SlideWiki: towards a collaborative and accessible platform for slide presentations

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SlideWiki - Towards a Collaborative and Accessible Platform for Slide Presentations

Abstract. OpenCourseWare platforms for open education resources have the potential to open new horizons for knowledge sharing and e-learning by reaching learners beyond the constraints of traditional learning systems. SlideWiki is a crowd-sourcing platform that aims to rethink the creation and sharing of knowledge by providing an environment where authors can collaborate, reuse, adapt and share their ideas on slide presentation tooling. The platform offers collaborative tools that will enable authors and contributors to translate the content into more than 50 different languages. As an OpenCourseWare platform, SlideWiki intends to make Open Educational Resources more accessible to different types of users, including people with disabilities and within formal and informal learning settings. To address the implementation, scalability, usability, and adoption of the platform, it has been designed and implemented in parallel to large-scale trials across Europe in many different learning settings. This has resulted in 56 trials taking place in different geographical regions, organizational units, and institutions, covering different teaching and learning scenarios. The experiences and feedback from the trials have influenced the redesign of SlideWiki related to accessibility and openness. This paper will discuss findings from the large-scale trials and how it influences SlideWiki technical redesign. This exemplifies how other online learning systems can incorporate user feedback into the technical development process to improve accessibility and collaboration.

1 Introduction

A major obstacle to increase the efficiency, effectiveness and quality of education in Europe and developing countries is the lack of widely available, accessible, multilingual, timely, engaging and high-quality educational material which can be adapted to suit the needs of local educators and learners. OpenCourseWare (OCW) systems provide educational materials in an openly licensed web-based platform that host Open Education Resources (OERs) where they can be reused and re-purposed. OERs are defiend as free resource with permission to engage with the 5R that define OERs: the right to Retain, Reuse, Revise, Remix and Redistribute[1]. Improving the availability and adoption of OERs is seen as an important step in the UNESCO Education 2030 plan [12].

OERs are increasingly popular with the MERLOT collection[2] hosting over 40,000 from over 250 providers. However, the uptake of OERs remains low due in part due to the limited availability of effective OCW platforms. In particular, collaborative content creation and reuse of materials remains difficult while the majority of resources are only available in English.

SlideWiki is an open, web-based OpenCourseWare authoring platform that aims to provide an open and accessible platform to create and share qualitative, rich and engaging educational content following the 5R principles of OERs. The platform allows

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[1] http://opencontent.org/definition/
[2] https://www.merlot.org

educators to create, edit, translate and reuse HTML slide presentations complemented with comments, links to sources and supporting materials as well as questions to help learners. As well as hosting open content, SlideWiki[3] uses an open-source code base to encourage others to contribute to the project as well as contributing back to the open source community.

The first version of the platform (SlideWiki 1.0) was first launched in 2012 [1] and won the OpenCourseWare Consortium's Excellence Award in 2014. While this platform has collated thousands of slides and acquired a user-base with the open educational community, it would require further development to reach its potential and become a sustainable open-source platform for online education.

In 2016 a EU H2020 grant was awarded for SlideWiki redevelopment and execution of large-scale pilots in SlideWiki as a collaborative OpenCourseWare authoring platform. This provided an opportunity to redevelop the SlideWiki platform in a user-centered project as well as develop, collate, and trial open educational resources covering a wide range of topics and educational levels to boost adoption of the platform. Through adopting a user-centered design approach where "development proceeds with the user as the center of focus" [11], it is possible to consider the needs of OCW users - whether they are content authors, educators reusing content or learners consuming learning materials. Due to the large range of learning environments, training providers and countries that may use an OCW platform, large-scale trials were required to capture the wide and varied experiences of users. The project utilizes agile development processes in combination with long-term trials to provide opportunities for educators and learners to influence the development process as well as evaluate the platform.

In this paper we discuss, how the large-scale trials have helped to develop a collaborative and accessible OpenCourseWare platform and discusses how this process can enrich the development of open learning technologies, particularly for those interested in creating open resources.

