Which Maturity Is Being Measured? A Classification of Business Process Maturity Models

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Abstract. Today's organizations face the challenge to excel due to demanding customers. Hence, they are relying on their business processes to outperform competitors. Maturity models have been proposed to gradually assess and improve business processes. However, the proliferation of business process maturity models has complicated the practitioner's choice. This article clarifies the foundation of business process maturity and presents a classification of maturity models. First, a literature study was conducted, based on the concepts of business process (BP), business process management (BPM), and business process orientation (BPO), to identify the different capabilities to be addressed by a business process maturity model: (1) modeling, (2) deployment, (3) optimization, (4) management, (5) culture, and (6) structure. Afterwards, these capabilities were used to compare and classify 61 business process maturity models. The main result is that we found six different types of maturity being measured by the currently proposed maturity models.

Keywords: business process maturity, business process management, business process orientation

1 Introduction

As the growing globalized market is characterized by demanding customers, organizations are striving to excel in order to gain competitive advantage or to outperform competitors in their societal obligations. Hence, organizations are increasingly focusing on their business processes [1]. Business process management is expected to contribute to both process excellence and business excellence by assuring a uniform way of working and by continuously looking for optimizations [2].

Nonetheless, the journey towards process excellence is challenging. As a result, various authors have proposed step by step road maps with best practices, from which organizations gradually benefit [3,4,5,6]. These road maps are called business process maturity models (BPMMs). They are evolutionary models for measuring (AS-IS) and improving (TO-BE) maturity, or '*the extent to which an organization consistently implements processes within a defined scope that contributes to the achievement of its business goals*' [7, p.2]. Maturity aims at systematically increasing the capabilities of a business process and the organization to deliver higher performance over time [6,8].

Given the importance of mature business processes, a proliferation of maturity models was realized during the recent decades [9]. It started with frameworks to deal with the software crisis during the 1970s-1980s, and which have been adapted to all types of business processes afterwards. At present, maturity models for specific business processes are integrated into single models [7,10,11], and new models have been designed for generic business processes [12]. Consequently, this proliferation of BPMMs prompts us to evaluate their content. For this purpose, the present study aims at providing a foundation for business process maturity, grounded in the business process literature, instead of rebuilding on existing BPMMs. We theoretically explore the capabilities to be addressed by a generic BPMM in the first research question:

(1) which capabilities, i.e., theoretical model components, must be assessed and improved to increase the maturity of a business process?

However, we do not assume that every BPMM actually has a model component for each capability found by the previous question. This leads us to the second research question:

(2) can the BPMMs be classified by the capabilities they actually address? If so, are there different types of maturity being measured?

Both research questions contribute to the BPMM literature, without presenting a new model. They clarify the BPMM fundamentals and a classification to support practitioners while choosing a model that best fits the organizational needs.

The subsequent section deals with the methodology. Next, the research results are presented (section 3) and discussed (section 4). Afterwards, section 5 explains the plans for future work. The last section concludes by summarizing the BPMM components and the resulting BPMM classification with possible maturity types.

2 Methodology

The research approach was twofold: (1) a literature study to identify the capabilities to be addressed, and (2) a comparative study to classify the existing BPMMs.

2.1 Identification of Theoretical BPMM Components: Literature Study

A BPMM assesses and improves a business process throughout its lifecycle by focusing on the necessary capabilities to perform. Hence, the model components of a BPMM must affect business process performance. In order to identify the theoretical model components, we relied on the extensive literature concerning business processes, which findings have been repeatedly corroborated by evidence.

It resulted in three comprehensive concepts, which are closely linked to the traditional business process lifecycles [13]: (1) business process (BP), (2) business process management (BPM), and (3) business process orientation (BPO). Their respective definitions clarified the differences between the concepts and indicated the theoretical BPMM components, i.e., the capabilities to be addressed. These components are also supported by theories on critical success factors for BP, e.g. [14].

2.2 BPMM Classification: Comparative Study

The theoretical components, previously found, were validated by collecting existing BPMMs. After mapping their content to the components, a classification was derived to determine the type of maturity being measured per model.

The research scope was set to generic business processes. It excludes BPMMs addressing specific process types, such as in the initial software engineering maturity models. However, models that integrate various specific BPMMs were withheld to represent those specific topics. Also supply chain maturity models were selected to study cross-organizational value chains.

Data was collected during the second quarter of 2010. First, we searched for articles in academic databases and search engines on the Internet by using the combined keywords of '*process*' and '*maturity*'. Secondly, we traced the references in the identified articles to get access to other relevant sources.

We acknowledge some restrictions regarding the accessibility of articles (in Ghent University engines), the language (English, Dutch, French or German), and the keywords. Notwithstanding these limitations, the technique turned out to be fruitful in terms of the number of maturity models identified.

3 Results

The research results are discussed by following the same structure as the methodology section. Each subsection deals with a distinct research question.

