DELIVERABLE D2.5

SECOND SYSTEM RELEASE

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Document Version:	v2, December, 2015
Document Status:	Final
Deliverable Type:	P - Prototype
Document Type:	Accompanying Documentation
Diss. Level:	Public
Lead Partner:	TUGraz
Workpackage:	WP2
Delivery Date:	M22 (December 2015)
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DOCUMENTATION

In the very heart of WP2 is the design and development of a Learning Analytics web portal. Based on the requirements specification document, the focus groups and design studies, we designed, planned, and developed such platform and have a second release in M22.

The significantly revised design and functionality mirrors all the experiences and demands of teachers that were involved in the studies of Y1 and Y2, as summarized in D2.2. Basically, the key requirements are simplicity and individual design. In contrast to the system version 1, which was designed with the idea of a typical online portal, the new version is designed much more in form of an app or a software tool. This was a clear recommendation of the design studies of the project. However, the system still has all the functionalities of the original portal. The working title 'workbench' has been removed.

The entry portal is available at http://css-kmi.tugraz.at/mkrwww/leas-portal2/. Demo login credentials are

> User: *Lea*, Password *Inthebox*
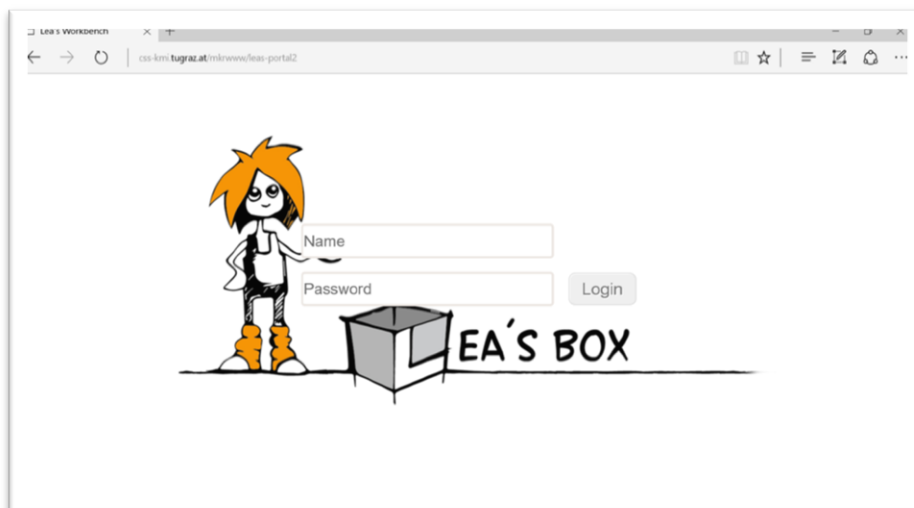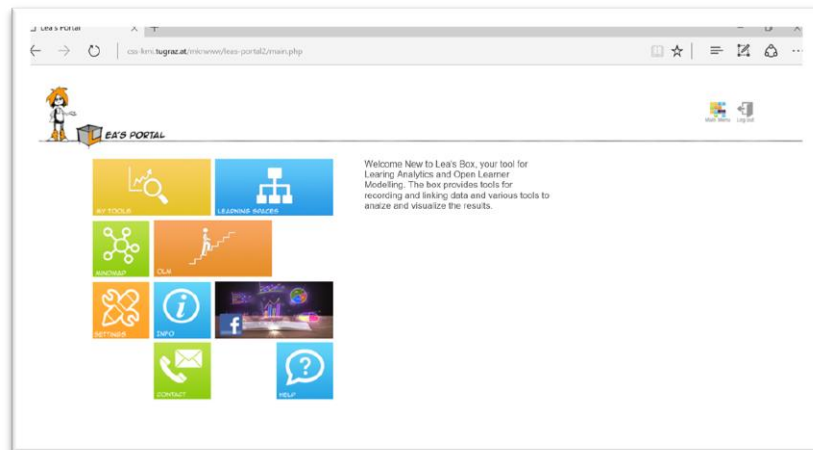
The start screen has changed significantly. There is a new menu in a typical "metro style" design (Please note: On the basis of further design studies and exchanges with teachers, the design was further advanced in comparison to the system design document D2.2). This design is intended to experience the system a bit like Windows 10 and its tiles of functions and features. This design is easily customizable and, perhaps in a final step, configurable with a wizard. The main menu grants access to the following components:

MY TOOLS

The first, and perhaps most important, feature is the "My Tools" tile. This functionality allows users to define a set of internal and external tools to primarily record and gather data for the analytics functions and the open learner modelling. As it was possible with the first release to link myClass tools and example apps (such as the 1x1 Ninja), we added an internal tool to record competency development. In principle this is a lightweight version of the newest myClass tool. Further features will follow in the next weeks and months. In addition, the My Tools section is the place to access new visualization services like the "competency landscape".

