

Method of data migration from one ERP system to another in real time

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Abstract. *The transition from one ERP system to another is a complex and demanding process for every enterprise, associated with numerous risks and unplanned expenses. This process usually ends and a new information system becomes operational at the beginning of new a business year. Practice shows that many of these projects are ineffective and result in disputes. The subject of this paper is a new methodology, created as an attempt to answer one of the key issues critical to the success of this type of projects, and that is the successful migration of business data. The methodology presents the migration from the current to the new ERP solution: throughout a business year and in a transparent way and real time. Potential advantages of the methodology are numerous and they will be further systematically described in this paper. Developed methodology was successfully applied to a medium size enterprise in a complex business project that was successfully completed within the planned time, scope and budget.*

Keywords. data migration, information system, ERP system, organizational change, database, business application

1 Introduction

The migration from one ERP system to another ERP system in an enterprise is a complex and long lasting process that involves many risks and a number of both planned and unplanned expenses. The word "(business) process" is used in this paper as a representation of a collection of interrelated

work tasks, initiated in response to an event, that achieves a specific result for the customer of the process [19]. This migration process usually takes several months of a business year and ends at the beginning of the following business year with installation of a new information system in the enterprise that is based on the new ERP system representing a group of new business program applications.

Practice shows that many such projects fail and end up in disputes between the enterprise as customer and the ERP manufacturers as project creators, most often due to unsystematic approach and inadequate assessment of the complexity and time required for the realization of the project. This paper will try to give an answer as to where the problem lies and how it can be resolved by means of automated algorithms, implementation of modern methods and information technology. The authors will analyze features and flaws of classic methods, and propose a new method of business data migration from the database of the current ERP system to the database of the new ERP system in real time, throughout a business year. The authors will subsequently try to prove the hypothesis that the methods of migration from the current ERP to a new one has not been completely explored, and that this calls for new researches that would provide better explanation of the structure, course and problems relating to this process thus making it more efficient, and, finally facilitate the communication and understanding between the manufacturer and the users of the ERP system, especially in terms of the duration, expenses and management of that process.

2 Organizational aspects of migration from the current to a new ERP system

Organizational changes represent a significant phenomenon that the majority of modern organizations have to face, occasionally or permanently. In most cases changes occur as a result of aspiration of the organization to adjust to the new situation on the market. Changes are usually caused by some factors from the environment outside the organization, although sometimes they can be provoked by certain inner factors. The external environment generates changes via factors that are in the domain of (market) competitiveness, socio-economic trends, and technologies. The changes of strategy and organizational development are definitely among the most relevant inner factors of change.

Organizational development represents a series of techniques and methods that managers can use to increase the adaptability of their organizations [14]. As a rule, organizational changes are met with resistance. Some authors claim that resistance can be present at two organizational levels: at the level of a group (team) and at the individual level [8, 307]. A large number of personnel within the organization tend to perceive changes as a threat to their own position, status, salary, and as just another burden and engagement out of their routine.

It is precisely the organizational development that offers certain tactics that can be used to reduce resistance to change [8, 308], that is: education and communication, participation, facilitation, bargaining, negotiation, manipulation and coercion [13]. Many authors recognized change scenarios that could be classified as follow: structural change, mergers and acquisitions, cultural change, IT-based process change [1]. One of the major IT-based organizational changes is implementation of the Enterprise Resource Planning system (ERP).

Enterprise Resource Planning is an information system used to identify and plan the enterprise-wide resources. [9, 546]. The objective of the ERP system is to coordinate all business operations of an enterprise, from evaluation of suppliers to the delivery of products and billing. ERP enables integration and automatization of business processes, sharing of the common database, creation of information in the real time. It encompasses "big"

modules like: MRP, finance, HR, SCM and CRM. Since ERP implies factors of organizational changes from the IT domain, it is worth mentioning that a large part of organizations still fail to achieve the business value that they expected to achieve when they decide to accept IT-based changes [1, 243]. As a result, there are several important issues that come into focus: strategy and IT, the role of IT management, the need for IT change managers, achievement of process change, change of the information culture. Certain analysts mention bad experiences in the implementation of ERP that are due to inadequate planning, and they provide several reasons why: pre-implementation preparation activities were carried out poorly; people were not well-prepared to accept and operate the new system; the implementation took much longer than expected; the costs of implementation were much higher than initially planned [4]. The staff has to be well educated and willing to accept the new roles that introduction of the new ERP system has imposed on them. That is a task for managers and company leadership.

Implementation of information technologies implies to a large extent the organizational culture. Some researchers perceive IT as the subculture of the organization [18], at which subculture implies opposition and independence from the organization.

Given that there are standard ERP systems of more or less prominent providers, the question raises of the harmony between the organizational structure and processes, and the requirements and standard IS solutions. Introduction of the ERP system or switching to another supplier often forces the organization to sort out its business processes (not earlier!). Some researches show that in the course of implementation of ERP products, companies make substantial investment in customizations to adapt the ERP system to their business model. This investment in customizations can sometimes be compared with the original cost of the ERP software [11].

