Knowledge Management and Business Processes Learning on the Job

A Conceptual Approach and its Prototypical Implementation

Julian Krumeich, Dirk Werth and Peter Loos
Institute for Information Systems (IWi) at the
German Research Center for Artificial Intelligence (DFKI)
Saarbruecken, Germany
{firstname.lastname}@dfki.de

***Abstract*—Business Process Management (BPM) has established itself as an important cross-functional task in many companies. Its primary goal is to optimize the business process design and hence the actual execution of business processes. Since optimizing processes on paper is not sufficient to really boost a company's performance, it is an essential task to optimize the process execution that defines how business processes are actually performed at the end of the day. However, before employees are able to carry out processes, they need a given up-front learning time. Hence, it seems promising to research how business process learning can be realized on-the-job in order to reduce this up-front learning time; thus, being able to work efficiently on processes already from the very beginning. In this paper, we present an approach towards business process learning on-the-job using the concepts of task guidance and process guidance. After introducing the approach, the paper presents a prototypical implementation of it and in doing so proves its feasibility. Afterwards, the paper outlines a promising use case that is going to be supported by our approach after future research.**

Keywords-Business Process Management; Business Process Learning; Action Learning; Process Knowledge; Design Science.

I. MOTIVATION AND CONTRIBUTION

Business Process Management (BPM) has established itself as an important cross-functional task in many companies [1]. Especially in the field of process modeling, a lot of effort is done. The motivation for this is obvious: a strict documentation of business processes fosters the ability to optimize them starting from their modeled as-is state and ending at the optimized to-be state [2]. However, optimizing processes on paper does not really boost a company's performance. Hence, one important facet in the course of BPM is the process execution that defines how business processes are actually performed at the end of the day.

Since most business processes are not performed fully IT-based, human beings do often play a central role in their execution. However, in contrast to IT systems, individuals rely on learning as a basis for knowing how to carry out specific processes. Thus, before persons are able to perform them, there is always a given up-front learning time needed. In addition, not only these high startup costs for being able to perform processes for the first time, but also the risk of wrongly conducting activities are at a high level at the beginning of gaining experience in processes.

During the execution phase of business processes, process guidance has been shown as useful in practice [3]. Hence, the guidance concept could be a way out of the previous described shortcoming. However, in research less effort is put into the question whether process guidance can foster employees in working on business processes that are unfamiliar to them, i.e. without having to learn these processes basically beforehand in a time-consuming and less productive way. Additionally, the same applies when significant changes have been enacted in processes which employees are already familiar with. Since working and business environment has come to ever shorter life cycles, the frequency of changes and hence the need for an efficient change-management including the training and learning becomes more and more important for doing successful business [4]. Consequently, it is often a heavy and time-consuming task for employees to learn unfamiliar processes or adaptations of common ones.

Hence, it seems promising to examine the concept of guidance as an approach to learn business processes on-the-job. Thus, this paper presents an approach demonstrating how task and process guidance can be used to help employees in learning unfamiliar business processes and changes within existing ones with which they are already familiar. To minimize the up-front learning effort, the learning procedure will be implemented into the execution phase of business processes.

The contribution of the paper is two-fold. First of all, the paper presents a conceptual approach that uses the concept of guidance with regard to learn business processes. In addition to that, the paper will further present an implementation of this theoretical concept; hence, following the design science research paradigm [5]. In doing so, the remainder of this paper is structured as follows: Section 2 examines related work in the field of conducting and learning business processes. Afterwards, Section 3 forms the foundation of this paper by introducing the developed concept. Within Section 4, a prototypical implementation of the concept will be presented. In the subsequent Section 5, an additional use case will be outlined that will be supported by the developed approach respectively prototype in the future. Finally, the paper closes with a conclusion and outlook.

 ISBN: 978-1-61208-254-7

II. Related Work

One approach heading pretty close towards the direction followed by this paper is the one proposed by Hawryszkiewycz [6]. He aims at integrating reusable *learning components* into business processes in order to allow employees to quickly acquire knowledge in their working context. One of his primary goals is to integrate learning resources within the actual workspace of employees. However, his approach just includes “a link to the learning systems from selected screens in the work process”. However, even though employees can start a learning unit by clicking on a button and hence the approach partly integrates business process learning into the actual process execution, employees will not improve or even build up their knowledge *on-the-job* meaning based on actually conducting business processes. In this context, *workplace learning* has evolved in literature describing the significant relationship between working and learning [4]. According to Chen and Kao [7], workplace learning summarizes activities and processes in the workplace by which employees acquire knowledge ranging from basic skills to high qualifications, which they can straightaway use in their job. As stated before, one dimension of workplace learning is on-the-job learning [8].

