PROCESS MANAGEMENT CONCEPTUAL EVOLUTION MAP

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Abstract:
Process management concepts have been present within the modern organizational development since its early days. Since then, we have been able to detect many changes, challenges and improvements that occurred in the field during the past century with the primary aim remaining unchanged: defining and optimizing organizational processes in order to achieve better business results. This paper discusses the field of process management from three angles: the evolution through time, the architecture of the concepts and the notable interaction within the scope of its evolution. The significant contribution of this paper is a development of the graphical conceptual evolution map built on the basis of the three perspectives, revealing the complexity and the impact of the process management in last two decades as well as the indication for the future development. It is a simple tool for improving the understanding of how the conceptual evolution has influenced what are today known as Business process management systems. During the research phase we concluded that relations, connections and time scopes of many different approaches under the concept of process management have not been specifically evaluated or discussed. This providedthe framework for the proposed conceptual evolution map with the opportunity for future expansion and additional shaping with new details.

Keywords: process management, management, process evolution map, development time line, conceptual architecture.

1. INTRODUCTION

Taking in consideration commonly used set of approaches for organizational optimization, it cannot be neglected that foundations of process management have been recognized as important tool of modern organizations. Defining a process as a primary focus is enabling organizations to create a new base for establishing flexible, productive and innovative organizational environment. The process management will chain together rise of organizational optimization and product quality value, ”if one takes care of the process, the product will take care of itself; and any result is part of an endless process leading to future results and future processes” (Chung, 2009). Once we develop or apply a process model to a business system, it “help to produce more timely and accurate information leading to better decision making, help to improve transparency leading to better risk management, and help to improve auditing operations leading to lower compliance costs” (Cernaushas et al., 2009). Different process oriented approaches have been set up on the same basic elements of business process recognition, description and modification that provides the framework for necessary adjustments or improvements within the organizational environment. “However, it is very dangerous to assume that simply copying either the business processes or the approach towards their improvement from one successful case to another will bring the same benefits” (Trkman, 2010). That is why, while defining optimization solutions, various options have been available: from applying the open sets with already defined and specific process oriented model measures to developing innovative solutions for localized issues, which includes “gathering the information related to processes from different sources, monitoring these processes, and aligning them with corporate strategies and high-level goals” (Pourshahid et al., 2009). The strategic influence of process oriented approach triggers optimization loop and “should be a continuous effort within an organization with constant improvement in business processes” (Trkman, 2010). “It should be innovative and dynamic capability of organization which is: the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (Teece, et al.,1997) together with its internal process optimization motivation that encourages organization’s achievement dynamics to rise competitive advantage bottom line. From its early days until today, the process management has been, due to stated characteristics, subjected to dynamical changes, also subjected by constant economic and organizational developments. A conceptual evolution map produces a variety of approaches that are dealing with a process identification from different perspectives and that consequently enable a development of process management suits that can be recognized in general business environment. However, until today no clear conceptual overview has been presented to make process management field more transparent, which is the main motivation of introducing process management conceptual evolution map that connects its theoretical origins with its practical dissemination and integration insights. The lack of such knowledge disables clear indications of present changes in the field, thus inhibits understanding of these occurrences and makes it impossible to predict future development trends with required certainty. Consequently, the most important added value of the evolution map is a contribution to systematization of the process management concept and a step towards intentionally conducted survey of concept’s past evolution and prediction of future development. The developed model gathers the three different scientific perspectives of a process management under common evolutionary denominator. Not only does it provide the ability to determine position of the observed process management approaches withinthe time line of past century, it also shows how structural branches diversify within the main strings of concept expansion and which are the important horizontal connections that accelerated the conceptual evolution. This paper’s structure is set in following content order. After the introduction a theoretical background of the topic is presented with crucial definitions and historical overview of the process management. In the third chapter the used methodologyis introduced and chapter four consequently presents the analysis with results, where identified interactions in the scope of process management concept and graphical model of conceptual evolution map are revealed. In conclusion we present general findings, experienced constrains and plans for the future work.

