LMS for Internal Training at Kentico

Master’s Thesis

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Brno, Fall 2016
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Hereby I declare that this thesis is my original authorial work, which I have worked out on my own. All sources, references, and literature used or excerpted during elaboration of this work are properly cited and listed in complete reference to the due source.

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Acknowledgement

I would like to thank my advisor doc. RNDr. Tomáš Pitner Ph.D. for all the help with this thesis. My big thanks also goes to Mgr. Zuzana Flašková for the time she spent helping me and her endless patience. Last, but not least, I want to thank my family and my girlfriend for supporting me.
Abstract

The aim of this Master’s thesis is to analyse business processes and software tools used for internal training in Kentico. The next goal is to define requirements for a learning management system in Kentico internal training, find systems which meet criteria and compare them to each other as well as to the learning management system currently used in Kentico and to choose the best one. Suitability of learning management systems is also verified in usability testing. Thesis also contains suggested and implemented changes for internal training in Kentico.
Keywords

internal training, e-learning, learning management system, lms, Kentico, xAPI
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1 Introduction

Proper training of employees is important and necessary in every company. Internal training nowadays is being managed with use of information technologies as they help it to be more transparent and effective. In order to fully use potential of support software systems, one must configure them correctly and set up business processes that will be both understandable and useful to people involved in them.

In this thesis we examine software tools and business processes used in internal training of Kentico and we look for ways to improve it.

In the first chapter we describe Kentico, its internal organization and how its internal training currently looks like and works. We also describe what is learning management system.

In the second and third chapter, we focus on software tools and business processes used in internal training. We describe them and the way they are used in Kentico.

In the fourth chapter we define roles in internal training and requirements for learning management system in Kentico.

Based on gathered information we choose in chapter five learning management systems and we analyse them according to identified needs. We also execute usability testing with Kentico employees in order to assess usability of selected learning management systems.

Finally in the sixth chapter we propose enhancements to internal training in Kentico.

1.1 Kentico Software s.r.o.

Kentico is software company developing web content management software. It helps clients create successful websites, online stores, community sites and intranets using Kentico integrated marketing solution.

It has offices in the United States, United Kingdom, Australia, the Netherlands and Czech Republic and more than 1000 partners in 80 countries. Its main office is located in Brno, Czech Republic.

Since its founding in 2004, the company has been steadily growing and number of its employees is increasing (Figure 1.1). From one
employee it grew to forty-five employees in 2009 and reached one hundred employees in 2013. Three years later in 2016 the number of employees has doubled and Kentico currently employs two hundred people.

Increasing number of employees lead to more complex organization and deficiency of solutions for internal training which worked when the number of employees was in small numbers. To handle this situation more systems for internal training have been purchased but organization remained organic, without any defined processes or methods.

Now when company reached two hundred employees it became necessary to analyse internal training and to automate it as much as possible. It also became much more challenging to distribute information to all employees at the same time.

1.2 Departments organization

Employees in Kentico are organized in teams. Each team belongs to department by its line of work and departments are further organized
into five groups (Figure 1.2). Company is lead by Chief Executive Officer who is in the case of Kentico also the owner.

1.2.1 Administration

Administration group is supervised by Chief Administrative Officer. It consists of four departments:

- Human resources department oversees recruitment, training and development of employees. It is also responsible for company’s compliance with labour code.

- Office CZ department takes care of all tasks associated with administration of company office in the Czech Republic. It manages company facilities and infrastructure. This department also manages relations with universities.

- Office US department takes care of office administration in United states of America.

- Finance department ensures financial stability and financial legal compliance of the company.

1.2.2 Operations

Operations group is the biggest one. It is directed by Chief Operating Officer and focuses on software development, management and support. This group includes five departments:

- Development department is supervised by Development director and consists of teams that develop products. There are one or more teams per product. Each team consists of people of different specialization: software developers, testers, technical leaders, technical writers and scrum masters. There are also two special teams. First one is Research and development which consists of specialists focused on security and testing automation. The second one is Kentico academy and its purpose is to create opportunity for students to do internship in Kentico and later become regular employees.
1. Introduction

- Product management department doesn’t have any teams. Its members are product managers and product owners of individual products.

- Internal services department manages hardware and software infrastructure. The head of the department is Internal services director. There are two teams in this department:
  
  (a) Internal team is responsible for development, management and support of internal software. It also develops systems integration and automation. Employees in internal team are developers and testers similarly to teams in development department. Main difference is the fact that customers of internal team are Kentico employees from other departments.
  
  (b) IT team manages all servers and computers including operating systems and accessories used by employees, computer networks, email and computer account. They also provide support for other employees.

- Customer success department specializes in assisting customers with Kentico products. It is managed by Customer success director. There are five teams in customer success department:
  
  (a) Customer success management CZ oversees customer success operations in Czech Republic office.
  
  (b) Customer success management US oversees customer success operations in United States of America office.
  
  (c) Support team is divided into Support CZ and Support US groups by their geographical location. Support engineers assist customers with technical problems in products and delegate information to development teams.
  
  (d) Training organizes training about products for customers and company partners.
  
  (e) Consulting helps companies better understand customer experience, which is the way customer use product and services from their perspective.
1. Introduction

- User experience department is directed by UX leader. It focuses on improving experience users have with Kentico products.

1.2.3 Marketing

Marketing group helps with promotion of product and gaining new customers. It is managed by Chief operations officer.

- Direct team communicates directly with potential customers and organizes one on one product demonstrations.

- Channel team targets partners. Partners are companies creating websites for their clients using Kentico products, thus helping Kentico generate revenue.

- Cloud team manages marketing for cloud products.

- Webpro team is responsible for managing main company website http://www.kentico.com and other related websites.

1.2.4 Sales

Sales group is being overseen by Vice president for global sales. Teams in sales department are defined by their geographical location of interest. There are three of them:

- Sales NA (North America),

- Sales EMEA + SA (Europe, Middle east, Africa and South America),

- Sales APAC (Asia and Pacific).

Each team is further divided into work groups by territories. Each work group consists of Territory sales manager, Account executive and Account manager.

There is also sales operations team which specializes in order processing and communication with internal team.
Figure 1.2: Departments organization
1.2.5 Summary

In this section we described simplified organizational structure of Kentico. It showed us challenges of internal training as it is necessary to ensure education and knowledge sharing of people from various teams, with different technical knowledge and also from different countries.

1.3 Scrum

Software development teams which have the most employees use Scrum for project management. We will describe it in greater detail as it focuses on self-organization and therefore influences the way in which internal training works.

Scrum is an agile framework for managing complex projects while productively and creatively delivering products of the highest possible value.

There are three essential roles in Scrum:

- Product owner represents customer’s interests. He has final authority in prioritization of tasks and requirements questions.

- Scrum master is a facilitator for the team and Product owner. He doesn’t directly manage team but rather helps to remove barriers between development and product owner so that product owner directly drives development. He is also responsible for keeping information about team’s progress up to date and available to all parties. Scrum master should also focus on improving team’s performance by facilitating creativity, improving engineering practices and tools.

- Development team in software development is usually mix of software developers, architects, testers, etc. The team has autonomy to choose how to best meet the goals, and is held responsible for them.

