Business process visualization depending on user needs

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Abstract. In this paper, I describe our approach to simplified process visualization based on user’s role in the process.

During our work on reference process model for universities in the Czech Republic, we have identified two different user groups of business processes diagrams. While the management of a university and process analysts need to see the whole process, tasks of every participant and communication and cooperation within the process, the needs of the other group – participants of the process are very different. For them the process describes a service offered by the institution and the only information they seek is how to use this service, or, in case their role is the role of the service provider, how are they supposed to solve the request.

Finding a solution how to satisfy both these groups and keep the process models simple and manageable even in large quantities is subject of our research.

Keywords
BPMN 2.0; simplified process visualization; reference process model, process portal, IBPM.

1. Introduction

1.1 Process model user groups

During process modeling on CTU in Prague, University of west Bohemia, companies in private sector, and our work on reference process model for universities in the Czech Republic, we have identified two different user groups of business processes diagrams. While the management of a university and process analysts need to see the whole process, tasks of every participant and communication and cooperation within the process, the needs of the other group are very different.

This group consists of all the possible process’s participants. For them the process describes a service offered by the institution and the only information they seek is how to use this service, or, in case their role is the role of the service provider, how are they supposed to solve the request.

The second group can be described as individuals with only little or none process notation proficiency and little or none willingness to improve it, because the process model understanding isn’t their primary goal - they are looking for information stored in the process model.

For the reasons mentioned above, the second group strongly needs a simplified process notation giving them all the necessary instructions what to, when to do this, with whom to communicate and how and when will the service be delivered. This simplified process notation should leave out all the task performed by other participants and communication and deadlines not vital for the user.

Satisfying these disjoint groups seems impossible with the same process diagram, so the question is how fulfill their needs and minimize the work needed for maintaining multiple diagrams in the same time.

1.2 Process portal (IBPM) on CTU in Prague

IBPM (Innovative Business Process Manager, also known as Process portal) is a web application for process modeling, process visualization and overall know-how storage. It connects business process with organization structure (roles and users), documentation, data stores and information systems.

IBPM is a successor to original Process portal developed by Faculty of Electrical Engineering (FEE) of CTU in Prague, used by FEE, Faculty of Mechanical Engineering, University Centre for Energy Efficient Buildings and rectorate of CTU in Prague, rectorate of University of west Bohemia and various private companies. Process portal contains over 700 processes and subprocess and description of over 250 services.
2. Process model notation

There are many notations that could be used for process modeling, the most common are mentioned in this paper.

2.1 Existing modeling notations

**BPMN** (Business Process Model and Notation) was developed directly for modeling of business processes by Business Process Management Institute (later Object Management Group). Currently in version 2.0, this standard focuses on understandability for business users, while offering complexity of information needed for analyses, automatization and other use by process analysts or IT specialists.

BPMN 2.0 uses seven standard elements, which can be further complemented by less common elements.

- **Pool** is a process container, in which other elements should be placed. Pool can also be used as a black box in more complicated diagrams.
- **Lane** divides pools according to participants responsibilities in the process. If pools are not present, lane could be used to divide the whole diagram.
- **Processes and subprocesses** contains other processes, allowing creation of process hierarchy, complex and understandable in the same time.
- **Tasks and activities** describe the individual steps process participants have to take.
- **Flow** defines order, in which process steps are taken, or visualizes communication between participants, with database etc.
- **Gateways** are elements that decides which flow will be followed according to the condition given. Gateways could be exclusive, inclusive, parallel or event-based.
- **Events** are used to catch or throw any event, that happens in the process. Start events, intermediate events and end events of various types are used, mostly message and timer.
- **Other elements** – BPMN 2.0 uses other element to add even more details about the process, for example data stores, txt annotations, milestones etc.

**UML** (Unified Modeling Language) is notation for software engineering. Its name shows it origin – UML was created as a standard that combines all stages of software development in order to unify various standards used for this purpose. Nowadays could be used for modeling every possible system, its structure, behavior, requirements and so on.

UML is a robust notation, allowing its users to visualize various views on the modeled situation by many types of diagrams. This is also its weak point – UML was created by software specialist and the number of its elements a diagrams makes it difficult to understand by business users.

UML Activity diagrams are very similar to BPMN 2.0. Stephen A. White in his article Process Modeling Notations and Workflow Patterns compared modeling patterns with conclusion, that “The examination of how the 21 workflow patterns can be modeled with a Business Process Diagram and an Activity Diagram demonstrated that both notations could adequately model most of the patterns. The only exception was that Activity Diagram did not have an adequate graphical representation of the Interleaved Parallel Routing pattern, even though the underlying Activity Diagram metamodel has the appropriate structure to create the pattern.”

For reasons mentioned above is UML an alternative for experts, not for business users.

**S-BPM** (Subject-oriented business process management) is a new notation with a different approach to modeling processes (in comparison with BPMN 2.0 or UML Activity diagrams). It focuses on communication between process actors (the subjects), which compose a business process orchestration or choreography. The modeling paradigm uses five symbols to model any process, while it is able to visualize all the situations modelled in BPMN 2.0.

Each business process consists of two or more subjects which exchange messages. Each subject has an internal behavior (capsulation), which is defined as a control flow between different states, which are receive and send message and do something.

This communication based notation brings many advantages: faster process modeling or simpler process validation by process participants (actors), but mainly, it allows direct transformation into executable form.

