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BPMS implementations in SMEs:
Exploring the creation of a situational method

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Abstract

Small and Medium Enterprises (SME) comprise 99% of the European-economy, though, most research and implementation methods concerning Business Process Management Systems (BPMS) focus on large enterprises. We create a BPMS implementation method that is suitable for SMEs. Based on three existing BPMS implementation methods and by incorporating differentiators of SMEs and large enterprises a BPMS implementation method is constructed. The constructed method is validated through a series of interviews with BPMS implementation experts. Experts agree with the constructed method though discussion arise on a more detailed level of activities in the method.

Keywords: BPM, BPMS, implementation method, SME

1 Introduction

Business Process Management (BPM) became popular in the early 2000's, after fifty years of evolution of quality management approaches that started with Total Quality Management (TQM) as early as in 1949 (Dahlgaard, Kristensen, & Khanji, 1998; Powell, 1995; Ross & Perry, 1999), followed by Six Sigma and Business Process Re-engineering (BPR) (Hammer & Champy, 1993; Smith & Fingar, 2002) finally resulting in BPM.

Although currently a lot of research in this field has already been done, most research

focuses on large enterprises. This also holds for implementation methods created by Business Process Management System (BPMS) vendors and scholars. Yet, Small and Medium-sized Enterprises (SMEs) form 99% of the European economy¹.

Another issue, with most current methods, is that existing methods do not incorporate situational factors (factors in which organizations differ and thereby influence the manner an organization should approach the implementation). Though, most methods recognize that the method should be adapted to specific circumstances within an organization they do not indicate how the method should be adjusted. Though BPM has received much attention over the last years, there are still different opinions on what BPM is. In most literature it is agreed that BPM is at least a structured management approach that enables continuous optimization efforts and views organizations from a process perspective (Jeston & Nelis, 2006; Burlton, 2001; Van der Aalst, Hofstede & Weske, 2003). Still, detailed definitions vary. Some definitions are more focused on the management side of BPM (Jeston et al., 2006) while others emphasize on the technical realization (van der Aalst et al., 2003).

Also within the Information Systems domain an ongoing evolution can be recognized amongst others from Enterprise Resource Planning (ERP) towards Workflow systems (WfMS) to Business Process Management Systems (BPMS). A BPMS is the technical enabler of BPM; it provides the ability to model and execute business processes and represent cases (instances of a business process) to the users. Some vendors use different terms for BPMS like, Business Services Orchestration (BSO) and composite application or more marketing related names like next-generation workflow, smart middleware, hyper-tier and real-time enterprise (Smith & Fingar, 2002). In our research we define BPMS as “a (suite of) software application(s) that enable the modeling, execution, technical and operational monitoring, and user representation of business processes and rules, based on integration of both existing and new information systems functionality that is orchestrated and integrated via services” (Ravesteijn & Versendaal, 2007).

In our research, we create a BPMS implementation method tailored to the needs of SMEs, which is based on existing methods, and elaborates on the differences between large enterprises and SMEs. By creating this method, we lay the foundation for SMEs to implement a BPMS in their organization in a manner that fits the needs of individual enterprises. Therefore, our main research question is:

“What is a BPMS implementation method which is based on situational factors specific for SMEs?”

In the following section we present our research method. Section 3 gives an overview of related research on the differences between SMEs and large organizations and on the topic of BPM(S) implementation. In section 4 we describe the implementation method that we constructed. The (process of) validation of the method is described in section 5. Finally we end our paper with conclusions in section 6.

¹ http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm

2 Research method

Since we search for a validated method to implement BPMSs in SMEs in a situational manner, an artifact is created, and therefore we have used a design research approach to create the artifact. Figure 1 shows the IS research framework proposed by Hevner, Salvatore, Jinsoo and Sudha (2004), it is a design research approach for researching IS. Our research is strictly not a research where an IS theory or IS artifact is created but, rather a research to create an artifact (method) for implementing an IS, both our research as Hevner et al. (2004) have the goal to build and validate an artifact therefore we deem this as a valid approach.

