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Towards a Business Process Managment Maturity Model

Michael Rosemann
Queensland University of Technology, m.rosemann@qut.edu.au

Tonia de Bruin
Queensland University of Technology, t.schulze@student.qut.edu.au

TOWARDS A BUSINESS PROCESS MANGEMENT MATURITY MODEL

Michael Rosemann, Queensland University of Technology, 126 Margaret Street Brisbane Qld 4000, Australia, m.rosemann@qut.edu.au

Tonia de Bruin, Queensland University of Technology, 126 Margaret Street Brisbane Qld 4000, Australia, t.schulze@student.qut.edu.au

Abstract

Business Process Management (BPM) has been identified as the number one business priority by a recent Gartner study (Gartner, 2005). However, BPM has a plethora of facets as its origins are in Business Process Reengineering, Process Innovation, Process Modelling, and Workflow Management to name a few. Organisations increasingly recognize the requirement for an increased process orientation and require appropriate comprehensive frameworks, which help to scope and evaluate their BPM initiative. This research project aims toward the development of a holistic and widely accepted BPM maturity model, which facilitates the assessment of BPM capabilities. This paper provides an overview about the current model with a focus on the actual model development utilizing a series of Delphi studies. The development process includes separate studies that focus on further defining and expanding the six core factors within the model, i.e. strategic alignment, governance, method, Information Technology, people and culture.

Keywords: Business Process Management, Maturity Models, CMM, Delphi

1 INTRODUCTION

Business Process Management (BPM) consolidates objectives, frameworks, methodologies and tools which have been proposed in a number of approaches including Business Process Reengineering, Business Process Innovation, Business Process Modelling and Business Process Automation/Workflow Management/Process-Aware Information Systems. It is widely recognised as a foundation for contemporary management approaches as it goes via the analysis of business processes to the roots of an organisation. The popularity and significance of BPM leads to the question of how advanced different organisations are in their BPM development. The notion of 'maturity' has been proposed for other management approaches as a way to evaluate "the state of being complete, perfect, or ready" and the "fullness or perfection of growth or development" (Oxford University Press 2004).

Maturity as a measure to evaluate the capabilities of an organisation in regards to a certain discipline has become popular since the Capability Maturity Model (CMM) has been proposed by the Software Engineering Institute at Carnegie Mellon University (Paulk et al., 1993). Whilst the original CMM has a specific focus on the evaluation of software development processes, this model has been varied and extended in a number of approaches and is now applied for the evaluation of IT Infrastructure Management, Enterprise Architecture Management and Knowledge Management to name a few.

The research project which underlies this paper aims towards the development of a new CMM-based maturity model for the evaluation and scoping of BPM initiatives. The structure of this paper is: Section 2 summarises related work, Section 3 details a new proposed BPM maturity model. Section 4 gives a brief overview of the application of the proposed model in pilot case studies and surveys. Following this, in Section 5, is an outline of the Delphi study, which we are currently conducting for continual development of this model. Section 6 concludes with a review of limitations of this research.

2 RELATED WORK

2.1 Business Process Management

The definitions of Business Process Management range from IT-focused views to BPM as a holistic management practice. The IT-focused definition characterises BPM from the perspective of business process automation (Harmon, 2003). The analysis of BPM definitions reveals that the focus is often on *analysing* and *improving* processes (Zairi, 1997), (Elzinga et al., 1995). DeToro and McCabe (1997) see Business Process Management as a new way of managing an organisation, which is different to functional, hierarchical management. This view is supported by Pritchard and Armistead (1999) whose research resulted in BPM being seen "as a 'holistic' approach to the way in which organisations are managed". Armistead and Machin (1997) state that BPM is "concerned with how to manage processes on an ongoing basis, and not just with the one-off radical changes associated with BPR". According to Zairi (1997), BPM relies on good systems and structural change and, even more importantly, on cultural change (Spanyi, 2003). A comprehensive BPM approach requires alignment to corporate objectives, adequate governance and an employees' customer focus and involves, besides a cross-functional viewpoint, strategy, operations, techniques and people.

