on which the action is executed. Natural language supports human communication effectively, both in written and oral form. As humans use natural language structures as primary means to ensure mutual understanding (Börger and Stärk 2003), model descriptions for formal modeling could make use of it, in order to facilitate understanding models. In order to ensure coherence of specifications, the exchange of messages determines the flow of control (in contrast to function-oriented approaches).

The S-BPM modeling language captures the above mentioned constituent elements of natural language sentences. Models describe structural properties and behavioral alternatives, including the interaction occurring in the technical and/or organizational environment. S-BPM models can be transformed step by step into an executable application in a seamless way.

Modeling means to represent parts of the observed reality in terms of languages. In case of S-BPM natural language terms are used, as they allow for universal use and are familiar to stakeholders through daily communication. S-BPM uses the standard semantics for sentences, comprising subject, predicate and object:

- A subject is the starting point for describing a situation or events,
- activities denoted by predicates, whereas
- an object is the target of an activity (denoted by a predicate).

Existing modeling approaches tend to focus on predicates or objects, adding the subject for natural language explanations of the represented information (cf. identifying function trees before specifying eEPCs in ARIS (Scheer 2001)). For a more detailed discussion of S-BPM in the context of traditional approaches see Fleischmann et al. (2012a, p. 269).

Models address both, individual work tasks, and organizationally relevant ones. In the course of accomplishing their tasks, stakeholders receive work inputs and pass on results. Hence, interaction and communication, either direct or indirect, are to be considered as an essential activity for subject-oriented modeling.

Figure 6 contains the natural language description of a customer order process. It is the initial version of the order process we have also used above.

This simple order process can be modelled following two different approaches (Fleischmann et al. 2012b). They differ by the starting point of building a process specification. The traditional approach (modeling through construction) starts from
the scratch (‘empty sheet’), and the process model is constructed step by step. Task-relevant actors or systems need to be identified as the process specification evolves, and the lines of interaction need to be included as required for task accomplishment. The other approach (modeling through restriction) is only available in S-BPM. It starts with a generic process model which is restricted step by step. The generic process can be compared with the behaviour when each involved stakeholder uses e-mail: Each stakeholder can communicate with another stakeholder he or she is linked to. A process is derived from such a completely networked structure by removing communication lines step by step that are not relevant for business achievements. In the course of modelling the lines of interaction between subjects are adapted to those required for task accomplishment.

In the following both approaches will be explained in detail. In Sect. 3.1 the stepwise construction of a communication-based process model is detailed. In Sect. 3.2 the stepwise reduction of interaction between actors or acting components is explained. In either cases, actual or envisioned business processes need to be represented in a transparent and traceable way. Finally, in Sect. 3.3 we refer to tangible tools facilitating work knowledge elicitation and its subject-oriented representation.

3.1 Modeling by Construction

Subject-oriented modeling of processes applying the construction approach includes the following major activities:

- the subjects involved in a process,
- interactions they are part of,
- the messages they send or receive through each interaction, and
- the behavior of each subject encapsulating functions and interactions

In the following we detail them according to major modeling concerns.

3.1.1 Who Am I and Who Needs to Be Involved? Subjects and Their Interactions

As already mentioned subjects are abstract resources representing the parties involved in a process the modeling process might start with identifying the involved...
subjects the messages they exchange. The result of that step is the Subject Interaction Diagram (SID) or communication diagram as it is already shown in Fig. 1. After that step the behavior of each subject is defined.

3.1.2 How Do I Operate? Subject Behavior, States and State Transitions

Subject behavior is described by three states (send, receive, internal function) and transitions between these states. These states represent predicates (operations), which means, that they are active elements of the subject description. Services are being used to implement the states and state transitions necessary to exchange and manipulate business objects. When specifying the behavior of each subject, as shown in Fig. 3 for the customer and order handling, a sequence of sending and receiving messages, and activities to be set for task accomplishment need to be represented.

3.1.3 Which Objects Do I Have to Manipulate? Services and Business Objects

The description of a subject defines the sequence of sending and receiving messages, or the processing of internal functions, respectively. In this way, a subject specification contains the sequence of predicates. Predicates can be of the type “send”, “receive” or “internal function”, the latter dealing with specific objects, such as required when a customer orders some products. As a consequence at least one operation needs to be assigned to each state. Detailing the operations is not necessary at the modeling stage. It is a matter of an abstract object specification or of the integration of an existing application. As an example the operation could be represented by a transaction of an ERP system related to the regarded object, for instance the update of an order master data record. Figure 5 shows how the predicates of a subject are defined by means of objects.

As we abstract from implementation details in the course of modeling, it seems suitable to replace the term ‘operation’ by the more general term ‘service’. A service is assigned to a state and thus triggered and processed if the state is reached. The name of the states and the names of the assigned services can be different as shown in Fig. 5 because in a state several services can be used in order to define the required functionality executed in a state. The end conditions correspond to links leaving the state. Each result link of a sending state is assigned to a named service. Before sending this a service is triggered to identify the content or parameters of a message. This service determines the values of the message parameters transferred by the message. Similarly, each output link of a receiving state is assigned to a named service. When accepting a message in this state that service is triggered to identify the parameters of the received message. The service determines the values of the parameters transferred by the message and provides them for further
processing. All services are triggered in a synchronous way, i.e. a subject only reaches its subsequent state once all services called in a certain state have been completed.

### 3.2 Modeling by Restriction

The restriction approach in S-BPM starts with an overall generic process model. This generic model represents some kind of chaotic process: Everybody communicates with everybody whenever he or she wants. The first modeling task is therefore to restrict the number of participants. This means modelers have to decide how many subjects are involved in the process to be described. In a scenario everybody is communicating with everybody the behavior of the involved subjects is identical. However, starting with generic process templates that are only defined by the number of involved parties a process can become more concrete step by step. The procedure requires several restriction steps:

1. Specify a generic template according to the number of parties involved in handling a certain business case (cf. Fig. 8)
2. Name the subjects accordingly
3. Remove message connections between subjects which are not necessary
4. Name messages and introduce message types accordingly
5. Adapt specification to actual subject behavior
6. Refine the structure of the business objects transmitted by the various messages

In the following subsection these steps are exemplified.

#### 3.2.1 Who Needs to Be Involved? Generic Process Model

Figure 7 shows a generic subject-oriented process model with three involved parties. It fits to the number of subjects we expect for the customer order process. This means a modeler needs to identify the number of subjects in a process initially. This is the only information he/she needs for the first step. Each of the parties exchange messages with another party. We want to show how this generic process is restricted step by step in order to get a process specification for the customer order process as described in Figs. 7 and 8.

Each subject can send messages with the name “Message” to any other subject any time. Figure 8 shows the behavior of the subject with the name “Subject1”.

In the select state a subject decides whether it wants to send or to receive a message. To start a workflow it does not make sense to receive a message because all the other subjects are waiting for messages. This means the start subject will start with sending messages and the message exchange can begin. Choosing the send transition the subject goes into the state “prepare message and select address” and fills out the business object that is transmitted by the message “message” (see end of...
After that the subject decides to which other subject the message with the business object as content will be sent.

In the select state a subject can also decide whether it wants to receive a message. If there is a message for the subject available it can be accepted and a follow up action can be executed. It is not specified what the follow up action is. This is like receiving an e-mail. The receiver can interpret the content of an e-mail and knows what the corresponding follow up action is. The abort transitions back to the select state enable to step back in case a subject has made the improper choice.

The representation scheme can be easily created for any number of participants, following the same principles as shown for 3 parties. The behavior of each subject has to be adapted to the number of subjects in a process. In the send area transitions are required to send a message to every single new subject, and the same is necessary for the receive area. With that extension scheme the behavior for each type of multi-party process can be generated automatically.

Utilizing the message “Message” a business object is sent. The structure of this business object corresponds to the structure of a traditional e-mail with extensions like subject (attention: here the word “subject” has a different meaning. It can mean topic, issue, theme etc.), keywords and signature. Figure 9 depicts the specification of the business object “Message” in an XSD notation (XML Schema Definition).

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2 This choice can make sense for a start subject, from the second time on it goes into the select state.
3.2.2 How Do the Stakeholders Need to Interact? Adaption of Generic Scheme

Following the restriction steps in Sect. 3.2 a process specification is developed corresponding to the business requirements. In our example these steps result in a communication structure as shown in Fig. 10 and a behavior specification of the subject “customer” as shown in Fig. 11.

A comparison of Figs. 11 with 2 shows that modeling by restriction and construction does not necessarily result in identical models. Nevertheless both models need to deliver the requested business results.

With each restriction step the guidance for the subject holders is becoming more stringent to their actual task accomplishment. In this way, a subject-oriented system specification can guide the parties in a process for organizational development.
3.3 Tangible Modeling Support

S-BPM modeling is currently supported by various tools. Besides traditional computer-based 2D-modelling tools there exist modelling tools with tangible interfaces. These interfaces have been developed for supporting people who are not familiar with process modelling to capture their process knowledge. The tools help people to participate in creating models of those processes they work in, without forcing them to learn how to handle complex modelling tools (Fleischmann et al. 2013c, 2014a) – see Fig. 12.

![Fig. 10 Subjects and exchanged messages](image1)

![Fig. 11 Instantiated behavior of the subject “customer”](image2)
Metasonic touch is a table on which the behavior of a subject can be described. Each activity type (Receive, Send, Do) is represented by a block with a different colour: Red for send, green for receive and yellow for doing. The lines between the states are drawn that the states which should be connected short are brought in contact with each other. The model created on the table is directly stored in a PC and can later changed by a common modeling tool. People who are involved in a process and have to define their behavior can stay around a modeling table and cooperate in a natural way to describe their subject behavior. The table produces a very communicative work atmosphere.

The experience with the modelling table are motivating for further research with tangible interfaces. One prerequisite for tangible interfaces are a very restricted number of symbols because of the number of clear colours and forms.

4 Implementation

In this section we first detail the benefits of decoupling (subject-oriented) business process models from implementation details while designing their organizational embodiment (Sect. 4.1). Then we discuss the capability of S-BPM model representations to be executed after validation without further transformations (Sect. 4.2).

4.1 Architecture Definition: Subject, Roles, and Agents

A set of subjects compose a business process. As already shown subjects can execute three different types of actions: Sending messages to other subjects, receiving messages from other subjects, and performing local actions on business objects. Business objects are transported via messages from the sending subject to the receiving subject. Local actions executed on a business object, such as creating, deleting or changing the object, can be considered as method invocations as known from object-oriented software development (see Fig. 13).

Agents are entities which are capable to execute actions. Each agent can be involved in several processes, where the same agent can enact different subjects
across different processes. In turn, the same subject can be enacted by a single agent in one process or by a group of agents in another process. Roles are generalized combinations of subjects from different processes, cast into functional positions within the agent organization.

Roles are assigned to specific agents that execute the actions defined in subject descriptions. Agents can be people, software programs, robots etc. As a result, subjects may be enacted by heterogeneous groups consisting of different agent types. For instance, an “Order handling” subject may be enacted by a group of two interacting agents: software controlling the order handling workflow, and a human user entering required data.

Processes can be executed in different parts of an organization. The role “warehouse worker” acting in various processes exists in any subsidiary of a company. The role is the same but it is executed by different agents. A corresponding example is shown in Fig. 14.

In Fig. 14 two processes are shown: the ordering process, and a vacation application process. The role “Order handler” consists of the subjects “Order Handling” and “Employee”, and the role “Warehouse worker” consists of the subjects “Employee” and “Shipment”. The role “Order handler” is assigned to the group “Order Dept.” and the role “Warehouse worker” to the group “Warehouse Dept.”. The agents “Florian” and “Katrin” enact instances of the subjects “Order Handling” and “Employee”, and the agents “Josef”, “Christian” and “Thomas” enact instances of the subjects “Shipment” and “Employee”.

The embedding of subjects into a socio-technical environment can be complex. As an example there might exist the rule that instances of the subject “shipment” has to be executed by agent “Josef” for a certain group of customers and by “Christian” for a different group etc. This means process models need to be embedded in their specific organizational setting, called process context or just context.
A more detailed discussion about the relationship between subject-oriented processes and organizational aspects can be found in Fleischmann et al. (2012a, 2013e) and Lawall et al. (2013).

4.2 Automating Execution: Instances of Processes and Subjects

A process model including its embedding in its environment is only a pattern in order to properly react to certain business events. If the business event occurs, an instance of the process model in the corresponding environment is created in order to handle that business event. Such a business event can come from outside or inside of a process system. A business event from outside can be that a person wants to order some products. In order to handle that self-created event properly, an
instance of the corresponding process model is generated. This can be implemented by using a defined order number which is on each related document (in BPMN this id is called correlation key).

In S-BPM an instance is a complete, executable copy of the corresponding process model in the environment to which the business event belongs. An order arriving in subsidiary A causes the creation of a process instance in the environment to which subsidiary A belongs. An order arriving at subsidiary B causes the creation of an instance in its respective environment. Using that copy the business event is handled.

The creation of a process instance is not only caused by humans. It can also be caused by certain data states, a timer or by instances of other processes belonging to the same process network. Process instances can be created by subjects in other process instances if they send a message to a subject of a connected process and there is no corresponding instance which is related to the sending process instance. Then a corresponding process instance is created and linked with the initiating process.

5 Conclusion

Changes in society and business require different paradigms in business process management. Most of the current BPM approaches are still based on Taylorism and Fordism. In the Post-Fordism era job enrichment, self-management and communication have become central issues. Parties involved in processes want or need to organize their work by themselves. In global, highly distributed business operations known but still unpredictable events have become routine. Therefore communication-based BPM approaches have to recognize also spontaneous communication activities. Unpredictable activities like changing orders need also to be covered by suitable specification elements. In this chapter we have described such an approach.

S-BPM requires stakeholders to take responsibility for organizational developments by getting skilled in specifying business processes. This task should not be too challenging, as S-BPM models utilize natural language constructs (subject, predicate, object) and e-mail-like communication patterns between actors (subjects). In this way, individual members of an organization are enabled to contribute to coherent and intelligible process specifications. Moreover, resulting specifications can be processed without further transformation after validation.

The current state-of-the-art in S-BPM is just the point of departure for further developments:

- S-BPM lays ground for integrating social media communication in business procedures. As its common ground is the exchange of messages, informal relations between stakeholders need to be researched, in order to understand
business operations better and to implement sophisticated concepts, such as highly interactive customer knowledge management.

- Individualization of task accomplishment could be enforced on the basis of normative business operations, also termed standard operational procedures: S-BPM-models allow describing how to achieve a work result in a variety of ways in a coherent and consistent way. The actor/role/system-specific encapsulation of behavior in S-BPM is the key enabler for allowing diversity.
- Coopetitive behavior can be implemented on a process level. Competitors joining (ad-hoc) networks for innovative biddings or service provisions can keep their organizational assets encapsulated, offering only communication interfaces while hiding operational details as part of their USP.

Each of the above mentioned issues represents a research topic that should enlarge the scope of applying BPM, as even private, but societally relevant processes require stakeholder-specific communication and interaction.

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Knowledge Engineering in Business Process Management

Dimitris Karagiannis and Robert Woitsch

Abstract Business Process Management (BPM) has become a commodity nowadays. It has undergone an evolution from the initial business process re-engineering in the 1980s to a well-established management approach, which is extensively discussed in this book (See introduction chapter of Harmon on the Scope and Evolution of Business Process Management). This chapter deals with the increasingly important domain of knowledge-sensitive BPM as a current challenge imposed from semantic web, the cloud, social networks or Web 2.0 not only to provide new technologies for BPM but also trigger a cultural change of people involved. Three aspects of knowledge sensitiveness in BPM are proposed. First, BPM can be seen as a domain itself focusing on BP-frameworks identifying basic concepts such as business model, domain, regulation, or model processing (See introduction chapters by Rosemann and vom Brocke on the Six Core Elements of BPM). Second, BPM needs to be applied using a management method such as the BPMS methodology. Third, BPM needs to be executed within an environment; hence, it is deployed. BPM can be seen as a basic concept for corporate knowledge leading to knowledge-sensitive BPM. Studying the knowledge-sensitiveness two forms of interpretation are distinguished: (1) knowledge engineering (KE) focusing on machine interpretable knowledge and (2) knowledge management (KM) relating to human interpretation of knowledge. In the following, the focus lies upon KE distinguishing three viewpoints: (a) KE is established in BP-frameworks as a realization within the used meta models for those frameworks; (b) knowledge-intensive actions within the BP method – which is typically performed by business process (BP) analysts – is supported by KE techniques; (c) deployment of BPM
within a typical execution environment is likely including knowledge-based applications, hence those knowledge concepts need to be reflected. KE techniques are proposed for the areas above and empirical experiences as results of research projects are described. As a conclusion an outlook on the conceptual and technical integration summarizes the chapter.

1 Introduction

Business Process Management (BPM) is an established management approach, although there is a controversial interpretation among the different disciplines between information management, business informatics, or software engineering in computer science (see Hammer 2014; Harmon 2014; Rosemann and vom Brocke 2014). The common understanding is to interpret working procedures as directed graphs, to map these working procedures of the real world into formal models, and to finally make them operational. In knowledge-intensive enterprises and especially those involving knowledge worker this original paradigm need to be adapted in order to introduce flexibility, although the aforementioned principle to impose a formal structure is the same. The operational aspect is underlined by different deployment approaches as for social deployment, like but not limited to organizational regulations, space management, so-called pockets of creativity, platform teams or incentives, or technical deployment like but not limited to workflow management systems (WfMS), service oriented architecture (SOA), semantic interoperability, Customer Relationship Management (CRMs), portals, or enterprise application integration and enterprise 2.0 solutions.

One of the current roles of BPM can be shown in the prominent sample of the business and IT alignment. The importance of BPM is demonstrated, as business and IT alignment is no longer seen as a “nice to have,” but as a “must-have” to ensure that IT infrastructure is aligned with business. This critical assessment of BPM is underlined by the provocative Gartner survey (Gartner 2006) that eight out of ten American dollars invested in IT are “Dead Money” as they are “. . .not contributing directly to business growth.” European investments in IT are estimated to be EUR 315 billions per year.

The complexity of BPM is assessed by the observation that currently there is a shift from data-rich to information-rich to service-rich (http://complexsystems.lri.fr/Portal/tiki-index.php?page=SOS+Homepage&bl) structures in economies, business, and social communities. Through the rapid development of IT, new services that share resources and configure inter-organizational workflows, have been developed. These technologies are “moving up” the technology stack to influence

3 See book chapter by Jerry Luftman (2014) on Strategic Alignment Maturity.
not only technical computation but also tasks that require human interaction. Developments such as service-oriented architecture (SOA), service-oriented knowledge utilities (SOKUs), software as a service (SaaS), virtualization, systems of systems\(^4\) or currently the omnipresent cloud are influencing the way IT infrastructure and services are rendered for business processes (Karagiannis et al. 2008; vom Brocke 2007b).

BPM is a commodity today and is acting as a mediator between business models, regulations, application domains, and model processing, establishing the required performance as well as ensuring the required compliance. This means BPM needs to balance between assuring compliance and raising performance.

Knowledge engineering (KE) is a promising instrument to support BPM in order to support achieving this balance. In order to structure this chapter we propose three different viewpoints for KE in BPM:

1. BPM is interpreted as a domain on its own.\(^5\) As BPM includes several aspects, such as realization approaches, tools, or modeling approaches, it is necessary to focus on the basic concepts that are BPM specific. Independent how BP-frameworks are structured, we argue that KE can always be applied in model processing, as conceptualization is commonly performed by model-based formalization. This is described in Sect. 2.

2. Each BPM approach requires a concrete instantiation in order to be based on organizational context. This is typically performed by applying management methods; therefore, Sect. 3 describes KE in supporting such BP management methods.

3. As BPM needs to be operational, it is deployed into the organizational/IT landscape, as the execution environment will likely consist of knowledge-based applications, we argue that the applied BPM approach also needs to be aware of the applied KE technologies. Section 4, therefore, reflects KE in BP-deployment.

Figure 1 introduces the structure of the chapter and visualizes how the two approaches - BP-frameworks and KE are linked. The so-called knowledge space represents a particular domain in which knowledge is provided – in this chapter the domain is “BPM support”. Knowledge space can be structured, according to a number of dimensions, whereas we are concerned with the interpretation of the knowledge distinguishing between machine interpretation and human interpretation.

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\(^4\) A system of systems (syn. hybrid computing system) is a system composed of (super-) computing resources of different architectures. They are tightly coupled, interconnected by high-speed network and are treated as a single system.

\(^5\) See book chapter Hammer (2014) providing insights as to what the BPM domain is about.
Hence the knowledge space is represented either focusing on human interpretation – in case of knowledge management – or focusing on machine interpretation – in case of KE.6

2 Knowledge Engineering in BP-Framework

“The initial objective of Business Process Management is to capture the guidelines and business rules for an enterprise which govern the way it functions: how a task is processed, which jobs have to be performed, responsibilities and qualifications of actors, and so forth” (Karagiannis 1995).

These guidelines and business rules are usually very general and could be applied to different situations. Especially knowledge workers require a much

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6Davenport (2014) explores a particular aspect of knowledge in BPM, i.e. how BPM can facilitate knowledge work. As opposed to the general knowledge engineering approach presented in this chapter, Davenport presents process-oriented approaches tailored to the specific requirements of autonomous knowledge workers.
more flexible form of conceptualization. BPM starts with this observation in order to capture the business process by applying various acquisition techniques, ranging from top down approaches either in form of pragmatic modeling or ethnographic surveys or bottom-up approaches in form of log, messages or event mining, are distinguished. Once business processes are captured, the aim is to transform the working procedures in appropriate formal representations (Junginger et al. 2000), thus enabling model processing.

In the following section we discuss the question how KE techniques can be used to enrich the BP-framework. First, possible elements of the BP-Framework are discussed and second, KE is introduced to conclude that both can be model-based resulting in the proposed meta model approach enabling KE in BP-frameworks. As a conclusion of this section solutions are presented that have been demonstrated in research projects.

2.1 BP-Framework

The BP-framework is seen as a set of assumptions, concepts, values, and practices that constitute a way of interpreting BPM. In order to approach the discussion on knowledge-sensitive BP-Frameworks a possible categorization is discussed in order to better stress possible injection of KE: (1) business models, (2) domain, (3) regulations and (4) model processing using a model-based approach. In the following, the concepts are briefly discussed in order to stress the possible conceptualization using models and to argue for relevant KE injection.

2.1.1 Business Models

There are several frameworks for describing a business model that are seen as “...a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm” (Osterwalder et al. 2005).

Independent from the selected business model framework, there are common artifacts of a business model such as but not limited to the external factors, - market situation, competition, regulations, and social and technical environment - as well as the internal factors, - business strategy, business organization, and technology.

Model-based approaches provide appropriate concepts and enable the conceptualization of business models. A recent prominent model-based approach is the business model canvas (http://www.businessmodelgeneration.com/canvas) by Osterwalder that provides generic concepts for business models.
2.1.2 Domain

Domain is understood as application domain for BP-frameworks, hence we do not focus on the domain of BP like bank or insurance sector, but on different management instruments applied on BP-frameworks. Based on the experience of a BPM consultancy, we distinguish: (1) process documentation, (2) process optimization, (3) process cost calculation, (4) process performance management, (5) capacity planning, (6) risk management, (7) quality management, (8) Six Sigma, (9) Sarbanes-Oxley Act (SOX), (10) software requirement engineering, (11) service-oriented architecture, and (12) IT security management.

Typically the domain-specific usage of BPM requires certain behavior and constructs that are provided by modeling languages used for BPM. Usually common modeling languages for BPM support most of the aforementioned domains.

2.1.3 Regulation

Regulations define local dependencies to the application domain and to the BPM approach that can be divided into legal regulations, business regulation, or technological regulations (Karagiannis et al. 2007).

Business regulations are commonly agreed approaches and standards, technological regulations use technical frameworks to enable interoperability, whereas legal regulation frameworks in a given context are mandatory in a given context to be applied by organizations.

BP-models are typically used to support, implement or ensure compliance according to aforementioned regulations. Appropriate concepts describing the relevant aspects of the BP in sufficient detail are required. Selecting the correct modeling language is a challenging task as the BP-modeling language needs to cover all relevant aspects of required regulations.

2.1.4 Model Processing

Model processing is the entry point for KE in BPM-frameworks as the conceptual representation enables the use of KE approaches. Model processing in this context is a series of automated operations on models that retrieve, transform, or classify information for further use.

As the processing is independent of the previously mentioned sample categories like business models, domain, and regulations, it is reasonable to use model processing for KE in order to have a domain agnostic view on KE in BP-frameworks. Samples of KE in model processing are: (1) Business processes can be interpreted as ontologies, (2) Business rules and business processes are integrated in one modeling language or (3) Ontologies can be used to annotate business processes.
KE for model processing establishes a direct use of KE within model processing and an indirect use of KE for the whole BP-framework, as when instantiating the framework for a concrete case, all dimensions are represented in models.

### 2.2 Knowledge Engineering for BP-Framework

Before discussing different knowledge support, it is important to distinguish between KE that is prioritizing machine interpretable knowledge and knowledge management (KM) that is prioritizing human interpretable knowledge.

The history of KE started in the 1940s when the first attempts of artificial intelligence were made. After an initial hype, disillusionment, and first commercial success, KE can be found today in semantic technology (Karagiannis and Telesko 2001). A prominent vision is “Semantic Web” that is seen as the “upgrade” of the current content-driven web with linked data or agent based approaches.

KM, in contrast, evolved out of the KE community and has its origin in 1995. It is a holistic view on the knowledge space that considers human interpretation (Woitsch 2004; Mak 2005; vom Brocke 2007a).

In both cases, model-based approaches provide concepts for the formalization although the level of formalisms is different. Humans have the ability to interpret incomplete, partly corrupted models or intentionally unstructured process parts like standard operating procedures, guidelines, checklists or pockets of creativity. Machines require knowledge representations in a complete and correct manner like formally correct ontologies, goal models to configure agents or first order logic.

Both knowledge approaches use models to conceptualize. The knowledge space specifies the domain, encapsulates its content, and provides semantics for its interpretation. Hence, the knowledge space identifies KE for BP-framework.

#### 2.2.1 Model-Based Representation of BP-Framework Knowledge

The knowledge space is described by four dimensions: (1) form, (2) content, (3) interpretation, and (4) use, which is introduced in Fig. 2.

Form: represents the syntax and semantic, such as a group of human experts, text documents, models, program code, mathematical forms, or statistics. In our sample applying KE for BP-model processing, the form is typically understood as modeling languages for BP-models. Nearly all models in BPM are of linguistic type that can be further distinguished in being realized with textual or graphical/diagrammatic languages (Kalfoglou and Schorlemmer 2003). Independent on the selected model representation, this representation needs a corresponding formalism in order to enable IT support.

Content: represents the domain, in which KE is applied. When applying KE for model processing, we interpret the concrete BPM approach that realizes the BP-framework as content in form of models.
Use: defines how KE is applied for model processing such as the mediation and mapping between modeling languages, the managing and evolution of models, the documentation, transformation, analysis, simulation, or similarity checks. Interpretation: the representation of knowledge is either focused on machine interpretation – in terms of KE or on human interpretation – in terms of KM. KE in BP-frameworks focuses on machine interpretation, applying formalisms that represent knowledge for model processing. In the following, mechanisms and tools are discussed for KE in BP-frameworks.

2.2.2 Model-Based Approach for KE

Models enable the externalization of knowledge in a machine interpretable form. Originally, expressions of knowledge are based on symbols like rules, frames, logic, predicate logic, or concept maps to express static and dynamic knowledge. Fuzzy logic had been introduced enabling a transformation from natural text into fuzzy logic as aforementioned knowledge representations are difficult to be correctly applied by domain experts. For completeness reasons we state sub-symbolic approaches such as neuronal networks, which are an imitation of human brain.

Prominent samples for current applications are ontologies, bayesian networks, rule models as well as goal models for agent based approaches.

Consequently, KE in BP-frameworks can be applied using a model-based approach covering original approaches and applying currently used applications. Therefore, the challenge is how to conceptually link KE in BP-frameworks with models.

2.3 Conceptual Integration of KE and BP-Framework Using Models

Concept models are considered as an instrument to formally specify both (a) the BP-framework as well as (b) KE. Hence, a conceptual integration of BP-framework models with KE models can be established using a model-based approach.
A solution is the application of a meta-model approach for the BP-framework as well as for KE to enable the integration of these two meta-models. The meta-model approach is introduced in Fig. 3 depicting the layered model stack by Strahringer, adapted by Karagiannis (Strahringer 1996; Karagiannis and Höfferer 2006).

Models are seen as “representation of either reality or vision” (Peters and Ozsu 1993), representing the real world in an agreed syntax and semantics. The modeling language is defined by syntax, semantics, and notation that provide the necessary modeling primitives in order to build the model. The concepts that describe the modeling language are defined in the meta-meta model language, which leads to the well-known model layers depicted in Fig. 3.

The meta-models are therefore seen as a modeling language that can be used to generate models. This enables the distinction between meta-models for BP-frameworks – such as BPs – and meta-models for KE – such as business rules. In case both model-based approaches are realized using meta-models, it is possible to integrate both model-based approaches.

2.3.1 Meta Model Frameworks

A prominent framework for BP-Framework-meta models is the ADOxx® meta²-model, which has been researched at the University of Vienna, and implemented in the commercial tool ADONIS® (Bayer 2001; Junginger et al. 2000; Karagiannis et al. 1996; Karagiannis and Höfferer 2006).

This meta² model provides not only the basic meta-modeling classes that are necessary to define a modeling language such as class, attribute, and relation, but it also introduces several concepts for the specific BP-support, such as model types, views, attribute profiles, and predefined classes for directed graphs for business processes and non directed graphs for organizational structure. Information on how to develop meta models based on ADOxx® is provided by the Open Models Initiative Laboratory (www.omilab.org).
The commercial products ADOscore®, ADONIS®, ADOlog®, and ADOit® demonstrate the applicability of this approach.

Another prominent framework is MOF – meta object facilities (http://www.omg.org/mof/) – from which the ontology language OWL and the rule language SWRL can be deduced (http://www.w3.org/2007/OWL/wiki/OWL_Working_Group). MOF is a candidate for object-oriented enterprise modeling, and therefore, used for the object-oriented approach via ontologies. KE modeling languages such as semantic standards are often derived from MOF.

The challenge relates to the integration of meta models derived from MOF – which are used for KE representations – with meta models derived from ADOxx® – which are used for BP-framework representations and to enable syntactical and semantic linkage.

2.3.2 Integration of KE in BP-Framework Using the Meta Model Approach

The usage of meta-models for the BP-framework as well as for KE enables the transformation, exchange, reference, and integration of meta-models and other models (Kühn 2004; Kühn et al. 2003). Applying the meta-modeling approach for both the BP-framework and KE, it is possible to apply meta-modeling merging patterns to realize KE in BP-framework. The challenge of integration is on a concrete model level. There are different approaches like formal structure, formal behavior, semantic or model-based.\(^7\) In the following relevant merging patterns are introduced to integrate BP-framework models with KE models.

**Reference pattern:** The reference pattern defines links that relate one element in the BP-framework meta model to one element in the KE meta model. A BP-framework, for example, can be further specified by providing links to an ontology to enable the semantic description of a BP object within an ontology.

**Extension pattern:** The extension pattern specifies how the BP-framework can be extended by concepts of KE. New concepts can be integrated, for example, in form of rules. This means that a rule model can be integrated in BP-models.

**Transformation pattern:** In the transformation pattern, part of KE models is created by parts of BP-framework models. In our domain this mechanism enables for example the generation of an ontology out of a business process.

**Merge pattern:** The merge pattern can be regarded as a specialization of the transformation pattern, where a merge rule generates a part of the KE model from two or more BP-framework models.

2.4 Project Solutions for KE in BP-Framework

In the following, a number of project solutions are introduced that have been realized with ADOxx® and different KE scenarios.

1. **The reference of business processes to abstract services for an abstract workflow** has been applied in the LD-Cast ([www.ldcastproject.com](http://www.ldcastproject.com)) project. The goal was to combine three different systems, one storing the business processes, one handling the ontology and a third one storing the annotation between business process tasks and services. In this setup, BP-framework has not been extended with ontology but a so-called “RDF-Tunnel” has been introduced that is responsible for the annotation management between the BP-framework of ADOxx® and the KE-framework with ATHOS. Both systems have been technically encapsulated using web services providing relevant interfaces and a third system called “RDF-Tunnel” managing the references between business processes, abstract services and aligning ontology concepts. This architecture is regarded as a complex integration of BP-frameworks and KE but provides full functionality for both, the model processing within the BP-framework and the knowledge processing within the KE.

2. **Extension of business process models with business rules** has been done in the FIT project ([www.boc-group.com/research](http://www.boc-group.com/research)). The goal was to provide a process modeling framework for e-Government offering both (a) business process modeling as well as (b) business rule modeling environment. The ADOegov® business process modeling framework has been extended by three model types to offer business rule models and by one ontology model. These business rules follow the SWRL specification, and require ontology references for the term definition. Parts of the OWL specification have been implemented into the business process management framework. The extension enables the use of rules and ontology concepts within business processes.

3. Combining **extension and reference of business process models with full fletched ontologies** has been applied in the AsIsKnown ([www.asisknown.org](http://www.asisknown.org)) project. The goal was to develop a workflow that acts as an online shop assistant providing assistance according to user profiles. Users on the web-shop for home textile were guided to questions to offer most appropriate products. The challenge was that a full fletched ontology was better maintained in the appropriate ontology management system (OMS) and hence a close – conceptual – linkage to the business process management system had to be developed. The solution was a combination of the “extension” and “reference” pattern. The business process model was extended by a so-called “transit model” that represents a copy of the relevant ontology concepts. This “transit model” had special behavior to ensure synchronization with the OMS. This “transit model” was referenced to the original OMS concepts, in case ontology feature were necessary. Functions such as the inference mechanisms have been performed by the OMS. Additionally a lexicon has been referenced out of the BP-models.
In this case the business process model acted as an orchestrator for the web-shop that was simple to maintain by the domain experts. In case inference was needed, the business process modeling tool automatically forwarded the request to the OMS using the references.