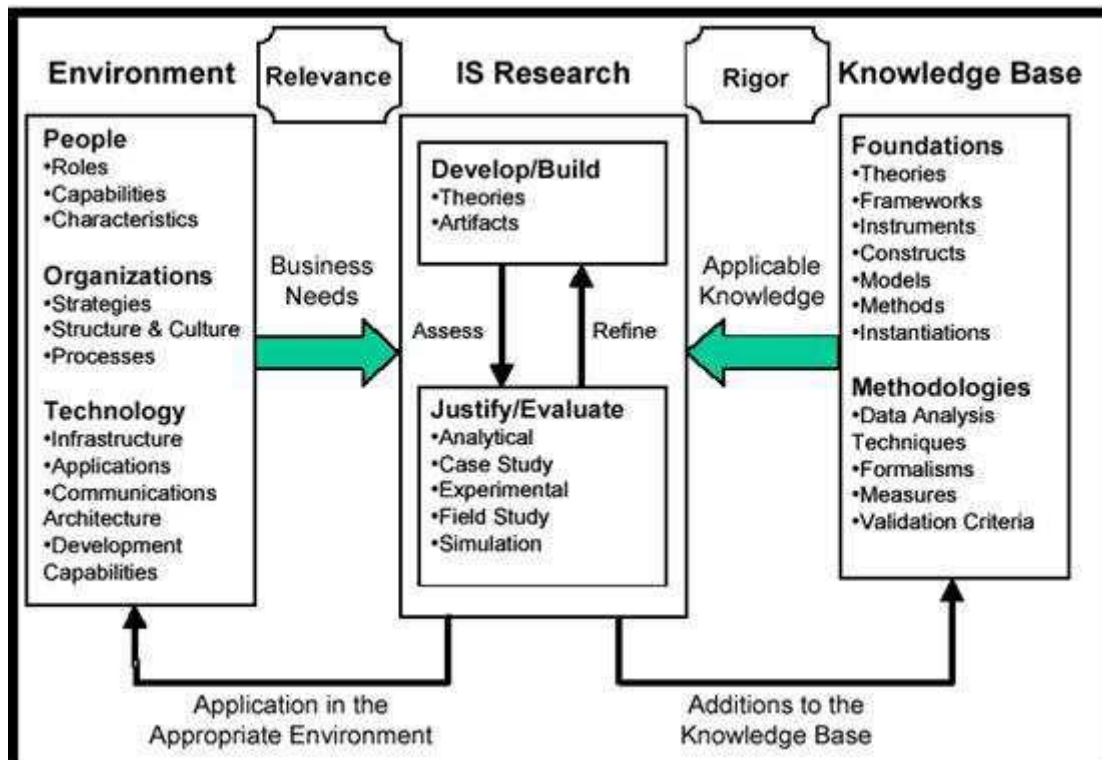


Figure 1: Information systems research (Hevner et al., 2004)

As can be seen in figure 1, the environment justifies the research and its relevance by the needs from the business (Hevner et al., 2004). At the other side, the knowledge base provides existing knowledge such as methods, frameworks and theories to build the new theories and/or artifacts. The knowledge base also provides methods for the justification/evaluation of the developed theories or artifacts.

In the IS research itself, the business needs and applicable knowledge are combined to create the theories and/or artifacts (Hevner et al., 2004). When the theories and/or artifacts are created they are evaluated with formal methods to validate research. Based on findings during the evaluation, the developed theories and/or artifacts are refined (Hevner et al., 2004).

Our research consists of three phases; literature study, method creation and validation of the research. In the literature study, (Section 3) we identify how SMEs and large enterprises differ and thereby we make a selection of existing BPMS methods that we use as the foundation of our method. In the creation of the method (Section 4) we use

Method Engineering (ME) techniques to compare the existing methods and to model the new method (Van de Weerd et al., 2008; Hong, Van den Goor & Brinkkemper, 1993). To validate the created BPMS implementation method we conduct eight expert interviews (Section 5).

3 Explorative literature study

Before the construction of the method, we first constructed a list of criteria to determine how SMEs differ from larger enterprises and second established the current state of (research into) BPMS implementation methods.