Apart from the concept of workplace learning, also relevant for the approach to be developed are the so-called learning workflows and the adaptation of workflows, to which lots of work has been done in literature. The goal is to *dynamically and flexibly apply changes into workflow systems*. In doing so, unwanted side effects of complex changes in workflows are avoided since it is very inefficient and often impossible to stop running activities or workflows in order to enact changes. A recent work done by Weber et al. [9] presents a detailed review of challenges and techniques that exist in continuously managing the lifecycle of dynamic processes respectively workflows. As an example, one approach towards this direction is proposed by Dadam et al. [10]. With their ADEPT2 Process Management System, they aim at achieving a quick implementation and deployment of new business processes in order to enable ad-hoc changes of running processes on the fly. To have a broad overview on these aspects, it is also referred to the recent state-of-the-art analysis provided by Burkhart and Loos [11].

While the previous research stream primarily focuses on technical issues regarding how to dynamically enact changes into running business processes, other work explores ways how business processes can be improved by learning from their actual business context. A recent state-of-the-art analysis can be found in Ploesser et al. [12]. They state that *context-awareness* in BPM is a current and future challenges in process management in order to achieve true agility and flexibility. In this context, work dealing with learning how to *improve business processes* can also be regarded [13]. This learning process is also considered as an evolutionary process like BPM and hence must be managed as other business processes are managed in organizations.

III. Business Process Learning on the Job

Within the previous section on related work, some general concepts have been presented and outlined forming the basis of our approach:

- Firstly, business process learning will be intervened with the actual working on processes, i.e. the learning effect results from the process execution. This is basically what is understood as business process learning on-the-job.
- Secondly, the actual learning will be realized by using reusable learning components that are integrated into single process steps. In using the inherent knowledge of these components, users are assisted via task guidance (based on context-oriented knowledge) and process guidance (based on process flow-oriented knowledge).
- Thirdly, this guidance will be realized by recommendations that depend on the underlying business process models and is aware of the context-situation in which the business processes are conducted. This is achieved by continuously monitoring the users’ behavior and adapting the process models based on their actual process execution for the individual user and on the other hand for all users within an organization.
- Fourthly, these process model adaptations and optimizations will be dynamically applied into the workflow system. In doing so, the approach aims at overcoming the trade-off between guidance (recommendations) and being flexible and adaptable to support ad-hoc processes (adaptation mechanism) (see Burkhart and Loos [11] for more details).

According to Abecker et al. [14], Allweyer [15] and Lehner [16] *business processes* and *knowledge processes* have to be considered as intervened concepts during their execution (see Figure 1, (1) and (2)). Since the major objective is to learn knowledge linked to the underlying business processes, we need to have a closer look at what process knowledge actually mean. In this regard, Remus [17] distinguishes between two kinds of process knowledge: *process flow-oriented knowledge* and *content-oriented knowledge* in business processes.

Besides combining business processes and knowledge processes there is also the need for including the *training and learning processes* into the overall process design [15] (see Figure 1, (1) and (3)). This means that employees have to learn both types of knowledge in order to know how to perform a business process. To realize this, the approach builds upon two basic concepts of learning that are considered as promising for process learning on-the-job: *task guidance* and *process guidance* (see Figure 1, (b)). While task guidance helps employees in conducting the current active process step (via content-oriented knowledge), process guidance (via process-oriented knowledge) assists them in questions regarding how to proceed in the business process. Based on this guidance during process execution, the concept follows a passive, structured on-the-job learning methodology, which is also called action learning [4].

