
Framework for the Automation of Business Processes

Abilio Tinoco Leon

Systems Engineering School, Faculty of Industrial and Systems Engineering, National University of Engineering, Lima, Perú

Email address:

tinoco@bpi-center.com

To cite this article:

Abilio Tinoco Leon. Framework for the Automation of Business Processes. *International Journal of Systems Engineering*.

Vol. 4, No. 1, 2020, pp. 1-6. doi: 10.11648/j.ijse.20200401.11

Received: January 19, 2020; **Accepted:** February 28, 2020; **Published:** May 28, 2020

Abstract: Companies that are in a constantly changing context need enterprise agility to create new ways of doing business. For this reason, companies are changing their organization to one based on business processes. That is, companies expect to achieve business agility through the agility of their business processes. However, process automation is focused on technology and not on business process strategy. Therefore, the agility of the business process is achieved in part of the business process cycle. Companies can improve enterprise agility if they achieve agility throughout the business process cycle. This paper proposes a framework for automating business processes - FABP, to respond to business requirements with agility. The FABP uses the enterprise integration approach, where the activities of business process automation processes exchange models and reconfigure models through development driven by models from start to finish. The FABP focuses on agility for the definition of the business process strategy. That is, in the ability to reconfigure the enterprise model to obtain the business process strategy model. In this way, improve agility throughout the business process cycle. The result of the reconfiguration of the enterprise model to obtain the business process strategy model is partial. Therefore, it is concluded that the FABP allows to improve the agility of the business process and therefore the business agility. The paper presents a FABP that allows to respond with agility to the enterprise requirements.

Keywords: Business Process Management, Agility, Model Driven Development, Business Process Automatization, Enterprise Model, Enterprise Integration

1. Introduction

In today's market, everything has to be achieved faster and with greater flexibility. Thus, in order to stay in this context, enterprise agility is imperative [1]. So enterprise agility is a strategic differentiator [2]. Therefore, more agile business models are required to respond effectively to business requirements. However, to develop new business models, they need appropriate methods to plan and implement [3]. In this sense, business architecture is a management instrument that provides knowledge to determine the needs and priorities of change from a business perspective, in the same way to evaluate the benefits of innovation [4].

Enterprise agility requires capabilities to detect, transform and take advantage of business opportunities [5]. Therefore, knowledge sharing is important for business agility. However, agility lies not only in what is done, but also in how it is done, that is, in business processes [6].

Companies are increasingly demanding the agility of their

business processes, since the performance of their business processes is a key resource for competitive advantage [7]. Therefore, companies require greater agility to adapt their business processes in response to their business requirements and changes in their environment: laws, technology, market [8].

On the other hand, BPM also contributes to business agility. So, when it is approached as a process with the support of a software system, it can improve its efficiency and effectiveness [9].

Therefore, companies that are in a changing environment require business agility, this involves different aspects such as culture, leadership, knowledge, business architecture, business process, methods for planning and implementing changes and technology.

This paper focuses on enterprise agility through the agility of business processes, agility for the implementation of new

technologies. In this sense, the agility for the automation of business processes. Because the activities of the business process automation process are not fully integrated [10], agility is lost. Therefore, a FABP is required to respond more quickly to business requirements.

The purpose of this paper is to propose a FABP that allows to respond with agility to the business requirements with the approach of business integration and the development driven by models.

In section 2, the research methodology is described, in section 3, the FABP is described, in section 4, literary review is done, in section 5, the analysis of the literary revision is done, in section 6, the analysis of the result is made and the conclusions are finalized.

2. Research Methodology

The activities to establish the FABP proposal are shown in Figure 1.

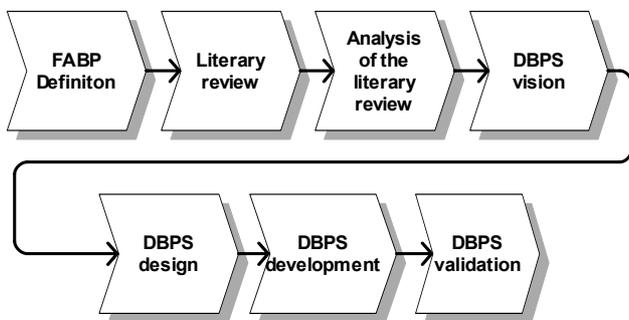


Figure 1. Activity flow establish the FABP proposal.

