

# A Reliable Methodology for BPM Project Implementation

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## INTRODUCTION

Contemporary managers and business experts are mainly familiar with the semantics of the BPMN 2.0 specification and use recommendations for business process modelling and management. These topics are extensively covered in literature; whereas the outstanding book by Silver (2011) is an excellent source concerning the development of a good business process model, business process management has been discussed in several very useful monographs (e.g., Jeston 2008). However, the knowledge of the subject, though indispensable, is not, by itself, sufficient to guarantee that a BPM project will be successfully implemented in practice. Therefore our paper does not deal with the issue of developing a good process model but rather focuses on managing a business process modelling project. We believe that the prospects for successful implementation of BPM projects can be greatly improved if the efforts of all the participants (i.e. management, business experts, business process architects, software engineers) are coordinated and in accordance with a reliable methodology, such as the one proposed in our paper, which we entitled **Business Process Modelling Methodology (BP2M)**.

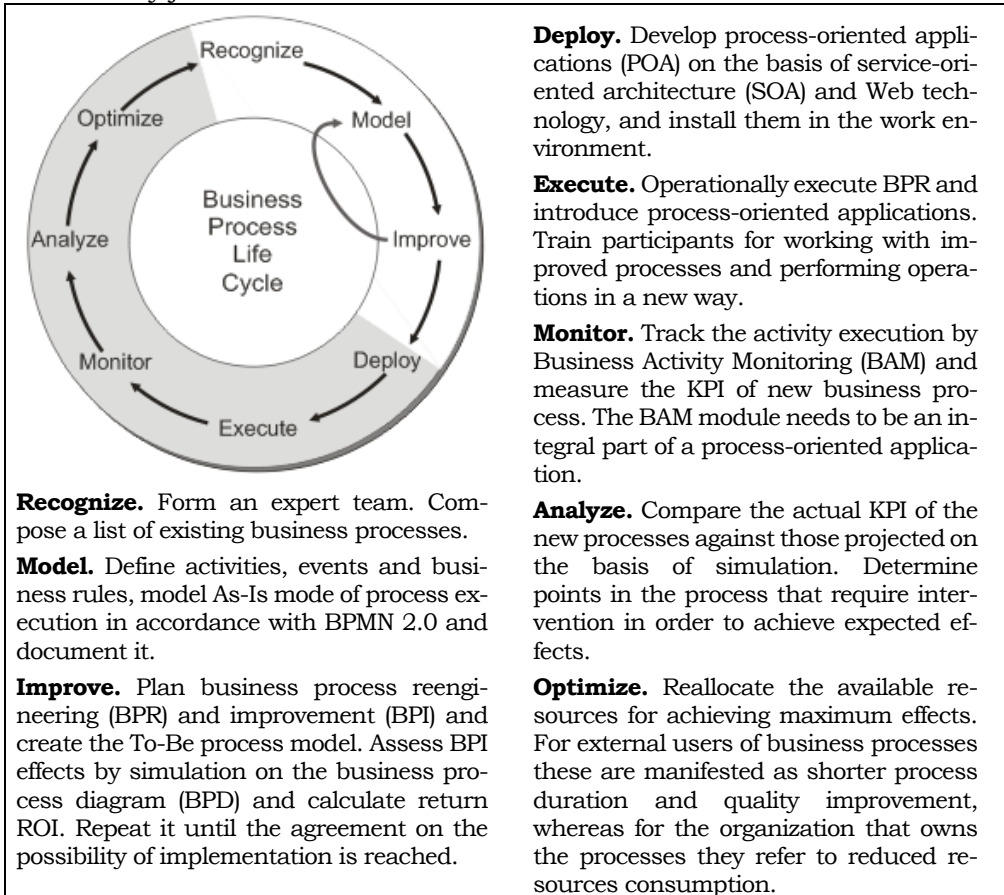
Business process management as framework for BP2M

A point of departure in devising an unambiguous definition of a business domain that BP2M is applicable to is the concept of business process management system. In our approach business process management (BPM) refers to a well-elaborated set of interlinked procedures through the execution of which an organization accomplishes its mission and realizes its business goals. Such a system can be represented by extending the general PDCA (*Plan, Do, Check, Act*) model by W. E. Deming. The extended Deming cycle, adapted to business process management, which can also be interpreted as a business process life cycle, consists of 8 phases that are shown and briefly described in *figure 1*. Drawing on our definition of business process management, it is evident that the BP2M methodology comprises the first three phases of the extended Deming cycle (i.e. Recognize, Model and Improve phases represented in the white segment in *figure 1*). The development of process-oriented applications (Start phase) is beyond the scope of our paper.

Business processes are investigated and modelled to systemize the knowledge of an organization (business, public service or state administration) concerning its operation and allow for its activity to be improved. Consequently, the basic purpose of business process management is the improvement of overall organizational performance, to be measured by means of adequate Key Performance Indicators (KPI), in other words, by monitoring changes in those indicators during implementation (Execute and Monitor phases in *figure 1*).

If at a certain point the performance of new business processes does not meet the predefined values (determined in the Analyze phase), the resources that are available for process execution need to be reallocated (Optimize phase) or a new reengineering and improvement cycle needs to be initiated.

Accordingly, our methodology has been devised with the aim of harmonizing each business process reengineering and improvement project with the organization's (profit organization, public service) strategy and ensuring that such a project is economically justified.



