

SIMPLE - a social interactive mashup PLE

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Abstract. This paper presents an approach for a mashup PLE especially designed for the interactive and social context of work-integrated learning (WIL). The mashup PLE consists of a freely configurable set of widgets, whose functionalities are based on a framework of five activity classes to actively support informal learning in a social environment. We present an exemplary implementation of desktop widgets for each of the classes. Based on the evaluation of the widget framework we highlight future research directions for designing PLEs in the context of WIL.

1 Introduction

Personal Learning Environments (PLEs) support knowledge workers in informal context-based work-integrated learning situations. These are supposed to place the user in the centre of her learning and working environment and provide the integration in the users' social network, give access to the community and organisational knowledge base as well as private documents and notes. Therefore, users must be enabled to create and manage their own working and learning environment self-reliantly. This aim can be achieved by provision of a Mash-Up of widgets supporting learning and working. The PLE approach described in this work is a desktop based mashup approach. It provides widgets for discussions and reflection about digital resources, tagging, searching for resources and persons on different channels (domain-related or web resource), widgets for awareness functionality (e.g. last activities) and a widget for aggregating resources to certain topics (collection widget).

2 Widget Mashup Approach

The selection of functionalities implemented by the widget mashup approach is based on a two-way approach. A participatory design approach with application partners has been chosen to align our research closely to their real needs. In participatory design [Bødker et al., 2004] end-users are invited to cooperate with

researchers and developers during (several stages of) the innovation process: during the initial exploration to help defining the problem, during the development to help focusing on appropriate solutions, and during the evaluation to provide feedback on the proposed prototype.

In parallel a more theoretical approach was applied. The requirements elicitation phase was based on the results of an ethnographic study [Barnes et al., 2009]. The important aspects of those requirements for work-integrated learning were transformed into use cases describing workplace learning situations and personas representing the context of the user [Maier and Thalmann, 2008]. Based on the use cases, the learning activities presented in [Attwell et al., 2008] and the results of several evaluation phases (see Evaluation section) we derived a model of activity clusters. Each cluster contains a set of activities that are coherent regarding their required widget functionality. That means on the one hand, each widget can be categorized in one or more clusters according to its functionality and on the other hand, each activity cluster has to be considered in PLE design. Figure 1 depicts the model, consisting of activity clusters describing sets of services that emerged from the requirements analysis, and which acts as a framework for widget development [Schoefegger et al., 2009].

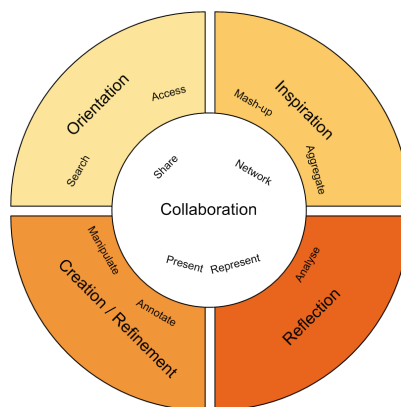


Fig. 1. 5 activity clusters build the framework for the PLE development.

The widget mashup approach described in this work provides a platform for the development of additional widgets supporting the activity clusters. In the following the clusters and some widget implementations are described in detail. The status of the system presented here, was part of the evaluation presented in section 3. These widgets turned out to be useful in order to support learning in a PLE environment but the approach is not limited to these widgets (see also figure 2).

2.1 Creation and Refinement

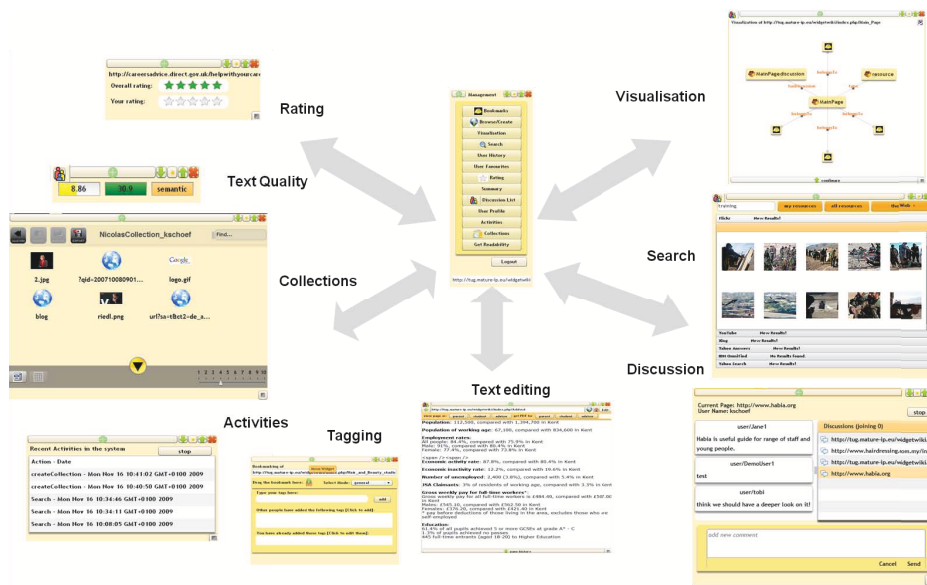


Fig. 2. Subset of the widgets developed for SIMPLE

The purpose of creation and refinement services is to generate knowledge artefacts that meet a certain form of (higher) quality standard (e.g. reports, presentations, learning material) by aggregating existing knowledge assets. Furthermore, the services help to identify available or newly created knowledge objects that need an improvement in their maturing levels or can contribute to a given maturing process, for example by offering access to meaningful maturing indicators.