3. FABP

3.1. FABP Concept

The FABP is a set of activities, procedures, models, model methods and tools for automating business processes to respond to business requirements with agility.

3.2. FABP Components

The FABP is formed by the following components:

- 1) Activities for the definition of the business process strategy - DBPS.
- 2) Procedure for the description of the activities.
- 3) Models to record the content of the business process strategy.
- 4) Model methods for the transformation of models through model driven development - MDD.
- 5) Tools to support automation activities.

3.3. FABP Contextual Perspective

In the contextual perspective of the relationships between the components of the FABP are shown in Figure 2.

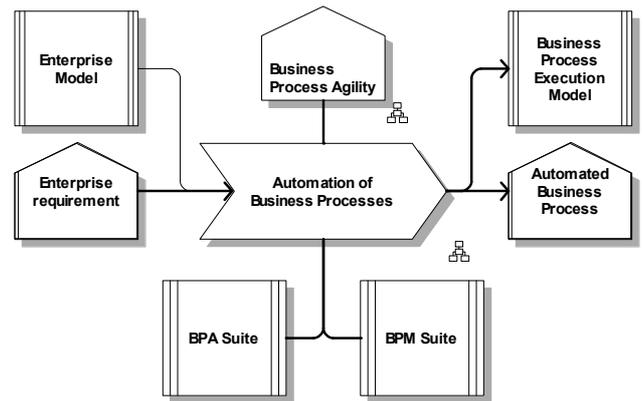


Figure 2. FABP contextual perspective.

3.4. FABP Detailed Perspective

The detailed perspective of the relationships between the components of the FABP are shown in Figure 3.

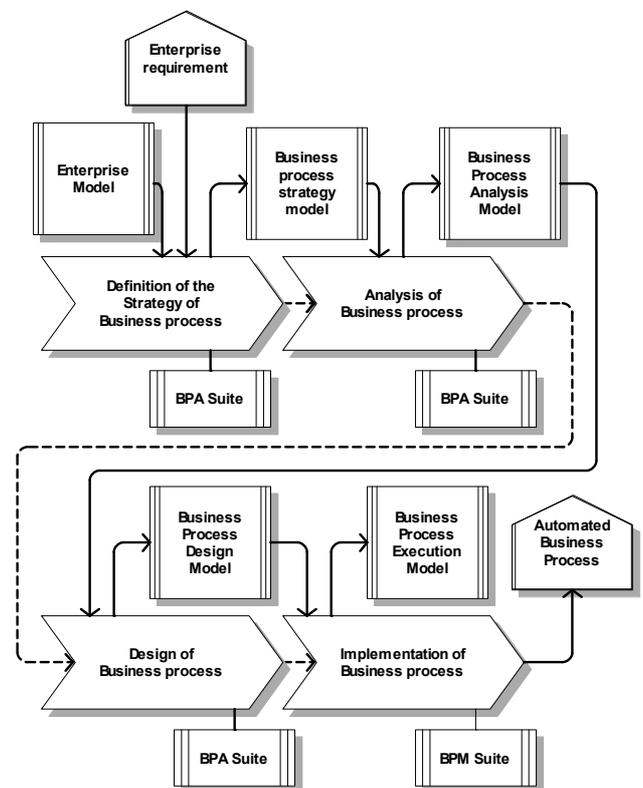


Figure 3. FABP detailed perspective.

3.5. The Purpose of the FABP

The purpose of the FABP is the automation of business processes to respond to business requirements with agility.

3.6. FABP KPI

The FABP agility KPI is the reconfiguration, proposed by Raschke [11].

3.7. *FAPB News*

The activities in the business process automation process are not fully integrated, there is no integration between the business process strategy definition activities and the business process analysis [10]. However, the agility of the business process could be improved if it is possible to integrate the business process strategy definition and business process analysis activities and if they are carried out with the MDD, see figure 3.

3.8. *Business Process Strategy Definition - DBPS*

3.8.1. *DBPS Concept*

The DBPS is an activity and its procedure, with a set of models, model methods and tools that have the purpose of obtaining the business process strategy model - BPSM with reconfiguration capacity.