Extensive organizational changes that take place when introducing ERP system are primarily a result of the need to change the organizational design - from the one based on the rigid structure in terms of function, to a process-based design that provides support to the operation of the integral system [3].

3 Methods of ERP system implementation and data migration, and their effectiveness

Today's practice uses three basic methods of transition from one ERP solution to another. By abbreviation 'ERP system' (Enterprise Resource Planning system) we mean an integrated information system in general. There are three basic implementation methods:

1. Big Bang - Implementation happens in a single instance. All users move to the new system on a given date;
2. Phased Rollout - Changeover occurs in phases over an extended period of time. Users move onto new system in a series of steps;
3. Parallel Adoption - Both the legacy and new ERP system run at the same time. Users learn the new system while working on the old [12], [2].

The majority of authors agree that these are three basic methods of introducing the new ERP software. Surveys show that the first two are most commonly implemented (Big-Bang 38%, Phased Rollout 40%, a combination of Big-Bang and Phased Rollout 11%, Parallel Adoption 9%, Others 2%) [12].

Authors use different methodologies of introducing the ERP system, but they all usually envisage the following introduction steps:

1. Business Review,
2. Project Planning,
3. Installation, Upgrade and Data Conversion,
4. Training and Education,
5. Business Process Engineering and Best Practices,
6. Conference Room Pilot Testing,
7. Go-Live!,
8. Post Implementation Review and Continuous Improvement [5], [7].

Data migration is rarely perceived as a very serious problem, and it tends to be insufficiently accentuated. According to investigations into the main technical problems that cause failure of implementation of ERP solutions, data migration is one of the primary factors of failure [20]. Along with optimum design of chart of account structure, effective and efficient migration of data is one of the cornerstones for the success of an ERP implementation [16]. It often happens that, in order to reduce their expenses, executors/vendors of software impose the burden of migration on users/former providers of ICT services, or on the internal information system. When introducing their software, the leading manufacturers/offers of modern ERP systems [10]: SAP, Oracle and Microsoft, request complete data for import into the new system according to the already existing specification. The data model of the new system remains unchanged, and the data from the old systems are adjusted to the new solution. Excel, Microsoft Access or SQL databases are used as a medium for the exchange of data.

ERP systems also support data import and their manipulation in the course of that transfer. As for non-standard data, it is usually necessary to design a "custom-made" application. This application converts data from various records into the one that was specified in accordance with the models provided by ERP manufacturers [15].

One of the recent researches on the introduction of ERP was conducted in 2008 by the consulting company Panorama Consulting Group on a sample of 1,322 world companies for a period from 2005 to 2008. It yielded strikingly poor results (Table 1.).

Table 1: ERP implementation success results [6].

%	Description of results
93%	of ERP implementation take longer then expected
59%	implementation cost more than initially assumed
13%	of companies characterize themselves as "very satisfied" with software impl.
57%	of participants suffered operational stoppages.

The data given in Table 1 indicate the need for new and more effective ways and methods of introducing new systems, with a special emphasis on data migration as one of the key factors in the implementation of a new solution.

4 Methods of migration from the current to a new ERP system in real time

Some ERP systems researchers listed four basic rules of data migration see Fig. 1, this was used as starting point in authors development of the proposed methodology.

This new methodology presented in Table 2. perceives and executes migration as an automated repetitive business process in real time rather than as a one-time technical operation.

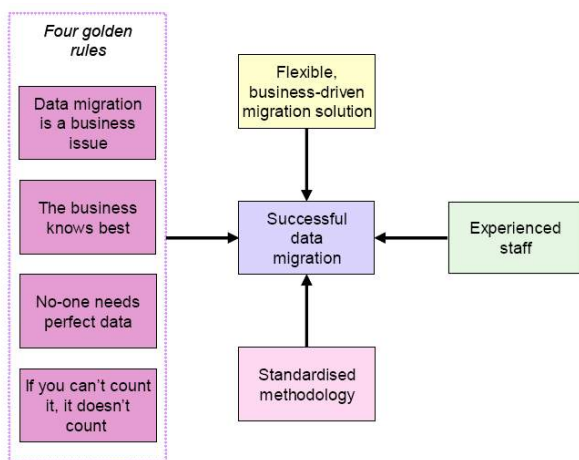


Figure 1: Four Golden Rules of Data Migration [17]

Apart from the manufacturer of the new ERP system and automated algorithms by which the data from the database of one business application migrate to another in real time, the process involves only the key personnel, or all employees capable of monitoring the realization of specific business processes.