4. The Transformation of business process models into ontologies has been applied in BREIN project (www.eu-brein.com). The goal was to create an ontology using process models (Karagiannis et al. 2008). In order to use a semi-formal description of business process models to better involve domain experts, ADONIS® Community Edition (www.adonis-community.com/) has been used to model business processes. Mapping rules have been created to transform these business processes into domain ontologies. The challenge is the semantic enrichment of mapping rules as pure syntax transformation is insufficient. In case the semantic enrichment is insufficient continues evaluation and improvement needs to be performed by knowledge engineers. This leads to a complete domain conceptualization that has been applied for service discovery and agent-based SLA negotiation within a grid middleware.

Currently a similar approach is applied in the BIVEE project (www.bivee.eu). Processes are modeled in BPMN notation and are transferred into an ontology representation. Here the ontology language BPAL (Missikoff et al. 2011) is used that provides additional concepts for business processes.

Figure 4 stresses the different integration approaches of KE into BP-frameworks, whereas the white boxes represent the BP-meta model and the grey boxes represent the KE meta model.

3 Knowledge Engineering in the BP Management Method

This section discusses the second possibility to inject KE into BPM, by applying KE within the method to ground BPM into the organizational context.
3.1 Organizational Context of BP-Framework

Organizations have their history, terminology, organizational culture, and system environment that influence their BPM. Change management and cultural influence are important challenges that are reflected in the chapters in this book, grouped as people and culture. Participatory involvement of knowledge workers is essential and can be supported by KE.

3.1.1 The BP Method

Setting the BP-framework into a concrete organization requires a BP management method. We introduce Business Process Management Systems (BPMS) as a method that can be interpreted as a high-level life cycle consisting of five processes (Karagiannis et al. 1996):

1. **Strategic decision process** is triggered by strategic decision to select the appropriate approach, identify the process in question, and specify the required resources.

2. **Re-Engineering process** is concerned with a detailed insight of the selected processes and demonstrates all activities, their links and relationships, involved persons, and connections to the external environment. Typically this process deals with the conceptualization using business process models. The design part is concerned with the mapping of the real world in a modeling environment, whereas the modeling part is concerned with the change and adaptation of the models in order to achieve more efficiency.

   This phase is probably the most interesting one in order to decide if KE can be injected into a BP management method. Depending on the selected approach there are different possibilities to support knowledge engineering in the form of planning tools, animation tools, or simulation tools. The design and modeling phase allows also to a large extent include domain experts and knowledge workers to participate in the business process model conceptualization.

3. **Resource allocation process**: The main objective of the resource allocation is to align the business with concrete IT-infrastructure, in terms of IT-based deployment or with concrete organizational units, in terms of human-based deployment. This process became more important during the last few years, as the paradigm of a fixed IT-infrastructure changed dramatically. Model driven-architecture, service-oriented architecture, and software as a service, cloud, enterprise 2.0, social networks and public available collaboration platforms changed the nature and role of traditional workflows. They need to consider human involvement, collaboration and orchestration within virtual organizations. Semantic enrichment plays therefore a role in this phase.

4. **Execution process**: This process deals with the concrete execution of workflows or the concrete execution of business processes. As mentioned, BPM enables the social as well as the technical deployment (Karagiannis 1994). One of the
challenges is to interact with technical services in the same manner as with humans (http://download.boulder.ibm.com/ibmdl/pub/software/dw/specs/ws-bpel4people/BPEL4People_v1.pdf). The “virtualization” concept that has originally been used in the Grid community (http://www-fp.mcs.anl.gov/foster/Articles/WhatIsTheGrid.pdf) now finds its way to the cloud.

5. Performance evaluation process: This process collects concrete operational data about the execution of business processes and integrates them into different evaluation frameworks. Hard fact data collection is performed by logging of execution data to enable data mining, visual data mining, text mining or visual text mining. Current log, web, or social network mining tools extend semantic information to make the monitoring domain-specific. Additionally, soft facts can be acquired by questionnaires allowing an integrative cockpit to monitor and evaluate.

3.1.2 Knowledge Intensive Actions in the BP-Method

In the following, the focus is on the transformation from real world into formalisms. This phase can be categorized into five knowledge-intensive actions.

Figure 5 depicts the five knowledge-intensive actions, while conceptualizing the real world into a business process model.

Acquisition uses either quantitative acquisition methods, such as ethnographic studies, questionnaires, or mining techniques, or qualitative methods, such as interviews or workshops, to acquire information for the actual design.

Based on the collection of representation parts, the design produces a model of the real world, by taking the individual parts of the acquisition to form a complete and coherent representation as the “is-model.” In the idealistic case, the analysis and modeling are two counterparts; while the analysis aims to identify weaknesses in the existing model, the modeling performs continuously changes in the model.
that need to be analyzed until the quality is sufficient in the form of a “should-be-model.” Finally, the model passes the evaluation to check whether the model has been correctly generated. The result is a quality assured model.

The aforementioned actions strongly rely on the used modeling language, hence different level of expressiveness result in different possible knowledge support.

3.2 Project Solutions for KE in BP-Management Methods

KM and KE approaches are likely to be applied in combination (Telesko et al. 2001), hence in the following list, solutions for KE for BP-management method are discussed:

1. **Adaptive questionnaires** have been realised in the FIT project ([http://www.boc-group.com/research](http://www.boc-group.com/research)). The goal was to support the acquisition and use KE in such a way that the sequence of questions can change according to the previously given answers. The idea is that answers are seen as objects that refer to questions. Therefore a so-called “loose coupling” is established between the sequence of questions and the sequence of possible answers. The question sequence is primarily executed by a workflow engine, whereas the referenced possible answers are treated similar to Web-services that are bound to the questions during execution. Applying mechanisms for adaptive workflows, it is then possible to hand over the control of the question sequence to a rule engine in case an adaptive question sequence has been reached. The previously given answers are then interpreted as facts and the engine tries to find new questions that match with already provided answers. A more detailed description on the cooperation between workflow engine and rule engine is provided in the smart process execution section. The result of the project was a smart questionnaire tool capable to provide questions according to previous answers.

2. **Knowledge-based designer** has been developed and applied in several projects, as a reference case, the AsIsKnown project is introduced as a sample ([http://www.asisknown.org](http://www.asisknown.org)). The goal was to ensure homogeneous modeling from different domain experts with different implicit knowledge, cultures, and natural languages. In order to provide common term ontology for business process modeling, a common language has been created. The glossary is used to check the correct usage of terms in models and provides reports on the compliance of the used terms. In case the term is not found, it proposes terms available within the glossary. The domain expert is involved in the evolution of the glossary, as when unsatisfying suggestions are provided, there is the possibility of insisting on new terms. The glossary evolves on the basis of the negotiation between the ontology expert and the domain expert. The result was a homogeneous business process model although several experts from different organizations collaboratively modeled the process.
3. Collaborative design of business processes is applied in the Immigration Policy 2.0 project (http://www.immigrationpolicy2.eu/). The goal is to design processes relevant for legal residents and use collaboration tools as a design and feedback platform. Initial discussion started on the wiki pages and were collected and transformed into a business process model. The drafted business process model was displayed at the Wiki and legal residents were able to comment and propose changes. This interaction followed a protocol to result in harmonized business processes. Harmonization aspects were introduced as other public authorities were able to participate in this collaboration as well, and hence commonly participate in the BP design.

In order to “hide” the conceptual complexity of the business process, the graphical notation of the business process was changed. Processes on the Wiki have an iconic style, where small drawings describe the business process instead of difficult understandable concept notations.

The result is a collaborative modeling platform that respects to deal with inexperienced business process designers, and hence provide different medium in form of a Wiki and different graphical presentation in form of drawing instead of difficult interpretable concept icons.

More detailed discussion on collaborative and how Enterprise 2.0 meets BPM are in previous chapters of the book.

4. Domain-specific graphical representations of business processes were developed and applied in the project plugIT (www.plug-it-project.eu). The idea was to dynamically align the graphical notation with respect to the content of attributes. A typical business process model was extended with a “grouping” concept that can group several activities. After comparing two business processes all tasks of the process that were sequentially and semantically equal were grouped and the color of that group was set to green; all tasks that were similar were grouped with yellow color and tasks that show a difference were grouped and highlighted with red color.

The result was a color coded business process that showed the result of a sequential and semantic comparison.

5. Knowledge-based reference models have been developed in the plugIT project. The goal was to compare business processes with already existing business processes, using the color-code mechanism discussed before and to identify pre-defined IT-solutions. Business processes have been annotated with domain ontologies and exported using aforementioned transformation rules into ontologies. As reference solutions have been previously created with annotations, the created business process is able to be compared in order to indentify the most similar business process and therefore the most appropriate IT-solution.

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8 See book chapter from Lind et al. (2014) on Collaborative Process Modelling: The Intersport Case Study.
The result is a reference repository of IT-solutions that is annotated with a domain ontology and every new business process, annotated with the same ontology, can be immediately compared to most suitable IT-solutions.

6. **Knowledge-based analysis of models** was realized in the project *AsIsKnown*. The goal was to provide enhanced search functionality (http://www.asisknown.org). Traditionally, a search interface is offered to enable the search for modeling constructs. In case the modeling language cannot provide a satisfactory answer, the request is translated term by term into OWL and passed to the domain ontology. An inference engine searches term by term, for example, parent-, children-, and sibling- concepts to enlarge the analysis features of the BP-models.

The result is an extension of model search functionality by providing full fetched ontology features.

7. Graphical representation of semantically enriched data was developed and applied in *plugIT* (www.plug-it-project.eu). The goal was to design automatically a model based on a semantically enriched data set. The “graphical notation pipe” has been introduced that proceeded in three steps. First, the “notation discovery” compared each annotated data object with constructs of meta-models using the semantic annotation. In case appropriate concepts in the meta model have been found the “notation lay-outing” has been performed, by searching for the most appropriate notation in an abstract notation language that has a set of possible iconic representations and their semantic annotation. Last step is the notation generation that produces a graphical model, using the syntax of the detected meta-model, the detected notation and assimilated the concrete data into the model. Graphical models such as business processes where able to be created as a result of data queries from log files, databases or similar data sets.

8. **Knowledge-based evaluation** for quality assurance deals with the challenge that an expert and a novice modeler have different competences in modeling guidelines and the correct application of the modeling language. The aim is to make implicit knowledge of the experienced modeler explicit in order to enable checks of the model generated by novices that go beyond current model analysis. Examples for model checks that can be implemented are for instance tests that verify whether processes have exactly one start-object and heuristics that assess the quality of a model on the number of inter-model references in comparison with the number of objects in the model.

Applying the BP-management method enables the binding of the BP-framework into a concrete organizational context using KE support when designing the concept models.

### 4 KE in BP-Deployment

BPM can be either technically deployed via workflow engines that interpret machine interpretable processes, or can be socially deployed via business processes or organizational order that provides human interpretable processes.
BP-deployment requires awareness of KE technologies used in the executive platform like Enterprise 2.0, Enterprise Content Management, Semantic Web or the cloud in order to provide the corresponding concepts. In the following, BP sample deployments that use KE techniques are introduced.

### 4.1 Project Solutions and Knowledge Techniques for BP-Deployment

In the following, solutions for KE in BP-deployment are discussed that basically use the concepts of the BP-framework and deploy them into system platforms.

1. **Smart process publishing** has been developed and applied in the project FIT. The goal was to tackle the challenge that business process models are designed by skilled modelers – usually familiar with concept/icon representation - while the process documentation, however, is designed for the none-experts. So the same model information is provided for two differently skilled roles. Currently available mechanisms implement a “one to many” publishing component that distributes the content differently towards separate target groups. This is seen as server-side content adaptation that requires large resources publishing the content for each of the user groups separately. Personalized content generation enforces a paradigm change to a client-side content adaptation, where the user interface at the client interprets the content differently depending on the context of the user. The idea has its origin from the Adaptive Web (Brusilovsky 2003) that creates a user model based on the navigation behavior of the user. Once the user model has been identified, there are active content elements that change their appearance on the basis of the user model.

   Originally this principle has been applied while developing a web page for a pilot enduser of the project. Click behavior of citizens have been observed in order to create a user model in form of an ontology. Based on that user model, the web page behaved differently e.g. enabling an experienced user to apply via email and an inexperienced to apply a form via post. The basic principle has been built into process documentation in order to realize filtering of business processes, filtering of attributes, selection of personalized graphical appearance, or textual representation of the processes, as well as process or presentation of different reports.

2. **Smart process execution** using adaptive workflows (Leutgeb et al. 2007) have been developed and applied in the FIT projects and using semantic service discovery (Catapano et al. 2008) have been developed and applied in the LD-CAST project. The goal was to introduce flexible workflows. The integration of the workflow engine and the business rule engine enables an adaptive and smart workflow engine that requires semantic concept. Technically two Web-Services are discussed, whereas the workflow engine executes the workflow template, in case a special node – the rule node – is reached, the
Workflow engine invokes the rule engine in a similar way like any other web service. The business rule engine receives relevant data as well as the rule-set in form of a parameter that is modeled in the BP-model. The results of rule execution are provided in a specific format to the workflow engine. The so-called “Rule Enactor” transforms the application data of the workflow engine into a format for rule execution. This architecture reduces the complexity of the workflow- and the rule definition, as the Rule Enactor encapsulates the rule-engine as a Web-Service and takes care about the data interactions for a predefined set of invocation types.

There are different ways to realize semantic workflows. One possibility is by applying a semantic service discovery. The service ontology is used to map BPs to workflows. These workflows are defined as abstract, as up to the defined point in time they have no concrete services bound to their activities/tasks. In the second step, registered concrete services, which could be used to carry out one of the activities, are annotated with the same concept from the ontology.

Figure 6 shows the required concepts for the integration of BPs, abstract workflows, and concrete services, where respective items have been annotated with corresponding concepts from the ontology (C1–C4). Once all required items have been annotated, registered, and published, the abstract workflows is provided to the end users. If an abstract workflow is accessed, it has to be bound
to a concrete workflow, where semantic service discovery offers different mechanisms for lazy or ambiguous bindings.

A more complex way to realize semantic workflows was developed in the plugIT project, where aforementioned simple annotations from task to service were exchanged by a service profile schema. Hence a service was not only described by an annotation but by a set of parameters. The match of all parameters allowed the workflow engine to select the according service.

3. **Smart allocation of IT-Infrastructure to business processes** was developed and applied in the project plugIT. The goal was to provide IT-infrastructure from an IT-service provider to a business process that was requested form a client. The IT-architecture model that has been designed after the requirement analysis of a business process depicted one possible solution of an IT system that fulfills the requirement of that particular business process. The challenge was to identify, if such an IT system is already available to serve the requesting client, or if this IT systems need to be timely deployed and installed. In the given complexity of several thousand IT-system configurations and several thousand clients, this decision is time and cost critical – thus becoming highly relevant in the current cloud age.

The reference IT models were annotated with an ontology, and search requests to the CCMDB where also annotated. Hence freely modeled IT-systems that fulfill the business process requirements, where annotated and the most appropriate reference IT model was selected. It was ensured that for each reference model a corresponding search agent in the CCMD database was available, so the result set was assimilated in several copies of IT models, presenting the different concrete results in form of several concrete IT models.

Typically such a search request resulted in several hundred possible concrete solutions, so heuristics needed to be applied in order to minimize the result set. The rule engine implemented such heuristics and reduced the original result set from the CCMDB to a manageable set of about 20 concrete IT models that fulfill the business process request. Finally the modeler selected the concrete solution if it was applicable or was confident in requesting a new IT configuration for the particular business process.

5 **Outlooks on KE in BPM**

This section gives an outlook on the conceptual and technical integration of KE and BPM introducing the next generation modeling framework. First, the conceptual integration and second, the technical integration is discussed by providing a reference architecture.
5.1 Conceptual Alignment

There are different approaches, where either semantic techniques using an ontology stack (Schacher and Grässle 2006) or meta modeling patterns (http://www.athena-ip.org/) are used to establish BPM alignment. This section argues for a hybrid approach, by applying the meta model patterns and realizing the transformation with the help of semantic. The Semantic Integration World Animation (SIWA) (Nissen and Jarke 1999) approach as an extension to MOF is seen as a promising multilevel modeling framework that enhances the meta modeling with additional semantic primitives. Well-known semantic lifting injects semantics in meta models (Kappel et al. 2006).

An ongoing challenge is to further investigate aforementioned approaches to semantically enrich meta models and models to enable a tight integration from BPM and KE. Figure 7 propose an enriched conceptual architecture introducing a common base for BPM- models and KE models.

As discussed at the beginning of the chapter, integration of BPM-models and KE-models can be realized differently. Following the merged approach, would mean that KE meta models and BPM meta models are combined into one holistic meta model. This approach is on the one side stable but on the other side inflexible. Today’s requirements on flexibility like KE plug-ins are not compliant with the merge approach. Referencing KE meta-models, enable flexibility in plugging-KE

![Fig. 7 Conceptual architecture for knowledge alignment](image)
approaches, but are filigree. Further research is necessary to raise the maturity level of the current research approaches and make the use of KE technology inside BPM-framework end user friendly and less error prone.

Early project feedback showed that semantic lifting of meta models is insufficient, as reasonable semantic inferences are only possible when the concrete meaning of an object is specified. This leads to semantic lifting of each object within a BP model, which is usually seen as an additional burden. A pure referenced alignment permits the adaptation of the BP modeling languages, therefore uses full text strings for annotations. This is currently not end user friendly and to a high extend error prone. A more user friendly approach is to slightly adapt the BP modeling language, which is only possible with a limited number of modeling tools. In that case, features to annotate each object while modeling a BP can be provided. In both cases, the big challenge is to find appropriate domain ontologies, to annotate the models to. Once this has been solved, domain experts are mostly accepting this additional effort in annotation, when the user support is appropriate and they see the benefit of a semantically enriched BP-model.

A sound concept for conceptual alignment is therefore the use of libraries. Similar to software libraries, meta-model libraries can be combined and realize as a hybrid approach between the inflexible “extension” and the filigree “reference” approach. An open community is investigating to develop such meta-model libraries in the laboratory of the Open Models Initiative (www.omilab.org).

5.2 Technical Alignment

BP model editors of the future are expected to provide a flexible architecture, where plug-ins are able to be added, the modeling tool can be flexibly re-configured and made personalized as well as the user interface automatically adapts, whether the BPM tool is used on a computer, a smart phone or any other mobile device.

Instead of one fixed model editor, it is expected to have a plethora of editors in form of full fletched management tools, apps, plug-ins, add-ons or functional extensions. Similar to the conceptual integration, the technical integration needs to find mechanisms to “plug and play” KE functionality.

There is a large variety of modeling tools, ranging from informal, unstructured, and text-based to semi-structured and formal ones. Different tools are used for different purposes and it is quite common to encounter both unstructured and structured modeling methods. As most of the tools are already in use, the challenge is therefore not to exchange the existing modeling tools, but instead use a reference architecture that integrates existing modeling tools and make them interoperable to enable the alignment of BPM and KE.

The following high level reference architecture envisions a flexible service-oriented infrastructure to enable plug-ins. Here the service-oriented metaphor is used to demonstrate the technical challenges of such a system, by encapsulating functionality, sufficiently describe this functionality and compose the requested set of features. This does not necessarily mean that SOA is the only acceptable
approach, as current component oriented solutions, Widgets and mash-ups or highly disconnected tools only sharing a common model base are currently realized by different prototypes.

Technically spoken, traditional three layer architecture of meta modeling tools (Junginger et al. 2000) needs to be enriched by a so-called “Semantic Modeling Kernel”.

The high level reference architecture is depicted in Fig. 8, demonstrating the vision of the next generation modeling framework. The bottom layer is concerned with the transparent storage of models and modeling languages with the vision of an open model repository. The middleware framework provides the possibility to register, discover compose modeling functionality. Traditional user and security handling is typically expected here. The top layer is the user interaction portal, which provides user interfaces for web- or app-based modeling services.

The next generation modeling framework need to consider a new layer, the so-called semantic modeling kernel that is responsible for the realization of the aforementioned conceptual integration. This layer is responsible for the transformation of syntax, semantic, and context that enables the aforementioned integration of meta-models and semantics.
Project feedback showed that very flexible semantic modeling kernel – the project plugIT used a semantic workflow engine to orchestrate dynamically registered modeling components such as an ontology matcher – are very filigree and instable. Furthermore the discovery, negotiation and enactment of a complex semantic analysis of a BP-model took up to 10 min, which was not end user friendly. The project BIVEE (www.bive.eu) now aims to develop a semantic modeling kernel via components that reduce the flexibility but introduce stability and raises the performance.

ADOxx (www.adoxx.org) provides the basic meta modeling platform and enables to an open community the implementation of plug-ins with the aim to approach aforementioned technical vision.

6 Summary

This chapter identified three aspects of KE support in BPM: First, BPM can be seen as a domain on its own, and hence, the basic BP-framework can be enriched with KE. As the BP-framework and KE can be represented by models; the integration of KE in BP-frameworks can be realized with the meta model approach. As the instantiation of a concrete BPM approach requires a management method that binds the BPM approach into the organizational context in order to enable the actual management, the BP-management method has been introduced. KE in BP-management method has been discussed focusing on the knowledge intensive actions.

Realizing BPM within a concrete organization, it is necessary to enable the execution within an environment. In case this environment uses KE, the BPM approach requires awareness of these concepts in the building phase. Hence, KE in BP-deployment is introduced to draw awareness to the fact that knowledge-sensitive BPM solutions during execution time require knowledge-sensitiveness in build time.

This chapter discussed approaches for KE in BPM. Considering also the human interpretation that is focused in KM, there are similarities for KM in BPM. The introduced approaches as well as the outlook considered a model-based approach for KE in BPM. As KM can also be realized using a model-based approach and the introduced mechanisms can be used for the more formal models in KE, it is possible to use the aforementioned mechanisms for the partly informal model used in KM.

The outlook discusses a conceptual and technical integration of KE and BPM enabling a discussion beyond the aforementioned solutions.

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Culture in Business Process Management: How Cultural Values Determine BPM Success

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Abstract There is consensus among practitioners and academics that culture is a critical factor that is able to determine success or failure of BPM initiatives. Yet, culture is a topic that seems difficult to grasp and manage. This may be the reason for the overall lack of guidance on how to address this topic in practice. We have conducted in-depth research for more than three years to examine why and how culture is relevant to BPM. In this chapter, we introduce a framework that explains the role of culture in BPM. We also present the relevant cultural values that compose a BPM culture, and we introduce a tool to examine the supportiveness of organizational cultures for BPM. Our research results provide the basis for further empirical analyses on the topic and support practitioners in the management of culture as an important factor in BPM initiatives.

1 Introduction

Bluntly put, BPM initiatives often fail for cultural reasons. Tremendous investments in business process analysis, modeling, and process-supporting IT still represent the core expenditures of many large scale BPM programs. This focus on methodological and technological aspects of BPM seems to be just as natural in BPM practice as the recognition that culture is often the reason for project failure (Attaran 2004; Rosemann and vom Brocke 2014). One of the major difficulties with the culture concept is the fact that it is hard to grasp. This blurriness of the concept may be the main cause for a lack of guidelines on how to manage the culture factor and which investments to make regarding the development of an organizational culture in a BPM context.

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In our research, we have aimed at going beyond the statement that culture is an important factor in BPM. We were motivated to study and analyze culture in depth to create a concise understanding and specific normative advice for organizations on how to deal with culture in BPM projects. To that end, we conducted multiple studies with national and international companies, involving experts from academia as well as end-user organizations. In this chapter, we revisit the findings of three specific studies that help gaining an overview on the topic of culture and the findings from our research.

Particularly, we first report on a framework that explains the role of culture in BPM and that is grounded in a comprehensive literature review (vom Brocke and Sinnl 2011). We then present which cultural values determine the notion of BPM culture based on a global Delphi study with renowned thought leaders and experts in BPM (Schmiedel et al. 2013). Finally, we introduce an instrument which we developed recently on the basis of several studies with BPM experts worldwide and which serves to measure the supportiveness of organizational cultures for BPM (Schmiedel et al. 2014).

This chapter is structured as follows. First, we introduce the understanding of the two main concepts which are at the basis of our research, i.e., BPM and culture. Second, we present the findings of three core studies of our research, focusing on the results of the respective studies rather than a detailed presentation of the methodological procedure. Third, we discuss the implications of these findings for research and practice. Finally, we conclude the paper with an outlook on the research topic.

2 Background

2.1 Business Process Management

BPM refers to a management approach that focuses on a horizontal understanding of organizations in terms of business processes rather than a vertical perception in terms of functions. Two major objectives of organizational BPM approaches are the efficiency and effectiveness of business processes (DeToro and McCabe 1997; Hammer 2014; Smith and Fingar 2004). This means that organizations should both execute business processes right and execute the right business processes. Smith and Fingar (2004) argue that only mature business processes and mature BPM manifest themselves in highly efficient and effective business processes (see Fig. 1).

Originally, BPM research may have focused primarily on the efficiency objective as a strong emphasis on the role of IT can be recognized in early research. Since BPM’s emergence as a new management approach, technical aspects, such as the
technological support of business processes and their design, were central to BPM (Reijers 2003; van der Aalst and Kumar 2003). The focus on workflow modeling and process automation may have been substantiated through numerous IT solutions that emerged along with the concept of BPM (Jeston and Nelis 2008). While it seems evident that IT is an essential driver of organizational change towards process-orientation (Davenport 1993), a pure focus on IT systems does not account for the comprehensive meaning of BPM.

We base our research on a holistic understanding of BPM as a management approach. That means we consider a comprehensive set of factors relevant to the success of BPM, e.g., strategic alignment, governance, people, and culture beyond methods and IT (Rosemann and vom Brocke 2014). While a holistic understanding more and more represents a new consensus among academics and practitioners in the field, many research projects and organizational initiatives still reflect a one-sided understanding of BPM through a sole focus on methodological and technological aspects of the management approach. Before going into details on how we approach culture as a factor in BPM, we introduce our understanding of the concept in the following.

### 2.2 Culture

Culture refers to the shared values of a group that become visible in actions and structures (Schein 2004; vom Brocke and Sinnl 2011). The defining elements of culture are commonly illustrated in an iceberg model (Selfridge and Sokolik 1975). The point of this analogy is that the main part of culture, much like an iceberg, comprises largely invisible elements that lie underneath the surface (see Fig. 2). While these elements are referred to in different ways, e.g. Schein (2004) refers to
them as underlying assumptions, culture researchers commonly use the term values to describe the core part of culture (Hofstede 2005; Parsons and Shils 1951; Straub et al. 2002), i.e. the subconsciously shared concepts of the desirable.

These values manifest themselves in actions and structures above the surface (Giddens 1984), i.e., observable artifacts such as behavioral (e.g. manners, rituals) and structural (e.g. physical environment, technology) patterns that are the visible representations of the underlying cultural values (Schein 2004). It is important to notice that publicly expressed (espoused) values in the mission statement of organizations need to be distinguished from our understanding of invisible cultural values (Schein 2004). While publicly articulated values represent observable structures of organizations, they are not necessarily in line with subconscious values that are actually lived in an organization.

It is important to note that the concept of culture always refers to a specific group (Leidner and Kayworth 2006). Depending on the context, this group can be a nation, an organization, a work group, a profession, a family or even a loosely coupled group of individuals, such as a social soccer team. Group cultures can be inhomogeneous in the sense that subgroups within a certain group can exist, which form overlapping cultural identities (Hofstede 2005; Huntington 1997). For this reason, culture is a very complex concept that often consists of various intertwined group cultures.
3 Results from Three Core Studies on the Role of Culture in BPM

3.1 First, the Interdependence Between BPM and Culture

To gain a better understanding of culture’s role in BPM, we conducted a comprehensive literature review (vom Brocke and Sinnl 2011). Acknowledging the fact that an all-encompassing review of previous research cannot possibly be undertaken, it is important to clearly define the scope of a review (vom Brocke et al. 2009). In this regard, the literature review we conducted followed established and comprehensive guidelines on this method (Creswell 2009; vom Brocke et al. 2009; Webster and Watson 2002). Accordingly, we set a clear focus on research that explicitly considers culture in the context of BPM.

Based on a structured analysis of existing literature on the topic, we developed a framework which organizes the various notions of culture that play a role in BPM practice. This framework explains the interdependence between the two concepts BPM and culture that can be identified in contemporary literature in the field (vom Brocke and Sinnl 2011). Figure 3 depicts this framework which we call BPM-Culture-Model.

The BPM-Culture-Model consists of three main concepts. The understanding of these concepts which we derived from the literature review can be described as follows:

- **BPM Culture**: BPM culture refers to a culture that is supportive of achieving BPM objectives, i.e. efficient and effective business processes. It is understood as a set of specific values which are inherent in the management approach BPM and which become visible in specific actions and structures that represent these values in the organization. It can also be considered a to-be culture when a BPM approach is followed. This means that the culture of the organization should embrace BPM-facilitating values. However, this does not mean that the corporate culture should only incorporate those values. Rather it should include those values into the existing culture.

- **Cultural Context**: Cultural context refers to the given cultural environment that a BPM initiative faces in an organization. It comprises several group cultures, such as national, organizational, or work group cultures. These group cultures are complexly intertwined, e.g. project teams from internationally working organizations often include employees from different nations and also from various departments. The cultural identities of each employee shape the prevailing cultural context in an organization and determine the as-is cultural setting at the start of a BPM initiative.

- **Cultural Fit**: Cultural fit refers to the basic congruence between BPM culture and cultural context. It represents the prerequisite for a successful BPM approach in organizations. In other words, the incorporation of BPM-supportive values, actions and structures in the cultural context of an
organization is a necessary, yet not sufficient means to achieve efficient and effective business processes.

The BPM-Culture-Model explains the interrelation between the concepts BPM and culture. It can be used to analyze BPM approaches in specific companies (vom Brocke et al. 2014; vom Brocke and Sinnl 2010). In this regard, the model helps explaining, for example, why BPM works better in one company than in another. Beyond, the model can also be used to for prediction purposes. That means, the analysis of a specific organizational culture can provide an indication for the cultural change that is required to realize a successful BPM initiative.

Particularly, when looking at the specific case of a company, the model can be used to evaluate how a specific organizational culture fits together with the concept of BPM culture, i.e. how far a cultural fit between the environment and the BPM approach is present. In cases where such a fit is not present, a BPM approach is likely to fail in case the organization is not willing to develop the present culture towards being supportive of BPM.

This BPM-Culture-Model provides the basis for our subsequent studies, which primarily focused on the notion of BPM culture with the intention to specify the concept and to measure it.
3.2 Second, the Concept of BPM Culture

To specify the BPM culture concept, we conducted a Delphi study as one of the two major empirical studies in our research. One of the main application fields of the Delphi method is concept development (Okoli and Pawlowski 2004). Therefore, this method was chosen to specify the concept of BPM culture, that was identified in the literature review. The Delphi method relies on the use of expert opinions to obtain consensus on the studied issue (Dalkey and Helmer 1963). Based on this, the Delphi technique allows to address unspecified issues that require diverse backgrounds of expertise (Czinkota and Ronkainen 2009; Linstone and Turoff 1975).

In fact, it was found that the specifics of a culture that supports BPM may most profoundly be identified by BPM experts from both academia and practice since BPM is a management approach that is developed and promoted by researchers and practitioners at the same time. Accordingly, our study involved experts from both areas. While the involvement of experts from different backgrounds yields the risk that consensus may not be found, the identified results in the case of consensus among the experts (which was achieved in this study) are solidly grounded in the opinions of thought leaders in the field.

The main question we examined in the Delphi study was which organizational values the experts consider to be supportive of achieving efficient and effective business processes. In an intensive iterative processes of addressing the experts and coding their responses, we identified four central values as being supportive of BPM (Schmiedel et al. 2013). These values are also referred to as CERT values based on their acronym. Table 1 provides an overview of the values and their definitions.

In our research, we discussed the identified CERT values against the background of an established culture framework (Schmiedel et al. 2013), i.e. the Competing Values Framework (CVF) (Cameron and Quinn 2006). The CVF distinguishes organizational cultures along two dimensions. The “focus” dimension differentiates an internal from an external focus of an organization. The “structure” dimension is determined by the two extremes of flexibility and stability. Based on these two dimensions, the framework contains four types of organizational cultures with a specific focus along the two dimensions: create, compete, collaborate, and control.

The framework is called Competing Values Framework since each of the dimensions comprises opposite extremes, however, the authors of the framework acknowledge that ideally an organization would incorporate all characteristics of the two dimensions (Quinn et al. 2011). A closer look at the CVF shows that the CERT values can be easily mapped to the two dimensions. Customer orientation matches the external focus while cross-functional teamwork matches the internal focus. Excellence fits to flexibility in the sense that continuous improvement and innovation represent forms of organizational change that require flexibility. Finally, responsibility fits to stability in the sense that accountability and commitment can be seen as structural control mechanisms which provide stability. Figure 4 gives an overview of the CERT values in the CVF.
The examination of the CERT values in the context of the CVF reveals specific insights on the nature of the values and also gives potential explanations as to why they are difficult to implement in BPM practice. The seemingly competing nature of the CERT values may be the reason for the challenges that seem to be present in realizing a BPM culture in practice. For example, in daily business, it may be perceived as a trade-off to either focus on the excellence of internal processes or on the adaptation to external customer requirements.

The conceptualization of BPM culture in the presented study served as a basis for the further specification of the concept in another empirical study, which we present in the following.

Table 1
Constituting (CERT) values of the BPM culture concept

<table>
<thead>
<tr>
<th>Value</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer orientation</td>
<td>The proactive and responsive attitude towards the needs of process output recipients</td>
</tr>
<tr>
<td>Excellence</td>
<td>The orientation towards continuous improvement and innovation to achieve superior process performance</td>
</tr>
<tr>
<td>Responsibility</td>
<td>The commitment to process objectives and the accountability for process decisions</td>
</tr>
<tr>
<td>Teamwork</td>
<td>The positive attitude towards cross-functional collaboration</td>
</tr>
</tbody>
</table>

Fig. 4 CERT values in the Competing Values Framework (Schmiedel et al. 2013)

The examination of the CERT values in the context of the CVF reveals specific insights on the nature of the values and also gives potential explanations as to why they are difficult to implement in BPM practice. The seemingly competing nature of the CERT values may be the reason for the challenges that seem to be present in realizing a BPM culture in practice. For example, in daily business, it may be perceived as a trade-off to either focus on the excellence of internal processes or on the adaptation to external customer requirements.

