Introduction of BPS Systems into Operational Practice: Achievements and Setbacks

Tomas Andersson, Ilia Bider, Rogier Svensson

IbisSoft AB, Box 19567, SE 10432 Stockholm, Sweden
{tomas|ilia|rogier}@ibissoft.se

Abstract. The paper summarizes an experience of building business process support systems and introducing them into operational practice acquired over some period of time. The systems were built based on the state-oriented view on business processes. The paper describes and explains difficulties of marketing such systems and introducing them in the operational practice, as well as how these difficulties could be overcome.

1. Introduction

In this paper, we assume that a process-oriented organization of work is better than a traditional functional or project-oriented organization without giving any argumentation on the matter. By process-orientation we understand not the way of "thinking process oriented", but the way of "working process oriented". The latter includes genuine cooperation between all process participants independently of to which department they belong, and whether a particular process instance follows the standard pattern, or deviates from it. It also means motivated involvement of process participants who understand their own role in the process and the roles of others (including the management). Business process orientation as a way of working also means that the experience gathered from previously completed processes is directly used in operational practice.

Business process-orientation (as a way of working) is difficult (if ever possible) to achieve without a specially constructed Business Process Support (BPS) system. Such system among other things should:

- Give to each process participant easy access to the state of the affairs in any particular process instance. This includes information on what has been achieved so far (process state), how it has been achieved (process history), and what is going to be done in the nearest future (process plan).
- Give to each process participant easy access to all process instance he/she is participating, including information on what he/she is supposed to do in the frame of each process instance and when.
- Provide participants with effective communication channels along the process instance lines.
- Provide easy accesses to the organization's experience, e.g., already finished processes, so that it can be analyzed, and participants can learn by example.

Naturally, a BPS system should also help process participants to complete activities within the frame of each process instance. This function of a BPS system is the same as in traditional business applications, while the above listed properties are specific for BPS systems.

Due to its specific functionality, a BPS system should be regarded as a tool of organizational change. Introduction of such a system in operational practice is a part of the task of creating the fit between business processes and support system. This part consists of adjusting the organization, i.e. people to business processes. This task is not a trivial one, because, usually, most of the workers have no practical (and/or theoretical) experience of working in a process-oriented way.

This paper shortly describes our experience in building and introducing BPS systems in operational practice, with all its setbacks and achievements. The experience is divided in 2 periods, the early period from 1989 to 1992, and the later one from 1998 up to now. We did not work much with BPS systems in between these two periods.

The paper is structured in the following way. In Section 2, we give a brief description of the state-oriented view on business processes that was and still is used in our BPS systems, and describe the main ideas behind the system architecture. Section 3 describes our early experience in building and marketing BPS systems. Section 4 presents the latest experience, and Section 5 draws the strategy for the nearest future.

2. State oriented view on business processes

The BPS systems that we discuss in the paper were built based on the state-oriented view on business processes as described in [1]. This view focuses on changes produced by activities executed in the frame of a given process instance. The main concept of the state-oriented view is the process's *state*. The process's state is aimed to show how much has been done to achieve the operational goal of the process and how much is still to be done. A state of a process is represented by a complex structure that includes attributes, and references to various active and passive participants of the process, such as process's owner, documents, etc. A state of a given process instance does not show what activities have been executed to reach it; it only shows the results achieved so far.

The process is driven forward through *activities* executed either automatically or with a human assistance. Activities can be planned first and executed later. A *planned activity* records such information as type of action (goods shipment, compiling a program, sending a letter), planned date and time, deadline, name of a person responsible for an action, etc.

The process's state is used as a primary tool in deciding on what should be done to reach the process's goal from the current state. All activities planned and executed in the frame of the process should be aimed to minimize the difference between the current state and the projected final one. However, in some cases, a *history* of the

process's evolution in time is important when deciding on actions. The history is defined as a time-ordered sequence of all previous states.

