KP-Lab platform based on service-oriented approach

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Abstract. This paper presents architecture of KP-Lab platform that has been
implemented for support of new approach in learning domain. The KP-Lab
platform is a set of services that are based on heterogeneous technologies,
which provide interoperability that is neither language nor platform dependent.
For these reasons, the KP-Lab platform is based on web services. The important
part of KP-Lab development process is to integrate KP-Lab and third-party
tools and applications into with the Shared Space Application that is core end-
user tool in KP-Lab.

Keywords: web service, architecture, ontology

1   KP-Lab platform

The main goal of KP-Lab[2] project (Knowledge Practices Laboratory) is to research,
develop and integrate relevant technologies that support trialogical learning.
Trialogical learning [1] presents an innovative approach to collaborative work and
learning based on the idea of collaborative advancement of shared objects of activities
(so called knowledge artefacts).

The KP-Lab platform (see Fig.1) is based on interoperability of the integrated
tools and on a support of semantic web models and standards. It is composed of
several groups of services and libraries, e.g.:

- Semantic Knowledge Middleware Services (*SWKM Sevices* in Fig. 1),
  providing storage [3], management and optimisation of the metadata as
  created by the KP-Lab tools.
- Content Management Services (*Repository Services* in Fig. 1), dedicated to
  those services that serve the creation and management of regular content
  used in knowledge artefacts, either towards KP-Lab's own content
  repositories or external content repositories.

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[2] www.kp-lab.org

- The Multimedia Services (*MM Services* in Fig. 1), oriented towards the manipulation and management of dynamic content such as streamed material for audio and video function to be supplied to the KP-Lab tools.
- Technical services cover those middleware support services, dedicated to the authorization and identity management, the user management, routing etc.

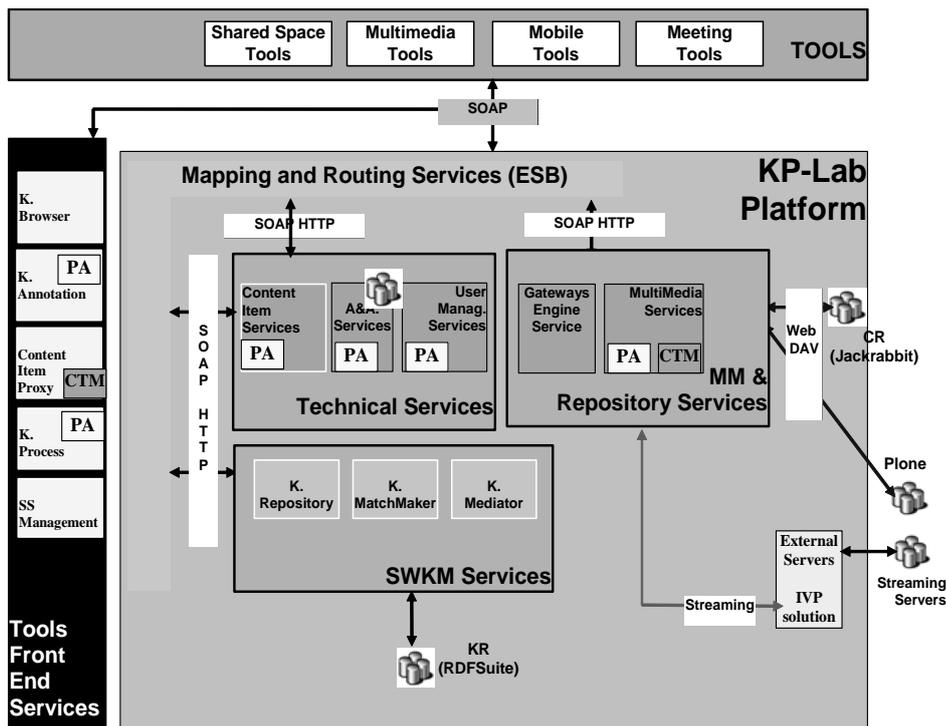The place of the KP-Lab platform in the global architectural view of a KP-Lab project can be depicted as in the Fig.1.

Fig. 1. Logical view of the KP-Lab architecture [2]

One important component of the KP-Lab platform is the "common language" of the communications and functionalities around knowledge in the KP-Lab platform. The software model relies on the Trialogical Learning Ontology (TLO) that has been developed for these purposes.