3.1 How do SME differ from large enterprises?

The European Union considers SMEs to be enterprises with less than 250 employees and a turnover less or equal to 50 million or a balance sheet total less or equal to 43 million. SMEs thus, differ in terms organization size and revenues. However there are more criteria, Ghobadian and Gallea (1997) identified 39 differences in 6 categories between large enterprises and SMEs. Table 1 shows an example of the first ten differentiators of the category ‘structure’. The remaining categories are ‘procedures’, ‘behavior’, ‘processes’ and ‘people’ (full list in appendix, table 4).

#	Large enterprises	#	SME
	Structure		
L1	Hierarchical with several layers of management	S1	Flat with very few layers of management
L2	Clear and extensive functional division of activities. High degree of specialization	S2	Division of activities limited and unclear. Low degree of specialization
L3	Rigid structure and information flows	S3	Flexible structure and information flows
L4	Top management a long distance away from the point of delivery	S4	Top management close to the point of delivery
L5	Top management’s visibility limited	S5	Top management highly visible
L6	Multi-sited and possibly multinational	S6	Single-sited
L7	Many interest groups	S7	Very few interest groups
L8	Normally slow response to environmental changes	S8	Normally rapid response to environmental changes
L9	Low incidence of innovativeness	S9	High incidence of innovativeness
L10	Cultural diversity	S10	Unified culture

Table 1: Organization comparison SMEs vs larger enterprises

Some researchers have identified characteristics which are important to the adoption of IT in SMEs. Thong and Yap (1995) distinct two types of characteristics in SMEs that are related to the adoption of IT in SMEs: ‘CEO characteristics’ and ‘organizational characteristics’. They concluded that SMEs that adopt IT are larger in size, more likely to have CEOs that possess a positive attitude towards adoption of IT, more likely to have CEOs who are innovative and likely to have CEOs who are knowledgeable about IT (Thong & Yap, 1995). Also, in “IS success factors in small business” (Yap, Soh, &

Raman, 1992) the supportive role of the CEO is tested and proven to have a positive effect on IS success. One of the reasons that the CEO has this impact on IS success is that in SMEs, the CEO is in many cases, also the owner (Fink, 1998; Yap et al., 1992).

3.2 Selecting methods

In the search for implementation methods that could be applicable to BPMS implementations, 18 different methods were found in, mainly, professional literature (Jeston et al., 2006; Burlton, 2001; Hammer et al., 1993; Sogeti, 2008; Ravesteijn et al., 2007, 2008; Cordys, 2012; Scheer & Nüttgens, 2000; Reichert, Rinderle, Kreher & Dadam, 2005; Van der Aalst & Van Hee, 2004; Pega, 2012; Harry, Schroeder, & Linsenmann, 2000; Rajagopal, 2002; Brahe & Bordbar, 2007; Curtis & Alden, 2006; OMG, 2008; Ramesh, Jain, Nissen, & Xu, 2005; Fitzgerald, Murphy, & Cork, 1996). However the methods that we want to include in our study as part of our research should have a high granularity in the activities, deliverables and roles they describe. For instance the Smart BPM (Pega, 2012) method, which is developed by the BPMS vendor PegaSystems, is only described on a high-level and also, the method is strongly intertwined with their Smart BPM products. Therefore it is not usable in our research. The same holds true for most of the 18 methods that we found in a preliminary literature study. After a careful review of the methods we found we three methods for comparison in our research: Cordys@work (Cordys, 2012), the 7FE Framework (Jeston & Nelis, 2008) and the CSF method (Ravesteyn & Versendaal, 2009) These methods are selected because they are well documented and there is a clear distinction between the methods. Table 2 gives a short overview of these selected methods.

Cordys@work	The focus of the method is to implement the BPMS in three days, three weeks and three months (3 + 3 + 3). As the method is provided by a BPMS vendor, it has a strong emphasis on the perspective of the BPMS implementer. Cultural and strategic aspects from the organization's point of view are not addressed (Cordys, 2012).
7FE Framework	The 7FE framework is a method in which BPM is implemented in ten phases. According to the method, BPM projects predominately are initiated from strategy-, business issue- and process- perspective. The body of the method consists of understanding the current issues and processes, create solutions from both IT as people perspective, implementation and realizing value with the goal to end up with a culture of sustainable performance (Jeston et al., 2008).
CSF method	Ravesteyn et al.(2009) created a method based on the idea that a BPMS implementation has a higher chance to succeed when all critical success factors are embodied during the implementation. In their research, they identified 55 unique success factors and 14 are identified as being critical.