In Scrum product owner creates a prioritized wish list called Product backlog. During Sprint planning development team takes tasks from top of backlog and decides how to implement them. Development team has a certain amount of time called Sprint which lasts thirty
days or less to complete its work. Team meets every day to assess its progress at meeting called Daily scrum. The Sprint ends with a Sprint review during which development team presents results to product owner and sprint retrospective where Scrum master discusses with the team what went well and what to improve in the future [1].

1.4 Current state of internal training in Kentico

Internal training in Kentico has not been previously organized in systematic manner and all teams handled their training in their own way. Some teams used software tools while others relied on direct communication.

There are many groups of employees within company which company needs to target with specific training. For example, there are employees with the similar role in development teams (Figure 1.3). As shown in Subsection 1.2, there are also teams in different countries which should share knowledge.

Figure 1.3: Development roles distribution
1. Introduction

One of the main company policies is transparency, therefore general information should be shared to everyone in the company.

Internal training and knowledge sharing became more difficult to execute as company grew and it needs enhancements in order to be effective.

1.5 Learning management system

A learning management system (LMS) is a software application for the administration, documentation, tracking, reporting and delivery of electronic educational technology (also called e-learning) courses or training programs [2].

Learning management systems range from systems for managing training and educational records to software for distributing online or blended/hybrid college courses over the Internet with features for online collaboration. Colleges, universities, school districts, and schools use LMSs to deliver online courses and augment on-campus courses. LMSs also act to augment the lessons the teacher is giving in a brick and mortar environment, not just replace them. Corporate training departments use LMSs to deliver online training, as well as to automate record-keeping and employee registration.

1.6 E-learning standards

According to ISO, standards can be defined as documented agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics, to ensure that materials, products, processes and services are fit for their purpose [3].

For systems to interoperate they need to know how to process data structures they share [4]. Without standardization each system would rather expect others to adapt to its data structure.

Four major advantages of developing a standard in the field of e-learning are [4]:

- Durability - no need for modification as versions of system software change.
• Interoperability - operability across a wide variety of hardware, operating systems, web browsers and learning management systems.

• Accessibility - ability to locate and access learning content from anywhere and anytime.

• Re-usability - possible modification and use by many different development tools.

1.6.1 SCORM

Shareable Content Object Reference Model (SCORM) is a set of technical standards for e-learning software products established in 1999. Originally it was envisaged by the government of the USA as they had problems with lack of interoperability of different learning management systems. Some of the problems included wrong results, content duplication and poor coordination [5].

Advanced Distribution Leaning (ADL)\textsuperscript{1} team was drafted by the department of defence to put SCORM together. It was also supported by industry specialists and partners. Commercial enterprises also started to abide by these standards, which lead to their widespread usage today [6].

1.6.2 Experience API

The Experience API\textsuperscript{2}, also called xAPI and formerly called Tin Can API, is a new e-learning specification designed to support the learning community in standardizing and collecting both formal and informal distributed learning activities [7].

This API captures data in a consistent format about a person or group’s activities from many technologies. Very different systems are able to securely communicate by capturing and sharing this stream of activities using Experience API’s simple vocabulary.

Experience API is continuation of SCORM standard, which is no longer being developed [8].

\begin{footnotesize}
\begin{enumerate}
\item https://www.adlnet.gov
\item experienceapi.com
\end{enumerate}
\end{footnotesize}
1. Introduction

The core component of xAPI is Learning Record Store (LRS) which receives, stores and returns data about learning experiences, achievements and job performance. There are also tools and systems called activity providers which generate data about learning experiences and send them to LRS \[9\].

Learning Record Stores are usually stand alone products including a range of analytic and reporting features. They can also be incorporated into an LMS. Different Learning Records Stores can communicate with one another \[10\].
2 Software for internal training

Several software tools are being used to support internal training. Our goal is to analyse them and the way they are used in Kentico.

2.1 TalentLMS

TalentLMS\(^1\) is learning management system provided as a cloud service. It allows to organize learning materials into courses and their assignment to users. We will describe it in greater detail later in this thesis (Section 5.1).

It is important to point out that Kentico uses TalentLMS for both internal and external training. While they both use the same TalentLMS instance as primary learning management system, their requirements are different. Examples of such differences are user creation and data access management as described in following paragraphs.

Internal training needs to have user accounts for all Kentico employees and provides most of the courses in a form of course catalogue from which employees can choose themselves. In terms of information covered in these courses, there are internal details which should never be made public.

External training on the other hand provides courses to customers for a price. User account for customer is only created after the specific course is paid for and there is no freedom of choice from available course.

These requirements are hard to fulfil in a single environment with shared settings.

2.2 Confluence

This collaboration system created by Atlassian\(^2\) is used for many different purposes in Kentico (2.1). It primarily serves as internal data storage for company as it allows to store information in organized manner and supports searching through them. In Kentico all employ-

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1. available at https://www.talentlms.com
2. available at https://www.atlassian.com/
ees have access to most of the documents except ones specifically set as private by author.

Figure 2.1: Confluence

Confluence\(^3\) is organized into workspaces. Every user has his own workspace and there is also a workspace for every department in the company. The workspace is further organized into pages containing information. Pages can reference both other pages and external sources.

Employees of each department are responsible for their workspace and there are no common rules on how information should be further categorized or how often it should be updated. Because there are a lot of pages written by many people with different styles it can be rather difficult to find specific information unless one is provided with direct link to information or the information he is looking for is contained in a title of the page.

Since most of the internal information is stored in Confluence and all employees are working with it every day, some departments in Kentico choose to use it for internal training instead of the learning management system.

\(^3\) available at https://www.atlassian.com/software/confluence
2. Software for internal training

2.3 Skype

Skype\(^4\) is a program for instant communication currently owned by Microsoft\(^5\). Kentico uses Skype as its main communication software. It provides individual instant messaging as well as chat groups. It is also possible to make video calls and conference calls. All features including storing history are provided for free. It is easy and fast to use and it is used across the whole company. It is therefore naturally also used for fast knowledge sharing. Mainly team chat groups are place where valuable information is being shared. It could be however greatly improved by storing this information in a more organized fashion. While it is very good to share knowledge with co-workers through Skype, there are some limitations to this kind of use.

Information is only available to people currently present in the conversation. While it is possible to look up information in the chat history, it is not convenient to search through hundreds of short messages. It will also not be available to people who join the company in the future.

2.4 Small improvements

Small Improvements\(^6\) by Small Improvements Software\(^7\) is a performance management system. It allows giving feedback to employees as well as self-assessment by employees.

In Kentico it is used to support self-development and assessment of employees.

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4. available at https://www.skype.com/
5. available at https://www.microsoft.com
6. available at https://www.small-improvements.com
7. available at https://www.small-improvements.com/contact
2.5 Instructor.cz

Instructor.cz\textsuperscript{8} is an online solution for health, safety and fire-fighting training courses which are mandatory for employees. It is provided by company PREVENT\textsuperscript{9}.

\textsuperscript{8} available at \url{http://www.instructor.cz/}
\textsuperscript{9} available at \url{http://www.prevent.cz}
3 Internal training processes

In this section we analyse business processes of internal training in Kentico. In order to better describe them, we use Business Process Model Notation 2.0 (BPMN2) [11] diagrams as well as detailed text description. To show what tools are being used for each task we state them following the task’s name in brackets.

