Sharing Personal Learning Environments for Widget Based Systems using a Widget Marketplace

Daniel Dahrendorf, Diana Dikke, and Nils Faltin

[1]imc information multimedia communication AG, Saarbruecken, Germany
(daniel.dahredorf, diana.dikke, nils.faltin) @im-c.de

Abstract. Presently, there are multiple web and mobile application stores on the market providing various tools and supporting creation of mashup spaces. However, only some of them concentrate on offering learning tools and necessary guidance in constructing Personal Learning Environments (PLEs) by the users. This paper represents a marketplace focusing on educational applications and their categorisation according to functionalities, learning phases they support, and learning domains the tools refer to. The represented approach aims at assisting users in selecting applications supporting their particular learning goals and needs. Besides interoperability and technical issues, the actual use of the technology and further research questions are discussed.

Keywords: Personal Learning Environment, Self-Regulated Learning, application store, mashup, widget, learning bundle, recommendation

1 Introduction

In the last years, a lot of research has been conducted in the area of Personal Learning Environments (PLEs) covering two aspects: PLE as a concept and as a technical solution. As a technical solution, PLEs can be seen as mashups of (small) software components, which are brought together and organised to fulfil specific (learning or teaching) goals. Both the assembling of PLEs as well as their sharing is supported by multiple well known platforms (e.g. iGoogle[1] and netvibes[2]). Most of these solutions are widget based.

The existing application stores established on the market provide a wide range of tools and (in some cases) may support creation of mashup spaces and their sharing with a community. However, they have only few tools and content focusing on learning, as well as little guidance to find applications for a specific learning purpose, such as categorization of tools. Further, existing platforms allow only assembling tools used in a platform itself (e.g. widget based systems do not allow adding web or mobile applications in their spaces).

[1] http://www.google.com/ig
[2] http://www.netvibes.com

This document describes a learning application marketplace, the ROLE Widget Store, which is a part of the EU project ROLE infrastructure [3]. The Widget Store addresses the issues identified above providing various learning applications categorized based on functionalities, learning phases, and learning domains.

Also, the Widget Store offers services allowing platform independent PLE sharing, thus, supporting the development of a community of practice to exchange learning tools as well as composed templates of learning tools and artefacts (the so-called learning bundles).

Concentrating on the concept of learning bundles, this document describes how they can be applied and shared across different learning platforms. The paper describes not only interoperability and technical issues, but also actual use of the technology, as well as further research questions, e.g. types of tools that could be offered for (mobile) PLEs in the future.

2 Related Work

While multiple application stores (especially in the mobile sector) are available, platforms focusing on educational applications are still rare. Two of them, besides the ROLE Widget Store, are represented below.

The open source project Edukapp[3] founded by JISC and used in the EU project ITEC[4] aims at providing cross-university widget stores. It includes W3C and OpenSocial widgets and plans to offer recommenders and social functionalities. The ITEC project will use the developed applications to provide a widget directory for secondary schools.

Edshelf[5] is a directory of learning applications and offers educational, mobile web and desktop applications. Currently, a beta version is published which is already filled with applications for different platforms. The applications are categorized by several functionalities: teach, make, communicate, find, assess.

3 The ROLE Widget Store

3.1 Overview

The overall goal of the ROLE Widget Store is to provide a repository for education related applications to create flexible Personal Learning Environments based on open technologies. This includes a wide range of tools, support in finding applications for a specific learning goal (e.g. by a community, automatic recommenders, and predefined compilations of applications), as well as simple mechanism to add widgets to a PLE (see Fig. 1.).