Tagging Widget: Any kind of resources which are available through the system can be tagged. This can be for example a web resource from the browser or a collection. It allows to drag and drop the resources on the widget and is connected to the WidgetServer so that tagging can be part of a workflow initiated from another widget.

Rating Widget The rating widget allows a fast (5 star) rating of any resources and provides a quantitative feedback about the quality of a resource to the user. During the evaluation it turned out that users would not provide more information than these 5-star rating because of their time constraints.

2.2 Orientation

These services provide support for identifying already existing relevant knowledge objects, related topics or colleagues working in related fields. With the help of these services, the user gets an overview of what is important in relation to his topic of interest in order to ensure organisational consistency and avoid redundant actions. Having an overview of the organisational knowledge is necessary to develop and express new ideas whilst trying to keep organisational coherence.

Search widget: The search widget provides an aggregated multichannel search for resources. Results can be local documents, organisational-wide resources (wiki), web resources or persons (experts).

2.3 Inspiration

The purpose of this set of services is to support inspiration for probably interesting topics and offering new perspectives on already existing topics of a knowledge workers field of interest. This class of services supports brainstorming, organising and analysing ideas. It encourages knowledge workers to gain new knowledge by presenting for example mash-ups of existing knowledge assets including videos or pictures or an aggregation of organisational knowledge assets related to a certain topic.

Collection Widget: The collection widget allows aggregating and structuring resources according to certain topics. For reducing the barrier between web and desktop, it allows knowledge worker to collect links to web resources as well as documents or files available on the local PC. Collections can be created as shared or as private collections, where shared collections are accessible and changeable by all users and private ones only by the owner.

2.4 Collaboration

The aim of this set of services is to offer collaboration support. This includes for example the distribution of knowledge artefacts in communities. The goal is to create opportunities for discussing questions or problems with authors of related knowledge artefacts, share newly created knowledge artefacts with possibly interested colleagues, present/represent newly acquired knowledge to different target groups or simply start a collaboration for developing new ideas related to a topic. The initiation of a collaboration and the collaboration itself are necessary to reach a consensus and a common understanding of knowledge assets of organisational interest.

Resource-related discussion widget: The discussion widget provides a small chat functionality, where each chat is related to a concrete resource. Hence, it enables users to reflect and discuss about these resources.

2.5 Reflection

Reflection is necessary for organisational and individual development. Though it is mainly driven by actions of individuals, reflection can contribute towards improved organisational systems and practices. When people change their way of thinking or carrying out their work tasks, this has organisational implications. Reflection services aims at guiding knowledge workers to improve organisational knowledge by comparing ones contributions to others with respect to the organisation's goals.

Tag Gardening Widget: e tag gardening widget provides an overview of tags linked to resources and allows users to rename or delete tags. Similar to the tagging widget, it provides a tag recommendation service for most related tags to the resource. During the evaluation cycles it came out that the tagging widget and the tag gardening widget should be separated in order to reduce complexity.

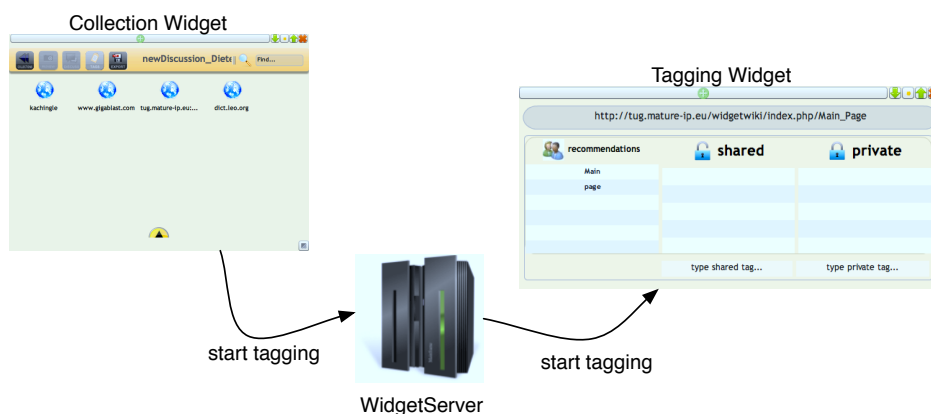


Fig. 3. Sending messages from one to another widget can be used to improve workflows and usability.