Table 2: Process of migration from the current to a new ERP system

No.	Description of the steps in the migration process
1	Definition of the X-set of actual key data about business processes in the database of the new ERP system, from the beginning of the business year to an x-date. The X-sets make it possible to interrupt operation of the current ERP system conclusively with x-date and to resume the operation in the new ERP system starting with x-date + 1, without having to stop business processes.
2	Identification of the data from X-set within the database of the current ERP system on the basis of a detailed analysis of the logical and physical database model. If identification of the X-set is possible, next step has to be taken. If not, it has to be concluded that migration from the current to the new ERP system in real time is not possible.
3	Demo installation of the application and the base of the new ERP system onto the company's central computer.
4	Design of service application for the direct migration of actual data from the X-set of the current ERP system database to the new ERP system database.
5	Installation of service application for the direct migration of data onto the company's central computer.
6	Beginning of the systematic training of personnel for the work with the new ERP system applications by means of audio-visual presentations of applications and work on the demo installation of ERP system onto the company's business network.
7	Launching of the service application on the company's central computer and performance of direct migration of actual data from the X-set of the current ERP system database to the data base of the new ERP system.

No.	Description of the steps in the migration process
8	Systematic daily testing of transparency of the actual data in the current ERP system and the data that migrated to the base of the new ERP system. The testing is performed by the personnel skilled in monitoring the respective business processes.
9	Assessment of transparency of the data in the base of the new ERP system and deciding on whether conditions are met for termination of work with the current ERP system and proceed with work using the new ERP system. If the decision is negative, the process goes back to step 4). If the decision is positive, the process continues.
10	Identification of specific functionalities of the current ERP system that are not present in the new ERP system but are required in order to provide standard support to business processes
11	Final work on the applications of the new ERP system in line with specific requirements of the company, and activation of all control parameters of the applications of the new ERP system.
12	Termination of operation of the old ERP system on x-date and transfer to operation of the new ERP system as of x-date + 1.

The fundamental starting point of the method described in Table 2. is the definition of X-set of data, whose migration from the base of the current to the base of the new ERP system enables starting and continuing the operation in the new system.

The experience of authors of this paper in the practical implementation of the described methods prove the fact that X-set does not necessarily encompass all data from the current data base and the actual business year, but rather those data that are capable of determining the transparency of the data that migrated to the new ERP system and continuation of the company's operations in the new system at any given moment of x-date + 1 in the course of the business year.

In that sense the X-set is basically composed of the following subsets of data:

1. All referential catalogs of the database that render possible the instituting of referential integrity in the relational base of the new ERP system;
2. Entries of all warehouse/commodity input/output transactions that document the circulation of commodities from the beginning of a business year, and the current state of stocks;
3. Entries of all financial records created in the financial processing of analytical documents of business processes and commodity-financial transactions;
4. Standard counter of all documents used to support business processes.

Implementation of the method presented in Table 2, may have manifold effects: it makes possible the testing of transparency of actual and migrated business data in real time; uninterrupted company's work without stoppage of the current ERP system; informing the personnel about the possibilities of the new ERP system and training of users in operating the system by applying actual business data as demo data; observation of the differences in functionality between the current and the new RP system; detection of requirements for the necessary finishing of implementation of the new ERP system; and making a realistically founded decision on whether or not the migration of the company's information system from the current to the new ERP system is possible.

This method, due to its characteristics, can be applicable in all three classical ways of implementing ERP systems (big bang, phased rollout, parallel adoption). Benefits that are obtained by this method are easily applicable to any of the classic scenario of implementing ERP systems, noting that the best results can be achieved in parallel adoption.

In the view of the method described above, the manufacturer of the current ERP system may, but does not necessarily need to have a role or responsibility, except the responsibility for the consistency of the base and authenticity of business data.

The manufacturer of the new ERP system provides service program application for automatic migration of business data, whose program code automatizes the entire algorithm of the direct data

migration and guarantees transparency of migrated data in relation to the original data in the database of the current ERP system.

The company as user of the new ERP system runs a test of the new application and in relation to the real business data, confirms transparency of the migrated data, and makes a final decision on whether or not it will make the changeover to the new ERP system.

5 Conclusion

The idea for this paper is a result of authors' years-long experience in the field of development and implementation of the ERP system [22], [21], and also of observed problems which initiated new researches and led to new solutions to that process.

In item 2. We tried to explain how the problem of organizational changeover and advancement of business processes is becoming more and more the prime moving force of improvement or change of the company's entire ERP system, which is a precondition for the existence and operation of the overall information system.

Table 1, provides research data on effectiveness of ERP system implementation which confirm that, on the one hand, there is a great need and also a number of reasons for replacement of the old ERP system that hinders development and business operation of complex business systems and, on the other hand, that process is burdened with many problems that are most often a result of the sub-standard methods of replacing the ERP system.

A contribution of this paper is in the method of changeover from the current to a new ERP system in the course of a business year in real time as elaborated in section 4. It may be useful to many of those who deal with problems involving introduction of the ERP system as a means of ensuring effectiveness of the process.

The feasibility of the described method is demonstrable: the authors of this paper developed a program application and it was implemented in a case of direct data migration from the base of one to the base of another ERP system in a medium-sized enterprise. The service application has about 5,000 lines of program code and it migrates data from about 40 tables of the base of one to the base of another ERP system.

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