**Figure 1: Business Process Life Cycle**

The responsibility for strategy selection undoubtedly pertains to the domain of the organization's management. It is the duty of business process analysts and architects to (in cooperation with business experts) propose a business process reengineering and improvement model the effects of which can be calculated and proved exactly. The goals that have been generally formulated as *'BPM resulting in cheaper processes that are executed faster and yield higher quality'* need to be proved by figures based on the mathematical processing of expected improvement results by simulation run on the process model (shown as iteration of Improve and Model phases in figure 1).

Business process reengineering and improvement can be motivated by changes in the environment in which the organization operates, introduction of new technologies (including ICT), redesign of particular working steps, or by a combination of all the three factors. Considering that process reengineering and improvement is a costly endeavour, their expected effects need to be compared against necessary investment. According to our methodology, project justifiability can be assessed by calculating Return on Investment (ROI), following the expression  $ROI = \frac{Benefit - Cost}{Cost}$ . As a rule, ROI is calculated for a three-year period, which amounts to

the time after which the technology that is being used should be replaced. An improvement project is considered effective if  $ROI_3 > 0.5$ , although in certain projects executed by the authors of this paper  $ROI_3 > 1.0$  was obtained. It should be noted that variables for assessing ROI in public services and state administration are calculated in a somewhat different way than those in profit organizations since the cost and benefit need to be calculated on the service provider's side as well as on that of the user, who needs the required service in shortest possible time and with minimum costs. In our methodology this means that the effect of BPI in public institutions ROI will be calculated for a complex system constituted by the service provider *and* the user.

### DESCRIPTION OF BP2M METHODOLOGY

Based on the BPMN 2.0 specification, experience from working in the field and our own research, we devised a comprehensive **B**usiness **P**rocess **M**odelling **M**ethodology (BP2M), so far verified on multiple occasions in projects we participated in. To our knowledge, no similar methodology has previously been described in literature, including online sources. This methodology was grounded on the following assumptions:

- In every organization or company it is the duty of the management and business experts to undertake BPR and BPI. They need to be well familiar with BP2M and cooperate during its implementation to ensure that the developed process model is informed by their knowledge of business processes in their organization and of the business segment in which their organization operates.
- However, when operational use of the methodology is concerned, the management and business experts mainly do not have sufficiently broad knowledge and skills required for business process modelling that would enable their organization to yield a maximum effect facilitated by this modelling technique. The management will therefore hire specialized consultants (business process architects) that possess such knowledge and skills, and cooperate with them by also engaging their best business experts in the BPM project.
- Consultants need to have a good understanding of the domain for which business processes are modelled, but in general do not possess specific knowledge about the business practice in a particular company and are not authorized to operationally implement the improved business process. Reliable process models can therefore only be modelled by consultants cooperating with business experts.

A business process modelling project can only be successful if cooperation on the project is established in a way that the management and the business experts determine *what* a particular model should represent and the consultants provide a modelled solution for *how* that objective can be optimally achieved. Such interaction between the beneficiaries and the designers constitutes the core of BP2M, represented in *figure 2*.

