From Informal Learner to Active Content Provider: SLEAM approach

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Abstract. Creation of the reusable learning content in the process of
work is a challenging but promising trend in e-learning and knowledge
management. While the main research focus nowadays is concentrated
on the extraction of the tacit knowledge and experience using wikis and
blogs, the fact is ignored that a lot of useful process-relevant information
already exists on the web or in the enterprise document management
systems (DMS) and needs to be brushed up and integrated into process-
embedded learning scenarios. The proposed approach helps knowledge
workers to transform documents found on the web and in the enterprise
DMS into reusable learning objects and make them available for adaptive
workplace learning.

Key words: Workflow embedded authoring, rapid authoring, topic map

1 Introduction

Recent studies in Germany showed [1] that only 20% of small and medium sized
enterprises (SME, with less than 500 employees) are using e-learning solutions.
However, the absence of official learning-at-work strategy in the enterprise does
not mean that employees do not learn during the work: they use online-sources,
search corporate DMS or intranet, ask colleagues who knows more (informal
learning). The results of information search are remaining available to the in-
formal learner, are stored in the bookmark list of the browser or in the local
file system. The found information is only partially relevant to the user's needs
because internet articles or technical documents are not designed for the goal- or
context- aware learning. Nevertheless, in the opinion of authors, this information
is still valuable and can be reused by other team members if one transforms the
information into reusable learning objects (LO, see [2]).

The current article is structured as follows: The chapter 2 introduces to
a problem of content authoring for small enterprises and defines requirements
to an efficient process of content authoring. In 3 an overview of currently used
authoring strategies is given. In 4 we make a proposition of the optimized process
of process-integrated authoring (SLEAM). The article concludes in chapter 5 by
giving idea of the future work.

2 Problem setting

Assuming, a small company realizes the necessity of process-embedded e-learning and would like to introduce e-learning solution. The first problem thet the company might face is that the responsible manager does not know what type of learning content and on which topic do they really need. The company does not also have means to hire a specialist to analyze the learning domain and produce e-learning content. In this case, preparing of learning content has to be a part of the employees' job. As the learning content creation is not the main job of the employees, the process of the content creation must take as little time as possible.

Considering the situation described above, one can derive the following requirements to:

1. The process of the learning content authoring:
   (a) Must be performed by company insiders without taking them from the main work for too long therefore it has to be integrated into the process of work and use tools that are easy to learn.
   (b) Authoring tools should be able to convert existing documents or web pages into learning objects (LOs) rather that creating LOs from scratch.
2. The output of the content authoring process:
   (a) Produced content should be fine-grained learning objects rather than executable learning programs.
   (b) Produced learning objects should be annotated with metadata according to a standard format in order to be able to be imported into LCMS.

3 Authoring methods

Currently, there exist a lot of different approaches to learning content development. We will evaluate them with respect to the requirements listed in the previous chapter.

3.1 Instructional System Design - ADDIE

Instructional system design is one of the systematic approaches to the learning program creation [3]. ADDIE is a traditional method that, provided the method is applied by an experienced professional, guarantees creation of an effective training program. An example of usage of the method can be found in [4]. The method has well-known disadvantages. One disadvantage of the method is its complexity. To use it efficiently the training program authors need high qualification and experience. The second disadvantage is that the method is time consuming.

Result: ADDIE does not satisfy our requirements

3.2 Rapid Instructional Design

Rapid Instructional Design (RID) tries to solve problems of ADDIE by simplifying its process. For instance, in [5] the authors shortened the analysis phase by interviewing experts instead of analysing organization processes in detail. In general, RID introduces the *Rapid-prototyping* phase that follows after the *Design* phase. In this phase a "quick-and-dirty" learning program is compiled and tested with real students. The phase is repeated until all the main drawbacks are fixed. After that, the final development and implementation are followed. One of the projects supporting RID is Explain-Project [6].

Result: RID does not satisfy all our restrictions, but is better suitable for smaller budgets. The idea of testing the content before development is highly relevant to the requirements defined in chapter 2. But, the main target of the RID is a systematic creation of training courseware, whereas the authors of this paper propagate an approach supporting adaptive informal learning in working processes.

3.3 Rapid Authoring and Context-Aware Re-purposing of Learning Content

Nowadays there is a lot of so called "rapid authoring" tools appeared that allow non-professionals to create learning courses in standard sharable formats using existing MSOffice documents (see [7]) or making them from scratch. Similar approach presented in [8] advocates re-purposing of the existing learning resources in order them to suit to a new learning context. Although we agree with the idea of re-purposing, we argue that deeper integration of such framework into working processes is needed.

Result: Re-purposing of the learning content is what a small company really needs. But the methodology of integrating such framework into company processes is missing. Rapid authoring tools are easy to use and allow to convert documents into LOs. But produced LOs are monolithic, coarse-grained and contain lot of garbage information. Therefore, they are difficult to reuse as part of adaptive courses.

3.4 Weblog and Wiki Based Authoring

In [9], the idea of the configuring of individual learning spaces by using weblogs and concept maps is presented. The method has following disadvantages: firstly, the life-cycle of weblog posts is relatively short - they become unavailable after a certain period of time; secondly, the learner has to write content by herself rather than to reuse existing documents. Similar to weblogs, wikis can be used as efficient means for a simple content creation and grasping practitioner's experiences [10]. Wiki pages have longer life time comparing to weblogs.