The conceptualization of BPM culture in the presented study served as a basis for the further specification of the concept in another empirical study, which we present in the following.
3.3 Third, the Supportiveness of Organizational Cultures for BPM

To operationalize the concept of BPM culture, we developed and validated items that allow measuring the different dimensions of a BPM culture empirically. We perused the survey method to further specify the cultural values that were identified in the Delphi study as defining elements of the BPM culture concept. Developing a measurement instrument includes a broad range of methods itself. Following well-recognized and comprehensive approaches (Davis 1989; MacKenzie et al. 2011; Moore and Benbasat 1991; Recker and Rosemann 2010a, b), a multi-stage approach was used to develop an instrument to measure BPM culture.

Particularly, our approach involved methods such as literature review, interviews, own category method, ranking exercise, and index card sorting test. Testing the resulting instrument included techniques such as pre-test, pilot test, and field survey. This variety of data collection and analysis methods, which also involved a significant number of experts, enabled the development of a reliable and valid survey instrument to measure the concept of BPM culture (Schmiedel et al. 2014).

In the processes of instrument development, we identified two sub-dimensions for each of the CERT values that are summarized in Table 2. Based on these sub-dimensions, we developed and validated items to measure each sub-dimension. These items were then implemented in an online survey.

The survey instrument serves as an assessment tool to examine how far the culture of an organization is supportive of efficient and effective business processes along the eight cultural sub-dimensions. The results of such an assessment can be illustrated as displayed in Fig. 5. The visualization shows the differences between a BPM-supportive culture, a BPM-unsupportive culture and a partially supportive culture, as examples. The tool can be used to gain first insights on the organizational culture via an assessment through individuals but it also provides the opportunity to assess an organizational culture through several or all employees of an organization. The latter is particularly useful to compare the perspectives of various departments or divisions on the culture in an organization.

The instrument can also be used to compare the findings of an organization with benchmarking results from similar organizations of the industry sector. Based on such an assessment, organizations can determine culture development strategies. Those cultural dimension that received a low score but are considered strategically important to the organization can serve as a starting point for deriving specific activities on how to improve the organizational culture in terms of its supportiveness of BPM objectives.

In the following, we discuss the findings of our three studies regarding their implications for research and practice as well as their overall limitations.
4 Discussion

4.1 Implications for Research

Several implications for research can be derived from the contributions of the three studies. At least five major areas of future research naturally and logically follow from the work conducted to date (Schmiedel 2012):

- **Model application.** The BPM-Culture-Model provides an avenue for future research. Specifically, the notion of a cultural fit between BPM culture and a given cultural context could be examined based on the conceptualization of BPM culture from this research. Propositions could be derived to provide a starting point for the quantitative assessment of the reliability and validity of this
model. Such research could provide empirical insights on the explanatory and predictive power of the suggested model.

- **Case exploration.** The conceptualization of BPM culture revealed four seemingly competing, yet complementary values as major determinants of this concept. Future research can build on these findings in several ways. For example, it could be examined how far BPM initiatives face difficulties or even fail because organizations do not live all of the identified values at the same time. In addition, it could be analyzed whether practitioners perceive trade-offs in realizing those values as a potential reason for an imbalanced focus on the four values. This could be examined on the basis of several in-depth case studies.

- **Survey application.** The operationalization of the BPM culture concept brought forth a survey that can be applied to a number of areas of future research. For example, the measurement instrument that was developed serves as a reliable and valid tool to assess the impact of BPM culture on the overall firm performance. Further, it can be used to examine how far an organizational cultural context is supportive of a BPM approach. In this context, it could be assessed how far distinct work groups perceive the cultural fitness of their organization for BPM differently. Exploring the reasons for potential differences would then provide the basis for another area of future research as follows.

- **Guidelines development.** Based on the analysis of individual organizational cultures, guidelines could be developed on how to achieve a BPM culture. For example, best practices could be analyzed to learn what kind of methods or techniques could be established to stimulate actions that are in line with the identified BPM values. In this regard, the differences between specific industry cultures or national cultures could be analyzed since the prevailing cultural context may call for the need to implement the cultural values differently in daily operations. Case studies or action research may serve to address these areas of future research.

- **Research transfer.** Beyond the BPM context of our research, future research may apply the understanding of culture underlying the BPM-Culture-Model to BPM-related domains. In this regard, future research could examine further management approaches, such as supply chain management, project management, stakeholder management, risk management, etc., in terms of how they can be supported by a particular cultural setting. Presumably, some cultural values may be identified that are at the core of all of these approaches, others may indeed differ or even be conflicting. Based on this, research may be able to generalize what type of organizational culture supports overall organizational performance. In addition, this comprehensive research endeavor may provide valuable insights for managers with regard to the cultural values they would need to focus on when specific organizational difficulties arise or when a particular management initiative is launched. Taking it even further, an overview on the cultural requirements of several management domains would allow for a culture-driven organizational development on the one hand; on the other hand, it would enable a culture-oriented selection of suitable management
approaches for specific types of organizations (e.g., family-run company vs. military organization).

4.2 Implications for Practice

Apart from the relevance for the academic world, our research also contains several implications for practitioners. Specifically, at least five major guidelines can be identified for end user organizations (Schmiedel 2012):

- **Awareness creation.** The BPM-Culture-Model can serve as a means to create awareness for the variety of cultural aspects that play a role in BPM practice. Moreover, the model structures the seemingly different perceptions of culture as both an influencing and influenced concept with regard to BPM. Particularly useful for practitioners may be the understanding that (1) the management approach they choose needs to fit to the culture of the organization in order to successfully realize their management initiatives, and that (2) they need to create a culture that fits to and supports their management objectives.

- **Target setting.** The specification of the BPM culture concept provides practitioners with particular insights on what constitutes a culture that facilitates their BPM initiatives. In this regard, the examination of the determining elements of a BPM culture revealed a reference culture supportive of achieving efficient and effective business processes. BPM practice can draw conclusions from the identified reference or target culture by critically reflecting how far the organizational culture that is present in their corporation represents a BPM culture, i.e. how far their culture supports BPM.

- **Culture assessment.** The measurement instrument that was developed to operationalize the concept of BPM culture was instantiated in the form of an online survey tool that practitioners can use to assess the supportiveness of their organizational culture for BPM. The tool displays the personal results of the individual analysis immediately upon completion in a graphical presentation. Based on the perceived existing culture, the assessment provides insights how far each of the four BPM value dimensions and their respective sub-dimensions are lived in the organization. At the time of writing, the tool is available at [www.cultural-fitness.org](http://www.cultural-fitness.org) (further details: [www.bpm-culture.org](http://www.bpm-culture.org)).

- **Effort estimation.** Based on the assessment of the supportiveness of specific organizational cultures for BPM – either through the online tool or through critical reflection of the BPM reference culture – practitioners can estimate how far cultural difficulties may occur when implementing BPM. In this regard, our research serves as a means for practice to determine the relative effort needed when establishing a BPM approach in an organization. In other words, the intensity of required cultural change can be estimated on the basis of an as-is-analysis of the organizational culture.
• *Action taking.* Additionally, knowing the as-is-state of the organizational culture in terms of its facilitating character for BPM and knowing the BPM reference culture, practitioners can derive measures to be taken to achieve a cultural change towards a BPM culture. The institutionalization of the identified BPM values may include corporate training programs, hiring guidelines, peer performance evaluations, rewarding schemes, etc. In this regard, assessing how far an organizational culture facilitates a BPM approach represents a first step towards identifying actions that can be taken to realize such a culture.

### 4.3 Limitations

As with any other research, the conclusions offered in this chapter should be interpreted in light of some necessary assumptions and boundary conditions that we had to impose to be able to reach some definite insights.

Notably, in order to be able to explain BPM culture, we needed to focus on one specific level of a group culture. While our research on the relation between BPM and culture revealed a framework that includes several cultural groups, such as national culture and work group culture, the subsequent research concentrated on organizational culture. This narrowed focus on culture was required to conceptualize the notion of BPM culture which had been identified as a facet of organizational culture that plays a crucial role in both the research field and the developed framework. In fact, an examination of the derived framework, involving a focus on additional group cultures, could have only revealed tentative, hypothetical results at the time because BPM culture, one of the core concepts of this model, had not been specified and conceptualized. On the basis of the operationalization of the BPM culture concept, future research can now empirically examine the framework, including a focus on specific group cultures such as work groups or nations.

Second, we have to stress that our work on culture has been influenced by our very own cultural background. In this research, it was assumed that BPM is a general scientific approach which comes along with specific values that are underlying this approach and which shape the concept of BPM culture. Since BPM originates from Western countries, the values underlying this scientific approach may be particularly characterized by Western cultures. Yet, it was not examined in this research how far the understanding of the management approach differs across cultures around the globe. In other words, this research abstracts from potentially varying notions of BPM culture that may be present in different contexts. In fact, the notion of BPM culture may not only differ across national cultures but also across company specific contexts like industry. For instance, it might be that in high-risk industry sectors (such as construction) BPM success is measured in terms of compliance achievements more so than in efficiency or effectiveness gains. In our ongoing research, we attempt to understand some of these contextual factors in more details.
Finally, we stress that typical research method limitations that relate to the way we executed our studies also apply. These include limitations regarding sample size, respondent bias or subjective interpretation bias of the data collected.

5 Conclusion

Our research has been driven by the desire to be able to specify how cultural values determine successful BPM. To that end, we conducted three core studies, which help to gain a better understanding how the concepts of BPM and culture relate, what makes up the concept of BPM culture, and how it can be measured. On the basis of this work, which has been discussed in this chapter, we can now proceed to study – and ultimately explain – with previously unachievable detail and precision how culture as a potential success factor can drive, or impede, BPM success in organizations. Our work to date is also already assisting end user organizations in understanding the cultural settings in which their BPM operates, and in identifying appropriate culture development strategies to improve the supportiveness of their organizational culture for BPM.

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Cultural Change in Process Management

Ulrike Baumöhl

Abstract Organizational change management is an important task in the context of Business Process Management (BPM). Organizational change covers a broad range of topics, from strategy to corporate culture and performance management. BPM is at the center of change initiatives as the main lever for implementing change through process engineering. Yet, especially the cultural aspects of organizational change have not been systematically integrated into the principles of BPM. Since organizational change is mainly driven by projects, an integrated change method would be helpful to support the business process manager to achieve the goals of change. Existing methods, however, are often rather inflexible and do not cater to the situational needs of a change project. Moreover, they tend to focus on specific topics of change, for example, either strategy or processes or culture. This leads to a disregard of the interrelation of the relevant topics, and with this, the complexity of organizational change. As a consequence, an approach is required, which first of all supports the holistic analysis of an organizational change project, and secondly provides a method construction process which allows for a situational design of the change method integrating the relevant dimensions of organizational change as well as the involved “hard” and “soft” factors. This chapter introduces a corresponding approach.

1 Introduction

Successfully changing an organization is still one of the major challenges of today’s management. A study by Jorgensen et al. (2007, pp. 1–19) points out that despite many approaches in theory and practice, still only 38% of the analyzed projects are considered successful. An interesting fact presented is the fairly low diffusion of
formal change methods. In only 22% of the companies, a formal change method exists and is employed during the change process. The authors compare the maturity of change management with that of project management 20 years ago: the degree of improvisation during the process is high and the success of the change process depends on a fair amount of serendipity. However, considering the value that can be destroyed by a failed change process, the dependency on serendipity is not acceptable. The volume of only the merger and acquisition market of 200 bn. Euro in 2006 already justifies a closer look at how organizational change processes can be managed more efficiently.

Organizational change is mostly driven by Business Process Management (BPM) (cf. Oesterle 1995; vom Brocke et al. 2012). Almost any effort of an organization to adapt to new requirements involves at some point of time analyzing the processes (cf. Baumöl 2008). This step results in either initializing a process reengineering or a process engineering phase, depending on the degree of change that is to be introduced. The reason for the high significance of BPM for organizational change is first of all the function of processes as direct levers for implementing the strategy. Secondly, they serve as junction between the strategy and the supporting information technology (IT) solutions by defining the business requirements for the IT solution. As a consequence, each change – be it on the strategy level or on the task level – is directly dependent on BPM.

One of the critical success factors of transforming the company by changing processes is the responsiveness of the people and their true commitment toward the new ways of doing things. As a consequence, a “process culture” with values, beliefs, and process-oriented behavior needs to be established before the change process starts [also cf. Bucher and Winter (2014)]. Moreover, the challenge today is to foster the ability to manage evolutionary, continuous change rather than driving revolutionary change. As a consequence, the “unfreeze–freeze” paradigm cannot be applied here.

The change method, in which the approach of business process engineering is ideally embedded, plays an important role for the success of the change initiative. Current BPM methods often lack a dedicated change management approach (cf. e.g., Spanyi 2006). This is probably the case because these methods are designed to focus on the content related rather than the behavior-related change. Thus, mainly the so-called “hard factors,” which are much more tangible and communicable, are addressed and the “soft factors” are at most treated indirectly. This becomes very clear, when during a project meeting, the question about the way a change is addressed is answered by the process consultants by explaining the way new requirements or changes in the process design during the implementation phase are managed. This misunderstanding happens very often and shows that there is still room for improvement with respect to the awareness of the cultural issues of organizational change.

It does not help, though, to refer to change methods for solving this shortcoming. The majority of change methods proposed in theory and practice (cf. e.g., Tichy and Devanna 1990; Friedman and Gyr 1998; Vollmann 1996; Doppler and Lauterburg 2000; Burke 2002; Kotter 2008) concentrate on specific change topics, such as change
of culture or change of processes. This is efficient with respect to the chosen focus, but it often neglects the complexity of the entire change process with its many influencing factors. The methods promoted by consulting companies tend to be strictly standardized and fairly inflexible. As a consequence, companies facing a change process often find themselves changing the change method before even starting, and as a consequence, lose the efficiency gains a standardized approach promises (cf. Classen et al. 2003, pp. 3–12). The change process is operationalized by a portfolio of change projects. The goals and milestones of these projects are defined by the goals of the organizational change. The projects are managed by the respective project management methods of the company, for example, PRINCE2 or standards of the Project Management Institute (PMI). Since these merely have a supportive character for change methods, they are not discussed in detail in this chapter.

The hypothesis on which this chapter is based states that only a comprehensive and flexible approach toward organizational change can foster the receptiveness of the intended changes. To solve this challenge, the following objectives are pursued in this chapter:

- Explain the prerequisites for dealing with organizational change.
- Present a framework for describing change projects and the relevant influencing factors.
- Suggest an approach for constructing situational change methods called “Change Method Engineering (CME),” which caters to the requirements of the people responsible for the change process, for example, the business process manager.

Such an approach combines hard and soft factors and integrates with this the relevant dimensions of organizational change. Moreover, it has to be flexible to its construction process as opposed to trying to treat all organizations more or less the same way.

An approach like this supports the business process manager facing the challenge of dealing with organizational change in the following way:

- The business process manager needs to understand the overall consequences of the proposed changes on both the “hard” and “soft” factors: CME takes into consideration the most relevant dimensions of organizational change and integrates them. With this, it does not focus either on “contents” or on “behavior,” but builds the necessary bridge to provide the full picture.
- The business process manager needs to have a framework for modeling the change process and the resulting change projects with all relevant factors: CME suggests a framework for modeling both the change process and the change project in connection with its “hard” and “soft” context to gain a detailed understanding of the prerequisites and requirements of organizational change.

1 vom Brocke et al. (2014) present the case of the Hilti corporation, providing insights into how change processes are facilitated by a so called “culture journey”.
The business process manager needs to have a toolbox for constructing change methods, which answer to the respective requirements of the situation the company is in: CME provides a method construction methodology, which has been deduced from successful change projects.

And last, but not least, the business process manager needs to identify possible barriers to accept and to adapt to the new process architecture: CME provides a concept based on keywords for the analysis of the state of acceptance in the dimension “culture & emotions.”

The argumentation is first of all built on the notion that change processes are driven by a chain of individual decision processes which cannot be deterministically foreseen. Thus, following a constructivist approach toward change, a flexible construction of the change method is mandatory. Secondly, the hard factors normally drive the emotional change process, both directly and indirectly. Only by integrating the hard and the soft factors, a successful management of the change process becomes possible. Figure 1 presents the building blocks of the chapter and their relationship. It shows that there are three basic factors which have to be considered when managing organizational change. First of all, BPM has to be established as a management approach within the company, since it serves as a basis for driving the change process. It does so in two ways: On the one hand, the intended change is implemented in the business processes and BPM is the approach to manage it. On the other hand, the principles of BPM are also applied for managing the change process. Secondly, the prerequisites for organizational change must be clear and understood. The questions, what went well and what went wrong in other change projects, or are there best practices, must be considered. Thirdly, the

![Fig. 1 BPM and change effects in the organization](image-url)
change project must be clearly defined and documented. Thus, a framework for describing change projects must exist, which could serve as an input for the method construction process.

The change process starts with the first idea or need to change the organization and it goes on until the change is established within the organization. The goals of the change process are implemented by one or more change projects, which are based on a specific method [also cf. Bucher and Winter (2014)]. This chapter suggests a change method, which consists of two major parts: a framework for describing the project context and a procedure to construct a situational change method.\(^2\)

The chapter develops in the following way: First, evidence is presented that the success of organizational change is in most cases dependent on the “human factor.” Then, results of a 2004 study by the author highlight the most important factors for successful change from the perspective of the people “being changed.” Following that, factors are presented which directly address and influence the “human factor” of organizational change. These factors are taken from an in-depth analysis of several change projects in the US (i.e., California), Germany, Switzerland, and Austria. With this, the prerequisites of organizational change are discussed. In the next section, a framework for describing change projects is presented, which was also developed based on the interviews of the 2004 study. As a basis for the method construction approach, the responsiveness to change is analyzed based on the concept of mental models. In the last section, based on the business engineering approach of method engineering, a method construction process is presented, which takes into consideration the requirements of situational flexibility as well as the integration of relevant dimensions of a change project. With this integrated approach, a systematic change process becomes possible, considering both hard and soft factors. It combines techniques from the engineering and business disciplines with approaches from organizational psychology. Moreover, in addition to the theoretical concepts, a case study is presented which shows the application of the presented ideas in a real-life company context.

2 Prerequisites for Modeling Business Process Driven Organizational Change

To understand and in the end manage the change process successfully, it is first of all important to analyze the influencing factors on success and failure of organizational change. The second step is to model, that is, describe the change project as comprehensively as possible to make it communicable. Lastly, it is crucial to understand the mechanisms and levers for successful change. These steps are the

groundwork for a systematic approach toward constructing a change method and thus, managing the change project. In the following sections, the basics of the three steps are presented. These are, at the same time, the foundation for the CME approach which is presented later on in the chapter.

### 2.1 Influencing Factors on Organizational Change

Recent studies have shown that the rate of success of change projects is still considerably low (cf. Jorgensen et al. 2007): only 38% of the projects analyzed are rated as successful in every aspect, 46% of the projects are considered “troubled,” and 16% are rated as failure. Figure 2 sums up these results graphically.

Among the 220 projects analyzed, the reasons for troubled or failing projects are diverse, but eventually they can be traced back to mainly soft factors (cf. Jorgensen et al. 2007). To complete the picture, it is interesting to look at a different study which analyzed successful projects and the main factors for success (cf. Houben et al. 2007). Here it is interesting to note that also “hard” factors (e.g., existence of training programs, compensation, organizational structure, and performance management system) played a role in the success. These factors were not mentioned in the analysis of failure. This represents a contrast to the failure factors, which are mainly soft factors. Table 1 summarizes the failure and success factors ordered according to their relative importance.

These findings support an in-depth study of 52 companies on methods applied in change projects in the San Francisco Bay Area and the Silicon Valley, Germany, Switzerland, and Austria conducted by the author in 2004 as well as the literature analysis of 37 case studies and methodologies (cf. Baumö 2008). The recent findings of Jorgensen et al. and Houben et al. show that the issues of organizational change management seem to be quite stable, so it seems to be safe to assume that the findings from 2004 are still valid.

**Fig. 2 Success and failure of change projects (cf. Jorgensen et al. 2007)**
One question of the interview questionnaire asked for the experiences with successful change and the relevant influencing factors according to the interviewee’s opinion. Five main topics could be identified based on statements which reflect the major influencing factors on success. Similar topics have been identified, for example, by de Bruin et al. (2000). These topics are (also cf. Fig. 3):

- Strategy
- Leadership
- Sustainability
- Performance Measurement
- IT

To gain a certain degree of significance, only those factors were selected for defining the topics that were mentioned by more than 50% of the interviewees.

The main challenge stated by the interviewees was the balance of two different kinds of contexts: on the one hand, the commonly accepted and known context in which people are used to act, and on the other hand, the new and uncharted context which they are expected to adapt to within a short period of time. In other words, the balance of stable and dynamic structures within an accelerated change of context.

When people referred to strategic aspects of successful change, they mainly mentioned two things: first of all, the need for clarity about today’s situation in connection with the clarity about tomorrow, that is, the target situation; and secondly, the structured transition process, which ought to be accompanied by a straightforward management of expectations, a reward system, continuous education for coping with the new structures and processes, an involvement of the people, and a clear and timely communication.

<table>
<thead>
<tr>
<th>Failure factors</th>
<th>Success factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient commitment of management (61%)</td>
<td>Sponsoring by top management (83%)</td>
</tr>
<tr>
<td>Nontransparent goals and visions of the change process (56%)</td>
<td>Honest and up-to-date communication (73%)</td>
</tr>
<tr>
<td>Lack of leadership experience of management with respect to insecurity and fear of change (56%)</td>
<td>Involvement of employees (69%)</td>
</tr>
<tr>
<td>Conflicts within management (56%)</td>
<td>Motivating and change-friendly corporate culture (53%)</td>
</tr>
<tr>
<td>Lack of management support (52%)</td>
<td>Existence of “change pioneers” (39%)</td>
</tr>
<tr>
<td>Insufficient information, e.g., too late or incomplete (50%)</td>
<td>Efficient organizational structure (26%)</td>
</tr>
<tr>
<td>Insufficient room for coping with fears and resistance (46%)</td>
<td>Support of change process by alignment of corporate culture (21%)</td>
</tr>
<tr>
<td>Neglect of psychological factors within the project planning (43%)</td>
<td>Efficient training programs for the new processes and/or IT solutions (19%)</td>
</tr>
<tr>
<td>Insufficient human resources for the project (37%)</td>
<td>Compensation and incentives (16%)</td>
</tr>
<tr>
<td>Lack of confidence in the communication process between management and employees (36%)</td>
<td>Support of new structures by adequate performance measurement (12%)</td>
</tr>
</tbody>
</table>
Leadership aspects mentioned were the relevance of role modeling by top management and the change team, the importance of creating the right context for change, and an explicit approval of changed behavior. The last point is important, since accepted behavior in the “old world” often does not correspond with the required behavior in the “new world.” Thus, top management has to make clear what the new rules of behavior are and that it is acceptable to change to them. Moreover, the interviewees stated that the assignment of ownership in connection with the already mentioned involvement were important.

When referring to “sustainability,” the interviewees indicated that one of the most important success factors was the existence of BPM to provide a systematic approach toward the change of processes as a core activity within the change projects. In addition to this, they underlined the importance of a project-specific definition of its long-term, that is, sustainable, success after having finished the project, as well as the respective metrics and checkpoints. To do this already very early on in the project is important for target-setting and expectation management. At the same time, the interviewees claimed that the focus needs to be on the execution and the discussion of the results to proactively control the success of the project.

The next topic is performance measurement. In this context, performance measurement was referred to as the philosophy as well as the system that is used for setting objectives, defining metrics, measuring success, and defining as well as deploying measures for dealing with deviations. An important success factor mentioned here was the attitude toward the company in general and change in particular. The attitude is a prerequisite for accepting the performance management system and its metrics as well as measures. It can also be said that the more positive the attitude toward the company, the more receptive the employees are toward change. Furthermore, the interviewees stressed the so-called “task-culture-metrics-fit.” This means...
that new tasks have to be aligned with (maybe to be changed) corporate culture as well as the metrics, which are used to measure performance. If, for instance, the company decides to establish a less hierarchic decision process and empower the employees, the hierarchical culture of the old days needs to be changed and the metrics have to honor a behavior which embraces the new competencies. If these three factors are not aligned, a cognitive dissonance (cf. Festinger 1957) occurs, which keeps the employees in continuous insecurity about their performance and contribution. This statement is furthermore supported by the interviewees. They claimed that during and after change projects, it was important for them to understand the employed measurement mechanisms, their specific contribution, and the consequences of their actions with respect to overall performance. They mentioned that often it was not quite clear how their performance was actually assessed and how their individual contribution impacted the performance of the company.

The topics “sustainability” and “performance measurement” have been separated to stress a typical shortcoming of change projects: even though a performance measurement system exists, the change project is controlled by typical project management-driven parameters, such as “on time,” “on budget,” and “on scope,” rather than addressing the long-term effects and success of the project.

The last topic IT was mainly mentioned in connection with its support and enabling function. IT contributes to the success by facilitating communication and the exchange on the progress of the change project, its results and intentions. This platform function is considered crucial for the acceptance of change initiatives. Moreover, IT’s task is said to support BPM and with this the implementation of the new or changed processes. Finally, it was mentioned that IT plays an important role in enabling strategic agility by providing a flexible, for example, modular, infrastructure.

These results clearly indicate that both hard (e.g., organizational structure or performance management systems) and soft factors (e.g., role modeling, incentives) must be integrated for a holistic approach toward change. The presented topics build the basis for gaining a systematic approach for modeling change projects, and thus, facilitate the communication process.

2.2 Approach for Describing Change Projects

Communication and exchange on the change project and the intentions, which are pursued by it, are mentioned to be important success factors. The basis for facilitating communication is a description of the project, which should be as comprehensive as possible. The present approach is based on keyword clusters to fulfill this requirement. These keywords are used to trigger the description of the underlying concepts, such as, for example, business model.

In the 2004 study mentioned above, keywords for describing change projects were elicited during the interviews and an analysis of change literature. These
keywords can directly be connected to the topics, which have to be addressed for successfully managing change. These topics, however, are not independent from each other. Thus, the resulting 86 significant keywords have been subsumed under four clusters, which support their clear separation (for a full list of all keywords and the explanation of their allocation to the clusters cf. Baumöl 2008):

1. **Business architecture**: The business architecture is constituted by the business strategy and the derived business model, the process architecture, the structure of the supplier network, the company’s position in the value chain, the skill set of employees, products and the characteristics of the customer base. Thus, keywords, such as business logic, implemented management system, characteristics of decision processes, roles and functions, skill profiles, or technical infrastructure are subsumed into this cluster. This cluster is, compared to the other three, fairly large. This is justified by the complexity of this cluster, since it covers all the contents-related issues of the change project.

2. **Culture and emotions**: The corporate culture(s) and emotional configuration represent an important basis for responsiveness to change. As a consequence, the description of the relevant factors and artifacts, which constitute this basis is crucial for the project. Keywords, such as expectations of involved people, structure of power centers, key influencing persons and attitudes, stabilizing factors, history of the company’s success, reasons for resistance, or argumentation of sense-making belong to this cluster.

3. **Performance measurement**: The adaptation of the performance measurement system has been established as an important success factor during the interviews. Thus, it is not surprising that keywords for describing the performance measurement mechanisms came up in the course of the analysis. The following significant keywords are assigned to the cluster: metrics to be used for measuring performance, activities for dealing with resistance and deviations from target values, speed of change, quality measures, or scenarios for dealing with different prognoses.

4. **Context**: The context into which the change project is embedded plays an important role. The context influences the options for the change project, that is, the freedom of action that is granted. Significant keywords for this cluster are:

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3Burlton (2014) discusses the various aspects of planning and implementing business architectures from a process management perspective and presents a methodological framework for executing typical Business Process Management activities.

4Schmiedel et al. (2014) give an introduction in the concept of culture in BPM. Vom Brocke et al. (2014) report on a case study investigating into the role of culture in a global process standardization project.

5Heckl and Moormann (2014) provide a comprehensive discussion of process performance measurement.
the triggers for the change, possible discontinuities during the change phase, influence that stakeholders are exerting, milieu of the industry, or the economic situation.\textsuperscript{6}

Since each change project has its specific characteristics and is thus almost unique, not all the keywords fit in any one case. This means that for the description of the change project, the most suitable keywords have to be selected. This immediately leads to the question which keywords are the right ones. One hypothesis of the 2004 study was that frequently occurring keywords define the so-called reference scenarios. These scenarios are used to define the general topics of change projects. By running a statistical cluster analysis of the keywords and the change projects they were connected with, it was indeed possible to confirm the hypothesis, and five reference scenarios could be identified.

These reference scenarios are:

- Strategy adaptation
- Improvement of strategic agility
- Business process engineering and business process redesign
- Communication and interaction with the customers’ and business partners’ networks
- Growth strategy and cultural aspects in a technological context

For each of the reference scenarios, a distinct set of keywords could be identified. As a consequence, a change project can be described based on this reference set and moreover additional relevant and situation-specific keywords can be added.

2.2.1 Case Study: Implementation of the Customer Service Idea Within an IT Organization; Part One: Description of the Change Project

In 2004, a mid-sized company in the financial services industry decided to reposition its IT organization toward an improved customer orientation. The goal of the change project was to establish an internal IT service provider within the IT department, but to have, at the same time, a direct interface to the business areas. Being a typical IT department, this required not only a change of the strategy together with a change in most of the processes but also a major change of its culture. To achieve this, CME in combination with the project management standards of the PMI were deployed.

The first step to describe the project and its context was to select the reference scenario: In this case, “strategy adaptation” was selected as the closest fit. Based on this, the standard set of keywords could be selected and during an initial discussion with the department head, three more keywords have been identified: working

\textsuperscript{6}Bucher and Winter (2014) discuss the significance of situational particularities which have to be accounted for by Business Process Management methods.
conditions, required (target) behavior of the employees, incentives for good performance (cf. Fig. 4).

These keywords were used to describe the status as it is, as well as the target situation for the project, for communicating the goals and for exchanging ideas and standpoints with the people involved. It was a good basis for starting the discussion among the different groups throughout the department and to give the factual as well as the emotional discussion a direction or an anchoring, respectively.
The description framework provides an important technique, in the sense of method construction [cf. Fig. 6 and Bucher and Winter (2014)], to the business process manager. With this framework, he or she gains a holistic understanding of the project going beyond the sole focus on processes. Only with this understanding, the business process manager is able to design solutions for BPM tasks.

This section present the first step to initializing a change project – its thorough description as a basis for discussion. An interpretation of reactions and contributions to the discussion of the people involved in the change project as well as a conclusion as to their responsiveness to change, however, can only be successfully made if the underlying assumptions and beliefs are understood. Thus, the possibilities of analyzing and eliciting values, assumptions, and beliefs as constituent parts of the organizational culture needs to be discussed before constructing the situational change method.

2.3 Responsiveness to Change: An Explanatory Model

There are quite a few explanatory models with respect to employees’ responsiveness to change (cf. e.g., Kotter 2008; Kanter 2003; Burke 2002; Strebel 2000; Watzlawick et al. 1974). The influencing factors which can be found in these contributions are diverse, for example, the definition and redefinition of the employment relationship, the group or rather peer structure, power centers within the company, the design of a vision of the new way to work and its communication, the importance of the “burning platform,” the clear definition of the problem and its resolution, and motivational structures.

All these factors can be traced back to the way the employee perceives the current situation of the company, his or her position within the organization as well as the interpretation of the intended changes. From these pieces of information, the employee designs a model of the world and its operating mode; in other words, a mental model.

Already for some decades now, research on mental models has attempted to understand and explain human behavior (cf. e.g. Mathieu et al. 2000; Wilson and Rutherford 1989; Rouse and Morris 1986). Mental models are, in brief, a representation of the understanding of human knowledge about the world. Mental models are used to describe and explain observations as well as predict events (cf. Mathieu et al. 2000, p. 274). In this chapter, mental models are defined according to Rouse and Morris (1986, p. 360): they are “mechanism whereby humans generate descriptions of system purpose and form, explanations of system functioning and observed system states, and predictions of future system states.”

The concept of mental models can also be used to support the explanation of the responsiveness to change.

Norman (1983, p. 12) explains three properties of mental models:

- **Belief system**: A mental model reflects the belief system of the individual, which is acquired through observation, instruction, or inference. The belief system is a
personal instance of the perceived world and corresponds to the situation in which the individual finds himself or herself, respectively.

- **Observability**: The properties of a mental model should correspond to the properties of the observed world and support the sense making process. Otherwise, the model cannot serve as an explanatory model for the individual. An example of this property is the belief of the early Greeks in the existence of Zeus: they explained natural phenomena with the existence of higher beings and with that could explain the observable phenomenon of lightning.

- **Predictive power**: The mental model serves the understanding and anticipation of the developing target situation. Thus, it ought to build on inference rules adapted to the information processing power of the individual to support the “running” of the mental model.

As a consequence, since the three properties can have different instantiations, it is safe to assume that there are different mental models with respect to daily business and change (cf. Klimoski and Mohammed 1994, p. 432; Cannon-Bowers et al. 1993). The mental models for daily business have evolved over time and build the basis for the development of a mental model of the change project.

The reception of change has not yet been fully understood. The use of mental models could be a means to gain a better understanding on why some individuals accept and endorse change and others reject it. The evolution of a mental model centers on individuals’ assessment of their own capabilities and knowledge (cf. Mathieu et al. 2000, p. 274–275).

The 2004 study and the hints during the interviews have also proved the assumptions of the above-mentioned authors that the reception of change is influenced by the existing mental model and uncertainties about capabilities and knowledge with respect to four influencing factors. These factors are briefly described in the following:

- **Future**: Not surprisingly, change projects seem to be disruptive for the expectations of the future development. Almost anyone being in a change situation starts to make predictions about the future: What role/position, which responsibilities or new peers can be expected? Thus, it is mandatory to develop the conceptual model of the target situation, as has already been described in the previous section.