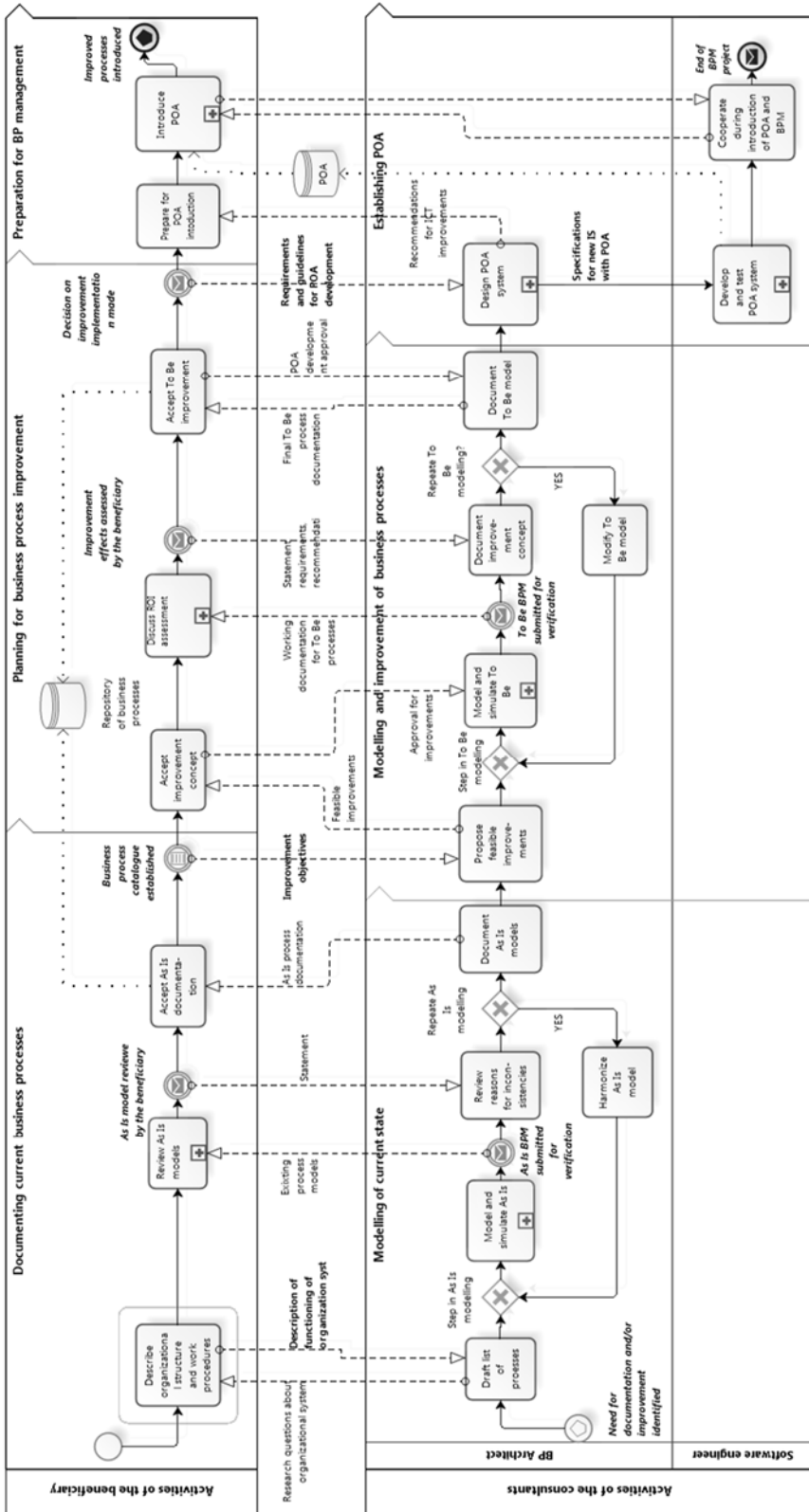









Figure 2: Methodology as a process







The methodology is defined as a complex business process model executed in accordance with the BPMN 2.0 specification. It is first represented graphically in *figure 2* as a model of collaborative processes that are executed by the beneficiary (Activities of the beneficiary) and the consultants (Activities of the consultants). The activities of the consultants are realized through two roles: the business process architect's role and the software engineer's role. Taking into consideration the aim of this paper, the process-oriented applications (POA) development procedure is not further elaborated. Instead, it is represented as a sub-process.

In addition to the graphical representation, the entire methodology is textually exemplified in *table I*. Each item in the table describes a particular activity that is performed during business process modelling, including the explanations of corresponding events and gates.

Table I: Activities of the beneficiary as part of BP2M





Process name: Activities of the beneficiary	
<p>The term 'beneficiary' refers to any organization (company, institution, public service, state administration body) for which a BPM project is executed.</p> <p>The BPM project is executed through collaboration of processes that are run by the beneficiary on the one hand and by the consultants on the other. In course of that collaboration content is exchanged that is represented as notifications (16 in total). The most important notifications are Description of organizational system functioning, Improvement objectives and Requirements and guidelines for POA development, which therefore need to be documented separately. It is through these documents that the beneficiary, for which the BPM project is executed, can influence the design of a correct model of current processes, and, above all, the reengineering, development and design of improved future processes.</p> <p>The process represents the segment of the BP2M in which business experts or the management of the organization that aims to improve its business processes (beneficiary) are engaged, cooperating with business process architects and software engineers.</p> <p>From the perspective of the beneficiary, a BPM project consists of three phases (modelled as milestones) that refer to the level of business process maturity that the organization desires to achieve. They are:</p> <ul style="list-style-type: none"> <li>Documenting current business processes,</li> <li>Planning for business process improvement, and</li> <li>Preparation for business process management.</li> </ul>	
Name of element	Process element description
	The initial event of an indefinite type since the beneficiary can have a large number of reasons for initiating a BPM project.
 Describe organizational structure and work procedures	On the basis of the targeted research questions provided by the consultants the beneficiary needs to describe their organizational structure, workplaces, way in which processes are conducted, bottlenecks, possible improvements etc. This activity will be performed through several appointments between business process architects, management and the organization's leading business experts. A manager needs to participate in the interview on behalf of the organization: in case the entire organization is encompassed by the BPM project, the CEO acts on behalf of the organization. The output of this activity is the document Description of organizational system functioning, in which all business processes need to be identified. To be prepared for the interview, the business process architect needs to be well-familiar with the organization, its mission and way of functioning in the business area as well as with its processes. This knowledge can be obtained from the organization's internal documents or public documents that regulate its

	activity (laws, professional norms). All business processes need to be briefly described according to a unified schema.
 Review As-Is models	On the basis of the previously described process elements the consultants will model current business processes. A simulation is run on the model to verify its correctness by comparing the actual and simulated values of the selected KPI. After being discussed by business experts, As-Is models are either verified or errors concerning the actual work procedures or discrepancies between simulated and actual KPI values are indicated. This action depends on the organization's internal decision-making procedures and is therefore represented as a sub-process in model.
 As-Is model reviewed by the beneficiary	The project is continued after the beneficiary has verified As-Is processes in terms of their structure and correspondence between the actual KPI values and those obtained by simulation. Eventual remarks regarding the presented process model draft or correspondence between the simulated and actual KPI will be submitted by the beneficiary to the consultants in written form. In our process model this is marked as a notification labelled Statement.
<input type="checkbox"/> Accept As-Is documentation	The beneficiary accepts documentation on the current business processes as correct and in correspondence with the actual state. The documented processes thus serve as the Business process catalogue. If this procedure has been conducted for the entire organization, it can be considered that it has reached the second level of business process maturity.
 Business process catalogue established	The beneficiary has received completed and previously approved Business process catalogue. In order to improve their business processes, the beneficiary will send the consultant a specification of Improvement objectives that they desire to achieve by BPR and BPI as well as target values of specific KPI by means of which they aim to measure the effectiveness of the project of reengineering and improvement of their business processes.
<input type="checkbox"/> Accept improvement concept	On the basis of the received Improvement objectives the consultants will propose organizational, technological and ICT procedures for reengineering and improvement of business processes. The beneficiary will consider the proposal, assess its feasibility in their organization (using SWOT analysis and other methods) and reach a consensus concerning feasible improvements with the consultants. In this way the beneficiary confirms their readiness to conduct the planned modifications in future business processes once the processes have been modelled in detail. On the other hand, the consultant guarantees that proposed measures will be technically feasible with the equipment that is either commercially available or can be purchased under standard commercial terms.
 Discuss ROI assessment	After the consultants have designed To-Be models (into which the previously agreed improvements have been incorporated) and calculated the effects of modifications, the management and business experts will consider the proposal of new business processes, their feasibility and expected cost-effectiveness. The expected cost-effectiveness of a BPM project is obtained by calculating ROI, wherein all the effects and costs of reengineering and improvement are taken into consideration. For this procedure, which is represented as a sub-process, other strategical analysis methods (SWOT, BCG, Value Chain etc.) also need to be used.
 Improvement effects assessed by the beneficiary	The project is continued after the beneficiary has accepted all the proposed improvements (represented in To-Be models) and the costs of conducting the planned improvements. Remarks by the