As a result, S-BPM might be preferred notation in many situation, but its style makes it difficult for business users to understand the process steps, participant’s responsibilities etc.
Flowcharts are one of the oldest notation for process visualization. ECMA (European Computer Manufacturers Association) Technical committee started work on this methodology in 1960. Flowcharts could be of two types: one to visualize program steps (tasks), the other to visualize information flow in the system. Despite this, flowcharts can be also used for process modeling. This notation has been overcome for its deficiency in visualization all process aspects, but is sometimes still used by manufacturing companies.

Aris is a successor to flowchart diagrams, developed directly for Aris software family by IDS Scheer (IDS Scheer is also provider of information system SAP). Its main advantage is strong integration with SAP, which allows fast deployment of described business process. This integration works both ways, so users running the process are able to switch to the process visualization and see current step, steps following or the steps and decisions already taken. This advantage is also its main disadvantage: users of this notation depend on information system a business process management system provider, because Aris doesn’t have any other interface to communicate with systems from other providers.

2.2 Notation used by IBPM

IBPM is now set to support two types of processes models. One, called internal processes, offers complex BPMN 2.0 process diagrams, while the second type called services is simplified for general public use (based on BPMN 2.0, extended by a new process element). BPMN 2.0 was chosen mainly for its understandability, which is not in contradiction with its ability to describe all necessary situations and satisfy all user groups, when correctly used.

2.2.1 Internal processes

Modeling of internal processes is usually the first step when organization decides to apply process management. It is important for complex description how the organization works, defining process steps, participant’s responsibilities and interaction between participants and with information systems.

Target group of internal processes is organization’s management, process analysts and its workers. It can also be used as a job description or as a source of know-how for new employees and temporary replacement.

Internal processes use BPMN 2.0 notation in its full complexity, without excluding any elements. Regarding to process granularity, not every detail has to be described, the focus is on overall process understanding and dependencies.

2.2.2 Services

Modeling of services usually follows modeling of internal processes. Services are not necessary for business process management adoption, but they are an understandable form of presenting acquired knowledge to general public.

For the customer (of given service) is the understanding of the orchestration of the whole process not important, he needs simple guidelines for using this service. These guidelines should describe customers steps in such detail, that allows him to successfully complete the steps in the most common cases. For unique situation further documentation or contact information (to process owner or person responsible) must be available.

IBPM uses simplified BPMN 2.0 notation, meaning that only the most common elements are used. Pools are not divided by lanes, because the diagrams show the process from customer’s point of view. Only exclusive gateways are used (meaning that parallelism is eliminated from service diagrams). Start and end events are used only in their simple form and for intermediate event only timer event is used (meaning waiting for specified time or date).

For modeling of communication between the customer and service provider new element was created. In BPMN 2.0 another pool should be used, but it contradicts the required simplicity of service diagram, so a “person” element is used.

Service diagrams very often use data object (for referencing further documentation, user guides, linking templates etc.), data stores (in cases when online applications or information system should be used in one of the process steps) and text annotation to give more detail.

Although the service diagrams are very simple, many users prefer written text to graphic representation, so adding text description is recommended.
2.3 Process model maintenance

At this moment, process portal of the Faculty of Electrical Engineering of CTU in Prague contains over 350 internal processes and many of them are also in the form of service diagrams (around 70 internal processes described by 160 service diagrams).

Chosen approach of satisfying both process user groups with special diagram has a couple of downsides, that were disregarded at the start.

This distinction means, that two or more process diagrams are made for many business process and must be maintained up to date. In some cases, processes may have more than one type of possible customer and other diagrams must be prepared.

In the case the original internal process is to be changed, derived services must be updated as well. At this moment, we don’t have appropriate tools to store connection between the original internal process and derived services, so such services have to be looked up manually and might even be overlooked, depending of process analyst experience and seniority.

This approach was the only solution known in the time we identified the need for simplified diagrams for end-users, but the growing number of kept diagrams leads to growing amount of time needed to maintain them.

3. Conclusion

Notations and methodologies for business process modeling offer many possibilities how to visualize business processes depending on target audience or planed usage of process diagrams.

BPMN 2.0 can be used for process visualization required by both target groups at the CTU in Prague, internal processes for management, IT specialists and process analysts, and services for general public use.

On the other hand, none of available notations and methodologies offers solution, guidelines nor best practices for effective maintaining of two process diagram types at the same time.

For this reason, creation of such a methodology is needed. For compliance with process models of CTU in Prague and the use in IBPM should be the methodology based on BPMN 2.0 and further specify how a complex process model unifying internal process and derived services should be created. The methodology should describe all the necessary elements, attributes and special tags for distinguishing the individual views (within one source process diagram), while IBPM would allow users to switch between these views. In the end one complex process diagram (for each business process) should exist, involving multiple user-based views and a process portal logic should allow us to view the process in desired detail.

Creation of this methodology and process portal innovation are subjects of other research activities.

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References

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Lukáš ZOUBEK was born in České Budějovice in 1987. He received his Ing. degree in 2014 from the Faculty of Electrical Engineering of the Czech Technical University in Prague, specializing in Economics and Management in Electrical Engineering. Currently a Ph.D. student at the Department of Economics, Management and Humanities at the Faculty of Electrical Engineering of CTU in Prague. His interest is mainly in performance management and business process management. He is part of Centre for Knowledge Management at CTU FEE since 2013.