The remainder of this paper is organized into five sections. Section 2 discusses research into the requirements for successful OCW platforms and how they have influenced the main objectives of the SlideWiki project. Section 3 introduces the SlideWiki platform, its main components and features. Section 4 describes the projects trials and how they evaluate the platform. Section 5 presents results from the trials' evaluations. Finally, section 6 discusses how the large-scale trials and their evaluations have contributed to the objectives of the SlideWiki project and draw conclusion that may aid future projects.

2 Requirements for successful OCW platforms

While OCW platforms and OER repositories already exist, their widespread adoption remains limited. A number of studies have considered how the presentation of OERs in these platforms could affect the use. Vahdati et. al. [13] undertook systematic analysis of 100 courses and revealed the following weaknesses:

1. **Legal re-usability**. The majority of the courses do not provide open license which requires restrict reuse of the content.

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[3] https://slidewiki.github.io/

2. **Multi-linguality**. English is the original language of the vast majority of the courses and 12 out of 100 courses were originally offered in languages other than English.
3. **Format re-purposeability**. Most of the courses are only available in PDF, thus preventing true re-usability.
4. **Recency**. Only one third of the courses in this study have been updated in the recent two years.
5. **Learning by self-assessment**. Self-assessment material to aid learning were only provided by half of these courses .
6. **Community Involvement**. Only 20% of the courses were the result of collaborative authorship.

Research by Jung et al [9] also highlighted the importance of providing OERs in a format that could be reused, revised and remixed to match individual teaching and learning needs and that the content must be of high quality and up to date. Hence, it was important that the re-development of the SlideWiki platform facilitated collaborative creation and re-usability of content, supported multi-lingual content and offered tools that help with engagement and with the resources to collaborate, re-mix and re-use content.

In order to address these needs, the project identified four main objectives:

Objective 1. Implement real-world, large-scale trials in different geographical regions, including public and private educational institutions (universities, training centers), business, community and grassroots initiatives, large education providers as well as vocational training providers. The variety of participants also encourages collaboration in the creation of inclusive and engaging open content for learning and teaching.

Objective 2. Create a body of OERs that reduced the restrictions of time and physical space on learning and teaching. OERs must also be accessible on a range of devices including mobile and tablets.

Objective 3. Foster greater connection between formal and informal learning by integrating with social networks, learning analytics and learning mashups. This includes assistance for didactics and instructional design by helping to select and re-use material that has been created for a certain purpose and successfully used by others in a similar context for a group of learners or individuals.

Objective 4. Ensure the platform is accessible to all and offers inclusive learning opportunities to support children and adults with physical, sensory and cognitive disabilities and impairments who undergo general education, lifelong learning or vocational training.

3   The SlideWiki Platform

The SlideWiki platform uses slides format to represent OERs, as slide presentations provide a comprehensive mean for demonstrating knowledge in a short, concise, and illustrative form. Slides are grouped together into a *deck* that represents an educational resource. Authors can import existing slide presentation in PowerPoint or Open presentation format. They can also attach slides from decks they or other authors have created. A deck may also contain sub-decks to assist with organizing materials. A sub-deck may be created by the same author or could be an existing deck created by someone else

that they have attached to their own deck. Decks can be grouped together in Playlists. A Playlist could consist of decks in a course, at an event or on a related topic.

The features of the platform are targeting three types of users: authors who create and edit content; educators who reuse and remix content and learners who consume and interact with content. Figure 1 illustrates the main features of the platform. Decks can
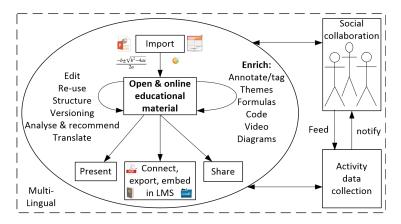

Fig. 1: Overview of SlideWiki features

be viewed by any user without signing-in, where the user can navigate between slides (as illustrated in Figure 2) or they can display slides in Slideshow mode, which can also be downloaded to run offline. Users can also like and share the deck on social media and download slides as PDF or other formats.