- **Skills**: The individual skills must be adequate for the already known or expected tasks or for new technology that is going to be implemented during the change project. Uncertainty evolves if the employee is unsure about the suitability of his or her skill level.

- **Workplace**: Working conditions belong to the group of very important but implicit, and thus, often neglected influencing factors of responsiveness to change. The expectations (e.g., improvement of working conditions, potential relocation, or new peers) connected with the change project play a vital role on how the mental model is developed.

- **Rules**: Change normally brings new rules to an organization. These rules can either have a normative character or belong to the newly developing culture and
manifest themselves either as organizational artifacts or implicit standards of behavior. Uncertainty can arise if the normative rules are not clearly documented in an early stage of the project or the new cultural rules do not become transparent and interpretable or adoptable, respectively.

The degree of uncertainty with respect to each factor influences the mental model each involved employee has of the change project. Thus, it could be a step toward a positive reception of the oncoming change to eliminate the uncertainty to a certain degree wherever possible. Since many instances of mental models can exist, which might differ only marginally, it is necessary to cluster these instances of the existing individual mental models to create profiles for efficient and targeted interventions.

The instances of these factors are moreover dependent on three other personal factors, which cannot easily be influenced, since they stem from the past:

- **Technical and functional background:** The employees have to be in the position to understand the intentions and objectives of the change project. A main requirement for this is their education and with this their ability to understand the technical and functional requirements of their tasks. This factor represents the required qualifications which an employee already possesses to fulfill a certain task. The factor “skills” refers to the skills which are required by the intended change and the employee might have to acquire first.

- **Previous experiences, attitudes and “superstitions”:** Each employee has past experiences with almost any aspect of a change project, be it the technical objectives or the emotional or cultural effects. As a consequence, an attitude toward the project is developed, which can either be positive, neutral, or negative. It is important to understand the effects of the developed attitude to be able to interpret the ensuing behavior. The so-called “superstitions” or beliefs are another element of behavior. Superstitions have normally been developed over time and represent rules that seem to work even if they make no sense or cannot be validated. Nonetheless, these superstitions are deployed to the perceived intentions and objectives of the change project; especially, if the situation is new and unusual for the individual. Norman (1983, pp. 8–11) describes superstitions in connection with the use of a calculator: the observed persons pressed the clear-button several times because they were unsure of the functionality of the calculator and developed the belief that hitting the button several times for sure produces the expected result.

- **Individual ability to process information:** Each individual has a different capacity for processing information. This is also crucial for the responsiveness to change and needs to be addressed by selecting an adequate way of communication and providing information.

These factors need to be taken into consideration, but cannot be actively used to influence the reception of change.

To understand and influence the mental models which impact the outcome of a change project, it is necessary to form a conceptual model (i.e., an “objectified”
model) of the target situation and compare this to the observed mental models of the target situation. The conceptual model tries to present the “objective” image of, for example, an IT system, which is the basis for explaining the IT system to a user and with this forming the user’s mental model as to how the IT system works. Young (1983) and Greeno (1983) provided the first approach for dealing with conceptual and mental models. The conceptual model is a very important part of the effort to gain positive response to the change initiative, since it is the framework within which the employee is “trained” to understand and accept the new environment. The conceptual model has to fulfill three criteria to be of use (cf. Norman 1983, pp. 13–14):

- **Learnability**: The model must be easy to understand and interpret for the employees in the given context.
- **Functionality**: The model must provide enough input to understand the way the target situation works and the new “system” reacts.
- **Usability**: The model must correspond to the individual’s ability to process information in the given context.

One conclusion which can be drawn from the above findings is that the design of the environment to enable employees responding to change in a positive way is the key. The employee uses the mental model as a guideline on how to act and behave in the familiar environment. To introduce new work processes or new ways of behavior, respectively, it is crucial to build on the present mental model and change it gradually. This means that new elements are added to the familiar environment rather than eliminating all familiar elements to start virtually from scratch.

One of the major requirements for an organization is, as already explained above, to be able to adapt continuously to the changing environment. Thus, the challenge for the business process manager is to balance the stable, familiar structures with new, flexible elements to foster the required ability to adapt. Information or rather the ability to process and make use of the information which is provided on the change project, its goals and the activities plays an important role. This information is processed within the mental model, which serves as the reference framework against which the new situation is assessed.

Method construction plays an important role in supporting the employees to accept change and contribute to the success of the change project. The construction process which is driven by the responsible person and addresses all employees who are involved in the change project makes the change effort visible, and with this, supports the adaptation of the mental model. At the same time, it serves as a means for communication. On the one hand, it enables the employees to deal with the change by exchanging opinions as well as fears. On the other hand, it enables management to understand the various responses to the change initiative, be it acceptance, skepticism, or rejection. This leads to the concept of shared mental models, which support the change effort by allowing the employees to build on their own mental models, compare them to those of peers, and discuss implications as well as next steps (cf. Stout et al. 1996).
Mental models are an important part of the context factors, which influence the change project, and as a consequence, are input factors for the CME. They are combined with two other input factors, “situation” and “decision,” and presented in the next section.

During the case study introduced above, some observations with respect to the influence of mental models could be made. These observations, although they were not in the main focus of the change project, are discussed in the following section.

2.3.1 Case Study: Implementation of the Customer Service Idea Within an IT Organization; Part Two: Observations on the Impact of Mental Models

Very early in the project, it became clear that three (more or less typical) attitudes toward the intended change were manifested: the “business-as-usual-prevails-anyway” attitude, the “it-is-about-time-let’s-change” attitude, and the “I-don’t-know-but” attitude. The observable attitudes are a manifestation of the mental models based upon which the employees receive and react to the intended change. Although it is difficult to objectively elicit mental models, it is possible to observe specific patterns of behavior and remarks which hint at the mental model. If the observation is introduced as a systematic instrument during the change project, it might help to influence the attitude, and with this, the underlying mental models. Although it was not done systematically in this project, some activities were directed to this subject.

The discussion of the above-mentioned attitudes during meetings and personal talks seem to prove the four factors as to how these models influence the receptiveness of change. The first attitude was mainly taken by IT specialists who had already seen some change initiatives and over time had come to the conclusion that nothing ever happens if they just do as they always did. Since the service orientation required the understanding of the user’s needs and requirements, which had not been in the focus in the mainly technology-driven department, it was especially important to influence this attitude. The introduction of the systematic description of the change project and method construction process helped to involve everybody in the department and catalyze discussion and engagement. This seemed to support the change of the first attitude. The second attitude is supportive of the intended change and most of the employees showing it, worked at the interface to the business areas; they could directly assess how important it was to understand the requirements. They were asked to be promoters of the change project, which worked quite well. The third attitude presents indecisiveness. The employees were skeptical about the change and mostly mentioned former, failed projects, which had already tried to introduce service orientation. It clearly helped to discuss the project and its goals in a systematic way and construct the change method with the involvement of the employees. However, not everybody could be convinced that the intended change would be beneficial in the end. As a conclusion, it can be said that the systematic and conscious handling of the existing mental models by first observing attitudes and using them for creating a conceptual model of the intended change could be advantageous for the success of the project.
3 Change Method Engineering: Method Construction for Organizational Change

Organizational change is driven by BPM – this is the foundation on which this chapter is based. As a consequence, BPM has to integrate not only strategic, governance or methodological, but also cultural aspects (cf. e.g., Spanyi 2006). Change is implemented through dedicated projects, which offer the chance to integrate BPM principles with those of organizational change. Thus, each change project should be based on a method which is constructed according to the specific situation. This method serves as a guideline for the course of the project. As the above discussion proves, a holistic approach, addressing both hard and soft factors, toward change needs to be pursued. The concept of CME has been developed to cater to the specific situational needs of change projects. It provides a toolbox for firstly systematically describing the change which is intended and the context in which it is embedded. Secondly, it is based on the above-mentioned set of reference scenarios and the pool of activities which support the implementation of the intended change (cf. Sect. 2.1) to select the “right” course of action for the situational method. And finally, construction patterns are suggested to support a systematic method development.

A change initiative has three phases: the pre- or rather planning phase, where the change method is constructed, the actual project phase (implementation I), where the change is implemented, and last, but not least, the phase “implementation II” where the move to daily business is made and the intended change is anchored within the organization.

The overall responsibility for the pre- and the project phase is with the project manager. Operational responsibility is delegated to the business engineer or the business process manager, respectively. One of the two has to manage the method construction process and its deployment throughout the phases implementation I and II (Fig. 5).

Fig. 5 Position of method construction during the change process
3.1 Basics of Method Construction

For a situational approach toward method construction, first the elements which constitute a method have to be defined. In a second step, the construction process has to be developed. According to Gutzwiller (1994), Oesterle (1995), Winter (2003), and Baumöl (2005), a method consists of activities, results of these activities, roles which are assigned to the activities, techniques supporting the activities, IT tools for documenting the results and an information model that ties the results logically together. The construction of the situational method develops around activities; they define the characteristics of the method. In Fig. 6, the above described elements are presented (cf. Winter 2003; Bucher and Winter 2014).

One of the questions to be solved is how the activities are gained. For the approach suggested in this chapter, the activities are derived from the descriptive keywords presented above. Each keyword can be translated into an activity, for example, the keyword “stabilizing factors” is translated into the activity “identification and analysis of stabilizing factors for the organization.” As a consequence, the set of descriptive keywords for a specific scenario defines the activities for the change method.

The sequence of the activities is dependent on two things: there are activities which set the ground for the project, that is, they serve the determination, analysis, that is and documentation of the basic framework and the status quo of the environment into which the project is embedded (e.g., history of successes, business logic, power centers, and milieu). The second group of activities addresses measures, results, or consequences of the change project (e.g., measures in case of resistance, key influencing people, scenarios). This group of activities builds upon the first group and can only be defined after the first one. The sequence of activities within these two groups has to be defined by the project team and is highly dependent on the situation.

Project management activities, as they are defined in many companies, can be found in both the groups.
Depending on the activities, the other elements of the method are defined. These are, for example, the roles which perform the activities (process owner, project manager, change manager, etc.) and the results which are to be achieved (defined and documented processes, project plan, communication plan, etc.).

The method construction process is crucial, since it reflects the situation in which the change project is embedded. Even though it must be flexible and adapted according to the situation, it cannot be a more or less random process, but has to follow a structured plan, which supports the efficiency of the change project. As a consequence, the construction process belongs to the standard procedures of CME.

3.2 Structured Process of Method Construction

The method construction process consists of three phases: analysis, definition, and sequencing. These phases base on the so-called construction patterns, which are presented in detail in Baumöl (2008). In the following, the basic mechanisms of these three construction patterns are presented.

3.2.1 Analysis

The process of method construction is not only influenced by the context, but also by the mental model and the attitudes of the employees. As a consequence, an effective construction process has to integrate these influencing factors and start with defining them. The first step of the analysis phase is to understand and define the situation. This step requires first of all a precise description of the situation by focusing on the parameters, “complexity” and “risk,” for both the current situation and the target situation. It is based on the topic of the change project and the ensuing reference scenario. Secondly, the decisions during the set-up of the project have to be analyzed. They are operationalized by the parameters “intention,” “objectives,” and “solution.”

As a first step, the “situation” is described based on its defining parameters. The parameters, complexity and risk, are subsumed under the “problem domain.” This domain represents the general definition framework for the project and the target domain (cf. Fig. 7). Complexity is operationalized by five perspectives in which complexity can manifest itself:

- **Organization perspective**, for example, a high degree of interdependencies within the organization drives complexity, and so does a very diverse background of the workforce.
- **Process perspective**, for example, a high maturity of the process architecture reduces complexity; a high number of involved process domains drive it.
- **Technology perspective**, for example, a high reusability of the IT infrastructure reduces complexity; the need for a considerable redesign drives it.
Control perspective, for example, a positive attitude toward the measurement system, maybe because of an attractive incentive system, reduces complexity; and so does a high maturity of the measurement system; a high degree of interdependency between various departments drives complexity.

Market perspective, for example, a high dependency on suppliers drives complexity and so does a high sensitivity of the business model for innovations.

The documented analysis of these five perspectives leads to an overall estimate of complexity measured by the attributes “high,” “medium,” and “low.”

Risk is assessed based on the same perspectives and analyzes the probability of the occurrence of a “risky” event, for example, from the organization perspective, the failure of the project due to resistance by the employees. The documented risk analysis of the five perspectives is also measured by the three attributes “high,” “medium,” and “low.”

The second step describes the element “decision” by three parameters. The intention is analyzed as the first parameter. This is a text-based analysis of the prior and original goals of the change project. The approach to achieve these goals, that is, the chosen solution, is also described in this context and from these two parameters, the objectives which are directly related to the change project are
deduced. Thus, a hierarchy of goals is defined: first of all, the overall goals of the intended change are set and then the objectives, in the sense of sub-goals for the change project or change projects, respectively, are deduced.

In a next step, the third influencing factor “mental models and attitude of employees” complements the tuple, which is thus constituted of three elements.

This factor is operationalized by the above-mentioned dimensions of uncertainty with respect to the individual’s capabilities to deal with the intended change and the personal factors.

With this, the context of the change project, which requires a situational method is adequately analyzed and documented.

Figure 7 presents the tuple and the parameters used for operationalizing the context.

3.2.2 Definition

The second phase of the construction process is supported by the definition pattern. The goal of this process is to select the keywords for the description of the project and the activities for the method. This is carried out based on the reference scenarios and a discussion with the stakeholders of the project. Here, the combined approach of using standards or best practices and complementing them with the situational elements takes full effect: The reference scenarios provide the keywords which were used for the respective scenario in most of the analyzed, successful change projects and with this systematically support the selection of the keywords for the required comprehensive description of the change projects (cf. Sect. 2). Further keywords which refer to the specific situation can be added during the discussion process.

Since this step is crucial, this part of the definition process is constructed as an iterative activity. Only if the relevant stakeholders have committed themselves to the way of describing the project and the planned activities, the next phase, that is, the construction of the method, can be executed. Of course, the discussion process has to be restricted to a defined time frame to avoid endless loops of new or old arguments. As a result of this first step, a set of keywords is obtained, which can be used for the comprehensive description of the change project.

The next step in the phase “definition” is the deduction of the activities from the keywords as described above. The activities are the first elements of the method, which have to be selected to be able to define the rest of the other elements of the method (e.g., roles, techniques; cf. Fig. 6). The result of the second step is a concrete instance of these elements for the situational change method.

3.2.3 Sequencing

After the definition has been completed successfully, the third and last phase is the sequencing of the activities. The main goal of this step is to define the right sequence of the activities, that is, the phasing of the change project. This is carried
out by developing various alternatives for the sequencing and discussing their pros and cons within the team and with the stakeholders.

After this last phase of the construction process, the method with all its elements has been completed and with this the pre-phase of the change project is concluded. Then, the project phase “Implementation I” can be started.

3.2.4 Case Study: Implementation of the Customer Service Idea Within an IT Organization; Part Three: Extract of the Results of the Method Construction Process

In the following, an extract of the results of the method construction process for the case study is presented. Figure 8 shows the activities and their sequencing. Another result of the construction process was a comprehensive list of the other elements of the method: all expected results of the activities, the involved roles, the techniques and the tools (e.g., ARIS), which were connected to the activities. As a support for the sequencing, two dimensions have been defined: four phases with respect to time and four blocks related to contents. These served as a basis for allocating the activities. The four phases were:

- Phase 1 “Initialisation and positioning”
- Phase 2 “Implementation”
- Phase 3 “Anchoring of the results”
- Phase 4 “Monitoring of the project success”

The four contents-related blocks were:

- Block 1 “Analysis of the prerequisites for the change project”
- Block 2 “Definition of the project”
- Block 3 “Definition of target parameters”
- Block 4 “Definition of control metrics”

The overall result of the construction process is the method “Internal IT Service Provider” consisting of a comprehensive description of the situational context of

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<tr>
<th>Sequencing of the activities for the method “Internal IT Service Provider”</th>
<th>Phase 1 (3 month): Initialisation &amp; Positioning</th>
<th>Phase 2 (10 month): Implementation</th>
<th>Phase 3 (2 month): Anchoring</th>
<th>Phase 4: Monitoring of project success</th>
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<td>Block 1: Analysis of the prerequisites of the change project</td>
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<td>Analysis of business logic</td>
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<td>Analysis and definition of value-added (as-is perspective)</td>
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<td>Analysis of process orientation (as-is perspective)</td>
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Fig. 8 Extract of the results of the method construction process
the change project according to the abstract example in Fig. 7, a comprehensive
description of the project itself (cf. Fig. 4), a list of activities and related elements
and finally a chart with the sequencing of the activities, ordered according to time
and contents.

The definition of the activities and the dependent building proved to be fairly
easy, since the keywords were used as a basis and they represented already a
common understanding of the change project. The sequencing, however, was
much more subject to discussions and the responsible project member had to strictly
guide the process. The method was then deployed and brought the expected
success. Minor alterations during the process had nonetheless to be made, reacting
to changes in the project context.

The application of the CME approach proved beneficial for structuring and
communicating the change project and its goals. For the organization, it was the
first time to explicitly model structures and openly discuss chances and risks of the
intended change. The procedure to clearly describe the project and its context as
well as the way to proceed during the project was well received and evaluated as a
considerable improvement. Moreover, the support by the pool of method elements
and the integrated approach to include all relevant dimensions of change were
highly appraised. However, applying the method created a higher planning effort
and increased the communication needs, thus taking up more time than other
projects, especially for the responsible people. Sometimes, it was received as
bureaucratic because of the need to explicitly document results in a fairly detailed
way. Since it was the first time the method was applied, the learning curve was
arduous although it was also steep. As a conclusion, it can be stated that to harvest
the benefits of the method, it seems first of all to be necessary to follow a pragmatic
approach when using the method, that is, “keep it simple and flexible.” Secondly, to
make use of the learning curve effect, it should be introduced as a standard and be
used for each change project. A dedicated training for the people driving the
method in the organization seems to be a good addition since project management
or process management training does not provide the entire picture.

To continuously improve the method construction process and enhance the pool
of activities, a systematic management process is necessary. This process is
described in the next section.

3.3 Management Process for Change Method Engineering

The management process for CME focuses on two steps: on the one hand, the
structured procedure for constructing the method; and on the other hand, the
continuous updating of the pool of activities as well as reference scenarios and
enhancing of the knowledge base. This is necessary for a systematic use of CME to
take advantage of the learning curve and to establish continuous improvement. The
left-hand side of Fig. 9 (cf. Baumöl 2008, p. 156; Gericke and Winter 2006, p. 234)
represents the above-described phases of the method construction process. The
right-hand side presents the improvement process and its elements. The existing
method elements constitute the initial knowledge base for method construction. Experiences from projects, new method elements, and other lessons learnt are used to enhance the initial knowledge base. Method administration is responsible for this step and the result of method administration is a so-called “repository of method elements,” which also includes the construction patterns.

4 Conclusion

Change is for sure necessary for the survival of each individual and each company. Nonetheless, change projects create a high amount of tension within a company and often conflicting sentiments. Even worse, change projects tend to paralyze companies for a considerable time span. The responsiveness to change, be it accepting or rejecting, is a critical success factor for each change project. As a consequence, it is important to understand which factors seem to be important for the people with respect to change, how the mental model of change is created and finally, what are the possibilities to influence the responsiveness for the good of the people as well as the company.

All three questions have been addressed in this chapter. The first objective was to explain the prerequisites for dealing with organizational change. The analysis provided a systematic basis for initiating a change project: they answer the
questions “what must be considered” and “which mistakes could be prevented from the start”.

The second objective was to present a framework for modeling change projects and the influencing factors. The resulting framework is the first one to support the comprehensive description of a change project considering hard (e.g., the process architecture) and soft factors (e.g., the influencing factors on mental models). Further research here is to investigate the options for eliciting and describing mental models by maybe defining certain profiles. Once mental models can be explicitly modeled and communicated, their influence on the change process can be further analyzed and activities for influencing existing change models can be added to the pool of CME activities.

The third objective was to suggest an approach for constructing change methods, which can be flexibly adapted to the specific situation. To achieve this, the concept of CME has been introduced as a means to drive change projects in a structured way by also taking into consideration the emotional prerequisites within the company. Further research in this area is necessary with respect to analyzing and complementing the reference scenarios and to complete the pool of activities without overloading the basis. Moreover, the systematic training of business engineers and business process managers with respect to the integral approach for organizational change must be driven onward by specific programs. What has already been achieved for project management must now be carried out for change management: establish standards and the communication of best practices rather than treating change management like a process whose results are serendipitous at best.

With these results, CME contributes to the domain of BPM by providing a comprehensive approach for supporting the business process manager to drive organizational change. It does not only consider the contents-related aspects of business process-driven change, but also the success-critical aspects of culture.

However, even though CME provides a framework for effective and efficient change, the business process manager has another crucial part in the change project. He (or she) is responsible for the construction of a situational change method which reflects the specific situation of the project. A thorough understanding of the system “organization,” and with this also the success factors of business process-driven change, is mandatory. The business process manager is the bridge between the hard and the soft factors of change.

There is still considerable research required in this field to understand the “people factor” of change. It is important to note that this research process can only add value if companies and universities work together closely and construct solutions for successful change initiatives.

References

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How Organizational Culture Facilitates a Global BPM Project: The Case of Hilti

Jan vom Brocke, Martin Petry, Theresa Schmiedel, and Christian Sonnenberg

Abstract The role of culture in business processes is often underestimated. Especially the success of Business Process Change depends to a large extent on the employees’ willingness to adapt to a new work environment and eventually accept short-term losses for long-term benefits. We, therefore, engage with the Hilti Corporation analyzing the role of culture in a specific change project. After introducing the Hilti business model, we take a closer look at the measures taken at Hilti to actively manage a global culture by means of the Culture Journey. Against this background, we examine the impact culture may have on Business Process Change. The IT-driven change project Global Processes and Data (GPD) at Hilti serves as an example for exploring the way in which culture affects process change. We conclude deriving some lessons learnt from the Hilti Case on the role of culture in BPM.

1 Introduction

Every company has its own culture with its own values which become apparent, for example, in the actions of the employees. The culture develops along with the history of the company, and therefore represents the people’s behavior. However,
culture is not passive, it is not just a pattern of behavior. The culture of a company can actively be shaped as a pattern for behavior (Neuberger and Kompa 1987) – as Hilti does. Hence, it is an important step for a company to identify its core values as the origin of the corporate culture. Most of the times, these values, have led back to the vision and attitude of the founders of a company and have developed over time (Buß 2008). In this study, we want to investigate the specific situation of Hilti’s corporate values, which in fact have been shaped strongly by its founder Martin Hilti, who started the company in 1941 in Schaan, Liechtenstein. Today, Hilti is a leading company for products, systems and services for the construction industry in more than 120 countries around the world.

In 2000, Hilti launched a major BPM project bringing all eight production plants, more than 50 sales organizations, and over 20,000 employees into one single global ERP system. From 2009 to 2010 we had the opportunity to investigate into this project based on document analysis and interviews involving major stakeholders of the project, including Martin Petry, co-author of the chapter, who is the CIO at Hilti and who was responsible for the BPM project under observation.

Another major aspect of the case is that Hilti upholds a clear value orientation and has developed the concept of the Culture Journey to facilitate that its employees become aware of the corporate culture and actually live the corporate core values. Apart from various activities belonging to this concept, Hilti summarized its approach to cultural awareness within the organization in a book provided to every employee. Below, an excerpt of this book is presented, alluding to what the Culture Journey at Hilti is aiming at:

The way we do things at Hilti is based on living strong values. We act with integrity in all we do. We demonstrate courage to go beyond the circle of habits. We outperform through teamwork and we have commitment to personal and company growth. We share a common purpose of passionately creating enthusiastic customers and building a better future. We take responsibility for the development of the business, our team, and ourselves. We encourage, coach, and support each other to achieve outstanding results.

With such a statement, Hilti may not differ much from other corporations or organizations. However, as the people and corporate core values are vital to the business model of Hilti, much effort is put into making sure that the employees at Hilti really live up to these values.

With these two rather unique characteristics (a) the impressive BPM initiative with only a few of its kind and (b) the remarkable investment of Hilti in developing – and living – a clear corporate culture, the case can be used to investigate into potential relations between the corporate culture and BPM success. The overarching

to more thorough introductions which have been made available by now such as vom Brocke and Sinnl (2011), Schmiedel et al. (2013), as well as the introductory chapter by Schmiedel et al. (2014) in this handbook. By using the original data and conceptualization from 2009 to 2010 we intend to keep constancy to further publications taking additional perspectives on the case, such as vom Brocke and Sinnl (2010) and vom Brocke et al. (2013).
question in our research was: to what extend might the cultural values at Hilti (and the initiatives of the cultural journey in particular) have contributed to succeeding in the BPM project? In addition, what conclusions might we be able do draw from this case on a more general level?

In the following, we present the Hilti business model in which culture plays an essential role. We then take a closer look at the measures taken at Hilti to actively manage a global culture by means of the Culture Journey. Against this background, we analyze the impact culture may have on Business Process Change. We take the IT-driven project of Global Processes and Data (GPD) as an example and set out exploring the role of culture. As to our prior source of knowledge, we report on the results of interviews conducted with managers of Hilti. Finally, we conclude deriving some lessons learnt from the Hilti Case on the role of culture in BPM.

2 Culture as an Integral Part of the Hilti Business Model

2.1 Introducing the Hilti Business Model

In order to understand the relevance of corporate culture within Hilti’s business processes, it is necessary to have a look at the business model of the Hilti Corporation. It can be seen that the organization’s culture plays an essential role being perceived as the backbone of corporate success. In this section, we first give an overview of the business model and its various elements, before studying the mechanisms of realizing and maintaining a strong culture in more detail.

The Hilti business model is essentially framed by two elements: (1) customer value and sustainable profitable growth as the primary objectives (output), and (2) passionate people sharing a motivating culture as the essential drivers for business (input). Both elements span the Hilti business model displayed in Fig. 1. The various elements of the model show how Hilti aims to realize its objectives.

The model illustrates that business is initially driven by “Purposes and Values” that are shared by the “People” working at Hilti. These purposes and values are continuously communicated and further developed within the process of “Our Culture Journey.” For guiding business activities the “Champion 3C strategy” is another essential pillar in the business model. Processes responsible for creating customer value and sustainable profitable growth are the engines of the business model.

All pillars of the business model are connected with a feedback loop, driving the continuous improvement of individual pillars. In the following section, these pillars are described in some more detail providing a framework for our further examination.
2.1.1 Purpose and Values

At Hilti, the purpose of business is summed up by the Hilti Core Purpose Statement: *We passionately create enthusiastic customers and build a better future.* This statement nicely illustrates both, objectives and drivers of business.

Regarding the objectives, Hilti goes beyond the common goal of customer satisfaction and – according to the objective of creating customer value – draws the picture of the “enthusiastic customer.” This underlines the intention to create success for the customers by identifying their needs and providing innovative and value-adding solutions. In one interview, a manager puts it as follows: *It is not about selling customers a drill, it is more about providing them a complete fastening solution in a certain situation. That means: where to put that hole, how to measure it, how to make that hole, what to fill it up with, and to ensure that a building is going to stay there for 10, or 20, or 50 years – and doing all this in an efficient way and in line with highest health and safety standards.*

Enthusiastic customers already account for one aspect of Hilti’s sustainability objective. Building a “better future” also relates to this objective and is further defined through the following elements: (1) to foster a company climate in which every team member is valued and able to grow, (2) to develop win-win relationships with partners and suppliers, (3) to embrace responsibility toward society and environment. In discussions with representatives of the company, it became apparent that Hilti’s responsibility-driven attitude may particularly ground on the special business Hilti is active in. A manager explained it like this: *Hilti is not about putting pictures on the wall. It builds tools to hold buildings together, to make sure that bridges do not fall down, to make sure that tunnels are safe, to make sure that concrete sticks to steel or steel sticks to concrete even in the most difficult conditions and environments.* This shows that sustainable solutions are a key objective for Hilti to serve its business purpose.
With regard to the drivers in the business model, Hilti’s employees share the following corporate values:

- **Integrity**: Integrity means being upright toward all people you interact with, acting according to principles, incorporating a holistic perception, and feeling responsible.
- **Courage**: Courage stands for having a backbone, being brave enough to go beyond the obvious and proven and exploit new ideas.
- **Teamwork**: Teamwork signifies pulling at one string, sharing a common goal, using synergies and therefore enlarging competence.
- **Commitment**: Commitment implies identifying with the company, feeling an inner engagement for accomplishing high performance.

Hilti’s corporate values account for a motivating culture and passionate people as important drivers of the business. These values serve different goals at the operational level. They provide a basis for both selecting new personnel, and developing employees within the Culture Journey. As a manager stated: *When we recruit people we ask: Do they fit our corporate core values? And if we see this guy is not so much of a team player […] we do not even start looking at the skills.* Furthermore, Hilti’s values provide a framework on how to work together in the business processes.

The priority given to purposes and values at Hilti is visible in the Culture Journey. Its impact will be analyzed later on in this chapter.

### 2.1.2 Our Culture Journey

The Culture Journey at Hilti is a corporate initiative that intends to make sure that the corporate purposes and values described before are meaningful to all employees working at Hilti. These approximately 20,000 people work in more than 80 market organizations around the world. In this global setting, a specific process is needed in order to foster a shared understanding within the company, and to help people identifying with the company. The Culture Journey binds people to act together and is an important source of motivation and integration. A manager underlines the importance of the initiative: *We need to ensure that everybody sings the same song. And we do that through the Culture Journey, continuously working on our corporate values.*

The implications of the Culture Journey for the business model in general, and also more specifically for BPM, will be further explored in the remainder of this chapter. Before going into more detail, the other elements of the Hilti business model will be briefly introduced in order to complete the picture. This will help better understand the various effects of Hilti’s corporate culture.
2.1.3 Customer, Competence, and Concentration

In order to be the customers' best partner, a manager explains, sales people and product managers continuously listen to the specific needs of the customers. Many innovations are driven out of customer needs reported to, or experienced by, the product managers in the field. Therefore, the overall objectives of the corporation are transformed into tangible action plans and strategic initiatives are derived. Within the Hilti business model, the champion 3C strategy serves that purpose. It draws on customer, competency, and concentration as the main strategic drivers.

Before, we described Hilti’s enthusiastic people and motivating culture as the main drivers for business and customer value as a main objective. At the same time, customers are seen as business drivers. This shows the corporation’s business understanding as being process-oriented in the sense that customers represent both beginning and end of the business process. Hilti’s strategic drivers are specified as follows:

- **Customer**: We want to be our customers' best partner. Their requirements drive our actions.
- **Competency**: We are committed to excellence in innovation, total quality, direct customer relationships, and effective marketing.
- **Concentration**: We focus on products and markets where we can achieve and sustain leadership positions.

Specific initiatives are derived from these drivers. For example, Hilti employs a direct sales model and does not sell through a distributor network, or through wholesalers. That means a customer always buys a Hilti tool from a Hilti employee and thus communicates his needs directly to Hilti. Focusing on direct customer relationships is the key for Hilti being excellent in innovation.

In order to put these strategic drivers into practice, Hilti applies a strong process oriented structure building the next pillar of the business model.

2.1.4 Processes

In the Hilti business model, four process areas are defined on the corporate level, each of which is further distinguished on more specific levels.

- **Product Portfolio Management**: This aspect essentially deals with the design of new products. On the top level, it comprises the management of the entire portfolio of products and services across a life-cycle. It also comprises research and design of specific products on the more detailed levels.
- **Market Reach**: Considering the Market Reach process, five different sales channels are differentiated, namely (1) Hilti centers, (2) Territorial sales people, (3) Pro Shops, (4) B2B (incl. Hilti online), and (5) Customer Services.
- **Supply Chain Management**: On a daily basis, Hilti purchases significant amounts of material and delivers a high volume of its products to its customers. Supply
chain management deals with the logistics and the warehouse management by means of logistic centers. Moreover, the management of relations to its supply-chain-partners is an essential element for Hilti in order to achieve win-win situations.

- Professional Services: These processes include delivering after sales services. An essential part is dealing with repair services which should be provided with a favorable quality and speed. Another important part of Professional Services is fleet management: Customers pay a low monthly fee for the use of a Hilti tool and also experience a package of value added services that deliver direct business benefit.

In addition to the processes characterizing the core business, a process area for management and support is distinguished. In particular, IT services are located therein, supporting the four process areas.

All processes are measured in terms of outcomes in order to actively manage their contribution to the corporate purposes and values. These outcomes form the next pillar to be described as part of the business model.

2.1.5 Outcome

According to the primary objectives, Hilti is aiming at customer value and sustainable profitable growth. These goals can be translated into business goals at a more operative level. Sustainability translates, for example, in high quality as an undisputed element in the Hilti business model. At the same time, profitability is focused on. That means Hilti safeguards efficiency, in order to deliver high quality at reasonable costs, and in appropriate time.

For further operationalization of the objectives, visions are created covering the development of a 5–10 years life-span. In 2000, for instance, “Vision 2008” was announced named “Accelerated Profitable Growth.” As part of this vision, the goal was set to have a yearly turnover of four billion CHF and 450 million CHF of profit by 2008. As these goals were already reached before 2008, a new vision was announced in 2006, namely “Vision 2015: Be a Great Company.” One goal is to double sales to eight billion CHF per year, and to more than double profit by 2015.

In addition to the financial operationalization of the objectives, Hilti follows a stakeholder approach (vom Brocke et al. 2014), looking at the value contribution of the processes from the perspective of all stakeholders. Considering the employees’ perspective, for instance, Hilti aims at ensuring that everybody at Hilti grows into their job positions according to individual capabilities and preferences. In the same way, win-win relationships with the suppliers as service providers are an essential part of the value concept. Apart from the stakeholders directly involved in the processes, Hilti is also concerned about a positive impact on society and ecology. As a consequence, Hilti is actively involved in social welfare projects around the world, for example, in Sri Lanka and in Brazil.
Against the background of the Hilti business model, the role of corporate culture in BPM can be analyzed in more detail. In the following chapter, we examine the specific mechanisms of realizing and maintaining a corporate culture.