All activities currently planned for a process instance make up the process *plan*. The plan together with the "passive" state (attributes and references) constitute a so-called generalized state of the process, the plan being an "active" part of it (engine). When an activity is executed, a process changes its generalized state. Changes may concern the passive and/or active parts of the state. At the minimum, the executed activity disappears from the plan. In addition, changes are introduced in attributes and references and/or new activities are planned to drive the process forward.

When an activity is executed in the frame of a process instance, an event is registered. A *registered event* is a record that links the change in the state of a process to the reality outside the process. For example, it can record the date-time when the event happened and/or was registered, name the responsible for the event, register comments on the event at the moment of registration (or even later), etc. A list of all events that happened within the frame of a given process constitutes the *chronicle* of the process, i.e. its written history.

The heart of a BPS system based on the state-oriented view consists of:

- Historical database that automatically stores information on all events and all past states of all processes, documents, and other business objects.
- Principle of dynamic and distributed planning. Dynamic means planning when needed, distributed means planning to each other. Planning for each other constitute a communication channel between process participants along business process instances. Planning can be partly manual, partly automatic.
- Navigational system that allows the end user to freely navigate through the space of interconnected processes in the present and past.

When using a state-oriented BPS system, executing of an activity in the frame of a process instance conceptually consists of (at maximum) three steps: (1) introduce changes in the process state, (2) plan new activities, (3) register an event of current execution.

3. Early experience

Our first experience in building BPS systems goes back to 1989-1990, when we built a system to support sales and marketing activities of a trading company [2]. The system was called *DealDriver* to highlight that it helped the workers to "drive" their deals from the beginning (e.g., getting an order) to the end (e.g., receiving payment). The order processing process had automatic planning programmed in it. Sales and marketing activities were planned manually. The system was developed for the character-based environment and run under DOS over a PC LAN.

This system has been used internally at *IbisSoft* for 13 years. The main advantage of the system for us was that it gave full control over all communication with the external world in the past and future (plans). First, the system was used only by the people who developed it, but later, new sales persons were trained to use the system.

We encountered no serious problems in teaching new people how to work with the system.

The efforts of marketing our BPS ideas at that period were not successful. In our view, the main reasons for that were as follows:

- Our inexperience in sales and marketing in general.
- Low readiness of the market: the ideas of business process orientation were unknown to the majority of companies, and, definitely, BP was not a buzzword.
- Wrong focus of marketing and sales. The system was marketed as a system not as new way of working. As a result, marketing efforts were wasted on IT personnel who could not see what was special with the system in comparison to all other systems in a given application domain.

Still, our efforts lead to getting commissions for building a couple of prototypes based on our ideas, but the recession of early nineties forced us to abandon the BPS business activity for some time.

In parallel, our colleagues in Moscow built another BPS system based on the *DealDriver* ideas and its source code. The system, called *SoftMotors*, fully supported business processes at a car service station (service and repair). The system had all features incorporated in *DealDriver* but one, it had no planning component (neither automatic, nor manual). Communication between process participants was along changes in the states of process instances. When urgent attention was required, non-computer means were used, like banging on the wall that separated the neighboring department.

The system was successfully installed and used at about 20 customer sites. Marketing and sells were relatively easy because of lack of competition at that time in this part of the world. When competing products did arrive on the market, our colleagues had got the same situation as we had from the very beginning.

Training the personnel for using *SoftMotors* was not an exceptionally big problem. Most of the workers did not have any previous experience with computer systems, and accepted the system architecture as something normal. They could not compare it with other systems, and thus discover its unusual nature. It did not mean that all the users fully understood how the system worked. At least in one case, the workers tried to cheat the system by arbitrarily changing the process state. The fraud was easily discovered due to the historical nature of the underlying database.

4. Latest experience

4.1 Marketing strategy

The second period of our experience with BPS systems started in 1998. The following changes happened by that time. First, the ideas of business process orientation became relatively popular, almost on the level of “buzzword”. Second, we totally understood that we should not market our ideas as a system, but rather as a new, more effective way of working. At that time, our first code-base (*DealDriver*) was still character-based, and it could not be used even for demonstration. The decision was made to

start marketing business process analysis instead of developing a new system in hope that some customers would wish to develop a BPS system afterwards.