	beneficiary or their request for ROI verification for processes variants will be submitted to the consultants in written form.
<input type="checkbox"/> Accept To-Be improvement	The beneficiary accepts To-Be processes and expected improvement effects, whereby the Business process catalogue is updated. If this procedure has been conducted for the entire organization, it can be considered that the prerequisites for business process management have been fulfilled, which will be realized only after POA have been implemented. In that sense, the organization will grant (or refuse to grant) its approval for POA development.
 Decision on improvement implementation made	The organization has accepted To-Be processes and decides whether to proceed with implementation of accepted solutions through the development of process-oriented applications. In case they decide to continue with implementation, the organization submits the Requirements and guidelines for POA development, in which priorities and additional POA functionalities are specified.
<input type="checkbox"/> Prepare for POA introduction	During the development of new POA, organizational (reengineering), technical (new SOA-based ICT) and educational (training for new business processes) preparations are undertaken by the beneficiary concerning the implementation of new business processes. Those changes are conducted according to the consultants' instructions, in correspondence with To-Be models.
 Introduce POA	Introduction of process-oriented applications is a technical prerequisite for business process management. The implemented POA provide insight into each process instance, identification of bottlenecks, reallocation of resources and measurement of achieved KPI. Those functionalities are an integral part of business process management.
 Improved processes introduced	From the organization's perspective, the BPM project has terminated. However, if market or technical conditions in accordance with which new business processes were designed change, or if during business process management new possibilities for improvement are identified, a next phase in the business process life cycle can be initiated (figure 1).
 Documenting current business processes	First phase of the BPM project that is aimed at documenting business processes in accordance with the BPMN 2.0. In practice this phase is referred to as Business process catalogue development. Although this phase is itself beneficial in a certain sense, the primary goal of the organization is to acquire the highest level of business process maturity, that is, to proceed with the execution of the second and third phase of the BPM project.
 Planning for business process improvement	On the basis of As-Is business processes and the consultants' proposal of possible improvements the organization decides which improvements it is capable of conducting. Based on the organization's decisions the consultants develop To-Be models of new business processes and calculate economic benefits that can be expected if improvements are implemented.
 Preparation for BP management	Third phase of the organization's BPM project that is aimed at ensuring the prerequisites for business process management. Technical, organizational and educational activities for POA introduction are practically conducted in this phase leading to facilitation of effective management of new business processes.







The Activities of the consultant's process, which collaborates with the Activities of the beneficiary process in accordance with BP2M, is described in *table II*.










Table II: Activities of the consultants as part of BP2M



Process name: Activities of the consultants	
<p>This part of BP2M comprises activities that are conducted by the consultants (business process architects and software engineers) but are executed in intense cooperation with the organization's management and its business experts.</p> <p>From the perspective of the consultants, a BPM project consists of three phases modelled as milestones. They are:</p> <p>Modelling of current state,          Modelling and improvement of business processes, and          Establishing POA.</p> <p>This process is conducted by business process architects and software engineers, defined as swimlanes in the model in figure 2.</p> <p>The BPM project is initiated if one or more of the initial events has occurred.</p>	
Name of element	Process element description
 Need for documenta-tion and/or improvement identified	<p>A BPM project can be initiated for the purpose of: documenting the existing processes in order to acquire the second level of business process maturity according to the Business Process Maturity Model (BPMM), improving business processes without providing computer support in business process execution, or improving business processes by providing computer support in the execution and monitoring business Processes (BAM).</p>
 Draft list of processes	<p>The goal of this step is to obtain a list of processes in the organization for which the BPM project is executed, verify the completeness of that list and briefly describe each business process according to a unified schema. For the processes to be identified all external documents (e.g. laws) relevant for the organization's activity and internal documents that determine its work procedures (document and data lists, business rules etc.) need to be analyzed using appropriate methods (Value Chain and/or Decomposition Diagram) need to be used. The data for these methods is gathered by interviews with the management and the organization's business experts. To prepare themselves for the interview, the consultants are supposed to analyze all the available documents and independently draft the first version of the list of processes. It is essential that the CEO of the organization for which business processes are modelled is present in the interview. Drafting the list of processes should be in strict accordance with the business process definitionii.</p>
 Step in As-Is modelling	<p>The subprocess that follows is either performed for the first time or is repeated in case the beneficiary has expressed remarks concerning the correctness of the existing process model.</p>
 Model and simulate As-Is	<p>Modelling is performed in accordance with the BPMN 2.0 by using the appropriate software tool. This complex procedure is further explained by a subprocess. In this phase a Business Process Diagram (BPD) is designed in one of the two following ways: as a collaboration diagram, for a small number of participants. The activities of each participant are placed as a private non-executable process model, while collaboration between them is modelled as the exchange of notifications between activities and events occurring between private processesiii; as a set of BPD's, if there is a large number of participants in a complex process. In that case a private non-executable process model is designed for each participant, while their collaboration with other participants is modelled as messages between activities</p>