 ISBN: 978-1-61208-254-7

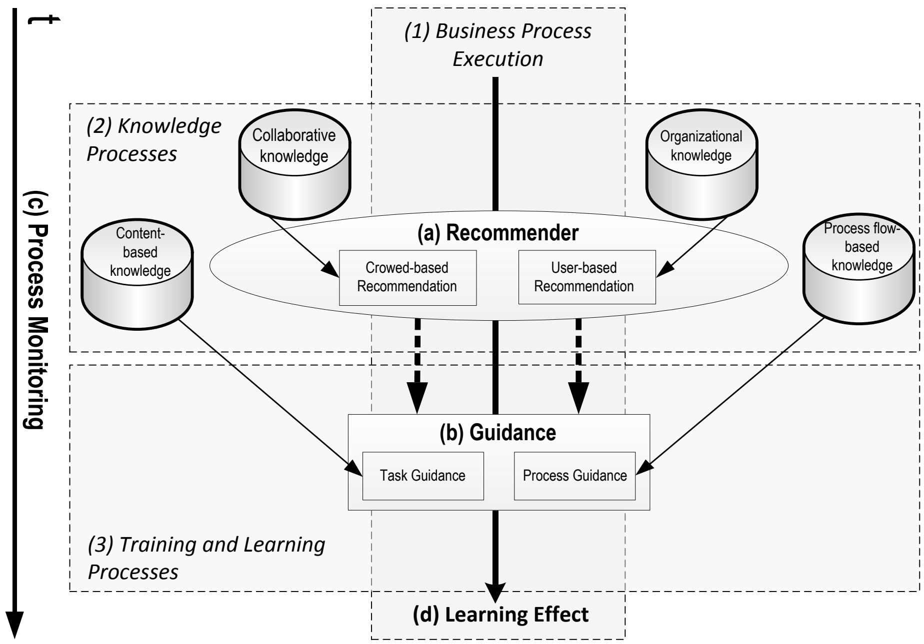

Figure 1. Approach towards Learning Business Processes on the Job

This means “Learning occurs at the actual work setting as a result of using a systems approach, and with limited involvement of a trainer/facilitator”. In this regard the adjective “structured” does not describe the underlying business processes (cf. the last bullet point), but outlines the usage of a system that actually helps to learn.

To realized task and process guidance, the concept makes use of recommendations (see Figure 1, (a)) based on the underlying business process models. In this regard, business process models are defined as a combination of single process steps, each of them including task guidance components based on the underlying content-based knowledge, which are considered as learning components. In monitoring users in their work on a continuous manner (see Figure 1, (c)), their behavior can be assigned to a specific process step within a process model. Hence, based on underlying process models, the approach recommends further process steps to the users in order to successfully accomplish the process execution.

However, these process step recommendations are not solely based on the standard underlying process model, but can additionally be crowed-based or user-based. It is distinguished between crowed-based and user-based recommendations since each individual user exhibits a very personalized process that may deviate from the standard business process—as far as it is in line with a company’s compliance rules. Of course, user-based recommendations are preferably applied when a user has already acquainted knowledge on the process and not at the beginning when working on a process for the first time. Nonetheless, pure personalized recommendations could reinforce inefficient or even incorrect sequences, such as inadvertently skipping important process steps. Crowd-based recommendations mitigate this shortcoming. In doing so, crowd-based recommendations enrich the set of possible process paths through aggregation of the process experiences from multiple users; hence, it builds upon the knowledge of many. After a given amount of deviations from the standard process model, it will be adapted to the new business situation.

Thus, there is a continuous learning effect resulting in enhanced personal (user learns how processes are conducted) and organizational (business process models adapt to new context situations) knowledge (see Figure 1, (d)).

In doing so, this recommendation methodology (see [18] for more technical details) contributes to the knowledge process that is linked to the business processes. Hence, collaborative knowledge is build up and based on optimizing the process models, the organization knowledge will be enhanced as well. Furthermore, changes can be automatically enacted into (running) business processes as one of the approach’s preconditions. Through the task and process guidance, users will be able to learn the process execution on-the-job; hence, they experience a learning effect (see Figure 1, (d)) which reflects the combination of business process execution and the training and learning processes.

IV. Prototypical Implementation of the Concept

Having introduced the theoretical concept in the previous section, this section will show a prototypical implementation illustrating the feasibility of the learning approach in one particular context. This will ease the comprehensibility of the introduced concept and furthermore proves its feasibility to be realized.

