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DEVELOPMENT OF METHODS OF IMPROVEMENT OF BUSINESS PROCESS MANAGEMENT

Об'єктом дослідження є методи удосконалення управління бізнес-процесами підприємств. Інтеграційно-трансформаційні процеси, що відбуваються в українській економіці, висока конкуренція, тиск кризових факторів, висока непередбачуваність змін у зовнішньому середовищі вимагають від українських підприємств постійного пошуку нових більш ефективних методів управління. Нові методи управління мають бути спрямовані на зміцнення конкурентних переваг підприємства на ринку та стабільну діяльність підприємства у стратегічній перспективі.

Отже, одним з найбільш проблемних місць є завдання переорієнтації підприємств на високотехнологічну модель удосконалення та розвитку бізнес-процесів. Удосконалення методів управління бізнес-процесами підприємства в рамках реалізації стратегії розвитку дозволяє знайти шляхи оптимізації його діяльності (економічної ефективності) з урахуванням специфіки управління на перспективу.

Проведений аналіз дозволив розробити та систематизувати критерії оцінювання результативності управління бізнес-процесами підприємства на основі запропонованого алгоритму відповідно до цілей бізнес-процесів і вимог споживачів. В роботі розроблено методику оцінювання та підвищення результативності управління бізнес-процесами підприємства, яка дозволяє провести оцінювання бізнес-процесів підприємства відповідно досягнутого рівня (результативність бізнес-процесів) та підвищення ефективності бізнес-процесів підприємства відносно галузевого і світового рівнів (бенчмаркінг бізнес-процесів).

В ході дослідження удосконалено технологію проведення бенчмаркінгу, яка дозволяє підвищити результативність бізнес-процесів підприємства за рахунок включення етапу по оцінці ефективності розроблених заходів у процес бенчмаркінгу. Завдяки цьому запропоновано інструментарій для визначення рівня результативності управління бізнес-процесами і їх ранжування на основі використання вербально-числової шкали Харрінгтона. Шкала Харрінгтона дозволяє визначити рівні результативності бізнес-процесів з урахуванням отриманих результатів, які потрапляють в числові інтервали. В роботі запропоновано використання методу аналізу ієрархій з метою отримання найбільш достовірного значення показника результативності системи управління бізнес-процесами підприємства.

Ключові слова: *управління бізнес-процесами, критерії оцінювання, результативність бізнес-процесів, бенчмаркінг бізнес-процесів.*

1. Introduction

The processes of globalization and integration of the economy of Ukraine into the world economy have fundamentally changed the economic conditions for the functioning of domestic enterprises. Integration processes are characterized by increased instability, uncertainty of the external environment, increased competition in the domestic and foreign markets. Given this, enterprises are faced with the issues of new tools and methods for managing production processes. At this stage in the world there is an increasing role of using and introducing modern methods of improving the management of business processes of enterprises.

In order to effectively manage business processes, it is necessary to assess their state, since any changes in the conditions or results of the business processes are associated with one or another management decision. The state of business processes can only be determined under conditions where appropriate criteria and measurement methods exist. Based on the measurement and analysis of the effectiveness of the management of business processes of enterprises, measures should be developed to improve them using appropriate mechanisms and tools. Therefore, in order to increase management efficiency and achieve key objectives, enterprises need to improve their business process management system using a process approach.

Given this, the problems of improving the management of business processes of enterprises in a competitive and globalized economy are relevant and require further study and resolution.

2. The object of research and its technological audit

The object of research is the methods of improving the management of business processes of enterprises.

The integration and transformation processes occurring in the Ukrainian economy, high competition, pressure of crisis factors, high unpredictability of changes in the external environment require from Ukrainian enterprises the constant search for new more effective management methods. New management methods should be aimed at strengthening the competitive advantages of the enterprise in the market and stable activity of the enterprise in a strategic perspective.

So, one of the most problematic places is the task of reorienting enterprises to a high-tech model of improving and developing business processes. Improving the methods

of managing business processes of an enterprise within the framework of the implementation of a development strategy allows finding ways to optimize its activities (economic efficiency), taking into account the specifics of management for the future. The problem can be attributed to the little studied, which, in turn, provides a large field of activity for further research.

