

Essentials of BPM

[Shah, M. I]

Abstract—Business process modeling has become an ever more popular and essential part of today’s organizations. The business process can be visually represented, depicting the activities, and independencies while at the same time highlighting any inefficiencies and potential areas for improvement. The important of embedding good business process modeling techniques into an organization cannot be underestimated. This paper introduces the audience to business process modeling, its benefits, and guidelines for introducing it into an organization and the key concepts and elements that underpin good business process modeling.

Keywords—business process modeling, benefits, guidelines, elements

I. Introduction

Business process modelling (BPM) has become ever more popular as organisations strive to ensure that their business processes are fully transparent, documented and understandable. Process improvement and re-engineering initiatives would be very cumbersome if existing processes were not already documented, in some form or other. BPM has evolved over the past few decades and continues to evolve. The last two decades has seen a proliferation of business process management modeling languages, standards and software systems [1]. Research on quality issues of business process models has recently begun to explore the process of creating process models. As a consequence, the question arises whether different ways of creating process models exist [2].

This paper aims to provide an overview of business process modeling, its main elements, benefits and guidelines on how BPM can be supported within a business.

The remainder of this paper will go as follows. Section 1 will introduce Business Process Modelling and the key concepts of a process and process model. Section 2 will introduce the benefits of business process modelling. Section 3 will introduce some key guidelines for business process modelling. Section 4 will introduce some essential concepts in business process modelling. Section 5 introduces the key elements of business process models. Section 6 introduces three key modelling standards. Section 7 introduces some common notation elements. Section 8 draws the conclusion.

Shah, M. I
MATHS I C
GPO BOX 1771 SYDNEY NSW 2001, AUSTRALIA

II. BPM

BPM is an approach whereby organizations attempt to graphically represent their business processes. Organizations which embark on BPM must focus on the following key application components of BPM all within an overall process strategy [3]:

- Identifying their processes
- Measuring their processes
- Establishing dedicated end to end process management
- Introducing a systematic process improvement program

Business process reengineering has renewed interest in business process modeling as a prerequisite for process analysis and improvement [7]. Many organizations have built over time, repositories of business process models that serve as a knowledge base for their ongoing business process management efforts. Such repositories may contain hundreds or even thousands of business process models [5]. The modeling of business processes often starts with capturing high-level activities and then drilling down to lower levels of detail within separate diagrams. There may be multiple levels of diagrams depending on the methodology used for model development [6].

We will now introduce the concept of a process and process model.

A. Process

At the core of BPM is the concept of a process. According to the Oxford Dictionary, a process is a series of actions or steps taken in order to achieve a particular end. A process is generally initiated by an event. The event triggers a sequence of activities that need to be actioned, over a period of time, either manually, automatically or a combination of both. The activities can be actioned by a single person (role), multiple people (same role), and/or a combination of multiple people (multiple different roles) over a given time period. The process is deemed complete when the objective of the process has been met. Note that a process is generally defined in such a way in, so that it is repeatable and it may contain decision points, allowing for multiple paths to completion [7].

B. Process Model

A business process is the combination of a set of activities within an enterprise with a structure describing their logical order and dependence whose objective is to produce a desired result [8]. It is a visual representation of sequential flows, and control logic, linked activities, actions for various role profiles. Process models describe how businesses conduct



their operations and typically include graphical depictions of at least the activities, events/states and control flow logic that constitute a business process[10].

Business process models capture the activities an organization has to perform to achieve a particular business goal. Thus, it implements a process type by describing its activities as well as their execution constraints, resource required and information processed [11]. The breadth of detail included in process models varies based on the level of detail. Business process models can be quite high level giving only a general overview of a process and simply providing very high level activities. While on the other end of the spectrum, process models can be quite low level, providing more granular detail about the activities performed. The level of detail also drives the type of additional information that is included in process models, such as data, resources and stakeholders.