	<p>and events in the main process and with each pool representing one of the participants.</p> <p>The selection of the content to be represented by BPD should be in strict accordance with the business process definition. A single project (which will encompass several different BPD) must contain all the processes of an organization. Logical consistency of the designed BPD needs to be verified by using simulation software, which may be incorporated in some BPM tools. The simulation is run for a statistically relevant number of business cases with a 95% reliability. The model is adequate if all the business cases are passed from start to end event, if all the paths were active, and if the KPI's in the original process are statistically equal to the KPI's determined by the simulation. KPI typically include the average process duration and the resources usage.</p>
<p> As-Is BPM submitted for verification</p>	<p>The designed process models, along with model adequacy (conducted by statistical comparison between the selected KPI in the real process and the values of those KPI obtained by the simulation), are submitted by the consultants to the beneficiary's business experts and management for adequacy verification.</p>
<p><input type="checkbox"/> Review reasons for inconsistencies</p>	<p>The received notification (or the Statement of the beneficiary) can be interpreted as the beneficiary's acceptance of the designed process models, so next activity is proceeded with. On the other hand, if in their statement the beneficiary has indicated inconsistency between the actual and simulated KPI, the lack of correspondence between the real process and its model needs to be analyzed.</p>
<p><input type="checkbox"/> Repeat As-Is modelling?</p>	<p>The procedure of modelling the existing business process is repeated as long as it has been confirmed (in the Statement of the beneficiary) that the process model corresponds with the actual process performed in the organization.</p>
<p><input type="checkbox"/> Document As-Is models</p>	<p>Each business process needs to be documented to determine the following attributes: short name, detailed description, KPI concerning process performance, start and end event, process inputs and outcomes, activities and decisions within the process, required resources (by type and amount), causes of insufficient process efficiency as well as reasons for improvement and expected benefits it could yield. The names of processes and their related activities need to be brief (15-40 characters), but specific enough to describe their essence. Therefore they should be formulated according to a neutral grammar pattern: 'Predicate object (adverbial phrase)'. The performer is not specified in the name of the activity (since it is determined by the position of the activity on the swimlane), adverbial phrases are to be used only when they are necessary for the understanding of the activity content, whereas appositions and attributes are to be avoided. Examples of activity names are: 'Issue invoice', 'Send goods to customer' etc. The process execution will be exemplified in detail in the description, which, though extensive, needs to be succinct and avoid redundant words and phrases. The documentation, completed in accordance with the aforementioned guidelines, is submitted to the beneficiary.</p>
<p><input type="checkbox"/> Propose feasible improvements</p>	<p>Consultants, who have familiarized themselves with the organization's business processes during As-Is modelling, propose improvements that are in correspondence with the organization's goals and are feasible in practice. Possible improvements can be grouped into four categories:</p> <p>effects to be achieved by implementing contemporary ICT,</p>

	<p>effects to be achieved by changing the order of execution of activities (elimination of certain activities, changes from serial to parallel execution), that is, by changing model topography, effects to be achieved by organizational changes, rearranging the portfolio of the products and services and a reengineering without changing the organization's legal position, and improvements encompasses by the previous category, which, however, imply a change in the organization's legal position (changes in the portfolio, laws or statutes, etc.)</p> <p>In practice, combined improvements are most common. Moreover, it has to be noted that:</p> <p>all changes must be accepted by consensus between the beneficiary and the consultants, and</p> <p>in case of the improvements described in the fourth category above, changes in the organization's legal position need to be incorporated in the BPM project.</p> <p>In proposing improvements, the current level of the organization's business process maturity needs to be taken into consideration.</p>
 Step in To-Be modelling	<p>The subprocess that follows is either executed for the first time or is repeated in case the beneficiary has submitted remarks regarding the correctness of the To-Be process model.</p>
 Model and simulate To-Be	<p>The consultants develop To-Be models by incorporating changes adopted by consensus between the beneficiary and the consultants, in other words, anticipates their impact on the process structure, activity duration and the range of required resources. In terms of activity execution, all the explanations provided for the 'Model and simulate As Is' subprocess are applicable here. The integral part of the subprocess is calculating the effects of reengineering on reducing process duration and consumption of required resources. The improvement of business processes is a business venture for which ROI needs to be calculated. In calculating ROI for service providing companies, benefits and costs for the process owners, as well as for all the users of services, need to be included.</p>
 To-Be BPM submitted for verification	<p>The designed To-Be process models, along with model adequacy verification (conducted by comparison between the selected KPI in the real process and the values of those KPI obtained by the simulation), are submitted by the consultants to the beneficiary's business experts and management for verification.</p>
 Document improvement concept	<p>The received Statement of the beneficiary can be interpreted as the beneficiary's acceptance of the new models, so the procedure is continued by documenting the To-Be state. On the other hand, if beneficiary has indicated issues regarding improvements feasibility, excessive costs or insufficient effects (ROI), additional improvement possibilities are analyzed and other To-Be process variants are explored that will subsequently also need to be verified.</p>
 Repeat To-Be modelling?	<p>The procedure of To-Be modelling is repeated as long as the beneficiary has confirmed that the process model is satisfactory and feasible, and expected effects correspond with the predefined goals.</p>
 Document To-Be model	<p>In terms of documentation content, all the explanations given in the 'Document As-Is models' are applicable, bearing in mind that all the modifications with regards to the As-Is state need to be specified in the documentation.</p>