3.1 Creating account in TalentLMS

When a new employee is hired, there are multiple internal systems he needs to access. Some of that are created for him but the most important for internal training is the TalentLMS account, which employee has to create himself based on an invitation he receives from HR specialist. The HR specialist then has to add him to correct user groups and enrol him to courses based on his position.(Figure 3.1)

3.2 On-boarding training

On-boarding is a process during which a new employee gains necessary knowledge and skills to be effective in his job. This process starts on the first employee’s day and it consists of various training activities (Figure 3.2).

3.2.1 Basic employee training

Basic employee training is the first training each new employee takes after he joins the company. Since employees usually join the company on the first day of the month, it is usually organized for all of the new employees at once. This training is lead by human resources specialist. The HR specialist describes to the new employees the basics: how attendance system works, what are their duties and rights, shows them the office and introduces them to their respective teams. This training consists of a theoretical presentation as well as practical illustrations. All of the information shared through this first on-boarding meeting are also available on Confluence.
Figure 3.1: TalentLMS - account creation
3. Internal training processes

3.2.2 Basic computer training

During basic computer training employee sets up his work computer, installs all the necessary programs and investigates functionality of the internal systems. He follows instructions written on paper provided to him but he can also ask his colleagues for help when needed.

3.2.3 Health safety, fire-fighting training and driver’s training

These three trainings are organized in an external system instructor.cz. It provides courses required by law. After course completion, the employee is issued a certificate of completion.

3.2.4 Company history and departments

This series of presentations familiarizes the new employee with the company, its history and structure. The goal of this training is to teach the new employees the vision and strategy of the company as well as to show them what is the role of each department in the company.

Each presentation is available in TalentLMS as a separate course with a short test at the end. All the new employees are enrolled to these courses and they are expected to pass through them after pre-
sentations. However, participation in these courses is currently not monitored in any way.

### 3.2.5 Position training

This is a position-specific training each new employee needs to pass through. For example there are different specific training sessions provided for a new developer or a new sales representative. This kind of training usually consists of introductory explanation to processes and tasks typical for given position which are supported by a specific documentation and instructions.

### 3.2.6 Team training

Training specific for employee’s team. This is a highly specific training and depends solely on team’s focus. For example, in Internal team it includes familiarization with internal systems, source codes and all duties of an Internal team member.

### 3.3 Senior promotion test

Promotion test takes place when employee wants to be promoted to a senior position, for example from a developer to a senior developer (Figure 3.3). This process is completely manual and it is very time and labour intensive as we show in detailed description.

![Figure 3.3: Senior promotion test](image-url)
3. Internal training processes

3.3.1 Employee initialization

Process starts when employee informs his manager that he would like to take senior test in order to be promoted. There are also other requirements that need to be met by employee to be promoted, however they are irrelevant in scope of this process.

3.3.2 Employee preparation

Employee is provided with learning materials consisting of questions from previous senior tests. These are stored in the Confluence system. He then proceeds to prepare himself for similar kind of questions.

3.3.3 Test assembling

New senior test is assembled by director of development from combination of question from questions used in previous tests and new ones that he comes up with (Figure 3.4). Questions consist from both test and open answer questions as well as practical assignments.

3.3.4 Test execution

Employee takes test by writing down his answers on a paper in a given time limit. This includes test questions. Test needs to be supervised by qualified person and therefore must take place when both employee and supervising person have enough time during their working hours.

3.3.5 Evaluation

Evaluation is done personally by a director of development and is completely manual. It is time consuming and can get postponed considerably by a lack of time to perform evaluation. Results are not stored anywhere with exception of final decision about promotion.

3.3.6 Informing employee

Employee is informed about his results and has one chance to consult his results before they are destroyed. As there can be a considerable delay between test execution and evaluation, it is also likely employee
3. Internal training processes

Figure 3.4: Senior test assembling
will not remember his answers or justification for them. This can complicate results consultation.

3.4 Knowledge sharing - product release

Knowledge sharing take many forms and happens every day. It can be among closely cooperating employees as well as rarely communicating departments. One example that takes place regularly is a knowledge sharing between developers and support engineers when new version of product is released.

To be able to provide support to customers support engineers first need to learn about new features and changes from previous versions themselves and accommodate with them (Figure 3.5).

![Figure 3.5: Knowledge sharing - product release](image)

3.4.1 Formal presentation

When a new version of product is released developers who worked on it create formal presentation for support engineers. They present all changes and new features in the product and ways how to deal with basic problems.

3.4.2 Preparation for test

After presentation support engineers are expected to prepare for a test by studying presentation that is available in learning management system as well as getting accustomed to the system by trying it out.
3.4.3 Test execution

After they gain required knowledge about the new system, support engineers must take the test in order to prove their knowledge. If support engineer fails the test he must repeat process of learning and take it again.

3.5 Knowledge sharing - Momentum

Monthly in Kentico there is an all hands meeting called Momentum where the Chief Executive Officer and heads of departments present current state of the company including financial state and plans for the future to employees. This event is important for transparency in company and also gives employees space to ask questions or raise concerns.

After the event itself presentation with all information is uploaded to TalentLMS by an HR specialist as a new course and all employees are enrolled to it (Figure 3.6). This process is currently time intensive because there is not automation and all employees must be enrolled one by one.
Figure 3.6: Momentum - creating course
4 Learning management system requirements

In this chapter we define requirements for a learning management system based on needs of internal training in Kentico.

4.1 Roles identification

Employees participating in internal training have different roles which affect their needs and requirements. We identified following roles in Kentico internal training:

- **Administrator**
  A person responsible for administration of learning management system. This includes graphical interface, user accounts, system notifications and other settings affecting system globally (Figure 4.1).

- **Content creator**
  His responsibility is course management. He creates new courses, populates them with learning materials and assigns them to user groups or specific users (Figure 4.2).

  Content creator is also responsible for continuous improving of his courses. He analyses course statistics and user feedback and updates content or course flow if necessary.

- **Learner**
  Learner can choose courses from catalogue or can be enrolled by his manager or content creator. He can view learning materials and attend his courses (Figure 4.3).

- **Manager**
  Manager is learner’s supervisor responsible for managing his training. His main concerns are what courses is learner has enrolled to and if he completes them in a required time frame (Figure 4.4).
4. Learning Management System Requirements

Figure 4.1: Use case - Administrator
Figure 4.2: Use case - Content creator
Figure 4.3: Use case - Learner
Figure 4.4: Use case - Manager
4.2 Functional requirements

The Functional Requirements Specification documents the operations and activities that a system must be able to perform [12].

- **Course management**
  Course is the way to organize related content so it can be easily found and studied by a learner. Content creators and managers should be able to assign students to courses and if necessary restrict access to them. It should be possible to present course in a way that is easy to navigate and orient in. Automated tests should be an optional part of the course to validate student’s understanding of content.

- **User groups management**
  It should be possible to organize students into groups based on their profession. This can be further used to assign relevant courses to whole group of students easily. For example course about programming could be easily assigned to all developers in company.

- **Reporting**
  System should provide reports about various things such as performance of students, popularity of courses or a number of visits during period of time.

