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## **In Search of Competencies Needed in BPM Projects**

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### **ABSTRACT**

*Business Process Management (BPM) and supporting BPM-systems are increasingly implemented within organizations and supply chains. However a common accepted definition of the BPM-concept is omitted and the same is true for the competencies (knowledge, skills and attitudes) that project members need during a BPM-implementation. In this paper we present the results of a survey among Dutch consultants, developers and end-users of BPM-systems. The survey is designed to investigate whether there is a shared view among different disciplines with regard to the definition of BPM and the relevant competencies for BPM implementation. After presentation and interpretation of the results of this survey, we propose an international study to explore if BPM definitions and its relevant competencies differ across regions and cultures.*

### **INTRODUCTION**

Gordon B. Davis organized the first course on Management Information Systems at the Management Information Systems Research Center (MISRC), University of Minnesota, in 1969. The course was accompanied by the book *Management Information Systems: Conceptual Foundations, Structure, and Development* (Davis, 1974). Since then, the academic field of Information Systems (IS) is constantly growing and changing. New domains are added or disappear every year. One of the domains that is associated to Information Systems more and more is Business Process Management (BPM).

BPM originates from existing domains as Business Process Re-engineering and Quality Management and is also closely related to Service Oriented Architecture (Ravesteyn, 2007). This latter linkage is one of the reasons that recently the market for BPM and supporting technologies has changed rapidly. Analysis reports of Gartner, Forrester and similar research firms show an increasing number of companies that enter the market for BPM systems and solutions. Quite remarkably, many of these solutions appear to be combinations of different BPM tools and concepts from different solution providers. A prominent example is the combination of SAP Netweaver with the modeling tool ARIS of IDS Scheer. Also, the roots of the suppliers in the BPM domain differ a lot. As a consequence, inherently different software solutions that support for instance Workflow Management and Enterprise Integration

Application are also positioned as Business Process Management Systems (BPMS). The functionality of these systems obviously varies to a large extent. The same holds for the consultancy organizations that are active in the BPM domain. They originate from various fields of expertise such as logistics, marketing and IS development. Furthermore, the market for BPM is going through a phase of takeovers and consolidation. In 2007, Webmethods was acquired by AG Software, BEA Systems bought Feugo, and this year BEA Systems was by turn taken over by Oracle. Considering all these developments, it can be concluded that BPM is a very difficult and complex area in which many different types of organizations and stakeholders are active. It appears that all parties involved in the BPM domain have their own vision about future developments and how to compete.

Within this complex environment, Universities and other higher educational institutions globally develop and teach courses on BPM that basically need to fulfill the needs and demand from the market. This paper reports about a Dutch research project that illustrates how this challenge is taken up by the University of Applied Sciences Utrecht in cooperation with the Dutch BPM-Forum.

## RELATED LITERATURE

Much research has been conducted in the field of BPM during the last decade. This ranges from general theory on BPM (Elzinga et al., 1995; Zairi & Sinclair, 1995; Van der Aalst et al., 2003; Indulska et al., 2006; Shaw et al., 2007) to more specific topics such as:

- BPM maturity (Rosemann & de Bruin, 2005)
- Strategic alignment of BPM (de Bruin & Rosemann, 2006)
- Business process modeling (Bandara et al., 2006; Ami & Sommer, 2007)
- BPM and webservices (Van der Aalst et al., 2007)
- BPM implementation issues (Alavi & Henderson, 1981; Sultan & Chan, 2000; Dumas et al., 2005; Ravesteyn & Versendaal, 2007).

Despite the extended research agenda on BPM, studies that specifically address education on BPM are limited. The discussion on this topic was initiated by a column of Peter Fingar (2006) in which he stated that the curricula of MBA-courses at business schools are too focused on administration, not on innovation. He suggests to launch a Master of Business Innovation in which a core of MBA topics (such as finance and accounting, quantitative analysis, economics, marketing and organizational behaviour) is integrated with modules on BPM, business activity monitoring, process modeling and simulation. After this, a paper in *BPTrends* by Michael zur Meuhlen (2008) reveals a more detailed view on the skills that different BPM constituents need. Zur Meuhlen distinguishes four different groups that are involved in BPM-projects: (1) executives, (2) business analysts, (3) systems analysts, and (4) vendors or systems integrators. Each group has different responsibilities and therefore needs diverse skills. For example, executives need to ensure process performance and compliance, and hence need skills in process analysis, governance and portfolio management. In contrast systems analysts are responsible for the implementation of the process and its corresponding information systems and therefore need skills in process modeling, workflow implementation, user interface design and systems integration. In his paper zur Meuhlen does not only provide good insight in BPM skills, he also presents a list of universities specialized in BPM courses. Finally, we mention the study conducted by Bandara et al. (2007). She analyzed which business process modelling skills were mentioned in 300 online job vacancies found globally across the most prominent online recruitment sites. Subsequently she organized a focus group representing potential BPM recruiters to validate and contextualize the findings. It should be noted however, that the study of Bandara et al was focused on business process modelling, not business process management skills, and the vacancies analyzed were geographically limited to Australia, England and the United States.