Table 2: BPMS implementation methods included in the research

Next to the difference in structure, the methods also differ in their origin. Cordys@work is a method provided by the BPMS vendor Cordys and is created from the vendors perspective. They incorporate activities such as *Qualification*, in which the vendor, together with the client, are finding out whether they can find a solution together, or not. The 7FE Framework is a best practice method and created for large scale BPM implementation projects. Jeston and Nelis (2009) incorporate the organization's strategic process and process architecture as part of the method. The CSF method is created from a scientific point of view and consists of 12 method fragments and 172 activities which

is far more than the other two methods. Cordys@work exists of 4 method fragments and 61 activities and the 7FE Framework of 10 fragments and 94 activities.

4 Creating the method

To create a method specifically for SMEs three selected methods are compared using a super-method (Hong et al., 1993). A super-method is a method which contains all the activities of the compared methods.

Also, all the differentiators that can be applicable to an activity are mapped on the activities of the super method.

As an example in table 3 a part of the process of comparing the different methods is shown. In the first column, the number of the activity is shown and consists of a major and minor number. The major number refers to the activity in the second column. A minor version refers to the sub-activity in the third column. In the fourth, fifth and sixth column, the methods are compared. Since the super-method consists of all the activities of the compared methods, there is at least one hit with the compared methods. Activities 1.1 and 1.2 in the super-method have an exact match (indicated with an =) with activities 1.1 and 1.2 of the 7FE Framework. For activities 1.1 and 1.2, there is a partial match with activities in the CSF method. Activity 1.1 of the super-method does more (indicated by >) than the corresponding activity of the CSF method. When there is no match between the super-method's activity and the compared method the cell is left empty.

#	Activity	Sub-activity	7FE Framework	Cordys@work	CSF Method
1.1	Formulate organizational strategy	Analyze internal external aspects of the organization	=1.1		> 1.1
1.2		Make strategic choices	=1.2		> 4.1
1.3		Define enterprise goals			= 15.2
1.4		Define enterprise objectives			= 15.3

Table 3: Method comparison

Based on the comparison between the three existing methods a basic method was created. We assumed that if an activity is reflected by all three methods, it is important, thus it should be incorporated in the foundation of the new method. To give the method more structure, we applied the phases that are presented by Ravesteijn and Versendaal (2007) to the method and created different method fragments according to the phases. Four phases are recognized, that are consistent with the continuously improvement character of BPM, namely; '*Architecture Design*', '*Developing an IT Solution Based on SOA (Service Oriented Architecture)*', '*Management of Implementation and Change*', and '*Measurement and Control*'. Also, a fifth phase is recognized: '*Management of Organization and Processes*'. *Management of Organization and Processes* is an overall phase in which the project is managed.

The activities in the super-method are enriched using the 39 differentiators (Ghobadian et al., 1997). For each activity we evaluated whether one or more of the differentiators could be applicable. Both the large enterprise as SME criteria are evaluated on the

activities. If a large enterprise characteristic is applicable to an activity, this could be a reason not to include the activity in the method. In contrast, for SME characteristics this could mean that an activity should be incorporated in the constructed method. For example we incorporated an activity labeled '*Understanding BPM*', which in the super-method is a set of multiple activities like '*Research different perspectives*', '*Develop BPM mindset*' and '*Evaluate current knowledge about BPMSs*', which are to elaborate for SMEs. SMEs, compared to large enterprise have less decision makers, have a less extensive decision-making chain, modest human capital and financial resources at hand (Ghobadian et al., 1997). Therefore, we combined these activities to one activity, '*Understanding BPM*'.