[3] http://code.google.com/p/edukapp
[4] http://itec.eun.org
[5] http://edshelf.com

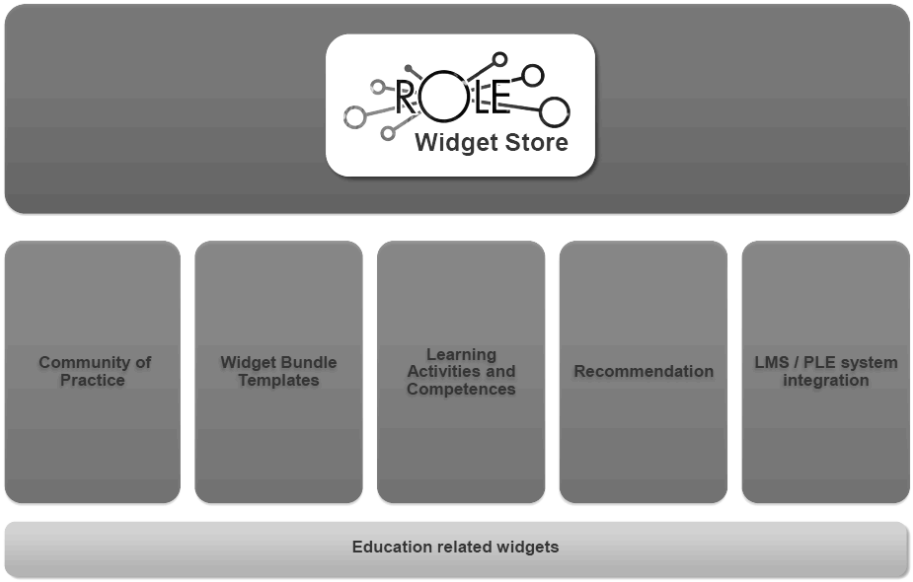

Fig. 1. Overview of the Widget Store components

As widgets allow flexible mashups by providing, on the one hand, a small set of functionalities and, on the other hand, the possibility to communicate with other widgets, they were chosen as the software type to be supported in the Widget Store.

Inter-widget communication can be realised either between widgets in a browser (local inter-widget communication) or remote between two users (remote inter-widget communication) [3].

Widgtes, both the W3C [1] and OpenSocial specification [6] can be integrated into several CMS, PLEs and LMS (e.g. Moodle[6], Liferay[7], CLIX[8]).

3.2 Widgets

The developers registered in the Widget Store are able to add either self-developed widgets or widgets based on a licence allowing further distribution. Currently, W3C and OpenSocial Widgets can be added to the repository via upload or reference respective their specification.

Metadata, which is already available in the widget manifest, is extracted and automatically added to the system. The widgets can be enriched with additional metadata (e.g. author contact details and licence) and media (including screenshots, screencasts and use cases).

Once a widget is uploaded, its quality is checked by a ROLE developer (acting as editor). An additional important quality indicator is users' feedback by rating and commenting. Further, a detailed usage report can be added to the widget.

---

6 http://moodle.org
7 http://www.liferay.com
8 http://www.im-c.de/germany/de/solutions/learning-management/clix-2012

3.3 Bundles

Bundles are templates for PLEs containing learning tools and content. The idea of bundles is to exchange good practices of working with learning environments. Bundles are not intended to model a structured course (IMS Learning Design[9]). Instead, they are intended as a fast and simple way to provide learners with tools, content, and a detailed description of how to use these to complete a specific learning task.

A bundle targets particular learning needs that are described in the bundle itself. Using the categorisations (see section 3.4) bundle designers can choose several tools from those available in the marketplace to create a set of applications supporting learning goals. Additional references to learning content can be added.

For each tool and content bundle designer are able to add a learning activity in order to describe what should be done using the tool or working with the learning content. Once a bundle is created by a learner or instructor, it can be shared to be discussed and refined by the community (see Fig. 2).

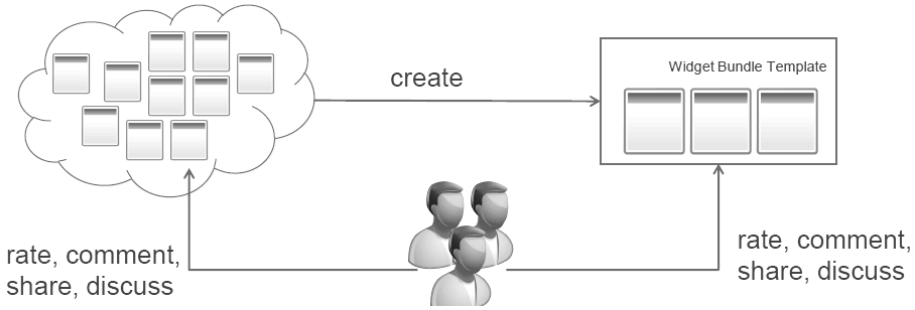

Fig. 2. Creating and improving bundles

3.4 Categorisation

In order to support learners in selecting applications for their PLEs, a tool categorisation describing purposes of the widgets is offered. The introduced categories allow users to choose widgets supporting different learning phases and can be used for recommendations to complement a PLE.