 Design POA system	<p>Refers to the complex task of designing process-oriented applications (POA) according to structure- and object-oriented methods for information systems design. This implies: designing an executable model for all processes, developing a database, and creating web forms, since POA function as web applications.</p>
 Develop and test POA	<p>Refers to the developing and testing POA, which need to operate in a web environment, running on service-oriented architectures (SOA). The developed process-oriented applications are submitted by the consultants to the beneficiary following ITIL specifications.</p>
 Cooperate during introduction of POA and BPM	<p>Business process architects and software engineers cooperate with the beneficiary during POA introduction and the establishment of the Business Activity Monitoring (BAM) system. This cooperation, conducted during the 'Introduce POA' subprocess, is interactive and encompasses, among others, practical training of end-users that will work with the new process-oriented applications.</p>
 End of BPM project	<p>The end event in the implementation of BP2M that needs to coincide with the termination of the activity on the beneficiary's side.</p>
 Modify To-Be model	<p>If the beneficiary has indicated that the expected effects of BPI are not sufficient and has documented that in Statement, requirements and recommendations, the consultants will explore other improve-ment possibilities and implement changes in the model to be verified by rerunning of the 'Model and simulate To Be' subprocess.</p>
 Harmonize As-Is model	<p>If the beneficiary has indicated any differences between the process model and actual procedures, or between simulated KPI values and real KPI values, the model will be modified by the consultants. These changes will lead to a process model which corresponds more accurately to reality, which needs to be verified by rerunning of the 'Model and simulate As Is' subprocess.</p>
 BP architect	<p>Consultant well-familiar with methods and style of business process modelling in accordance with the BPMN 2.0 as well as in correspondence with the business domain for which the BPM project is executed. Their responsibilities include modelling business processes, assessing expected improvements, assisting the beneficiary increasing the business process maturity level and preparing the process model that will serve as a starting point for POA development and business process management, all of which should be done in cooperation with the beneficiary's business experts. Furthermore, the business process architect works closely with software engineers in designing executable business processes.</p>
 Software engineer	<p>Consultant with expert knowledge of BPMN 2.0 and effective use of ICT in a given business and technological environment. A software engineer is responsible for designing executable process models and translating them into a process-oriented application to be executed on a SOA platform. In POA development and implementation, the software engineer works closely with the business process architect and jointly participates in training end-users for POA, its implementation and test run.</p>
 Modelling of current state	<p>First phase of the BPM project from the consultants' perspective. The output of this phase (or the first partial delivery) is complete documentation on the As-Is business process models developed in accordance with the BPMN 2.0 and verified so as to represent the real current state. Such documentation constitutes the Business process catalogue. This phase does not yield direct benefits for the</p>

	beneficiary (except for the fact that during it the organization's business processes have reached the second level of maturity according to BPMM) unless it is used for the improvement and management of business processes. As-Is models provide a starting point for the development of improved To-Be processes, whose implementation can lead to certain economic benefits.
 Modelling and improvement of business processes	Second – creative – phase of the BPM project. On the basis of knowledge about the organization's existing business processes obtained in the previous phase, the consultant proposes improvements, coordinates them with the beneficiary and incorporates them in order to the improve business processes. The To-Be model is used for calculating expected improvement effects, measured by selected KPI (most notably, those that refer to resources, costs and added value of the process as well as process duration from the user's perspective). The output of this phase (or the second partial delivery to the beneficiary) is documented model of future business processes and calculation of ROI that is expected to be obtained by implementation of those processes. In this phase the expected effects are estimated by using simulation on the process model before investments into reengineering and improvement are made.
 Establishing POA	Third phase of the BPM project. On the basis of the To-Be model, whose benefits were estimated in the previous phase, POA are developed in order to enable monitoring of each particular business case. Since POA support process execution in strict accordance with the process model they represent a new knowledge-based type of applications. To fulfil that function, POA are running on service-oriented architecture (SOA). The ultimate goal of the BPM project is to reach this phase, since POA implementation implies that the prerequisites for business process management (that is, acquiring a high level of business process maturity) have been met. This should to be the goal of every BPM project.

AREA OF IMPLEMENTATION OF BP2M METHODOLOGY

Business Process Model (BPM) is not a uniform concept. The BPMN 2.0 specification comprises four BPM types: Business Process Diagram (BPD), Collaboration Diagram, Choreography Diagram and Conversation Diagram. BPD, being the most detailed among them, is the one most commonly used in practice, while other three diagrams can be considered synthetic representations of specific knowledge about business processes and/or transitional forms that are used in transforming a verbal business system description into a detailed BPD. Our methodology refers to the BPM execution project and is thus applicable regardless of the diagram type to be used. Still, the methodology steps are arranged so as to support BDP as the most detailed process model type.

