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Technique allowing reducing stages of analysis and design of application while implementing Business Process Management System (BPMS) has been suggested. It was possible due to elimination of enterprise activity examination stage and formation of business process models on the basis of structural functional models obtained as a result of reengineering project or developing quality management system. The required steps of model construction in BPMS were revealed. Appropriateness of business process modeling with the help of traditional means and further use of models for transfer into BPMS by conversion was validated. Algorithm of automated transformation on the basis of processing XML-files of models was suggested.

In the radical reengineering becomes unacceptable method for improving business processes as its labor content does not allow reacting rapidly to changeable market demands. Corporate information systems of type ERP (Enterprise Resource Planning) introduced by reengineering results allow adapting to any enterprise structure but frequently long duration of reconfiguration disables enterprise to manage their business process managing in real time.

Investigations of enterprise management principles from the position of process approach are widely given in scientific literature by both foreign and domestic authors [1–5]. At the beginning of the current century the process approach has got supporting in the form of software tools BPMS and now is called BPM — Business Process Management [6–9]. Unify NXI (Unify), Oracle BPEL Process Manager (Oracle), ActiveBPEL (Active Endpoints) may be given as the examples of BPM-systems (and their developers). BPMS architecture including graphics editor, engine, monitoring module allows updating existing processes in the required rate.

A code in a special programming language, for example BPEL (Business Process Execution Language) corresponds to the diagram of the process in BPMS. The process in BPEL language itself does not fulfill any functions and intended exclusively for coordination (or orchestration) of web services. BPEL specification is approved as standard of OASIS (Organization for the Advancement of Structured Information Standards) [10]. Some part of developers uses this standard and others use their own nonstandardized languages of process description.

At present applications in BPMS are developed on the basis of user manuals which contain description of interfaces and installation steps. New concept requires novelty in its usage as well.

The suggested technique of process diagram construction in BPMS includes the following main stages:

2. Conversion of CASE-model into BPM-model.

Here and further CASE-facilities are implied as their subset which is intended for simulating business processes. For example, AllFusion Process Modeler (earlier BPwin), ARIS Toolset. BPwin supports the following methodologies: IDEF0 (Integrated Computer Aided Manufacturing (ICAM) DEFINition language 0), DFD (Data Flow Diagram), IDEF3; ARIS Toolset — VACD (Value-added chain diagram), eEPC (extended Event-driven Process Chain), FAD (Function allocation diagram), IFD (Information flow diagram) etc. Models implemented
according to these notations are also called structural functional models.

Use of such two-stage approach is substantiated in the following way:

• If enterprise has already examined its activity during process of reengineering or construction of quality management system and described business processes then business applications should be developed on the basis of existing models that supports reduction of development duration due to elimination of analysis and design stages. Models are transferred into BPMS by conversion techniques including automation facilities use. These techniques are developed on the basis of juxtaposition of traditional methodologies and BPM-specifications of business processes description. Juxtaposition by the example of DFD methodology and BPEL specification is examined in [11].

• If enterprise has not described before its processes or existing models lost their urgency then it is necessary to use notations of structural functional models for qualitative business processes analysis and design. The last conclusion may be made as a result of comparative analysis of CASE-facilities and graphics editors of BPMS which includes the following main points:

1. Diagrams in CASE-facilities are more demonstrable and natural for visual perception as they are based on functional approach and notion of «blackbox» for which a specified set of output parameters corresponds to a certain set of input parameters. Actions in these diagrams are simulated by means of a single element — functional block in which the simulated function is described in some words. In BPEL a specified operation is fixed to each block and it is necessary to choose a type of block before imaging any activity on BPEL diagram. Reading BPEL diagram it is also necessary to know each block dedication. Besides, diagrams in BPM-systems include also blocks of exception (errors) processing required straight at performance that overloads diagram. Use of CASE-facilities at stage of analysis and design is easier for analyst.

2. In BPM systems there is no capacity to use phrases from several words in blocks, transitions names that forces to reduce them and results in diagram informativity lose. So, for example, transition name in model Unify NXJ can not be separated into several lines, therefore, it closes other objects of the model. Also in BPM Russian is not always supported at development and performance of business processes. CASE-facilities have no such disadvantages.

3. On BPM diagrams it is not seen what kind of information is required and transferred for performance of one or another block inside business process and between services as well, as arrows point only to action sequence. At the same time arrows in BPwin point both to information flows transmitted between functional blocks and to sequence of function performance.

4. Enterprises aiming at increase of quality and efficiency of activity and having made a decision to construct quality management system and certify it turn to outer organizations which use just traditional facilities of business processes modelling for describing consumer processes. These facilities are intended specially for such purpose and won wide recognition (BPwin, ARIS Toolset). In this case experience in use of the given facilities increases naturally specialist efficiency at enterprise activity description.