In doing so, we put a particular emphasis on email-based processes since email communication has generally become an integral part of daily business activities within companies at any size. On average, employees spend 2.6 hours a day with sending and receiving 33 respectively 72 emails

 ISBN: 978-1-61208-254-7

[19] [20]. Furthermore, not only the time spent with emails as a means of communication, but also the knowledge that is bundled without structure in companies' email repositories is very difficult to manage. This becomes clear, if the number of 75 % is taken into mind representing the percentage of a company's knowledge saved in email messages [21]. As a direct consequence, if employees spend 1/3 of their time with email communication and 3/4 of a company's knowledge is stored in email inboxes, it can be concluded that in various companies a majority of business processes take place via email communication.

Hence, it is promising to ground the approach for process learning in the context of email-based processes. Since emails are a very flexible and ad-hoc means of communication we also address one of our goals, namely supporting flexible and ad-hoc processes.

A. Introducing the Underlying Three-Layer Approach

The developed COPA system, which implements the approach, automatically hooks onto the existing email infrastructure and collaboration systems, e.g., Microsoft Exchange, and assigns incoming emails based on their semantic content to new or running business processes.

This technique allows it to provide users task guidance helping them in conducting the currently active process step within an underlying business process. Furthermore, users will receive process guidance, so that they know how to conduct the following steps within the assigned business process. To explain how the task guidance and process guidance is realized, we initially introduce three layers on which the approach and hence the prototype is based:

- On the level of the system layer, each received email will be intercepted by the system and subsequently be analyzed, archived, decoded and decomposed. Each part of an email, i.e. headers, body or attachments, will be transformed into plain text and merged into a single XML document to allow the other layers to directly access the information for further processing. In addition, the system layer will provide system connectors usable to interface external as well as legacy systems, required to be accessible throughout a task.
- The semantic layer signifies meaningful communication of an enterprise. Outgoing from pattern based information extraction—using e.g., regular expressions—business process and specific process steps within them can be identified and relevant information in this regard will be extracted.
- From a task guidance and process guidance point of view, the process layer is the most important one, since it contributes to the actual process learning on-the-job. The layer is further subdivided into one process build-time (configuration) component and four process run-time components, all of which are described in the following subsection.

B. The Process Layer for Task and Process Guidance

In the following, we take order processes as an example to apply the concept and its implementation to a concrete problem domain. Based on an initial set of business process models stored in an Enterprise Process Repository (EPR), the system can be employed. Therefore, it intercepts the incoming and outgoing email traffic and passes it through the three layers described in the previous section. Figure 2 shows the actual output of a processed email message. Subsequently, the four run-time components are presented and explained by making use of the figure.

Process Detection. The detection component uses the EPR to determine whether an incoming email relates to an already running business process or whether a new process instance has to be initiated. In more detail, based on a semantic analysis performed in the prior semantic layer, the email can either be assigned to an existing process—where it constitutes the next step—or the email is considered as a starting event and triggers a new process. In this case, a new process instance with its specific process ID (see Figure 2, F) will be created outgoing from the corresponding reference model template from the EPR.

Further, the information whether the incoming email is part of an already instantiated process or a completely new one, is being displayed to the user (see Figure 2, F). Future incoming emails concerning this particular business process will be assigned to this process instance henceforth. As mentioned before, the correct assignment of the current process step to the correct template is being realized by an analysis of process characteristics done by the semantic layer. If the detection component assigns an incoming email to a wrong process (step) based on an incorrect semantic analysis, the user still has the possibility to manually reassign the email to another process step (see Figure 2, H). To assist the user, the system provides information about the semantic matching of the email to a process step.

Another feature of the system, which relates to the automatic acquisition of business processes or at least their adaptation to new circumstances, is the following procedure: if the common business process sequence is “A -> B -> C” and after conducting process step A, an incoming email relates to process step C or a user initiates via sending an email process step C and this process adaptation is done a given amount of times then the system automatically adapts the underlying business process in the EPR since this adaption in the process flow might result from a changed business circumstance. In this regard, process models within the EPR can relate to the overall enterprise or just to a subset of employees. This means that such process deviations can on the one hand only affect the personal respectively subset related process template or on the other hand affects the underlying process template of the whole enterprise. How this technique is conceptually realized can be seen in Burkhart et al. [18].