The SlideWiki platform uses a component-based architecture for implementing its functional features. The following elaborates the main components of the system:

Slide Authoring interface. SlideWiki employs an inline HTML5 based WYSI-WYG (What-You-See-Is-What-You-Get) text editor for authoring the presentation slides. This is accessible to assistive technology users and also creates accessibility-compliant content.

Change management controls. SlideWiki supports versioning of slides and decks to ensure that every authors personal revisions of slides and decks are always preserved and they can track the history and changes of the content. Decks can also be "forked". This allows authors to create their own copy of a deck to enable repurposing.

Search and Browsing interfaces. All the content on SlideWiki, such as decks, slides and users, is indexed to provide efficient search and browsing of content. Decks can also be grouped using tags and topics.

Social Interaction. SlideWiki can support social activities where users can discuss and comment on slides/decks; share slides/decks on popular social networks and rating tools to encourage participation of audience. Decks can be broadcast live to audiences through the Presentation Rooms. Users can receive recommendations of content that may be of interest based on their history and preferences.

Import and Export of slide decks. Slide decks can be imported from PowerPoint and OpenOffice formats and exported to a number of formates, including PDF, SCORM and ePub3.

Self-Assessment tools. Authors can add questions and quizzes to decks in order to encourage learners to interact with the learning content to a greater depth.

Translation of educational resources. Authors can translate existing decks into more than 50 supported languages. Once translated, the deck can be edited independently from the original one but remain linked in order that authors of translated materials receive notifications of updates to the original material.

Linked Data Interface. The platform provides an RDF-based version of the content on SlideWiki supported by a Linked Data interface which enables accessing and querying data in a machine-readable format.

Licensing. All content is licensed under the Creative Commons CC-BY-SA license. Through the change management controls, contributions and authors are tracked to allow for accurate attribution.
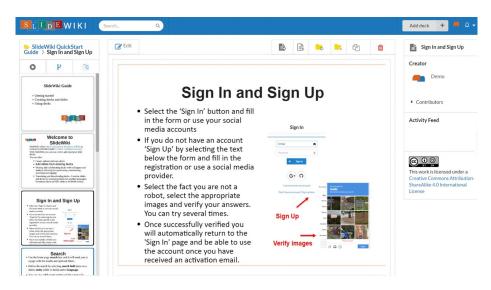

Fig. 2: A slide preview in the SlideWiki platform

Enhancing the accessibility and inclusiveness of OERs was one of the main objectives of the project. Therefore accessibility considerations have been included at all stages of design and development. The following design decisions were made to enable accessibility and inclusiveness:

1. Selecting code libraries for their accessibility and ensuring that all new features are checked against the Web Accessibility Content Guidelines (WCAG) 2.1 [5] during development.

2. Encouraging content authors to make their content accessible when adding content to slides [3]. For example, when an image is added to a slide, alt text must be provided.
3. Slide templates have been designed to assist with structuring the content to aid accessibility and reuse by ensuring that slide content is structured with appropriate headings, list and table tags.
4. Deck themes for setting background colors, fonts size and styles have been customized to match best practice for readability.

4   Large-scale trials of the SlideWiki platform

The trials have been organized into four major educational sectors: (1) Professional and vocational training, (2) Higher education, (3) Secondary education, and (4) Open community education. Forty internal three-year trials were organized by 16 project partners. An addition 16 external trials were commissioned for the final year of the project.

The internal trials were planned so that they would increase their content and audience incrementally during the three-year project. Initially the trials started with a limited number of authors who were directly involved in the project creating content before widening to include a larger set of authors, educators and learners across their organizations and domains.

In order to establish the domains of the trials, identify possible gaps, and creating clusters of trials, a categorization of the internal trials was undertaken. This was performed during a collaborative session with trial leaders which resulted in 14 dimensions for the categorization of the trials as described in Table 1.