3. The aim and objectives of research

The aim of research is development of practical recommendations for improving the management of business processes of a modern enterprise on the basis of tools that ensures the objectivity of results for making management decisions.

To achieve the aim of the research the following objectives are defined:

1. To analyze the methods of improving the management of business processes of enterprises.

2. To develop a methodology for assessing and improving the effectiveness of management of business processes of enterprises.

4. Research of existing solutions of the problem

Significant amount of work of modern scientists are devoted to the study of the problems of improving the management of business processes of enterprises. In these works, approaches are described on the formation of strategic management models for creating competitive advantages of an enterprise [1], and the issues of business process reengineering are investigated [2, 3]. In [4], a significant contribution was made to the development of the concept of process management, namely, the concept of «improving business processes» was introduced for the first time and practical recommendations were given on the application of techniques and methods for redesigning business processes. In the process of research, many scientific approaches to modeling and improving the management of business processes of market-oriented enterprises have been highlighted. The functional approach involves the allocation of business processes, based on the functions performed by units [5]. The product approach involves the use of the results of processes (goods and services) [6]. The matrix approach allows to submit a business process model in the form of a matrix, each element of which is a separate business process, reflects the subsystems and stages of the product life cycle [7]. It should be noted that in the late 1990s there was a transition from the use of the functional approach to the process approach [8]. The authors of the work [9] of managing business processes of a modern enterprise are considered on the basis of conceptual aspects of the system-process approach and the use of modern analytical technologies. According to the authors of work [10], it is advisable to use long-term methods of improving business processes of an enterprise such as business process redesign, benchmarking and engineering. These methods can be used in a complex, depending on the tasks.

But some areas of business process management, in particular, concerning the effectiveness of business processes remain unexplored, as economic transformation requires the creation of new approaches and solutions. Despite the large number of publications and diverse approaches to the formation of criteria and methods for assessing the effectiveness of the management of business processes of enterprises, there is no comprehensive approach to these issues in the scientific literature. Considering this, the problems of integrated assessment and improvement of the effectiveness of the management of business processes of enterprises in a competitive and globalized economy require further study and development.

5. Methods of research

General scientific and special research methods are applied during the execution of the work:

– scientific abstraction, analysis and synthesis for determining the methodological essence of the enterprise's business processes and determining the criteria for their assessment;

– expert method (meeting method) to determine the weight criteria for each business process;

– method of weighted sum of the estimates of the criteria for determining the integral indicators of the effectiveness of business processes of the enterprise;

– method of Harrington verbal-numeric scale to determine the level of performance of business processes, taking into account the obtained results, which are used in numerical intervals;

– method of analyzing hierarchies to obtain the most reliable value of the indicator of the effectiveness of the enterprise business process system.

6. Research results

Analysis of scientific papers in the field of business process management methodology allows to formulate a number of conclusions concerning the effectiveness of business processes and are as follows:

– in the conditions of market relations, where the main characteristics of external factors are mobility and uncertainty, effectiveness is an important indicator of such a dynamic system as an enterprise. And manifests itself as a result of the interaction of business processes with each other, as well as the interaction of the enterprise with the external environment;

– effectiveness of management characterizes the business process in terms of achieving goals and planned results of production, business, marketing, financial, social, innovation and other activities of the enterprise;

– effectiveness of management characterizes the ability of a business process to fulfill obligations to internal and external customers through the fulfillment of their requirements.

Thus, according to the above, let's keep in mind the degree of achievement of the objectives of the business process and satisfaction of the requirements of internal and external customers under the effectiveness of business process management.

In the works related to the management of business processes, various criteria for assessing their performance are proposed: the level of compliance of products with the established requirements, the degree of fulfillment of plans on time, the level of labor productivity. However, the problem of defining assessment criteria has not been solved yet. Given the above, the algorithm for determining the criteria for assessing the effectiveness of business processes is proposed, which consists of five stages (Fig. 1).

