

Identifying the Workflow Potential of Business Processes

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Abstract

Though the activities of business organizations in the field of workflow management are facing an enormous growth, a methodical solution for an essential problem occurring in many workflow projects is still lacking: the identification of those processes that can be supported by workflow applications in a profitable way. In this paper we present a structured framework, which can serve as a guideline for the evaluation of processes during the selection and introduction of a workflow management system. This framework contains three groups of criteria: technical, organizational and economic. Designed as a scoring model, this approach enables the user to evaluate the workflow potential of business processes systematically. First, the underlying concepts and design of the framework are outlined. In the following we describe, how the framework can be adjusted to individual needs through a three-step aggregation process. In order to demonstrate the practical relevance its application within an industrial workflow project is described.

1. Current practice of workflow projects

Workflows are processes - temporal and logical sequences of activities that are necessary to perform operations on economically relevant objects - whose control logic lies within the control sphere of an information system. Every workflow is based on a process model that has been enhanced with additional attributes supporting its automation, the so called *workflow model*. A *workflow management system* is an information system that supports the execution (and optionally the specification) of workflow models. From the point of view of the workflow management system the elementary process activities are encapsulated, i.e. the workflow management system has an external view on the automated or manual execution of the functions but it is not concerned with the internal functionality of the activities.

With the rapidly growing interest in workflow management, an increasing number of corporate projects involving the implementation of workflow-based applications [1] can be observed. In this area, companies face

several problems such as fitting a new information system into the given IT infrastructure or the selection of the process candidates for workflow automation. While technical questions are extensively discussed in the literature, there is a lack of an elaborate and detailed solution for the identification of workflow candidates among the business processes of the enterprise. The identification of business processes with high workflow potential, i.e. those processes that can be supported by workflow applications *profitably*, is an essential issue within a workflow project because the selected processes and their system environments are the core determinants of the technical and business related requirements for workflow systems [2]. A delay in, or even a neglect of, this task leads inevitably to severe scheduling problems or, in the worst case, to the failure of the workflow project.

The absence of an appropriate discussion of the workflow-relevant processes is also reflected in the common practice of workflow projects: Without a detailed analysis of the processes the selection of the workflow system is often reduced to technical criteria. Consequently, the functionality of the workflow management system dominates the business requirements of the processes that are subject to workflow automation. This goes along with the popular belief, that processes already optimized during BPR projects do not need to be changed anymore [3]. As a consequence, workflow projects often have failed or have been realized just to a minimal extent. Indications for this are the low number of workflow-based applications that are actually applied in day-to-day business, many non-operative pilot installations and minor applications for backoffice processes such as vacation day permission or travel expenses settlement (cf. [4], [3]).

These facts are even more important as the mere introduction of a workflow management system does not necessarily guarantee any economic advantage. On the contrary, the purchase of complex workflow management systems and (to a much higher extent) their introduction, operation and maintenance, induces immense costs. Therefore, it has to be realized that workflow management cannot make business better in general, but that an economic and technical, methodically sound analysis of

the potential workflow-relevant processes is indispensable.

In this paper we present a structured framework which can serve as a guideline for the evaluation of business processes in this respect. After a discussion of related work in *section 2* we outline the underlying considerations and concepts of the framework in *section 3*. In *section 4* the design and details of the framework are discussed. In order to demonstrate the practical relevance of the framework its application within an industrial workflow project is described in *section 5*. A brief summary and an outlook on future work concludes the paper.

2. Related work

In comparison to the broad discussion of the functions and alternative architectures of workflow management systems (cf. e.g. [5]), less attention has been paid to the domain in which the workflows should operate [6]. The workflow literature emphasizes mainly process and structural aspects such as whether the process has got a certain degree of stability in time or throughput capabilities. However, practical experience shows that these criteria are not sufficient as they neglect many other relevant aspects, especially those related to business goals. Only a few sources can be found in the workflow literature that explicitly mention criteria for the selection of workflow-relevant processes (cf. e.g. [8], [9]):

In his procedure model for the introduction of workflow management systems, KUENG provides a “criteria catalogue” for the assessment of business processes. This catalogue is divided into the categories: common aspects, time aspects, quality aspects/customer satisfaction, structural/qualitative aspects and cost/revenue aspects [8].