Result: weblogs and wikis are simple intuitive tools for the "from-scratch" content creation. It means that our approach has to consider them as a very important source of information that can be repurposed as reusable LOs.

4 Process of Workflow-Embedded Authoring

Having analyzed the overview from chapter3, the authors proposed a new approach of the process-embedded content authoring called SLEAM that stands for **S**earch, **L**earn, **E**xtract, **A**nnotate, **M**ap that are the main phases of the authoring process. In the fig. 1 the main phases of SLEAM are shown in the working context:
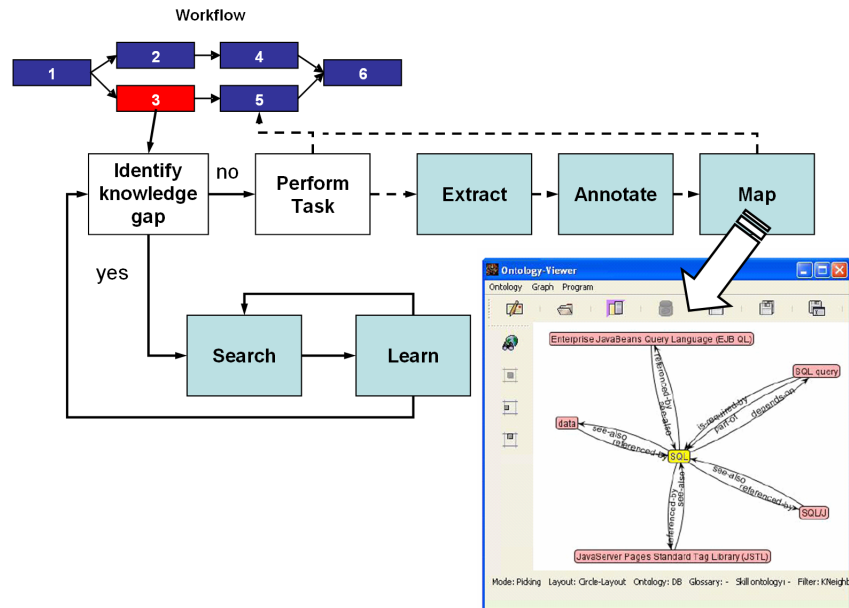

Fig. 1. SLEAM process

1. After a user starts a new task, a knowledge gap preventing the user to perform the task might be identified. Identification of the knowledge gap can be done by the working environment (e.g. workflow management system, see [11]) or by the user herself.
2. **S**earch: After identifying a knowledge gap the user starts looking for the necessary information in the internet, intranet or in the corporate DMS.
3. **L**earn: After the user found the relevant information, the process of learning is started. If the found information does not satisfy current user's needs the process of search is repeated. If the user satisfied his information needs she can return to the task and complete it.
4. **E**xtract: The system asks user whether the found information can be reused by other team members in the context of similar tasks and offers her to

extract reusable LOs from the documents. If the user agrees, a context-aware rapid authoring tool is started that allows the user easily to extract parts of documents or web pages as reusable LOs.

5. **A**nnotate: After the LO extraction the user is proposed to annotate extracted LOs with metadata. User context information should be used to assist the user in annotating LOs with metadata (author, task name, search query).
6. **M**ap: In order that the LOs could be efficiently used in the process of the workflow-embedded e-learning, they have to be mapped to the ontology of learning concepts (see [11]).

Comparing SLEAM to the authoring approaches listed in chapter 3 one can find that the SLEAM approach integrates main features of rapid-authoring and context-aware authoring, but:

1. SLEAM enhances rapid authoring methods by providing tools for LO extraction from the documents instead of converting the whole documents to LOs.
2. Unlike wiki-based authoring SLEAM practitioners do not have to create some learning content, but to reuse existing documents.
3. Unlike context-aware content repurposing, SLEAM is working with raw material for creating LOs and not with LOs as such.

Unlike in ADDIE or rapid instructional design approaches where the analysis phase is given high priority, in SLEAM the methods of dynamic identification of learning goals ([11]) is used. These methods exploit information retrieval and machine learning techniques. In the same time, similar to the rapid instructional design, SLEAM does not start developing LOs before the author is not sure that the found information is really useful in the given context.

5 Conclusion and Outlook

SLEAM process solve the most of the requirements defined in chapter 2. It enhances rapid authoring approach by integrating it into the working context and by providing means for selective extraction of LOs.

However the SLEAM approach has several major problems:

1. Employees have to be motivated to produce content. This can be solved, for example by providing browser plugins, that will propose employees to save the documents that they found in internet as LOs. Other plugins can be implemented for the Google Desktop Search or for the interface of the corporate DMS.
2. In order to make the method more lightweight one needs to use automatic metadata extraction mechanism. In this case the author will be assisted during the LO annotation. To better classify LOs and map them to the concepts in the learning concept ontology, text processing algorithms can be used.

3. Copyright problems. The content found in the internet can be protected by copyright laws and must not be reused without an approval by the original author. This problem is difficult to solve by using software algorithms but the users must be aware of the copyright issue.

The subject of the future work on SLEAM will be finding solution to the identified problems. The proposed technology was not evaluated yet, therefore case studies will be planned and conducted.

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