The BPMN 2.0 specification defines that in BDP each business process can be represented in three ways: as Public (abstract) process, Private (internal) non-executable process and Private (internal) executable process. On the other hand, from the perspective of the model purpose, Silver (2011) proposes systemization of BDP into Descriptive, Analytic and Executable. In addition, if we consider that a model can refer to the existing (As-Is) or future (To-Be) process and that it can be designed by business or IT experts, it is evident that doubts can ensue over which type of process diagram is most adequate for a given purpose. To address that issue, we developed a model taxonomy that relies on the following three criteria: purpose, development phases and predominant user, shown in *figure 3*.

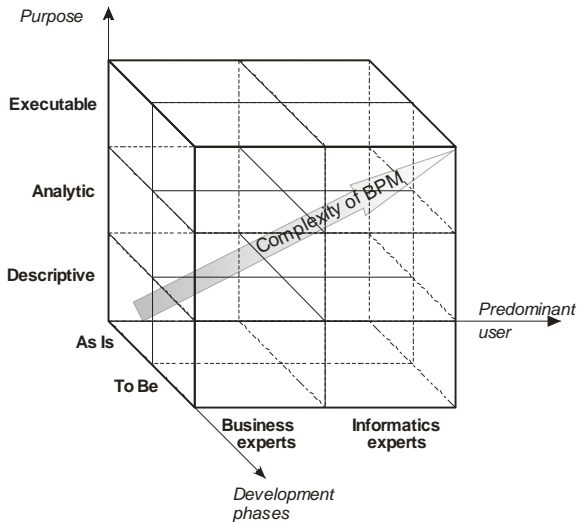


Figure 3: Taxonomy of Business Process Diagrams

In terms of its purpose, a BPM can be *descriptive* (drawn with a basic set of symbols), *analytical* (drawn with a complete set of symbols, intended for process investigation, improvement and simulation) and *executable* (very detailed, aimed for the development of the process-oriented application). In terms of development phases, a BPM can represent the *existing* process (As- Is) or the *improved* process that the organization intends to introduce (To- Be). The predominant user can refer to either *business* or *informatics* experts. By combining these classifications it is possible to recognize 12 BPD types. Each model type  $M_s$  is unambiguously defined by values at the axes of the taxonomy space, which can be expressed as  $M_s \rightarrow \{x_i, y_j, z_k\}$ . Some of them can only appear in theory: for example,  $M_s \rightarrow \{\text{'Business'}, \text{'Executable'}, \text{'To-Be'}\}$  will very rarely be developed. Some of them are fairly common, as in the examples:  $M_s \rightarrow \{\text{'Business'}, \text{'Analytical'}, \text{'As-Is'}\}$ , which enables detailed understanding of existing processes and represents a starting point for their reengineering and improvement, or  $M_s \rightarrow \{\text{'Informatics'}, \text{'Executable'}, \text{'To-Be'}\}$ , which provides a basis for the development of process-oriented applications to support future business processes. The general direction of process model development and improvement is determined by the main diagonal of the parallelepiped in *figure 3*, extending from  $M_o \rightarrow \{\text{'Business'}, \text{'Descriptive'}, \text{'As-Is'}\}$  to  $M_r \rightarrow \{\text{'Informatics'}, \text{'Executable'}, \text{'To-Be'}\}$ .

Such a three-dimensional classification will be useful for the management in defining BPM project goals, correct selection of the consultant team members and required competencies that team members need to demonstrate, as well as in estimating project duration and costs.

Our BP2M methodology is applicable to any of the 12 BPD types.

In practice, business process modelling can be aided by the so-called reference models. Some consulting firms provide verified reference models, usually accompanied by software solutions for particular business areas, with the aim of initiating such reengineering of clients' business processes that would allow for applications to be introduced faster. The access to reference models is also possible through non-profit organizations, with the aim of supporting public service companies in optimization of their processes<sup>v</sup>.

### RECOMMENDATIONS FOR BP2M IMPLEMENTATION

An extensive bibliography on business process modelling – itself a very broad topic – also includes references which represent an outstanding source on the topic. This section contains a list of recommendations that will facilitate more successful management of a BPM project using BP2M:

- Business processes are the only original mechanism that an organization can use to improve its performance only with own resources.
- Processes are subject to change. Owing to developments in the business environment and the increasing potential of contemporary ICT, business processes constantly need to be improved in accordance with principles exemplified in relation to *figure 1*.
- Business goals are achieved by executing processes. If an organization does not manage its processes and does not measure their performance, it can hardly know whether its efforts are headed in the right direction.
- Management is possible if a process as the object of management is clearly defined, which is achieved by modelling business processes using a norm-based procedure that can be understood by all the participants in the BPM project.
- Since modelling presupposes systematic consideration of activities, their purpose and performances, required resources, roles and organizational units responsible for their execution, it cannot be simply restricted only to 'model drawing'.
- A business process model is not supposed to serve its own purpose since it: (a) comprises the organization's entire technological knowledge, (b) enables the assessment of the effects of investments into reengineering and improvement and (c) serves as the basis for the development of process-oriented applications.
- Service Oriented Architecture (SOA) is a platform for the development of process-oriented applications (POA) which connect all activities and participants in a complex process in a way that business experts modelled as optimal in given circumstances.
- Process maturity phases evolve over time. However, maturation will not occur automatically and needs to be motivated by carefully elaborated actions of the management. The understanding of the business process maturity model is helpful in defining adequate actions.
- All the key procedures in business process management are encompassed by professional norms (BPMN, BPMM), which are based on sound theory and have been verified in best practice worldwide.
- Well-structured business processes cannot be bought. Instead, they can only be improved by the organization's business experts led by the management and assisted by experienced consultants. Frameworks are not 'ready for use' solutions; they can only provide guidelines to finding the best solution for each particular organization, enabling it to avoid lengthy distractions.