KOBIELUS defines six key criteria, which can help to identify potential candidates for business process reengineering [9] prior to the introduction of a workflow management system. These criteria focus on qualitative aspects such as accuracy, customer satisfaction and flexibility but also include cost, quality and speed.

However, both approaches lack a detailed discussion of the aforementioned criteria and do not take the underlying organizational situation and corporate objectives into account. The main intention of the framework proposed in the following sections is to overcome these deficits.

3. A framework for the identification of workflow relevant business processes

Available workflow products follow different workflow paradigms such as transactional orientation [10], speech-act based approaches, collaborative and administrative workflow [11]. The intention of our approach is to establish a generic framework for identifying the workflow potential that can be applied to any given business processes, regardless of implementation constraints. The approach has been evaluated during the introduction of a transaction-oriented workflow management system. However, the single elements of the framework can be adjusted to match the requirements of the specific business situation. Therefore the adaptability of the design for different workflow paradigms can be achieved by using different criteria weights and a different selection of criteria from the master catalogue.

The causal structures underlying the framework are described as an Entity Relationship Diagram and depicted in figure 1 (for the extensions of the ERM notation used here see [12] (generalization, specialization) and [13] (reinterpreted relationship types)). With the attention of serving as an operational instrument the framework comprises a number of checklists in form of tables. These tables correspond with the causal relationships that are shown in figure 1 as well. The framework is composed of the following elements (entity types are printed in *italics*):

Workflow management systems provide a certain set of *Workflow Functions* that support the *Goals* of business process management. The degree of support is dependent on the *Workflow Potential* of the supported *Business Process*. This workflow potential is the result of the match between the business process and a given set of *Criteria* which can be divided into technical, organizational and economic criteria. In order to enable a multi factor analysis of business processes each of these criteria is *weighted*. The weights may vary, depending on the requirements of the *Project* during which the framework is employed. The criteria relate to the *Automated Control* of the business processes, which is supported by the workflow functionality. The *Manual Control* of the business processes is not supported by workflow automation and is therefore not related to the workflow potential of the business processes.

