

A Seminal Hybrid Business Process Management Model

Muhammad Ayaz

College of Computer Science & Information Systems, Department of Computer Science, Umm Al-Qura University,
Makkah Al Mukarramah, Kingdom of Saudi Arabia
mohd.ayazkn@gmail.com, mamajeed@uqu.edu.sa

Abstract– Business process management has been heralded as a key method for improving Business Process. Thereby enhancing the efficiency and effectiveness of business operations. There are a number of critical success factors. However, there need to be in place in order to attain business process. One of them is the method or technique to be used for the capture, documentation, modeling, communication and improvement of business processes. There exist a number of methods for the business process management, each of them with a particular area of focus and limitations. Two most popular models are flow based model (which has limited notations and unable to design flexible and complex processes) and the constraints based notations model for which most of the practitioners are unwilling to adopt it because of the worry of paradigm switching. Thus, I proposed a new hybrid business process management model to combine these models and take the benefits of the existing flow based model. The proposed model will not replace the existing flow based model, rather it will use different techniques to use the constraints based notations model with in the flow based model and develop a model which should be used by any organization to design flexible and complex process.

Keywords– Business Process Model, Constraint-Based Notations, Control Flow and Hybrid Business Process Model

I. INTRODUCTION

The business process may be considered the backbone of any organization. It comprises the end-to-end activities that enable the organization to fulfill the objectives.

The business process management (BPM) is an area of computer science which is a systematic approach to making an organization's workflow more effective, more efficient and more capable of adapting to an ever-changing environment. A business process is an activity or set of activities that will accomplish a specific organizational goal. Elzinga [1] defines Business Process Management (BPM) as follows: A systematic, structured approach to analyze, improve, control, and manage processes with the aim of improving the quality of products and services. A business process can be defined as

“a collection of related, structured activities that produce a service or product that meet the needs of a client”. Often these unique business processes running in the organization are what make it competitive. These processes are critical to any organization since they generate major revenue and also constitute the majority of costs. Business processes are inter-related and inter-dependent and also change with time. Processes interact with existing systems within the organization and with outside parties. Successful automation of these processes helps any organization.

Today's complex business environment makes it impossible for an individual person or a single group of people to fully know or understand all the dynamics associated with the operational business processes within an organization. This is why, it is essential that companies map, monitor, analyze, and collaborate on process knowledge and management improvement. It is here that organizations are examining Business Process Management (BPM) which can assist in maximizing the financial “bottom-line” impact of process improvement efforts through effective communication. It supports all elements of business processes from modeling and documentation, communicating, measurement, and analysis to continuous process management and improvement. BPM is the orchestration of various business systems into identifiable and controllable systems. Every company has its own unique way of doing business and this unique way is captured in the business processes of the company.

Zairi [2] defines the following conditions that need to be in place in order to achieve desired objectives from BPM:

- The Major activities in the process flow must be properly mapped and documented.
- BPM creates a focus on customers and relies upon horizontal linkages between the defined key activities.
- BPM relies on systems and documented procedures to ensure discipline, consistency and repeatability of quality performance.
- BPM relies on measurement activity to assess the performance of each individual process, set targets and deliver output levels which can meet corporate objectives.
- BPM has to be based on a continuous approach to optimization through problem solving and extracting additional benefits.

Muhammad Ayaz is a senior lecturer in College of Computer Science & Information Systems, Department of Computer Science, Umm Al Qura University, P.O Box 715, Makkah Al Mukarramah, Kingdom of Saudi Arabia, (Email: mohd.ayazkn@gmail.com, mamajeed@uqu.edu.sa)

- BPM has to be referenced back to best practices to ensure that superior competitiveness advantage is achieved.
- BPM is an approach for culture change and does not result simply through having good systems and the right structure in place.

Therefore, it can be seen that the efficiency of processes at an organization cannot be ascertained until and unless a business process is first planned and constructed properly.

A number of business process models like flow chart model, constraints based model etc are available that would be used by the organizations to operate their business activities but most of them are unable to fulfill the requirements of the organizations in the modern business world. Therefore I proposed a new hybrid business process model, which should be adopted by most of the organizations for their business activities and taking maximum benefit from it.

II. LITERATURE REVIEW

The business process is key interest of any organization and every organization is trying to model their business process in an efficient way to take maximum benefit from their business. Today, most of the practitioners are using the traditional model like flow based process notation model [3] for any business activities in their organization. This shows the order of work as flow between activities in the organization. This model is ideal for structured work but it is unable to work in the large domain and to model flexible processes, because they have limited notations and unable to design the flexible business process. In order to model the flexible process to operate in flexible domain we need to modify this model to add some new notations and characteristics of these notations in this model.