The BPSM should answer the questions Q1-Q7, proposed by Scheer [12] and the question Q8 proposed by Burlton [13], these questions are:

- 1) Q1: What products / services are offered to which markets?
- 2) Q2: How important are the different business segments to achieve overall strategy?
- 3) Q3: What are the critical success factors that define the business objectives we want to achieve?
- 4) Q4: What are the key members of the organization to achieve business objectives?
- 5) Q5: What is the process structure, organizational structure and information technology structure?
- 6) Q6: What areas of processes and what processes are related to business objectives and what are the KPIs of related processes?
- 7) Q7: What activities are required to achieve business objectives?
- 8) Q8: What is the information and knowledge required to meet the capacity demanded of the process?

3.8.2. *DBPS Purpose*

Definir la estrategia de los procesos de negocio con capacidad de reconfiguración.

3.8.3. *DBPS Components*

The process for defining the business process strategy will consist of the following components: The activity, the procedure, the BPSMs, the model methods and the tool.

3.8.4. *DBPS KPI*

The KPI is the ability to reconfigure of the enterprise model - EM to obtain the BPSM.

4. *Literary Review*

4.1. *Literary Review of Models*

In the 1999 Scheer [14] proposes the model goal for the business process strategy (M1). This model goal answers the questions Q3, Q4, Q5 and Q6.

In 2009 Bridgeland [15] motivated by the transformation of the business due to mergers and acquisitions and outsourcing and relocation, proposes the business motivation model (M2). Business motivation modeling helps the success of business transformation, helps implement changes in the business. On the other hand, The Open Group [16] proposes TOGAF, the framework of enterprise architecture (M3), composed of business architectures, application architecture, data architecture and technological architecture.

The enterprise architecture is composed of catalogs, matrices, main and complementary diagrams. The footprint business diagram shows the alignment of business drivers, business objectives, processes and business services.

In the 2012 Meertens [17], motivated by the failure of projects because they start from a technological perspective instead of a business perspective, he states that the design of business processes must start from a business model (M4) and then it must be passed to an enterprise architecture. Meertens [17] also proposes the transformation of a Canvas business model and ontology to a standard model of the ArchiMate (M5) business architecture. This architectural approach would allow the analysis of cause and effect due to changes in the business strategy.

4.2. *Literary Review of Processes*

In 2001 Burlton [18], proposes the BPM methodology (P1) consisting of eight activities. The activities of defining the context of change and alignment of the architecture of the processes to the business strategies correspond to the process of defining the business process strategy.

In 2006 Jeston [19], proposes the BPM methodology (P2) through phases, the strategy phases, process architecture and launching platform correspond to DBPS.

In the 2014 Harmon [20], he proposes a methodology for BPM (P3). The methodology has three perspectives: business, processes and technological implementation. The business perspective aims to DBPS.

Gulledge [21], motivated by the demonstration of the value of SOA, which derives from the alignment of business services with business processes, proposes an approach for service-oriented implementation (P4) and concludes that this can be implemented with any technology.

Scheer [12], motivated by the optimization of the organization's infrastructure to achieve the holistic vision for BPM proposes a methodology for BPM (P5).

Burlton [13], motivated by what in an organization the relationship between what it tries to do and its ability to execute that intention, is extremely weak and inconsistent in many cases. It proposes the process of aligning the environment, intention, stakeholders, strategies, business processes and other capabilities and their relationships with each other with integrity (P6).

The methodologies proposed by Burlton [18], Jeston [19], Harmon [20], Gulledge [21] and Burlton [13], do not refer to the use of meta models to record the DBPS, which would allow structuring the information for the purpose of analysis, understanding, alignment and evaluation the DBPS.

5. Analysis of the Literary Review

5.1. Relationships Between Models and Questions

The first analysis consists in establishing the relationship between models and questions. Scheer's model [14] is related

to questions Q1 and Q3.Q7, similarly the Open Group model [16] is related to Q5.Q6 On the other hand, the Meertens [17] - Canvas model is related to Q1.Q3 and Q6.Q7 and finally the Meertens [17] -Archimate model is related to the questions Q1 and Q6. See Table 1.

Table 1. Relationship between models and questions.

Models	Questions							
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Scheer [14]	✓		✓	✓	✓	✓	✓	
Bridgeland [15]- Motivación			✓					
Open Group [16] - TOGAF					✓	✓		
Meertens [17] - Canvas	✓	✓	✓			✓	✓	
Meertens [17] - Achimate	✓					✓		

5.2. Relationships Between Procedures and Questions

The second analysis consists in establishing the relationship between the procedures and the questions, for the DBPS. The Burlton procedure [13] is related to all queries Q1.Q8, however the Harmon procedure [20] is related only to queries Q3.Q7, and somewhat similar to the

procedures of Scheer [12] and Jeston [19] are related to queries Q4.Q6. See Table 2.

