An Overview of Business Process Modelling Languages

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Abstract —— **Now a day's various types of Business Process Modelling Languages are available for designing new software process. Interest to evaluate this study is that all the enterprises need to satisfy their business goal speedily and easily with minimum cost and efforts. To achieve this they must use any one model from available models. Now basic aim of our study is to evaluate various business models and identify which model is appropriate for the business stakeholders of any organization to achieve specified goal. In this paper we address to review available business process models and compare them.**

We mainly focus on BPM – Business Process Model, UML-AD – Unified Modelling Language Activity Diagram, EPC – Event Driven Process Chain and BPMN – Business Process Model Notation. In the heart of this study, question arrives that do these models have any differences in their representation? In our result, we found trivial differences in all business models and find BPMN is a good process model for transform various business message and activity between stakeholders to understand business processes.

Keywords— **Business Process, BPM – Business Process Model, UML-AD – Unified Modeling Language Activity Diagram, EPC – Event Driven Process Chain, BPMN – Business Process Model Notation, Stakeholders, Representation power.**

I. INTRODUCTION

Davenport & Short (1990) define business process as *"A set of logically related tasks performed to achieve a defined business outcome."*

A process is *"a structured, measured set of activities designed to produce a specified output for a particular customer or market"*

Special purpose of business process model is mainly divides into two categories namely Organization Design and Information System Design. In organization point of view it required for documentation of process, Reorganization of process, Controlling & Monitoring of process and for continuous upgrading Quality and Knowledge. In other side Information System Design required for selecting software like ERP, form based customizing, development of software, simulation and workflow management.

Organizations have been structured around Adam Smith's idea to break down work into simple discrete tasks performed by workers with basic skills (Tailor-made). It can be used to drive the modeling, analysis and redesign of business process.

II. WHAT IS BUSINESS PROCESS MODEL

- **What is Business?**

  It is an organizational activity that performed by various stakeholders to get desired result for services and products.

- **What is Process?**
  (According to Merriam-Webster's Dictionary)

  (i)   A natural phenomenon marked by gradual changes that lead to a particular result
  (ii)   A natural continuing activity or function
  (iii)   A series of actions and operations conducing to an end

- **What is Business Process?**

  The business process is an association of related activities with well defined boundaries and relationships, which make use of different resources to convert inputs into outputs for satisfying client requirements. In other words, the approach to handle a business needs by people and systems together.
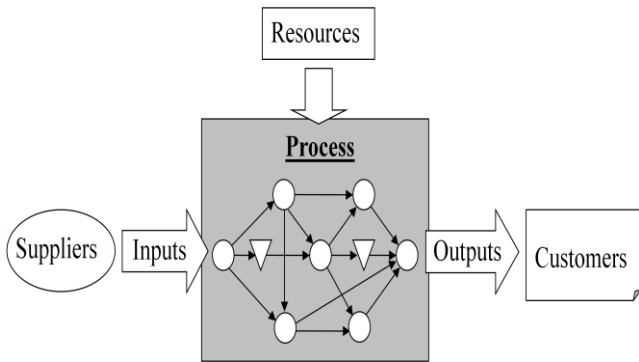
Figure – 1 The process identify the conversion of inputs and outputs

- **Inputs and Outputs**
  - Set up communication between the process and its surroundings
  - Identify the process boundaries
  - Simple to identify the Input use by the environment in order to generate the preferred Output.
  - inputs and outputs of the process can be categorized
    - o Tangible (Ex. client, raw stuff, hard cash, products)
    - o Intangible (Ex. time, knowledge, services, energy)

- **The model of a business process**

General concept of this approach is to handle a business needs by people and systems together using some kind of language, like EPC, UML-AD, and BPMN.

A basic view of the complex reality and model of business process are as under.
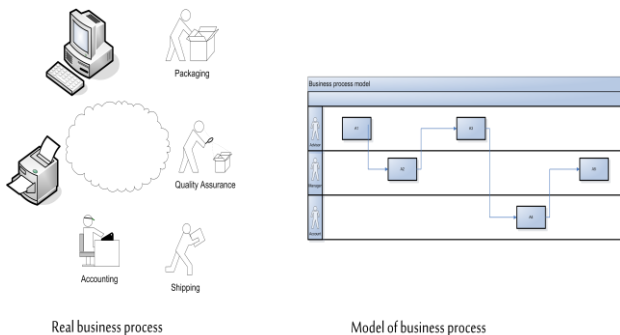