Thus, throughout this work BPM is seen as a holistic organisational management practice, which requires top management understanding and involvement, process-aware information systems, well-defined accountability and a culture receptive to business processes. It is based on a process architecture, which captures the interrelationships between the key business processes and the enabling support processes and their alignment with the strategies, goals and policies of an organisation.

2.2 Business Process Management Maturity Models

Recently a number of models to measure the maturity of Business Process Management have been proposed. The common base for the majority of these models has been the Capability Maturity Model (CMM) developed by the Software Engineering Institute at Carnegie Mellon University. This model was originally developed to assess the maturity of software development processes and is based on the concept of immature and mature software organisations. Paulk et al. (1993: 5) stress that improved maturity results "in an increase in the process capability of the organisation". CMM introduced the concept of five maturity levels defined by cumulative requirements. Among others, Harmon (2004) developed a Business Process Management Maturity (BPMM) model based on the Capability Maturity Model (see also Harmon, 2003). In a similar way, Fisher (2004) combines five "levers of change" with fives states of maturity. Smith and Fingar (2004) argue that a CMM-based maturity model which postulates well-organised and repeatable processes cannot capture the need for business process innovation. Further BPM maturity models are offered by TeraQuest/Borland Software (Curtis et al., 2004) and the Business Process Management Group (BPMG).

One shortcoming of current BPM maturity models has been the simplifying focus on only one dimension for measuring BPM maturity and the lack of actual applications of these models. An attempt to divide organisations in groups depending on their grade and progression of BPM implementation was made by Pritchard and Armistead (1999). Whilst trying to define maturity of BPR programs, Maull et al. (2003) encountered problems that they could not use objective measures. They tried to define maturity using two dimensions, an objective measure (time, team size, etc.) and a "weighting for readiness to change" (Maull et al., 2003). However, this approach turned out to be too complex to measure. Therefore, they chose a phenomenological approach assessing the organisation's perception of their maturity, using objective measures as a guideline. Another example of how to define maturity (or in their case "process condition") is provided by DeToro and McCabe (1997), who used two dimensions (effectiveness and efficiency) to rate a process' condition. In addition to dedicated BPM maturity models, a number of models have been proposed which study single facets of a BPM maturity model. An example is Luftman (2003)'s maturity model for strategic alignment.

The comparison of low and high maturity in Figure 1 helps to understand the comprehensiveness and range of BPM maturity. The idea of comparing low and high maturity derives from Paulk et al. (1993), who presented such a comparison to facilitate the understanding of the concept of process maturity.

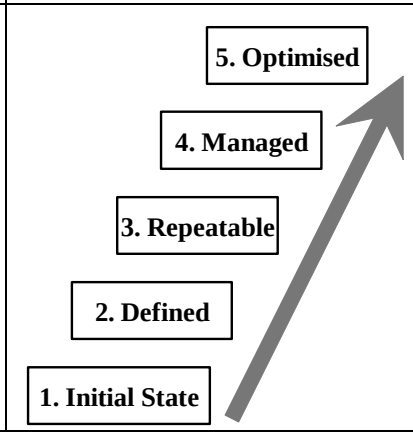
Low Maturity		**High Maturity**
Un-coordinated, isolated projects		Co-ordinated BPM Activities
Low BPM Skills		High BPM Expertise
Key Personnel		Organisational Wide Coverage
Reactive		Proactive
Manual		(Meaningful) Automation
Internally Focused		Extended Organisation
Low Resourcing		Efficient Resourcing
Naive		Comprehensive Understanding
Static		Innovative

Figure 1: Comparison of low and high maturity and the five maturity stages.

Further shortcomings of available BPM maturity models are the missing rigour in the model development process, the limited scope of single facets of BPM, the lack of empirical tests for these models and especially the lack of sufficient depth in the assessment levels.