Figure 1 shows the BPMS implementation method for SMEs labelled '*Management of Organization and Processes*'. '*Management of Organization and Processes*' consists of nine possible sub-activities and nine corresponding deliverables. At the left side of the Process Deliverable Diagram (Van de Weerd et al., 2008) the (sub-)activities are shown, at the right side the deliverables corresponding to specific activities. The first four activities are to start up the BPMS implementation project. Before a BPMS implementation can start, a common understanding of BPM should be created by the initiators of the project. In SMEs management is closer to the employees and there are good chances that someone of the upper management is already supporting the BPMS implementation. If management support is not present, a lobby should be started to get upper management commitment. If there is a common understanding of BPM and the project has gained upper management commitment, the project can be initiated. Projects can be initiated in two ways, a project initiation document could be created to describe the scope of the project or, a more informal project initiation could take place. The difference between the two project initiation activities is caused due to the less formal nature of SMEs (Ghobadian et al.,1997). It is expected that SMEs know a large difference in usage of project management methods. Smaller organizations will probably not use formal project management approaches such as Prince II, but rather manage the project based on previous experiences and gut feeling (Ghobadian et al.,1997). Therefore, '*Manage project*' is a closed activity (activity with a shadow border), which means that the activity is not elaborated in our research. SMEs are free to pick any project management method they like to manage the project.