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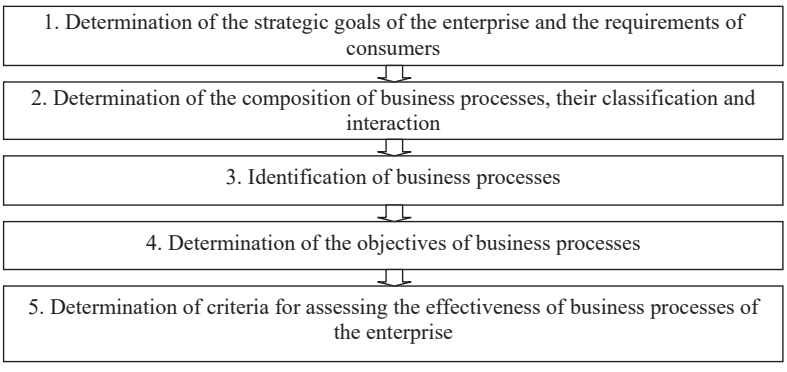

Fig. 1. The algorithm for determining the criteria for assessing the effectiveness of business processes of an enterprise

In this case, it is important to define criteria based on the goals of business processes that are developed taking into account the strategic goals of the enterprise and the requirements of consumers. Classification contributes to the distribution of business processes of the enterprise into groups: the main business processes and business management processes. Determining the relationship between business processes is necessary to build a process model of an enterprise.

When identifying business processes, their characteristics are described: functions, order of actions, incoming and outgoing flows and requirements to them, suppliers and consumers of processes, resources. On the basis of the above actions, the objectives of business processes are defined, which act as a declaration, have a temporary, quantitative and qualitative characterization and provide the basis for the selection of performance assessment criteria. With the help of the proposed algorithm, criteria for assessing the main business processes and business management processes are determined. Table 1 shows the assessment criteria for the main business processes of the enterprise [11].

Effectiveness assessment of business processes according to these criteria allows to identify problem areas and make timely management decisions to improve the efficiency of the enterprise.

After examining the existing approaches to the assessment of business processes, it is determined that the results of the enterprise's activity are a quantitative expression of the output results from each business process of the enterprise. The results are determined on the basis of an assessment of the state of business processes of an enterprise by the achieved internal level (performance of business processes) and industry and world levels (benchmarking of business processes).

With the gradual development and application of the process approach in enterprises, scientists and practitioners are increasingly paying attention to the assessment of business processes. The most studied is the first direction of assessment – the performance of business processes. The second direction – business processes benchmarking is the least highlighted in the scientific literature and the least applied in practice.

The study of existing approaches to assessing the effectiveness of business processes has shown that they mainly come down to the definition of the performance indicator without further improvement measures. In this regard, the use of these approaches does not give significant results in achieving the goals of the enterprise. Based on the study of work on the assessment and improvement of the effectiveness of business process management, it is determined that there is no scientifically based assessment methodology that covers all business processes of an enterprise. There are methodologies for assessing the effectiveness of management system processes, most of which are developed relative to the quality management system and tools for increasing the effectiveness of processes that are not related to each other.

Let's believe that the procedures for assessing and improving the effectiveness of business process management should be:
– first, consistent with each other and be carried out consistently, because in case of obtaining the value of the indicator of the effectiveness of the business process, below the permissible norm, it is necessary to develop measures to improve the effectiveness of the business processes;
– secondly, the assessment should cover various areas of the enterprise.

Table 1

Criteria for assessing the effectiveness of the main business processes of the enterprise

Process	Assessment criteria
1. Marketing research	– the level of implementation of marketing research plan; – the degree of accuracy of sales forecast; – the degree of compliance with the time spent on the analysis and harmonization of product requirements; – the level of management's use of marketing research results in preparing and making decisions
2. Product development	– the level of output of relevant products; – the degree of compliance with the time spent on the development of new products; – compliance of the design or development results with the established requirements (number of comments to the project)
3. Preparation of production	– compliance with the implementation of the schedule; – the level of claims from divisions
4. Purchase	– the level of compliance of the purchased materials with the established requirements; – the degree of fulfillment of the procurement plan
5. Production	– the degree of implementation of the production plan in a certain period; – the level of compliance of manufactured products with the requirements; – the level of compliance with the requirements for the safe performance of work; – the level of products for which, during the operation of the consumer, no modifications were made related to the elimination of manufacturing defects
6. Measurement and monitoring of products	– absence of detected inconsistencies; – the level of compliance with control methods; – level of provision with monitoring and measurement tools; – the level of control in full in accordance with the documentation
7. Product sales	– the level of implementation of the implementation plan; – the level of fulfillment of supply contracts; – lack of consumer complaints regarding the delivery and storage of products

Note: developed on the basis of [11]

Considering this, a methodology for assessing and improving the effectiveness of business processes of an enterprise has been proposed [12].