3 THE PROPOSED BPM MATURITY MODEL

3.1 Underlying Theoretical Model

The proposed new Business Process Management Maturity (BPMM) model extends and updates earlier maturity models by addressing the requirements and complexities identified within Business Process Management in a more holistic and contemporary way. In particular, the model addresses issues encountered by researchers including Pritchard and Armistead (1999) and Maull et al. (2003).

The proposed model is multi-dimensional including a number of distinct components being: factors, stages and scope (organisational entity and time). The underlying assumption of the theoretical model is that the factors (based on identified BPM critical success factors) represent independent variables and the dependent variable is BPM success, i.e. the actual process performance. A further assumption is that higher maturity in each of these factors will be reflected in higher levels of success in the BPM initiative. This notion of 'process success' has to be translated finally into relevant, BPM-independent, success measures for the individual organisation, i.e. actual business success (Figure 2). A focus of future research will be to test the contribution to process success of each factor. Furthermore, it will be important to identify relevant contextual factors, for example, process-oriented incentive schema might be an indication for a mature organisation, but such schema can not be applied to public organisations. This leads to the important aspect that there is (most likely) not a common set of BPM best practices which are equally valid for all organisations. Consequently, we define the highest level of maturity (level 5) as the most sophisticated level of conducting BPM, which is not identical to the best way. It is a case-by-case challenge to identify the most appropriate BPM maturity level based on context, underlying objectives, related constraints, possible business cases, etc.

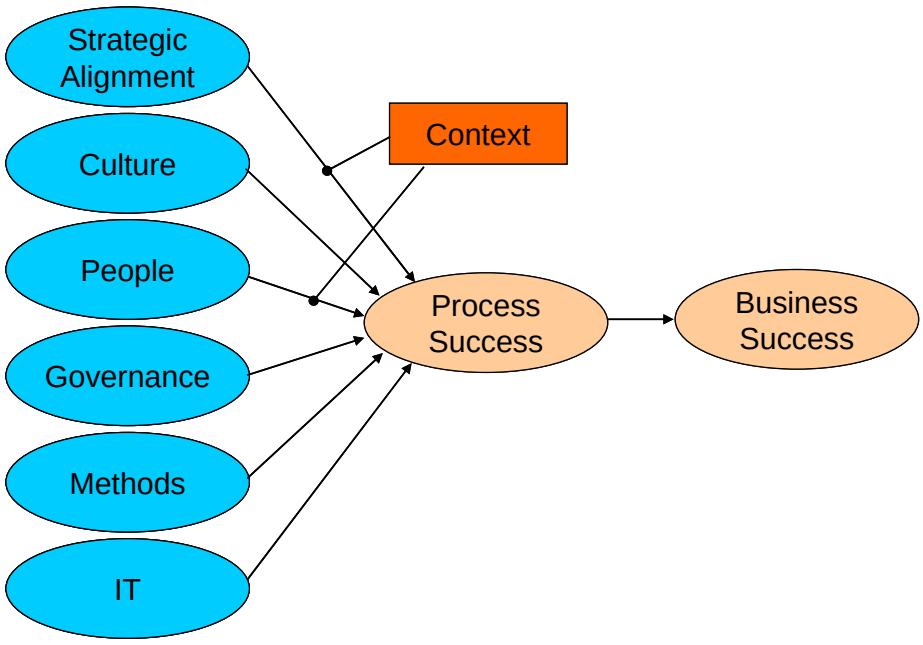


Figure 2: The underlying model

At this stage, our focus is on the independent factors for two reasons. First, it provides insights into how process performance can actually be improved rather than measured. Second, a number of models and solutions are already available for the measurement of process performance (e.g. IDS Business Process Performance Measurement). A brief overview of the dimensions of our model incl. definition, origin and purpose is included in Table 1.

