

The Analysis of Unstructured Processes in Business Administration

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Received: February 2000

Abstract. One of the problem in business process reengineering is the identification and implementation of new workflow procedures for specific business processes, if they are not clearly defined. Analysis of unstructured (ad-hoc) activities cannot be based on traditional approaches using existing business procedures and expert knowledge. The method of business processes analysis in unstructured environments is presented in this paper. The creation of new business procedures is based on investigation of the communication acts, and application of similar workflow patterns. This method is useful in the earliest stages of business process reengineering. Preliminary analysis in ad-hoc area can be done for process identification, applying the existing knowledge baggage, reducing the analytical efforts, and creating the strong motivation for managers.

Key words: business process analysis, business process reengineering, workflow, unstructured process, communication act, workflow definition, business procedure, Language Action methodology.

1. Introduction

Nowadays the approach to the administration problems is changing: there is a greater connection between Information System and Administration System of an enterprise as a whole system. What is common to all of organizations is the need for Innovative Information Systems, which relate the information technology to administrative procedures. The core technology for the architecture of such Information System is *groupware* infrastructure (Michelis *et al.*, 1996). Organizations are being forced to change their working methods in order to be able to adapt to the new opportunities and ways of collaboration. The basic functions in which organizations are highly interested fall into five categories:

- Document Management and Publishing,
- Calendaring and Scheduling,
- Project and Workforce Management,
- Communication, Collaborative Working and Conferencing,
- Knowledge Management, Creating and Sharing Corporate Memory.

By its nature *Business Process Reengineering* (BPR) is the radical redesign of business processes to achieve improvement of performance. In order to design and deliver

high-value enterprise solutions we need to understand the whole business environment. Observed business processes in the specific organisation can be divided into *clearly defined* and *unstructured (ad-hoc)*. The processes related to the main business objectives (*case-dominating processes*) are clearly defined in existing administrative documents (business procedures). On the other hand, we can observe the *unstructured business activities* as the common chaos area of the business environment. The proportion between case-dominating and ad-hoc areas is not clearly defined. It depends not only on the activity type or management style, but also on the subjective meanings, like traditions, experience of the employees, implemented information technologies, etc.

2. Clearly Defined and Unstructured Processes

Case-dominating business processes, as usual, are related with corresponding administrative documents or are performed by mutual agreements. The contextual interpretation of the rules, duties and responsibilities is going in the same way by all participants of the process. There is a lot of methods and patterns for modelling of *clearly defined processes*. We can easily build *workflow definition* for traditional processes like customer order processing, requisition management, project tracking, budgeting, preparation of reports, etc. On the other hand, we can observe another type of processes that have not clearly defined procedures and there are no unified opinion from the experts how the work should be done. Such type of processes can be observed as the common amount of *organisational chaos*. The lack of ordering activities means only that here we have the potential area for identification and ordering activities through administrative procedures and workflow modelling. The area of business chaos can be defined as *unstructured area* with *unstructured activities*. We can't make any presumption about the common structure of ad-hoc activities, as well. We can talk only about someone as *enterprise community* which deals with something as ad-hoc activities. The examples of ad-hoc activities we can take from the areas like the common administrative work, preparation of the decision and problem tracking, co-ordination of discussion and meeting, utilisation of resources of knowledge employees, establishing the rules for something, etc.

In the means of BPR, ad-hoc activities can be divided into three separate groups:

- activities that can be prepared for the potential BPR, and corresponding procedures and workflow definitions can be created. This group of activities become ordered and in some cases case-dominating after BPR,
- activities that can be involved in the preliminary BPR studies, but due the smallness, the return of investment may occur as negative,
- other activities with hardly observed and identified rules.

3. Language Action Based Modelling

We take Language Action Perspective (LAP) modelling and mapping as theoretical background for our studies in ad-hoc BPR area. The Language Action perspective was intro-

duced in the field of information systems by Flores and Ludlow in the early 80's, and further developed by Winograd and Flores (Winograd, 1988). LAP argues that the a language item can be an action, and is used to coordinate activities and to create a reality shared by communication patterns as the basis for their interactions. The early work on LAP is based on Searle's Theory of Speech Acts (Searle, 1975). As a result of criticism of the shortcomings of Searle's theory, Habermas' Theory of Communicative Action is combined with Searle's theory as the philosophical foundation of LAP nowadays. LAP focuses on the conversations between two agents in a business process. An organisational process is enacted by a chain of customer/performer pairs who co-ordinate their actions through conversational interactions (transactions) to achieve the result. The conversation forms commitments for action by which people co-ordinate their work.