The first part of the methodology – assessment of the effectiveness of the enterprise's business processes – includes nine stages. At the first stage, at the beginning of the reporting period, the planned ones are established, and at the end of the reporting period (the period depends on the specifics of the enterprise's activities, the company's objectives, and consumer requirements) the actual values are determined according to certain criteria for assessing the effectiveness of the enterprise's business processes. At the second stage, the weights of the criteria for each business process are determined by an expert way (the method of «meetings») according to the formula:

$$\alpha = \frac{\left(\sum_{i=1}^{N} A\right)}{N}, \quad (1)$$

where a – the weight coefficient of the criterion; A – the rating given by the i-th expert; N – the number of experts.

At the third stage, relative unit criteria of business processes are calculated in accordance with the planned and actual values of the criteria according to the formula:

$$K_i = \frac{X_n}{Y_n}, \quad (2)$$

where K_i – the relative unit i-th criterion of the business process; X_n – the actual value of the criterion; Y_n – the planned value of the criterion.

At the fourth stage, the integral indicators of the effectiveness of the business processes of the enterprise are determined by the method of weighted sum of the criterion estimates, taking into account the weighting factors and the relative single criteria by the formula:

$$P_{pr} = \sum_{i=1}^{n} K_i \alpha_i, \quad (3)$$

where K_i – the unit relative i-th process criterion; a_i – the weight coefficient of the criterion; n – the number of criteria.

At the fifth stage, the level of business process performance is determined according to the modified E. Harrington scale. At the sixth stage, business processes are ranked in order of importance by the T. Saaty method of analyzing hierarchies [13] to determine weights. At the seventh stage, the efficiency of the system of business processes of the enterprise is determined in accordance with the performance indicators and weights of business processes according to the formula:

$$P_{syst} = \sum_{j=1}^{n} \left(P_{prj} m_j\right), \quad (4)$$

where P_{prj} – the performance of the j-th process; m_j – the weighting factor of the j-th process; n – the number of business processes.

At the eighth stage, the level of performance of the business process system is determined according to the E. Harrington scale. At the final stage of the assessment decisions are made on the management of business processes of the enterprise. To this end, improvement measures are being developed with subsequent monitoring and analysis of performance. If the performance indicator of a business process falls within the interval (0.0–0.37), then in accordance with the developed methodology, benchmarking is provided.

Summarizing the existing approaches to benchmarking and improving it, seven consecutive stages are proposed (Fig. 2).

At the first stage, an enterprise is selected for comparison, in the role of which partners, distributors and suppliers of the enterprise can play, since they are really interested in the success of the entire business. The second stage involves collecting information about technologies and the results of this business process using checklists. At the third stage, this information is analyzed and compared with similar data of its business process. At the fourth stage, measures are being developed to improve the business process. At the fifth stage, the efficiency of the developed measures is calculated for making decisions on their implementation in the business process. If the result of the economic justification of events is positive, then they are embedded in the business process (the sixth stage). If the assessment result is negative, then it is necessary to return to the fourth stage and to develop measures taking into account the resources, specifics and capabilities. At the final, seventh stage, control over the business process is carried out.