Dimension	Definition	Origin	Purpose
Factor	A specific, measurable and independent element which reflects a fundamental and distinct characteristic of BPM. Each factor is further broken down in a 1-m hierarchy.	Current factors have been derived from an extensive literature review of BPM critical success factors and barriers to successful BPM implementations.	To cluster important components of BPM and allow a separate evaluation of these factors, i.e. to enable identification of strengths and weaknesses within the organisation that were most likely to impact on BPM success. To enable organisations to tailor specific BPM strategies with a view to improving BPM success. To enable future research into relationships and correlation between factors to improve understanding of BPM issues.
Maturity Stage	A pre-defined maturity stage ranging from 1 (low) to 5 (high).	Levels and names are based on those used in CMM.	To quantify and summarise the evaluation for one factor/scope/time item on a well-defined scale.
Scope Organisational Entity	The organisational entity which defines the unit of analysis and to which the model is being applied, e.g. a division, a business unit, a subsidiary.	The organisational entity is defined on a case-by-case base by the participating organisation.	Acknowledgement that in reality BPM does not conform to any one implementation & adoption route. To enable internal comparison and assessment between entities. To enable specific strategies to be implemented. To identify and maximise leverage of internal knowledge sources and sharing.
Scope Time	The point in time at which the model is applied.	Variable aspect of the model that is selected by the organisation applying the model	To enable understanding of current position and the formation of an internal baseline. To enable the model to be reapplied over time to assess progress in a longitudinal study.
Coverage	The extent to which BPM practices extend through the organ. entity being assessed.	Concept based on the notions of efficiency and effectiveness in similar models (DeToro and McCabe, 1997)	To recognise the fact that the standardised and consistent distribution of BPM capabilities deserves recognition.
Proficiency	The perceived goodness of BPM practices in the organ. entity being assessed.	Concept based on the notions of efficiency and effectiveness in similar models (DeToro and McCabe, 1997)	To recognise the fact that the quality of BPM capabilities deserves recognition.

Table 1: Dimensions of the BPMM Model

The dimensions of the model have been mainly derived from a comprehensive review of the literature on BPM. It consists of four orthogonal dimensions which form the framework for the BPMM assessment as indicated in Table 1. Factors are considered to be the primary dimension as they represent the elements within organisations critical to the success of BPM. Further insights into the detailed elements of the model can be found in Rosemann and de Bruin (2004). These dimensions were used to construct a multi-dimensional BPMM model as depicted in Figure 3.