LAP is not merely a philosophical framework, but has served as the basis for several important tools and methods in information systems, such as the Coordinator (Winograd, 1988), SAMPO (Lehtinen and Lyytinen, 1986), Action Workflow (Medina-Mora *et al.*, 1992), DEMO (Dietz, 1998) and BAT (Goldkuhl, 1996). The models of business processes based on communicative actions have multiple purposes. In the first place, they provide a structured overview of the business and its constituting business processes. The models also provide the possibility to diagnose inefficiencies and ineffectiveness of business processes.

4. The Method of Unstructured Process Analysis

The method of analysis and reorganization of the processes in unstructured environments is presented below. Main practical results you can find also at (Telesius and Jaliniuskas, 1999b). The purpose of this method is identification of the processes and applying the workflow in the environment where we can't collect the initial knowledge in the traditional way using existing business procedures and expert knowledge. We have proposed to observe the communication activities of employees in ad-hoc area.

Our method is based on the Language Action paradigm methodological background. LAP provides a model and mapping tools, and also a background for social ad-hoc network analysis for the purposes of BPR. The organisational process is made explicit as a network of conversations and commitments interrelated through roles. By defining all activity as a set of language/communication acts, we can view all organisational activities in ordered-dominated and unstructured areas. We can identify the participants, start/end points, duration, related objects (as documents), phases of collaboration, satisfaction acts, i.e., elements for building of Language/Action loops.

Let take the process X which might take place in the customer's ad-hoc area. We can make some presumption about the possibility to place this process into the group of activities for potential BPR. In order to start the analysis of process X, the initial amount of knowledge should be collected:

- We can make the observation of enterprise processes, through the observation of employee conversational acts in the communication sources like e-mail, manager's

assignments, personal and collegial decisions of the staff, correspondence traffic, etc. The collected data can be used for creating of total *communication map* and making presumption about the existence of process X. The communication map and quantitative figures help us to create a preliminary structure of the processes in ad-hoc area.

- As usual, we have the practice of implementing similar process X in another business environment. The detailed *workflow pattern* for X was build with similar contextual interpretation, and we can apply this pattern to our needs.

The analysis and reengineering in ad-hoc area means *the identification of the process X and creating the appropriate definition of workflow (Wf)*. It can be done by the following sequence of steps:

1. Analysis of clear defined processes and elimination of communications of this type from analysis area.
2. *Preliminary analysis of communication acts* in ad-hoc area for the purpose of creation of preliminary process map.
3. *Specific process X identification* and creation of preliminary structure, i.e., identification of basic commitment cycles, definition of common objects and general characteristics, such as intensity, duration, costs, etc.
4. *Process X approximation* with the similar workflow pattern, i.e., adjusting the design template by replacing the parameters with well known elements from X and applying the detailed contextual interpretation from the pattern.

5. How does the Method Work. Case Examples

Let take three different sectors – governmental, banking and industry, where the observation was performed during our practical work. As an example, let take three processes (BP1, BP2 and BP3), each from the corresponding environment.

Environment 1. Governmental Sector

The ongoing VADIS project means creation of the Administrative Information system of the Government of the Republic of Lithuania (Telesius and Jaliniauskas, 1999a). VADIS project was started in 1996 and covered the information infrastructure of Prime Minister's Office and other governmental institutions (15 ministries, 50 state institutions and about 2500 public servant workplaces). About 150 typical administrative workflows were developed in VADIS project with corresponding regulations and Wf definitions.

EXAMPLE 1. (BP1) – *Preparation of documents for Government decision*

The Wf application includes the problem tracking from the primary stages in the responsible ministry, approving through related ministries, and preparation of final documents for decision making in Prime Minister office. This process is precisely defined in Government legislation acts, and all documents related to some specific problem are routed in the same way.

Environment 2. Banking Sector

The project for creation of the groupware infrastructure and document tracking system in the largest Lithuanian commercial bank ‘Vilniaus bankas’ covers the infrastructure of central office and 15 branches. The main objective is the establishment and development of a uniform, reasonable and competitive quality management system of the bank services and internal work procedures stating. This project was started in 1998, and means the BPR of about 230 administration procedures in the bank using groupware tools and Wf automation.