The strategy we chose proved to be relatively successful. In the end, we have got a number of business process analysis projects. During the first projects, we developed a practical methodology of business process analysis based on the state oriented view on business processes, see [3] for details. A typical analysis was done in the form of meetings with an expert group that included people actually working in the business process under analysis. None of the projects was of the "management-only" kind. During each of the analysis projects, a full understanding was reached with the group of what their processes were and how they could be driven in a more structured and effective way, provided a proper support system had been obtained. This gave us a hope that introduction of a support system would not constitute a major problem.

Our marketing and sales efforts were not directed to any special segment of the market, we tried to go to the Industry, Non-profit organizations, and Public sector. However, the latter two proved to be more accessible, at least for a small consulting company as ours. Therefore, the analysis projects completed so far was conducted in a somewhat special environment, namely, Swedish public sector (e.g., Swedish municipalities), and non-profit organizations (e.g., association for tenants). Both these sectors have their peculiarities that concern their business processes and their internal environment.

Most of business processes in the above sectors are of administrative nature, such as preparation of decisions, inquiries/investigations, processing of complaints, lobbying, etc. We call such processes loosely-structured to stress that for these processes it is difficult to pre-determine the order of activities. This term has connotation with the concept of ill-defined problems in AI, see, for example, [4], and with such terms as ad-hoc, emergent and dynamic workflows, see for example[5,6]. The internal environment in these sectors is in a way more "democratic" than in industry. The management is reluctant to dictate its will, and is more wiling to give the initiative to the employees. The latter has both positive and negative sides, e.g. requires more internal marketing.

Our marketing strategy worked well also in the area of getting orders for building BPS systems. After completing a number of analysis projects, we started to get commissions on delivering systems.

4.2 Systems introduced and under introduction

The *first system* we built and introduced was a support system for recruiting of new members to the Association of Tenants, Region West Sweden. The system, called *ReKo*, was built based on the analysis of the recruiting process overviewed in [3]. The system had a reduced functionality because most of the participants of the process were working outside their office (going from one apartment to another); the planning capability was not built in the first version of *ReKo*.

It took about half a year to build the system. It took one year before the organization started to use it in their operational practice and fully substituted the previously used technique based on Microsoft Excel sheets. The main reason for a one year delay was (natural) resistance to organizational changes. To overcome the

resistance, a competition was used at one point to show the advantages of the new system to the administrative personal. The goal of the competition was to test who can complete certain tasks quicker: an experience office worker with the old technique or non-experienced person (our own member of staff) with the new technique. Winning the competition was one of the many steps to overcome the natural resistance.

After one more year, the recruiting staff became fully acquainted with the system and understood advantages of working in a more structured way. It is worthwhile to mention that new members of recruiting staff, employed after *ReKo* had already been introduced in operational practice, had no problems in adjusting themselves to the established way of working.

By the end of the second year (i.e. one year after introduction), the statistics showed growing numbers of new members, which was attributed to better order in recruiting activity imposed by the system. Now, we are considering the next step of the system development, which is going from paper lists to palm computers. In parallel, we negotiate with other regions of Association of Tenants on introduction of *ReKo* in their operational practices.

The *second system* we built was a support system for processing applications for child adoption. The system, called *Emma*, was built on commission from one of the Swedish municipalities. It supports inquiry/investigation of families applying for child adoption. Initially, the system supported full featured manual planning and detailed registration of all events happened in the course of an inquiry. The first stages of introduction, however, showed that the personnel was reluctant to use exact planning and detailed registering. To go farther with introduction, a compromise adjustment was done to the system. Manual planning was substituted by automatic planning without deadlines. Registration of events was simplified to just making comments.