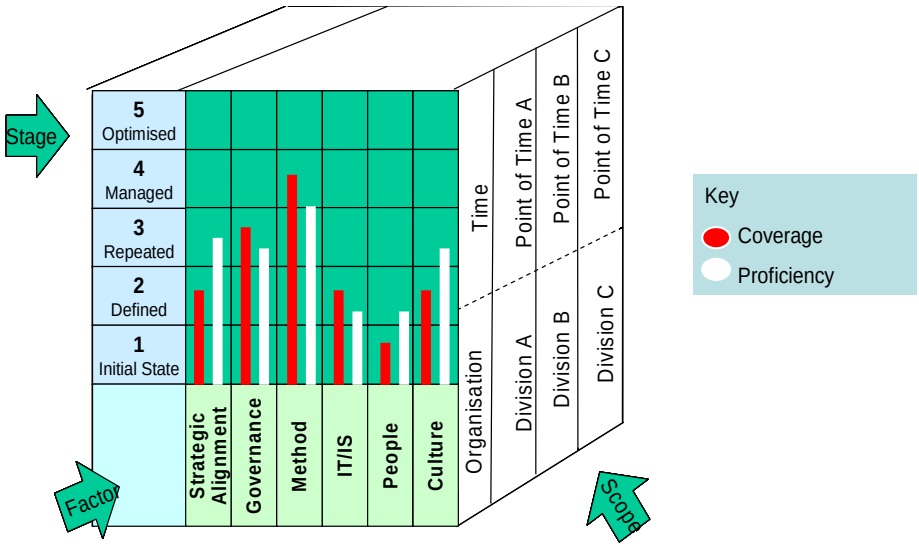


Figure 3: The BPMM model

4 APPLICATION OF THE PROPOSED BPM MATURITY MODEL

In addition to developing a sound BPMM model, our aim was to create a model that had wide practical application and acceptance. The initial model was tested within two Australian organisations where extensive pilot case studies and surveys were undertaken (Rosemann and de Bruin, 2004). In addition, input into the initial model was received from a global network of experts including academics and practitioners. Many of the involved academics had proposed their own BPM maturity models. Outcomes from this research have been incorporated in the current version of the model discussed in this paper. A summary of this research is provided in the following sections.

4.1 Selection of Organisations for Conduct of Pilot

Two organisations were selected for application of the pilot. These were chosen primarily on the basis of research suitability as opposed to necessarily representing high levels of BPM maturity. The organisations were known to us and were familiar with the conduct of research having participated in prior research projects. Both organisations have a recognised BPM initiative being undertaken that is driven from a centralised area within the organisation and operate within the Queensland public sector. Following a briefing on case study outline, the nominated BPM contact selected further case study participants from within the organisation. Both organisations chose to have the model applied to their business lines. One organisation had two business lines of which one is commercially based and competitively structured whilst the other is represented by long-term assets with less commercial focus and higher levels of government support and intervention. The other organisation was represented by four lines of business that represent the high level value chain processes defined for the organisation.

4.2 Conduct of Case Studies

A detailed case study protocol was developed to ensure consistency of data gathering when conducting multiple case studies. To strengthen validity of results, the same two researchers were involved in each case study session with both organisations. Following the conduct of an initial meeting at which the model and its origins were presented, a range of tools were used to gather data during the case study. These included: a Feedback Survey to assess the design of the model and the appropriateness of the structure, dimensions and practicality; an Establishment Survey to gather information about the organisation's BPM initiatives; interviews with key BPM personnel; and review of BPM related materials. The case study questions were open-ended and designed to elicit a broad range of detail with respect to BPM practices within the organisation.

4.3 Conduct of Survey

In addition to the case studies, an extensive survey was conducted to apply the model within one of the organisations. When designing the survey one of the difficulties was to define the right questions in terms of quality and quantity in order to obtain relevant and useful information for meaningful analysis. The final maturity survey contained over 300 questions categorised by factor, coverage and proficiency. In an effort to increase user acceptability, the survey was developed to enable completion by either separate people for each factor or by one individual for the entire survey. The earlier conduct of the case study verified that the factors in the model were perceived as being representative of BPM. The organisation was able to identify BPM experts for each factor despite operating within a traditional functional structure. The organisation defined 'entities' as the 4 discrete business lines and opted to have individual experts within each factor complete relevant sections. Surveys were completed by 3 of the 4 business lines resulting in 15 individuals completing the survey. Results of the survey were analysed and presented back to the organisation for comment and verification.

4.4 BPMM Special Interest Group

In addition to empirical research undertakings, we participate in a global BPMM Special Interest Group (SIG) that communicates via telephone conference every 6 – 8 weeks and via email. Of particular interest to the group is the development of a BPM maturity model that has practical application *and* theoretical credibility. This group provided valuable comments with regard to the initial version of the BPMM model. Related BPMM models merged with our initial model. This group lent support to findings from the case studies for adding granularity to the factors to meet varying end-user needs. Three levels are supported by the model are: Level 1 – the six factors; Level 2 – capability areas within each of the factors; and Level 3 – detailed questions to measure each capability area. Essentially these levels form a tree structure that can be expanded based on the reporting and analysis requirements of the end-user.

4.5 Summary of Research Outcomes

The research conducted to date has highlighted a number of improvement areas within the model development process.