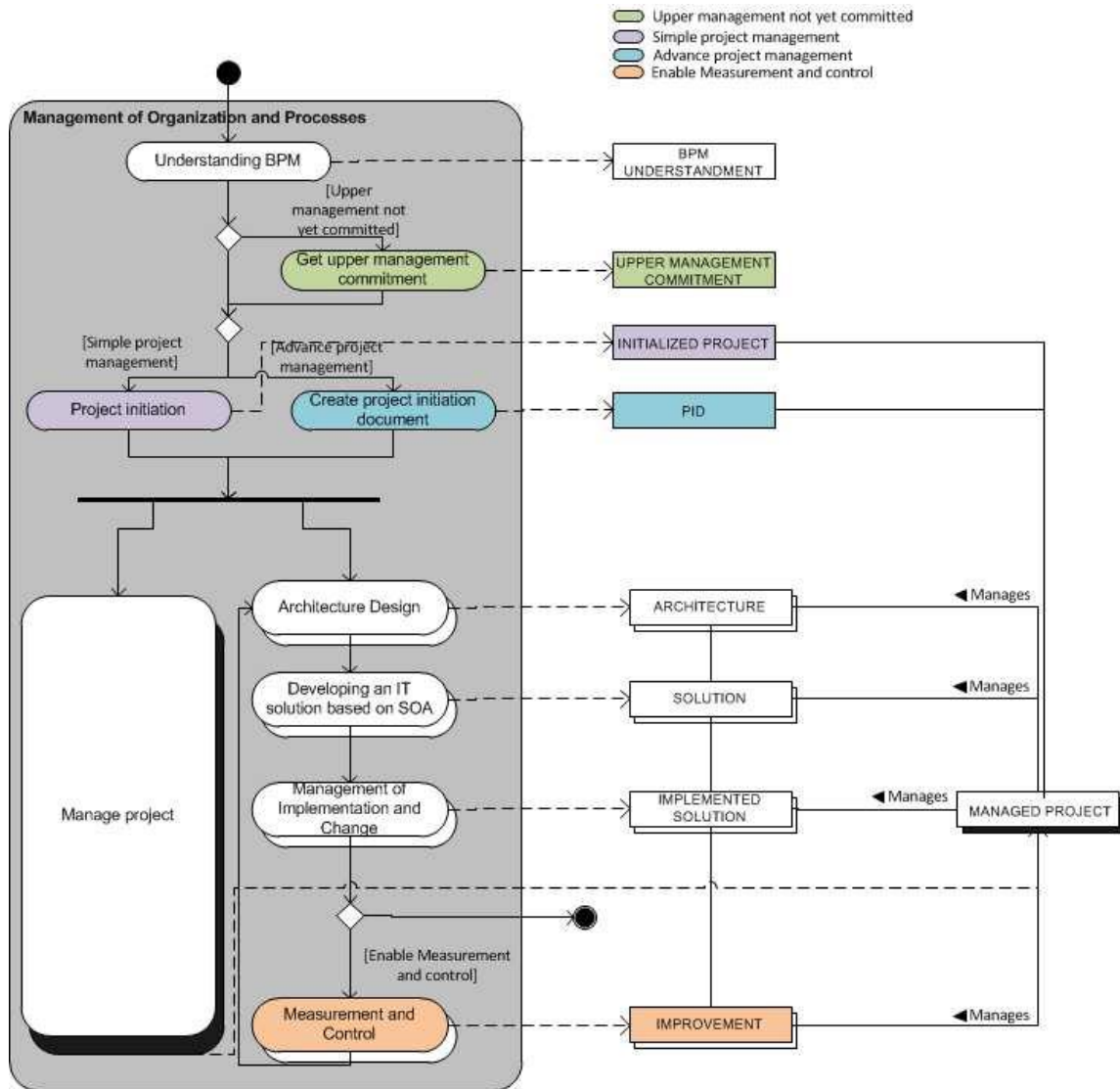


Figure 1: Management of Organization and Processes

Parallel to managing the project the phases *Architecture Design*, *Developing an IT solution based on SOA*, *Management of Implementation and Change* and *Measurement and Control* are executed. These phases are executed *subsequently* which differs from the 7FE Framework and the CSF method where some phases are executed *in parallel*. It is anticipated that SMEs, due to their assumed lack of resources and focus (Ghobadian et al., 1997), are required to execute the activities in sequence rather than in parallel.

Expected is that when a BPMS is implemented and handed over to the business, not all SMEs are going through *Measurement and Control*. Though, *Measurement and control*, is an essential part of the continuous optimization efforts of BPM we expect that some SMEs lack the resources (Ghobadian et al., 1997), focus and thereby, the greatest improvement has already been accomplished in the first improvement cycle. When an organization decides to start with the *Measurement and Control* activity it is mandatory to enter a new optimization cycle, since it is a waste of resources to measure and think of interventions to optimize processes and not implement them.

5 Validation with experts

In order to validate the created method, eight experts were interviewed to test the method for completeness and the practical applicability. We consider a professional an expert when they have extensive knowledge about process management and have experience with SMEs. The experts are professionals that fulfill various positions in the field of BPM. The background of the experts differ, all experts have extensive knowledge about BPM but their viewpoint (technical/business) is different also their experience within different type and size of organizations differs.

The interviews consisted of the researchers presenting the method to the experts fragment by fragment and asking the experts to reflect their vision and experience on the fragments. By going through the method with hardcopies of the method fragments, we could directly change and rearrange activities and raise discussion with the experts. In this manner, we were able to validate the whole method in eight, interactive, one to two hour interviews.

Reoccurring topics of discussion were awareness and project management. Comments of experts on awareness were generally about the organization becoming aware of the benefits of BPM(S). When organizations get more aware about the benefits, they tend to see more opportunities and want to get more out of their BPMS implementation effort. With these comments, the experts acknowledged the importance of a common understanding of BPM but note that the real awareness is created during the project. *Manage project* is an activity which currently overlaps all the four lifecycle activities. Experts though commented that *Measurement and Control* is normally executed by people in the day to day operation of the enterprise and not by the project team. This is also suggested by literature (Ravesteyn & Batenburg, 2010) but was initially omitted because of the idea that BPMS implementations are executed as projects in SMEs and that this would also entail *Measurement and Control*.

Measurement and Control is a situational activity in this method. Here, some of the experts recognized that in practice *Measurement and Control* is not always executed. They also observed that even in large enterprises *Measurement and Control* is not always executed. The experts stated two reasons for enterprises to not execute the *Measurement and Control* activity. The first reason is that the greatest savings and optimization is reached in the first cycle of a continuous optimization effort. The second reason is, again, awareness. When enterprises are not aware of the benefits of measuring and controlling their processes in order to optimize the processes they tend not to do this.

Other experts noted that even if *Measurement and Control* is not knowingly executed by the enterprise, there is always some level of measuring and controlling in place, though this might not be related directly to the BPMS implementation. Enterprises are legally obliged to keep financial records which can thus be considered the most basic level of measurement.

As shown in figure 2 an extra activity, *Select and involve supplier*, is added. The involvement of suppliers, which could be consultancy firms, ISVs or vendors, was expected to happen in during the *Architecture Design* activity. Though, experts say that this could happen at any moment between the start and the end of the *Architecture*

Design Activity. The issue is that the experts are contacted by clients with a problem. How it is solved and that the solution is called a BPMS does not concern the client at that time. As concluded earlier, *Measurement and Control* is not part of the project but is conducted by the business. Therefore, we added an activity *Manage business* which represents the effort of the business to manage the *Measurement and Control* activity.