The next section will introduce some of the perceived key benefits of business process modeling.

iii. Benefits of BPM

Organizations are beginning to realize the importance of supporting a robust, business process modeling framework. Business process management is an important approach for managing organizations from an operational perspective [9]. According to the global Delphi study undertaken and reported in [12], the overall top ten perceived benefits of business process modeling include:

1. Process improvement
2. Understanding
3. Communication
4. Model-driven process execution
5. Process performance measurement
6. Process analysis
7. Knowledge management
8. Re-use
9. Process simulation
10. Change management

The top perceived benefit of business process modeling is process improvement. The support of business process modeling in an organization provides a greater ability to improve processes.

The second perceived benefit is that of understanding. Business process modeling enables the support of a much clearer, improved and consistent understanding of business processes.

The third perceived benefit is that of communication. The support of business process modeling in an organization helps improve communication of business processes across different stakeholder groups.

The fourth perceived benefit is that of model-driven process execution. The support of business process modeling helps to facilitate process automation, execution or enactment, as there is a model above which this can be based on.

The fifth perceived benefit is that of process performance measurement. The support of business process modeling in an organization helps to iron out any issues that might arise relating to the definition, identification or modeling of adequate levels of process abstraction.

The sixth perceived benefit is process analysis. The use of business process modeling increases an organization's ability to model processes in order to analyze them for possible problems, time and or cost reductions.

The seventh perceived benefit is that of knowledge management. The support of business process modeling helps to improve an organization's knowledge management by increasing support for the identification, capture and management of an organization's knowledge base.

The eighth perceived benefit is that of re-use. The use of business process modeling by its nature provides an organization with a greater ability to re-use previously designed and validated processes.

The ninth perceived benefit of business process modeling is that of process simulation. The support of business process modeling in an organization increases its ability to see how a current or re-designed process might operate and the implications of doing so.

The tenth and final perceived benefit of business process modeling is that of change management. The support of business process modeling increases an organization's ability to support business change management practices, results or impacts.

Now that we have reviewed the perceived benefits of business process modeling, the next section review recommended guidelines for business process modeling.

iv. Process Modelling Guidelines

There is numerous business process modeling standards that exist in the world today. As with most information technology standards, all have their benefits and weaknesses. So it is important that any new foray by an organization into business process modeling should attempt to follow a recommended set of guidelines, to ensure they do not deviate too much from the main path.

As detailed in [13], an empirical research was undertaken into the connection of model characteristics and understandability and error-proneness, based on this a set of seven process modeling guidelines were established. Below is the list of seven recommended process modeling guidelines, referred to as 7PMG:

- G1- use as few elements in the model as possible
- G2 - minimize the routing paths per element
- G3 - use one start and one end event
- G4 - model as structured as possible
- G5 - avoid 'OR' routing elements
- G6 - use verb-object activity labels
- G7 - decompose the model if it contains more than 50 elements

The 7PMG listed above help an organization to create better process models.

The first guideline, G1, recommends that the size of the process model be kept to a minimum, as it improves the understandability of the model and will help to reduce the number of errors.

The second guideline, G2, recommends minimizing the routing paths per element, to ensure it remains understandable.

The third guideline, G3, recommends that a single start and end event is employed, because research has found that the greater the number of start and end points, the greater the chance of error probability.

The fourth guideline, G4, recommends that the model be as structured as possible, to help make the business process models easier to understand.

The fifth guideline, G5, recommends ignoring routing elements with an 'OR' condition, this too will help reduce the number of errors in the business process model.

The sixth guideline, G6, recommends using object labels from verb-objects, to help improve understandability.

The seventh guideline, G7, recommends that a process model should not have more than 50 elements. If it does, it should be decomposed into more than one model, in order to increase understanding and help reduce the number of errors.

The following section will introduce essential concepts in business process modeling.

v. Essential BPM Concepts

In the previous section, this paper looked at seven key guidelines for establishing a business process model. This section attempts to build on this, by now focusing on some of the essential concepts that need to be defined and communicated through any good business process model. These essential concepts include [6]:

- Activity (commonly referred to as task, function or operation)
- Behavior (commonly referred to as action, business rules or control)
- Resource (commonly referred to as relation class, junctions and links, interaction, dependencies, mean-ends and decomposition links, object links or organization)
- Agent (commonly referred to as social actor, or role)
- Information (represented by a message, message sending or information infrastructure)
- Entity (represented by attributes or object class)
- Event (represented as event objects or inputs / outputs)

These concepts form part of the underlying building blocks that are used to develop the business process models.