Building on the previous contributions, the goal of this paper is to present the specific market demands in the Netherlands concerning competencies in the field of BPM. In the next section our research methodology and survey are presented. Then the survey results concerning the definition of BPM and BPM-systems are discussed. In the subsequent section we present our findings regarding competencies needed in BPM-projects. We end the paper with conclusions, discussion and future research.

**RESEARCH METHODOLOGY**

As earlier consultation and survey research on BPM is nearly non-existent, we developed our survey basically from zero. The goal was to conduct a field consultation on the definitions, implementation approaches and competencies for BPM and BPM-systems. Because of its explorative aim, the survey was broadly designed and consisted of several parts:

- General questions. Some open questions concerning the respondents’ role and company (number of employees, industry).
- Questions about the definition of BPM. Two definitions and six Likert-items related to BPM and BPM-systems were queried.
- Questions about the perspectives on BPM. Some open questions on models and tools related to different BPM-perspectives (i.e. the strategic, operational, design, change perspective, et cetera).
- Questions about the BPM-architecture. Some closed and open questions concerning the software architecture of BPM-systems.
- Questions about the implementation of BPM-systems. In total 26 Likert-items related to BPM-systems implementation and its critical success factors were queried.
- Questions about competencies for BPM. Some open questions about the knowledge, skills and attitude required for BPM(-system) implementations.

For this paper, we focus on the questions regarding the definitions and competencies for BPM-projects. In 2007 the survey was sent to contact persons from 925 Dutch organizations. These organizations were recruited from two groups: one group of 700 companies were member of the Dutch ‘BPM Forum’, another group consisted of 225 companies whose managers follow professional courses at the University of Applied Sciences Utrecht. These two groups ensure that companies with both (relatively) high and low BPM knowledge are recruited. Also, BPM Forum members are assumed to have a different view on the BPM-domain compared to the other group of companies. In addition, our sample was specifically stratified to recruit respondents from three groups according to what can be seen as the BPM value chain: (1) developers of software tools for BPM, (2) consultancy organizations, and (3) end-user organizations. After sending out the (web-based) surveys and reminders, the response consisted of 39 fully completed questionnaires. This response rate of 4.2% is obviously below expectations, but not exceptional for surveys among respondents that are not directly related or acquainted to the sender. It should also be noted that completion of the survey was quite time consuming, i.e. 40 minutes on average.

Despite the limited size of the response group, we were able to achieve a relevant variation on the two main stratification criteria, i.e. the two target groups and the three different backgrounds. Table 1 presents an overview of the response.

**Table 1: The survey response group by membership of the BPM forum and BPM supply chain position.**

	BPM developer	BPM consultancy	BPM organization	End-user	Total
Members of the BPM Forum	6	15	3		24
None BPM Forum members	0	6	9		15
Total	6	21	12		39

## THE DEFINITION OF BPM AND BPM-SYSTEMS

There are many definitions for BPM and BPM-systems. It can therefore be expected that there is disagreement (or: confusion of tongues) between different groups of practitioners on BPM. To find out whether this is truly the case, we proposed our respondents the following two definitions that partly overlap, but also stress different aspects of BPM:

1. *Business Process Management is: “a field of knowledge at the intersection between Business and Information technology, encompassing methods, techniques and tools to analyze, improve, innovate, design, enact and control business processes involving customers, humans, organizations, applications, documents and other sources of information” (Aalst, ter Hofstede & Weske, 2003).*
2. *Business Process Management Systems is: “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” (Ravesteyn & Versendaal, 2007).*

Measured on a 7-point scale (from 1=fully disagree to 7=fully agree) the 39 respondents largely agree with both definitions of BPM and BPM-systems – the average score was 5.15 and 5.00 for definition 1 and 2 respectively. An open question provided respondents the opportunity to comment on the two definitions. This was not used however, which indicates that both definitions are recognized by the respondents.

Next, we asked respondents to rate six items on BPM and BPM-systems on a similar 7-point Likert scale. These items are presented in Table 2 below (translated from the original Dutch version). They are designed to measure how innovative and promising the respondents believe BPM is. Note that items 3 and 4 are formulated in a deviant way for reasons of reliability.