2.2 A Closer Look at Culture: The Hilti Culture Journey

It is comprehensible that “any successful process management effort requires a strong emphasis on culture, leadership and change management” (Davenport 2008, p xvi). While there is evidence on the importance of cultural aspects in BPM (Hammer 2014; Armistead et al. 1999), little is known about specific measures to actively consider corporate culture in BPM (Baumöl 2014; Gore 1999 for some discussions on probable measures and actions to design organizational culture; Lee and Dale 1998; Zairi 1997). As to the example of the Culture Journey at Hilti, we can now study such measures in more detail and analyze the leverage of these initiatives within a global BPM project.

There are different phases toward a consciously lived corporate culture. These include the development, the realization, and the maintenance of the corporate culture and its values. Regarding the development, a company’s culture is based on the values and visions of the founders for the most part, and develops over time according to various internal and external influences. Very often, neither managers, nor other employees, are aware of the corporate culture. Awareness, however, is the first step to actively shaping it, accomplishing major changes, or harmonizing it worldwide. It is the first step to realize an aspired corporate culture.

2.2.1 Realizing a Corporate Culture: Taking Efforts for Values

Moving toward a specific corporate culture is a very intense undertaking. The more people are involved in an organization, the bigger the challenge to integrate people of different socio-cultural backgrounds. Sustainable initiatives are required that go beyond single workshops.

Hilti’s tool to realize its aspired corporate culture is the Culture Journey. That means every employee goes through several so-called “team camps.” These camps are organized off-site, and intend to foster teaching and learning of corporate values. The effort taken to organize and conduct these trainings is significant. I have never seen a corporate initiative that costs millions a year to make sure that everybody is on the same page, a, manager states. And we are not talking about half an hour: The first team camp takes 2 or 3 days and we continue in that fashion resulting in 2–4 days of commitment every year, the manager keeps on reporting.

Thirty-eight thousand working days were spent on the Culture Journey in 2007. In 2008, the working days even increased up to 53,000 days per year.

Every new employee of Hilti attends a training called “Welcome to Hilti.” This is a 5 day event, of which 2–3 days are solely spent focusing on a “fast track”
Culture Journey. Further camps follow, according to a standardized process, making sure that everybody is going through the same training and getting new employees up to speed.

Summing up, we can conclude that quite a significant effort is made at Hilti realizing the corporate culture worldwide. Apart from building up a common understanding, initiatives for maintaining the corporate culture are also considered.

2.2.2 Maintaining the Corporate Culture: Making Values Relevant

Hilti’s corporate culture is also embedded into the management process. Annual ratings are conducted in order to examine to what extent the corporate culture is actually lived by the employees. The degree of the aspired culture’s realization is measured and consolidated – measured at the individual team member’s level and consolidated at the department and group level.

For each employee “Performance Metrics for Personal Development” are evaluated by means of a scorecard, including sections for each corporate value dimension: integrity, courage, teamwork, and commitment. Based on this scorecard, regular feedback talks are conducted. As one manager reports, the corporate values are under close surveillance. If an employee, for example, lies and therefore violates integrity, the dismissal of him or her is taken into consideration. At the same time, Commitment is strongly acknowledged and employees receive appreciation for their contribution to the corporation’s success.

Apart from the individual management of team members, the core corporate value rating also is an essential part of the performance measurement on the group and department level (see Fig. 2).

As part of the overall Performance Measurement a global employee opinion survey (GEOS) is carried out particularly capturing cultural issues. GEOS is a large scale survey that is conducted anonymously and that serves to comprise people’s perspectives on the company. The survey, which nearly all employees participate in (well over 90%), includes more than 80 questions focusing on areas such as direction, execution, trust teamwork, encouragement, and recognition regarding the department, team, and individual performance level. For instance, employees are asked to evaluate the work-relations in the team. Further questions elude to what extent employees’ feel they understand the link between their work and the overall business, or to what extent they have the feeling of being supported in their personal development and career.

Following up on the ratings, Hilti takes actions to make sure the corporate culture can be maintained. Within this process, the employees’ feedback is a valuable source of knowledge regarding the measures to take. Continuously examining to what extent the corporate culture meets the vision of it is an essential part of the Hilti business model primarily fuelling the sustainable profitable growth at Hilti, as one manager points out.

As a result we can observe that Hilti follows a systematic process in realizing and maintaining its aspired corporate culture worldwide. We now focus on the IT
2.3 Implications for Hilti IT: A Business-Driven IT-Strategy

Even though IT plays an important role throughout the entire business processes and, therefore, cannot be separated from “business,” the alignment of business and IT is an issue. This can be seen from both theoretical discussions on the two disciplines and from the governance structure in practice where most often there are IT departments separate from other departments. Hence, the clash, or rather the alignment of business and IT, is widely discussed (Coombs et al. 1992; Guzman et al. 2008; Leidner and Kayworth 2006; Robey and Boudreau 1999).

At Hilti IT, a strong alignment with the overall corporate values can be observed ensuring that the corporation’s business and IT go in the same direction. In particular, the Culture Journey had a significant impact on the Core Purpose Statement, terminology, and organization of Hilti IT.
2.3.1 Impact on the IT Core Purpose Statement

According to one of the IT Managers, it was within one of the team camps that people from Hilti IT created their own Core Purpose Statement. Just like the overall Hilti Corporation has a statement that describes the purpose of the corporation (We passionately create enthusiastic customers and build a better future) Hilti IT also started to work on the creation of such a statement. It reads as follows: We passionately enable business excellence through global IT solutions. The Hilti IT Core Purpose Statement was carefully derived from the Hilti Core Purpose Statement by questioning how Hilti IT can contribute to reach the overall objectives. IT is, thus, not at all seen as a means in itself, but as a means to support excellence in business.

2.3.2 Impact on the IT-Terminology

The Culture Journey led to a change in thinking that had an impact on the terminology used at Hilti IT. Right out of the discussions driven by the Culture Journey, there was the intention of expressing the idea of global cooperation in the wording commonly used. We need to have the courage to completely disband having or even using the term “local IT.” You are not local IT anymore, you are now “global IT.” This action was indeed a small change, but it turns out to make a specific difference. For example, the Spanish IT team is no longer a “local IT” team, but rather an “onsite IT” team, and part of the global picture.

2.3.3 Impact on the IT-Organization

In terms of work practices, the Culture Journey also contributed to “breaking down departmental walls” and fostering cooperation between the departments. The implementation of joint task forces, for example, developed directly from the attitude to take responsibility valuing teamwork. In these task forces, business and IT people, for instance, work together on innovative solutions. According to our interview partners, the task force members do not perceive themselves as representatives of individual departments. They are not us and them, as a business representative said. That is not IT and this is not us. We are a team. Yes, we do not belong into the same department but we sit in the same room, he explained further.

Summing up, we can learn that the Culture Journey has a significant effect on the way IT is carrying out business at Hilti. In particular, there is no divergent sub-culture but rather a strongly business-oriented IT. As the examples show, the shared corporate purposes and values had been a major source for the development of a new IT-Strategy. What we have not analyzed so far is the leverage of the corporate culture. In order to do so, we will look at a global BPM project at Hilti.
3 Global Processes and Data: An IT-Project Driven by Culture

3.1 Scope of the Project

Realizing the IT-Strategy of 2000, Hilti started quite a remarkable project on GPD. The objective was to overcome local data and process silos by introducing global standard business processes and standardized data structures supported by a global SAP solution, managed centrally from the headquarters in Liechtenstein. By the end of 2008, in excess of 95% of revenue, in excess of 40 sales organizations, and all eight production plants were operated on one global system. This means more than 15,000 users work with SAP ERP and 6,000 users also work with SAP Mobile.

Global standards for processes bear great potentials in terms of economies of scale. However, at the same time, these initiatives may face tremendous resistance from the local actors (Brenner et al. 2014; Tregear 2014). While methods for modeling standardized processes and process variants may well be at hand, particularly from the field of reference modeling (vom Brocke 2007; Hallerbach et al. 2014), there are strong obstacles with regard to people giving up well established local processes for the sake of globally “dictated” ones.

Against this background, the GPD project is considered an ambitious initiative. It was conducted following multiple waves and has until now been perceived as successful. For our study, such a huge transformation project was interesting to pick as an example to reflect the role of corporate culture in this process. We mainly base our study on the assessment of the managers who were actively involved in the project.

At first, we analyze the scope of the GPD project in more detail. Driven by the IT strategy, GPD particularly required: (1) a global scope, and (2) an orientation toward the support of globally decentralized sales processes.

3.1.1 IT Becomes Global

One objective of the IT strategy was to globalize IT. Before the implementation of GPD, the organization of Hilti IT was fragmented, that is, having two chief information officers (CIOs), one CIO of Hilti, and another one for Hilti North America, in addition to multiple independent IT heads locally, who reported to local management teams.

A Hilti IT Manager described the need as follows: *A centrally managed IT with one global CIO was needed to properly handle a globally used, integrated business application environment for 15,000 users.*

After redesigning the organization of Hilti IT, the “onsite IT” teams would report to the regional infrastructure managers (RIM) who, then, would report to the central
IT team at the headquarters which is called “global IT.” The RIM are split up into five regions: the Far East region, three regions in Europe and the Americas.

To make sure that Second Level Support for all Business Applications is available at all times, three strategic locations for the Second Level support teams were selected. We apply a follow-the-sun Second Level support concept. We went with Kuala Lumpur in the Far East, Headquarters in Schaan, and Tulsa in the US almost perfectly within an 8-8-8 h schema, an IT manager explains.

Consequently, moving toward a global IT has not only led to economies of scale, but also accounts for Hilti’s employees further growing together, practicing teamwork on a world-spanning scale. Therefore, the process change impacts Hilti’s culture, providing a flow of activities that intensifies global collaboration among employees.

3.1.2 IT Supports Sales

The IT Strategy also had to account for the fact that Hilti is not only a production company. Actually in terms of headcount, Hilti is a service company involving most people in direct sales. One manager put it like this: The majority of people are not making drill hammers. Actually, the majority of people are involved in direct sales. Globally we have 200,000 customer contacts every day.

Hence, it is crucial to support the customers in the best way possible by driving integrated marketing and sales processes through its Market Reach community, creating outstanding customer relationships and MR productivity. That’s what CRM @ Hilti is all about.

For this purpose, Hilti built a global process for CRM, which entails a comprehensive 360 customer information offering, the seamless integration of all sales channels, as well as a structured Sales Management Process (SMP). This defines the relationship between marketing and sales, the proper planning of the weekly customer visits, as well as the execution on the road. It is a natural extension of Hilti’s Champion 3C strategy (Customer, Concentration, and Competence) which translates to being the customer’s best partner, having the customer requirements drive actions, delivering excellence through innovation and total quality, and ensuring a direct customer relationship. To accomplish this, Hilti selected to base all customer relevant information on an integrated CRM system. This tool enables the 360 picture of the customer base, which all Hilti sales channels are utilizing, fitted to their specific needs.

The vehicle chosen to deliver and capture a significant portion of this information is an SAP based, in-house optimized solution, named TS-Mobile. With a PDA, the territorial salesperson gets the information concerning upcoming customer visits and logs customer information and sales activities, eventually synchronized into the SAP CRM and ERP solutions.

Hilti was well aware of the fact that introducing GPD was not only a matter of deciding on an information system, and therefore an IT project. On the contrary, the biggest difficulty of the process change was to have employees around the world
change their daily way of work and adopted work patterns. Challenges had to be foreseen which are now discussed in more detail. The role Hilti’s corporate culture played in overcoming the difficulties of the change project will be considered afterward.

3.2 Challenges Within the Project

Introducing GPD, brought in massive changes not only for Hilti IT, but also for all Hilti employees. Following the corporate culture, it was considered essential to integrate people in the change process from an early stage, in order to facilitate acceptance of the new system and to get support in the new processes.

In this section, we illustrate specific challenges within GPD in order to better understand the project and the changes for the employees going along with it. We differentiate between (1) organizational issues and (2) financial issues.

3.2.1 Organizational Issues: Restructuring Hilti IT

The organization of Hilti IT underwent significant changes initiated by the GPD project. These changes are related to business process orientation and include three perspectives: subject areas, infrastructure, and governance.

The subject areas within the IT were closely aligned to the business processes, namely the following three (in alphabetical order):

- **D-area**: comprising development, production, supply chain, and logistics. This area is aligned with supply chain management and product portfolio management.
- **F-area**: basically comprising support and management functions, finance, human resources, and back office support mechanisms. The corresponding business area is management and support.
- **R-area**: comprising sales channels such as Hilti online, the TS mobile, and CRM. This area corresponds with market reach and professional services.

For the support of the three areas, Hilti IT established so-called Process Competence Centers (PPCs) according to the D, F, and R-area (Rosemann 2014).

Furthermore, an effective and powerful infrastructure was considered vital. The infrastructure layer in Hilti IT is supported by a team covering technical components such as servers, storage facilities, laptops, operating systems, or application provisioning. Another layer in Hilti IT is the governance, which is concerned with enforcing business excellence, ensuring IT security, coordinating operations, and conducting performance measurement.

Accordingly, the IT leadership team, consisting of nine managers, is equally partitioned into three managers on the governance side, three managers on the infrastructure side, and three managers on the PCC (subject areas) side. That way a
maximum alignment with business can be provided, consolidating the infrastructure, governance, and PCC perspective in one IT leadership team. Restructuring the organization of Hilti IT was a difficult undertaking since it necessitated both changes in work practices, and changes in responsibilities.

3.2.2 Financial Issues: Adjusting the Budgeting Structure

The new organizational structure also had implications for the budgeting. Before implementing the global IT strategy, responsibility for the IT budget was in the hands of the (now called) “onsite IT” of each market organization. This was changed to a centralized model, according to which global IT autonomously governs the entire IT budget.

This change had a significant impact on the work practices and also affected the employee’s perception. For example, the salaries of the IT people working in the onsite IT department used to be paid from the local market organization, which are now paid out of the centrally managed budget. A manager gives further examples: *If the IT in France wanted to buy a server they bought a server. If they needed maintenance on a router they bought that in Paris. As a consequence of this global IT strategy that has changed.* The global IT infrastructure team, as explained above, is now centrally managing the purchases of hardware and network capacity, thus disburdening the “onsite IT” teams and achieving economies of scale.

We can conclude that the GPD project at the Hilti Corporation brought along significant changes. These changes are driven by the economic potential of GPD and they are essentially facilitated by the IT infrastructure. However, we see that the effects of the initiative are not at all limited to IT. On the contrary, the managers reported on – to some extent – dramatic changes to the way people do (and perceive) their work. Therefore, GPD seems to affect both processes, and culture and the introduced challenges can account for enough reason to have a project like GPD fail. Since most parts of the change project have already been completed by now, we are interested in the results of the project, particularly in the role Hilti’s corporate culture played regarding the challenges of the project.

3.3 The Role of Culture: Assessing the Cultural Leverage

Given the strong initiative at Hilti in realizing and maintaining its specific corporate culture, we are particularly interested in the role the Culture Journey played in the GPD project. Our interest is based on the fact that IT projects most commonly fail due to a lack of user acceptance (vom Brocke and Thurnher 2009; Baumöl 2014). This is the case particularly in projects which require changes in people’s work practices to a large extent. Therefore, the support of these people is a crucial success factor (Anderson and Ackerman Anderson 2001; Hlupic 2003). As former IBM CEO Gerstner puts it, *culture isn’t just one aspect of the game – it is the game.* In the
end, an organization is nothing more than the collective capacity of its people to create value (Gerstner 2002).

With respect to previous studies, we therefore assume that (1) the Culture Journey and, especially, the shared corporate purpose fostered the support of the initiative since employees understand the benefits of the global initiative. In addition, we assume that (2) the corporate values – integrity, courage, teamwork, and commitment – have a positive influence on the people’s behavior during the change project, and thus contribute to the effectiveness and efficiency of the project.

1. Overall influence of the Culture Journey on the support of the project

Regarding the shared corporate purpose, representatives of Hilti perceived the Culture Journey as a facilitator for the change project. We couldn’t implement global solutions without Global Processes and Data and indeed without this commonly shared understanding driven by the Culture Journey, I think the project would not have turned out to be a success a manager stated in our interviews. Of course, resistance was also part of the people’s reactions in the GPD project: No doubt that also challenges come along making people change their habits and giving up their well established practices for adapting to blueprints. But still, the corporate culture provided a means to manage these issues. A shared corporate culture cannot prevent resistance in all cases, but it accounts for a common understanding that helps overcome those resistances.

In addition, the corporate purpose gives a clear frame of reference explaining the need for change. Since Hilti integrated every employee right from the beginning, people felt being part of the global picture. The common corporate purpose gave meaning to the action of the single employee which in turn, for example, raised the willingness to work with the new ERP solution. People thus were able to accept single short-term discomfort for overall long-term benefits.

As Hilti emphasizes the maintenance of its corporate culture, e.g., through its recruitment process and the Culture Journey, it ensures the sustainable success of projects like GPD. One manager put it in a nutshell: Let’s face it: you either get on or off the bus – and those people working with Hilti are happy to be on it. This has once again proven true regarding the great changes within the GPD project.

2. Specific influence of the corporate values on the implementation process

In addition to the overall support of the changed initiative, we further analyze the role of the corporate values as a potential facilitator for implementing change in the GPD project. In fact, the managers reported positive effects of the corporate values regarding the change process.

3.3.1 Integrity

The interviews revealed several effects of integrity. The organizational change of aligning the structure of Hilti IT with the structure of the corporation’s business, for instance, is a stringent logic consequence of living integrity. It means that the entire
corporate change serves consequently building a better future starting inside the corporation. People are likely to follow a project that is part of a bigger picture, when they already defined integrity as a value for themselves.

As all employees incorporate a holistic perception, it was thus easier to demonstrate the usefulness of the project as one essential driver for acceptance. Even though some changes were perceived as unfavorable for the market organization, at the same time they made sense from a holistic perception.

Integrity also facilitated the management of the project since each team concerned with the implementation of tasks was responsible for its actions. If you say you are going to roll out a new solution, then roll out the solution. If you say you are going to do that by June 1st, then do it by June 1st. Considering the scale of the project, a high level of accountability was crucial for project management.

Furthermore, the position toward Hilti’s stakeholders was a key factor for the change management since it led to a broad understanding for the challenging situation during the project.

3.3.2 Courage

The corporate value of courage proved to be an important facilitator for the GPD project. Starting the initiative, already took courage considering the dimensions of the business process changes. While this was courage on the management side, our interviewees reported that courage was also a major source for people in the market organizations to leave the circle of their habits. It took courage to kick of this thing at first, but also courage from all the people adapting to new ways of doing their job, without really knowing where this would lead them.

In addition, the corporate value of courage imposed further positive effects on the management of the project. The characteristics of giving honest feedback contributed much to the efficiency and effectiveness of the initiative, as it was reported. We have the principle, ‘brutal facts, no blame’ which is a matter of courage. This attitude for example, helped a lot: Obstacles appearing throughout GPD were communicated in a timely manner, and solutions were found.

Courage set a positive climate for taking the risk of realizing the GPD project. In addition it also helped managing the required changes, particularly by means of an open and honest way of cooperating with each other. This relates to teamwork, as another important corporate value at Hilti.

3.3.3 Teamwork

The managers reported that another prerequisite for succeeding in the GPD project surely was ‘sharing common goals’ and ‘pulling at one string’ as it is referred to by the corporate value of teamwork at Hilti.

Apart from the general situation of people working together, a special quality of team work within the global change project was reported to us. This is the element
of interlinking teams and building new teams involving members of different disciplinary settings worldwide: Hilti employs high performing and specialized teams, being very good in one task but not necessarily in another. However, in order to implement a global solution by means of GPD, building multi-disciplinary teams became a vital necessity. For example, this takes accepting that I am in IT but I am going to be working in this very business related project or the other way round.

Furthermore, the attitude of learning from each other turned out to be of major importance for the project. For that purpose, the environment of open communication and honest feedback created an atmosphere of respect and openness that helped to also learn from failures in the project. If something is not working out as planned it has to be communicated. Learning from communicated failures of past projects and acknowledging these failures was vital for the GPD project. And even more so, it enabled Hilti IT to report a good success rate of IT projects nowadays.

3.3.4 Commitment

The commitment of the employees involved in the GPD project was perceived as a major success factor by our interviewees. Not only the commitment of team members, but also the commitment of the senior and executive management was pointed out in the interviews. There was definitely a need for commitment from the executive management and executive board to accept effort, impact and cost of the project. And this commitment to support IT and push GPD has always been there. It was clear for everybody right from the beginning that GPD really is of strategic importance to Hilti.

Regarding the GPD project, the perception of the decentralized market organizations played a major role as they were directly affected by the change. Their commitment was of utmost importance in order to make people change their habits. Thinking in terms of the overall corporation and transcending, for example, departmental structures already accounted for significant commitment in the project. Interestingly, the people’s commitment also affects the economic results of the units: Right after we go live in any market organization their KPI’s may deteriorate. Training is not enough, data is never fine, and change management is never prepared enough. Very seldom do you see them improve immediately, but rather it happens over time. That was strong commitment of the people believing in us and going along with the change.

We see examples of the facilitating role of the corporate culture functioning as a driver of stability in Hilti’s change project. Both corporate purpose, and values, played a significant role in supporting the GPD project. Hilti’s employees living the corporate values account for a large part of the success in coping with the challenges of this change project. Against this background, we would now like to draw some conclusions and also indicate directions for future research.
4 Conclusion

In this chapter, we examined the role of corporate culture in BPM. Regarding our source of knowledge, we studied a real life example, reporting from interviews conducted with representatives of the Hilti Corporation. At Hilti, culture plays an essential role for business. As such, it is also incorporated as the major element in the Hilti business model. The systematic process, called ‘Our Culture Journey’ helps disseminating and living the corporate culture on a global and corporation-wide scale. For the IT department, this initiative particularly led to a business-driven IT strategy.

As to the role of culture in BPM, we can conclude that the Culture Journey was both a driver and an enabler for change. It can be considered a driver regarding the GPD project as the IT Core Purpose Statement called for global solutions that could be met by managing processes and data within a global IT setting. In addition, the Culture Journey also turned out to be an important enabler for the GPD project. According to our interviews, the changes were hardly possible without the clear corporate business model. More specifically, it is this facilitating role of the corporate culture that is of foremost interest for BPM in general. Hence, we further set out analyzing the potential leverage of the Culture Journey within the GPD project.

Within our study we found several good examples showing that positive effects on the change project could be realized by the Culture Journey. We particularly analyzed to what extent the corporate purpose in general, and the corporate values more specifically, were perceived useful by the interviewed managers for conducting the GPD project. It indeed remains an open issue to quantify these effects in terms of an economic leverage.

Apart from the impact Hilti’s corporate culture had on the change project, we also found that the change of processes influenced culture. Process improvement allowed for an intensified way of living the teamwork value on a global scale.

Drawing from the statements of our interviewees’ one might conclude that GPD would not have been as successful in absence of the specific corporate culture. Hence, the earnings of the initiative might be kept in mind when evaluating the leverage of the Culture Journey. Just as well, the implementation efforts could be taken into account. However, such issues can hardly be calculated and were thus better left to their qualitative nature.

What we can learn in terms of value considerations, however, is that efforts in culture are investment-related in nature. Shared corporate purpose and values once realized (and continuously maintained) may well serve for multiple purposes within the corporation. In our study, we picked the GPD project as one example, while at the same time numerous other fields exist to which the corporate culture delivers value, such as avoiding high employee fluctuation and a related loss of knowledge, or arranging win-win situations with business partners.

Our findings reported in this chapter are indeed limited to the Hilti Case. We analyzed corporate documents and conducted interviews with managers involved in
both the Culture Journey, and the GPD project. However, considering the early stage of research on culture in BPM, we aimed at utilizing this case study for setting a basis for future work, and eventually stimulating further research in this important new field in BPM.

References


Creativity-Aware Business Process Management: What We Can Learn from Film and Visual Effects Production

Stefan Seidel, Katherine Shortland, David Court, and Didier Elzinga

Abstract  Creativity is of considerable importance to many organizations and is a core competitive factor in a variety of contemporary industries. Consequently, process managers increasingly ask: How can I successfully manage an organization without crushing creativity? In this chapter, we describe an approach to creativity-aware process management that is based on the understanding that many value-creating processes comprise both well-structured, transactional parts and often highly creative parts. We explain how the creative parts (“pockets of creativity”) can be identified and described in those processes that highly rely on creativity (“creativity-intensive processes”). Our explanations are grounded in studies in film and visual effects production (VFX), but we argue that ‘conventional’ industries can learn much from their management practices. We propose a set of guidelines that can support process managers in successfully managing creativity in business processes without systematically crushing it. We use the case of a leading Australian VFX company in order to illustrate our explanations.

1 Introduction

There has been an increasing awareness that the management of business processes that involve creativity is critical. This is true not only within the growing creative industries (Hartley 2005; Hesmondhalgh 2002), such as game development and film production, but also within industries such as software development and
pharmaceuticals that rely on the creativity of their employees. Creativity is commonly associated with the generation of products, services, processes, or ideas that are both novel and appropriate (Woodman et al. 1993; Amabile 1996). Amabile (1998) states that, despite its importance, “creativity is undermined unintentionally every day in work environments that were established – for entirely good reasons – to maximize business imperatives such as coordination, productivity, and control” (p. 77). Managers are thus forced to ask: *How can I successfully manage an organization without crushing creativity?*

In recent years, Business Process Management (BPM) has shifted the focus toward so-called human-centric or knowledge work processes (Davenport 2005; Eppler et al. 1999; Harmon 2007). BPM researchers and practitioners have been recognizing the role of knowledge, judgment, collaboration, and individual capabilities in many critical processes, ranging from financial operations to healthcare, art, design, and entertainment. The literature reveals important factors, such as high levels of required autonomy, motivation, and expertise (e.g., Davenport 2005). Still, creativity as a driver for the innovativeness and competitiveness in organizations deserves special attention in BPM (Seidel 2009, 2011).

Figure 1 suggests that the recognition of the importance and impact of creativity on BPM may be called *creativity-aware process management*. The recognition of BPM as a management approach with the potential of effectively managing creativity may be called *process-aware creativity management*. Our focus is on creativity-aware process management, which is built around the concept of the *creativity-intensive process*.

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1 Human-centric processes are discussed in detail by Harrison-Broninski (2014). Approaches to support knowledge work by means of process management are presented by Davenport (2014).
Over the last few years, we have studied organizations from the creative industries in order to understand how creativity influences business processes and their management (e.g., Seidel 2009, 2011; Seidel et al. 2010). The creative industries are those which focus on creating and exploiting intellectual property (Hartley 2005). Prominent examples are the film industry, visual effects (VFX) production, or the development of computer and video games. The processes we studied can be described as highly dependent on creativity, interdependent, complex, and intensively involving the client. We have learned that such processes are characterized both by divergent and convergent thinking as well as an often vague understanding of the requirements of the creative product. In conjunction with different subjective perceptions brought in by a variety of involved stakeholders, this leads to high uncertainty with regard to process flow, required resources, and particularly the outcome (Seidel et al. 2010). In fact, in many cases the specifics of the outcome are not fully understood until the process is completed. As a consequence, the process manager is faced with particular challenges, such as high risk exposure and high demands for flexibility.

In this chapter, we introduce a model of creativity-intensive processes. We explain how creative organizations manage these processes in order to pursue both operational and creative process performance. In doing so, we describe the concept of pockets of creativity that conceptualizes creativity in business processes and we explain how organizations can manage creativity at a process level. We propose guidelines to support process managers in successfully managing creativity without systematically crushing it. We will use the case of a leading Australian VFX company in order to illustrate our explanations.

2 Illustrative Case

Rising Sun Pictures (RSP), is an Australian VFX company exclusively dedicated to the production of effects for feature films. The company is based in Adelaide and Sydney. Clients of RSP include major Hollywood film studios, international producers, directors, and VFX supervisors. The company has contributed to films such as The Lord of the Rings, Harry Potter, and Superman.

The increased value share of VFX in film and television (TV) has contributed to more and more globalized competition which is accelerated by emerging technologies such as high definition television (HDTV) and digital intermediate (DI) postproduction paths. VFX companies that have traditionally relied on the creativity and flexibility of their resources are now increasingly forced to apply contemporary business approaches, such as BPM, to stay competitive.

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2 The case study was conducted between 2006 and 2008.
The film production value chain can be roughly divided into the stages of development, preproduction, production, and postproduction (Clevé 2006). Within the development stage, tasks such as budgeting, financing, and scheduling are carried out to initiate a project. Preproduction deals with all the aspects related to the practical production needs, such as casting, location scouting, etc. Subject to the production phase is the actual shooting (Clevé 2006), that is, the production of the feature film, TV commercial, etc. The postproduction phase comprises all the steps that have to be done between production and final delivery (Clark and Sphor 1998), such as editing or sound editing. The creation of VFX is also within this phase (Wales 2005). Although the creation of VFX is often seen as a separate production process called the digital production process (e.g., Kerlow 2004), it typically begins parallel to the production phase. Figure 2 visualizes this model.

The main process of RSP is the so-called VFX production pipeline, which generates digital sequences for films. The pipeline comprising complex sets of processes is characterized by innumerable interdependencies and high levels of creativity which result from the complexity of the generated products. For example, generating a VFX shot requires the creation of the so-called bones, textures, and animation. The primary outputs are computer-generated images (digital assets) that can contain characters, animations, and realistic simulations. One such example is an animated spider. Figure 3 shows the results of an intermediate process step of generating the spider (the so-called mesh). These computer-generated images will later be part of a shot that includes footage from production. Thus, there are also interdependencies with production processes. For example, the spider may be dangling from a web in a barn that was shot on a “real world” set; hence the intimate connection to the production stage.

The generation of VFX is a resource-and labor-intensive process. Even short sequences may take the work of several weeks or even months. Thus, ineffective management bears huge financial risks.
3 A Model of Creativity-Intensive Processes

3.1 The Dynamics of Creativity-Intensive Processes

Mastering creativity in organizations requires us to understand the creative process, the creative product, the creative person, and the creative situation, as well as the interaction between these components (Woodman et al. 1993). In creativity-aware BPM, we propose a process-centric view that establishes a connection between these components: Creative persons are actors in business processes who generate creative products. Thus, the creative product is a process-oriented object that is characterized by novelty and purposefulness (Firestien 1993). The business process is carried out in a creative situation, involving organizational resources and available information technology (IT).

Before we proceed to the model, let us consider a real-world example, the production of a particular shot involving the spider example. During the initial brief with the VFX company, the client (e.g., a director) discusses what that particular shot should look like. It is an iterative and communication-intensive process, where the VFX organization not only tries to understand the client’s vision, but also stimulates the client with ideas she might not have had before. Simultaneously, the VFX company must also be conscious of matching the client’s requirements to their own capabilities. As a result of this process of understanding and negotiating the requirements, both the client and the representatives of the VFX house have an understanding of what the product should look like. Thus, they develop a shared understanding of the process goals. For example, although the spider’s location in the scene (e.g., dangling from a web) may be known, the exact action and emotion may not. Exactly how the spider reacts is uncertain and cannot really be described until it is seen. Generally, it can be distinguished between attributes and meta attributes. While attributes refer to aspects that can be specified in advance (e.g., technical format, etc.), meta attributes refer to those specifics of a
creative product that are related to esthetics and creative judgment and cannot be fully specified in advance (e.g., the spider should look “scary”). The VFX house starts to develop a first version based on their understanding of the requirements. The resulting (intermediate) product not only depends on the creative person’s understanding of the requirements, but also on his/her creative and technical skills. Consequently, the product needs then to be reviewed by the client who, through seeing the actual product, may even get a better understanding of her own expectations. The result of this review may be further iterations of understanding and further negotiating the requirements, doing work, and reviewing.

Figure 4 suggests that creativity-intensive processes comprise a number of highly interwoven and iterative stages or phases: understanding the requirements, internally breaking the requirements down, doing work, and evaluating work. It must be noted that evaluation or review as well as doing work are part of understanding the requirements of the creative product. That is, the requirements are not entirely known before the process is completed. The completion, in turn, results in a final product and measurable process performance. Also note that the understanding of the requirements of a creative person or client is highly dependent on their expertise. Often, a senior creative person is more likely to understand the client’s vision than a less experienced person. Similarly, a more experienced client will be more likely to be capable of describing what she actually expects the creative organization to do because she has a better understanding of that organization’s capabilities.
3.2 Pockets of Creativity in Creativity-Intensive Processes

In reality, the rather high level view of creativity-intensive processes as introduced earlier translates into business processes that consist of a number of discrete elements or tasks (Fig. 5).

For example, at a high level, the production pipeline can be seen as a constant iteration between understanding the requirements of a shot, generating the shot, and evaluating the shot. However, in order to actually accomplish this, certain discrete tasks (or subprocesses) must be carried out. Some of the discrete elements can be viewed as well-structured subprocesses with defined outcomes, whereas others are highly creative. The latter one we refer to as pockets of creativity (Seidel et al. 2010). An example for a well-structured element with a defined outcome in VFX production may be the task of receive materials, where materials such as references and scans are received from different sources. Modeling and 3D animation are examples for pockets of creativity, where artists generate creative products such as the spider. The dotted lines indicate that a complete production pipeline comprises many more elements than are depicted in Fig. 5.
Figure 5 also illustrates that pockets of creativity may be further broken down. At the highest level, a pocket of creativity is a creativity-intensive process by itself. At the other end there is the individual creative process, such as generating a particular idea for a visual effect. For example, the pocket of creativity modeling is a quite complex process which iterates between understanding and refining the requirements, doing work, and evaluation. At the same time, this pocket of creativity will take place in another, higher level pocket of creativity in creating a particular asset or character (in this case the creativity-intensive process of the production pipeline), which also iterates between elaborating and refining requirements, doing work, and evaluation. Both the outcome of the modeling and the outcome of the whole character animation are not known until the process is completed.