The next section will introduce some of the key elements in business process modeling.

vi. BPM Elements

According to [6], a business process model consists of five key elements. These five key elements include:

1. Customers – a business process has its customers who usually initiate the business process
2. Activities – a business process is composed of activities
3. Value – the activities that are performed in the process model aim to create some sort of 'value' for the customer
4. Actors – the actors are those that operate the activities, actors may be humans or machines
5. Organisational units – a business process often involves several organizational units

vii. Key BPM Standards

As mentioned previously in this paper, no single standard exists for business process modeling. However there are three key standards that are important for any organization to be aware of when supporting business process models. These three key standards include [1]:

1. Business Process Modeling Notation (BPMN)
2. Business Process Execution Language (BPEL)
3. XML Process Definition Language (XPDL)

BPMN is the standard that represents the high-level notation / graphical representation of business processes, that are easily understood by business analysis and is particularly handy when communicating processes in business requirement documents.

BPEL is the standard that enables the automation of business processes and makes use of the web services platform.

While XPDL is the standard that is used for the file format and is the more popular interchange language that is used for the translation between different software using BPMN notations, and BPMN to executable BPEL without loss of information integrity.

The next section looks at some of the common notation employed in business process models.

viii. Common Notation

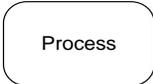
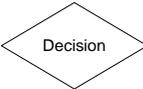
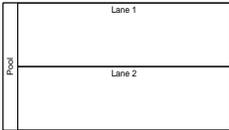
There are many different notations that are employed for use in by organizations in their business process models. It is not feasible to introduce and review each of the possible notations that could be employed. However below is a brief introduction to some of the more commonly employed notation elements in use today [7]:

- **Activities** – are the individual steps or pieces of work to be actioned in order to execute the business process.
- **Decisions** – are forks whereby the flow of work will proceed in either two or more flows

- **Events** – occur outside the scope of the process, however their result will impact the event by initiating, interrupting or terminating the process
- **Flow** – indicates the direction and sequence in which the activities work will flow
- **Roles** – represent the type of job function that a person or group of people will perform
- **Swimlanes** – traditionally are horizontal (but can be vertical) sections of a process model whose activities contained within that section are performed by a particular role
- **Pools** –an organizational boundary, it may encompass one or more swimlanes
- **Terminal Points** –the beginning or end of a process

Table 1 highlights some of the more commonly used symbols in play in business process modeling in organizations at present.

TABLE I
COMMON BUSINESS PROCESS SYMBOLS

| Component | Description | Symbol |
|---------------|---|---|
| Event | An event is an occurrence that triggers the business to respond and therefore initiates the business process. |  |
| Process | A process is an activity that is undertaken in order to achieve the desired result; it has a logical start and end point. |  |
| Decision | A decision is used to control how a process flow converges and diverges to processes. |  |
| Data Object | A data object provides information about any documents, data and other objects that are used and/or updated by a given process. |  |
| Participant | A participant is any participant in the business process. Participants are mapped to pools and swimlanes. |  |
| Sequence Flow | A sequence flow traces the order that activities will be performed in, in a given process model. |  |

ix. Conclusion

As shown in this paper, business process modeling is an important component of any organization. Good business process modeling ensures a company's processes are accurate, up to date and are a true reflection of their current business

processes. Good business process modeling cannot be instilled within an organization until these concepts are understood. This paper has introduced concepts required to support good business process modeling within an organization that is of a process, a process model and business process modeling.

This paper also looked at a global Delphi study that was undertaken and the key benefits that this study was able to highlight. This was then followed by the 7PMG, that is, the seven key process modeling guidelines that have been developed. This paper then looked at some essential business process modeling concepts and elements. As has been shown in this paper, it is clear that the benefits of an organization employing business process modeling is great, as it provides a valuable means by which to visualize the often complex business workflows of an organization. This paper has highlighted some of the key considerations, guidelines, concepts and elements that need to be considered in supporting business process modeling in an organization.

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