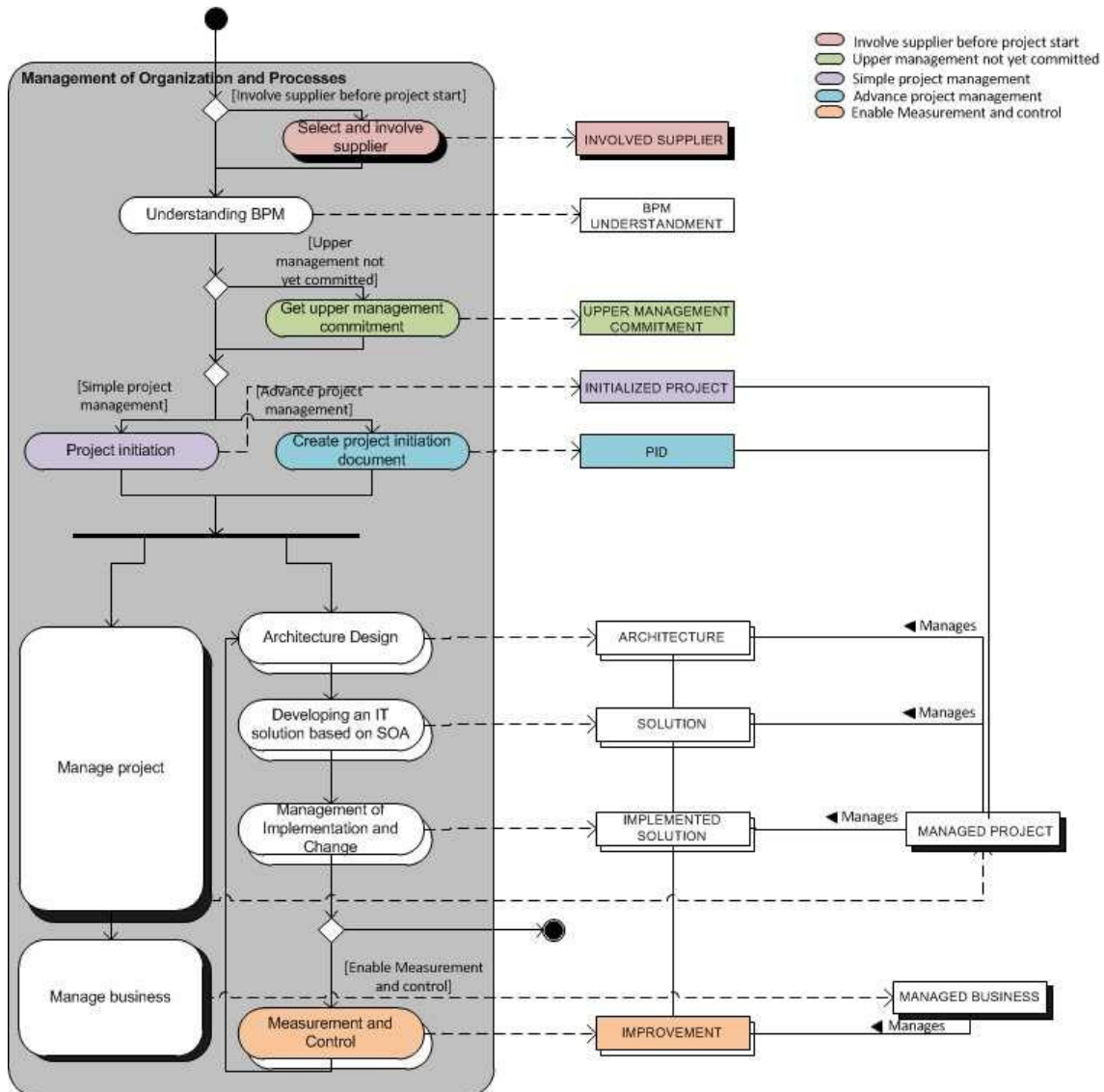


Figure 2: Management of Organization and Processes after expert interviews

6 Conclusion

In our research, we showed how BPMS implementations in SMEs differ from implementations in large enterprises and consequently constructed a BPMS implementation method tailored to SMEs.