How can one identify pockets of creativity within creativity-intensive processes? First of all, creative tasks are characterized by both divergent and convergent thinking as creative persons strive to generate something that is both novel and original. Moreover, pockets of creativity very much rely on the tacit knowledge and the expertise of the involved people. Yet, in order to identify pockets of creativity, more tangible factors are needed. Pockets of creativity can be described by three types of uncertainty and three types of constraints (Seidel et al. 2010).

First, as creativity means to produce something novel or original, the outcome is never entirely known in advance (product uncertainty). As indicated, those characteristics that are not fully known in advance (e.g., the emotion of the spider) may be referred to as meta attributes. Still, it is not the case that nothing is known about the product and there are typically certain requirements. These constraints limit the uncertainty with regards to the outcome. As indicated, those characteristics that are known in advance (e.g., the fact that there will be a spider) may be referred to as attributes.

Due to the uncertainty with regard to outcome and differing (subjective) perceptions of the creative product, the actual structure of the overall process or the number of iterations etc., are not known in advance. For example, in VFX production, there are certain process steps that every artifact (character, animation) goes through. However, the required elements, order, iterations, and exceptions are highly dependent on the nature of the shot. Also, different creative persons will carry out the same task in different ways. Still, it is typically not the case that nothing is known about the process structure. For example, particular well-structured subprocesses, such as review processes or aspects of data management, are known in advance.

As required process steps and iterations are not entirely predictable, so are resources and involved people not known in advance. For example, different creative people may use different resources (e.g., different systems) to carry out the same task. One example from VFX production is the so-called matchmoving, a process of creating a 3D camera for a particular set of images. While this process is time-consuming and expensive, often the VFX supervisor will not know whether it is required until the shot is attempted without it. Still certain resources that are required (e.g., particular IT systems) are typically known as well as resource restrictions (e.g., available time and budget).
Table 1 Characteristics of pockets of creativity

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
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<tbody>
<tr>
<td>Product uncertainty</td>
<td>Certain characteristics of a creative product are not known in advance. Uncertainty with regard to outcome depends on various factors such as the level of requirements specifications.</td>
</tr>
<tr>
<td>Process uncertainty</td>
<td>The process structure (required process steps, number of iterations, control flow) of creativity-intensive processes is often not known in advance. This is mainly due to different perceptions of the involved creative individuals and evolving product characteristics.</td>
</tr>
<tr>
<td>Resource uncertainty</td>
<td>Required resources in creativity-intensive processes are often not fully known in advance or vary during execution. As different operational procedures and different creative actors require different supplies, resource requirements remain uncertain until a creative product is finished.</td>
</tr>
<tr>
<td>Product constraints</td>
<td>Product constraints limit the degree of uncertainty in the outcome of a pocket of creativity. They are important for review cycles involved in a process and for process sections succeeding a pocket of creativity. Explicating characteristics of a product known in advance enables to secure required product characteristics and define how the process can continue after a particular creative task.</td>
</tr>
<tr>
<td>Process constraints</td>
<td>Process constraints describe how much of the process can or has to be pre-determined. They may impose mandatory process steps and temporal dependencies between specific process fragments. For instance, review steps may be enforced for every major refinement of a creative product.</td>
</tr>
<tr>
<td>Resource constraints</td>
<td>Resource constraints describe both resources that are compulsory to carry out a pocket of creativity (i.e., requirements) and resource restrictions under which the creative product has to be developed. Time and budget are common resource restrictions whereas specific technical assets or skill-sets of creative individuals exemplify mandatory resource requirements.</td>
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</tbody>
</table>

Adapted from Seidel et al. (2010)

Table 1 provides an overview of the three types of uncertainty and constraints that characterize pockets of creativity.

### 3.3 Risk in Creativity-Intensive Processes

Due to the above-described uncertainty, creativity-intensive processes are associated with high levels of risk. First, uncertainty in outcome can lead to customer dissatisfaction due to the subjectivity that is linked to the judgment of the quality of the creative product. We refer to this risk as creative risk. Second, uncertainty with regard to process structure and required resources can lead to what we refer to as operational risk. For example, the process may require more iterations than expected, which then results in higher costs and time consumption. Moreover, uncertainty with regard to process structure and required resources may lead to a mismatch between what is required to fulfill the customer expectations and the actual capabilities of the creative organization.
Yet, it must be noted that uncertainty in creativity-intensive processes also affords great opportunities. Creativity-intensive processes are inherently linked to a certain creative potential which denotes the processes’ capability of generating truly creative products. The creative potential is particularly influenced by the constraints with regard to product (i.e., the level of detail of the requirements specifications), process, and resources (most notably time and budget). Low levels of constraints are associated with higher levels of uncertainty – and creative potential as well as creative and operational risk, in turn. Generally, more time and budget allow for the exploration of more options, and thus are associated with higher levels of creative potential too.

As has been indicated, the understanding of the requirements of the creative product evolves throughout the process. Consequently, the degrees of freedom, as well as the associated risk, are highest at the outset when almost any thought is permissible. Throughout the process, various constraints are imposed upon the process, such as limited resources and a constantly evolving understanding of the requirements both on the client’s and the organization’s side. Figure 6 provides an overview of how requirements and risk develop throughout the process.

Note that this model is a simplification in that it describes how the understanding of the requirements and the associated risk ideally develop throughout the process, if the creative organization successfully (a) develops a good understanding of the client’s vision, (b) matches the requirements with their capabilities, and (c) reviews the product throughout the process. How creative organizations accomplish this is explained later in this chapter, when various managerial practices are discussed.

### 3.4 Summary of Properties of Creativity-Intensive Processes

To summarize, creativity-intensive processes can be characterized by varying levels of structure (comprising of both well-structured and creative parts), high levels of interdependency and iteration, and knowledge-intensity. As a consequence, the process manager is faced with particular challenges, such as high risk
exposure and high demands for flexibility. Table 2 provides an overview of important characteristics of creativity-intensive processes.

In what follows, we will use this conceptualization in order to discuss the salient roles, management practices, and use of information technologies in managing creativity-intensive processes in the VFX industry.

### 4 Roles in Creativity-Intensive Processes in VFX Production

Creativity-intensive processes involve various stakeholders. Focusing on the creative aspects of such processes, at least three groups of people deserve closer attention: artists, creative supervisors, and clients. As we will see in the subsequent section, these stakeholders shape creativity-intensive processes and need to be considered when it comes to managing these processes.

#### 4.1 Creative Person

In the VFX industry, the creative individuals who perform the actual creative work are commonly referred to as artists. These artists, such as a compositor or an
animator, will produce a particular element that contributes to a shot or series of shots. There are often multiple artists in the same role managed by a creative supervisor. They contribute their creativity in order to generate creative products. But what are the characteristics of creative individuals that in particular contribute to their ability to be creative, and that the process manager must recognize when allocating tasks? Expertise, motivation, and creative thinking skills have been proposed as key characteristics (Amabile 1988, 1998). This very much concurs with what we can observe in VFX production. Expertise, for example, is not only important with regard to a person’s ability to act creatively by producing her elements, but also with regard to her ability in assessing what it takes to carry out a particular creative task (how long it will take, etc.). Given the uncertainty linked to creative processes, this capability is of high relevance in order to plan for the process. Generally speaking, higher levels of expertise of creative people are associated with lower levels of uncertainty and thus lower levels of risk. Moreover, motivating creative people is a particular challenge which goes beyond the use of financial incentives. In the next section, we discuss the so-called creative buy-in to motivate people and still successfully meet a project’s goals. Finally, the artist’s work is very much characterized by divergent thinking (Runco 2007). As indicated earlier, divergent thinking contributes to the uncertainty that is part of any creative process.

4.2 Creative Supervisors

Due to the complexity of creativity-intensive processes, creative organizations need to employ what can be referred to as creative supervisors. Creative supervisors are process managers who, due to the creative nature of the processes, need the ability and authorization to quickly respond to changing requirements with regard to the creative product and the process, including process design and resource allocation. Creative supervisors act as process intermediaries who are responsible for aligning the organization’s processes with the client’s processes and for communicating with the client. Often, creative supervisors are creative people with high expertise (i.e., more senior people). More so than just experience, creative supervisors must possess the specific skill set of being able to plan, manage, and oversee a group of artists. Generally, creative supervisors must pursue two main goals: operational process performance and creative process performance. While the first goal pertains to classical measures such as time and budget, the latter refers to the quality of the creative product. Given the creative product’s subjective nature, measuring the quality of a creative output is difficult. We will discuss the measurement later in this chapter. In order to pursue these goals, creative supervisors have to

- Manage the process internally (allocating resources, build teams etc.),
- Coordinate communication and manage the expectations of the creative organization and the client.
In VFX production, creative supervisors are process managers who are usually responsible for processes at different levels of granularity. For example, a so-called lead may be responsible for the production of a particular character (character lead) or sequence (sequence lead), whereas a VFX supervisor is accountable for a whole range of elements that compose a shot or scene.

4.3 Clients

As has been maintained earlier, processes in VFX production are not only client-focused, but also actively involve the client. In fact, the client contributes to, and shapes, the processes in many ways. Clients of a VFX house can be producers, directors, and VFX supervisors from other organizations. Initially, the client will deliver an overview to the VFX house on the potential scope of what is required. Depending on how specific the client is at this early stage, the brief may be open to a great deal of interpretation or quite deterministic. In a highly iterative and interwoven process, the requirements of the creative product are determined and the supervisor seeks to match these with the organization’s capabilities accordingly. It is also essential that the supervisor establishes a working style that suits the needs of the client. This working style depends on the client’s background, expectations, as well as the particular project. Relevant issues to be dealt with by creative supervisors are:

- Where in the process shall the client be involved? Who will communicate with the client?
- How well does the client understand the VFX process and hence how early in the process can they be shown results?
- What artifacts are delivered to the client and when are they delivered?

5 Managing Creativity-Intensive Processes in VFX Production

Having introduced the main characteristics of creativity-intensive processes, as well as the different roles, we now describe how creativity is effectively managed at a process level in the VFX industry, and we derive a set of guidelines that are hoped to be valuable for process managers in any domain. Generally, creative supervisors in VFX production need sufficient authorization to quickly respond to changing requirements with regard to the product and the underlying process, including process-design and resource allocation.

We suggest the process manager to consider the following general guidelines:

1. Recognize the high uncertainty in both process and outcome and view it as a chance to generate highly creative and valuable outputs.
2. Structure the process around its pockets of creativity as these are the sections where the organization creates business value and distinguishes itself from its competitors.

3. Encourage risk mitigating strategies such as clarity in communication between all levels of the process to ensure that the expectations of all relevant stakeholders are met.

4. Constantly re-evaluate and re-align processes. Every process blueprint becomes irrelevant if the organization does not deliver to the client.

In the following, we introduce primary managerial practices, as well as IT systems, that are used in the creative industries in order to manage creativity-intensive processes. We proceed in analogy to the generic emphases of understanding and refining the requirements, doing work, and evaluation. We use the notion of *emphases* rather than *phases* so as to highlight that creativity-intensive processes are highly iterative and are not to be seen as a rigid sequence. We then introduce different IT systems that can be used in order to support these different managerial practices. Keep in mind that the three stages are highly iterative and are not more than a high level blueprint of creativity-intensive processes.

### 5.1 Understanding and Refining the Requirements

Understanding the requirements of a creative product (e.g., a VFX shot) as clearly as possible reduces uncertainty with regard to outcome, required resources, and process flow, as the creative organization can develop a better perception of what is needed to carry out the process. The challenge of understanding requirements is twofold: Firstly, the creative organization needs to understand what the client expects them to do. Secondly, it must be ensured that the organization has the technical and creative capabilities to meet the client requirements.

In our VFX example, the organization has to first understand the general requirements of each shot: where is the spider located, what does the spider do, and what other elements should be in the shot (e.g., trees, etc.). In order to reach high levels of client satisfaction, creative organizations must not only understand the requirements in general, but also what product features are of particular importance to the client. In some cases, it is possible to identify those pockets of creativity that are of exacting importance for a certain project and, thus, need to be treated with particular caution. At the same time, the organization must match the requirements with their technical capabilities. For example, if the shot would involve fluid dynamics, this would rely on a very sophisticated simulation pipeline. Very few companies have this capability and so taking on work that requires it depends on an understanding of the cost implied in achieving the result. This is a common and important problem for most VFX companies – understanding a priori that it will take to build creative capability. Once the requirements are understood at the highest level and the shot is broken down into discrete process steps, requirements need to be understood at the more
detailed levels. One example is the 3D animation of the shot, where the animator has to understand how precisely the spider moves in that particular shot. Again, the requirements at this more detailed level must match the organization’s capabilities as well as available resources, including time and budget.

Table 3 summarizes important managerial practices that creative organizations use in order to understand and refine requirements.

Summarizing, we propose the following guidelines for the process of understanding and refining the requirements of a creative product:

- Understand the requirements early in the process so as to mitigate creative risk. Use a variety of tools and techniques in order to create a mutual understanding of the requirements (in VFX production, these may include style frames and previews, for example).
- View understanding the requirements as a highly iterative process of negotiation between client and creative organization.
- Match the requirements to your capabilities. Know what can be done and validate early that you are capable of meeting the client’s expectations. Being caught up in operational problems is one of the greatest risks to creativity.
- Understand what features of the product are most important to the client.

<table>
<thead>
<tr>
<th>Managerial practice</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Creative brief</td>
<td>The initial creative brief is done upfront and is a process of creating a common understanding between creative persons and clients with regard to what is required. This stage is not only about briefing the creative people; creative people can stimulate the client by presenting reference to encourage creativity. The creative brief is hence a practice for supporting requirements engineering in a creative way.</td>
</tr>
<tr>
<td>Providing stimuli</td>
<td>The creative organization provides stimuli to the client in order to iteratively generate a shared understanding of the project goals. As mentioned above, the practice of providing stimuli is often combined with the creative brief.</td>
</tr>
</tbody>
</table>
5.2 Doing Work

Our research has revealed two main types of managerial practices that are used throughout the process of doing work: managing the scope of creativity and allocating resources.

5.2.1 Managing the Scope of Creativity

Allowing freedom for a particular task increases variance – and thus uncertainty – and decreases predictability. This leads not only to greater creative potential, but also to greater risk. The process manager (creative supervisor) must carefully decide what freedom she allows for each and every task to achieve high creativity and innovation while still ensuring that everybody works toward one aim. As Amabile (1998) puts it, autonomy “around process fosters creativity because giving people freedom in how they approach their work heightens their intrinsic motivation and sense of ownership. Freedom about process also allows people to approach problems in ways that make the most of their expertise and their creative thinking skills” (p. 82). By defining pockets of creativity and setting up goals and constraints, creative persons are actually granted freedom where it is needed while they do not have to diverge at their own risk. Possible constraints are deadlines, clearly defined outputs (such as a certain number of alternative artifacts etc.), review processes, and regular communication among creative persons and stakeholders.

As indicated, motivation is one of the most relevant factors that impact on a person’s capacity of acting creatively (Amabile 1998). Monetary incentives are in most cases not the sole source of motivation to enhance people’s creative power. In fact, creative people’s motivation may be fostered by means such as allowing them freedom or even putting them under time pressure. The creative supervisor must find a balance between the creative people’s personal creative agenda and the actual project goals in order to motivate people while simultaneously pursuing process goals and delivering to the client. This balance is called the creative buy-in.

Summarizing, we propose the following guidelines for managing the scope of creativity:

- Find a balance between project goals and the personal creative agenda of creative people.
- Try to not restrict creativity but channel it down the right path.

5.2.2 Allocating Resources

Pockets of creativity are crucial to an organization’s success as this is where the organization can distinguish itself from its competitors. Yet, as has been maintained, the creative parts of processes are difficult to predict with regard to required resources. Thus, we first advocate to identify pockets of creativity and then
to carefully consider what is actually needed to successfully accomplish them. The existent literature as well as our own research clearly point out that a lack of resources for creative tasks can completely compromise creativity (e.g., Amabile 1998).

Let us consider a shot where the spider will be dangling from a web. There may be a number of animators who have the technical capabilities of completing the shot. However, the VFX supervisor may further ask who has particular experiences with similar animations. She might then choose the person and further ask what software that particular person would use for that shot (different people may approach the problem differently) and make sure that the software is available.

Table 4 provides an overview of managerial practices with regard to resource allocation in creativity-intensive processes.

Table 4  Managerial practices in resource allocation

<table>
<thead>
<tr>
<th>Managerial practice</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task allocation and team building</td>
<td>Creative persons who are allocated to a task must have a certain expertise to be capable of accomplishing that task. Task allocation can also be used in order to facilitate knowledge transfer between experienced and less experienced individuals. Creative parts of a process are largely characterized by the application of tacit knowledge; by putting junior and senior persons on the same task, an organization enables the transfer of tacit knowledge. Moreover, through finding a balance between creatively challenging and rather simple tasks, creative people can be given the opportunity to follow their creative agenda, which, in turn, fosters motivation.</td>
</tr>
<tr>
<td>Time allocation</td>
<td>A lack of time is often associated with a lower quality of a creative product. Thus, creative supervisors must identify the particularly complex and creative parts of a process, so as to allocate sufficient time. Generally, more time enables creative people to explore and come up with various options, which can then be used in order to create a shared understanding between client and creative organization. Although insufficient time can reduce the quality of the creative product, sometimes enforcing constraints can generate creativity under pressure.</td>
</tr>
<tr>
<td>Allocation of other resources</td>
<td>Other resources include artist systems, such as particular animation suites, for example. Again, the identification and characterization of pockets of creativity throughout the process landscape sets the baseline for resource allocation. If creative tasks with high impact on the overall process success lack resources, this may fundamentally hamper an organization’s creativity and success.</td>
</tr>
</tbody>
</table>

Summarizing, we propose the following guidelines with regard to resource allocation in creativity-intensive processes:

- Do not overload key talent with trying to achieve all tasks.
- Leverage people with less experience by allocating them to challenging tasks and letting them work with more senior people.
- Avoid resource shortage particularly where you expect people to be creative. Thus, channel your resources toward the more creative parts of your processes.
5.3 Evaluation of the (Intermediate) Creative Product

Two main types of managerial practices for product evaluation can be distinguished: approval processes and ongoing communication.

5.3.1 Approval Processes/Reviews

The most important means to evaluate creative products are approval processes which safeguard that the creative product meets the requirements. It can be distinguished between quality assurance (technical reviews) and creative reviews, and further between internal and external approvals. External approvals include clients while internal approvals usually involve artists and creative supervisors. Approval processes are quite a complex practice, as the process manager has to make decisions, such as: when should the approval happen? Who should be involved? Do people have to meet physically? This practice requires the identification of pockets of creativity, as these are the process sections that are characterized by high levels of uncertainty and, therefore, particularly require review.

Wrong decisions with regard to review and approval can have serious consequences for the overall process. Due to differing subjective perceptions of creative products, for example, the exclusion of key stakeholders may consequently lead to expensive product revisions.

Summarizing, we propose the following guidelines with regard to approval processes:

- Understand who you work with and what their ability is in assessing a creative product.
- Reviewing at the right stage is critical in order to mitigate creative risk.
- When reviewing, keep communication open, so as not to compromise creativity.

5.3.2 Ongoing Communication

Ongoing communication (often through showing work in progress) ensures that the project team works toward one aim. This practice thus aims to mitigate variance that may be caused by weak requirements specifications as well as creative freedom. As a rule of thumb, vague requirement specifications require more communication between the different stakeholders and increase risk. The identification of pockets of creativity enables the process manager to identify where within the process there is a particular need to communicate with the client.

Let us consider the spider example. After client and creative organization have developed a first (mutual) understanding of the requirements, the VFX house starts to model and animate the spider. The spider is developed step by step. The VFX house could wait until the spider is completed and then review with the client. However, if the client is dissatisfied this would mean an enormous amount of work...
that would have to be redone. Alternatively, the VFX house can involve the client into the process by showing them work in progress throughout the process, so as to ensure that the VFX house’s understanding of the requirements and the client’s understanding of the requirements indeed match. At the same time, the VFX house must understand who their client is; that is, the client’s background and expertise. If the client is, due to low expertise, not capable of understanding where the process is heading when they are shown something that is far from finished, their involvement may actually hamper the process, consume time, and as a consequence, compromise creativity.

Summarizing, we propose the following guidelines for communication within creativity-intensive processes:

- Ongoing and appropriate communication is of high importance to ensure that the creative process is not heading down the wrong path.
- Communication is essential to creativity. Nominate key communicators early on to ensure clarity in briefing and feedback.
- As a rule of thumb, vague initial requirements specifications require more intensive communication.

5.4 The Use of Information Technology (IT)

Davenport (2005) argues that technology may be the most important intervention in the performance of knowledge workers over the last couple of years. This observation is also likely to hold for processes in the creative industries. Yet, it must be noted that the use of IT should not be mandatory; creative people need freedom in order to act creatively. The orchestration of IT tools that are used depends on the situation at hand. Moreover, as with other resources in creativity-intensive processes, it is hard to predict what tools will actually be required throughout the process.

In the following, we provide a brief overview of the most important classes of IT that are used in VFX production processes. We also explain how these software tools can be used in order to successfully manage creativity-intensive processes.

5.4.1 Artist Systems

Artist systems are tools that are used by creative people in order to generate creative artifacts. Examples for artist’s systems used at RSP are 2D and 3D packages, which enable artists to generate images and carry out the different tasks that are done within the production pipeline. Usually, within the production pipeline various tools need to be used in order to generate VFX for a feature film.
5.4.2 Groupware

Groupware systems play a prominent role in all major stages of creativity-intensive processes in order to create a mutual understanding of requirements, showing work in progress, and evaluating creative products. Groupware is a collective name for those systems that enable groups to work cooperatively. One major benefit in the usage of groupware systems can be seen in a potentially higher number of iterations of the creative product, which can ultimately reduce creative risk due to differing perceptions of the creative product. Groupware systems range from tools such as email or instant messengers to tools that are particularly tailored to the industry.

For example, RSP uses a software called cineSync which is a remote review and approval tool based on Apple QuickTime technology. By synchronizing the timeline and playback of movies, people around the world are able to view the work simultaneously. The tool supports audio-visual communication and also allows for interaction, as people can draw on the images they are seeing. Thus, the software enables rich communication between geographically distributed stakeholders. As has been indicated, the process of determining requirements of a product as well as the process of evaluation highly depends on the involved people. cineSync enables different people to express their thoughts in different ways and, thus, furthers the process of negotiating requirements and evaluating creative products. Consequently, it enables involved stakeholders to create a mutual understanding of process goals.

5.4.3 Knowledge Management Systems

As (previous) knowledge is an important factor that influences creativity (Weisberg 1999), knowledge management systems (Alavi and Leidner 2001) are a set of technologies that are used in the creative industries for making knowledge available to accomplish creative tasks. For every pocket of creativity, it has to be considered what type of knowledge can be made available (e.g., technical guidelines on how to use a tool, previous experiences for a certain type of task, or artifacts that have been created earlier and that can now be used as reference material). Thus, the identification of pockets of creativity can help to understand where knowledge is created, where it is stored and located, and how it is transferred and applied (Seidel et al. 2010).

Consequently, by identifying and comprehensively describing pockets of creativity, the organization is enabled to integrate knowledge into their processes. In a similar manner, Davenport (2005) suggests to embed knowledge in the technology that is used by knowledge workers.

In the VFX industry, knowledge management is of particular importance, as much of the industry’s knowledge is tacit knowledge that is located in the heads of, often freelancing, creative people. Consequently, the industry seeks to explicate
and store this knowledge in knowledge bases, in order to make it available for the organization.

### 5.4.4 Asset Management Systems

Asset management systems for digital assets, for example, can be used to facilitate the process of understanding the requirements of the creative product, as well as the actual work (cf. vom Brocke et al. 2010). In the process of understanding the requirements, existent digital assets can be used to support communication by showing what has been done previously and what could be done. This includes cognitively stimulating both creative people and clients by providing new options and potential associations. As a matter of fact, in many cases, being creative means to put together what has been done previously (Couger and Higgins 1993). Thus, supporting pockets of creativity with asset management systems can increase productivity and the quality of the creative output.

For example, when a particular shot with our spider is to be generated, an asset management system can be used in various ways: First, previous shots can be reviewed so as to get a better understanding of what would be possible. Second, assets (such as a tree the spider is dangling from) that have previously been designed for other shots may be re-used in this shot.

### 5.4.5 Workflow Technology

With regard to workflow technology (Ouyang et al. (2014) on workflow management) it must be noted that such systems have to be used very carefully when introduced into creative environments. As has been argued by various authors, there is a danger of straight-jacketing; the so-called production-workflow systems in particular tend to be too rigid (e.g., van der Aalst et al. 2005). Creativity-intensive processes, however, require high levels of flexibility. When a creative organization introduces workflow-related technology, they must ensure that no unnecessary constraints are imposed on pockets of creativity. Automating the well-structured parts of the processes, however, can give people more time to be creative, which can ultimately result in higher product quality. As indicated earlier, one key issue in managing creative organizations is not overloading key creative resources.

Yet, our research has shown that even simple solutions such as task lists that show the next process steps can support creativity-intensive processes in many ways. Even though creative people need freedom in order to act creatively, they also need security on what they have to deliver and when. It is up to the creative supervisor to find the appropriate balance of creative freedom and structure. Consequently, organizations in the creative industries make extensive use of such systems.

Summarizing, we propose the following guidelines with regard to the use of IT in creativity-intensive processes:
• Technology should be scalable. A lack of scalability may compromise creativity.
• Do not try to automate creative parts of the process as this may lead to too rigid processes.
• Technology should be accessible according to the pull principle; that is, creative people can access a tool in order to solve the problem at hand. Do not force the use of software tools unless it is actually required.

5.5 Summary of Managerial Practices and IT Used in Creativity-Intensive Processes

In Fig. 7, we pick up the conceptualization of creativity-intensive processes introduced in Sect. 3 and relate it to the above described managerial practices and IT systems used in VFX production. The managerial practices that are used in order to communicate with the client can be distinguished from those that are used so as to internally manage the process.

Creative organizations use these practices along with IT in order to pursue both creative and operational process performance while simultaneously mitigating operational and creative risk. The arrows in Fig. 8 illustrate how successful reviews and ongoing communication with the client can impact on the development of risk and the level of understanding of the requirements of the creative product.

Fig. 7 Managerial practices and IT used in creativity-intensive processes
5.6 Measuring Creativity-Intensive Processes

Harmon (2007) states that it “is widely held that performance information is a key differentiator and that organizations that can obtain and use information about their markets and their processes in a timely manner can perform better” (p. 139). But does this also hold for creative organizations? Is not creative output difficult to measure? In a 2008 Harvard Business Review article, Ed Catmull, co-founder of Pixar, wrote that it is a misbelief that much of what is done in a creative organization cannot be measured (Catmull 2008). He argues that most processes involve activities and deliverables that can be quantified. As indicated, creative organizations pursue both what may be referred to as operational process performance and creative process performance. While the first one is relatively easy to measure, the latter one is not. In fact, creative organizations must find a balance between the two. On the one hand, every organization must follow business imperatives such as time and budget in order to stay in business. On the other hand, they must pursue creative excellence, which means to meet, and even exceed, customer expectations in order to gain competitive advantage. Ultimately, both operational and creative process performance determine customer satisfaction.

Operational process performance refers to classical measures such as time, budget, and process efficiency [see also on process performance measurement by Heckl and Moormann (2014)]. To achieve these, organizations apply managerial practices that are known from process management, such as process automation and process optimization. Other possible measures may include the number of iterations that are necessary to generate a certain type of creative product (for example a particular type of VFX animation), for example.

Creative process performance refers directly to the creative product. It can be measured by its novelty/appropriateness (quality), as well as by the number of outputs generated. While purposefulness may be relatively easily identified through customer satisfaction, novelty can only be rated by experts in the particular area. In fact, measures have been developed in order to evaluate creative performance. Firestien (1993), for
example, states “the evaluation [of a creative product] must occur on a number of levels; not with a single factor, or a single total effective criterion score” (p. 265).

6 Conclusions

Creativity influences business processes and the way we do BPM. We believe it is both relevant and timely to take a closer look at the role that creativity plays within business processes, and how it can be managed. Existent modeling techniques, software tools, and management practices may support some of the important issues in this context. In this chapter, we aimed to move beyond such ‘conventional’ BPM wisdom as we discussed creativity-intensive processes as found in the creative industries.

The processes that we discussed in this chapter can be described as highly dependent on creativity, interdependent, complex and intensively involving the client. Other creativity-intensive processes, however, may be different. For example, they may not involve clients and may be characterized by lower levels of interdependency. However, we expect that the main characteristics, such as uncertainty with regard to outcome, process, and required resources, or operational and creative risk, can be found in many industries. Also, other industries may learn from the creative industries, as high levels of uncertainty are not only related to high operational and creative risk, but also to high creative potential. Finding a balance between risk mitigation and creative freedom can open tremendous opportunities to any organization.

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An Organizational Approach to BPM: The Experience of an Australian Transport Provider

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Abstract When discussing Business Process Management (BPM), there is an obvious lack of clarity in the use of the term. A consequence of these varying interpretations is confusion among practitioners and an inability to compare and contrast experiences in a meaningful way. To date, there has been no clear articulation of the distinction between these interpretations and how this distinction is reflected in practice. The chapter provides a clear explanation of three interpretations and details how a large Australian transport provider has applied a BPM Capability Framework to guide its BPM Initiative that aims at being an approach to managing the organization.

1 Introduction

When discussing Business Process Management (BPM),¹ there is an obvious lack of consensus in the use of the term. Common interpretations include: (1) BPM as a solution for a business using software systems or technology to automate and manage processes, (2) BPM as a broader approach to managing and improving processes that focus on the process lifecycle and (3) BPM as an approach to managing an organization by taking a process-view or orientation.

A consequence of these varying interpretations is confusion among practitioners and an inability to compare and contrast experiences in a meaningful way. Furthermore, this lack of clarity leads to an inability to build a cumulative body of knowledge as results and experiences can appear to be conflicting and inconsistent.

¹Please also see the discussions by Hammer (2014), Harmon (2014) as well as the conceptualization for BPM provided by Rosemann and vom Brocke (2014) in this Handbook.

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To date, there has been no clear articulation of the distinction between these interpretations and how this distinction reflects in practice.

This chapter makes a unique contribution in this area. First, providing clear explanation of the three interpretations, together with examples of how the interpretations result in different decisions within BPM initiatives. Following this, the chapter details how a large Australian transport provider has applied a BPM Capability Framework to guide its BPM Initiative that aims at being an approach to managing the organization.

1.1 BPM as a Technology Solution

In some cases, the term BPM denotes a technology solution for an organization (McDaniel 2001). For example, before describing the “four tenets of BPM” being modeling, integrating, monitoring, and optimizing, McDaniel (2001) says:

... BPM entails integrating the value of each asset, providing a seamless interface, and coordinating the efforts of all assets to achieve a goal, in a given sequence, within a set time... and... BPM provides end-to-end life cycle management of information requests or transactions made up on many steps...

In this context, McDaniel (2001) talks about the human element of BPM only in relation to the use of technology to automate manual tasks saying:

...executing a BPM solution is a pathway to internal employee efficiency. Enterprises can eliminate costly and slow manual steps that can be more effectively executed when automated...automating saves time for current employees and saves training costs for new employees...

The ten pillars identified by McDaniel (2001) provide further evidence of the technology focus of his use of the term BPM. The pillars include: (1) unified process automation and workflow model, (2) direct model execution and manipulation, (3) state management, (4) time-based exception management, (5) robust process monitoring and analysis, (6) nested model support, (7) concurrent model support, (8) standards based, (9) high scalability, and (10) high reliability.

Using BPM in this sense usually applies to a software solution to a given process or within a given project. While some software vendors still use the term BPM in this narrow technology sense, it is becoming increasingly common to use the terms Business Process Management Systems (BPMS) or Process-Aware Information Systems (PAIS) (Dumas et al. 2005).

1.2 BPM as a Lifecycle Approach

A number of researchers provide examples of the term BPM used to describe a lifecycle approach to managing and improving processes. For example:

...BPM is concerned with how to manage processes on an ongoing basis and not just with the one-off radical changes associated with BPR... (Armistead and Machin 1997)
A BPM approach involves four key areas including process documentation, establishing accountability and ownership, managing and measuring performance and improving processes by enhancing quality or performance... (Gulledge and Sommer 2002)

...A generic BPM method of preparation, process selection, process description, process quantification, process improvement selection and implementation... (Elzinga et al. 1995)

...A systematic approach to designing, prioritizing, managing, controlling and monitoring business processes... (Zairi 1997)

A common thread in these approaches is that the view of BPM is from the perspective of managing and/or improving the operations of a process or a set of processes. Garvin (1998) indicates that this approach often neglects the ongoing management and operation of many redesigned processes, highlighting a key limitation of this view. Furthermore, Garvin (1998) found that a tendency to focus on work processes led to administrative and supporting processes being overlooked which ultimately ended in inconsistencies in information and planning.

An underlying assumption in the use of BPM as a lifecycle approach to managing and improving processes is that a generic, systematic approach to BPM is possible and preferable. However, from a theoretical perspective, Sabherwal et al. (2001) suggest that taking such a narrow view will not capture the dynamics of organizations including the internal variances and external contextual situations.

1.3 BPM as an Organizational Approach

In addition to Pritchard and Armistead (1999), a number of researchers consider BPM to be an approach to organizational management that takes a process-view. For example, DeToro and McCabe (1997) indicate that BPM is a new way of managing an organization, which is different to a functional, hierarchical management approach. Similarly, at this level Harmon (2003) states:

...In the Nineties, a number of management gurus, for different reasons, began to argue that it was more efficient to conceptualize a company in terms of a set of value chains or business processes. This approach has been given many names, but the most popular, today, seems to be the Process-Centric Company...

Harmon (2003) claims a process-centric organization is one whose:

...managers conceptualize it as a set of business processes. Most process-centric companies, like most traditional organizations, still have departments and divisions. Unlike traditional organizations, however, process-centric companies place their primary emphasis on maximizing the efficiency of processes, and not on maximizing the efficiency of departmental or functional units. In effect, departments or functions contribute employees, knowledge and management skills to processes...Ultimately, however, the core business processes are managed and evaluated as wholes, and departments are rewarded for their effective contributions to successful processes...