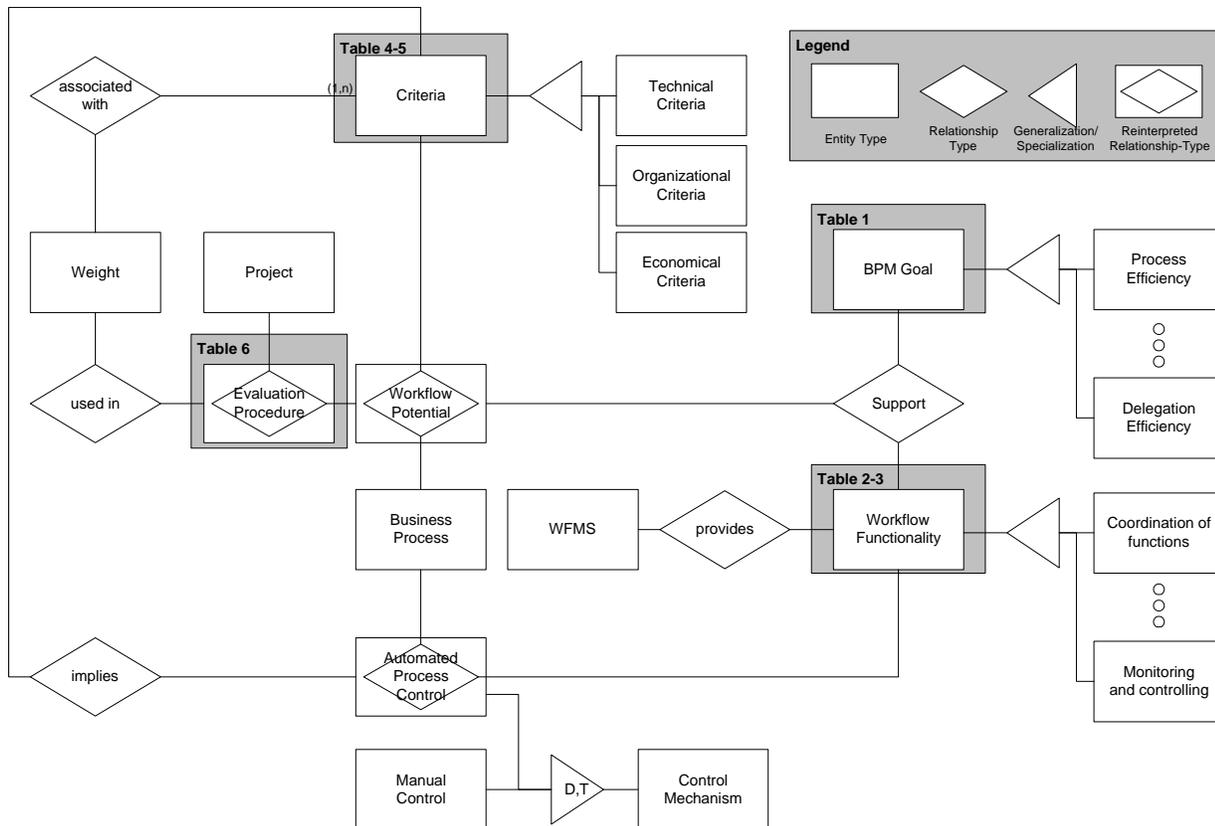


Figure 1. Conceptual foundation underlying the framework

The workflow potential of a business process is the degree in which the process can be supported by workflow applications *profitably*. In practice, the effects of workflow management use are expressed in a vague fashion, e.g. “decreasing the throughput time” or “increasing the transparency of processes” (see also table 2). Identifying the workflow potential of business processes requires a clear understanding of the impact of workflow management on business processes. Based on this the framework is developed in three steps that answer the following questions:

1. Which goals of business process management should be pursued?
2. In which way can these goals be supported by workflow management?
3. Which process criteria are relevant for this support?
4. How can business processes be evaluated using the aforementioned criteria?

We will address these questions in the following sections.

3.1 Goals of business process management

The possible goals of business process management can be divided into a number of goal categories. With regard to the first question this paper refers to five general (non disjunctive) goal categories: process efficiency, resource efficiency, market efficiency, delegation efficiency and motivation efficiency. These efficiency goals are outlined in table 1 [14].

3.2 Coordination functions of workflow management

In order to answer the second question, we first have to evaluate the functionality of workflow management systems that has an effect on the business processes (see figure 1). Since workflow management is mainly concerned with coordination aspects of business processes, workflow functionality can be divided into different coordination and control mechanisms. Table 2 gives an overview about these mechanisms (cf. [15]).

Table 1. Goals of business process management

Efficiency Goal	Description
Process efficiency	Optimization of process criteria such as processing time (to be minimized) or faithfulness to deadlines (to be maximized)
Resource efficiency	Efficient use of the resources (human resources as well as application systems) available for the execution of processes.
Market efficiency	The proper positioning of the enterprise in its relation to market partners. This includes a reliable prediction of delivery times, transparent communication with suppliers and customers and optimized procurement and distribution processes.
Delegation efficiency	Adequate use of the competencies of superior (greater scope of vision along the process) and subordinate (detailed knowledge about single activities) organizational units.
Motivation efficiency	Motivation of staff to act in a way congruent to the business goals of the enterprise.

Table 2. Coordination aspects of workflow management systems

Mechanism	Description
Coordination of activities	The workflow management system <i>automates the transitions between single process activities</i> . The implicit knowledge about the sequence of activities can be handed over to the workflow system entirely (this approach is regarded as transactional or production workflow by some authors (cf. e.g. [10], [16]) or it can be left in part to the discretion of the workflow participants (ad-hoc or collaborative workflow). The workflow-based coordination of activities reduces non-valuable-activities like the search for organizational information and supports learning effects through the explication of the process model.
Coordination of actors	The workflow management system supports the <i>assignment of actors to single process activities according to a set of rules</i> . The coordination instruments used here are the notification and synchronization mechanisms of the work lists. This coordination aspect accelerates the identification of qualified staff members and eliminates related (search) activities. Furthermore, a staff resolution using historic information (e.g. Who was responsible for this customer the last time?) supports empowerment approaches which postulate one-face-to-the-customer or a process ownership.
Coordination of data and application systems	During the presentation of a workflow activity the workflow management system <i>provides the relevant data</i> necessary for the fulfillment of the given task and <i>coordinates the appropriate application systems</i> (e.g. a word processor or a form-based data entry program) via remote data, object and procedure calls respectively. In combination with imaging and document management software the efficient supply of data is one of the most important economic arguments for the use of workflow management systems [17].
Monitoring and controlling of process instances	Workflow management systems foster the automation of the extraction, analysis and user-appropriate presentation historic data about workflow instances. This data is the main input for early warning mechanism and may additionally serve as a foundation for continuous process improvement (feedback engineering) [18].