Thereby we answered the research question; “*What is a BPMS implementation method which is based on situational factors specific for SMEs?*”. In the process of creating the method we used Method Engineering techniques and incorporated differentiators between large enterprises and SMEs. Two of the most notable differences with other

BPMS implementation methods are that *Measurement and control* is an optional phase and that the implementation is executed in sequence.

Based on the validation we can state that in general the experts agree with the constructed method. However we must remark that the validation is limited to a high-level validation. We only interviewed 8 experts during one to two hour sessions. Still we consider this enough time to walk through the method with the experts and get a good understanding of their views and opinions.

Still the proposed method is recognized as being useful to SMEs though, the method in its current form is deemed too academic for practitioners. However, experts share different opinions on when a BPMS is useful to an organization and suggest that usefulness is branch and volume specific.

To get a better insight in the contents of the activities, deliverables, responsibilities and the corresponding roles, more in-depth research should be conducted in future research.

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Appendix

#	Large enterprises	#	SME
	Structure		
L1	Hierarchical with several layers of management	S1	Flat with very few layers of management
L2	Clear and extensive functional division of activities. High degree of specialization	S2	Division of activities limited and unclear. Low degree of specialization
L3	Rigid structure and information flows	S3	Flexible structure and information flows
L4	Top management a long distance away from the point of delivery	S4	Top management close to the point of delivery
L5	Top management's visibility limited	S5	Top management highly visible
L6	Multi-sited and possibly multinational	S6	Single-sited
L7	Many interest groups	S7	Very few interest groups
L8	Normally slow response to environmental changes	S8	Normally rapid response to environmental changes
L9	Low incidence of innovativeness	S9	High incidence of innovativeness
L10	Cultural diversity	S10	Unified culture
	Procedures		
L11	Activities and operations governed by formal rules and procedures. High degree of standardization and formalization	S11	Activities and operations not governed by formal rules and procedures. Low degree of standardization and formalization
L12	System-dominated	S12	People-dominated
L13	Rigid and unadaptable processes	S13	Flexible and adaptable processes
L14	Incidence of fact-based decision making more prevalent	S14	Incidence of "gut feeling" decisions more prevalent
L15	Fragmented decision makers	S15	Few decision makers
	Behaviour		
L16	Mostly bureaucratic	S16	Mostly organic
L17	Strong departmental/functional mind-set	S17	Absence of departmental/functional mindset. Corporate mind-set
L18	Cultural inertia	S18	Fluid culture
L19	Meritocratic	S19	Patronage
L20	Rigid corporate culture dominating operations and behaviours	S20	Operations and behaviour of employees influenced by owners'/managers' ethos and outlook
	Processes		

L21	Extended decision-making chain	S21	Short decision-making chain
L22	Complex planning and control system	S22	Simple planning and control system
L23	Strategic process generally deliberate and formal	S23	Strategic process incremental and heuristic
L24	Formal evaluation, control and reporting procedures	S24	Informal evaluation, control and reporting procedures
L25	Control-oriented	S25	Result-oriented
	People		
L26	Personal authority mainly low	S26	Personal authority mainly high
L27	Dominated by professionals and technocrats	S27	Dominated by pioneers and entrepreneurs
L28	Range of management styles: directive, participative, paternal, etc.	S28	Range of management styles: directive, paternal
L29	Individuals normally cannot see the results of their endeavors	S29	Individuals normally can see the results of their endeavors
L30	Ample human capital, financial resources and know-how	S30	Modest human capital, financial resources and know-how
L31	Training and staff development is more likely to be planned and large scale	S31	Training and staff development is more likely to be ad hoc and small scale
L32	Specified training budget	S32	No specified training budget
L33	High incidence of unionization	S33	Low incidence of unionization
L34	High degree of resistance to change	S34	Negligible resistance to change
L35	Potentially many internal change catalysts	S35	Very few internal change catalysts
	Contact		
L36	Wide span of activities	S36	Span of activities narrow
L37	Extensive external contacts	S37	Limited external contacts
L38	Greater scope for an extended customer base	S38	Normally dependent on a small customer base
L39	Large customer base	S39	Limited customer base

Table 4: Characteristics large enterprises versus SME(Ghobadian & Gallear, 1997)