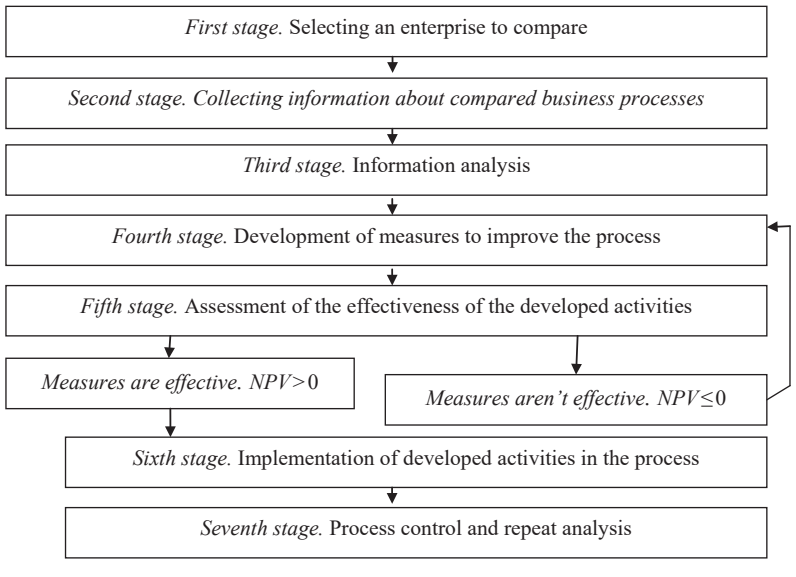

Fig. 2. Benchmarking of enterprise business processes

Let's consider it expedient to use tools to determine the level of performance of business processes and their ranking based on the use of a numerical scale and a method of analyzing hierarchies in order to obtain the most reliable value of the indicator of the effectiveness of an enterprise's business process system.

Business process performance indicators are calculated at the fourth stage of the assessment. The values are in the range from 0 to 1, they need a qualitative understanding

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to determine the algorithm of actions for managing and adjusting the enterprise's business processes. Harrington verbal-numerical scale is chosen and justified by the author as the basis for the interpretation of indicators [4], which allows to determine the levels of performance of business processes taking into account the obtained results, which fall into numerical intervals. The modified Harrington scale for determining the levels of performance and actions for business processes is presented in Table 2.

Table 2

Scale of business process performance levels

Numeric intervals	Level of performance of the business process	Business process stages
0.8–1.0	Very high level of performance	The process functions efficiently, but it is necessary to develop measures of action, if $P_{pr}=1$, then development of any actions is not needed.
0.63–0.8	High level of performance	The process functions efficiently, but minor corrective actions need to be developed.
0.37–0.63	Average level of performance	The process functions efficiently, the goals and objectives are partially achieved, but corrective actions need to be developed.
0.2–0.37	Low level of performance	The process is not working effectively, it is necessary to develop significant corrective actions.
0.0–0.2	Low level of performance	The process functions ineffectively, the goals and objectives have not been achieved, the intervention of the top management is required, if $P_{pr}=0$, then it is necessary to develop a new process

Depending on the level of performance of the business process, the following variants of the natural manifestations of performance are possible. With minor deviations (0.8–1.0), the effectiveness of the business process is disrupted by a small amount from the planned one. This means that a business process can function effectively for quite a long time without applying special measures to eliminate the cause of such deviations. In cases where a significant deviation has occurred (0.0–0.37), it is necessary to take appropriate measures in the form of developing business processes, corrective actions and other measures aimed at restoring the required level of performance.

The methodology for assessing and improving the effectiveness of business processes provides for a stage at which the indicator of the effectiveness of the business process system is calculated, which is necessary to inform stakeholders in the enterprise's activities, as well as to make management decisions by top management. This indicator is calculated by the method of convolution of all indicators of the effectiveness of business processes of the enterprise (fourth stage of assessment), taking into account the weighting factors (sixth stage of assessment).

Since the processes have a different impact on the achievement of the strategic goals of the enterprise, they must be ranked in order of importance. For this purpose, it is proposed to use the T. Saaty method of analyzing hierarchies, which is based on pairwise comparisons of alternatives on a nine-point scale (Table 3). Also in the ranking can be used and intermediate numbers (2, 4, 6, 8). The ranking of business processes is carried out by experts, comparing business processes with each other. The normalized amounts obtained as a result of calculations are accepted as weights of business processes.

Table 3

Scale of relative importance of alternatives

Intensity of relative importance	Determination
1	Equal importance
3	Moderate advantage of one over the other
5	Significant or strong advantage
7	Significant advantage
9	Very strong advantage

After examining the approaches to the benchmarking of other scientists, it is found that these approaches during the process benchmarking did not provide for the stage of assessing the effectiveness of measures that are embedded in the business process. Meanwhile, before introducing the developed measures into the business process under consideration, it is necessary to calculate the planned effectiveness of the implementation of this project. The development and implementation of measures is considered as an investment project, by appointment this type of investment can be attributed to investments that are invested in improving management or production efficiency.