Table 3 shows in compressed form how these workflow management functions support the business process management goals discussed in table 1 [15]. Therefore, this table can serve as a foundation to determine the importance of basic workflow management functions for the specific purposes. Potential users of workflow technology can use the table to identify the support functions relevant to their specific business situation. With the help of these support functions the relevant efficiency goals and the corresponding coordination mechanisms can be determined. This information can be used to specify the weight for single criteria of the criteria catalogue presented in section 4.

3.3 Criteria for the identification of workflow potential

Within the identification of the workflow potential of business processes three groups of criteria can be distinguished:

- *Technical criteria* for workflow automation (e. g. number of instances in a certain period). These criteria relate to the process structure, the resources involved, the throughput and the overall quality of the process.
- *Organizational criteria* for workflow automation. These criteria relate to the involved organizational environment of the business process. They are relevant in order to determine the likelihood of

Table 3. Relationship between coordination functions and business process management goals

	Process efficiency	Resource efficiency	Market efficiency	Delegation efficiency	Motivation efficiency
Coordination of activities	<ul style="list-style-type: none"> • Process-oriented execution of activities • Reduction of processing time • Standardization of processes • Transparency 	<ul style="list-style-type: none"> • Process-oriented assignments • Reduction of search activities • Learning effects • Transparency 	<ul style="list-style-type: none"> • Scheduled delivery dates • Flexible reaction to customer input • Customer triggers process • Transparency 	<ul style="list-style-type: none"> • Transparency • Delegation of entire tasks • Delegation of entire business processes 	<ul style="list-style-type: none"> • Less routine work • More sophisticated tasks • Transparency • Process orientation
Coordination of actors	<ul style="list-style-type: none"> • Process-oriented cooperation • Parallel execution of activities • Work list serves as a reminder 	<ul style="list-style-type: none"> • Process-oriented assignments • Parallel execution of activities • Load balancing • Management of work lists 	<ul style="list-style-type: none"> • Cost • Integration of business partners within the workflow • One face to te customer 	<ul style="list-style-type: none"> • Routing of tasks according to competencies (staff resolution) • Adequate of organizational knowledge 	<ul style="list-style-type: none"> • Less routine work • More sophisticated tasks • Load balancing • Improved self-organization through work lists
Coordination of application systems	<ul style="list-style-type: none"> • Direct provision of application systems 	<ul style="list-style-type: none"> • Ease of use 		<ul style="list-style-type: none"> • Ease of use 	<ul style="list-style-type: none"> • Ease of use
Coordination of data	<ul style="list-style-type: none"> • Process-oriented data transfer • Completeness • Discontinuous media • Handling times • Idle times • Consistency/integrity • Security • Error rate 	<ul style="list-style-type: none"> • Easier transmission • Handling times • Idle times • Paper-savings 	<ul style="list-style-type: none"> • Ability to query current process status 	<ul style="list-style-type: none"> • Decentralized availability 	
Monitoring and controlling	<ul style="list-style-type: none"> • Transparency • Process certainty • Error rate • Faithfulness to deadlines 	<ul style="list-style-type: none"> • Workload • Error rate • Use for ISO-Certification 	<ul style="list-style-type: none"> • Product quality • ISO-Certification • Ability to query current process status • Fulfillment of deadlines 	<ul style="list-style-type: none"> • Management information systems • Short feedback control circuits 	<ul style="list-style-type: none"> • Performance-based salary

success for a potential workflow project. Especially previous project experience of the staff involved in the project, time constraints and documentation available are scored in this section.

- *Economic criteria* of workflow automation relate to the benefits in relation to the specific business goals that can be expected from an automation of the business process. In this section qualitative (e.g. better response to customer inquiries) and quantitative benefits (e.g. shorter cycle times) are evaluated.

The proposed criteria catalogue is structured according to these three groups.

3.3.1 Technical criteria. The workflow potential of processes in terms of their technical structure can be derived directly from the coordination functions depicted in table 2. They relate to certain characteristics of the processes analyzed and can be determined using specific

information about the process (process metrics). These metrics include the number and change frequency of the resources involved in the execution of the process, the variety of application systems used and the throughput of the process. An important technical aspect is the organizational maturity of the process, i.e. the information, whether the process structure is subject to changes in the future or whether it shows some stability with regard to its structure. The availability of competent staff members and their time restrictions are aspects, that determine the likelihood of a successful workflow implementation. The manageability of the process (i.e. the “natural” number of exceptions) and the *actual* management of the process form the last criteria for this section. Table 4 provides an overview of the technical criteria.