Figure – 2 Real and Model Business Process

- **Advantages of modeling the business processes**

  - Better understanding of existing business processes
  - Documents the business process
  - Basis for improving existing business processes
  - Basis for experiencing and simulating new concepts and impact on the organisation
  - Basis for continued optimisation
  - Basis for creating information systems that support the business processes
  - One type is known as Workflow Management Systems

- **Challenges modeling the business processes**

  - Difficult to model the world with people and systems interacting together.
  - Real world process is not understood
  - Different people has different views of the process
  - Processes often cross organisational borders
  - No common vocabulary to use
  - It is difficult to use which model is suitable for redesign

III. DISCUSS VARIOUS BUSINESS PROCESS MODELS

3.1 Event-driven Process Chain (EPC)

EPCs were invented back in 1992 by Prof. Wilhelm-August Scheer, Keller and Nuttgens at the University of Saarland-Germany. An EPC is a modelling language which explains business processes and workflows. So the purpose can be explained as:
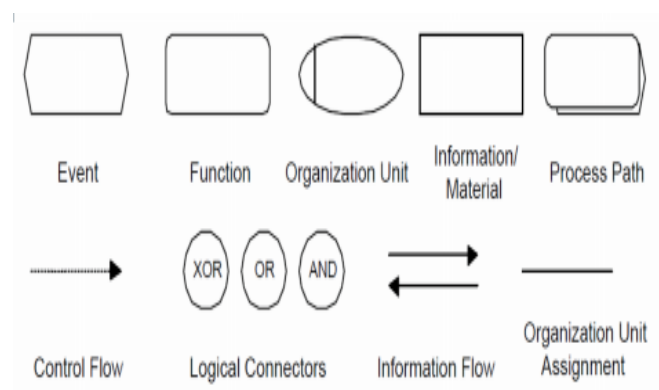

Figure – 3 Elements of EPC Model

- This diagram is used to describe business process workflows.
- Notation of EPC is Easy to understand.
- This is able of show business information system and also integrate other significant features like :
  - o information resources
  - o functions
  - o organizational structure and
  - o data

EPC is broadly acceptable standard to represent business processes. EPC Has 9 Elements to model business process:
1. Event
2. Function
3. Organizational Unit
4. Information Material
5. Process Path
6. Control Flow
7. Logical Connectors
8. Information Flow
9. Organizational Unit Assignment

3.2 Unified Modeling Language – Activity Diagram

UML is a common modelling language. It was primarily started to capture the activities of difficult software and non software system and at present it has develop into an OMG standard. This diagram offered elements and components to support the requirement of difficult systems. The diagrams are drawn from various perspectives like testing, design, implementation, maintenance etc.

Activity diagram is one of the significant diagrams in UML to explain dynamic aspects of the system. Activity diagram is fundamentally a flow chart to represent the flow form activity to activity. We can also say the activity as an operational system.

Activity diagram flow can be chronological, split or simultaneous. Activity diagrams deal with different type of flow controls using various elements like join, fork etc. This diagram does not display any message flow from activity to activity.
The functions can be discussed as:
- Design system activity flow.
- Illustrate the sequence from activity to activity.
- Describe the chronological, split or simultaneous flow of the system.

Five main categories of activity elements are:
1. Actions
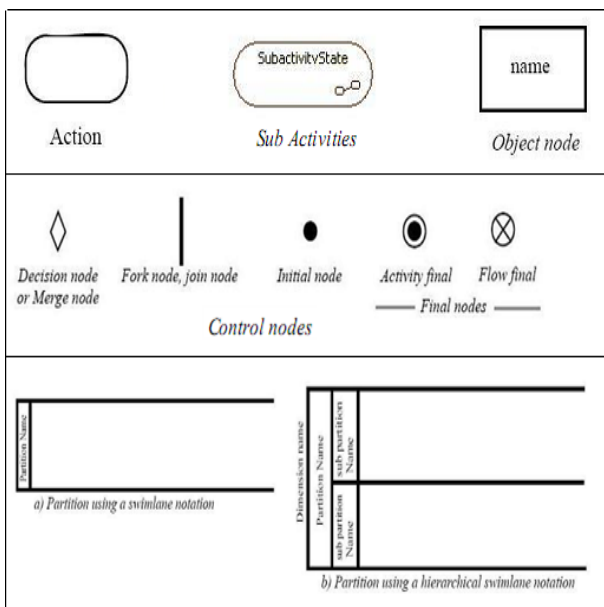2. Sub Activities
3. Data Objects
4. Control nodes
5. Partition