LEARNING SPACES
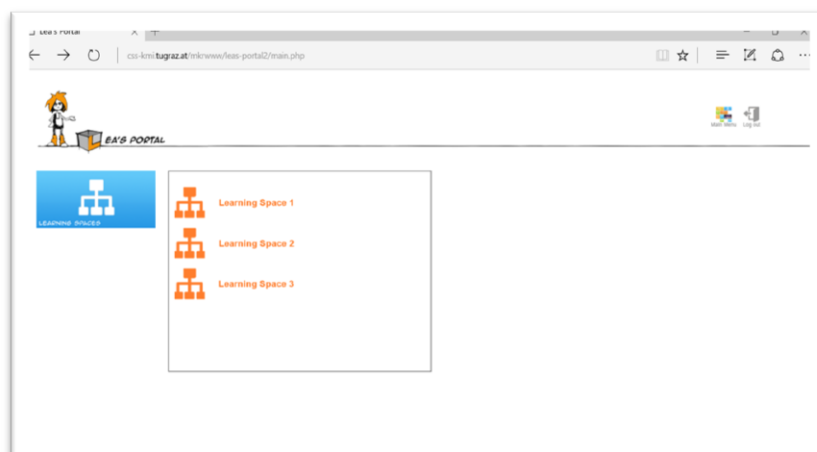
The next tile refers to the "Learning Spaces", this is the feature that allows teachers to access the Hasse diagram visualization module as the front end for CbKST related analyses and visualizations. The diagrams represent the competence spaces of learners and their learning paths. Learning Spaces can be defined for groups of students and subjects, on the basis of the competencies defined for the subjects. CbKST-based analyses occur on the basis of the activity and achievement data held by the system.

MIND MAPPING TOOL

The mind mapping feature of the first release is still available since it proofed to be a useful tool for teachers. In Y2 we made the integration into the new system stronger. Insofar, the tool can now be used as an editor for defining hierarchical competency models.
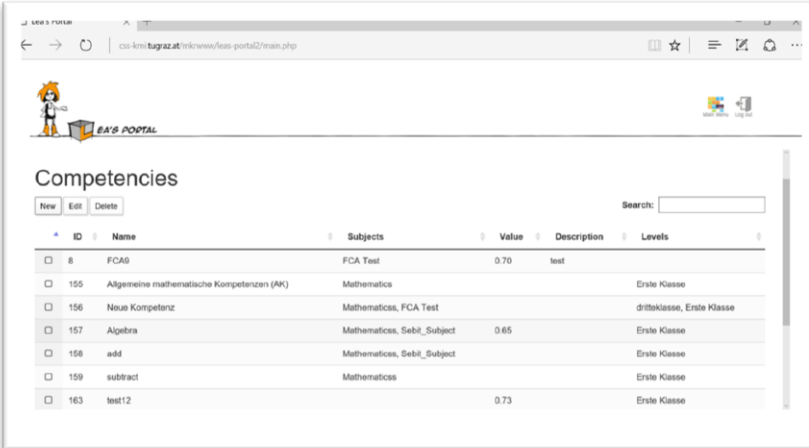
OPEN LEARNER MODELLING

A very prominent feature of Lea's Box is the OLM, the Open Learner Modelling tool. It is the key instrument to display the analyses in a suitable way for users such as teachers, learners, or parents. The tool itself has new visualization services and the new release includes negotiation features that allow students to negotiate the results of analytics.
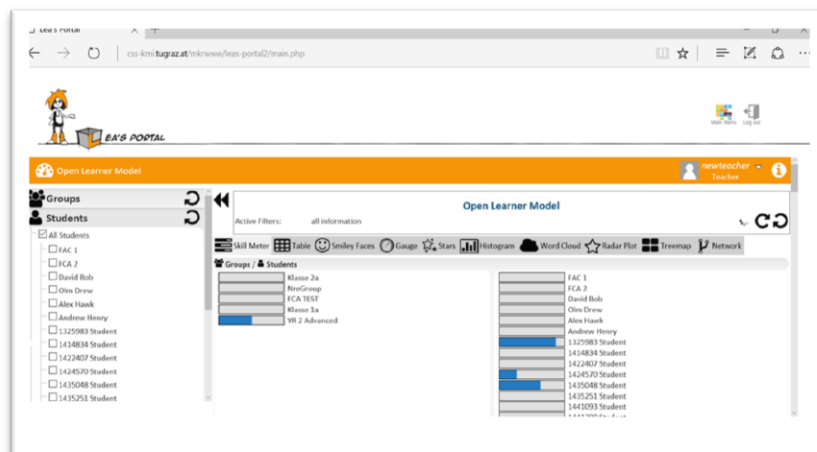
SETTINGS MODULE