In this regard, the methodology for assessing and improving the effectiveness of business processes includes a stage at which the effectiveness of the developed measures is assessed. It is proposed to use indicators based on the application of the concept of discounting: net present value *NPV* (5) and discounted payback period *DPP* (6):

$$NPV = \sum_{t=0}^{T} \frac{B_t - C_t}{(1+r)^t},\ DPP = k, \tag{5}$$

at which:

$$\frac{\sum_{t=0}^{T} \frac{C_t}{(1+r)^t}}{\sum_{t=0}^{T} \frac{B_t}{(1+r)^t}} = 1,\ k \in [1;n], \tag{6}$$

where B_t and C_t – the benefits and costs in period t; T – the total duration of the project; r – the discount rate.

The implementation of this stage in the technology of benchmarking allows to make informed decisions on the implementation of measures in the business process:

– if the $NPV > 0$, the project implementation is economically feasible, it is possible to proceed to the next stage and implement the developed measures in the business process;

– if $NPV \leq 0$, the project is not economically unfeasible, therefore, it is necessary to return to the previous stage and develop a new project.

This indicator is used, to a greater extent, for a comparative assessment of the effectiveness of alternative investment projects, but it can also be adopted as a criterion for the adoption of a separate project.

7. SWOT analysis of research results

Strengths. The strength of research is improvement of the management of business processes of enterprises lies

in the fact that the proposed measures allow to assess the performance of business processes using the identified criteria and the developed methodology. Obtained during the performance assessment information should be the basis for management review, should be used for operational control of business processes, goal analysis, analysis and improvement of the enterprise.

So, the proposed methods allow to develop an effective methodology for assessing and improving the effectiveness of the management of business processes of the enterprise. Compared to peers, the proposed methodology allows an assessment of the company's business processes in accordance with the achieved level (business process performance) and an increase in the efficiency of the company's business processes relative to the industry and world levels (business processes benchmarking).

Weaknesses. After examining approaches to benchmarking by other scientists, it is found that these approaches during the process benchmarking do not provide for the stage of assessing the effectiveness of measures that are embedded in the business process.

So, the risks of implementing the proposed methodology include the fact that the proposed methodology for assessing and improving the effectiveness of business processes provides for a stage at which the effectiveness of the developed measures is assessed. It is proposed to use indicators based on the application of the concept of discounting: net present value *NPV* and discounted payback period *DPP*. The development and implementation of measures is considered as an investment project, by appointment this type of investment can be attributed to investments that are invested in improving management or production efficiency.

Opportunities. It should be noted that in the future, the methodology for improving the management of business processes of enterprises can be supplemented by improving the technology of benchmarking, which can be effectively implemented when creating a benchmarking alliance, which may include enterprises of one alliance or corporation. That is, it is possible to improve the performance of business processes through benchmarking based on advanced methods and technologies of leading enterprises.

Threats. The threats, according to the method of improving the management of business processes of enterprises, include the fact that even the proposed approach is not a technology to avoid losses associated with the integration-transformation processes that occur in the Ukrainian and global economy. These include high competition in the goods and services market, the pressure of crisis factors, and a high risk of changes in the external environment.

The proposed method of improving the management of business processes of enterprises is seen by the author as universal for most enterprises of various sectors of the national economy of Ukraine. This, in turn, also creates certain threats in its use, since each sector of the national economy has its own characteristics and specificity. Thus, the proposed method of improving the management of business processes of enterprises needs to be adapted and adjusted in accordance with the requirements of a particular industry when it can be used.

8. Conclusions

1. Based on the analysis of methods for improving the management of business processes of enterprises, criteria for assessing the effectiveness of the management of business processes of an enterprise are identified and systematized. This is done using the proposed algorithm in accordance with the objectives of business processes and customer requirements.

2. A methodology is developed for assessing and increasing the effectiveness of managing business processes of enterprises. It is proposed to use tools to determine the level of performance of business processes of the enterprise and their ranking based on the use of the Harrington number scale. The Harrington scale allows to determine the levels of performance of business processes, taking into account the obtained results, which fall into the numerical interval. The paper suggests using the method of analyzing hierarchies in order to obtain the most reliable value of the indicator of the effectiveness of the enterprise business process management system. This allows to assess the business processes of the enterprise in accordance with the achieved internal level (performance of business processes) and industry and world levels (benchmarking of business processes).

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