Figure – 4 Elements of UML-AD Model

3.3 BPMN – Business Process Model Notation

Table – 1 History of BPMN

Aug-2001	Notation working group formed (35 companies)
May-2004	BPMN 1.0 published under BPMI - Business Process Management Initiative
Dec-2005	BPMI becomes part of OMG – Object Management Group
Feb-2006	BPMN 1.0 formalized as an OMG specification
Jan-2008	BPMN 1.1 released
Jan-2009	BPMN 1.2 released
Aug-2009	BPMN 2.0 Beta 1 released
May-2010	BPMN 2.0 Beta 2 released

- **What is BPMN**

1. It is a graphical modeling language, with different symbols, associations and attributes for the use of process modeling.
2. In other word it is a graphical notation that discusses logical steps in business process. This notation has been particularly considered to organize the sequence of messages and processes which flow among stakeholders in various activities.
3. BPMN gives a general language, which allows all the stakeholders to communicate processes clearly, completely and efficiently.

- **Importance of BPMN**

1. BPMN is a standard and globally accepted model.
2. BPMN is not depends on any methodology.
3. BPMN generate an identical bridge which reduce the gap among original business processes and their execution.
4. This model provides unified and generalize way so that every person of an organization can understand easily.
5. A process diagram is less complex and that's why major business people like it.

- **Limitation of BPMN**

1. It do not do State transitions and functional decomposition
2. It do not maintain organizational hierarchies
3. It not specifying data modeling
4. It can't display detail of task or data

These model elements are divided into six main categories:
1. Flow Objects
2. Gateway Controls
3. Connecting Objects
4. Partition and Lanes
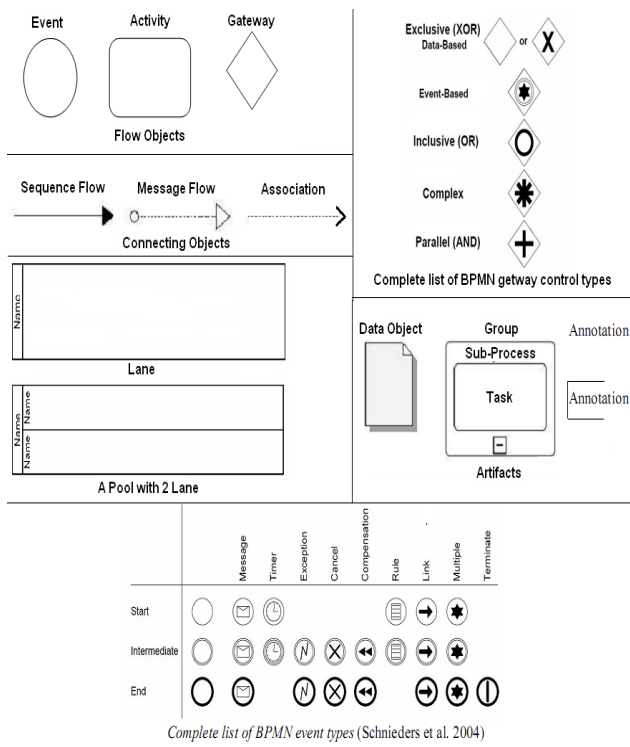5. Artifacts
6. Event Type

Figure – 5 Elements of BPMN Model

IV. COMPARISON OF THREE BUSINESS PROCESS MODELS

	EPC	UML-AD	BPMN
Structural	process path	use case	collapsed / expanded sub-process
Functional or Operational	functions	activity	task, process
Control	connector, flow	flow/edge, fork, join, decision and merge	sequence flow, fork, join, decision, merging, looping
Resource	information, resource object	-	data object
Organizational	role, person	partition, (swim)lane	pool, (swim)lane
Data Transaction	event	state diagram	message flow with data object

V. CONCLUSION

In market there are so many types of business process models are available. Among all models we discuss only three models named EPC - Event driven process chain, UML (AD) - Unified Modelling Language and BPMN - Business Process Model Notation. In our study we found minor difference among three models like EPC mostly used with ERP/SAP where as UML is mainly used for object oriented or class base designing and BPMN is used for common graphical notation that explain logical steps of business process. We conclude our result with that after observation of all graphical notation BPMN model have little bit more capability to represent business process using flow of control, easy design artifact and data-pattern.

If the matter of select any one models among above models, we can't take decision to select BPMN because of only representation power, we have to think various factor like available tools, developed process, experience and others. Unfortunately it is not in the scope of this research.

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