The KP-Lab platform is a set of services that are based on heterogeneous technologies, which provide interoperability that is neither language nor platform dependent. For these reasons, the KP-Lab platform is based on web services.

2   KP-Lab user environment

The user environment consists of a set of tools that enable collaborative knowledge practices around shared knowledge artefacts:

- *Shared Space application*   is a learning system aimed at facilitating innovative practices of sharing, creating and working with knowledge in education and workplaces based on trialogical learning theory. It supports users' collaboration according to different working practices and allows viewing of shared knowledge in flexible manner. It provides a set of tools for knowledge building and process management. The personalized, temporal and faceted views allow users to describe and visualize shared knowledge objects, their associations and state in different arrangements.
- *Meeting support* application (Map-It) that aims at generating in automatic manner a written/graphical record of a conversation.
- *Change laboratory* application which provides features for planning, organizing and carrying out work research processes based on the Change Laboratory theory (developmental work research that provides reflective feedback of participants' work) in an asynchronous or synchronous manner.
- *Semantic multimedia annotation* tool that allows users to annotate in a synchronous or asynchronous way multimedia contents such as video, audio, and text
- *Collaborative semantic modelling* application that supports collaborative use of visual models and the development of languages used in visual modelling.

The important part of KP-Lab development process is to integrate KP-Lab and third-party tools and applications into the Shared Space application that is core end-user tool. The tools will be invoked from the Shared Space graphical user interface (SSGUI) and content of shared spaces can be viewed and produced by these tools.
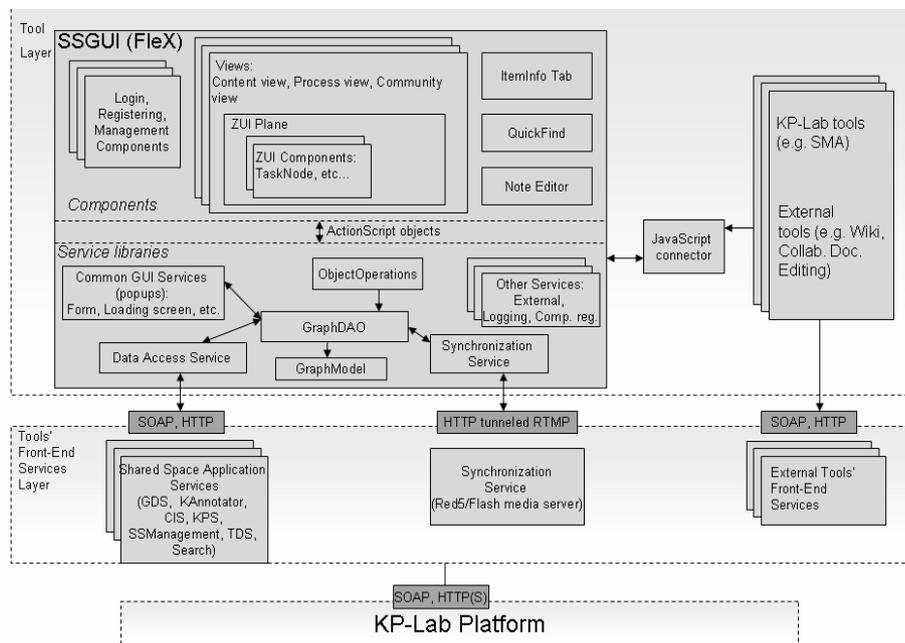

Fig. 2. KP-Lab user environment architecture [4]

Integration of KP-Lab end-user applications is following (see Fig 2):

- The Semantic Multimedia Annotation Tool (SMA) and Map-It will operate both as standalone applications and as tools that can be invoked from the Shared Space application.
- The Change Laboratory tool and CSM tool will be implemented as a Shared Space application plug-ins.
- In addition to the integration of KP-Lab applications, the Shared Space application will be integrated with third-party tools such as a Wiki.

The server-side modules of Shared Space application will be implemented as web services. The SSGUI and other presentation layer tools interact with these services directly using SOAP. Each Shared Space application service contains the necessary libraries to connect to the SWKM and other data sources.

Acknowledgment

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