During the second year of the trials, leaders were asked to analyze the activities they had undertaken based on this categorization. It was found that 87% of the internal trials were crowd-sourcing learning content and reusing existing materials but at the time only 56% of trials were delivering content to learners through the platform. This categorization has helped focus the priorities for the external trials.

Gathering feedback from the large-scale trials was essential to support the user-centered design approach, to enable the interface and functionality of the platform to be constantly evaluated by trial participants and users. The development team aimed to release updates every 4-6 weeks using agile development techniques, hence there was ample opportunities for feedback from the trials to influence the development of the platform. This includes influencing design, requirements and priorities as well as highlighting bugs and problems. The project put in place a variety of formal and informal mechanisms feedback to be communicated from the trials.

4.1   Informal feedback mechanisms from the trials

A feedback button was added to the SlideWiki platform and trial partners were encouraged to provide information on their experiences of using the platform directly. These messages went directly into the development team's ticketing system so could be incorporated into planning design sessions. Detailed feedback and requirements were also gathered via reports and small questionnaires, made by specific trial partners.

Table 1: Dimensions of trials' categorization

Categories	Value	% of trials
learners age	Adults (20-64)	80%
	Teenagers(13-19)	20%
Number of learners	Small groups (up to 10)	20%
	Medium-sized groups (from 10 to 59)	67%
	Large groups (60 or more)	13%
Collaborative authoring	Deck edited by one user	13%
	Decks edited by several users from the same organization	74%
	Decks edited by the community	13%
Content reuses other authors/decks	No reuse	20%
	Content reused	80%
Content will be adapted for other uses	No adaptation planned	60%
	At least one adaptation	3%
	Several adaptations planned	37%
Content breadth	One topic	30%
	Several topics	70%
Inclusive learning and accessibility	Training for people with disabilities	30%
	Training for people with and without disabilities	70%
Use in a MOOC and other open platforms	Only on SlideWiki	67%
	Other MOOCs and open platforms	16%
	Not applicable	17%
Use in an LMS and internal learning platforms	Only on SlideWiki	64%
	Embed/Link in LMS	23%
	Not applicable	13%
Interactive activities with learners	Content creation	47%
	View content only	20%
	Use of self-assessment feature	20%
	Use of comment feature	13%
Trial length	One session	7%
	One course	53%
	Several sessions	40%
Courses runs	Course runs once	7%
	2-5 runs planned/undertaken	70%
	More than 5 runs planned/undertaken	23%
Content and delivery language	English	50%
	Other languages (e.g., German, Spanish, Serbian)	50%
Learner occupation and stage of education	Secondary school	23%
	Post-secondary (graduate and undergraduate studies)	35%
	Trainees, professional, customers	32%
	Public (everyone)	10%

In addition trial leaders received a monthly online demonstration of new features with the opportunity to discuss the features with the development team. This was supplemented by reports, focus groups and meetings with trial leaders, educators and learners where their expectations, experiences and requirements when using the SlideWiki platform were discussed and presented with the SlideWiki project.

4.2 Formal feedback mechanisms from the trials

In order to gather regular, structured evaluation on the progress of the trials and the platform towards the project's goals, an online survey was distributed. This anonymous survey consisted of 23 questions. The survey was approved by the ethics committee of the participating university that oversaw the gathering of the feedback and participants had the opportunity for informed consent prior to completing the survey. The survey was distributed online in English and, where required, translated into local languages. The survey included:

– 5 background questions, including prior experience of SlideWiki and web applications.
– 8 questions on their experience of using SlideWiki. This section asks how participants used the platform and also included 3 quantitative questions to evaluate the effectiveness of undertaking tasks on SlideWiki (based on questions from the NASA Task load index [7]) and 2 questions on the usefulness and reliability of the platform. These were reported as two separate "task" and "usefulness" scores by averaging the question responses scaling out of 100).
– 10 questions consisting of the standardized System Usability Scale (SUS) [4] to provide a quantitative measure of usability and learnability of the platform.