5.3. Analysis of the Procedures

The third analysis consists in establishing the variability of the procedures. The Burlton [13] and Harmon [20] procedures have 5 similar tasks of 7 tasks.

Table 2. Relationship between procedures and questions.

Procedure	Questions							
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Burlton [Burlton 2015]								
Understand the business context			✓		✓	✓		
Determine stakeholder relationships	✓	✓			✓	✓		
Determine the importance of the market segment		✓						
Consolidate the strategic criteria								
Model business processes					✓			
Define the performance measure						✓		
Establish process governance				✓				
Manage business processes						✓	✓	
Align process capabilities					✓			✓
Harmon [2014]								
Understand the business context			✓					
Model business processes					✓			
Define the performance measure						✓		
Establish process governance				✓				
Manage business processes							✓	
Align process capabilities					✓			

6. DBPS Proposal

6.1. DBPS Vision

Taking into account the first analysis, where Burlton's procedure [13] is related to all questions Q1.Q8, and the second analysis, where Scheer's model [14] is related to almost all queries Q1 and Q3.Q7. For this reason, the Burlton procedure [13] can be complemented with the Scheer model [14], so that the MDD allows the reconfiguration of the EM to obtain the BPSM, and in consequence greater agility in the DBPS.

6.2. DBPS Design

Since the innovation of the DBPS is basically to integrate the Burlton procedure [13] and the Scheer model [14]. However, it is complemented with the Meertens [17] - Canvas model, see table 3.

6.3. DBPS Development

Because the design of FABP integrates the Burlton procedure [13] and the Scheer model [14]. For the model part, the EM and the BPSM are established, where each of these models is formed by a set of diagram types, see table 4.

The reconfiguration of the EM to obtain the BPSM, Platform, see table 4. through the MDD is carried out with the ARIS Software AG

Table 3. Relationship between models, questions and procedure.

Models	Questions							
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
	M1		M1	M1	M1	M1	M1	
Procedure	M4	M4	M4			M4	M4	
Understand the business context			✓		✓	✓		
Determine stakeholder relationships	✓	✓			✓	✓		
Determine the importance of the market segment		✓						
Consolidate the strategic criteria								
Model business processes					✓			
Define the performance measure						✓		
Establish process governance				✓				
Manage business processes						✓	✓	
Align process capabilities					✓			

6.4. DBPS Validation

The result of the development of the FABP is evaluated with the evaluation criteria of a EM proposed by Vernadat [22], specifically with the criterion of perfection (P), where the model is complete if it contains all the information necessary to solve the question Q1.Q8. Thus, the established levels of perfection are: 2 complete, 1 incomplete and 0 none.

After the development of the FABP, the level of perfection of the BPSM is evaluated and the result is shown in table 4.

6.5. DBPS Result

Taking into account the validation of the FABP proposal, where the level of perfection is 2 for questions Q2, Q4 and

Q6, instead the level of perfection is 1 for questions Q1, Q3, Q5, Q7 and Q8. Therefore, the level of reconfiguration of the EM model to obtain the BPSM is 1.

7. Conclusion

This paper shows a framework for automating business processes to respond to business requirements with greater agility. Responds to enterprise requirements focusing on the definition of the business process strategy. It improves business process agility with the integration of the business process cycle through model driven development, reconfiguring the enterprise model to obtain a business process strategy model.

Table 4. Perfection of the BPSM.

EM	BPSM		
Diagram types	Qi	Diagram types	P
Matrix of activity sectors	Q1	Product exchange diagram	1
Strategy diagram BSC KPI allocation diagram	Q2	Strategy diagram BSC KPI allocation diagram	2
Cause and effect diagram BSC BSC KPI allocation diagram	Q3	Objective diagram	1
BSC KPI allocation diagram	Q4	BSC KPI allocation diagram	2
Value-added chain diagram Organigrama Diagram of application systems	Q5	Function allocation diagram	1
BSC KPI allocation diagram	Q6	BSC KPI allocation diagram	2
BSC KPI allocation diagram	Q7	Value-added chain diagram	1
Business model BSC KPI allocation diagram	Q8	Function allocation diagram	1
Knowledge map Value-added chain diagram			