Automation of CASE-model transformation into BPM-models is suggested to be fulfilled on the basis of parsing, analysis and conversion of XML-documents of processes. It became possible at appearance of model saving capacity in format XML in AllFusion Process Modeler (BPwin) version 4.1.4. Besides, ARIS Toolset gives an opportunity to export model eEPC into format BPM (Business Process Modeling Language) [12] based on XML and used for business process modeling. Languages of business process models in BPMS including BPEL are also based on syntax of XML language. Algorithm of automated transformation is shown in Fig. 1: firstly, CASE-model of business process is exported or saved in XML format; then XML-model is converted by automatic transformation block into XML-model in BPM language; after that BPM-model is updated and added with attributes if it is required and at the output the working business process which may be performed by BPM-system occurs. To implement automatic transformation block knowledge of XML-scheme of input model is required for its parsing for extracting transformed elements according to the obtained techniques of transformation also knowledge of XML-scheme of output model is required to form it on the basis of transformation techniques.

To implement automatic transformation it is necessary to:

1) Obtain XML-schemes according to which XML-models are constructed. Not all the developers of the given products give such data; therefore, scheme generation is a separate stage.

2) Develop algorithms of processing elements of input XML-file.

3) Develop a system by programming tools which obtains at the input the model of business process in the form of XML-document and at the output it gives BPM-model also in the form of XML-document.

Structural elements of output XML-document should be formed on the basis of its scheme and input document data in accordance with the developed business processes transformation techniques and processing algorithms.

Then work of automatic transformation block is examined by the example of eEPC → Unify NXJ transformation. As it was said before ARIS medium allows exporting model eEPC into file of BPM format. The simplified scheme of such file has a form as it is in Fig. 2 that means that the whole process of this file is concentrated in the main container sequence which may in its turn contain
Elements of three types: action, switch, all. The specified elements correspond to the following elements of the model eEPC: function, Exclusive OR, AND.

Nodes switch and all are containers and have a structure showed in Fig. 3.

Each element of BPML should be singled out and treated in such a way that XML-file occurs at the output; it corresponds to XML-scheme of the model of business process in Unify NXJ the enlarged scheme of which looks like this (Fig. 4).

Algorithms of two first detailing level suggested for processing BPML-files are given in Fig. 5, 6.

Recursive approach to processing of XML-files of business processes allowed simplifying implementation of some functions. For example, to find the last process elements which should be connected with finite state it is not enough to find the last node inside node sequ-
ence as it can be node switch which can contain in its
turn some branches sequence with its nodes. Then it
can be checked out whether the current block is the last
or not according to the following algorithm:
1. Find the last node in the main sequence.
2. Check out whether the current node action is the
found last node.
3. If it is so then to create transition from the current
node into the finite one.
4. If it is not so then to check out whether the last no-
ode is the switch node.
5. If it is so then to find the last node for each branch
switch.
6. Check out whether the current node is the last node
of the branch switch (recursive call).
7. See steps 3 and 4.

Fig. 5. Algorithm of processing of XML-document in format
BPML

Software implementation of the block of automatic
transformation of business process models is carried out
in the Borland Delphi environment on the basis of the de-
veloped algorithms using components allowing analyz-
izing XML-files. The result of software performance is
XML-file which may be opened and executed in the sys-

tem Unify NXJ.

Fig. 6. Algorithm of sequence element processing in BPML

The main window of the developed software is
shown in Fig. 7. In this window it is necessary to indica-
te name of the file containing business process model in
format XML and intended for transformation and also
the name of the file where the resulting BPM-model
should be saved after clicking «Convert».

Fig. 7. The main window of the program of process model tran-
sformation automation

At the moment model transformation is implemen-
ted in one direction only (from structural functional
models into BPM-models). Bidirectional transformati-
on may be also useful for supporting models BPwin,
ARIS in urgent state. Therefore, the development of ad-
ditional module may be further task.

So, possessing powerful potential in operational
changing of business processes, BPM systems do not al-
low importing models performed in CASE-facilities and
do not possess such significant means of process
description and analysis as CASE-facilities. Therefore,
the latter should be used for qualitative analysis and de-
sign of business processes and then transfer models into
BPMs. Hence the technique of process models de-
velopment in BPM-systems including two stages was sug-
gested.

The first stage consists in modeling of processes by
CASE-facilities. For enterprises that havedeskabel
their activity this stage allows using cumulative experi-
ence in the field of their activity description and the ob-
tained models. The second stage consists in conversion
of CASE-models into BPM-models. For this purpose the algorithm of automatic conversion of models in format XML into schemes of BPM-systems was suggested. The developed techniques of transformation of business process models and the developed algorithms of conversion of XML-documents of the processes into BPMS formats are in the basis of this algorithm. This algorithm allows performing a part of transformations in automatic mode by recursive processing of XML-processes. The given technique allows accelerating the deployment of process management on the basis of BPMS.

**Conclusion**

The technique allowing decreasing the stage of application analysis and design when deploying business processes management system was suggested. The order of constructing models in BPMS is given. Appropriateness of business processes modeling by traditional modeling tools with further use of the models for transfer into BPMS by means of conversion was justified. The algorithm of automated conversion on the basis of processing XML-files of the models was suggested.

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