Process Tracking. As the second step along the process layer's execution, the tracking component monitors all incidents occurring within a running process and stores every performed step in context of the related process. This component utilizes the EPR as well as the semantic information gathered from the original incoming email, to track which process is triggered by this email. Additionally, it updates the assigned process instance within the EPR with

 ISBN: 978-1-61208-254-7

all important data that can be useful or applicable for future process analysis. Each performed step concerns two occurrences, actions and events. Actions signify human or application triggered activities, whereas events have no active part. In the context of email communication, actions mainly correspond to the activity of sending an email and events to incoming emails. Since every performed step is related to its unique process instance, it can be tracked and on this basis recommendations for further steps can be obtained and provided to the user (see Figure 2, G).

In case the system is applied in a collaborative scenario, it may be possible that the incoming email belongs to an overall process, whose previous steps have been executed by other instances. In this case, the tracking component offers a synchronization functionality, which offers the possibility of synchronizing already executed steps of an overall process throughout several instances. Hereby, the tracking component determines which information has to be gathered from other known instances. Thus, collected information will subsequently be added to the local database and utilized for further enhancement of the generated output. At this point, other beneficial aspects of the tracking component reveal.

The gathered information provides a comprehensible documentation for further disposal. Due to the semantic extraction of process information, e.g., customer information and quantity of ordered goods, the system enables a (mostly) automated build-up of a company unique customer database. The email contains two sets of data informing the user of the present state of the current process, as well as the visualization of the preceding process steps. The first data set contains key information about the email and the process at hand and informs the user about the present status of the process instance the email belongs to (see Figure 2, G). The second data set shows an overview over all preceding steps in the current process including the corresponding emails.

Task Guidance. As the correct process step has already been identified by the detection component and the semantic layer, the task guiding functionality is now deployed in two ways. First, the task guiding component exploits the EPR in order to gather relevant process data. Secondly, the task guiding functionality supplies the user with case-related information about the particular process step. On the one hand, this data consists out of internal information like customer history or article information from an own database (see Figure 2, A). On the other hand, additional external information are offered context-based either in form of a gateway to useful web links (see Figure 2, C) or email-integrated travel details to a location provided by Google Maps (see Figure 2, B). Besides the context-sensitive enrichment of incoming emails with internal and external information, the task guiding component provides the possibility to send email drafts that are context-sensitively selected and recommended to the user (see Figure 2, D). Furthermore, if other software systems are used within the enterprise, e.g., ERP systems, components can be integrated that transfer information out of the email to these systems (see Figure 2, E). Depending on the context, different information can be useful for a particular process. Hence, the type and level of detail of the information to be displayed can be adjusted using a customization tool.

Process Guidance. Due to prior process instances and according user actions, there is already knowledge about the underlying process available, which forms the input for the process guidance functionality. Using the Enterprise Process Repository, the guidance component—as the fourth step in the processing of an incoming email—offers suggestions and recommendations for the further proceedings in a particular process (see Figure 2, G; for detailed information on the recommendation process, it is referred to Burkhart et al. [18]). A second functionality of the process guidance component is to provide advice in actually executing the next process step once the user has chosen one of the provided actions.