Trial leaders were encouraged to request learners complete the survey once they have performed activities that involve interacting with the platform (not solely viewing slides). These activities could include commenting on slides, creating or editing presentations, using the questions feature, and solving problems and exercises using the platform. Authors and educators were also asked to complete the survey from the perspective of how they had used the platform to support teaching and learning activities. Survey results were analyzed at the end of each year of the project.

Due to the anonymous nature of the survey, it is not possible to analyze responses for individuals with disabilities and individual needs separately. However, as one internal trial was with learners with intellectual and neurodevelopmental disabilities and an external trial is developing materials for visually impaired users there was the opportunity for the development team to undertake specific testing with these groups to confirm their requirements were met. This was carried out by members of the project team with expertise in usability and accessibility evaluations.

Therefore the journey towards creating a collaborative, accessible, open slide platform has been supported by a range of formal and informal evaluations.

5 Trial Evaluations

In year 1, the platform was deployed as a beta version and some of the minimum requirements for teaching with the platform were not available until the end of year 1. The

survey responses reflected that the platform was mostly used for authoring by project participants, and that training was only undertaken with small numbers of learners. By year 2, many more features were available and the platform was launched for public access in the middle of year 2. Table 2 shows the number of participants, decks and slides during the first two years of the project.

Table 2: SlideWiki Authoring and Training numbers for Year 1 and Year 2

Authoring	195 Contributors 547 Decks 12, 363 Slides	**Training**	100 Educators 1, 947 Trainees

5.1 Informal feedback

The feedback mechanism built into the platform proved popular with trial partners. It allowed them to log issues, ask questions and make suggestions while they worked with the platform. In the 18 months since the platform has been launched, 777 tickets have been submitted. While sometimes duplicate tickets are received for the same issue or suggestion, this aids the development team with prioritizing of future work. However, one limitation of the feedback mechanism is that there is limited means to communicate back to users how their tickets have been addressed.

5.2 Formal feedback

During year 2, 291 respondents completed the survey and provided 614 free text comments. Table 3 summarizes survey results for the first and second years of the project. It shows the average SUS Usability Standardized Score, the Difficulty of Task Standardized Score, and a score related to the Usefulness of the platform. The results were aggregated for each educational sector.

Table 3: Summary of Trial Survey Responses. Average Scores for Year 1 and Year 2

Educational Sector	Year	N	SUS	Difficulty of Task	Usefulness
Secondary Education	Y1	5	53.5	33.4	47.5
	Y2	78	35.9	45.7	50.3
Professional and Vocational	Y1	18	57.8	51.0	51.0
	Y2	59	66.8	66.3	69.7
Higher education	Y1	6	62.5	52.6	66.7
	Y2	74	62.3	56.5	58.7
Open Community	Y1	8	53.8	27.1	53.1
	Y2	69	63.0	60.9	62.3

Professional and vocational sector In the first year of the project the professional and vocational sector reported a SUS usability score of 57.8 which increased to 66.8 in the second year. The difficulty of the task and the usefulness scores also increased between the first and second year of the trials. The trial leaders reported identified barriers particularly related to the import process in the Beta version of the platform and the preservation of the formatting when importing presentations. There were positive comments when viewing presentations pointing to the easiness of the task.

Learners in one particular trial reported high scores. On further investigation, it was found that this trial consisted of delivering training to professionals that had high technical expertise. The continued comments about the quality of the import process allow the development team to alter their plans to focus more on improving the output of the import process instead of adding support for more specialized formats.

Higher Education For the higher education and open community sectors, the SUS scores for year 1 were slightly higher than the scores in other sectors at 62.5. The difficulty of the platform use is considered neutral but usefulness was also higher (66.7). This could be a reflection that slide presentations play a key role in teaching and learning at higher eduction. Comments from authors in year 1 reported again some specific issues such as problems while importing, formatting tables, and managing images.

In year 2 the SUS score remained unchanged at 62.3. As most of the trials in the first year focused on authoring content and few of them evaluated SlideWiki on the learners side, that's why it seems there has been no improvement with respect to the average SUS score for year 1. During the second year, feedback of learners was gathered more systematically and the average SUS score rating remained nearly the same, which indicates that the authors and consumers of slides rate the system equally well, although there is still room for improvement.