Table 4. Technical criteria

Criteria	Definition
Process-oriented cooperative resources	
Number of functions (main process)	Number of the executable functions of the partial process with the highest likelihood of execution (including AND-connections)
<i>Organizational units</i>	Number/change frequency and local distribution of the organizational units involved
<i>Application systems</i>	Number/change frequency and operating system conformance of application systems
<i>Data objects</i>	Number and change frequency of data objects used within the process
<i>Synchronicity of data processing</i>	Qualitative evaluation of the necessity of asynchronous (independent) processing (contrary: discussion, poll, interaction)
PARTIAL EVALUATION	
Structure	
Number of functions (total process)	Total number of functions in the process model (incl. alternatives)
Branch factor	Qualitative evaluation of the relative number (compared to the number of functions) of (OR-) alternatives in the process model
Descriptive factor	Qualitative evaluation, how detailed the process can be described in advance; negative: Evaluation of the number of exceptions that cannot be depicted in the process model
<i>Complexity I</i>	Total number of organizational units/application systems/operating systems
<i>Complexity II</i>	Number of <i>different</i> organizational units/application systems/operating systems
<i>Horizontal process interdependency (I)</i>	Qualitative evaluation, how often the functions of the process model are affected through other process models (-> Describes the autonomy of the process, negative: the degree of interdependency with other processes)
<i>Vertical process interdependency</i>	Qualitative evaluation, how often are the functions of the process model referenced in other process models
<i>Organizational maturity</i>	Qualitative evaluation of how far the optimization process is finalized/accepted
- Responsibilities are clearly defined	Qualitative evaluation, if the (process-)responsibility is already determined (esp. process manager, organizational handbook etc.)
- Competent personal is available	Qualitative evaluation, if the personnel seems competent to perform the tasks <i>connected with the workflow-introduction</i>
- Organizational tolerance of additional tasks	Qualitative evaluation, if the personnel has enough capacity to perform the tasks <i>connected with the workflow-introduction</i> (e.g. is an additional task equitable for the co-workers (in addition to the daily business) ?)
<i>Likelihood of process changes (I)</i>	Qualitative evaluation of the expected changes within the process <i>model</i>
<i>Structure of single activities</i>	Qualitative evaluation, if the process functions follow a fixed algorithm
PARTIAL EVALUATION	
Processing cycles	
- Frequency (average)	Number of process instances within one Month/Year estimated/exact (state both: e.g. 'M/est')
- Variance (I)	Variance within the number of process instances within one Month/Year estimated/exact (state both: e.g. 'M/est')
PARTIAL EVALUATION	
Weaknesses in process quality	
- process manageability	Qualitative evaluation of the general manageability of the process (e.g. 'natural' defects rate)
- process management	Qualitative evaluation in how far the quality measures of the process can be kept within defines tolerance intervals
PARTIAL EVALUATION	
TOTAL EVALUATION OF THE TECHNICAL WORKFLOW-FIT	

3.3.2 Organizational criteria. The organizational criteria within this framework refer to the influence of the specific organizational environment for the project. Consequently, these criteria are much more dependent on the individual circumstances of the enterprise. These criteria can be used in order to determine potential delays in the workflow implementation due to missing documentation or unavailability of the human resources. Since the employees use the workflow system in day-to-day business and have the most knowledge concerning to the process characteristics, their integration into the

workflow project is crucial [17]. The mentality for innovation within the organizational units involved in the project, their availability and previous project experiences form one part of the organizational criteria. The strategic importance of the process with regard to the enterprise goals and the need for codetermination with employee representatives form two organizational aspects that determine the support for a workflow project both from the side of the employees and from the side of top management. The documentation available for the process is another crucial factor that has a major impact on the