Wolfgang Runte [14] defines the constraints based model for the business process management. The model is ideal for any business process but the main issues with this model is the independent used of the model and the Jajo & Reijers [6] mentioned that most of the practitioners are not willing to use constraint based model for the business process. Therefore, we need to change this model and make some modification if we want to model the business process through this model.

Axel & Burkhard [16] define and identify the structural process weakness in the flow chart model. Benjamin Kemper [17] define that the flow chart, the VSM and OR-type of diagrams have severe limitations, miss certain elements or are based on implicit but consequential premises.

A number of researchers believe that to directly model the business rules that give rise to the process using constraint based notation [4], [5] and then derive the possible steps from those rules when executing the process. The idea is excellent but the main issues in this approach is that most of the industries are not adopting this approach, because they believe that while using this approach, it might change the whole paradigm from flow based process paradigm to constraint based notation paradigm and majority of the practitioners don't want to switch from the existing paradigm [15]. They are not willing to model their business process in terms of

business rules instead of control flow. They believe that it would be good to use the flow based model and take the maximum benefit from it.

I notice from the literature that majority of the practitioners are more interested if we combine these two paradigms to design a new paradigm which is totally based on the flow based paradigm and use some notations from another paradigm to make it flexible, i.e., model the flexible processes. Therefore, I proposed a new hybrid business process model to address these issues. In my proposed model, I am not changing the original traditional paradigm but combining the new technique constraint based notations model with the control flow technique to take the maximum benefit from it. In simple words, the proposed model would be the integration of two techniques (flow based model and constraint based notations model).

Research Questions

- 1) What type of new notations should be used for hybrid modeling?
- 2) What type of techniques should be used to combine the flow based and constraints based models?
- 3) What type of strategies should be used to work with hybrid technologies?
- 4) What are the core requirements of languages that support hybrid modeling notations?

III. PROPOSED MODEL

The business process modeling is the important component of any organization in the modern business community and every business organization is trying to model the business process in fascinate style to achieve the maximum benefit from their business. Different organizations are using different business processes models to run the daily operations in their organization for their daily business actives. But the existing models are unable to fulfill the practitioner's requirements because they operate on limited notations and are unable to model flexible processes which are the core requirements of the organizations in the modern business world.

In order to address these issues, I proposed a new hybrid business process model to address these issues to take the maximum advantages from the exiting model. I will not change the traditional flow based model, rather I plan to integrate the two approaches (flow based process paradigm and constrain based notations paradigm) to take maximum advantages from the flow based process paradigm.

A) Constraints Based Business Process Model (CBBPM)

Constraints based model is a proved mathematical model, in which the outcome of each decision is constrained by a minimum and maximum range of limits. The decision variable sharing a common constraint must also have their solution values fall within that constraint bounds. A constraint based model approach is commonly used in the business process modeling (BPM). The constraint techniques can be used to guarantee that specified relation is hold, so that principle is declarative paradigm. In general, for the

processing of constraints, the problem is formulated as a constraint satisfaction problem (CSP). The CSP is a triple (V, D, C), where V denotes a finite set of variable, D denotes a set of associated domains with possible values for each variable and C denotes a finite set of constraints. Each constraint defines a relation between a subset of variables and constrains the possible values for the involved variables.

In the constraints based business process model, the control flow is managed by the process engine to separate the control knowledge from business rules. In this model, the rules which define dependencies and relations in business process are enhanced or replaced by constraints. The control knowledge should be modeled with rules to avoid the maintenance problems [13].

In the constraints based business process model, first the constraints as a replacement for business rules, to bring control as soon as possible back to the process engine. The user is able to model the control flow intuitively and graphically as process model instead of abstract business rules definitions. Second the dependencies and relations of elements and attributes of a business process may be modeled as constraints to inference values due to specific input and to guarantee a consistent process configuration.

In this model, the constraints should be used in the business process as a Static use of constraints at modeling (constraints are used to check for a consistent process model) and dynamic use of constraints at runtime (constraints are used to check for consistent states of process instances at runtime).

The constraint based model is of less procedural nature and uses a more declarative style. Using constraints, the behavior is restricted. Unlike procedural languages, constraints may be no-local. Activities and constraints on activities are the key elements of a constraint based model. Constraints define the boundaries within which activities can be executed. Beside activities and constraints on these activities, the constraint model also included a mapping that defines whether constraints are optional or mandatory.

This model is ideal and could be used to define any flexible and complex business process but the main issue is the unwilling of the practitioners and their uses in the business world.