- **System notifications**
  System should be able to send notifications preferably in a form of emails to users. The behaviour of when a user will be notified should be fully customizable. For example manager might want to be notified when student does not finish mandatory course in certain time frame or student might want to be notified about a new course assigned to his student group.

4.3 Non-functional requirements

Non-functional requirements are requirements that specify criteria that can be used to judge the operation of a system, rather than specific
We identified following non-functional requirements for learning management system in Kentico:

- **Usability**
  Learning management system should be easy to use and navigate for all users [14].

- **Availability and system response**
  System will be used by users for all around the world and it needs to be available seamlessly to all employees without a difference.

- **Sandbox environment**
  There should be a sandbox instance of learning management system available for administrators to test system customizations before publishing them to production instance.

- **Implementation support for developers and administrators**
  There should be support provided to company’s developers and administrators to ensure smooth deployment of learning management system.

- **Customizability and reconfigurability by non-IT personnel**
  Most of configuration of a system should be easy enough for non-IT administrators and users to manage it themselves.

- **System branding capabilities**
  It should be possible to customize appearance of learning management system in order to use company’s branding in it. This will help with integration of system and employees will be easily able to identify that the system is a part of systems used by the company.

- **Data model extensions**
  Data model provided out of box by learning management system may not have everything company wants to track. Since for example it may be not targeted directly at internal training, there can be some feature missing that the employees will need. The learning management system needs to provide an option to internal developers to program it itself in the first place. This
can be corrected by company’s developers but system must allow it in the first place.

- **Third party systems integration**
  Seamless integration with other company’s systems is very important as there as already many different computer systems company has in use. Not only would this burden internal team that will be responsible for managing learning management system from technical point of view but it would also be bad for all employees as they would have yet another system with a new pair of credentials to remember.

- **Well described and documented API**
  In order to utilize API (application programming interface) developers need to be able to understand how it works and how to use it. This serves to help automation of business processes and integration of internal services in company.
5 Learning management system selection

Based on requirements we defined in previous chapter we analysed available learning management systems. We tried them in trial versions and took part in their demonstration sessions by sales persons from individual companies.

In this chapter we analyse and describe key functionalities of four of them which met requirements the best and we compare them to each other. We also describe and evaluate usability testing which we performed with employees of Kentico.

5.1 TalentLMS

TalentLMS\(^1\) is a learning management system provided as cloud service provided by Epignosis\(^2\). In Kentico it is used for both internal and external training and has been in use for two years.

- **Course management**
  It is very easy to create new course in this system using simple form. Courses can be organized into categories which help with their management. One course can be listed only in one category at a time.

  It is possible to expose course to all users of a system in a course catalogue so they can enrol for it themselves. It is also possible to hide course and enrol users manually.

- **Creating content**
  TalentLMS has built-in content creating capabilities. Course consists of units which can be built separately directly in the system.

  There are multiple types of units that differ in a way they present information. There is for example content unit for a simple plain text. This type allows the user to write content with a help

\(^1\) available at [https://www.talentlms.com](https://www.talentlms.com)
\(^2\) available at [https://www.talentlms.com/contact](https://www.talentlms.com/contact)
5. Learning management system selection

of WYSIWYG\textsuperscript{3} editor. Web content unit is intended for html pages and there are also video, audio and flash pages for their respective data types.

Part of the unit types are also built-in formats test, assignment and survey which allow content creators to easily include interactive testing in their courses.

Every unit must define a way in which learner completes it. It can be with a check box, with a question or after a period of time. Without fulfilling this requirement user won’t be allowed to proceed to another unit of the course.

TalentLMS also supports SCORM and Experience API standards. Content in these formats can be imported into course and used as part of it. It however cannot be imported as a separate and self-contained course.

- **User management**

  There are four types of users available: Learner-Type, Trainer-Type, Admin-Type and SuperAdmin. It is also possible to define new types based on existing ones. All types with exception of SuperAdmin can be customized and their system permissions adjusted.

  SuperAdmin represents super administrator of the system and has all available attributes and permissions in a system. It cannot be modified in any way.

  The system itself is split in a views based on default user types. For example trainer can choose to view a course as a learner or as an instructor. In each view there are different information and options available.

- **User groups management**

  Users can be organized into groups. Courses then can be assigned to whole groups, however, this system doesn’t work very well as it doesn’t automatically enrol all members of a group and one must do it manually for all of them. Only real difference

\textsuperscript{3} WYSIWYG - What You See Is What You Get. More available at \url{http://whatis.techtarget.com/definition/WYSIWYG-what-you-see-is-what-you-get}
from user categories is that one user can be member of more than one user group at the time.

- **Reporting**
  It is possible to generate various reports for users, courses, groups and other entities in a system. They include summary graphs and text information and can be exported in Excel format. It is not possible to generate report in automated way through API.

- **System notifications**
  There are email notifications announcing events such as account creation or expiration of a course. List of triggering events is set and there is no support for custom events.

  There are also actions which are basically set combinations of a triggering event and an action in a system which follows. For example ‘On course X competition assign course Y’. There are only 10 actions available and their usability is very low. It would be much better if actions where not associated with triggering events.

  It is enough for basic notifications but it doesn’t allow more complicated automation.

- **Availability and system response**
  System is cloud based and therefore available with internet connection. System response is good and there are no significant problems.

- **Sandbox environment**
  It is possible to create sandbox environment with a use of branching capability of system. A branch is a subsystem with its own set of users, courses and settings. Users and courses can be members of multiple branches.

- **System branding capabilities**
  TalentLMS can be customized by choosing visual theme, page logo and colours. It is also possible to customize it using CSS language.
5. Learning management system selection

- **API**
  TalentLMS provides RESTful API\(^4\) and also Experience API. There is an online documentation available for both of them. Both APIs are secured with basic authentication and are disabled by default to prevent attacks.

- **Data model extensibility**
  It is possible to create a custom field for user and course entity. One can choose if they are mandatory or not, they can be hidden away from learners, visible on reports and branch specific.

- **Pricing**
  TalentLMS offers standard and unlimited pricing plans. With the standard plan there is a limit to number of registered users. When this limit is reached no new users can be registered (Figure 5.1).

![TalentLMS Pricing Plans](http://www.talentlms.com)

**Figure 5.1: TalentLMS standard pricing plans**

Unlimited plan allows registration of an unlimited number of users. The price is based on a number of different users that login to learning management system each month. After the limit of active users for moth given by specific plan is reached there is an additional fee of $4 per every user login over limit.

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5. Learning management system selection

Pricing plans are further divided by a number of allowed users to Free, Small, Basic, Plus and Premium.
There is also a difference when paying annually or monthly. With the annual subscription one gets a discount.
Kentico is currently paying $199 per moth for Standard Plus plan with annual pricing.

5.2 Docebo

Docebo is a cloud based learning management system.

- **Course management**
  A course management in Docebo is very similar to the one in TalentLMS. To create new course one has to fill a simple form providing name and description. There are also course categories, which can be organized hierarchically. Settings for a course are split into three different pages without an apparent pattern. For example to change a category of a course one must enter Advanced settings of a given course.