2. THEORETICAL BACKGROUND

The process management chains togetherthe organizational optimization and product quality value, ”if one takes care of the process, the product will take care of itself; and any result is part of an endless process leading to future results and future processes” (Chung, 2009). Once we develop or apply a process model to a business system, it “help to produce more timely and accurate information leading

to better decision making, help to improve transparency leading to better risk management, and help to improve auditing operations leading to lower compliance costs" (Cernaushas et al., 2009). Different process oriented approaches are set up on the same basic elements of business process recognition, description and modification that provides the framework for necessary adjustments or improvements within the organizational environment. "However, it is very dangerous to assume that simply copying either the business processes or the approach towards their improvement from one successful case to another will bring the same benefits" (Trkman, 2010). This is why, while defining optimization solutions, a variety of options are available: from applying the open sets with already defined and specific process oriented models measuring a development of innovative solutions for localized issues, which includes "gathering the information related to processes from different sources, monitoring these processes, and aligning them with corporate strategies and high-level goals" (Pourshahid et al., 2009).

2.1 Process management conceptual evolution through the century

To improve labor productivity Frederick Winslow Taylor was, in 19th century, first known to study different aspects of worker´s characteristics. His management model was set on the practical specialization of work activities (Taylor, 1911). In this time parallel we cannot neglect Henry Fayol who advocated management is made of actions close to majority of organizations, which was confirmed trough the practical implementation (Brunson, 2008). At the same time Gantt designed tool later named Gantt chart that could be marked as a very first process model ever used (Gantt, 1913). Taylor's work was followed and upgraded by Henry Ford who developed a concept that was based on the principles of product standardization use of specialized equipment and reduction of workers` specialization for purpose of production (Toliday & Zeitlin, 1987) and by Frank Bunker Gilbreth Sr. who introduced Therbligs – elemental work motions with aim to improve work results trough the constant improvement of the working conditions (Nanda, 2006). According to George (1968) he was the first who introduced Flowchart and Functional Flow Block Diagram (FFBD) and also the first who implemented basic cyclic approach, indicated introduction in total quality management that was upgraded by Shewhart's work in 1945 and Juan in 1951 (Reeves and Bednar, 1994). 1960s brought Petri net process modeling technique, which became popular in modeling and analyzing different kind of processes, from protocols to business processes (van der Aalst, 1998). In 1970s IDEF0 was developed, by US military for conducting analysis and estimations, and later evolved in its higher versions (Grover & Kettinger, 2000). Post-Fordism brought fundamental changes, comparing it to earlier Ford's philosophy: production line work got replaced by approach that supported learning, motivation and provision of know-how, to be able to guarantee the dynamic answers to the market demands (McDowell, 1991).

In early 1980s we can also find the first mention of a Theory of constrains brought new ideas about business planning, that attracted many executives and production planners (Rand, 2000) as well as Total quality management (Powel, 1995). In this decade Toyota production system directed Toyota company on a way towards one of the largest auto producers in the world (Fujimoto, 1999) and few years later Porter (1985) labels 1985 as a year of Value chain as a new presentation of organizations` activities. 1990s began with Rummler-Brache methodology, described in their book Improving performance (Rummler & Brache, 1995) together with Business process improvement (also known as business process redesign), described in James Harrington's Business Process Improvement: The Breakthrough Strategy for Total Quality, Productivity, and Competitiveness (Harrington, 1991). This is also the period of Business process reengineering (also known as Business process innovation), which is defined as the global innovation and thorough change of business processes to achieve important improvements in performance measures such as cost, quality, service and speed of production (Hammer and Champy 2009), enterprise resource planning was deployed and promoted among executives officiers (Umble et al., 2003) and Lean production, Derived from TPS and influenced by Taylorism and Fordism, began its successful march (Womack & Jones, 2003). Gupta (2008) spread importance of process based link with knowledge, today known as Learning organization, together with Nonaka (1991), who advocated understanding of knowledge within the frames of Knowledge management. Capability maturity model was developed that included set of criteria that can serve to improve organizational development processes (Paulk et al., 1993), Benchmarking was first time described as business tool in Boxwell's Benchmarking for Competitive advantage, and soon after, there was notable Six sigma breakthrough in General Electric (Eckes,