The new release includes an improved, extended and fully integrated configuration tool. Using this tool, users can not only set up the students, student groups (classes), learning subjects, and competencies, in the new release also activities and external tools can be specified. This allows a comparably easy mechanism to link external tools to the system in order to gather data for analyses. A detailed manual for the usage of the configuration tool is attached as an external annex to this document.

An important new development in Y2 concerned a module to register external data sources with the system. Via the configuration tool it is now possible to link external data sources (e.g., a learning app or learning management system), define activities (e.g., a specific quiz), and link these with the competencies and competence models held by the system. In addition, we re-defined the system API to allow external tool push data into the system. The call is defined as:

http://css-kmi.tugraz.at/mkrwww/leas-portal/api/pushin.php?
secrettoken=X&studentid=X&datasourceid=X&activityid=X&value=X&minvalue=X&maxvalue=X

The parameters required are a secret token (provided by the project), which is necessary for security reasons, the identifiers of the data source, and the activity, a value (e.g., aa test score) and a minimum and maximum value to define the possible range of values. By this means, the system subsequently can interpret various data types, for example percentages, Boolean values, or open values such as the time on task.

FCA TOOL

An entirely new feature of the second release is the module to perform FCA (Formal Concept Analyses) tasks. While we had an external, early version of the tool, it is now an integral part of the system. There are three versions available, one that displays the concept lattice for competencies over evidences in the system, competencies over activities, and competencies over students. A detailed description is attached in the external annex to this document. In principle, this tools allows teachers to identify certain clusters of learners, their activities, and third competencies (as described in detail in D2.2 and the key pedagogical questions).
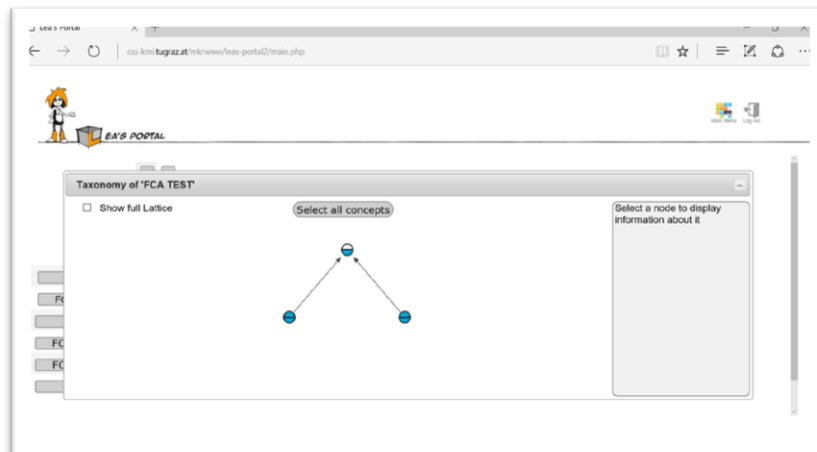
INFORMATION TILES

In addition to the core functionalities, the new system provides tiles for access further information and help. The Info tile leads to background information of the project, the help tile grants access to all manuals of the (internal) tools. In addition there is a contact tile and a link to the projects Facebook site. This site (/LeasLearning) is a very active hub of recent information about Learning Analytics and an easy way to get in touch with the project.