- **Creating content**
  Docebo is more focused on importing new content and not creating it inside learning management system directly.
  It supports SCORM as well as Experience API content. These however need to be created in an external authoring tool. There is also an option to upload a file or a video which can be downloaded by learners.
  Content which can be created directly in the system consists of HTML pages, tests and surveys.

- **User management**
  By default there are only two types of user roles available: User and Super admin.
  User is a basic role type. He is able to view courses and training materials and he is unable to manage system functionality.

---

5. available at [https://www.docebo.com](https://www.docebo.com)
Super admin on the other hand can manage every aspect of learning management system. All features and settings are visible to him and there is no way to limit Super admin’s permissions.

There is also the third user type which can only be used with a paid plug-in installed. This role is called Power User and his permissions are configurable. There are however some limits to this reconfigurability. For example Power User cannot be given permissions to manage branding settings of a system or to manage Power User type.

- **User groups management**
  User groups in Docebo allow us to organize users. One user can be in multiple groups at the same time. It is possible to enrol whole group to a course.

  It is also possible to organize users into hierarchical branches. This allows us to model company’s organizational chart more precisely then user groups.

- **Reporting**
  There are reports for users and courses available as well as custom reports which can be configured by a user. Built-in reports can be downloaded in PDF format and custom reports can be exported as XLS, CSV or HTML file. It is possible to schedule report creation to specific time and date. Reports can also be obtained through API.

- **System notifications**
  Notifications are not built-in and can be obtained as plug-in. Triggering actions for notifications are plentiful but only available action is sending an email to a defined email address.

  During our testing the notification plug-in stopped working few times.

- **Availability and system response**
  Docebo is provided as a cloud service and it is therefore available with internet connection. System response is good but during our testing various pages stopped working reporting Internal server error.
5. Learning management system selection

- **Sandbox environment**
  It is not possible to create a sandbox instance without buying another license.

- **System branding capabilities**
  One can customize Docebo learning management system by changing logo, favicon\(^6\), colour scheme and page title. It is also possible to customize main page.

  However in order to completely re-brand the system and hide Docebo products advertisements and marketplace one must buy *White labeling* plug-in.

- **API**
  Restful API provided as a free plug-in offers manageability of all system entities as well as some special actions as statistical information and reports.

- **Data model extensibility**
  It is possible to create custom fields for a course and user entity. One can also select type of custom field for example plain text, date or country with Docebo providing related values. It is also possible to choose whether custom field is mandatory and configure visibility for user.

- **Pricing**
  Price list is separated into two categories (Figure 5.2).

  Small and medium business is organized by a number of active users and can be paid either monthly or yearly. This kind of subscription contains learning management system hosted on shared servers with limited help desk support. All plug-ins must be paid for in addition to the base system.

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\(^6\) Favicon also known as website icon is a file containing one or more small icons associated with a particular website.
5. Learning management system selection

Figure 5.2: Docebo pricing

When paying yearly there is a two months discount. For Kentico with two hundred users it would cost $530 per month or $5300 when paying yearly.

The other category is titled enterprise and contains individual hosting of learning management system in location chosen by user. One also gets priority in help desk support and six weeks of consulting lectures. All used plug-ins are for free for enterprise users.

Enterprise subscription has individual pricing. For Kentico this was set to $26,000 per year.

5.3 aNewSpring

aNewSpring is learning management system created by company also named aNewSpring from the Netherlands.

- Course management
  
  In aNewSpring one must first create a template for a course. Template is at first in development stage and one can add content to it or change its properties like name and description. Template is then moved to published stage by its creator.

---

7. available at http://www.anewspring.com
After template has been published, courses can be created based on it. Multiple courses can be created from a single template and they will all be displayed in courses administration view under it. This allows us to create multiple courses with different settings but exactly the same content as the only way to change it is to change the template which is shared.

• **User management**

There are eight user types in aNewSpring.

*Tenant* role is available to the user who created the learning management system. Only a user in tenant role can edit some system settings, for example environment theme. Tenant can give tenant permissions to another user.

*Administrator* manages learning environment, but has less rights then the Tenant role.

*Author* can create, import and export course content.

*Designer* can create learning journeys from an existing content. The Administrator has to grant access to the content libraries he/she has to use in order to make a learning journey. If a Designer is also an Author, he can also create content via the course template.

*Instructor* is a role for someone who is coaching learners. He can view courses as learner, view reports and statistics and adjust several course settings.

*Mentor* is a third party person that can check the effort and progress of the learners.

*Student* is the one that follows the course. His options are totally depending on the setting the Designer and the Administrator have set for his or her course.

*Reseller* manages the catalogue and access codes for students. With the access codes the students can gain access to courses.

• **User groups management**

User groups management is hidden and cannot be accessed
from main menu. One has to navigate through user management and then select specific group which is confusing. Users cannot be members of multiple groups at the same time.

- **Reporting**
  System provides advanced reporting options with predefined report templates as well as option to create a custom report with custom filters.

- **System notifications**
  There are built-in email notifications which are triggered by various actions, for example when a new account is created. While it is possible to change email templates, one cannot disable notifications individually or change recipients.

- **Availability and system response**
  During our testing we experienced several blackouts and error messages informing us about internal system failure. They occurred on a several different pages during various actions.

- **Sandbox environment**
  There is not built-in support for sandbox environment and it would require separate system.

- **System branding capabilities**
  System allows user to change any colour used in the system as well as logo image.

- **API**
  System supports restful API as well as webhooks\(^8\). Restful API covers basic manipulation with users, groups and courses. Web-Hooks can be used instead of built-in email notifications to trigger actions in external systems.

- **Data model extensibility**
  It is not possible to extend data entities with custom content.

\(^8\) A WebHook is an HTTP callback: an HTTP POST that occurs when something happens.
5. Learning management system selection

- Pricing
  In aNewSpring system one pays for every learner subscribed to a course. As soon as a learner is subscribed to a course the license is activated and grants the learner access to their course(s) for one year. Licenses that are not activated remain valid indefinitely.

  Price for one learner is 24 €. There are also bundles which offer better price per learner (Figure 5.3)

<table>
<thead>
<tr>
<th>LEARNERS</th>
<th>BUNDLE PRICE</th>
<th>PRICE PER LEARNER PER YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>€ 2,700</td>
<td>€ 18 per learner per year</td>
</tr>
<tr>
<td>300</td>
<td>€ 4,500</td>
<td>€ 15 per learner per year</td>
</tr>
<tr>
<td>1200</td>
<td>€ 14,400</td>
<td>€ 12 per learner per year</td>
</tr>
<tr>
<td>2400</td>
<td>€ 21,600</td>
<td>€ 9 per learner per year</td>
</tr>
<tr>
<td>6000</td>
<td>€ 36,000</td>
<td>€ 6 per learner per year</td>
</tr>
</tbody>
</table>

(Source: http://www.anewspring.com)

Figure 5.3: aNewSpring pricing

5.4 LearnUpon

LearnUpon\(^9\) is online learning management system in a form of cloud service developed and managed by company which is also called LearnUpon. It is on a market since 2012.

- Course management
  LearnUpon features very basic course management. Course has name and short description but not much else.