At this level, the emphasis is on the management of the organization as opposed to using a standardized approach to managing the processes within the organization.
1.4 **Distinguishing a Lifecycle from an Organizational Approach**

Thus, the use of BPM at a process level and at an organizational level is fundamentally different. The following example highlights how this distinction could manifest within an organization.

Consider the notion of *documenting or designing*, a step in all of the above *BPM as a Lifecycle Approaches*. At this level, these steps lead to the visual representation of a process. Potential issues that individuals within an organization would address during this step could include:

- What level of detail does the representation of the process require?
- Who are the relevant stakeholders?
- How are their requirements captured?
- What technology is available for representing the model?

With the interpretation of *BPM as an Organizational Approach*, this step would result in different considerations. For example, from an organizational perspective the key issues in *documenting and designing processes* would include:

- What technology is the organization going to make available for modeling processes?
- Which people need to have access to this technology?
- Do these people need training in the technology?
- Who is going to be responsible for the maintenance of the model library?
- Where are the funds for purchasing the technology going to come from?

These examples show that there is a clear difference in the intent and consequence of BPM using these two different interpretations. Furthermore, applying a systematic lifecycle approach to the processes within an organization does not necessarily mean that individuals within the organization view the organization as a set of processes. Hence, being successful at adopting a BPM lifecycle approach does not automatically translate to being successful at an organizational BPM approach.

Arguably, the distinction between a *lifecycle* approach and an *organizational* approach may contribute to explaining why earlier process endeavors such as BPR and BPI were often unable to provide sustainable change within organizations. The authors contend that a major reason may be that, while endeavors such as BPR and BPI focus on changing *processes* and *process capability* within organizations, they do not focus on changing the *organizational capability* required to support process thinking at an organizational level. In other words, they do not challenge or change the fundamental way in which people think about how the organization operates. For example, approaches such as BPR and BPI do not focus on assisting to depict the organization as a series of interrelated processes. Nor do they assist in determining how to prioritize process projects for the organization as a whole or how to develop and implement appropriate governance mechanisms to guide process decisions throughout the organization.
This distinction marks the uniqueness of this chapter. While there is significant literature on a BPM as lifecycle approach, little deals with BPM as an organizational approach. This chapter addresses this shortfall by showing how one organization applies a BPM Capability Framework to guide the development of capability and to progress its (organizational) BPM Initiative.

2 Background to Company Q

Company Q is one of Australia’s largest and most modern transport providers. Company Q has annual revenue in excess of $AUD 3 billion and managed assets of $AUD 10 billion. Operating for 143 years, Company Q is among the nation’s longest running service enterprises with approximately 15,000 employees throughout the country. Company Q is a Government-Owned Corporation (GOC) directed by a Board that is accountable to two shareholding ministers.

Changes in the Queensland State Government in the late 1990s led to major organizational changes within Company Q. In 1999, a move to increase the commercialization of some State Government operations resulted in Company Q effectively moving from a monopoly government provider to becoming a national commercial operation in a competitive business environment. Since that time, Company Q has expanded operations by acquiring further subsidiary companies, and it is now a major player in the transport and logistics industry within Australia.

By 2002, following the move to commercialization, Company Q knew it had serious problems with its operations. Disparate projects were having a counteractive effect. Changing legislation and regulations were increasing reporting requirements and competition. Increased usage of its transport networks were resulting in scheduling difficulties, delays, and customer dissatisfaction.

Like many organizations, Company Q had actively tried to improve operations by applying methods like Quality Assurance (QA), Total Quality Management (TQM), Business Process Reengineering (BPR), and Business Process Improvement (BPI). Such endeavors had met with limited success reflecting in high levels of frustration and a lack of progress. Paradoxically, the failure of these earlier endeavors compounded in an inability to gain the necessary levels of executive support required to develop a long-term and sustainable approach to process thinking because of an inability to show early returns on investment.

2.1 BPM Within Company Q

In 2002, Company Q’s Board and Senior Executives assigned the Chief Strategy Officer (CSO) to lead a major change program to establish a sound platform to achieve service excellence and allow further growth of the business. The overall objectives were to (1) gain transparency of processes and cost, (2) achieve....
accountability throughout the different levels of management, and (3) operate as a successful organization that makes profit.

At the time, this undertaking was ambitious because of the culture of Company Q being typical of a public sector, monopoly organization where the need for continuous performance improvement and change was not at the forefront of people’s minds. This was evident within Company Q in a lack of recognition and understanding of process; the existence of functional silos; rules-based governance; and heavy unionization. Company Q considered the change program to be a cultural change program, with the aim of changing the mindset of staff members and moving toward a commercial framework.

Consequently, the CSO established three program streams. The three streams were Performance through Governance, Performance through Business, and Performance through People. The program stream of Performance through Business included a project that was to investigate Business Process and Systems. Company Q established a BPM team which was led by the Business Process Design Adviser (BPDA)\(^2\) to progress this project. The BPDA reported directly to the CSO.

The first phase of the Business Process and Systems project led to the identification of an enterprise-wide BPM approach as a means of addressing a number of the operational and strategic issues facing the organization. This included a need for Company Q to become more competitive and more focused on its customers. Due to the failings of past endeavors arising from the implementation and use of methods including TQM, BPR, and BPI, the BPDA believed that an organizational BPM approach that focused on building sustainable capability within the organization was appropriate to addressing Company Q’s needs.

In coming to this conclusion, Company Q conducted literature reviews, interviews, and study tours with other organizations facing similar issues in order to identify different management and operational concepts. Internally, the BPDA conducted workshops throughout the organization to engage key stakeholders in the development of a framework for the implementation of BPM within Company Q. However, getting support for adopting a BPM approach and developing the initial frameworks was difficult because of (1) conflicting literature and practice regarding what constituted an enterprise-wide BPM approach and (2) a lack of guidance as to how to go about adopting such an enterprise-wide approach.

The second phase of the project included making the frameworks operational in order to embed BPM principles and practices within the organization. In the first instance, the BPDA was responsible for the establishment of the methods and techniques within the framework, and the introduction of these to the organization. In this phase, the first deliverable from the BPDA was the development of the Enterprise Process Model that formed the base of the Process Architecture and provided Company Q with a tool to develop their new Business Model. The development of the Enterprise Process Model was not to the extent of an Enterprise Process Architecture but rather was a list of known processes in Company Q.

\(^2\)The BPDA is co-author of this chapter.
clustered by either function or end-to-end process. The second deliverable was the first version of Company Q’s BPI and BPR Framework including initial principles, tools and methods (also referred to as Company Q’s BPM Concept) and a proposed implementation plan. The implementation plan included the need to perform an organizational wide assessment to baseline the current state and identify potential organizational change arising from the adoption of a BPM approach.

The BPDA received approval to investigate BPM capability assessment methods to gain a deeper understanding of an organization’s maturity in BPM. This investigation resulted in an early appreciation of the differences between a BPM approach that was focused on the management of processes (i.e., what this chapter calls a lifecycle approach) and an approach that was focused on the management of the organization (i.e., what this chapter calls an organizational approach). However, subsequent investigation revealed a lack of a suitable means by which to (1) understand existing practices and to gain guidance on progressing and embedding BPM practices within the organization and (2) an inability to measure the progression of BPM practices adopted within the organization.

In addressing these issues, the BPDA approached Queensland University of Technology (QUT) for assistance. This initial contact from Company Q’s BPDA led to a study at QUT investigating the progression and measurement of BPM Initiatives within organizations.

3 Developing a BPM Capability Framework

Since 2004, researchers at QUT have worked to develop a model for assessing the maturity of BPM within organizations. One of the key outcomes from this research was a so-called BPM Capability Framework. The journey to develop this framework is documented in a number of existing publications including Rosemann et al. (2004), Rosemann and de Bruin (2004, 2005), Rosemann et al. (2006), de Bruin and Rosemann (2007), and de Bruin (2007).

Since its development, the Principal Researcher has used the BPM Capability Framework to explore the BPM Initiatives of a number of organizations. Furthermore, within industry, a number of organizations have independently applied the BPM Capability Framework to guide the development of their BPM Initiatives. In this chapter, the discussion centers on the application of the BPM Capability Framework by Company Q.

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3 The core elements of this BPM capability framework are also presented by Rosemann and vom Brocke (2014).

4 The Principal Researcher is co-author of this chapter.
4 Applying the BPM Capability Framework in Company Q

Representatives from Company Q developed a deeper understanding of the BPM Capability Framework because of the ongoing relationship with the researchers and participation in BPM forums including the BPM Roundtable and the Queensland BP Trends Chapter. On this basis, Company Q’s BPDA started using the BPM Capability Framework to develop a roadmap to guide Company Q’s BPM journey.

In particular, the BPDA used the BPM Capability Framework to guide Company Q’s (1) BPM communication, (2) BPM strategy development and implementation, and (3) internal BPM consultancy engagements. The following sections provide details on this application while Fig. 1 summarizes the key projects in Company Q’s BPM journey and the timeframe in which they occurred.

4.1 BPM Communication

In late 2006, application of the BPM Capability Framework within Company Q resulted in an overhaul of the BPM portal site. The subsequent redesign of this communication media reflects the BPM Capability Framework. An underlying directory structure, mapped to the Framework, stores all BPM documentation available through the portal. Staff members within Company Q access this documentation through the portal site.

Fig. 1 Key projects in company Q’s implementation of a BPM approach
within the portal by clicking on the relevant Capability Area button to drill down to the available information. In doing so, the Framework provides Company Q with the ability to develop a common language among its staff members. In addition, the site acts as a corporate repository and single point of truth for “all things process.”

The BPM team also uses the portal to provide management and staff with access to a range of education materials. For example, the portal provides access to:

- Company Q internal Case Studies of BPM projects
- BPM Book List
- BPM Conference Resources and Papers
- BPM Research areas structured according the BPM Capability Framework
- Links to major BPM Internet sites

Figure 2 shows the BPM Community Portal that utilizes the BPM Capability Framework at the core of its design and functionality.

### 4.2 BPM Strategy Selection and Implementation

Since 2006, Company Q’s BPM team has used the BPM Capability Framework to progressively implement, refine, and build upon strategies to develop capability in various areas. For example, the BPDA uses the BPM Capability Framework to provide direction on which capability areas to give attention. In doing this, the BPDA uses the capability area definitions to understand the intent of the capability areas, and knowledge of the organization to determine an informal level of maturity in the capability areas within business units and/or projects. From there, the BPDA determines which capability areas will deliver the greatest immediate benefit to
achieving the goals and objectives of Company Q. In doing so, the BPDA is able to allocate resources and develop capability that will optimize the benefit to the organization from adopting a BPM approach. The Principal Researcher is not directly involved in the determination or implementation of these strategies, however, the Principal Researcher and the BPDA meet regularly to discuss or clarify issues regarding the intent and interpretation of the capability areas and possible strategies and their implications.

4.3 Internal BPM Consulting Engagements

Following a restructure in 2005, Company Q’s BPM team moved into the Shared Services Group with the responsibility to deliver BPM services to the different business areas using an internal consultancy arrangement. The team uses the BPM Capability Framework to guide the conduct of its consulting engagements, including the subsequent recording and documentation of the engagements and their outcomes.

Every consulting assignment is carefully scoped, and the initiation phase includes an internal BPM capability assessment. This assessment enables the consulting team to plan additional activities to further improve BPM capability as part of the project delivery. Once the consulting project is finalized, a session of reflection is facilitated by the BPDA to identify the project results as well as the progression of BPM capability in the particular business area. Every project is treated as a case study, with a summary capturing the findings and adding to the progression of Company Q’s BPM journey. Each project contributes to the improvement of different capability areas within the BPM Capability Framework. The project summaries are an effective tool to further consolidate and communicate the BPM progress to the rest of the organization and for the BPDA to further set strategies to enhance capability areas within the model.

An example of one of the key projects delivered by the BPM team using the BPM Capability Framework in this way is the review and redesign of the strategic planning process for Company Q’s Corporate Strategy area. This project was twofold, delivering the design of the to-be process while at the same time enabling the BPM team to incorporate the necessary links to BPM into the strategic planning process. The project’s focus was on building the capability in Strategic Alignment and Governance. The project delivered a streamlined, integrated process for strategic planning including associated tools to make the process operational (e.g., a Process Priority Matrix). The project also provided the Corporate Strategy area with a clear customer value proposition, and established the process performance requirements to build the capability required. For example, the BPM team provided Corporate Strategy with an approach to identify and define their current value chains including how to redesign and redefined their business to meet the expected future needs of the market and to deliver value to their customers by being better able to meet requirements.
5 Benefits of Adopting BPM as an Organizational Approach

Since commencing its BPM journey in 2002, Company Q has gained many benefits from adopting an organizational approach to BPM. These benefits include an increase in customer focus, greater alignment in strategy and between areas of the business, changes in the way people within the organization work, improved governance structures, and increased recognition in the BPM community, as discussed in the following sections.

5.1 Increased Customer Focus

Within the last few years, customer surveys have shown that Company Q has become more customer-focused. The organization has dedicated resources to review and improve the service delivery processes within each Line of Business. Company Q refers to these dedicated resources (i.e., process professionals) as the BPM community. Members of the BPM community work together with the marketing and sales professionals and strategic planners to ensure that the proposed improvements to service delivery processes will meet customer needs.

5.2 Improved Strategic Planning and Strategy Deployment

The BPM team was engaged by the CSO to redesign the strategic planning process, together with the organization’s strategic planning professionals. The overall objective was to design an integrated strategic planning process that would enable successful deployment.

To further improve the strategic deployment process, the BPM community assisted in building the necessary mechanisms in the Lines of Business to successfully deploy strategic initiatives. The BPM community is working to improve their program and project management across their BPI and BPR efforts to ensure maximized results. The efforts of the BPM team have resulted in a strong community of process professionals across the organization that are aligned in their thinking and who utilize common methods for BPI and BPR. The majority of Company Q’s Lines of Business have recognized the importance of selecting and managing the critical programs and projects to improve service delivery from an end-to-end perspective and adopt these common methods within their own programs and projects.

The Chief Information Officer assigned the BPM team and the Enterprise Architect to develop the frameworks, methods, and tools to link business strategies and ICT. The efforts of the BPM team and the Enterprise Architect have resulted in a standard approach toward ICT Planning and Enterprise Architecture.
for Company Q. This approach minimizes the divide between business strategy and design and IT strategy and design. Consequently, Company Q is experiencing improvements in technology selection and solution development. The two teams provide an integrated service to the business, delivering future roadmaps, and designs in the areas of: business/process, information, application, and technology. All artifacts are consistent, reusable, centrally managed and recognized as key components of the organization’s DNA.

5.3 Changing Human Resource Capability

The efforts of the BP community and the BPM team have contributed to breaking down the functional silos in the organization. Process projects have triggered ongoing discussions around further improving the service delivery processes from an end-to-end perspective and challenged accountability structures, organizational structures, cost structures, roles and responsibilities, and capability development. Cross-functional teams have been able to prove the concept of (cross-functional) process collaboration by demonstrating positive results in overall performance and customer focus.

Company Q has adopted a (People) Capability Framework including a Performance Management process for its staff (at all levels) that is based on the BPM principles. Under this framework, individuals are now accountable for the outcomes of a process and Company Q recognizes and rewards teamwork that aims to optimize the end-to-end process. The BPDA reviewed the (People) Capability Framework and provided guidance on the incorporation of capabilities required to move the current culture toward a process-thinking culture.

Consequently, the BPM team is now in a position to review their BPM training package in line with business needs as there is better linkage between current capability and the required future capability. This piece of work has also highlighted that additional methods and tools are required for the adoption of BPM at different levels of the organization, that is, Strategic, Tactical, and Operational levels.

5.4 Increased Recognition in BPM Community

In recent years, Company Q has nominated a number of the BPM projects for the Australasia BPM Awards. The categories of the award are aligned with the organization’s current efforts in its BPM journey, calling for nominations in the areas of (1) Strategic Alignment and Governance, (2) Methods and Information Technology, and (3) People and Culture. In 2006, Company Q nominated one of their Business Process Architecture projects in the category Strategic Alignment and Governance and won the award. In 2007, Company Q nominated one of their
Business Process Redesign and Systems Implementation projects in the category of *Methods and Information Technology* and won an award for a second year.

Within Company Q, winning these awards has given the BPM community and the BPM team an increased profile. This has resulted in more proactive engagement of BPM professionals by senior management leading to greater involvement of the BPM team in emerging business issues. This external recognition of their success has also led the BPM community process professionals to be more motivated in working with the BPM team to progress the adoption of an organizational approach to BPM throughout Company Q. The BPM team in Shared Services is now the Practice Leader for BPM in Company Q, setting the overall BPM governance and providing support to upper level management in how to embed the BPM approach throughout the organization. Winning the awards has also given Company Q an increased profile in the Australian BPM Community.

### 6 Issues in Adopting BPM as an Organizational Approach

Despite the advances that Company Q has made, the progression of an organizational approach to BPM is not without issues. Recent changes within Company Q that have influenced the progression of the BPM approach include (1) changes in Company Q’s business model and (2) changes to the organizational structure. These examples show that the progression of an organizational BPM approach requires an ongoing focus and needs to evolve to keep pace with changes that occur within the organization and its environment.

#### 6.1 Changes in Business Model

In 2008, a change in the Board and senior management of Company Q led to a significant change in its business model, taking it from a model of an integrated transport provider to being a multiple company model. The new business model was designed to increase the flexibility and agility of Company Q, with stronger accountability to making it more competitive in the market place. Changes to the Corporate Governance Framework were necessary to enable the organization to implement the new business model.

Company Q revised their Corporate Governance Framework from a strongly rule-based to a principle-based focus to achieve the following benefits:

- Applying Principles as appropriate in the individual Businesses as one size does not fit all
- Making management more empowered in the decision-making process and having greater accountability in business outcomes

As a part of the new Corporate Governance Framework, the Practice Leaders (i.e., the functional and process owners) within Company Q developed Governance Principles for all practices (i.e., function and processes). Subsequently, the
Governance Principles underwent a peer review prior to implementation throughout the Businesses. However, since the new Corporate Governance Framework has been put in place, questions have arisen about its effectiveness.

Consequently, the Company Secretary asked the BPDA to assist in a review of the organization’s new Corporate Governance Framework. The purpose of the review was to ensure that the design of the accountability structure and decision-making process was effective. The BPDA assessed the new Corporate Governance Framework against the BPM Principles to identify any gaps. The review found that, despite the involvement of the Practice Leaders, the basis for the accountability structure was more on functional demarcations. Furthermore, the review revealed that not all Practice Leaders were included in the initial development and peer review. The review by the BPDA also found that there was no alignment of the overall decision-making process within some end-to-end processes and that links between business areas and/or levels of business were missing.

An independent external reviewer analyzed the BPDA’s findings and proposed an appropriate Corporate Governance Framework for Company Q. Company Q envisages that a subsequent redevelopment of the Corporate Governance Framework to address the issues found will create further challenges due to potential changes in accountability and organizational structure, and a lack of capability for executing the new framework. The success of this redevelopment will depend in part on the re-education of senior management and the development of Practice Leaders in the deployment of the practices based on the BPM Principles.

The low level of understanding of Information Management that exists within Company Q will also influence the change in the Corporate Governance Framework from rule-based to principle-based. A past compliance-driven culture has resulted in mechanisms for record keeping being in place; however, to assist the organization in becoming more competitive and to enable improved performance, a stronger information management focus needs to be established.

6.2 Changes in Organizational Structure

Since commencing its BPM journey in 2002, a number of organizational restructures have led to significant changes in the roles and responsibilities of the BPM team. At times, these changes have affected the manner in which the team operates or is resourced, while at other times, these changes have affected the location of the BPM team within the organization.

In mid-2007, the BPM team commenced their most recently defined role as the Practice Leader for BPM in the organization. Process professionals from the BPM community are now part of the individual support teams within the different Businesses. The process professionals work closely with people from within the strategic planning, human resource, finance, and IT functions as well as the areas of risk and project management. This change includes the BPM team working closely with other leadership teams of the organization to build BPM capability to support
and enable a more enterprise wide and top-down approach to BPM. An example of this is the BPM team working closely with Practice Leaders and Line of Business management. This work is building BPM capabilities within the factors of Strategic Alignment and Governance. The expected consequence of the work is that it will set boundaries for the future development and implementation of Methods and IT and that it will activate the cultural change needed to achieve higher levels of capability in the People and Culture factors.

A further consequence of the multiple company restructures is that the IT systems that support the activities of end-to-end processes lack integration. The CIO is currently tasked with rationalizing the IT systems (where appropriate). However, moves to rationalize IT systems will present a challenge to business units as interim solutions are applied in order to manage the high business risks associated with the changes.

6.3 Lessons Learnt During Company Q’s BPM Journey

Company Q has learnt numerous lessons that relate to the development and execution of strategies for implementing BPM as an organizational approach. The following points provide an overview of the key lessons learnt by Company Q during its journey. In keeping with the approach adopted within Company Q, these points are mapped to the factors from the BPM Capability Framework.

6.3.1 Strategic Alignment

Company Q found that a strong connection between strategy formulation and the selection of BPI initiatives needs to occur to optimize resource allocation. It recognized that a lot of effort was wasted throughout the organization by undertaking numerous improvement projects that were not business critical or strongly linked to the overall strategic objectives. These projects often came to a standstill or did not deliver value to the organization. The company has now determined that the strategic planners and BPM professionals work together, undertaking a business risk assessment and clearly defining the business critical improvement projects. This drives subsequent resourcing of projects and ensures projects undertaken are more effective and enable strategic objectives to be delivered.

Within Company Q, processes need to be clearly defined in order to be successfully measured. It was recognized that if the organizational processes were not defined from an end-to-end perspective, ownership and accountability for process performance could not be clearly assigned. When processes were not clearly defined, the process measures used related to only discrete components of the process and the performance outcome of the entire process was not managed successfully. The end result for Company Q was often unhappy customers. The experiences of the BPM community found that it was good practice to use the customer requirements to define the process and measures to ensure success.
It was acknowledged that Company Q had to become more customer focused to be able to compete in the market place and in doing so had to clearly understand customer requirements. Ultimately, Company Q had to decide which market segments were to be targeted as they found it was no longer feasible to cater to everyone as the cost of delivery was often higher than the return to the organization. Company Q investigated its service delivery processes and its cost to gain a better understanding of the market segments they should focus on considering the business environment they are working within.

6.3.2 Governance

Company Q found that BPM Governance needs to be put in place early to ensure clear direction and leadership and common terminology as people within Company Q only follow leadership when clear directions, boundaries, and rewards are set and properly interpreted and communicated. Furthermore, Company Q found that BPM Governance needs to be integrated into an overarching corporate governance framework as BPM is a management philosophy and not a standalone practice.

In Company Q’s experience, transparency is a key element to gaining accountability as they found that few people would take accountability if they were not fully aware of “what the accountability is for.” This meant that processes had to be well defined and furthermore, that the individuals accountable for the processes had a solid understanding of what was involved in achieving this outcome. Company Q also found that process leaders within the businesses needed support from their functional counterparts within an integrated BPM governance framework to ensure that optimal (process) decision making occurs.

In the experience of Company Q, linking individual performance measures with the overall end-to-end process performance acted to focus attention on continuous process improvement.

6.3.3 Methods

With respect to modeling processes, Company Q found that there needs to be a common process-modeling notation in use across the business to ensure consistent, reusable models. At the time of commencing their BPM journey, the notation selected was not as important as the consistent application of the notation and the ability for the notation to be supported by an associated modeling tool.

Company Q found that the use of multiple process improvement methods (in their case Six Sigma and Lean Manufacturing) was beneficial. This enabled the matching of the most appropriate method dependent on the different purpose and types of the improvement project. Company Q has developed guidelines on the selection of the most appropriate methods for use in different situations, and these form a part of their process review.

In Company Q’s experience, strong program and project management capability needs to be in place to track the benefits for the business. Company Q found that this
applied to process improvement and/or review projects as well as the overall BPM program of works that aims to deliver supporting BPM capability.

6.3.4 Information Technology

Company Q found that a common process repository/modeling tool is essential when progressing with BPM. The system itself (i.e., whether it was System Architect, ARIS or other similar software) was not important in the initial start up of BPM in Company Q. However, being able to match the suitability of the tool to the different purposes of the modeling has increased in importance when implementing different process improvement and review projects.

6.3.5 People

Company Q found that the most effective way for many of their staff members to learn was by them being involved in doing the work. Hence, the BPM team built BPM capabilities through discrete projects. Selection of projects was on their strategic importance and the level of energy senior management placed on the project. Every project provided the company with the required process improvement; however, as an additional value add, the projects also provided an increase in particular BPM capabilities as they served to develop the process related skills and abilities of the people selected to work on the project.

Prior to adopting BPM as an organizational approach, sharing of information within the organization was limited, despite endeavors to improve processes in numerous projects. Company Q found that an increase in the sharing of information and a new openness in the way in which people communicated with each other following involvement in process improvement projects that used the new BPM Principles and allowed different project teams to reuse information across the organization. This reduced cycle time and the cost of certain tasks.

Company Q’s staff did not positively connect with the notion of process or BPM, nor did they like the use of BPM terms. Hence, members of the BPM community had to convey their messages in a language filled with analogies and stories to build acceptance in the wider organization.

6.3.6 Culture

Company Q found that top-down leadership is essential to achieve a holistic implementation that includes a BPM approach throughout the entire organization (as opposed to within discrete components of it). Within Company Q, acceptance of the BPM Principles required many staff and management to change their mindset – creating a need for a program of cultural change. Without strong leadership from the top and clear guidance, the required change in people will not happen.
In adopting BPM, the strategies used need to be communicated in a manner that is meaningful for all management and staff. This requires different approaches at the different levels of the organization and not just a uniform approach. In part, this is because the implementations of strategies that happen in the operation of the organization are not the same as those on the executive management level. However, it is also because the appropriateness of the communication medium and/or channel varies between the levels.

7 Conclusion

This chapter presents the experiences of an Australian Transport Provider in adopting BPM as an organizational approach. In doing so, the chapter clearly distinguishes such an approach to one that focuses on technology solutions or to one that focuses on the management of processes throughout the process lifecycle.

The experiences of Company Q showed the value in adopting a BPM Capability Framework to develop a roadmap to guide the progression of BPM. This roadmap included direction for BPM communication, BPM strategy development and implementation, and internal BPM consultancy engagements.

Company Q found numerous benefits flowing from the adoption of an organizational approach. These included an increase in customer focus, an increased ability to change human resource capability, and increased recognition of BPM both within the organization and within the broader business community.

Finally, the lessons learnt during Company Q’s BPM journey show that often it is necessary to match the strategies for developing these capabilities to the individuals within, and experiences of, the organization itself for them to be successful. This suggests that a single, generic methodology for adopting BPM as an organizational approach is unlikely to lead to widespread success, and that organizations will find value in developing a capability “roadmap” that suits their unique needs and circumstances.

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Business Process Management in International Humanitarian Aid

Hugh Peterken and Wasana Bandara

Abstract International humanitarian aid provides assistance such as food, shelter, and health or counseling services across national boundaries to communities in need. Universally, international humanitarian aid organizations play a critical role, by supporting the survival and recovery of communities affected by crises such as natural disasters, conflicts or disease epidemics. In most instances the technological, human and financial resources of diverse countries are put together to support communities facing crises. These events, often require immediate action and long term support to sustain the community needs and are highly sensitive to the contexts in which the crisis incidents occur. Large amounts of funds and resources are received each year to support such initiatives and successfully distributing humanitarian aid is a complex operation. Given the size of the funds involved, the sheer complexity and criticality for fast, efficient and effective action in these initiatives, it is somewhat surprising that there is not much evidence of a business process focus by the humanitarian community. This chapter describes the core business of International Non Government Organizations (INGOs), depicts how the main aspects of Business Process Management manifest within INGO’s and points out the values and challenges of process centric approaches within international humanitarian aid organizations. The latter part of the chapter vividly illustrates these aspects using two example cases within the International Federation of Red Cross and Red Crescent Societies.
1 Introduction

The last 10 years have seen a number of large high profile disasters killing hundreds of thousands of people. There was the Indian Ocean tsunami of 2004, the Pakistan earthquake in 2005, the Haiti earthquake and Pakistan floods in 2010. In that time, as shown in the case study below, the International Red Cross was able to significantly improve its ability to help the population in need. It reduced the cost of supplying goods by 80% and halved the delivery time, allowing many more people to be helped. The improvements in business processes that led to this transformation are discussed in this article, along with some challenges that remain within the sector.

International humanitarian aid is assistance provided across national boundaries to communities in need. It consists of goods such as food and shelter, and services such as health or counseling. The aid is typically provided in response to crises such as natural disasters or disease epidemics. The primary objective of humanitarian aid is to save lives, alleviate suffering, and maintain human dignity.

The bulk of international humanitarian aid is provided through three channels, sometimes referred to as the three pillars of humanitarian action (http://humanitarian-space.dk/fileadmin/templates/billeder/dokumenter/Seminar_12_juni/RCRC_statement_on_neutrallity_in_humanitarian_assistance.pdf), namely the UN and governmental action as one, international non-government organizations’ action as second and the humanitarian work of the Red Cross Movement as third.

The United Nations has a number of agencies and funds providing both assistance and co-ordination, including the United Nations Children’s Fund (UNICEF) (http://www.unicef.org), the Office of the United Nations High Commissioner for Refugees (UNHCR) (http://www.unhcr.org), the World Food Program (WFP) (http://www.wfp.org) and the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) (http://ochaonline.un.org/). The latter provides an overall co-ordination role for international humanitarian response. A significant response effort passes through international non-government organizations such as the International Rescue Committee (IRC) (http://www.theirc.org), Save the Children International (http://www.savethechildren.net) and World Vision International (WVI) (http://www.wvi.org). In many high profile disasters, the largest single response effort comes from the Red Cross Movement, led by the Red Cross or Red Crescent society of the afflicted country. The International Red Cross movement consists of Red Cross or Red Crescent organizations in 186 countries (http://www.ifrc.org/index.asp), the International Committee of the Red Cross (http://www.icrc.org/) which works in conflict situations and the International Federation of Red Cross and Red Crescent Societies (IFRC) (http://www.ifrc.org) which co-ordinates and assists in disasters and health crises.

1 For example, in the tsunami of 2004, the Red Cross and Red Crescent raised more than $3bn (International Federation of Red Cross and Red Crescent Societies 2005) of the $7bn total funds raised (International Federation of Red Cross and Red Crescent Societies 2005).
In practice the work of the aid agencies is highly complex and there are many challenges in running an efficient business process. The level of investment in supporting IT systems is especially low, estimated at less than 2.4% of turnover in international non-government organizations (Brindley 2009). This is low in comparison to the investments seen in the private and government sectors, which have an average of 5.9% of turnover spent on IT systems (Tracy et al. 2008). Other challenges are in the co-ordination effort with other agencies, the legal framework of the recipient and donor countries (for example customs requirements or export restrictions) and the requirement to adapt to local requirements.

Much of the work is done through human interaction, with a strong focus on quality and accountability to ensure worthwhile outcomes. In the first instance, these outcomes may be to provide rescue, food, shelter and health services, but generally humanitarian programs also focus on longer term recovery and reduction in vulnerability for the affected communities. Given the complexity and variability of programs, much effort is put into an appropriate policy environment that defines working methods and best practices. Some examples of such policy environments are; the Humanitarian Charter and Minimum Standards in Disaster Response published by Sphere (http://www.sphereproject.org/content/view/27/84/), the UN Disaster Assessment and Coordination Field Handbook (http://www.reliefweb.int/rw/lib.nsf/db900SID/JDAB-5RJFX3?OpenDocument), the Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations (http://www.reliefweb.int/telecoms/tampere/index.html) and the Code of Conduct for the International Red Cross and Red Crescent Movement and NGOs in Disaster Relief (http://www.ifrc.org/Docs/pubs/disasters/code-conduct/code-english.pdf). These policies guide and define the boundaries, expectations and governance around the actions taken in the humanitarian aid situations.

International overseas aid from governments totaled approximately US$120Bn in 2009, of which approximately US$9.5Bn was humanitarian aid (http://www.oecd-ilibrary.org/content/book/dcr-2010-en). Add to this the substantial donations from private individuals, philanthropic organizations and business, whose contribution is more difficult to quantify, but in some countries is more than double the government aid (Hudson 2006). As an example, in the tsunami of 2004, it is estimated that US$4Bn in private donations were dispersed, over half of this by the Red Cross and Red Crescent movement.

Given the size of the funds involved and the nature of the related tasks, it is maybe somewhat surprising that there is not much evidence of a business process focus by the humanitarian community. Currently there are only a few specific areas of work within INGO’s, where a business process view is taken. The management of related supply chains is a common area where a process view is observed across most INGOs. Aidmatrix (http://www.aidmatrix.org/), a US based NGO is an exemplary case study in this context. They looked at the US domestic disaster response effort as a business process that could be enhanced through a systems approach and designed a web based product that moved all the key process components into a single portal, accessible by donors, aid agencies and people in need. Through implementing appropriate business rules and enabling the users of
the system, they have been able to simplify and streamline the overall disaster response process. Their product is now being used in all major US disasters, coordinated by the US Federal Emergency Management Agency (http://www.fema.gov). A trial version of the disaster management portal is available (see http://www.sandbox.aidmatrixnetwork.org/FEMA).

This chapter focuses on the value and challenges of a business process management approach in the distribution of international humanitarian aid (especially in disasters). The material is based on a number of case studies and the personal experience of the principal author who was the Chief Information Officer for the International Federation of Red Cross and Red Crescent Societies (IFRC) for over 5 years. First, the notion of Business Processes through the lens of the international humanitarian community is presented, describing how the core elements of Business Process Management manifest in humanitarian aid organizations. A summary overview of this discussion highlighting the values and challenges for BPM in the humanitarian context is provided. Next, two case studies; on the humanitarian supply chain and volunteer management is presented to illustrate the reality of the aspects discussed earlier. The paper concludes with a synopsis, pointing to some challenges and opportunities for future work.