- The initial level 1 factors were more based on past publications than on a contemporary understanding of BPM;
- The identification of level 2 capabilities required rigour and a consistent approach seeking consensus;
- Well-respected BPM thought leaders were involved in the BPMM SIG, but there was no mechanism to assure their active involvement.

5 DELPHI STUDY

5.1 Motivation

As indicated, it became obvious that a more structured approach for the BPMM development process was required. To progress the model we considered the most appropriate methodology to be the Delphi technique. The major reasons for this were: (1) a desire to maximise the benefit of the available pool of global BPM experts and (2) to incorporate the innovativeness of the research topic. The Delphi technique includes the identification and selection of a panel of experts from whom information about a specific topic is solicited through the iterative completion of a number of surveys. Delphi studies are considered beneficial when: (1) dealing with complex issues (Okoli and Pawlowski, 2004; Ono and Wedemeyer, 1994); (2) seeking to combine views to improve decision making (Bass, 1983); (3) in order to contribute to an incomplete state of knowledge (Delbecq et al., 1975); and (4) where there is a lack of empirical evidence (Murphy et al., 1998). Okoli and Pawlowski (2004) indicate that the two major areas for Delphi study applications are the traditional forecasting and more recently concept/framework development where studies typically involve a two step process being: (1) identifying and elaborating a set of concepts and (2) classification/taxonomy development. The structure of the planned Delphi study fits this two step process. Whilst the six factors of the model provide the main structure of the entire study each round contributes to an agreed definition for a factor (level 1) and the identification of the level 2 capabilities.

Reported advantages of Delphi studies include: (1) Anonymity leads to more creative outcomes and adds richness to data (van de Ven and Delbecq, 1974; Okoli and Pawlowski, 2004); (2) issues inherent in face-to-face groups such as dominate personalities, conflict and group pressures are virtually eliminated (Helmer, 1968; Loo, 2002; Murphy et al., 1998); (3) geographic boundaries and associated travel and co-ordination factors are essentially removed (Loo, 2002; Okoli and Pawlowski, 2004) and (4) duration and cost of study can be minimised (Powell, 2003).

There are, however, also a number of criticism of Delphi studies including; (1) the flexible nature of Delphi study design (Erffmeyer et al., 1986; Schmidt, 1997; Turoff, 1970; van de Ven and Delbecq, 1974); (2) the discussion course is determined by the researchers (Dalkey and Helmer, 1963; Richards and Curran, 2002); (3) accuracy and validity of outcomes (Ono and Wedemeyer, 1994; Woudenberg, 1991). To maximise potential outcomes from the Delphi studies we have considered both advantages and disadvantages when designing the overall Delphi study structure including the selection of the expert panel and the codification team as discussed in the following sections.

5.2 Delphi Study Structure

To determine the appropriate number of iterations for the proposed Delphi studies we considered both: the aim of the studies and the experiences of similar studies. Time and budget constraints indicate ‘the less the better’. However, this must be balanced to enable meaningful and creative input with a view to attaining the best possible outcome for the model. Erffmeyer et al. (1986) in a study into the optimal number of rounds achieved stability after the fourth round. In recent studies, Mulligan (2002), Powell (2003) and Richards and Curran (2002) considered three rounds were appropriate, whilst Murphy et al. (1998) and van de Ven and Delbecq (1974) suggest two or more and Loo (2002), three to four. These findings combined with the aims of the studies have led to the development of a four round Delphi study shown in Figure 4.