B) Flow Charts Business Process Model (FCBPM)

A flow charts business model is a traditional Business Process Model (BPM). Commonly, it is a diagram representing a sequence of activities. It typically shows events, actions and links or connection points, in the sequence from start to end. Business Process Modeling by implication focuses on processes, actions and activities, etc. Resources feature within BPM in terms of how they are processed. People (teams, departments, etc.) feature in BPM in terms of what they do, to what, and usually when and for what reasons, especially when different possibilities or options exist, as in a flow diagram. Business Process Modeling is cross-functional, usually combining the work and documentation of more than one department in the organization.

In this model the flow explains the typical manufacturing process beginning with a design activity and ending with an activity for the actual manufacture of product M in any organization. The activities in the flow charts are presented in chronological order. The first activity, followed by the second activity and so on. Therefore, there is no confusion as to the sequence or as to which will be a trigger for the next and so on. This model is very simple and adding and removing an activity can be easily done. Thus the flow charts model can be used to identify areas of improvement in the flow.

The flow charts model supports in finding the key elements of a process, which drawing clear lines between where one process ends and the next process starts. Flow charts are flexible and can be used to examine the flow of information, materials and combinations of these. They are extensible and can support icon sets to facilitate process mapping within various contexts. Flow chart provides strong support for

Table I: Comparison of Flow based model and Constraints based model

Parameter	Flow Chart Model	Constraints Based Model
The ability of the method to provide precise sequencing of workflow or activities	Key attribute of flow chart indicated by means of arrows	The constraints templates are used to define the relationships between the activities or determining the sequential order of processes OR The constraint flow contains several running instances each related to a constraint model and a sequence of actions performed by the instances up to the current moment
Use of additional graphical representation, e.g. data storage	Flexible in terms of accommodating icons as needed	Flexible in terms of accommodating constraints as needed
Decision making representation in workflow	Boolean logic flow is provided as standard with a yes/no option	The constraints are used to define the conditions to hold on the completed traces of instances
Definition of process actors or resources	The method does not allow for explicitly stipulating who does what	There is no proper method available to define directly the process actors or resources
Activity Controls	Absent from Flow chart (except for limited control through the decision activity)	It is limited used in the constraint model through the evaluation function which determines whether a constraint model is satisfied, violated or temporarily violated
Defining of Inputs	Flow chart describes activities working on the assumption that the required inputs are provided	The constraints model defines the activities on the base of constraints that the required inputs are provided for the process

decision making. However, the notations which are used in the flow chart model to define any activity for any process model are limited and some time it is unable to define some activity in any process or sub-process, which is the main drawback of this model. The flow chart model is ideal to define and model the simple process but to define the flexible and complex process, the flow chart model fails. Moreover, the flow chart does not by itself clearly define the control, input, mechanism and outputs. It is not clear that what type of policies would be used in this model to convert inputs into specified outputs. It is therefore clear that the other main weakness of business process mapping flow charts is the absence of support for the input, control, output and mechanisms (ICOM) detail.

C) Integrating the flow chart model and constraints based model

To overcome the drawbacks of both models and take maximum advantage from the flow chart model, I plan to integrate the two models and design a new model, the new model would be capable to design the flexible and complex business process.

In the proposed model, the flow chart model does not capture the complex number of steps that the actual process would have in reality. Therefore, the model supports layered abstraction of process mapping as follow. The flow based and constraint based notations models should be working in parallel. The flow based model should be working in the normal flow on incremental base (step by step) to design any business process but if somewhere at any stage it needs any notation which is not available in this model and is necessary for any activity in the business process, then it will be generated from the constraints based model and would be hybrid in this model. The middle layer software would be used to generate the notation from the notations based model and integrated of the flow based model. Moreover, the software layer would be capable to define any type activity at any stage and could be embedded in the flow based model. By using this technique, we can define and model any type complex and flexible process without any hesitation.

Suppose in the Fig. 1 the business process need a notation at the activity n but the notation is not available to define this activity, then the required notation would be generated from the constraint based notation model through the software layer and would be embedded in the flow based model to define the activity and fulfill the requirement of the process.

The proposed model has the flowing three components:

- 1) *Flow Chart Model*: This is a traditional business process model which has a list of notations to define any business process. It works in the chronological order to model any business process.
- 2) *Constraint Based Model*: This model has a list of constraints and rules to define and model any business process. This model has a knowledge based of constraints and rules which could be used to create any notations.
- 3) *Middleware Software*: This is an intermediate tool between the flow chart and constrains based models.

The middle layer is responsible to play an intermediate role between the flow chart and constraint based models. The middle layer software is used to generate any notation from the constraint based model and integrate it in the flow chart model. This layer is using an intelligent algorithm and can generate any type of notation.