EXAMPLE 2. (BP2) – Creation of internal procedures for banking services

This Wf application means preparing and distributing uniform procedures for the banking services. Department responsible for new service launching creates related procedure about new activities of bank’s infrastructure. After confirmation, it is stored into repository of actual documents for distributing to all branches.

Environment 3. Industry Sector

The project for creation of tools and procedures for business administration in the mineral fertiliser factory LIFOSA (head office and 2 branches with 120 workplaces) was started in 1996. About 50 business workflow definitions were developed in this project.

EXAMPLE 3. (BP3) – Requisition management

This workflow application automates all aspects of composing, approving, and fulfilling purchase orders inside an organisation according to the predefined rules. Employees can compose a purchase order and then send it around for management approval. After a requisition has been approved by all required managers, it is routed to the buyer (supplying department) for accomplishment. The assistant selects a vendor, places a contract or works on different proposals. When an item has been bought, the corresponding e-mail message is sent to the employee who ordered this item, indicating that the item has come in.

Let take some analysis of these 3 cases and 3 specific processes. We suppose to define a new process X in specific case with presumption, that we have the clear definition of similar pattern from another case. After the observation of communication acts (related to each process) was made, the final results and proportions were acquired (see Fig. 1).

Here, some summarising conclusion can be done.

There are clearly defined solutions for “*Internal procedures*” preparation in the banking sector. The dominated amount of communications was related with this process. The second significant amount of communications was held on “*Buying of something*” (i.e. requisition management), granting new banking services to the market, and preparing corresponding projects (i.e., preparation of documents). Here we can make a presumption about the significant role of these processes in Banking. Even more, we can suppose to use the similar governmental administrative process definitions for our needs in

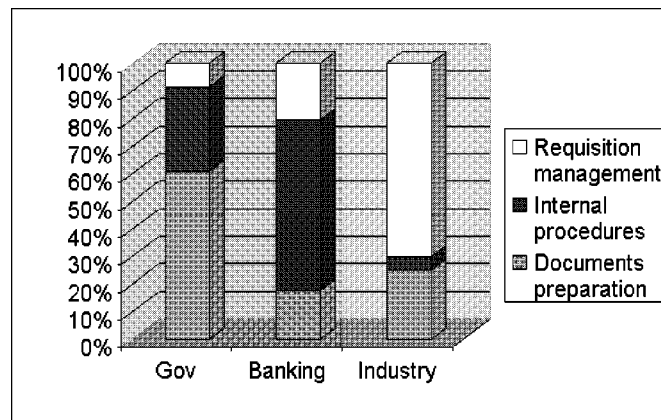


Fig. 1. Observed proportions of communication activities in different business sectors.

banking cases. The approximation of the banking process “*Preparing of new projects in banking*” can be made with “*Preparation of documents for decision*” pattern from the Government case, as well as “*Buying of something*” - with “*Requisition management*” pattern from Industry. The similar observation can be made in governmental and industry environment. We can work applying:

- the “*Document preparation*” pattern from Government case to Banking,
- the “*Requisition management*” from Industry case to Banking,
- the “*Internal procedures*” from Banking case to Industry.

The scheme of movement from governmental to banking area processes is illustrated in Fig. 2. That was really performed in our business cases, when we have tried to apply some administrative procedures from our governmental customer to business administra-

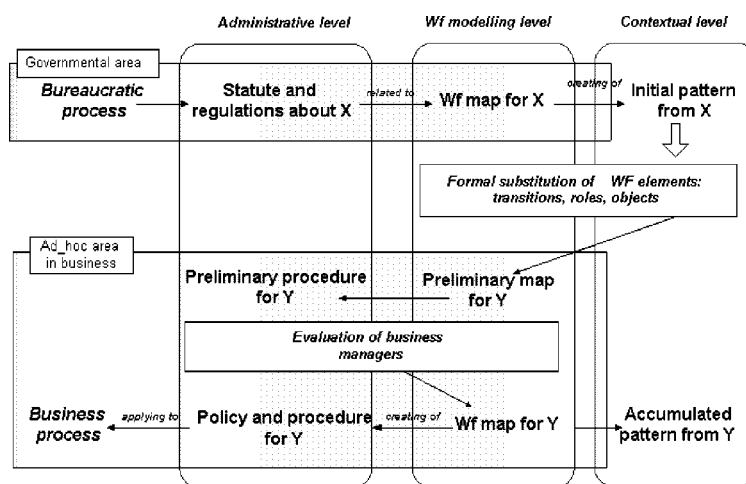


Fig. 2. The procedure of reusing of the governmental workflow to business purposes.

tion sector (Telesius and Jaliniauskas, 1999a).