References

- [1] Tim. Baker, "Performance Management for Agile Organizations. Cap 2. 2017", Palgrave Mcmillan, Australia 2017.
- [2] Fiona Cannon with Nicky Elford, "The Agility Mindset", Palgrave Mcmillan, Australia 2017.
- [3] Banu Aysolmaz, Mehmet Gürsul, Kathrin Kirchner, Ralf Laue, Robert Mertens, Felix Reher, Irene Schönreiter, Bernhard Turban, and Rüdiger Weißbach, "A Reflection on the Interrelations between Business Process Management and Requirements Engineering with an Agility Perspective", Business Process Management Workshops. BPM 2017.
- [4] Marc Lankhorst, "Enterprise Architecture at Work, Modelling, Communication and Analysis", Springer Fourth Edition, Berlin 2017.
- [5] Teemu Karvonen, Helen Sharp, and Leonor Barroca, "Enterprise Agility: Why Is Transformation so Hard?" J. Garbajosa et al. (Eds.): XP 2018, LNBP 314, pp. 131–145, 2018.
- [6] Neha Chatwani, "Organisational Agility, Exploring the Impact of Identity on Knowledge Management Cap. 1", Palgrave Mcmillan, Australia 2019.
- [7] Matthias Lederer, Peter Schott, Sebastian Huber, and Matthias Kurz, "Strategic Business Process Analysis: A Procedure Model to Align Business Strategy with Business Process Analysis Methods", H. Fischer and J. Schneeberger (Eds.): S-BPM ONE 2013, CCIS 360, pp. 247–263, 2013. © Springer-Verlag Berlin Heidelberg 2013.

- [8] Marwane El Kharbili and Tobias Keil, "Bringing Agility to Business Process Management: Rules Deployment in an SOA", *Whitestein Series in Software Agent Technologies and Autonomic Computing*, 157–170c_2009 Birkh`auser Verlag Basel/Switzerland.
- [9] Mathias Kirchmer, "High Performance Through Business Process Management, Strategy Execution in a Digital World", Springer Third Edition, 2017.
- [10] Abilio Tinoco Leon, "Systematic review of the business process automation literature", *Interfases Magazine of the University of Lima, Lima-Peru*, 2017.
- [11] Robyn L. Raschke, "Process-based view of agility: The value contribution of IT and the effects on process outcomes", *International Journal of Accounting Information Systems* 11 (2010) 297–313.
- [12] August-Wilhelm Scheer and Michael Hoffmann, "The Process of Business Process Management, Handbook on Business Process Management 2", *International Handbooks on Information Systems, Second Edition*, Springer-Verlag Berlin Heidelberg 2015.
- [13] Roger Burlton, "Delivery Business Strategy Through Process Management, Handbook on Business Process Management 2", *International Handbooks on Information Systems, Second Edition*, Springer-Verlag Berlin Heidelberg 2015.
- [14] August-Wilhelm Scheer, "Aris Business Process Modeling", Springer 2nd edition 1999.
- [15] David M. Bridgeland and Ron Zahavi, "Business Modeling: Apractical Guide to Realizing Business Value", Morgan Kaufmann Publishers is an imprint of Elsevier 30 Corporate Drive, USA 2009.
- [16] TOGAF 9, Open Group, 2009.
- [17] L. O. Meertens, M. E. Iacob, L. J. M. Nieuwenhuis, M. J. van Sinderen, H. Jonkers, D. Quartel, "Mapping the Business Model Canvas to ArchiMate", Presentation for the Symposium of Applied Computing (SAC) 2012 at Riva del Garda, Italy.
- [18] Roger T. Burlton, "Business Process Management", *Profiting from process*, Ed. SAMS, USA. 2001.
- [19] John Jeston and Johan Nelis, "Business Process Management", Ed. Elsevier, Great Britain 2006.
- [20] Paul Harmon, "Business Process Change", Morgan Kaufmann Publishers, USA 2014.
- [21] Thomas Gullede, "Integrated Business Process and Service Management", *Handbook on Business Process Management 1*, *International Handbooks on Information Systems, Second Edition*, Springer-Verlag Berlin Heidelberg 2015.
- [22] Francois B. Vernadat, "Enterprise Modeling and Integration, principles and applications", De Chapman & Hall 1st Edition, England, 1996.