Table 5. Organizational criteria

Criteria	Definition
Involvement of organizational units	
- Mentality for innovation	Qualitative evaluation, if the organizational members involved are in favor of innovations (e.g. the introduction of new software)
- Availability at specific times	Qualitative evaluation, if the organizational members involved have time for the project (are there any competing projects?) In general: Evaluation of the relation: personnel availability vs. personnel demand (every-day business)
- Success in transfer	Qualitative evaluation, if the organizational members involved are willing to bring the project to a successful end (can we expect continuous motivation and involvement?)
- Experience in projects	Qualitative evaluation of the present (IT-)project experience of the organization
PARTIAL EVALUATION	
Strategic importance	Qualitative evaluation of the basic, long-term importance of the process ('CEO relevance')
PARTIAL EVALUATION	
Need for codetermination	Qualitative evaluation of the need for codetermination that has to be expected
PARTIAL EVALUATION	
Documentation	
- ARIS-Models	Qualitative evaluation of the amount of documentation of form of event-driven process chains
- Procedural orders	Qualitative evaluation of the amount of documentation of form of procedural orders
- Availability of up-to-date information	Qualitative evaluation of the actuality of the documentation (esp. regarding pending changes)
- Quality of documentation (other criteria)	Qualitative evaluation of further quality aspects (conformance to standards, granularity, availability, general acceptance)
PARTIAL EVALUATION	
TOTAL EVALUATION OF THE ORGANIZATIONAL WORKFLOW-FIT	

schedule of a workflow project. If the documentation is outdated or insufficient, the missing information has to be gathered in a time-consuming process before the implementation of the workflow management system can continue. Table 5 summarizes the organizational criteria.

3.3.3 Economic criteria. The last section of the criteria catalogue focuses on the potential benefits the enterprise can derive from a process automation through workflow management systems. It emphasizes how the process contributes to the overall business goals of the company. From a quantitative point of view the reduction of the process cycle times are taken into account here. The economic criteria also refer to the qualitative benefits of workflow management, such as the digitalization of routine work, the enhances process transparency and the modularization of application systems (simplification of change management). Since a workflow management system controls the sequence of activities of a business process, the application system executed in one activity can be changed without affecting the other activities or application systems, which enables a local optimization and the reduction of IT-overhead. It has to be emphasized that the criteria which describe the contribution to the business goals of the enterprise different in nearly every company.

3.4 Evaluation of the Workflow Potential

Methodically, the evaluation procedure is based on a scoring model approach, which consists of three levels of criteria aggregation. First, the values of the elementary criteria are summarized in groups of related criteria. These groups are summarized again into the three groups of technical, organizational and economic criteria. The sum of the three cumulated criteria groups represents the final score for the analyzed process. The weight of the criteria can be adjusted on all three levels, giving the user a maximum of flexibility to adapt the catalogue to the enterprise needs.

4. Use of the framework

Since we present a maximum sized catalogue of possible criteria not all of the criteria may be applicable or appropriate in all cases. In these cases, the irrelevant criteria can be left out, leaving a reduced set of criteria to work with. It has to be stressed that the score, which is the final result, should not be the only criteria for the selection of those processes, which are to be supported by workflow management systems. However, the score at least focuses the project activities on the most relevant processes. A more detailed analysis of the remaining processes is always imperative. Nevertheless, the use of a methodologically sound criteria catalogue is a major

Table 6. Procedure model for the application of the scoring model

No.	Task
1	Analyze if the suggested criteria are appropriate for the specific purposes of the enterprise. Delete irrelevant criteria, add new ones and put all criteria in concrete terms. Mark the knock-out-criteria; these are criteria which, if the analyzed process does not fulfill them, immediately characterize the process as not-workflow-relevant. Examples for this situation is the lack of a process model due to a changing structure of the process or that the employees are already involved in another project (e.g. the introduction of ERP-software). Weight the criteria on all three levels.
2	Identify the business processes (e.g. using existing process documentation like organizational handbooks or process models) and create an individual column for every process.
3	Fill out the matrix. The knock-out-criteria should always be the starting point. By this means, processes with insufficient workflow potential will not be analyzed in detail. In most cases, it will be necessary to complete the matrix jointly with employees from the specific departments involved in the processes evaluated.
4	Calculate the score for the all processes with workflow potential by aggregating the single scores according to the weights. Order the processes by their final score.

means of reducing the complexity in this important project task. The *procedure model* for the use of this framework consists of four steps (cf. table 6).