Some observation can be derived from the schema:

1. At least, there are three levels of knowledge abstraction:

- *Contextual level* – accumulative workflow pattern can be build from the investigated similar business environments where we have got the appropriate workflow definition,
- *Wf modelling level* – preliminary Wf definition schema is created for the specific business area using workflow pattern from the contextual level,
- *Administrative level* – procedures and regulations are created for business administration with relations to Wf modeling level.

2. The ordering of ad-hoc area and creation of new procedure can be made by reusing of the typical procedure in contextual level, i.e., the specific process definition can be derived from the typical pattern with the similar contextual interpretation.

6. Observation of the Communication Activity

The analysis of ad-hoc processes cannot be based on the traditional knowledge sources, like clearly defined business procedures, expert knowledge, or business process diagrams. The main objective of analysis of communication acts is the preliminary mapping and classification of existing processes in ad-hoc area. At least two stages of analysis are held:

- analysis of the total amount of communications,
- analysis of the flow of communications related to specific process X and the identification of the common structure of this one.

Analysis of the total amount of communications can be made at the first stage for the purpose of preliminary classification of communication acts inside the total flow. We create a definition of the common interrelation loops. Preliminary classification places the boundaries among the processes. The classification from the first stage can be involved in the second stage of observation. That can be done differently:

- process classifier, as a *system of folders* about X, which can be inserted into user's e-mail storage, document repository or application. At the second stage, all messages (documents) related to X are moved to folder "X",
- process classifier, as a *system of categories* where all messages related to process X have a category "X";
- process classifier, as a *handbook database* with the bookmark "X", etc.

At the second stage we use the preliminary classification *for the identification and analysis of specific process X*. Only communications related to X are observed, and we can build the common process cycles and make a detalisation of the cycles.

As a simple example, let take the e-mail communication source. During the analysis we can easily insert the new folder "*process X*", and ask users to redirect all messages

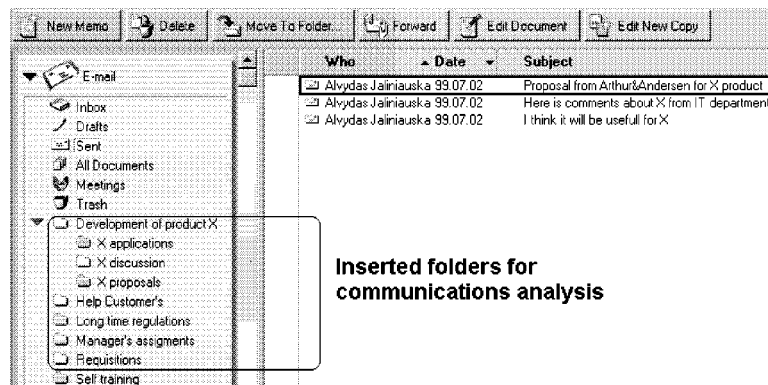


Fig. 3. E-mail storage with inserted folders for observation of communicative acts.

related to X to the folder “*process X*”. Fig. 3 shows an e-mail storage with inserted folders for communication observation related to several processes: customer’s help, requisition, self training.

Also the separate folder is created for the observed process X. After the customer have placed some messages into folder “X” we can make a *decision about existing of process X* in user’s ad-hoc area. At the same time we can look at the intensity of messages X in comparison with amount of messages in the other folders for decision about *the importance of X in the total amount of processes*. Subsequent analysis of process X can be done *for defining of common workflow objects and parameters*, i.e. participants, duration, typical subjects of communications, transferred objects (documents), etc. Seeking for more reliability, we can consider the corresponding messages about process X from e-mail boxes of all employees.

Data collecting from e-mail source is the most attractive and easiest way for observing X, but in most cases it is as usual incomplete. Bellow there are presented another useful sources for observation of communication activity:

- personal and staff decisions related to specific type of activity, i.e., personal resolutions, resolutions from the meeting protocols, assignments, etc.,
- messaging and calendaring from e-mail,
- the traffic of incoming correspondence,
- user’s activity in document repository related to a specific kind of documents,
- figures from financial reports – may be useful if process X have the separate positions in accountancy or financial simulation,
- time, cost and resource utilisation reports, i.e. project tracking materials, employees timesheets, expense reports, and other ‘wasteful’ paper,
- log of computer systems, etc.