**Table 2: Judgment of the statements on BPM and BPM-systems.**

#	Item	Mean	Standard Deviation
1	Figure 1 [see below this table] shows how, according to us, management concepts and IT innovations have evolved into BPM-systems	4.58	1.58
2	The BPM-systems that are currently on the market can be considered a new type of software application	4.07	1.75
3	BPM is being hyped as a new management concept but it has been around for a long time and can therefore not be considered as new.	3.82	1.62
4	BPM-systems are nothing more than a combination of long existing IT applications and functionality	3.84	1.59
5	The essence of BPM is the continuous measuring and improving of operational processes	4.79	1.79
6	By applying BPM an organization is able to make its processes and supporting information systems more flexible and adaptive to change	5.28	1.29

Figure 1 below was presented to the respondents:

Figure 1: Historical Roadmap to BPMS.

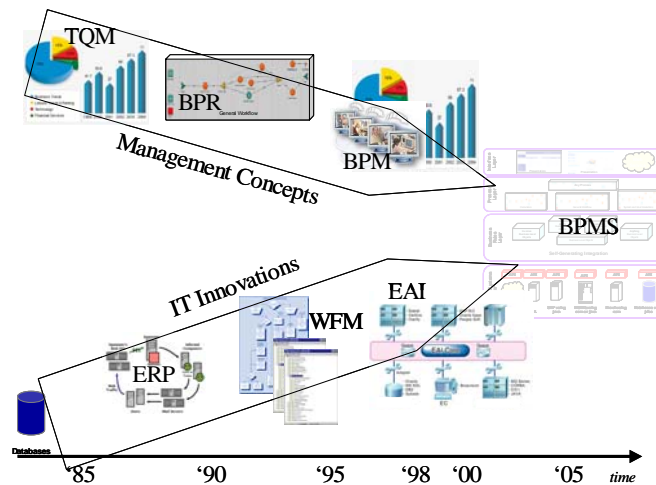


Table 2 shows that respondents agreed with the statements 1, 2, 5 and 6 (averages are 4 or higher), and consistently rated item 3 and 4 lower (average about 3.8). The relative low standard deviations indicate consensus within the group of respondents. A reliability check on the consistency of the 6 items was calculated by Chronbach's Alpha (Nunnally 1979; Peter 1979). The resulting Alpha of 0.68 confirms that the set of 6 items form an acceptable scale to measure a manager's vision on BPM as a innovating and improvement concept.

There are some interesting differences between items however. For instance, item 5 ("The essence of BPM is the continuous measuring and improving of operational processes") not only has one of the highest means but also the highest standard deviation. So while many respondents seem to highly agree with this statement, further analysis of the individual responses reveals that 6 respondents do not agree at all (scores of 2 or lower). Therefore, it is not possible to conclude that BPM is mostly about measurement and improvement of operational processes.

Further analysis showed some differences between the respondent groups the sample was stratified on (i.e. BPM forum member and BPM job position). For instance, the BPM-forum members highly agreed with item 6 (5.63), while the average for non-members on this item was moderate (4.73). A t-test for independent groups did not support the conclusion that this difference in opinion was significant however. Also, statement 1 (that refers to Figure 1) was rated much higher by the end user organizations (5.67) than by the developers and consultancy organizations (4.33 and 4.05). From an ANOVA-analysis (Bonferroni-test) these differences were not significant either. It is worth noting though, that the BPM-Forum members commented more frequently on how to improve this figure, while there were no comments whatsoever by the non-member group.

Based on these findings we conclude that the respondents generally show consensus about the two definitions and six statements on BPM and BPM-systems. This supports the notion that BPM and supporting technologies have evolved from a management concept to an integrated paradigm. Our respondents agree with the vision that BPM is about integration of processes and information with the reuse of existing information systems, modeling and execution of processes, and the offering of real-time management information. In addition, BPM is seen as the key to business innovation. It should also be noted that end-users of BPM agree more with this vision on how BPM(S) evolved, while BPM-Forum members tend to see BPM as means to make processes and IS/IT systems more flexible and adaptive to change.

## COMPETENCIES NEEDED IN BPM-PROJECTS

For this research a competency is defined as the required knowledge, skills and attitude by members involved in a BPM-project. In the survey three open questions were formulated to determine which types of competencies are needed in BPM-projects according to the respondents. The first question was related to general knowledge, skills

and attitude while the other two questions asked for specific competencies in the domains of business and IT. The answers provided by the respondents show a large diversity. Table 3 gives an overview of knowledge and skills mentioned most by the respondents (sorted by domain).