5. Case Study

The proposed framework has been applied successfully to the business processes of a German public utility enterprise. The enterprise currently employs 3,500 people and serves more than 1.2 million customers. Several business process redesign projects had been conducted in advance of this project. In order to utilize the optimization potential discovered during these projects the use of workflow technology was considered. Therefore, a project was set up with the aim of analyzing the workflow potential of the business processes. Based on this analysis a ranking of those processes which could be supported through workflow management should be compiled. Following this, one process that could be implemented as a pilot should be identified. Finally, a workflow management system for the pilot implementation had to be selected. The project was conducted by the enterprise in cooperation with the Department of Information Systems of the University of Muenster.

The evaluation of the workflow potential was based on numerous process models designed during business process reengineering projects. The proposed criteria catalogue was too extensive to be applied to all processes. In order to perform a pre-selection of processes a subset of six knock-out-criteria helped to rule out irrelevant processes in advance. These qualitative criteria correspond to the criteria found in the framework. They are aggregates of those criteria, which were considered most important for the enterprise. Table 7 summarizes these knock-out-criteria.

Table 7. Knock-out-criteria used for the elimination of irrelevant processes

Technical criteria (Table 4)	
1	Execution frequency (throughput)
2	Degree of division of labor
3	Degree of structure
Organizational criteria (Table 5)	
4	Persistency of the organizational and technical conditions
5	Capability of the organizational units (which would be involved) to cooperate
Economic criteria	
6	Strategic importance

The corresponding scores for each process could be determined with relatively small effort with the help of several experienced managers who had appropriate knowledge of the enterprise. Some of the processes were ruled out just temporarily. These processes would indeed have been suitable candidates in terms of the technical and economic criteria. However, their organizational conditions (referring to knock-out-criteria 4 and 5) were judged as not sufficient for a mid-term implementation. Furthermore processes which were sufficient in terms of technical and organizational criteria were put aside at first if they had little strategic relevance. Among these were also the frequently quoted processes of vacation day permission and travel expense settlement. It was the intention to introduce workflow management to the company using strategically important processes where the positive effects of workflow automation could be expressed in terms of strategic enterprise goals. This decision was also taken in order to gain acceptance for the workflow project among top management, which had been identified as an important factor for the success of the project.