Different combination of these sources may be used in the specific case. The analysis of communications about process X provide us with necessary information (participants, documents, stages of the process, etc.) for the subsequent applying of appropriate workflow pattern.

7. Workflow Patterns

In our example, we have supposed to apply the “*Document preparation*” procedure (process X) from the Government area to the “*Preparation of the new project in banking*” procedure (process Y) in banking area. Let us look at these steps more precisely. At the beginning, we can make only a presumption that these processes are similar and based on the same workflow pattern. The creation of banking process Y can be done by reusing of existing workflow pattern X. In our example, the initial workflow pattern was build in the governmental area. In other words, *we can create new business procedure by it approximation with the existing workflow pattern*. Workflow pattern is build like the structure of several elements:

- the common set of workflow objects,
- the main workflow definition in LAP notation with the common objects and interconnections,
- the process definition in alternative notations: administrative procedures, business diagrams, expert comments, etc.,
- links between the main workflow definition and alternative process definitions,
- links with other non-workflow elements in the business infrastructure.

The workflow pattern is built as Language/Action schema of workflow objects: Wf cycles, activities, subjects, roles, information objects (i.e., messages, assignments, documents, reports, etc.), rule-based transitions, relevant objects, invoked procedures. The structure of Wf objects corresponds to Workflow Management Coalition standard metamodel (Workflow Management Coalition, 1997) with some little extensions. The workflow objects are marked as variables within workflow schema. At the moment of initial creation of the pattern in primary (governmental) environment we have set a list of objects, created the map, made the links between the map and administrative procedures. For the purpose of applying our pattern for the banking process, the contextual interpretation must be done. We can make an approximation of banking process in the terms of approximation pattern. The creation of new process map can be done by formal substitution of variable elements in workflow pattern with elements from the communication schema in banking environment. We can use the preliminary defined objects from the communication schema that have been build in the stage of communication observation (i.e., the previous stage). The unknown elements from the primary (governmental) environment are not used in the workflow pattern. As a result of approximation, we get the preliminary process definition in banking with mixed contextual interpretation from the governmental and banking environments. Subsequently, the preliminary definition of the new workflow will pass through the customer’s reviewing, adjusting and final approving.

8. Conclusions

Unstructured business activities analysis cannot be based on traditional approaches using existing business procedures and expert knowledge. Only the observation of communi-

cation acts makes the background for success for identifying processes in unstructured environment.

In this paper we have presented *a method of analysis of unstructured environment*. The purpose of our method is identification of the processes and applying the workflow in the environment where we can't collect the initial knowledge in the traditional way. *A difference between traditional and presented method is shown in applying the interrelation between communication activities and workflow patterns for the process identification, and creating the corresponding contextual interpretation.*

The method is based on reusing of well defined workflow patterns from one business case for ordering of unstructured processes in another case. This method is useful in the earliest stages of the BPR for the preliminary analysis in ad hoc area with the purpose of processes identification, application of the existing knowledge baggage, and creation of strong motivation for managers.

The typical business (administrative) workflow definitions can significantly decrease the amount of analytical work in collecting knowledge about unstructured business procedures.

Acknowledgments

The author is grateful to anonymous reviewers for their work on the first version of this paper. I would also like to thank my colleagues Eugenijus Telesius of Vytautas Magnus University and Saulius Maskeliunas of the Institute of Mathematics and Informatics for the valuable comments.

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Nestruktūrizuotų veiklos procesų tyrimas verslo administravime

Alvydas JALINIAUSKAS

Straipsnyje pateiktas nestruktūrizuotų veiklos procesų tyrimo metodas. Diegiant darbų sekų valdymo sistemas, dažnai nepavyksta gauti patikimos informacijos apie egzistuojančius administravimo procesus. Tokio tipo procesams nėra aiškiai nustatytos darbo tvarkos, o veiklos dalyvių nuomonės yra prieštaringos. Metodas leidžia atlikti administravimo procesų analizę, tyrinėjant veiklos dalyvių tarpusavio komunikacijas. Veiklos procesų struktūrizavimui ir atitinkamų darbo tvarkų sudarymui siūloma naudoti darbų sekų šablonus ir proceso dalyvių komunikacines schemas. Metodą patogu naudoti ankstyvose procesų analizės etapuose, kai reikia nustatyti paties proceso egzistavimą, galimybę atlikti proceso reinžineriją ir įvertinti būsimą naudą.