3.1 Identification of Theoretical BPMM Components

Most definitions of BP refer to a transformation taking place, also illustrated as a value chain. They frequently mention: (1) predictable and definable inputs, (2) a linear, logical sequence or flow, (3) a set of definable and interrelated activities, (4) predictable and desired outputs, (5) horizontal or cross-departmental, (6) performed by resources, (7) repeatable, and (8) adding value for customers [15,16]. For instance, Harrington's definition sounds: *'a process is a series of interconnected activities that takes input, adds value to it, and produces output. It's how organizations work their day-to-day routines. Your organization's processes define how it operates'* [1, p.xxii]. This transformational view originates from manufacturing, and is less clear in service delivery. Hence, other definitions exist which rather emphasize a coordination of activities, instead of value-adding transformations, e.g. in [17]. Despite these different

emphases, all BP definitions focus on *business process modeling* and *deployment*. As a result, both aspects will be used as theoretical model components for BPMMs.

Secondly, BPM involves continuously managing and improving business processes, guided by process owners. Depending on their background, authors underline more the IT benefits [18], or the management aspects [19]. Gillot [17], Gulledge Jr. and Sommer [20] summarize four BPM components: (1) *modeling*, (2) *deployment*, with automation where possible, (3) *optimization*, or improving business processes based on real metrics to evaluate business process performance, and (4) the *management* of business processes, each with a process owner and a cross-departmental process team. Similarly to BP, these four components are selected as theoretical BPMM components. The difference with BP, is that BPM also addresses managerial aspects and optimization efforts with regard to one or more business processes.

Some authors go beyond these four BPM components by also referring to organization management, in particular by adopting a horizontal structure and a process-oriented culture with rewards linked to the performance of business processes instead of departments [21]. Even though the distinction between BPM and BPO is not always explicitly made, e.g. in [6], it allows us to separately examine the different nuances. It results in a funnel structure of BP, BPM and BPO, as shown in Figure 1.

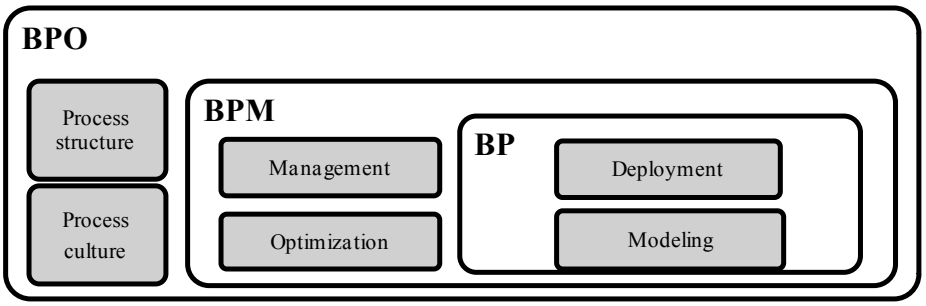

Fig. 1. The funnel structure of components in business process maturity models.

The six theoretical components specify whether BPMMs deal with BP, BPM or BPO.

3.2 BPMM Classification

61 BPMMs have been collected regarding business processes and supply chains:

(1) 37 business process models, of which:
- 13 academic [1,8,10,21,22,23,24,25,26,27,28,29,30];
- 24 non-academic [2,7,11,12,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50];

(2) 24 supply chain models, of which:
- 9 academic [51,52,53,54,55,56,57,58,59];
- 15 non-academic [60,61,62,63,64,65,66,67,68,69,70,71,72,73,74].

We have investigated their content in detail, including a mapping to the theoretical BPMM components. The result is a BPMM classification, as shown in Table 1.

Table 1. A classification of business process maturity models.

BPM for one BP (N=3)	BPM for more BPs (N=11)	BPM for all BPs (N=4)
• BP academic: [1,24] • BP non-academic: [40]	• BP academic: [22] • BP non-academic: [7] • SC academic: [55,58] • SC non-academic: [60,61,67,68,70,71, 72]	• BP academic: [21,27,29] • BP non-academic: [31]
BPO for one BP (N=3)	**BPO for more BPs (N=20)**	**BPO for all BPs (N=22)**
• BP academic: [8] • BP non-academic: [36,47]	• BP academic: [10,25] • BP non-academic: [11,12,38] • SC academic: [51,52,53,54,56,57, 59] • SC non-academic: [62,63,64,65,66,69, 73,74]	• BP academic: [8,23,26,28,30] • BP non-academic: [2,32,33,34,35,36,37, 39,41,42,43,44,45, 46,48,49,50]

In theory, all BP components are contained in BPM, and all BPM components in BPO. However, in practice, the lower components are not always present. BPMMs are classified as BPO if they address "process structure" or "process culture", and as BPM if they involve "management" or "optimization" without BPO components.

First, it turned out that no model merely addresses the BP components of "modeling" and "deployment". Instead, if present, they are supplemented by at least one BPM component. Secondly, the models strongly vary on the kind and number of business processes taken into account. As a result, a refinement in the classification was made to distinguish three BPMM foci: (1) a focus on one BP, (2) a focus on more than one, but not necessarily all BPs, and (3) a focus on all BPs in the involved organization(s) or supply chain (see Table 1). The result is a BPMM classification with six different types of maturity. It should be noted that some BPMMs offer multiple maturity types of which a practitioner can choose according to the organizational needs, for instance limited to a single BP or comprising all BPs [8,36].