While generally the higher education trials found the experience of delivering content was good, many echoed the comments of other trials about the need to improve the slide import and editing tools. This remains a high priority for the development team due to this feedback. In year 2, a number of trials demonstrated that they were able to collaboratively develop content with their peers and were starting to reuse content within SlideWiki from earlier trials. The higher education trials also identified a requirement to groups decks together which had a similar topic or were used in the same course. This feedback has led directly to the development of a Playlist feature for curating lists of decks.

Secondary Schools In year 1 the SUS score for the trials involving authors, educators and learners in secondary schools was 53.5, indicating borderline usability for the average of participants although standard deviation values indicate a wide range of responses. For secondary education, usefulness has a borderline score (47.5). The difficulty of performing a task had a score of 33.4 and comments by respondents indicated that they encountered many errors or found features were not yet available. Feedback from the teachers involved in these trials indicated they were attempting to upload an existing presentation to the platform and it took a lot of time to replicate the exact layout of their existing materials on the platform.

In the second year of the trials, the SUS score decreased to 35.9 suggesting that the usability of the system decreased. However, the SUS minimum and maximum values show that the range of responses is very wide, which indicates that perceptions of the usability of the platform were very varied. The 45.7 score recorded for the overall difficulty of the system indicates that the average of participants have found that the system is not easy to use. Further investigation into the feedback from the secondary school trials in year 2 with particularly low scores, identified that the teachers had limited time to get to know the platform and that at the time the interface had not been translated into their native language.The trial leaders reported that their participants were happy to follow the SlideWiki presentations online, but found importing or editing slides on the platform particularly difficult.

An earlier trial had involved secondary aged students who created slides in groups after following presentations on SlideWiki. The overall SUS score for this trial was higher (58.0). The comments from the learners indicated that while they enjoyed creating slides collaboratively, some found the platform frustrating as it was unfamiliar and they needed support to use it.

The school-based evaluations highlighted the difficultly with designing a complex web-application for users who may have limited experience of using online platforms. Such feedback has enabled the development team to identify where features and interfaces need to be redesigned to make them simpler to learn.

Open community sector The open community sector incorporated a wide range of informal learning settings from workshops to MOOCs and online courses. Due the nature of this approach to learning, trials encountered difficultly with gathering survey responses from all the learners that used the content. In year 1, the authors from this sector reported on average a SUS score of 53.8 which increased to 63.0 in year 2 which was in line with other sectors. However the authors reported that it was very difficult to create content with a difficulty task score of 27.1. By year 2 the task difficulty task score had increased to 60.9, demonstrating that the authors found the platform less difficult to use. There was also an increase in the score evaluating the usefulness of the slides between year 1 and 2 which demonstrates that reusing slides within a range of learning platforms was seen as valuable. However, some trials experienced difficulties with the performance of the SlideWiki platform which made it difficult for large number of students to access the slides at the same time. This was reported quickly to the development team who made performance improvements a priority for the later part of the year 2.

5.3 Accessibility focused trials

Among the trials, two specifically addressed the needs for learners with disabilities: one for a visually impaired and the other for cognitive difficulties (i.e., intellectual and neurodevelopmental disabilities). These trials were evaluated by face-to-face meetings with the trial/development team and the learners to test and analyze their interaction and requirements. For example, the trial with cognitive disabilities required an easy-to-read description of the platform functions and an easy access and navigation to a group of decks. The trial with visually impaired learners faced some challenges when

accessing the parts of the platform with screen-readers. At the end of the meetings, all the challenges and requirements were collected and prioritized for implementation. While some of these requirements were easy to fix and implement and were considered useful to the functionality of other trials (for example collating similar decks using the Playlist feature), other requirements are specific to the community which require personalization option (for example an easy-to-read version). By gathering requirements for a range of disabled learners, it has helped with balance the differing needs of groups. One challenge has been that a visually impaired user prefers extensive descriptive texts for a given resource while a learner with cognitive impairment prefers a visually illustrative material (e.g.,image) with less emphasis on text. This raised the need of realizing learner's characteristics and preferences in a leaner profile in order to guide them to the most appropriate resources and more convenient learning experience [2]. While it might seem obvious at the first glance, different learner requirement, it become complicated when experiencing duality especially when taking into account standardized evaluation and experienced consistency which is an important part of learning process.