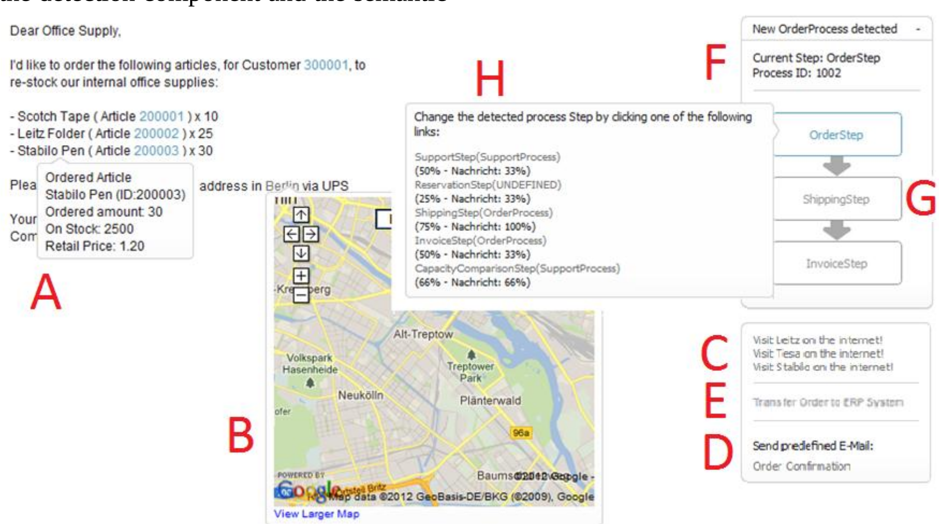

Figure 2. Screenshot of an enriched email message

V. EXPORT—Supporting SMEs in the ATLAS Export Procedure

A. Motivation

Having realized the basic use case regarding a support of order processes, we are currently researching how our approach can be applied to an additional application domain.

A study conducted by the United Nations indicates that inefficient customs processing accounts for 7% of the overall international trading costs. To address this problem, the European Commission finished the eCustoms law initiative in 2003. While this initiative has to be implemented by all member states, the German implementation is called ATLAS (Automatisiertes Tarif und lokales Zollabwicklungssystem). In 2009, this system fully replaced the manual, paper-based processing and became mandatory for the use case of exports. For larger companies, such online-based customs declarations offer the chance to be included into the existing IT-infrastructure and business processes. Thus, they can contribute to process automation. Small and medium-sized enterprises (SME) however face difficulties with the change towards ATLAS [22]. Considering their usually scarce IT landscape that does often not exceed the basic email infrastructure, they often rely on the online platform IAA-Plus as provided by the German customs office or consult an external service provider. Still, these alternatives do not satisfy all special needs and characteristics of SMEs. For instance, they cause additional costs and increase the complexity of process execution. Hence, the main objective of ATLAS, a largely automated handling of border-crossing product exchange resulting in an integrated and predictable supply chain, has not been reached.

B. Use Case Description that will be Supported in Future

A small SME occasionally exports its final products into foreign countries outside the EU. Considering the small size of the company in question, like most other such companies, it does not own an extensive IT landscape with an ERP system. Thus, software solutions that integrate ATLAS with common ERP systems are not applicable. To perform the electronic export declaration nevertheless, the company relies on the web-based platform IAA-Plus. This however turns out to be a time-consuming process because the responsible employee has to gather all relevant data from other colleagues and from Excel sheets (like product tariff numbers). Afterwards, this data has to be put into the web-form manually and, after completion of the export declaration, most of the data has to be transferred again to a logistics service provider. This processing is not optimal, yet it is typical.

EXPORT as an extension of the COPA system will address the mentioned problems. The majority of relevant information for the customs declaration has already been communicated between seller and customer before. For SMEs, this is in most cases done via e-mail. The e-mail infrastructure therefore has valuable information available. The EXPORT tool is simple to integrate into existing e-mail infrastructure. After installation, it extracts the required information from e-mail conversations and generates an ATLAS declaration automatically subsequent to a successful sell. If some piece of information is missing, the tool supports the user during the data input. As an example, it is referred to the product tariff numbers that are a challenge especially for SMEs. Appropriate search mechanisms as well as the automated building of a repository for mapping the own product portfolio to the respective numbers address this problem. As soon as the ATLAS system successfully assigned a unique Movement Reference Number (MRN) on the electronic customs accompanying document (ABD), this number can be forwarded together with the already available information to the cheapest logistics service provider. This happens via an appropriate interface connection and finishes the process.