MYCLASS 3

An integral part of LEA'S web platform still is the myClass3 tool. It's tailored to the concrete demands arising from the focus group work with our partner school in Graz, Austria and also (even with a slightly different look 'n feel) our partner school in Stuttgart, Germany. This version is intended to facilitate an easy tracking of learning performance, the related analyses, and an individualized reporting of results. The tool has been described in the previous deliverables.
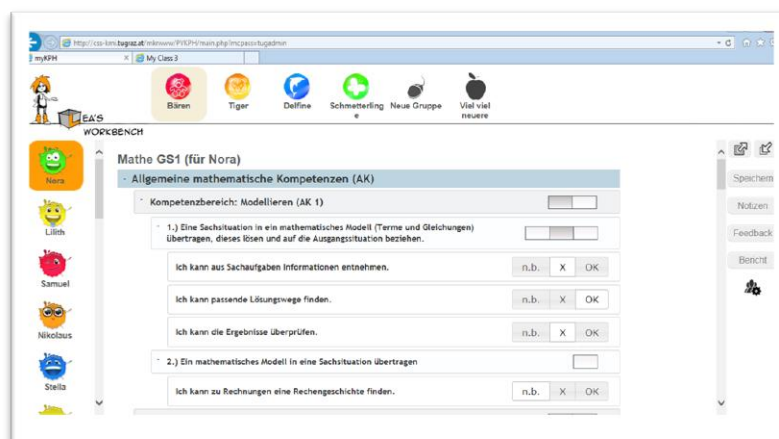
A significant extension was to provide the teachers with a tailored configuration tool (based on the modules of the system), that allows the school to use the system in an autarkic manner, independent from the project. Also, the schools host their system on an external, independent server. The features include the configuration of students, classes, subjects, competence models, teachers, indicial groups for certain projects. In addition, there is also a database backup function (teachers / editors were instructed to make backups of the database whenever they perform major changes with the tool to avoid any loss of data).
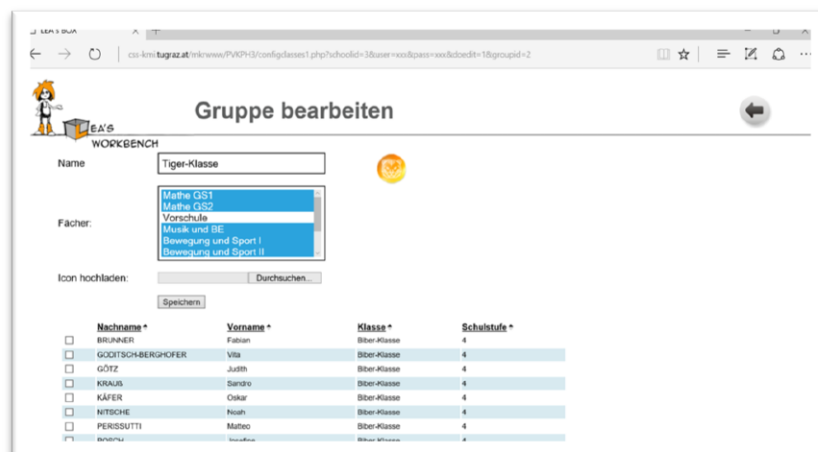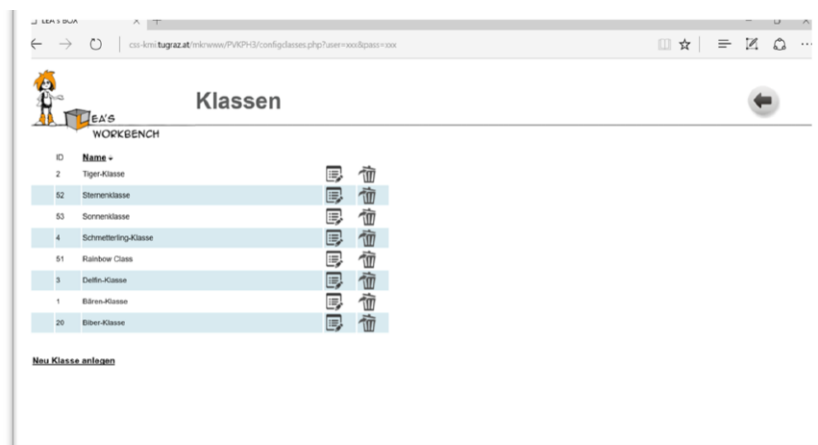

DATA STRUCTURE – RELOADED

A, on the first sight simple, task is to define a data architecture that is capable of handling all the demands of various internal and external tools. A particular difficulty lies in the heritage of OLM and myClass. Both are integral parts of the system, however, conceptual different. In addition we have to accommodate the demands from external tools and administrative needs of users-. Thus, we had to further advance the data architecture (in comparison to the second system design document).