4 Discussion

Six findings are drawn from the literature study and the comparative study. The first three concern the theoretical BPMM components (first research question), whereas the last three deal with the BPMM classification (second research question).

(1) *Component validation.* The six theoretical BPMM components, derived from the business process literature on BP, BPM and BPO, have been empirically validated

by comparing existing BPMMs. All actual model components were successfully mapped to a theoretical equivalent, without detecting new components.

(2) *Component coverage*. Most BPMMs do not cover all theoretical components, but three to five of them. All models address both "optimization" and "management", except for four models, with [24,72] ignoring "management" and [37,51] underestimating "optimization". The "structure" component is often neglected.

(3) *IT-enabled components*. Although IT is not a prerequisite, the majority prescribe IT to enable the three lowest components: "modeling" < "optimization" < "deployment". The degree varies from general IT, such as mentionning hard- and software, to specific IT, e.g. EDI, ERP, SOA, SaaS, BPMS, and specific vendor tools.

(4) *No BP maturity type*. The collected BPMMs demonstrate that merely improving "modeling" and "deployment" are insufficient to achieve higher maturity regarding generic business processes, and that "optimization" and "management" are paramount. For instance, not all business processes need to be fully modeled in advance, e.g. semi-structured process flows in service delivery. Nonetheless, such a BPMM may theoretically exist, but restricted to specific business processes, e.g. by focussing on the workflows of manufacturing processes.

(5) *BPM and BPO maturity types*. The majority of collected BPMMs measure BPO maturity, mainly because of process-oriented values, e.g. a client focus, innovation, empowerment or trust, and the rewards to ensure their realization. Although an organization-wide perspective fosters higher maturity, it is not included in all models. Organizations can limit maturity to BPM by assigning a process owner to manage and statistically track a business process, possibly restricted to a department. Nonetheless, they won't gain all benefits if the process owner has no cross-departmental authority nor if collaborating departments distrust each other.

(6) *Number of BPs*. BPMMs can be used to cope with one, more or all business processes. However, the models for a single business process are less numerous. More often, they are used in a single business domain with multiple business (sub)processes, such as software engineering or the supply chain. For instance, the latter has business processes for buying, producing, selling and planning products and services. This finding is conform to the idea of a large cross-departmental or cross-organizational business process, or horizontal value chain, with subprocesses in each department. Also frequent are BPMMs involving all business processes, which rather take a management perspective instead of focusing on particular business processes.

5 Future Work

All BPMMs will be further compared with regard to other elements in the assessment (AS-IS) and improvement (TO-BE) method, such as the lifecycle levels and the road map. Case studies will be conducted for the most comprehensive models. Above all, we will explore additional theories on the critical success factors for BP to obtain an operationalization of each component. Afterwards, we will be able to evaluate whether a new model design is appropriate for cross-organizational processes, and what the IT impact may be per component. Interestingly, different tracks may be identified depending on the organization size, type (products or services) and sector.

6 Conclusion

A business process maturity model (BPMM) addresses the capabilities of a business process and the entire organization, expressed as overall maturity, to deliver higher performance over time. These capabilities are represented by the BPMM components, which are systematically assessed and improved. The present study has elaborated on the theoretical model components to specify what is being measured by a BPMM. It has compared 61 BPMMs on six theoretical components, found in the business process literature. The components are linked to the traditional lifecycle of a business process, supplemented by organizational aspects: (1) modeling, (2) deployment, (3) optimization, (4) management, (5) culture, and (6) structure. In pairs, they form a funnel structure, starting from a business process (BP), which is a subset of business process management (BPM), and which is part of business process orientation (BPO).

However, in practice, BPMMs do not necessarily address all theoretical BPMM components. Above all, given the proliferation of BPMMs, practitioners may experience difficulties in choosing a model that best fits the organizational needs. In order to facilitate this choice, we present a BPMM classification based on two decisions: (1) which BPMM components are important for the organization (does a business process management perspective suffice or is an organizational perspective required?), and (2) which business processes to assess and improve (is there a focus on one, more or all BPs?). It results in six possible types of maturity: BPM maturity for one, more or all business processes, and BPO maturity for one, more or all business processes in the involved organization(s). Evidence has shown that a BP maturity type, centered around modeling and deployment, does not exist for generic business processes, as management and optimization are paramount.

In summary, the present study has reached its aim of providing a BPMM foundation in the BP literature. The six capabilities to be addressed in a generic BPMM have been identified and validated, as queried by the first research question. Regarding the second research question, the concept of maturity has been refined by specifying different maturity types. The resulting BPMM classification is relevant for both practitioners and academics, and contributes to the rather scarce BPMM literature. It allows clear communication, with scholars being able to clarify which dimension of maturity they investigate. New BPMMs may be designed based on the six theoretical BPMM components. Furthermore, the study challenges the maturity of maturity models by highlighting different designs, e.g. are BPO models for all BPs more complete and thus necessarily better than BPM models for one BP? Future research will focus on the operationalization by organization size, type and sector.

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