---

\(^9\) available at https://www.learnupon.com
• **Creating content**
  You cannot create content directly in LearnUpon system and you have to import it. Supported format include Word, pdf, PowerPoint, Prezi, video, audio, text and images. LearnUpon also supports SCORM and xAPI standards.

• **User management**
  There are four user types available within LearnUpon: administrator, instructor, manager and learner. Only administrator role is able to change system settings. Access rights for individual roles cannot be changed and one cannot create new user types.

• **User groups management**
  Users can assigned to user groups, however one user can only be in one group at the time. Group management is complicated as it is not possible to filter users of a specific group.

• **Reporting**
  LearnUpon comes with pre-configured reports all of which can be exported to Excel or pdf. Available reports include course status, training history, credit, exam, survey and sales reports. One can also schedule reports to run automatically on a daily, weekly or monthly basis.

• **System notifications**
  Only type of notification provided by LearnUpon is course reminder notification to learners. Text of this notification can be customized and you can set four reminders per course, so for example learners will be notified forty, thirty, twenty and ten days before course expires. This notification system is however insufficient as it lacks more triggering events.

• **Availability and system response**
  LearnUpon is provided in cloud and is available with internet connection. System response during our testing was good with minor drop-outs.

• **Sandbox environment**
  It is not possible to create sandbox environment without buying another license.
5. Learning management system selection

- **System branding capabilities**
  LearnUpon allow administrator to customize logo and system colours. One can also customize login page.

- **API**
  System supports restful API as well as webhooks. Using API it is possible to create users, enrol them in courses or extract user and course data from the system.

- **Data model extensibility**
  It is possible to extend user and course entities with custom fields. They can also be used in reporting or view filtering.

- **Pricing**
  There are two main pricing categories: annual pricing and monthly pricing. Annual pricing provides better prices per month.

  Pricing plans are further divided by number of allowed users and number of provided services to Starter, Bronze, Silver, Gold, Platinum and Enterprise.

  The best fitting pricing plan for Kentico with two hundred users would be Bronze for 300 € per month.

(Source: [http://www.learnupon.com](http://www.learnupon.com))

**Figure 5.4: LearnUpon annual pricing**
5. Learning management system selection

5.5 Usability testing

Usability testing is a technique used to evaluate design of system by testing it on users. This gives us direct input on how real users use the system [15]. Usability testing focuses on measuring a human-made product’s capacity to meet its intended purpose. We measure ease of use of a specific object or set of objects.

We prepared scenarios based on use cases for roles in the internal training. We also took into account remarks of users of users who are involved in managing internal training.

All tests took place in a controlled environment with learning management system prepared and populated with necessary data. Every test was done with only one user and one learning management system at the time.

We asked testing users to comment on everything they do. We also asked them to rate ease of use of a system for given scenario on a scale from one to five, where one means hardly usable and five means excellent. At the end of testing session users also rated on the same scale learning management system as a whole.

We chose testing users for every scenario based on their role in the internal training.

5.5.1 Scenario 1

User creation and assignment to user group. This use case is very common as it takes place every time new employee joins the company. Primary roles for this scenario are administrator and manager.

- **Instructions:**
  1. Create a new user named Test Test with email address test@test.ts.
  2. Create a new user group called testers.
  3. Add the user Test to this group.

- **Results:**
  All users completed this scenario in all systems. Users commented on problems with navigating to the correct section for
5. Learning management system selection

user management in Docebo, LearnUpon and aNewSpring systems. We can see the score results for scenario 1 in Figure 5.1.

<table>
<thead>
<tr>
<th>User 1</th>
<th>User 2</th>
<th>User 3</th>
<th>User 4</th>
<th>User 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>TalentLMS</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Docebo</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>aNewSpring</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Last</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 5.1: Scenario 1 results

5.5.2 Scenario 2

Ability to create a new course and assign users as well as whole user groups to it. Primary roles for this scenario are content creator and manager.

• Instructions:
  1. Create a course named Test course and assign it to testers group.
  2. Assign the user Maros K (already present in a system) to this course.
  3. Set end date of this course to 31.5.2016.
  4. Allow users to access course even after end date.
  5. Set yourself as a teacher of this course.

• Results:
Users had problems with this scenario in TalentLMS. Button with title Assign to group doesn’t enrol all members of the group but creates relation between them. This is highly unintuitive. Docebo and aNewSpring both have possibility to assign course to group only from user group management which is also not user friendly and all users spent a long time looking for it. Course management in LearnUpon was too basic and didn’t cover all requirements like expiration prolonging setting. It was also
5. Learning management system selection

unintuitive and users made many mistakes creating simple course.

Score results for scenario 2 are in Figure 5.1.

<table>
<thead>
<tr>
<th>User</th>
<th>TalentLMS</th>
<th>Docebo</th>
<th>aNewSpring</th>
<th>LearnUpon</th>
</tr>
</thead>
<tbody>
<tr>
<td>User 1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>User 2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>User 3</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>User 4</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>User 5</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 5.2: Scenario 2 results

5.5.3 Scenario 3

Create automatic notification triggered automatically by event taking place in learning management system.

- Instructions:

  1. Create notification, which will send an email to all learners and teachers of the course Test course 3 days before it expires.

- Results:

  Users had no problem completing this scenario in TalentLMS. Process to create notification in Docebo is not straight forward and users got stuck trying to define triggering condition correctly.

  aNewSpring doesn’t contain any built-in notification system with user interface.

  LearnUpon doesn’t have global notification system but has a support for course expiration notifications.
5. Learning management system selection

<table>
<thead>
<tr>
<th></th>
<th>TalentLMS</th>
<th>Docebo</th>
<th>aNewSpring</th>
<th>LearnUpon</th>
</tr>
</thead>
<tbody>
<tr>
<td>User 1</td>
<td>5</td>
<td>4</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>User 2</td>
<td>5</td>
<td>3</td>
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<td>User 3</td>
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<tr>
<td>User 4</td>
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<td>-</td>
<td>4</td>
</tr>
<tr>
<td>User 5</td>
<td>5</td>
<td>4</td>
<td>-</td>
<td>3</td>
</tr>
</tbody>
</table>

5.5.4 Scenario 4

Create a report regarding users and courses and interpret them.

- **Instructions:**
  1. Find what courses is user Test Test subscribed to and what is his current progress in them.

- **Results:**
  All systems have good reporting capabilities and they all fulfil requirements. Negative comments were all connected to personal preference of how should be reports presented and not to reporting functionality itself.

5.5.5 Scenario 5

Send a one-time mass email to set of users.

- **Instructions:**
  1. Send a mass email to all users in the group testers and inform them about the new course Test course you created.
5. Learning management system selection

- Results:

Usage of macro expressions to represent system variables in emails in *aNewSpring* was unclear and confused users.

<table>
<thead>
<tr>
<th></th>
<th>TalentLMS</th>
<th>Docebo</th>
<th>aNewSpring</th>
<th>LearnUpon</th>
</tr>
</thead>
<tbody>
<tr>
<td>User 1</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>User 2</td>
<td>5</td>
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<td>4</td>
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<tr>
<td>User 3</td>
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<td>User 4</td>
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<td>3</td>
</tr>
<tr>
<td>User 5</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 5.4: Scenario 5 results

5.5.6 Overall usability

The most commented shortcoming of *TalentLMS* was a lack of intuitiveness of actions. This includes position of buttons or naming of actions. While main page was considered to be highly organized and clear by all users, navigation between different sections of the system was confusing and they were often coming to a main page in order to navigate themselves.