Perhaps, this architecture is one of the most precious outcomes of the project. The following image illustrates the recent version:
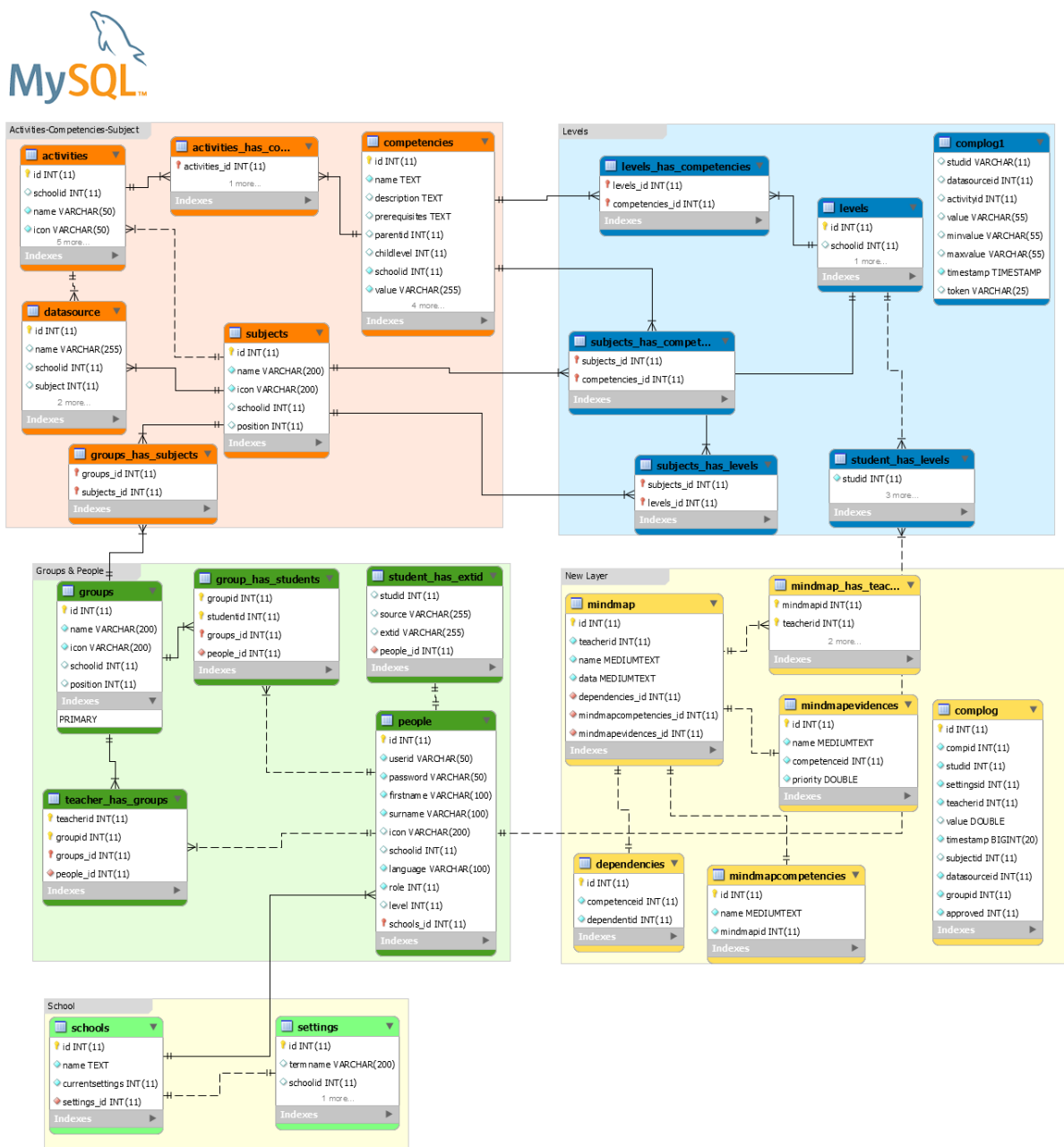
It shall be highlighted that in addition to the complexity of data that must be stored by the Lea's Box system, to meet all the requirements, we also have to think in terms of analytics. Many analytics and many data sets are computationally extremely demanding. This means, that a data warehouse approach must be included to account for the analytics that often must be done in real time. Consequently, the data architecture for performance data and evidences links to a "data warehouse". The principle idea is that performance data are stored redundantly in forms that match the analytics that are called by the users. For example, the data are stored aggregated and summarized over certain time intervals so that analyses and visualization can be realized in a highly performant way. The following figure illustrates the linked data warehouse approach:
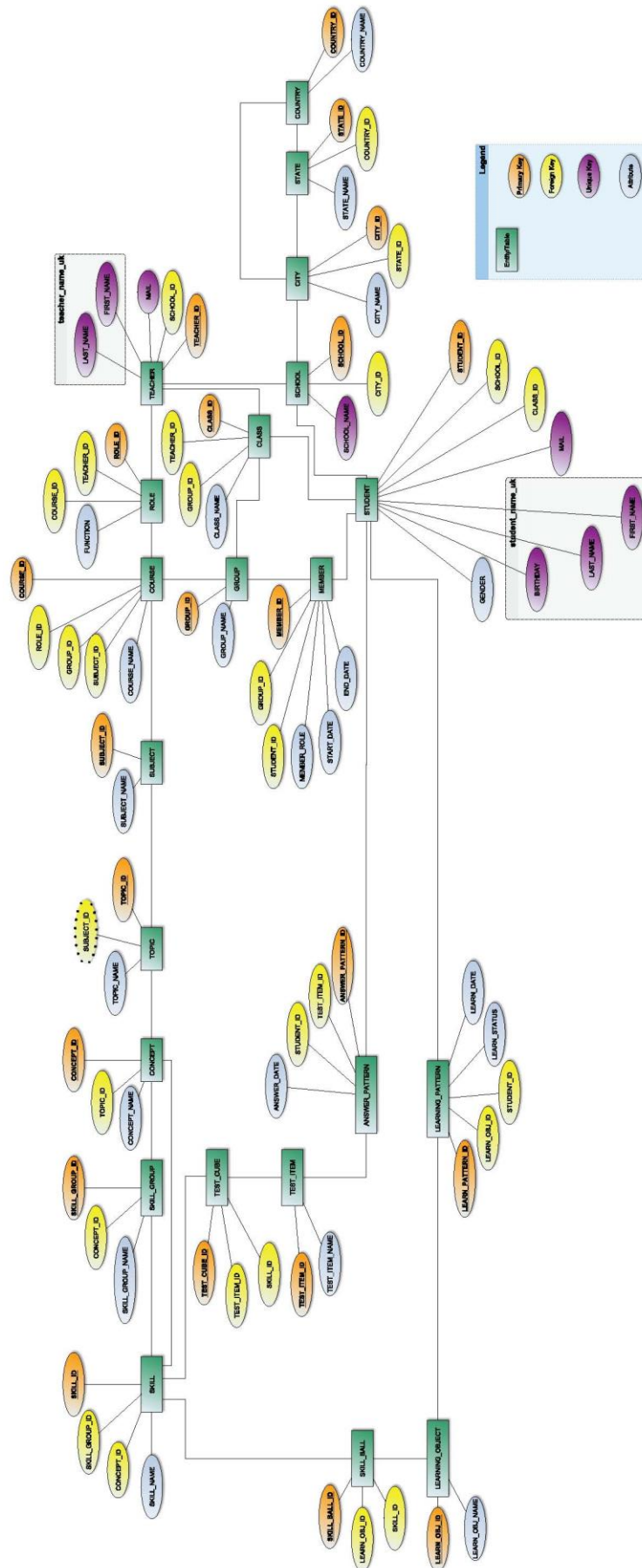
OUTLOOK

In year 1, we developed and released the base functionality. In year 2 we substantially revised the system and the tools on the basis of all our experiences with teachers and users. This includes the rich exchange with teachers also outside the design studies and focus groups, for example in teacher workshops or other events like conferences. What we have in M22 is a quite complete system that fulfills the basic ideas of the project.

Some aspects, however, are still matter of research and further studies. Particularly, the APis to the system (the Lea's API and the attempt to use TinCan as a general standard) are not fully complete and better solutions must be found. In particular the highly complex data structure raises demands for non-trivial and innovative solutions. At the end of year 2 we will present some feasibility use case studies to demonstrate to real usage of the Lea's Box system with external tools.

In the remaining project duration our main emphasis lies on making the system, as presented here, stable and "really" usable for educators, even with certain limitations and demands on configuration efforts. In addition, we will step by step fill the system with further features and, in the end, with live.

EXTERNAL ANNEXES

Attached to this deliverable document is a Zip archive containing the new software manuals, namely:

- A manual for the configuration tool
- A manual for the OLM
- A manual for the FCA tool