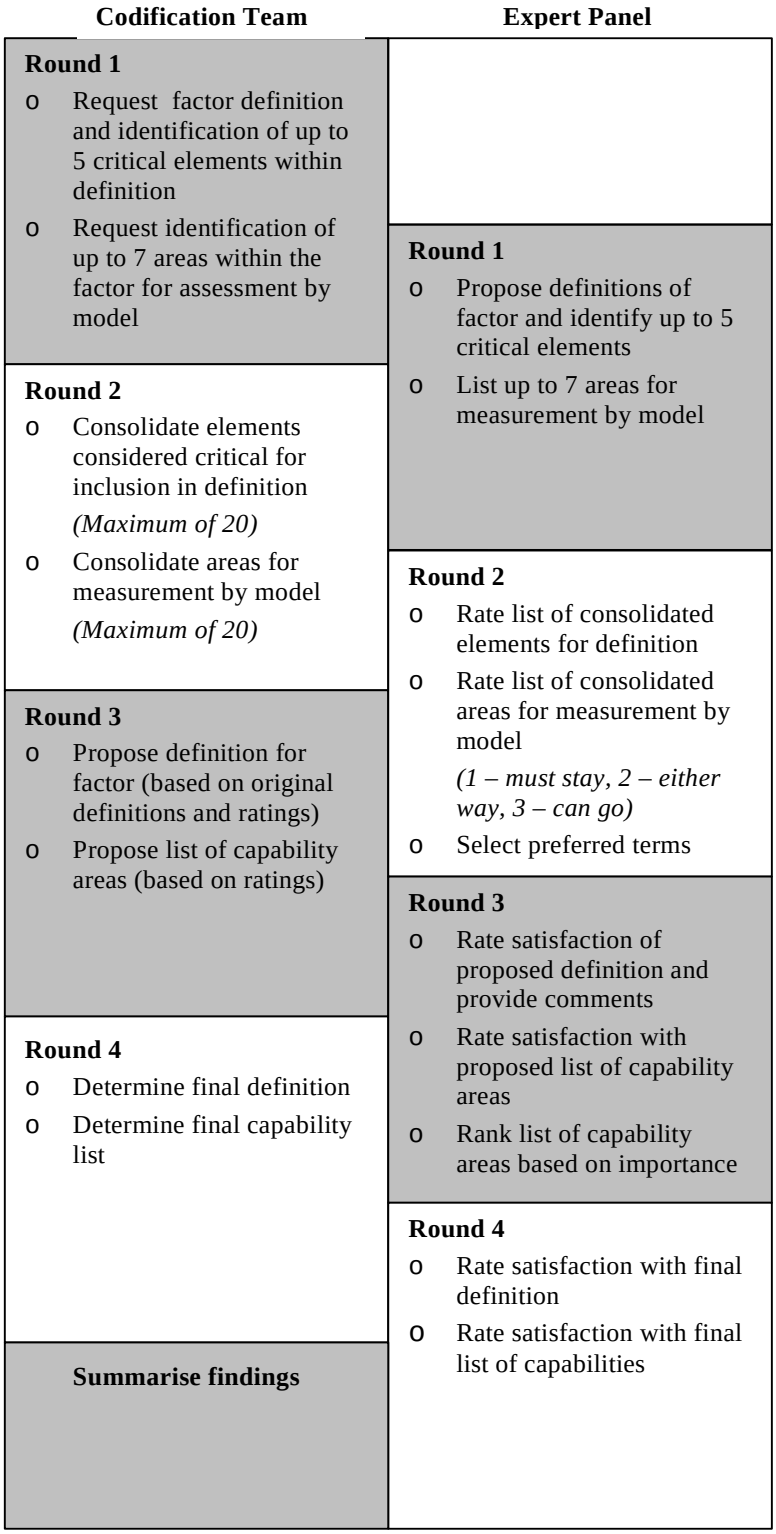


Figure 4: Proposed four round BPM Delphi study

5.3 Expert Panel

A vital aspect of the Delphi studies is the selection of the expert panel. Powell (2003) indicates that this selection will potentially determine the success of a Delphi study. In a similar vein to the approach taken by Okoli and Pawlowski (2004) we used an iterative 5 step approach: (1) Prepare a worksheet that identifies potential classifications; (2) Populate the worksheet with potential experts; (3) Evaluate experts; (4) Invite experts; and (5) Nominate additional experts (use referral from experts invites and further investigation). We considered three primary aspects for expert classification: category, region and expertise in the individual factor.