Navigation was also criticized in *Docebo*. The navigation panel on the left side with pop-up sections confused users as would select wrong section of a menu while moving the mouse to an actual page. Also positioning of buttons and links made it hard for users to find them.

Overall users identified *Docebo* as the most complicated of all tested systems.

*aNewSpring* is primarily designed for providing e-learning to external users and not internal training. This showed in processes which were often not in line with internal training requirements and made it feel not straightforward to users.

*LearnUpon* the most criticized learning management system from the four tested ones. Users didn’t like it visually as well as functionally.
5. Learning management system selection

<table>
<thead>
<tr>
<th>User</th>
<th>TalentLMS</th>
<th>Docebo</th>
<th>aNewSpring</th>
<th>LearnUpon</th>
</tr>
</thead>
<tbody>
<tr>
<td>User 1</td>
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<tr>
<td>User 2</td>
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<tr>
<td>User 3</td>
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<td>User 4</td>
<td>5</td>
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<tr>
<td>User 5</td>
<td>4</td>
<td>2</td>
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<td>2</td>
</tr>
</tbody>
</table>

Table 5.5: Usability testing - overall results

Based on our research and usability testing with Kentico employees we decided to keep TalentLMS as the learning management system in Kentico because it meets the best specified requirements from all tested systems.
6 Proposed enhancements

To make an internal training more effective and useful we propose following enhancements.

First, we describe changes to TalentLMS as a learning management system for internal training in Kentico, which will make it more user-friendly and automated.

The second section describes enhancements to the internal training processes, which we analysed in Chapter 3.

The last section is focused on content creation for internal training with specialized software tools and industry standards.

6.1 General enhancements to TalentLMS

TalentLMS has been selected as the most suitable learning management system for internal training in Kentico. During our research we identified several areas in which it can be improved. This section describes all implemented and suggested changes to TalentLMS and the way it is used in Kentico.

6.1.1 Separation of concerns

We split TalentLMS into two instances, one for internal training and the other dedicated to external training. This way they can have different settings suitable for their use and also they don’t share data about users and courses so there is no potential risk in revealing internal information to external users.

6.1.2 Sandbox environment

One of non-functional requirements for a learning management system for internal training in Kentico was a sandbox environment. Such environment is used by internal developers, when they are implementing some functionality for the learning management system to their code. Sandbox environment should have the same settings as production instance, but should only contain testing data.
To satisfy this requirement we created a separate branch inside of the internal training TalentLMS instance to serve as the sandbox. This provides internal developers with environment for testing purposes without risk of unintentionally modifying production data.

6.1.3 System notifications

We reviewed and adjusted system notifications in TalentLMS based on requirements from HR department. Following notifications have been deployed:

1. Email notification to a learner three days before course he is enrolled to expires.

2. Email notification to a learner when a new course is assigned to him.

3. Email notification to an instructor when a course expires.

4. Email notification to a user after an account has been created for him.

These notifications still only cover basic needs of internal training in Kentico and will be expanded with specific notifications, for example to a manager when a learner fails mandatory course, in the future as a part of automation of internal training in Kentico.

6.1.4 Single sign-on

TalentLMS provides a possibility to use single sign-on (SSO). In short, single sign-on is the ability for a user to authenticate once to a single authentication authority and then access other protected resources without re-authenticating [16].

We discussed the possibility of deploying single sign-on with Kentico internal team responsible for internal services and as the result single sign-on in Kentico is currently planned for the future as a part of automation and integration of internal training into internal services. Once deployed it will provide employees with an easy access to internal systems including TalentLMS and Confluence.
6. Proposed enhancements

6.1.5 .NET Framework library for TalentLMS REST API

Automation of processes and integration of internal systems today is very important for effective work in companies. In order to save manpower and time they try to automate processes and share data between systems as much as possible.

We created C# class library to allow easy usage of REST API provided by TalentLMS to allow further automation of internal training and better integration with internal systems in Kentico. We used C# programming language and .NET Framework as they are mainly used in Kentico.

The library contains all methods of TalentLMS REST API with entity classes which allow easier manipulation of data.

To demonstrate implemented functionality we created console application DemoApplication, which is included with the library. It uses library to perform basic retrieval operations provided by TalentLMS REST API.

Source codes of the library and console application are attached to this thesis. Set-up guide and description of the TalentLmsRestClient library and DemoApplication are available in Appendix A.

6.2 Internal training processes enhancements

Enhancements in this section are directly improving processes we described in chapter 3.

6.2.1 Creation of a user account

Since there is a new instance for internal training only, we were able to simplify account creation process to the point where a new employee is only required to change his password at first log-in for safety purposes. This process can be seen in Figure 6.1.

This process should be removed completely in the future, once the single sign-on functionality of TalentLMS is used. User data will be provided automatically from company domain accounts. This will lead to better automation and less human work will be required.
6. Proposed enhancements

6.2.2 On-boarding

There are already courses in TalentLMS covering parts of on-boarding training. They cover company history, departments introduction and company’s strategy.

They should be definitely expanded to cover information from the basic employee training (Subsection 3.2.1). This information is available on Confluence, however, it would be better for new employees to have all basic information in one place.

Other courses should be created for a different position to make sure all employees starting at specific positions share the same level of necessary knowledge. For example developers are supposed to follow coding standards. These are currently only available on Confluence.

With all on-boarding information available in TalentLMS, we can then set-up notifications to new employees in order to remind them about courses as well as HR specialists if new employee doesn’t complete on-boarding courses in given time frame.

Figure 6.1: TalentLMS - reworked account creation
6. Proposed enhancements

6.2.3 Senior tests

We propose a way to organize senior tests with use of learning management system.

Employee preparation for senior tests can be supported with course which will contain all information about requirements for position employee is trying to achieve. This way a learner can track his progress for himself and his supervisor. Preparation course can also contain exemplary test with subset of questions used in a real test.

TalentLMS provides great support for creating and executing tests. Tests can be created as a part of the course content directly in TalentLMS (Figure 6.2). There are five types of questions:

- **Multiple choice** consists of a number of items that pose a question to which learner must select an answer from among a number of choices.

- **Fill the gap** shows a learner sentences with missing words, which he must fill in.

- **Ordering** shows a learner a number of item which must be then ordered correctly.

- **Drag and drop** shows two groups of items. A learner must identify pairs of related items from both groups.

- **Free text** lets a learner to answer the question in his own words. They can be evaluated automatically based on specific words used in the answer. Alternative to this is assignment page which is always evaluated by an instructor.
6. Proposed enhancements

Figure 6.2: TalentLMS - Test options

There is also an option to create randomized question which chooses different question from pool of questions. Option to import question supports Aiken and GIFT (General Import Format Technology) formats. Use of these formats allows questions to be portable between different systems.

The Aiken format is a very simple way of creating multiple choice questions with a single correct answer in a clear human-readable format and user-friendly to work with [17]. Example of Aiken format is on Listing 6.1.