2 Business Processes: The Views of the International Humanitarian Community Views

While the humanitarian community involved in international disaster response is very diverse, this chapter attempts to synthesize the community’s perspective towards business processes using anecdotal evidence from the principal author’s prior experiences. First, a brief overview of the core processes within INGO’s is provided, with a particular emphasis on the international disaster response. Then the authors’ view on the manifestation of core elements of Business Process Management (BPM) (see Fig. 1) as stated in Rosemann and vom Brocke (2014) is provided, covering how Strategic alignment, Governance, Methods, IT, People and Culture aspects influence the decisions and pathways for applying BPM in INGO’s.

The complexity of the humanitarian response can be represented in business process terms in Fig. 2. The actions can generally be broken into three areas for analysis. There are the core value processes, implementing programs within the communities in need. There are a set of processes that support this work through for example, fund raising or recruitment. And there are processes often referred to as governance, which set policy and prioritize the work.

The core value processes are usually project based and project management methods are key to achieving successful outcomes. A program will start with an assessment of the humanitarian need. This assessment may identify a wide variety of requirements, from fresh water to immunization to counseling. Each INGO will
have a specialist capability, for example Médecins Sans Frontières (http://www.msf.org/) specializes in medical facilities and Save the Children International (http://www.savethechildren.net) specializes in program improving childrens’ lives. The program of work may consist of many projects, from many different agencies. In deciding which needs to address, there is strong collaboration between agencies to best serve the community’s requirements. There are structures in place to facilitate this collaboration including the Inter Agency Steering Committee.

Fig. 1  The six core elements of BPM (Rosemann and vom Brocke 2014)

Fig. 2  Overall humanitarian aid process
(http://www.humanitarianinfo.org/iasc/) and the United Nations Office for the Coordination of Humanitarian Affairs (http://ochaonline.un.org/), shown in Fig. 2 as interagency collaboration.

Following assessment, a plan of action is created and the resource requirements are defined. These resources are requested through an appeal for funds. The appeal may be to individual donors, to governments or to corporate entities. Fund raising is probably the best understood process within the humanitarian community with sophisticated IT systems available (for example Raiser’s Edge from Blackbaud (www.blackbaud.com)), clear metrics and industry benchmarks (http://www.blackbaud.com/targetanalytics/benchmarking/bench_overview.aspx).

With the funds that are raised, the program is implemented. There is ongoing evaluation and this, along with the response to the appeal, will lead to re-planning and revision. Finally, a report is produced to inform the donors on how their money has been spent. In many situations this cycle is repeated a number of times as the situation evolves and humanitarian needs change. For example, the initial needs after a disaster might be for search and recovery and first aid, which evolves into needs for hospitals, food and water, then into a need for shelter, reconstruction and counseling.

The support processes have many similarities to those in many commercial organizations. Operations are generally complex due to the international nature of the work, with multiple currencies, different employment laws in each country and multiple languages. Some support processes such as administration and logistics are sufficiently different to the standard commercial processes that IT systems have to be designed specifically for that purpose. These issues add to the costs of the processes.

The third major stream of work in INGOs is that of governance. This area encompasses many activities that provide a decision making framework. This stream receives considerable attention in the INGO world, and it is seen as important in ensuring that the activities of the INGOs are in the best long term interests of those people in need.

### 2.1 Strategic Alignment

Rosemann and vom Brocke defines strategic alignment as “the tight linkage of organizational priorities and enterprise processes enabling continual and effective action to improve business performance” and describe how a strategy-driven process improvement plan, bi-directional linkage between strategy and business processes, an enterprise process architecture and a well-defined understanding of process outputs are critical elements to achieve strategic alignment (Rosemann and vom Brocke 2014; vom Brocke and Sonnenberg 2014).

The contrast between the process focused organizations (for example retailers) and the people focused organizations (such as Red Cross) can be summed up in Fig. 3. In a human focused organization the realization of a strategy is driven
through individuals who are sufficiently capable to understand the strategy and then to undertake tasks within the local context that fulfils the strategic aims. The interpretation of the strategy is done through policy (for example with a policy on how to manage volunteers (http://www.ifrc.org/Docs/pubs/who/policies/volunteering-policy-en.pdf)), training courses (such as the Red Cross Impact Training Course (http://www.redcross.org.nz/cms_display.php?st=1&sn=11&pg=596)) and reference subject matter experts who can assist in recommending specific actions based on their experience and deep understanding of the subject. There is little focus upon, or understanding of, business processes.

The information systems environment focuses on supporting the individual staff members as a way of ensuring that the processes are followed. To give an example, the finance system at International Federation of Red Cross and Red Crescent Societies (IFRC) was engineering to provide immediate feedback to field staff on the financial health of their project (supporting the individual) while at the same time ensuring the reporting requirements of the organization under international financial reporting standards (supporting the process).

In contrast, a process focused organization has a clear view on how each service they provide supports the strategic aims of the organization. The processes are often monitored with metrics on process compliance and reflected in staff performance.
appraisals. The processes used to deliver these services are consolidated and optimized to reduce costs and improve quality with all encompassing IT systems such as ERPs, providing a backbone that is critical to the operation of the organization. When the system’s environment fails in a process focused organization the consequences are often very serious. One example of this was the troubles encountered by British Airways on the opening of Terminal 5 at London’s Heathrow airport (House of Commons London 2008; London Today 2008).

Another difficulty in approaching a business process improvement plan for humanitarian organizations is defining ‘improvement’. While it may be possible to measure certain enhancements in the support processes (Davidso 2006), (for example reducing the direct costs of transporting goods), the improvements from the core value processes are notoriously difficult to measure. At a high level, success measures are reflected in the eight Millennium Development Goals, MDGs (The Millennium Development Goals Report 2010). Millennium development goal 1 is to eradicate extreme poverty and hunger by halving, between 1990 and 2015, the proportion of people whose income is less than $1 a day. This target is measured across multiple countries over 25 years, so the impact of individual humanitarian programs is difficult to attribute to the overall goal.

The humanitarian programs undertaken strive to positively influence the situation of the people in need, and most well designed programs will define the positive impact. Unfortunately there are many other factors that might affect achieving these outcomes, such as conflict, adverse weather events and corruption. It is almost impossible to attribute a particular outcome to one thing alone; and running the same business processes in two situations may have very different outcomes. This may explain the strong emphasis and focus on the capability of people, why an iterative plan-do-check-act approach is used, and the extensive use of in-program evaluations; with business processes taking a back seat.

2.2 Governance

Governance “establishes relevant and transparent accountability, decision-making, and reward processes to guide actions” (Rosemann and vom Brocke 2014)

As mentioned in Sect. 2, there is considerable focus in humanitarian organizations on governance, accountability and decision making in complex multi-party operations. The collaborative nature of humanitarian actions means that processes occur across organizational boundaries; governance structures may change with

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2 For example, the humanitarian programs in North Eastern Sri Lanka after the 2004 Asian tsunami were severely hampered by the Tamil conflict.

3 For example, hurricane Gustav in Haiti in 2008 hampered ongoing humanitarian efforts responding to previous hurricanes and tropical storms.

4 As is widely reported in Afghanistan.
each project. The head of operations or the head of an organizational unit holds considerable authority and must carefully manage the operations under their control.

Inside humanitarian organizations, by contrast, business processes are predominately implemented within siloed organizational units. The management of these units provides the governance capacity where decisions can be taken within an existing hierarchy, metrics set, measured and acted upon. An example of this is the IT support processes, where ITIL may be implemented and the process governed inside the IT department, with the assistance of service desk software. Metrics can be defined (for example number of incidents treated within a timeframe), measured and referenced in individual’s appraisals.

Within an organizational unit the business process director role (as defined in Bandara et al. 2005) is usually taken by the head of that organizational unit. The resourcing of other process roles depends largely on that person’s commitment to business processes. Given the limited size of most organizational units, there is no capacity to permanently employ business process consultants or business process architects. These are generally contracted with any process improvement projects. Where permanent process analysts do exist, they work for the organizational unit manager, and are not always available to work on processes that cross organizational units.

The governance of processes becomes very difficult when the process crosses organizational boundaries. One example commonly seen in the humanitarian community is the difficulty in enforcing a staff performance appraisal process. This process touches every employee, but if the individuals do not feel that it is assisting them in their immediate task (such as responding to people’s needs in a disaster situation) then compliance rates can become unacceptably low.

2.3 Methods

Methods are “the tools and techniques that support and enable consistent activities on all levels of BPM (portfolio, program, project, operations)” (Rosemann and vom Brocke 2014).

One significant challenge within a humanitarian organization, is to communicate effectively with staff to present a process perspective of the organization. The first challenge is that of language. For example, in the Red Cross there are four official languages (English, French, Spanish and Arabic) and two unofficial languages (Russian and Mandarin). Translating even basic business process documents which are developed in English is a challenge. Translators or interpreters find it very challenging to represent terms such as “business process management” or “process control” in another language when they do not understand it in English.

In some cases where process diagrams were translated in many languages (an expensive task in itself) there was ambiguity through local language variations. We found that the terminology used in describing the warehouse management
process (item, waybill, pipeline etc.) translated differently between Spanish used in Europe and Spanish used in Central America where the main warehousing hub was located.

The industry standard techniques of business process modeling such as BPMN, Archimate and ARIS are generally outside the skill sets of humanitarian workers. Less sophisticated tools such as swimlane diagrams tend to be used, but they lack the features of other tools (such as the ability to; reuse, support collaborative model development, have multiple views, manage complexity through multi layers and support the distribution of models through diverse dissemination channels (Bandara et al. 2005; Curtis et al. 1992)), which inhibits humanitarian originations in reaching the benefits of effective process modeling.

2.4 Information Technology

Information technology (IT) refers to “the software, hardware and information systems that enable and support process activities” (Rosemann and vom Brocke 2014; Sidorova et al. 2014). As mentioned earlier in this chapter, IT departments within humanitarian organizations receive significantly fewer resources than those in private or government sectors. This restricts their ability to provide IT systems that support the organization’s processes. Some humanitarian organizations run ERP systems (for example SAP, Navision or Oracle E-business suite), but the process needs of the organization often do not line up with the traditional process models implemented by the ERP vendors. Given the restricted funding environment, undertaking significant configuration or coding on these systems is often unrealistic. There is also a perception that ERP systems restrict the ability to adapt business processes to local variations.

When business processes are codified and supported with IT systems, this can create challenges for IT departments. When processes are run manually and within organizational units, there are human based systems in place to reconcile outputs between these units (Fig. 4).

Once the processes are automated, there is a need for interaction between organizational units that is enabled by an enterprise integration bus (EIB). The processes can now be made more interactive. As an example, the payroll in an organization is usually managed by the HR Department. Traditionally, the payroll for each month would be created and submitted to finance for recording as financial transactions. Any discrepancies from incorrect coding would be reconciled in a meeting or phone call between HR and Finance.

When an enterprise integration bus is implemented, the HR system might implement business rules to prevent staff being allocated to incorrect financial
codes when they are assigned to roles. This eliminates the need for reconciliation meetings and the process is more interactive between systems, as shown in Fig. 5.

When there are discrepancies that cause a particular transaction to fail, the problem may be in one of the organizational units (HR or finance) but it also may be caused by software issues in the EIB. Thus the IT department might find themselves ‘caught in the middle’ when cross business processes are implemented.

The exact responsibilities for all possible issues can be difficult to agree and may be unclear. This often means that the IT department must investigate and allocate process exceptions themselves, just to keep the systems running. The implementation of an EIB may force the IT department to take a central role in managing cross functional business processes, often without any additional resources. This encumbrance may dampen the enthusiasm of any CIO in advocating a BPM approach.

BPM is defined as a discipline that integrates IT and business process expertise with the goal of transforming isolated business efforts into integrated and measurable cross functional activities that deliver operational and strategic advantages (Antonucci and Goeke 2011, p 4 and 6). Humanitarian organizations have both a limited IT capability and real difficulties in developing cross organizational IT systems to support complex business processes. This can have a direct impact on the process orientation of these organizations.


2.5 People

This comprises human resources, and can be defined as “the individuals and groups who continually enhance and apply their skills and knowledge to conduct the core business and relevant improvements” (Rosemann and vom Brocke 2014). One of the pleasant surprises of working in the humanitarian community is the quality and commitment of the people in the sector. The diversity within the sector is unprecedented, with different cultures, countries and educational backgrounds providing a superb environment for developing solutions in challenging environments. Unfortunately within this talent pool, there are very few who join the organization because of an evangelical approach to process improvement.

There are pockets of process focused individuals, typically within finance, logistics and IT. Often such people are in high demand by the private sector and the salaries paid in the humanitarian sector are not competitive, hence staff attrition in this area is very high. Staff working on the relief and health programs typically have low levels of basic IT capability which restricts the ability to implement complex IT systems. There have been attempts to ensure that staff are able to use computer applications at a recognized level of competence, through implementing the International Computer Driving License (ICDL) certificate (http://www.ecdl.org/icdl/index.jsp). For example in the Arab States, UNESCO Cairo Office rolled the ICDL program in 12 Arab States with more than 200,000 registrants, over 500 accredited centers, and more than 50,000 holders of the certification (http://www.unescoicdl.org/showpage.aspx?pageid=91).

The people who work in the humanitarian sector often do not see their actions as part of a set of business processes. Figure 6 represents a more typical view from a staff perspective of the workings of a humanitarian organization. In for example a disaster response situation, staff will undertake activities such as meetings, fund raising, developing plans and communicating with stakeholders. These activities are undertaken based on a staff member’s experience and within the policies and rules of the organization. Through these activities the donated goods, money, transport and people are transformed as quickly and efficiently as possible into the health services, food, water and shelter that the affected population is in need of. The Business Process moniker is usually applied to just the support processes such as the recording of financial transactions or the logistics of moving goods.

2.6 Culture

Culture in the Context of BPM, is “the collective values and beliefs that shape process-related attitudes and behaviour to improve business performance” (Rosemann and vom Brocke 2014; Schmiedel et al. 2014). As shown above, the overall circumstances of the humanitarian industry are not conducive to a BPM
approach. There are two key driving factors working against the BPM approach and making it difficult for any humanitarian leader to take the issue forwards.

The first reason is the attitude of the donors. Donors are very interested in the overhead costs of humanitarian organizations and see a low overhead cost as a mark of efficiency. A popular charity ratings agency called Charity Navigator (http://www.charitynavigator.org) evaluates charities on organizational efficiency, giving higher ratings to charities that have lower overheads and more money going directly to programs. This position is compounded by the humanitarian organizations themselves in a race to the bottom on overheads. Médecins Sans Frontières (http://www.msf.org/) (MSF) is an international, independent, medical humanitarian organization that delivers emergency aid to people affected by armed conflict, epidemics, healthcare exclusion and natural or man-made disasters. In their 2009 annual report, Médecins Sans Frontières advertised a “management, general and administration” figure of 6.3 % in 2009 (http://www.msf.org/source/financial/2009/MSF_financial_report_2009.pdf). Oxfam in 2009 expressed their support ratio at 9 % in their annual report (http://www.oxfam.org.uk/resources/downloads/reports/report_accounts09_10.pdf). This compares with widely accepted figures of
overhead in the equivalent commercial sectors of between 15% and 25% (for example see Lee and Covell 2008).

Unfortunately the development, implementation and improvement of business processes is an overhead (at least in the initial stages). The outcomes of a business process improvement initiative might reduce direct cost on the ground and may mean that more needy people can be helped, but the organization may be punished by donors who see it as an increase in overhead. Fortunately there are enlightened donors such as the Humanitarian Aid department of the European Commission (http://ec.europa.eu/echo/index_en.htm) and the UK Department for International Development (http://www.dfid.gov.uk/) who have specifically supported process improvement plans through funding supply chain improvements and improvements to human resource management.

The second reason is the litany of unsuccessful process definition and improvement projects that litter the humanitarian landscape. Projects may consume considerable resources defining and documenting processes, but may never move to the implementation stage because of the costs involved or the infeasibility of business change in worldwide dispersed organizations. When they do move to implementation, the failures become very public. Three examples of these difficulties were recently highlighted in a UN audit report of June 2009 (Terzi and Posta 2009). In one example highlighted in this report the World Health Organization implemented an Oracle ERP along with a radical process improvement plan (including off-shoring key finance processes). This severely disrupted the operation of the organization in a very public way (Russell 2009). Is it any wonder that the leaders of humanitarian organizations are wary of the potential risks of business process improvement?

2.7 Summary Views

The community reading this paper is probably already convinced that a serious approach to process management is key to success in business. This is not however a very widely held view amongst the stakeholders of the humanitarian community – the donors (with some notable exceptions such as The Fritz Institute (http://fritzinstitute.org/), ECHO (http://ec.europa.eu/echo/index_en.htm) and DFID (http://www.dfid.gov.uk/)), the leaders of the humanitarian organizations and many of the front line staff. The very real reasons for this are given above.

There is a reasonable compromise position. It must be accepted that many areas of work for humanitarian organizations are not amenable to a rigid process focus. The systems environment has to support staff in the less rigid process areas such as collaboration, communications and knowledge management.

The corporate services areas such as finance, IT, logistics, fund raising and HR can demonstrate improvement through a successful process based approach. The implementation of frameworks and best practices (such as ITIL), along with a sympathetic approach to the people environment is likely to result in real improvements in quality and efficiency.
The middle ground is where the challenge lies. This includes streams such as project management, case management and volunteer management. In many cases the process and system environment is not seen as an enabler and organizations can be stuck with inefficient systems and unused process documentation.

The private sector has become increasingly involved in humanitarian action over recent years. This is either through corporate social responsibility programs, through private foundations (for example the Susan and Michael Dell Foundation (http://www.msdf.org/) and the Rockefeller Foundation (http://www.rockefellerfoundation.org/)) or through direct employee engagement.

The private sector has a good understanding of the value of processes and the need for overhead; however it is rare for their corporate social responsibility programs to focus in this area. Successful corporate social responsibility programs generally have highly visible and emotive subjects, such as Procter and Gamble’s Pampers campaign for vaccinations against maternal and neonatal tetanus (http://www.pg.com/en_US/sustainability/social_responsibility/pampers_vaccinations.shtml).

If in contrast, corporate social responsibility programs focused on improving business processes and the IT systems that support them, the impact of such investments could be much more significant. One interesting and innovative approach from the private sector that tackles the issue head on is the proposition from Accenture Development Partnerships (http://www.accenture.com/Global/Consulting/Accenture-Development-Partnerships/default.htm). In this model, Accenture provides highly skilled resources into INGOs to work on systems and process improvements. The resources are provided at a heavy discount through contributions made by the company and the employees themselves. Working on such a project is seen as a key part in every employee’s career development.

3 Process Centric Examples in the Humanitarian Contexts: Insights from Two Cases

As mentioned above, there are many challenges in implementing a business process approach in international humanitarian organizations. This section illustrates the values and challenges of deriving process centric humanitarian approaches, narrating the experiences of two cases conducted within the International Red Cross.

The first case study is an example of the value and success of a humanitarian business process improvement initiative and illustrates a supply chain example at the International Red Cross between 2003 and 2006. It led to a dramatic reduction in costs for supplying assistance packages and was recognized with the European Supply Chain Excellence Award\(^5\) (http://supplychainexcellenceawards.com/) in 2006 for both the public/not for profit sector and the overall winner for all sectors

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\(^5\)The European Supply Chain Excellence Awards were launched in 1997 as an initiative to recognize and reward organizations in Europe that demonstrate excellence in their supply chain.
in that year. This example has previously been documented in detail in (Cuckow 2006; Heigh 2006).

The second case study illustrates the associated challenges of BPM in the humanitarian sector. It describes the approaches to managing volunteers, which is a common requirement within this community. The diversity of situations and approaches makes a business process focus challenging to implement.

### 3.1 Case 1: The Humanitarian Supply Chain Initiative by Fritz Institute

The International Red Cross supply chain has many similarities with commercial supply chains, but its processes are sufficiently different that they warrant discussion. The supply chain is one component of the logistics function at the International Red Cross.

The core value processes in the humanitarian industry start with an assessment of needs (refer to Fig. 2). From this, a plan or project is defined and if there are goods required, a project is opened in the supply chain process (refer to Fig. 7). The requirements are appealed for, asking donors to support the activities of the agency. The amount of money raised, the goods available from donors and the speed of supply, feed into the project design, providing the field-based staff realistic information on what resources will be available to them and by when. The available goods are then transported to their destinations and tracked on route.

In practice, the expertise and knowledge of the logisticians is critical to a successful response. On hearing of a disaster, staff will promptly estimate the key requirements based on the type of disaster and the location. The procurement and mobilization can be started by the logisticians while the field staff are clarifying actual project needs. For example, an earthquake in a mountainous region will probably require winterized tents and field hospitals, whereas flooding in the tropics would require hygiene kits and water purification for disease control. The processes and systems allow this flexibility, while constraining other areas such as procurement to meet high standards required by many donors.

Prior to 2003 these processes at Red Cross relied on spreadsheets and manual processes in the Geneva office. Constraints were enforced through management oversight and manual sign offs. This provided flexibility and was very efficient, but made consolidated reporting challenging and required that all logistics operations took place in a central office. Thanks to a generous donation from the Fritz Institute (http://fritzinstitute.org/), a project was initiated with International Red Cross to define and optimize the business processes and build a web based IT system to support these processes. The result was the Humanitarian Logistics System (referred to as HLS) specifically designed to improve the management of the humanitarian supply chain.
HLS is a web based supply chain management system that allows resources to be donated or procured and tracked from source to distribution point in real time. Goods are procured, transported, warehoused and distributed both in regular programs and in response to disasters. Requirements for goods are expressed as a mobilization table, and donors may provide money to purchase the goods or they may provide the goods themselves. HLS manages both procured and donated goods up to the in-country warehouse. HLS first went live in late 2003.

Following the initial project to define business processes and to implement HLS, ongoing emphasis was placed on continuous measurement and optimization of the supply chain (Jahre 2008). Data within HLS was analysed and process improvement metrics defined (Davidso 2006). Shortcomings in the data collected were identified and HLS was adapted. HLS is a web based system, which provides a capability to disperse activities in the business process to regions of the world closer to requirements. This was done at IFRC and provided many advantages in terms of cost, speed and local adaptability. At the same time oversight and controls were enforced which is important to maintain donor confidence. This process continues, driven by the evidence of the impact of improvements made so far.

In the 5 years after HLS was released, the International Red Cross implemented significant process changes and a new supply chain model. The increased complexity of processes required that the whole IT systems architecture be reengineered. The organization was running a set of largely isolated best of breed IT applications. These were unable to support the cross organizational processes and could not provide a consolidated view of performance.

The systems environment was migrated to a service oriented architecture with an enterprise integration bus (EIB) providing the capability to manage the processes as they passed between organizational boundaries (in this case logistics and finance). A data warehouse was also created to consolidate information from many systems and provide a holistic reporting capacity. The changes were far reaching, placing more control in geographically remote centers; optimizing procurement so the suppliers are contracted to supply goods which are neither supplied nor invoiced until they are needed in a disaster; and improving the distribution system so that immediate need stocks are held near to likely disaster locations. The latter change allowed goods to be shipped by road and sea in place of expensive air freight, dramatically reducing the costs of an aid package.

Fig. 7 The humanitarian supply chain at Red Cross
3.1.1 Applying the HLS: A Tale of Three Disasters

This section describes how the HLS positively impacted to support three global disasters. First these disaster situations are presented and then the overall impact is discussed.

**The Tsunami in South East Asia (2004):** In December 2004 the tsunami hit, affecting 13 countries and causing approximately 225,000 dead and 1.5 million displaced people (International Federation of Red Cross and Red Crescent Societies 2005). HLS was in operation and provided the systems backbone for the response, ultimately benefitting almost one million people with a budget of nearly USD$600 million. In the first 12 weeks of operations more than 250 full air charters and more than 1,000 forty foot shipping containers were delivered by the International Red Cross. The value of the HLS system and the robust supply chain processes was evident to all stakeholders; while many non government organizations found their logistics systems challenged by the scale and complexity of the operation.

The management at the International Red Cross for the first time had the ability to measure the supply chain from needs to delivery. They could identify the date on which a community need was identified and track when the goods were supplied to meet that need. They could also uncover financial information on a granularity that was not previously possible. This analysis was undertaken following the tsunami, and led to clear definitions of key performance indicators and system improvements to ensure that the process measurements were relevant to agency staff and to the end recipient of aid.

**Earthquake in Pakistan (2005):** On 9th October 2005, an earthquake measuring 7.6 on the Richter scale struck Pakistan with tremors felt across the region from Kabul to Delhi. The affected area of almost 30,000 km² was the size of Belgium. In Pakistan, 73,000 people were killed, and more than 120,000 people injured. Approximately 3.5 million people were made homeless. This was the second significant test for HLS.

The requirements and challenges of the Pakistan earthquake were very different from the tsunami, but the basic business processes of supply chain were the same. The scale of response was similar and the system enhancements allowed the International Red Cross to monitor its response more closely.

**Earthquake in Yogyakarta, Indonesia (2006):** In May 2006, a magnitude 5.9 earthquake struck Yogyakarta in Indonesia. Six thousand people were killed, 25,000 injured and 450,000 houses were damaged or destroyed. The International Red Cross mounted the largest response effort, with the supply chain relying on HLS as its key system. The operation was closely reviewed once the work had moved into the recovery phase.
3.1.2 Impacts of the HLS: An Example of Successful Process Improvement

The impacts from applying the HLS are depicted through the measurement of the key success metrics in the three disasters are shown in Tables 1, 2, and 3. The figures provided in these tables were derived from an analysis of the data held within HLS, sourced from (Heigh 2006).

As is evident from the above Tables, the speed and cost of response were dramatically improved. An aid package for a family in the Yogyakarta earthquake cost less than one fifth of the previous cost. Even adjusting for differences in location, this effect was very significant.

The key difference is not, however, the reduction in cost of delivering aid. It is in the improved outcomes for communities struck by disaster. In some cases the improvements mean that more families can be helped through the crisis and in other cases the money saved can be used to expand the scope of the response and recovery effort. In the Yogyakarta earthquake, the budget flexibility provided by reduced supply chain costs allowed a program to be initiated to rebuild destroyed houses. The money paid for building material and support from the Indonesian Red Cross volunteers who assisted in the rebuilding effort.

The example of the HLS has had far reaching impacts inside and outside the International Red Cross. The success in logistics led to an increased focus on processes throughout the organization. A policy, procedures, process (3Ps) repository was created to provide worldwide access to key organizational resources. The process mantra was taken up by individual Department heads with for example the IT department implementing an ITIL best practice framework. Finally it drove a re-examination of the core project management processes that ensure delivery of the programs that the organization runs in the areas of disaster relief and community health.

Outside the organization, the importance of the effort was recognized by key donors and partners. A number of organizations started to use International Red Cross logistics capability for a small service fee, based on Red Cross’s ability to

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6 Known as ‘Palang Merah Indonesia’.

<table>
<thead>
<tr>
<th></th>
<th>Indonesia tsunami</th>
<th>Pakistan EQ</th>
<th>Yogyakarta EQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Families receiving partial package by 2 months</td>
<td>28,021</td>
<td>29,229</td>
<td>53,112</td>
</tr>
<tr>
<td>Families receiving full package by 2 months</td>
<td>0</td>
<td>0</td>
<td>42,911</td>
</tr>
<tr>
<td>Average number of families served per day</td>
<td>445</td>
<td>555</td>
<td>613</td>
</tr>
<tr>
<td>% goods delivered from that region of the world</td>
<td>13 %</td>
<td>68 %</td>
<td>100 %</td>
</tr>
</tbody>
</table>

Table 1 Services provided to affected communities
efficiently manage the whole supply chain and to track goods from purchase to delivery (the system is currently being extended to track goods right up to the final distribution point).

A major donor to the International Red Cross, The Humanitarian Aid department of the European Commission (ECHO) recognized the value that the investment in business processes had delivered. The systems investment by Fritz of no more than $4 M (plus small ongoing operations costs) was delivering $10s of millions in savings on distribution costs every year. Not only was the aid cheaper, but it was more effective through arriving earlier and there was less opportunity for fraudulent activity – mainly because the HLS system had built in controls to ensure for example that purchases over a certain value had three quotes available.

ECHO continues to invest in business process improvements inside IFRC and offers incentives for other NGOs who receive ECHO funding to use the IFRC service rather than trying to build their own capability (a concept termed the humanitarian procurement centre). The work was also recognized internationally as best practice in supply chain management through with the European Supply Chain award in 2006.

### Case 2: Volunteer Management in the Red Cross/Red Crescent

One of the fundamental principles of the Red Cross and Red Crescent Movement is that of volunteering. The movement is estimated to have approximately 17 million volunteers worldwide benefiting vulnerable people and their communities. Indeed
the Red Cross and Red Crescent Movement aspire to be one of the leading organizations in mobilizing and managing volunteers to help vulnerable people. To do this it sets out a volunteering policy (see sample Volunteering Policy at (International Federation of Red Cross and Red Crescent Societies 2005) and requires that certain statistics be collected about volunteers and the work that they do. In this case study we demonstrate that a business process approach to volunteer management in the Red Cross has not proven effective.

Within each country, the national Red Cross or Red Crescent Society is responsible for implementing the volunteering policy and collecting and reporting on their work. The national society must follow its own countries laws (for example on the privacy of data) and puts in place structures to manage volunteers according to the IFRC volunteering policy. There are many activities involved with volunteers as shown in Fig. 8. Reading Fig. 8 from the top bubble in a clockwise direction, we describe the lifecycle of a volunteer. Starting with a vision and a plan of what a volunteer might achieve, the volunteer is recruited, screened, placed, trained, motivated, supported, recognized, assessed, evaluated and if necessary transitioned to a different role or out of the organization. This lifecycle relies on constant communication for success. The diagram deliberately does not depict this lifecycle
as a series of process steps, as the application of each bubble and the paths through them may vary considerably depending on circumstances.

These activities must be undertaken within the local context, often by volunteers themselves at the branch level. The circumstances of these volunteers differ immensely around the world – their age, ethnic background, education and motivation differ widely. The physical resources available to them might be substantial in some countries and non-existent in others.

In these circumstances, taking a business process view to volunteer management has not proven effective. There are numerous commercial IT systems that support the processes of volunteer management, but implementing them with all volunteers in a national Red Cross or Red Crescent Society is highly problematic. At branch level, where volunteer management generally takes place, there may be no computing resources and the branch committee members may be unfamiliar with the concepts that are needed to make such systems work.

In general, volunteer management at branch level runs on the basis of knowledgeable volunteers who have been trained on the key requirements. The processes are rarely documented and are different between branches, although checklists and paper based template forms may be used. In some cases local volunteers will construct their own IT systems to support volunteer management, often based on the skills and knowledge of an individual volunteer.

Referring to Fig. 8, volunteer management is seen as an activity of the individual who is guided by rules and policies and may be supported by systems (as often paper based and electronic). The focus is on clear policy settings and personnel development so that the overall aims of volunteer management are achieved. Identifying and mapping individual process steps has generally not proved to be a worthwhile task.

One consequence of this approach is the considerable difficulty involved in collecting and analyzing statistics about volunteers. The definition of a volunteer may differ between countries and between branches. The records are often paper based and challenging to collect; and branches are much more diligent in adding new volunteers to their records than removing inactive volunteers.

In a recent resolution of the Red Cross General Assembly (International Federation of Red Cross and Red Crescent Societies 2009) the definition of key volunteering statistics were harmonized. These will be used to create a global view of the volunteering resources. There is also work ongoing to define the monetary value of volunteers. This might persuade donors that, for certain programs, investment in a volunteer based organization can achieve better outcomes. It may be that these initiatives will strengthen the case for developing solutions to the issues mentioned above and lead to a more consistent approach to business process in volunteer management.
4 Conclusions

This paper has provided an overview of the challenges and opportunities of a business process focused approach within the international humanitarian industry. It has discussed the current status of business process programs, with many obstacles to be overcome to deliver more widespread acceptance of a business process perspective.

The focus in these organizations is on the capability of the individual to achieve outcomes within a local context. Many staff have poor basic IT skills and limited understanding of the value of business processes. This, combined with low investment in supporting IT systems, constrains the application of well defined business processes. The relative lack of metrics and easily measured success outcomes are another challenge.

Well defined, optimized business processes provide an organization with quality in its outputs, productivity of its staff and business information. For the individual staff member, however, business processes constrain their actions and often lead to an overhead from entering data into IT systems. While this data may be important to the organization to fulfill compliance or reporting requirements, the field worker sees it as inefficiencies enforced by headquarters. These perceptions lead to low process compliance and skepticism towards business process improvement projects.

The people focused organization is not unique to the international humanitarian community. Many other organizations such as small to medium enterprises have similar perspectives and challenges with the conventional business process view.

In the opinion of the authors, however, an approach to business processes that recognizes the realities of a people focused organization (Fig. 4) could succeed. Processes must support staff in their key motivation, which is to get things done as quickly as possible to alleviate the human suffering that they see around them. Any process design and system implementation must recognize the expectations of users; that systems are there to support them and not just to deliver data to some far distant management entity. The systems must provide immediate value to the user (for example by displaying relevant knowledge depending on the progression of the process), must mimic the current intuitive applications of the internet generations (such as Skype, Facebook and Twitter) and must have a compelling accessibility (for example using local language).

Creating a climate for investment in such systems requires donors who can understand the potential value of optimizing business processes. The ongoing costs of reviewing and optimizing processes and the IT systems that support them must be funded. The rewards from such an investment, would have the potential to improve the lives of vulnerable people far more than directly investing in specific programs in the field.

Insights from this chapter point to a number areas worthy for further investigation, for the progression of BPM and its application in the humanitarian sector. Investigations into the following areas will help to address some of the main issues
identified: How can one measure the success of BPM initiatives within the humanitarian context? How can capabilities be built and sustained within the sector? What IT capabilities are necessary for the adoption and successful conduct of BPM? What are the unique characteristics of people focused (as opposed to task/process focused) organizations? What methods, tools and techniques will be successful in improving the processes of such people focused enterprises?

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