**Table 3 : Knowledge and skill needed in BPM-projects.**

	General	Business	IT
Knowledge		<ul style="list-style-type: none"> <li>- Administrative Organization</li> <li>- Process modeling methodologies</li> </ul>	<ul style="list-style-type: none"> <li>- SOA and web services</li> <li>- Architectures</li> <li>- Knowledge about existing IT applications</li> <li>- Integration techniques and methodologies</li> <li>- Modeling data and processes</li> <li>- UML</li> </ul>
Skills	<ul style="list-style-type: none"> <li>- Analytical abilities</li> <li>- Process minded</li> <li>- Communicative abilities</li> </ul>	<ul style="list-style-type: none"> <li>- Process modeling techniques and abilities</li> </ul>	

The general skills that were mentioned are typically those one would expect. Nonetheless, a skill as process mindedness is also mentioned specifically, especially by the respondents with an IT background. This is of specific importance for the educational curriculum on BPM.

As can be seen in Table 3, the business related competencies that were mentioned by the respondents are:

1. Knowledge about administrative processes,
2. Knowledge on methodologies to model processes and
3. The ability (skill) to overview processes within the organization and throughout the supply chain.

The first is related to the judgment of the quality of current processes and suggestions on how to improve these. The second is about choosing the right modeling method for the situation at hand and being able to actually model (draw) the processes. The third is related to the tendency by many practitioners to dive into details when it comes to processes without having a broader overview on relations and dependencies at the same time.

For the Information Technology domain, respondents gave answers that merely deal with knowledge aspects. This might be the case because the respondents actually use IT-related knowledge, while for the general and business domain knowledge is not explicitly defined while the skills side becomes more important to mention explicitly. For example, we see that the knowledge and skills for process modeling in the business domain are interpreted as being able to use techniques like flowcharts or Event-driven Process Chains (EPCs). Almost the same field of knowledge in the IT domain, is related to understanding the Business Process Modeling Notation (BPMN) or Unified Modeling Language (UML). The latter methodology was regarded very important as it was mentioned several times by the respondents.

Finally, the survey contained questions about software to support BPM-projects. It appeared that respondents mentioned quite different applications ranging from process modeling tools such as Microsoft Visio and ARIS (from IDS Scheer) to middleware solutions for information system integration and process support. These differences match the different roles of the respondents: end-users and consultants suggest process modeling tools, while developers mention the middleware solutions more often. Once again, this illustrates that there is a strong need for persons who are able to communicate and bind professionals from the domains of business and IT. It also supports the statement that multidisciplinary project teams are key to the success of any BPM-project.

## CONCLUSIONS

In this paper we presented the results of a survey among Dutch consultants, developers and end-users. We queried 39 professionals on how they view the concept of BPM and the competencies needed during BPM-projects. The three groups were recruited from two separate populations with a high and low level of knowledge about BPM. One of the interesting results is that the different groups share a common view on BPM and BPM-systems, regardless of their role in the BPM value chain. On the other hand, our survey shows a number of significant differences between the professional groups. Among other things, developers and consultants with a specific BPM-experience more strongly believe that applying BPM enables organizations to improve processes and IS/IT in a more flexible and adaptive way. This is driven by the fact that developers and consultants are actually involved with the design and deployment of BPM-systems. Interpreting these differences, it seems that one of the most important risks of large BPM-projects is that the project is considered to be IT-driven only. If so, the responsibility for success is solely placed at the IT department. It should be noted however that even though IT is very important, technology exists primarily to support the implementation of BPM – not the other way around. Management support is imperative, together with involvement of process owners and technical people. As this research has shown, the skill to bring the business and IT domains together is crucial for organizations and BPM projects. Consequently, it is the challenge for (professional) universities to educate students in such a way that they will be able to meet these requirements of practice in the market.

## DISCUSSION AND FUTURE RESEARCH

Some important limitations should be recognized with regard to the results of this research. Most prominent, the results are limited to the Netherlands, i.e. to the opinions of Dutch BPM practitioners. An obvious extension of this research is to conduct the survey in other countries, and to subsequently explore the validity of our BPM definitions and list of competencies. A very interesting step for further research is to see if the definition of the BPM-domain and competencies differs between countries and/or cultural regions. This could be specifically investigated through surveying enterprises with international establishments. Another opportunity for further research is to compare the competencies collected by this research with those found by Bandara et al. (2007). It is important to note that in their research Bandara et al. did not find competencies that are related to skills in the architecture (e.g. SOA) and web services domain while in our research these were seen as very important.

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