Emma is in full use, but the volume of adoption applications is quite small and we do not have enough data so far to analyze the results of its introduction. Our original plan was to extend *Emma* to other activities in the same department of the municipality. Unfortunately, the manager that commissioned us the development of *Emma* had left her office in the middle of *Emma*'s introduction. The new manager so far has not showed any enthusiasm to extend the system beyond its current functionality.

The *third system* we built was a support system for a number of administrative processes at the main office of Association of Tenants, Region West Sweden. The processes included: service to their field (grass root) organizations, processing of feedback (e.g., complaints), lobbying (influence of decision of others), and some others. The system was planned as a full-featured system with manual planning, detailed event registration and structured state definition for each process.

The system, called *ProBis*, was delivered during 2003 in the module-by-module fashion. Modularization was envisaged to make the introduction easier. All modules were built on the same principles and they shared common user-interface. We believed that by the time the next module was introduced, the workers would already know how to deal with the system by learning the previous module. Due to organizational difficulties, our plan had failed, and the operational test of the system started only after practically all modules had been delivered and installed.

Having previous experience of introducing a support system in this organization, we expected some delays in the introduction process. However, the difficulties of introducing a system aimed at functioning through the whole organization showed to be much greater than in case of introduction of a system in a single department. Though some operational tests of the system have been completed, more efforts are required from both the customer and us in order to ensure full introduction of the system into operational practice. Currently, we are discussing with the customer's management measures to be undertaken in order to speed up the introduction. These measures concern both adjusting the system, e.g. changing the user-interface, and improving the organizational structure of the introduction project at the customer site.

4.3 Problems encountered

We hoped that it would be easy to introduce a BPS system built on the results of an analysis project. This hope has never materialized. Each introduction took a lot of time and efforts, to which we were not prepared.

Some of the problems were purely organizational; they are not unique to BPS systems, and they are often encountered during introduction of new information systems. To these class of problems, for example, belong:

- Bad planning of the introduction, e.g. absence of a formal responsible for introduction of each module
- Unwillingness from the management to press their people to use the system
- Assigning people that were not part of the analysis project to test the system
- Bad training programs

Another not-unique problem was users expectations. Part of the personnel had very little experience of using computers in general, and business systems in particular. This situation, in itself, was predictable. What was not predictable was lack of willingness to learn. Current users expect a system to be so intuitively clear that even an inexperienced user can "mouse click" him/herself to understanding the system. Our user-interface did not meet this expectation. Currently, we are planning substantial changes in the user-interface in order to better meet the users expectations. However, we believe that even with a better interface the system will still require considerable amount of learning.

In addition, we discovered a number of conceptual problems that are specific to BPS systems, and our kind of BPS systems in particular. Understanding of business process orientation in theory does not automatically imply understanding of how it will look like in practice. The following problems are examples in this category:

- Use of planning in general. People are usually not accustomed to plan their operative work in details, unless absolutely necessary, such as in cases where other people are involved. This problem is being solved by not requiring planning on the first stages of introduction.
- Use of planning as a way of communication. People are not accustomed to plan tasks for their colleagues or managers. This problem is being solved by changing terminology and user interface to "hide" the planning nature of communication.

- Level of details on the computer screens. Though the level of details is always agreed during analysis, the members of the analysis team do not fully understand that this will be the level of details to work with after the system has been introduced. This problem is being solved by temporarily hiding some details.

5. Strategy for the future

Based on our experience, the following strategy for introduction of our BPS systems in operational practice has been adopted for the future projects. We are not delivering any specialized system until a potential customer tests the new way of working in its operational practice. This is to be done in a project form with a group of volunteers (or persons assigned by management). The test group will use only a basis version of the system that supports internal and external communication, planning, reporting, and document management. The project will be supported by our personal on the regular basis. Any adjustments besides the names of coded values, e.g., names of activities, will be postponed until the end of the test. Only after completing the test, the discussion can be started on additional adjustments of the basis system, or creating a specialized system. Currently, we are negotiating one such project with a potential customer.

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