2.6 Widget communication service

Widget-based approaches normally lack of supporting (more or less complex) workflows as each widget's functionality is small and limited to itself. Therefore, a communication between widgets is necessary for knowledge worker to create more sophisticated functionality within their PLE according to their needs. Therefore, we have set up on the WidgetServer, a messaging environment that allows communication of widgets across web- and desktop context [Nelkner, 2009]. Hence, it can be used for an intercommunication between web based widgets or between web- and desktop based widgets so that a web widget can exchange

data with a desktop application in the same way. An example for the use of messages is depicted in figure 3. When a user wants to tag a resource in the collection widget, a message is sent via the WidgetServer to the connected tag widget, which comes up and allows entering the tags.

3 Evaluation

We have chosen to ground the development of SIMPLE on bottom-up and user-centered participatory design approach to ensure user acceptance and the alignment of the system with daily work routines. In order to realize this process, the evaluation consisted of three iterative evaluation cycles. Each evaluation cycle was adapted to the current development status and resulted in a system improvement.

The first evaluation phase consisted of a structured scenario-based walkthrough coupled with an interview. It aimed at assessing usability, as well as gathering functional and non-functional requirements. After the walkthrough, end-users individually provided feedback by filling in a questionnaire. The second evaluation cycle was performed as a hands-on usage phase of several days over a period of three weeks. The participants used the system on their own and in their context without any guidance by developers. After each day, the group summarized the feedback informally. The third phase was performed as a workshop with the developers. The tasks for which the system was used were defined in cooperation with the workshop participants but were performed without any guidance by the developers. The end-user activities were recorded with a video camera and the developers acted as facilitators observing the participants' behaviors. After this session interviews about positive and negative issues were conducted.

The overall feedback from all workshops and corresponding participants was globally very positive. The qualitative and quantitative data analysis based on the observations and questionnaires showed that most of the provided widgets are highly applicable and relevant in their working context. Especially the combination of the browser plugin, the search widget, the tagging widget and the collection widget are highly appreciated due to the seamless integration of browser and desktop software.

Especially the last evaluation workshop brought valuable feedback to the overall approach of widget based mashups. During working on their in this third workshop, it became obvious that the participants easily learned how to use the several widgets for recurring steps. It was easy for them to tag and rate resources, save resources in collections and also to search for resources in the database. Beside minor usability aspects of each widget, the overall approach was subjectively well accepted. However, while observing the users in action and evaluating the recorded videos it turned out that three aspects of the GUI design of SIMPLE need a deeper investigation:

1. The flexible mashup approach regarding the concurrent use of many widgets at the same time and related to that,

2. The 'flow' of the overall system in terms of reducing the barriers of switching between different widgets for different steps when performing a complex task.
3. The specific support to focus on certain tasks with small sized widgets providing limited functionality.
4. The support of more complex tasks with the combination of different independent widgets.

In the following we will highlight functionalities that have been reported by the participants as being very valuable in context of effectively supporting their daily knowledge work. This feedback also provides interesting insights into future research directions when designing PLEs for the context of work-integrated learning. The opportunity of **exploiting the highly faceted context** of resources for search: In each evaluation phase, a recurring theme was the importance of effective search functionalities. The ability to search and collect results across several sources was a high priority, as well as the ability to explore the context of a resource. This appeared, for example, as a requirement to being able to sort search result lists according to a number of relevance criteria which go far beyond traditional search engines. Criteria from the organizational context emerged as crucial (e.g. who used a resource? for which location of operation is it useful?), as well as the importance of the social network. Feasibility of **collaborative tagging** and development of common semantics: A further assumption that has been largely confirmed was the practical utility of tagging in the system to store, share and re-find resources. Users largely felt comfortable with tagging and saw its potential application to collaboratively develop and maintain a dynamic organizational domain model. Though, there was also a major concern this domain model would emerge from a rather unstructured utilization of tags and how the quality of the domain model can be ensured. **Individual expertise** and active areas of interest: It appeared to be promising to try to detect current active topics for all users and display them, or use them for calculating trustworthiness of content. This was also highlighted in the context of the more sophisticated functionalities the system provides (such as gardening the semantic space or knowledge space), users suggested to automatically detect knowledgeable people which could be recommended to take care of gardening activities within their area of interest and excellence. This is especially important in the area of very dynamic organizational contexts where information can be outdated very quickly and trustworthiness of content needs to be ensured. **History of changes** to documents and relationships between documents: In very dynamic organizational contexts, articles in the knowledge base will be changed regularly; new articles will be included by merging various information sources, additional information from outside and inside the organization will be added to the knowledge base. Thus, the participants raised of how important it was to allow users to gain an understanding of these processes and practices. Practically, there were questions around how resources have developed over time, and which other resources have contributed to this process and how this can be made visible to the users.

4 Conclusion

This abstract presents a mash-up based PLE environment for work-integrated learning. The requirements have been gathered from a top-down and from a bottom-up approach with application partners. With the theoretical approach service classes were defined, which are essential for supporting and fostering work-integrated learning. The application partner support provided us with concrete information about types of widgets and its combination. The web-integrating desktop based approach with intercommunicating widgets was judged as very valuable. However, the evaluation brought up the question for concrete relations and deeper information about persons dealing with resources in their social network, this can include e.g. the person's role, expertise, etc. These aspects are also part of the further developments and research as the usability problems are.

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