**What is the correct answer to this question?**
A. Incorrect Option 1
B. Incorrect Option 2
C. Incorrect Option 3
D. Correct Option

**ANSWER: D**

Listing 6.1: Multiple choice - Aiken format

GIFT is a more advanced format that supports multiple choice, fill the gap, drag and drop and free text question types [18]. Example of drag and drop question in GIFT format is in Listing 6.2.
Match the capitals {
  =England  ->  London
  =Germany  ->  Berlin
  =Greece   ->  Athens
}

Listing 6.2: Drag and drop - GIFT format

Having the test results in a learning management system further allows us to provide better analysis and reports. They can be also reviewed easily in the future.

6.2.4 Knowledge sharing - product release

Sharing knowledge about new product release could be enhanced in the same ways as senior tests by publishing it in TalentLMS. With ability to create tests, assignment, monitoring and reporting capabilities it is the best tool for the job.

A course with information about a new product release could also serve as information source for other departments.

6.2.5 Knowledge sharing - Momentum

The biggest issue with this process is enrolling all employees to course in TalentLMS.

While there is option in course management to add course to the user group (Figure 6.3), it doesn’t behave as one might expect. This action is not the same as enrolling all users in a user group to a course. Instead it is designed to create relation between course and user group to control which users can see and self-assign to the course. To actually enrol user to a course one has to do it for every user separately.

This becomes a problem when there is a need to enrol huge number of users to a course. Example of this is creating Momentum course which we described earlier in Section 3.5 in which we need to enrol all employees of Kentico. Enrolling users one at a time in this case is very time consuming.

To solve this problem we can use function of TalentLMS called Mass actions. First, we assign course to a user group as we described earlier in this section. Then we go to groups administration and we
6. Proposed enhancements

choose group to which we assigned the course. We switch view to Users tab. We then choose option Enrol users in group courses under Mass actions button (Figure 6.4). This action will enrol all members of a group to all courses assigned to it.

6.3 Content creation

Courses created for internal training are currently only imported presentations or simple pages created in TalentLMS.

To make courses more manageable for administrators and interesting for learners it would be much better to use e-learning content authoring tools.

When it comes to technology, e-learning content authoring used to be dominated by Adobe Flash\textsuperscript{1} technology which is being replaced by HTML5\textsuperscript{2} [19].

\begin{itemize}
\item \textsuperscript{1} Adobe Flash Player is the standard for delivering high-impact, rich Web content. More information at http://www.adobe.com/software/flash/about/
\item \textsuperscript{2} HyperText Markup Language (HTML) is the standard markup language for creating web pages and web applications. More information at http://www.w3schools.com/html/html5_intro.asp
\end{itemize}
6. Proposed enhancements

There is a number of tools available [20], for example Adobe Captivate [3], Elucidat [4] and Articulate Storyline [5]. There are also open source alternatives like H5P [6].

Course created in professional authoring tools also allow use of e-learning standards SCORM and xAPI.

6.3.1 Use of Experience API

TalentLMS contains implementation of LRS (described in Section 1.6.2) and also supports xAPI enabled content. It also allows to generate reports form xAPI data directly in system. TalentLMS refers to Experience API with its older name Tin Can. This can lead to confusion when researching a topic, because newer documents use solely the name Experience API or an abbreviation xAPI.

There is also built-in support for pushing xAPI statements to an external LRS. If this option is enabled in system settings, all received xAPI statements are immediately re-send to specified LRS. Since Expe-

4. available at https://www.elucidat.com
5. available at https://articulate.com/360/storyline
6. available at https://h5p.org/
rience API uses standard HTTP methods, any system able to process xAPI statements can be used in place of external LRS. This allows for custom real-time notifications to be send from TalentLMS as well as much better automation of processes.

All information exchanged in Experience API are sent as xAPI statements. Statements are serialized in JSON (JavaScript Object Notation)\textsuperscript{7} format. The most basic statement consist of three parts: an actor, a verb and an object (Listing 6.3).

\begin{verbatim}
{
    "actor": {
        "name": "John Smith",
        "mbox": "mailto:JohnS@mail.com"
    },
    "verb": {
        "id": "http://adlnet.gov/expapi/verbs/experienced",
        "display": { "en-US": "experienced" }
    },
    "object": {
        "id": "http://example.com/activities/example-activity",
        "definition": {
            "name": { "en-US": "Example Activity" }
        }
    }
}
\end{verbatim}

Listing 6.3: xAPI statement

Use of this standard in content creation would therefore allow better reporting, better integration with external learning activities taking place outside of learning management system and portability of information.

\textsuperscript{7} more information at \url{http://www.json.org/}
7 Conclusion

In this thesis we described Kentico and its organization. Then we analysed internal training in Kentico and described business processes and software tools used for internal training. We identified problems and areas which could be improved.

We gathered requirements for a learning management system and searched for available learning management systems. Then we chose ones which met requirements the best and compared them to each other. We also organized an usability testing with Kentico employees to learn their opinion about each system’s usability.

From our comparison and usability testing we concluded that best suited learning management system for internal training in Kentico is already deployed TalentLMS.

We also provided improvements and suggestions how to improve business processes in internal training as well as work with TalentLMS.

Finally we suggested how to create better content for internal training with a use of authoring tools and e-learning standards.

Further research can be done for content authoring tools to decide which are the best suited for Kentico. Also propagation of internal training courses and motivation of employees could be improved with use of techniques like gamification and internal marketing. Finally we suggest researching how Experience API can help with evaluating and improving internal training.
Bibliography


A TalentLmsRestClient library for .NET Framework

We created .NET class library for TalentLMS REST API as a part of TalentLMS enhancements for internal training in Kentico.

A.1 Requirements

- Library requires at least version 4.5.2 of .NET Framework.

- Administrator access to TalentLMS instance. If you don’t have TalentLMS instance available, you can create free account at https://www.talentlms.com/create. Free pricing tier of TalentLMS allows up to five registered users and up to ten courses. It should be sufficient for testing purposes.

- Active REST API in TalentLMS is required with API endpoint url and security token.

In order to activate REST API and obtain url and token:

(a) Log in to your TalentLMS instance as Administrator.  
(b) Navigate to Account & Settings page from main menu. 
(c) Navigate to Security section in Basic settings. 
(d) Make sure Enable API check-box is enabled. Here you can also see security token for API (Figure A.1).

1. Required user type is called SuperAdmin. It is different from Admin type, which doesn’t have required access rights to modify system settings.
A. TalentLmsRestClient library for .NET Framework

A.2 Library structure

Library contains documented interface ITalentLmsService which contains signatures of all available methods. These methods are mapped to REST methods provided by TalentLMS. Methods themselves are implemented in TalentLmsService class. Library also contains entity classes for TalentLMS entities like user, course or branch. TalentLmsException represents error returned by TalentLMS API in case of invalid request.

A.3 DemoApplication

We also provided sample console application in order to demonstrate functionality of the library.

A.3.1 Setup

Application requires API endpoint url and security token from TalentLMS. You must provide it in DemoApplication.exe.config file in TalentLms section.
A.3.2 Functionality

When run with correct *API endpoint url* and *security token* it will print information about TalentLMS system including: number of users, number of courses and number of groups. Optionally it will print information about user with provided email address (Figure A.2).