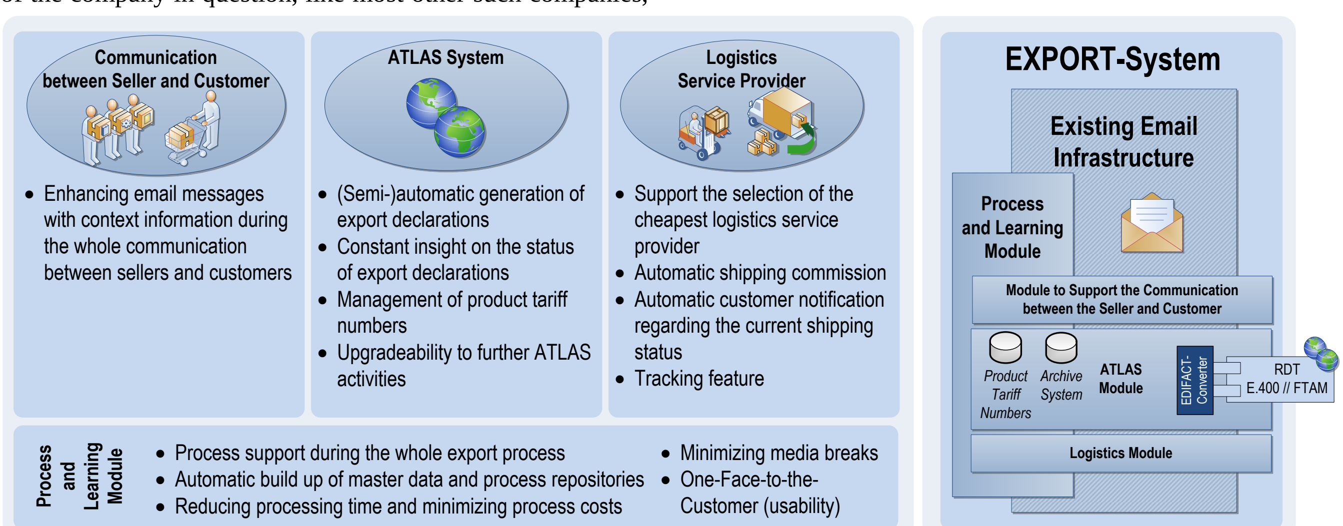

Figure 3. Main functionalities of an EXPORT supporting system and its schematic architecture

A learning component included in EXPORT builds a repository on its own during the tool operation in order to reduce manual data input and maintenance efforts during export processes; hence, ensuring a consequent implicit knowledge management. Additionally, the integrated process component supports the process execution starting from the customer request up to the communication with the logistics service provider and the product deliverance to the foreign customer. Thereby, it also allows for a retrospective view on the executed export processes. In summary, SME are enabled to cover the currently existing disadvantages in this section of the supply chain in an autonomous, straightforward and inexpensive way. Due to the process support that is given during the whole export process (via task and process guidance), users that are not familiar with the overall process can learn it on the job.

The main functionalities of EXPORT as well as a schematic outline of the system are visualized in Figure 3.

VI. Conclusion and Outlook

In this paper, we presented an approach that allows business process learning on-the-job using the concepts of task guidance and process guidance. After introducing the approach, the paper presented a prototypical implementation of the approach and in doing so proved its general feasibility. A first empirical evaluation of the approach and its application has already been conducted and can be found in Burkhart et al. [23]. This evaluation has demonstrated the basic benefits of guidance for carrying out unfamiliar business processes and learning them on-the-job based on real test persons that were involved. As a result, the study proofed that test subjects were able to process an unfamiliar workflow significantly faster by task guidance and process guidance. Furthermore, they experienced the processing as significantly easier and moreover, they were significantly higher satisfied with the result of the conducted workflow.

In the next step, we are going to evaluate our approach using the implementation in a real-world scenario or even in a large-scale field study. Moreover, further highly-important features, which are only testable in a time-consuming way, e.g., the adaptive, flexible and self-learning features, will be evaluated to see how learning is progressing and how organizational-based as well as crowed-based knowledge will increase over time. Furthermore, we are going to implement further features into our prototype to be able to support the promising use case that was presented at the end of this paper. In applying the conceptual approach to this further application domain, we can prove its applicability and feasibility in more general and extended terms.

References

[1] O. Marjanovic and W. Bandara, “The Current State of BPM Eduction in Australia: Teaching and Research Challenges”, Business Process Management Workshops (BPM 2010), pp. 775–789.

[2] E. Kavakli, “Modelling organizational goals: Analysis of current methods”, ACM Symposium on Applied Computing (SAC '04), pp. 1339–1343.

[3] G. Grambow, R. Oberhauser, and M. Reichert, “Contextual Generation of Declarative Workflows and their Application to Software Engineering Processes”, International Journal on Advances in Intelligent Systems, vol. 4, no. 3/4, 2011, pp. 158–179.