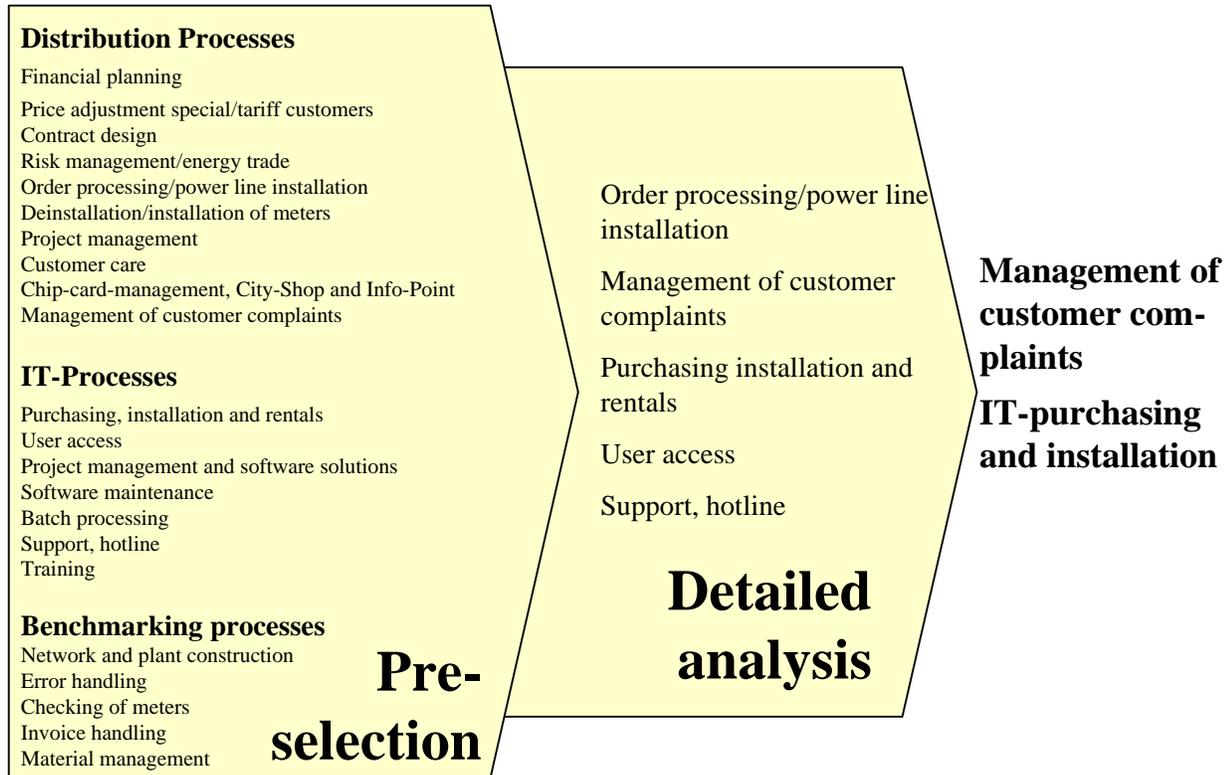


Figure 2. Process selection

The remaining processes were analyzed using the proposed framework generating a ranked list of the processes according to their workflow potential. An initially promising candidate was the management of customer complaints. This process reached high scores in the technical criteria regarding the number of functions and the number of application system changes. This was due to the high variety of data needed to manage a complaint. This data is managed by a number of different application systems (e.g. a customer master data management system, a geographical information system (GIS), a technical information system (TIS), a sales information system (SIS) and an accounting system) which are in part administered by different companies. The high variety of data needed and the numerous transactions which are necessary in order to make up mistakes lead to a high number of activities in the process. Besides a high throughput of approximately 7.500 complaints per year (see processing cycles in table 4) the process had several weaknesses (cf. process quality in table 4) and therefore a high optimization potential. Because this process has a direct interface to customers its strategic importance is extremely high. In the organizational domain this process reached a very high score regarding the mentality of innovation (cf. table 5)

which rooted in the daily usage of complex information systems.

Despite of the initially high scores the customer complaints process was not chosen for the pilot workflow project. The detailed analysis revealed that the weaknesses mentioned above were related to the extreme heterogeneous application systems environment. With regard to this several activities for changes and additions to this environment had already been initiated and further changes in the organization were planned. However, the organizational maturity (cf. table 4) of the process was not endangered because of these reorganizations. The actual problem were the plans for the organizational and technical changes, which were not detailed enough to specify requirements for a workflow application. Due to this the organizational maturity of the process was judged as being very low. On the other side this criteria was weighted very high because the schedule for the installation of pilot workflow application should be kept.

Project management selected – based on the scoring values and the strategic objectives of the enterprise – the internal IT-service process for the pilot application. Instead of the strategic importance with regard to the customers the *internal* strategic importance was very high for this process. The reason for this was that almost every department of the enterprise participated as a customer in

this process. The realization of the high optimization potential (cf. table 4) would create positive effects for all these departments, which in turn would foster a higher acceptance for other workflow projects thus raising the probabilities for successful implementations.

The use of the framework not only led to a more objective process analysis but also helped to identify potential problems before the implementation phase of the system was initiated (e.g. personnel availability or the maturity of planned organizational and technical changes). It turned out that the evaluation of technical process criteria is far less complex than the scoring of organizational or economic criteria. This is caused in part by the involvement of corporate policy aspects as well as several interpersonal factors that do not affect technical aspects of a process. It was also noted that the scores as the result of the framework led to a structured and even more comprehensible presentation for project management, since the decision makers didn't have to know the processes in detail and still made a decision based on the relevant information.

6. Conclusions

The proposed framework can help to assess the potential of business processes for workflow automation in a more structured and therefore less error-prone way. The division of the criteria catalogue into three groups of criteria and the three-step aggregation procedure enable users to customize the criteria weights to suit their individual needs. The use of this scoring model should be preceded by a pre-selection based on a few knock-out-criteria, in order to rule out irrelevant alternatives immediately to reduce the complexity of the task. In further work, we will analyze how this framework can be used for reference process models. On the one hand, the use of the framework can lead to general recommendations for potential workflow candidates in reference models, thus enhancing the quality of reference models. On the other hand, a procedure model for the use of reference models for workflow automation could be added. At the moment, we are developing a tool which supports the use of this framework. This tool will support every step of the proposed procedure model. Through different questions and answers the tool will allow the user to customize the framework (identification of the relevant criteria, addition and removal of criteria, adjustment of the criteria weights) and provides a ranking of the business processes according to their degree of workflow-suitability. Moreover, remarks will be stored and a reporting facility will be added.

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