2001) together with Workflow management and its main purpose systematic process orie nted approach (van der Aalst, 1998). In 21st century expanded Supply chain management, connecting organizations that ran operational and managerial value-adding processes (Lambert & Cooper, 2000), Capability maturity model evolved in Business process maturity model that is still subject of current researches (Hüffner, 2004), process architecture based management got introduced trough Service oriented architecture which revealed component based process view (Bieberstein et al., 2008), Process automation appeared together with Enterprise application integration. Both are symbiotically incorporated in process modeling (Linthicum, 2003), and Business process collaboration became very important part of modern global business development" (Gong et al., 2006). Business process mining appeared as useful tool for process identification and definition, with extracting knowledge about processes from their transactional log files (van der Aalst et al., 2006). In 2011 Business process model and notation 2.0 was released that replaced first generation of BPMN and became a standardized notation for the writing down the business processes (Allweyer, 2010). With the rapid development of IT technology, influences can be seen also at IS and its business part is not excluded. Real-time business intelligence is becoming decision driver, disabling process slowdown, and supporting transformation from short term Process management (Plenkiewicz, 2010) in Day to day process management (Cohen, 2010) and finally in Real-time process management (Smith et al., 2003).It is not hard to indicate that from early scientific beginnings until today the development of following vertical structure can be distinguished: 1st is process modeling and 2nd is process improvement. Each of these contains many different approaches that use specific set of methods. From the horizontal point of view such structure is intertwined with similar western or eastern influences that are necessary for establishing connections and enable synergies among approaches and methodologies. Such synergies produce market products, suits that became known as Business process management systems, that contain different solutions for specific demands and allow tailored accession to optimal results. BPMS can be identified as latest generation in the process management concept, because after a century of development, testing and spreading of process management structure, modern systems are trying to merge it together and use out the best of it: the perfect elements that will provide demanded solutions.

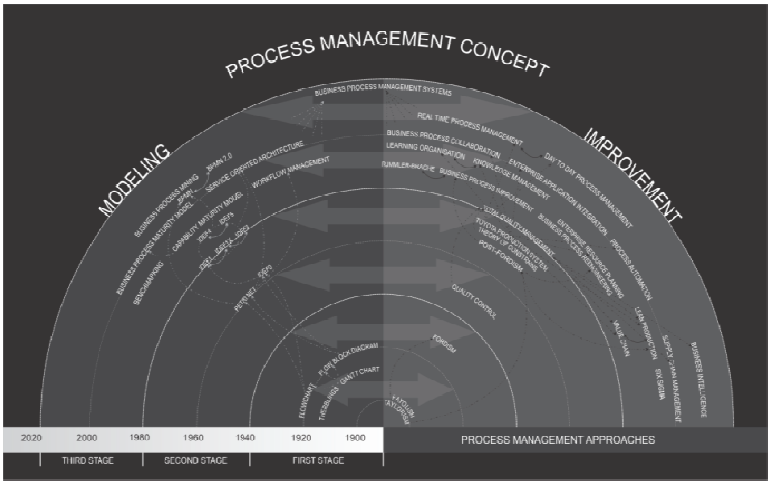
3. RESEARCH METHODOLOGY

The methodology that was used for purpose of this paper consists of descriptive methods, overview of the literature, studied cases and relevant researches that directly included process management or held a connection with the concept. We used methods of theoretical comparison to define different general aspects of process management, theoretical synthesis to stress substantially connection among them and graphical visualization to create multidimensional holistic model of results. While collecting theoretical sources, we relied on a chain referral sampling method that provided us with variety of information, we needed to get wide overview of the process management field.

4. ANALYSIS AND RESULTS

At the early beginning of the research we discovered uncertainty among basic definitions concerning process management or business process management. Process management, based on a view of an organization as a system of interlinked processes, involves concerted efforts to map, improve, and adhere to organizational processes (Benner, 2001). We define business process management as follows: Supporting business processes using methods, techniques, and software to design, enact, control, and analyze operational processes involving humans, organizations, applications, documents and other sources of information (van der Aalst et al., 2003). Trying to understand the difference between two managing definitions we must define the difference between the processes that are their primal focus. A process is a completely closed, timely and logical sequence of activities which are required to work on a process-oriented business object. Such process oriented object can be, for example, an invoice, a purchase order or a specimen (Becker, et al., 2003). A business process is simply how an organization does its work – the set of activities it pursues to accomplish a particular objective for a particular customer, either internal or external (Davenport, 2005). The conceptual evolution map enables us to get a clearer picture of the process management historical changes. The first half of our proposed time line presents approaches like: Taylorism, Fayolism, Fordism and Quality control that are representatives of constructed approaches, using several perspectives to achieve process development and optimization. On the other hand we can recognize approaches like:

Gantt charts, Flowcharts, Functional flow block diagram, Petri net and Therbligs which are used for mostly for process description and explanation, without integrated tools to directly rise process optimization level. The following two decades defined on one hand strong approaches as Theory of constrains, Toyota production system and Total quality management that provided the ability to change and improve addressed processes, while on the other new IDEF modeling approaches: IDEF0, IDEF1, IDEF1X and IDEF3. Searching for connections among modeling approaches from 1900 until 1980, we can notice following similarities. 1st stage: Gantt chart acts as predecessor of Flowchart and Functional flow block diagram which can be also further evolved Flowchart with elements of Therblings (additional elements with new meanings). Fordism acted as an influence on later Taylorism. 2nd stage: Flowchart and Functional flow block diagram present clear foundation for development of Petri net and IDEF0 which use similar graphic notation for presentation of connections and activities. At the end of the period IDEF0 evolved in versions 1-3 that use very similar notation for information modeling, data modeling and process modeling. The improvement approaches in this stage present connection between Quality control and Total quality management. Less clear but notable is connection between quality twins and Toyota production system. Latter was originally called Just in time production and evolved in modern general Just in time philosophy that includes some elements of quality oriented approaches. Theory of constrains uses different, constrain elimination focused logic that highlights no obvious connection with the others in this period. Post-Fordism appeared as an answer to the market demands and implemented contra Fordism approach. There could be found some similarities with Taylorism. In period after 1980, during the 3rd stage: there was notable expansion of different approaches associated with improvement as well as modeling. IDEF pool got versions 4 (object-oriented design) and 5 (ontology description capture) and Benchmarking got introduced as a qualitative modeling approach. We can draw connection between Capability maturity model and Business process maturity which addresses CMM's process oriented features. There is also evolving connection between Petri nets and Workflow management. In this stage BPMN became standard in process modeling and in short time evolved from first to second generation. Service oriented architecture, complex and not primarily used for business process modeling can be, when graphically presented, compared with earlier approaches like Petri net or IDEF pool. Business process mining philosophy that stands on the time line in front of all modeling approaches derived out of data mining to enable process modeling in environment where other approaches fail to produce satisfactory results.Process improvement approaches within 3rd stage can be determined by following grounds, where evolution ties with previous stages get harder to distinguish because of numerous different interactions among developing approaches.



Picture 1: Process management conceptual evolution map (Source: author.)

i. knowledge (Learning organization in interaction with Knowledge management) influenced by Toyota production system;
ii. process core change (Business process improvement in interaction with Rummler-Brache, Business process reengineering) influenced by Post-Fordism;
iii. IT based (Enterprise resource planning, Enterprise application integration, Process automation, Business process collaboration) influenced by Toyota production system;

iv. interdisciplinary (Business intelligence, Supply chain management, Six sigma) influenced by Total quality management;
v. quality (Value chain and its successor Lean production) influenced by Toyota production system, Total quality management and Post-Fordism;
vi. constrains (Day to day process management in interaction with Real time process management), influenced by Theory of constrains and Toyota production system.

5. CONCLUSION

Understanding levers of process management has been subjected to research from the beginning of 20th century by scientists, professionals and different organizations. With this paper we contribute to clearer identification of how process management concept developed through the century from time and interaction perspective. As a starting point of the research, we took the earliest mentioning of management as a part of science and then we divided the 20th and beginning of 21st century by three separations that mark periods of 40 years. In this time window, research indicates two general branches of process management concept evolution: *modeling branch* which sets its scope among identification, definition and mapping; and *improvement branch* that on the other hand reaches in a process itself with aim to raise its optimization level. Within these two branches we can witness appearance of different approaches among which some triggered further development of the whole branch or influenced long term concept evolution. In the modeling branch we can observe how approaches from first stage maintained their influence through the second stage until the third one when they hit the expansion of approaches. The improvement branch shows us a notable foundation in first stage that lost its influence by the second half of second stage that indicates strong introduction in third stage where expansion occurs in the same time parallel with modeling branch. Even though we addressed both branches individually we cannot neglect their constant interaction which becomes even more apparent in the beginning of 21st century under the introduction of Business process management systems. The most important outcome of this theoretical research is a three-perspective presentation that shows process management from development time line, conceptual architecture and evolution interactions. All three together form conceptual evolution graphical model that clearly indicates main milestones of process management and predicts general direction of future development of the concept: systemic, IT based, real-time capable.

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