The proposed model is ideal and could be used by any practitioner to define complex and flexible business process in their organization and it also avoid the practitioners' worries of paradigm switching. The block diagram of the proposed model is mention in the Fig. 1.

IV. CONCLUSION AND FURTHER STUDY

The proposed model will combine the flow based model and constraint based notations model to take advantages of the exiting model. Moreover, the model is flexible and has a lot of new notations to model flexible business processes which are the core requirements of organizations for the business process activities in their organizations. It neither replaces the flow based model nor uses the constraint based notations model independently this avoid the worry of the practitioners of switching the old paradigm. The proposed model should be ideal and could be used by any type of organization for their business process activities. Further analysis and testing of the propose model needs to be carried out in order to access the flexibility and breadth of the hybrid model. Moreover, development of software that integrates both flow based model and constrains based model is another application for further research.

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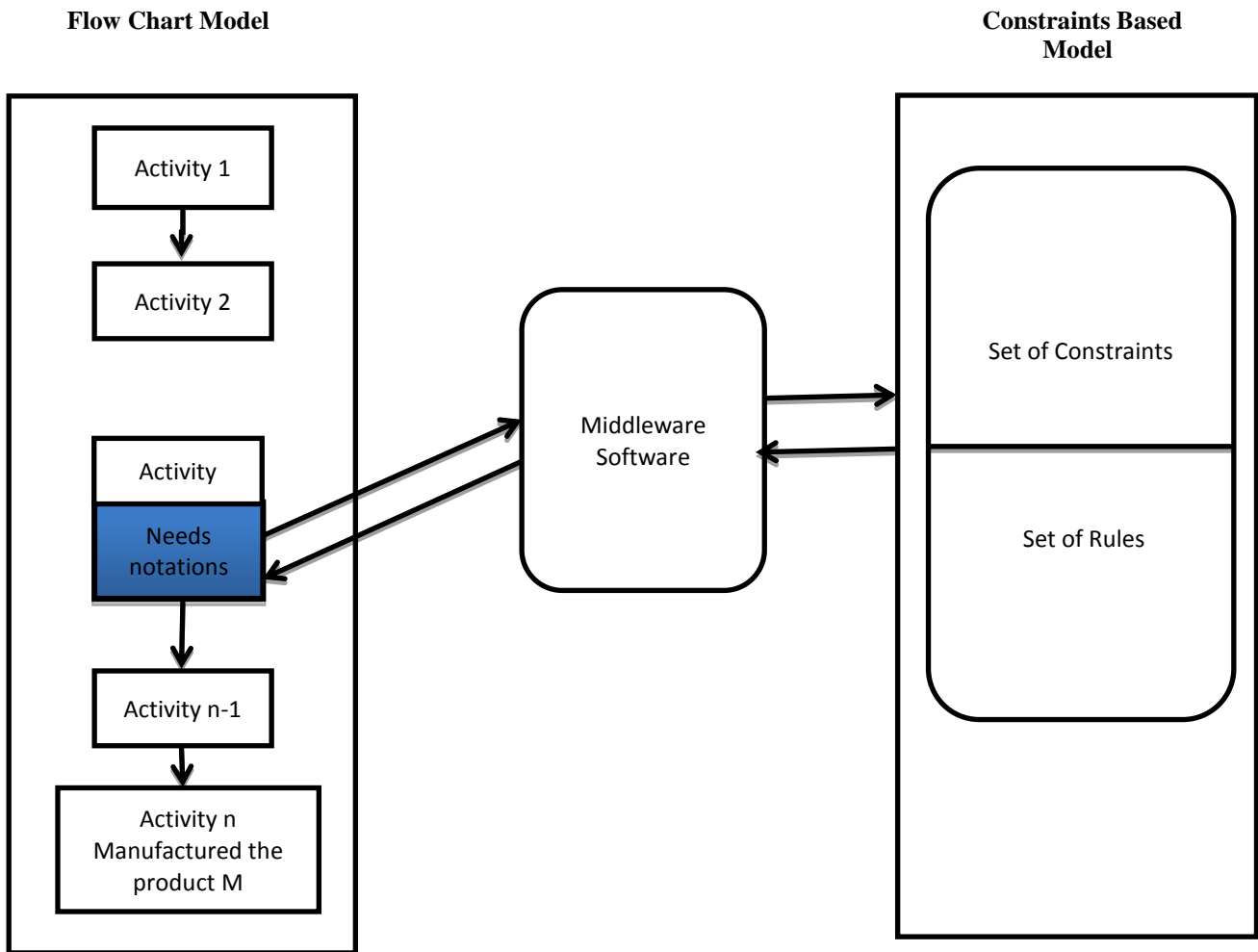


Fig. 1: Proposed Hybrid Business Process Model