To address the key design issue of "academia vs. practice", a balance of academics and industry representatives were considered for the category classification. Industry practitioners were further assessed on the basis of their specialisation, i.e. we aimed to include representatives from both BPM consulting organisations and organisations from any field interested in application of such a model.

Classification by region was important for two reasons. Firstly, we wanted to ensure the model was influenced by regional differences in approaching BPM. To address this, the aim was to have at least one expert for each category (e.g. academic or practitioner) from each of the main regions. Secondly, we wanted to ensure that contemporary global BPM issues were incorporated in the model. To address this, we identified a number of world-renown authors with recent BPM publications.

The inclusion of the factor expertise was due to the conduct of multiple Delphi studies – one for each of the factors within the BPMM model (i.e. strategic alignment, governance, method, Information Technology, people and culture.) Whilst we made some attempt to classify experts in this way we largely left it to the participants to self-assess their expertise and to nominate for the factors in which they felt best qualified to participate. We felt that self-nomination for participation would potentially increase motivation and commitment to the study.

In determining the appropriate number of experts for inclusion in the panel we considered relevant literature together with the aims of the studies. Between 15 and 20 experts was considered to be an appropriate number and was consistent with guidelines from other researchers (Loo, 2002; Okoli and Pawlowski, 2004; Powell, 2003; Richards and Curran, 2002).

A summary of experts by Category, Region and Factor is provided in Table 2.

	Strategic Alignment		**Governance**		**Method**		**Information Technology**		**People**		**Culture**	
Category / Region	**I**	**A**	**I**	**A**	**I**	**A**	**I**	**A**	**I**	**A**	**I**	**A**
USA	8	6	10	6	10	5	9	4	9	5	8	5
Australia	2	1	2	1	2	1	2	1	2	1	2	1
Europe	1	-	1	-	1	1	1	1	1	-	1	-
Asia	-	-	-	1	-	1	-	-	-	-	-	-
Category Total	***11***	***7***	***13***	***8***	***13***	***8***	***12***	***6***	***12***	***6***	***11***	***6***

Table 2: Delphi Study Participants (I – industry, A –academia))

5.4 Codification Team

In addition to the expert panel we selected a codification team to consolidate results obtained from Delphi study questions. This team consists of three individuals each with an extensive knowledge of BPM. In addition further basis for selection was: (1) category – academics were chosen due to their understanding of qualitative research methods; and (2) region – representatives were chosen from regions containing the majority of experts. In particular, we felt selection on the basis of BPM knowledge and region may assist in highlighting any potential cultural inferences during the consolidation process. The administration and co-ordination of the Delphi study was undertaken by one of the principal researchers who is also a member of the codification team. Team members were:

1. Not able to participate in the expert panel at any stage;
2. Unaware of the identity of expert panel members (except the co-ordinator);
3. Not advised of any demographic details of the expert panel members in relation to responses being coded (except co-ordinator);
4. Used the qualitative research tool N-Vivo for data analysis; and
5. Consolidated their analyses as a team prior to proposing to the expert panel for consideration.

6 LIMITATIONS AND CONCLUSION

This paper has a number of limitations. First, the planned Delphi studies are incomplete at this stage and therefore the impact of their findings and our success in overcoming/minimising inherent criticism of the Delphi method itself is unknown. Second, at this stage we do not have empirical evidence for the correlation between the factors of the BPMM model and BPM success. Further testing of the relationship of independent and dependent variables will be the core of our future work. Finally, pilot testing of the BPMM model has only occurred in a small number of Australian organisations. This effect is minimised to some extent by the contribution from the global BPM Special Interest Group however, further testing of the model is required and is planned following the completion of the Delphi studies.

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