[4] R. L. Jacobs and Y. Park, “A Proposed Conceptual Framework of Workplace Learning: Implications for Theory Development and Research in Human Resource Development”, Human Resource Development Review, vol. 8, June 2009, pp. 133–150.

[5] A. R. Hevner, S. T. March, J. Park, and S. Ram, “Design Science in Information Systems Research”, MIS Quarterly, vol. 28, March 2004, pp. 75–105.

[6] I. T. Hawryszkiewycz, “A Framework for Integrating Learning into Business Processes”, South East Asia Regional Computer Science Confederation (SEARCC) Conference 2005, pp. 23–28.

[7] H.-J. Chen and C.-H. Kao, “Empirical validation of the importance of employees' learning motivation for workplace e-learning in Taiwanese organisations”, Australasian Journal of Educational Technology, vol. 28, May 2012, pp. 580–598.

[8] N. Clarke, “Workplace learning environment and its relationship with learning outcomes in healthcare organizations”, Human Resource Development International, vol. 8, March 2005, pp. 185–205.

[9] B. Weber, S. Sadiq, and M. Reichert, “Beyond Rigidity - Dynamic Process Lifecycle Support: A Survey on Dynamic Changes in Process-aware Information Systems”, Computer Science - Research and Development, vol. 23, May 2009, pp. 47–65.

[10] P. Dadam, M. Reichert, S. Rinderle, M. Jurisch, H. Acker, K. Gösner, U. Kreher, and M. Lauer, “Towards Truly Flexible and Adaptive Process-Aware Information Systems“, United Information Systems Conference (UNISCON 2008), pp. 72–83.

[11] T. Burkhart and P. Loos, “Flexible Business Processes - Evaluation of Approaches”, Multikonferenz Wirtschaftsinformatik 2010 (MKWI 2010), pp. 1217–1228.

[12] K. Ploesser, M. Peleg, P. Soffer, M. Rosemann, and J. C. Recker, “Learning from Context to Improve Business Processes”, BPTrends, vol. 6, Jan. 2009, pp. 1–7.

[13] J. Ghattas, P. Soffer, and M. Peleg, “Learning Business Process Models: A Case Study”, International Conference on Business Process Management (BPM'07), pp. 383–394.

[14] A. Abecker, K. Hinkelmann, H. Maus, and H.-J. Müller, “Geschäftsprozessorientiertes Wissensmanagement”, Berlin: Springer-Verlag, 2002.

[15] T. Allweyer, “Geschäftsprozessmanagement: Strategie, Entwurf, Implementierung, Controlling”, Herdecke: W3L-Verlag, 2005.

[16] F. Lehner, “Wissensmanagement: Grundlagen, Methoden und technische Unterstützung”, München: Hanser, 2006.

[17] U. Remus, “Prozessorientiertes Wissensmanagement: Konzept und Modellierung“, Regensburg: University of Regensburg, 2002.

[18] T. Burkhart, D. Werth, and P. Loos, “Flexible process support by automatic aggregation of implicit and explicit user behavior“, Fourth International Conference on the Applications of Digital Information and Web Technologies (ICADIWT 2011), pp. 167–172.

[19] Email Equation, “Email marketing services for small to midsize business”, 2010, retrieved July 20, 2012, from http://www.emailequation.com/emailmetricsroi.html.

[20] The Radicati Group, “Business User Survey”, 2010, retrieved July 20, 2012, from http://www.radicati.com/wp/wp-content/uploads/2010/11/Business-User-Survey-2010-Executive-Summary.pdf.

[21] Messaging Architects, “Policy-Based Email Security and Data Leak Prevention”, 2012, retrieved July 20, 2012, from http://www.messagingarchitects.com/solutions/guardian.html.

[22] J.-B. Delèze and J.-P. Lattion, “Nutzen einer möglichen Beteiligung der Schweiz am E-Zoll-Projekt der EU“, 2011, retrieved July 20, 2012, from http://www.dievolkswirtschaft.ch/editions/201103/Deleze.html

[23] T. Burkhart, J. Krumeich, D. Werth, and P. Loos, “Flexible Support System for Email-based Processes: an Empirical Evaluation”, International Journal of E-Business Development, vol. 2, Aug. 2012, pp. 77–85.