Modelling and reengineering of business processes in public services needs to be conducted in accordance with legal norms, while also anticipating the potential of contemporary ICT. Consequently, it is an informatics, as well as a business and legal venture.

Process modelling will lead to simpler procedures, make the public sector more capable of providing quality services to individuals and organizations, enable the

development of process-oriented applications and create preconditions for business process management.

Business process modelling and reengineering in profit organizations will reduce resources consumption for each unit of the delivered product and thus make them more competitive in the market.

### PRACTICAL EXPERIENCES IN IMPLEMENTING BP2M

The BP2M methodology constitutes our synthesis of knowledge and experience regarding business process modelling that has undergone multiple verifications through projects we conducted. Four of them are described below:

*Analysis, improvement and reengineering of business processes (Croatian Institute for Pension Insurance – CIPI, 2009)*. A complex project in which, apart from 15 members of the consultants' team, about 40 business experts from CIPI also participated. Around 300 business processes (both in the CIPI headquarters and over 70 of its branch offices) were modelled in the As-Is version, then optimized and modelled in the To-Be version, using BPMN 1.1 notation and IBM WebSphere Business Process Modeler. Reengineering and improvement effects for all business processes were calculated using simulation, with estimated cost reduction for CIPI resources amounting to about 30% and reduction of service time for the end-user amounting to about 46-67%. ROI for the entire project was also calculated. Terms of Reference (TOR) specifications for the new process-oriented system were drafted. A generic ICT infrastructure based on SOA was proposed.

*Supervision of business and ICT integration (Plinacro – Gas Transmission System Operator, 2010)*. Modelling harmonized business and gas transportation processes (using BPMN 1.2 and IBM WebSphere Process Modeler) to verify effects of implementation of a new information system. Improving the business processes for gas transportation control and aligning them with the management information system. Testing the software supplied in accordance with ISO/IEC 9126 standard and advising the client on the organization of ICT operations in accordance with ITIL.

*ICT strategy for process-oriented Document Management System (Croatian Employment Service – CES, 2011)*. Content and workflow analysis for more than 500 documents which enter CES, are created by CES or are sent to clients (unemployed persons and employers) was performed. A strategy for a new process-oriented Document Management System (pDMS) was established. All business documentation was classified into 14 basic types. Developing As-Is flows of documentation for all these types in accordance with the process approach and drafting To-Be models in accordance with BPMN 2.0. The existing DB was expanded and all new program procedures were designed. Expected effects and cost savings were obtained by simulation and ROI for the entire project was calculated. TOR specifications for the development and implementation of the new pDMS were drafted.

*Process model of the University (University of Zagreb, 2012)*. Analysis and modelling of all academic, teaching, research and student As-Is processes at Croatian universities. Reengineering and improvement of processes by using contemporary ICT, modelling To-Be processes, simulation on the process model and calculation of expected effects. All business processes were modelled in accordance with the BPMN 2.0 specification. For several processes new process-oriented applications were developed using BizAgi Studio, which were deployed for execution on the process engine.

### CONCLUSION

In this paper our methodology for BPM project implementation is shown as an array of interlinked activities executed by business experts, business process architects and software engineers, who cooperate during BPM project execution. Each participant has a particular role. Business experts are responsible for As-Is modelling, defining key performance indicators for measuring the reengineering effects, validating To-Be models and making the company ready for implementation. Business process architects' job is to define optimal solutions regarding To-Be business processes and to prove that their performance has indeed been enhanced using predefined KPI on the one hand and to define software and ICT for BPM on the other.

Finally, developing and testing process-oriented applications, as well as preparation for their implementation is the responsibility of software engineers.

The methodology itself is defined as a business process comprising 21 activities and subprocesses organized in two pools and three lanes. Procedures for each participant are defined by sequence flows, events and decisions, whereas collaboration between participants is shown by message flows. The methodology has been graphically designed in accordance with the BPMN 2.0 specification, with the description of all steps provided separately.

The proposed methodology has been verified in practice on several real-life projects, wherein it has proved to be an invaluable tool for the management in supervising BPM projects.

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<sup>i</sup> The acronym BPM stands for 'Business Process Management' as well as for 'Business Process Modelling'. The former meaning of the acronym is the one most commonly used in articles on management, with the assumption that 'Modelling' represents the first phase without which 'Management' cannot be accomplished. The term 'Business Process Management' thus comprises all the 8 phases of the business process life cycle (*figure 1*).

<sup>ii</sup> Several different definitions of the business process are provided in literature. Having synthesized various sources we propose the following definition: *A business process is an elaborately interlinked set of activities and decisions which is executed upon an external incentive in order to accomplish a certain measurable organizational goal, and for which time and resources are spent while converting input values into specific products or services significant for the buyer or user.*

<sup>iii</sup> This is how the methodology proposed in this paper is also presented.

<sup>iv</sup> Further information on measuring the business process maturity level in accordance with the BPMM is provided in the standard that can be downloaded at <http://www.omg.org/spec/BPMM/1.0/PDF>.

<sup>v</sup> Highly abstract standard process models devised by APQC (American Productivity & Quality Center) can be downloaded at <http://www.apqc.org>.