The tool categories were derived from the Psycho-Pedagogical Integration Model (PPIM) [2], which has been developed in the ROLE project to support the concept of personalised self-regulated learning. Fig. 3 demonstrates mapping of categories (grey) and phases of the PPIM (white).

[9] http://www.imsglobal.org/learningdesign

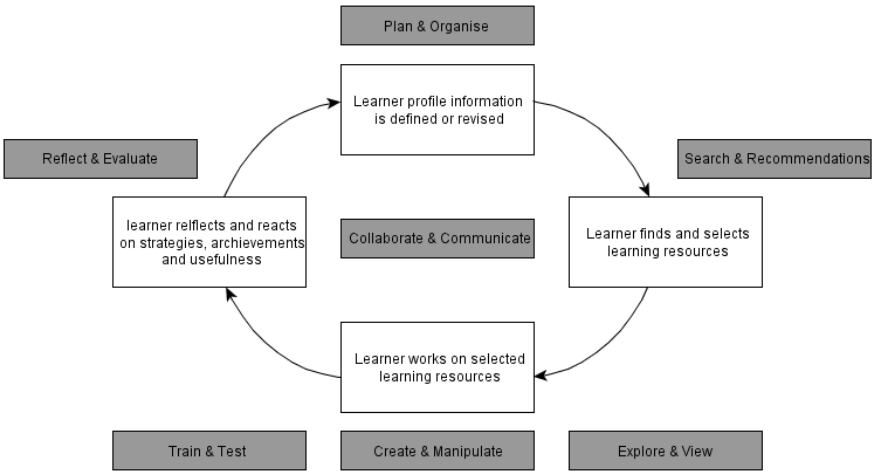

Fig. 3. Mapping of PPIM phases and tool categories

In addition to the tool categories, functionalities described in an ontology[10] developed in ROLE are introduced. These functionalities represent features of widgets (e.g. text editing, video chat), whereas the ontology includes also tool categories represented above and defines mapping of the categories and functionalities to support recommendation systems.

Widgets can be either generic (e.g. text editor) or targeting specific learning domains (e.g. French language). It is also possible that widgets only provide some specific learning content. As these widgets can be hardly described by tool categories or functionalities, a categorisation based on learning domains is introduced. The service of dbpedia[11] is used to allow users tagging widgets by learning domains so other users can find them more easily.

The categorization of bundles differs from the one of tools. A bundle can (and should) be designed to cover several phases of the PPIM model and thus refers to several tool categories. Also, a bundle does not provide functionalities by its own. The approach of the Widget Store is that a bundle automatically inherits functionalities of tools it contains and can be tagged manually by learning domains from the dbpedia.

3.5 Integrating Widgets in (Personal) Learning Environments

To allow users adding widgets to their preferred learning platform, the Widget Store provides several possibilities.

Firstly, the store offers a button available for a limited number of platforms to add a widget directly to the target platform.

Secondly, the store provides an embedded view, so it can be integrated in learning platforms using an inter-widget communication library. This approach is used in the test implementation of the ROLE project [7].

[10] http://purl.org/role/terms
[11] http://dbpedia.org

Finally, the store offers web services allowing other platforms receiving information about the tools and bundles and processing this information to support learners in assembling their PLEs.

Several more PLEs and LMS already support manual integration of widgets, making it possible to manually add widgets from the marketplace. For this reason, it is possible to download the widget code from the store or get the reference to the widgets. For platforms, which do not support widgets yet, an embed code is provided.

3.6 Actual Use and Evaluation

Currently, around 90 learning tools contributed by the ROLE project consortium members and external developers are available in the Widget Store. These are equipped with categories, functionalities, and learning domains and can be filtered by relevancy, type, name, author, and date. In addition, community features, such as connection to Facebook and Twitter with "Like it" button, as well as rating and commenting of widgets are available.

The applications available in the Widget Store can be added to PLEs, such as iGoogle, Graasp[12], and ROLE test environment SandBox[13]. Furthermore, the tools can be used to populate learning spaces of a Personal Learning Management System (PLMS) [8] aiming to extend curriculum-based learning in an organisation with self-regulated learning activities.

The Widget Store has been used and tested in several project workshops and courses at universities. An evaluation of widget usage in conjunction with ROLE PLMS has been conducted at one of the ROLE test-beds [8].

4 Conclusion and Outlook

Presently, the ROLE Widget Store provides web based learning applications and recommender tools (e.g. mashup recommender [9]) supporting construction of PLEs and PLMS by the users. Planned future work are to add further tools, such as desktop and web based tools, as well as mobile applications to be used in mobile learning environments.

This wide spectrum of tools will allow learners to create, share and refine platform independent learning bundles. Also, more PLE hosting platforms will be integrated with the Widget Store; support for representation of external tools and learning artefacts on such platforms will be provided. This includes examining the possibilities to bring content to mobile devices by transforming web widgets into mobile applications.

In order to enrich learning experience of the users and support pedagogical aspects of the learning processes, the integration of a pedagogical recommender developed in the ROLE project is planned. In addition, a bazaar for social requirement engineering [5] (in development) will be integrated in the store as soon as it is released. Future work concerning fostering of a community of practice around the marketplace as well as detailed evaluation is foreseen.

[12] http://graasp.epfl.ch
[13] http://role-sandbox.eu

Acknowledgements. The work reported has been partially supported by the ROLE project, as part of the Seventh Framework Programme of the European Commission, grant agreement no. 231396.

References

1. C´aceres, M.: Widget packaging and configuration, W3C working draft 22 march 2011, http://www.w3.org/TR/widgets/ (2011)
2. Fruhmann, K., Nussbaumer, A., & Albert, D.: A Psycho-Pedagogical Framework for Self-Regulated Learning in a Responsive Open Learning Environment. Proceedings of the International Conference eLearning Baltics Science (eLBa Science 2010), 1-2 July 2010, Rostock, Germany (2010).
3. Govaerts, S., Verbert, K., Dahrendorf, D., Ullrich, C., Schmidt, M., Werkle, M., Chatterjee, A., Nussbaumer, A., Renzel, D., Schefel, M., Friedrich, M., Santos,J., Duval, E., Law, E.: Towards responsive open learning environments: The role interoperability framework. In Kloos, C., Gillet, D., CrespoGarca, R., Wild, F.,Wolpers, M., eds.: Towards Ubiquitous Learning. Volume 6964 of Lecture Notes inComputer Science. Springer Berlin / Heidelberg (2011).
4. Isaksson, E., Palmér, M.: Usability and inter-widget communication in PLEs, 5th European Conference on Technology-Enhanced Learning (ECTEL). Barcelona, Spain (2011).
5. Klamma, J., Hannemann, R.: Der Bazar der Anforderungen – Open Innovation in emergenten Communities. Journal paper, Springer Berlin,Heidelberg (2011).
6. Mitchell-Wong, J., Kowalczyk, R., Roshelova, A., Joy, B., Tsai, H.: Opensocial: From social networks to social ecosystem. In: Digital EcoSystems and Technologies Conference, 2007. DEST ’07. Inaugural IEEE-IES. pp. 361 –366 (2007).
7. Mödritischer, F., Krumay, B., El Helou, S., Gillet, D., Govaerts, S., Duval, E., Nussbaumer, A., Albert, D., Dahn, I., Ullrich, C.: May I suggest? Three PLE recommender strategies in comparison. In: Proceedings of the Personal Learning Environments Conference (PLE 2011), 11-13 July, 2011, Southampton, UK (2011).
8. Schanda, F., Dikke, D., Mueller, N.: Personal Learning Management Systems (PLMS): Concept, Classification, Evaluation. In print (2012).
9. Nussbaumer, A., Berthold, M., Dahrendorf, D., et. al.: A Mashup Recommender for Creating Personal Learning Environments. In print (2012).