6 Discussion and Conclusion

The development of the SlideWiki platform in parallel with large-scale trials across many different educational sectors has enabled the project to deploy numerous approaches for capturing and utilizing user feedback.

During the second year, a stable version of the platform was released, the editing interface and functionality was improved and other features were added to the SlideWiki platform based on feedback from the earlier trials. The feedback from the large-scale trials has also allowed the project plan to be adjusted to meet the needs of the users.

The trial evaluations also supported an assessment of the Quality in Use of the platform at the end of year 2. This was based on the Quality in Use model proposed by Fogli & Guida [6] and underpinned by ISO 25010, This model considers the Accessibility, Usability, Impact and Usefulness of SlideWiki platform.

Data was collated by reviewing the survey responses, (including comments in the free text questions), the feedback tickets submitted by trial partners and by undertaking an accessibility audit using the WCAG-EM methodology [4]. This survey data proved essential in order to evaluate the areas of the Quality in Use model for Usability and Impact due to the range of stakeholders and users that were interacting with the SlideWiki platform. However, it was difficult to assess usefulness based on the trial evaluation as this was closely linked to quality and appropriateness of the learning content that was being created by the authors.

The survey reported scores for usability and task difficulty that were lower than are expected from websites that are considered user-friendly. It is recognized that as website interfaces become more complex and offer more functions, users perceive the sites to be less usable [14]. While [8] reported a SUS score for Wikipedia of 84.0, [10] reported that lower scores for familiar desktop applications: SUS of 74.6 for Microsoft PowerPoint and 56.5 for Excel. The trial survey has provided a wide range of user-centered feedback. While the project has benefited from using the SUS score as a guide

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[4] https://www.w3.org/WAI/eval/conformance

for benchmarking the usability of the platform, its primary use has been for highlighting areas where further development work should be prioritized. It is clear from the trial responses that it is difficult to compare the raw scores between years when both the platform and the trials become larger and more complex over time. In particular cross-referencing of survey responses with comments was necessary to understand what features were influencing the quantitative scores.
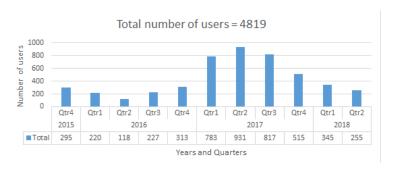

Fig. 3: Number of registered users 2015-2018

The large-scale trials have enabled the platform to continue to grow its user base. Figure 3 illustrates the growing number of users from the beginning of the project 2015 until April, 2018. The graph shows an increasing number of registrations by 2017 when the first release of the new platform was available and trials started their authoring and training practices. By April 2018 the platform had 4,820 registered users.

The trials have also contributed to the creation of new OERs and decks. Table 4 summarizes the state of currently available decks. The platform has now 25,261 decks; with a total of 32,1367 slides. Almost 86% of the decks were created or imported by the trials at the beginning of year 2016, when the new platform was released, while the remaining 14% of the decks were migrated from the old platform to be reused by some trials.

Table 4: Summarized statistics on decks until April, 2018

Total number of decks edited by more than one author	3,512
Total number of forked decks	1,356
Total number of decks	**25,261**

According to the platform analytics, approximately 14% of the decks have been edited by more than one author and 5% of the decks were forked for reuse. This percentage is not as high as indicated by the trial leaders plans but it is expected that reuse of content will increase by the end of the project as trials continue to build on existing content. In addition these figures do not take into account educators reusing and downloading decks without editing the content which is currently not tracked. The trial

evaluations highlighted that it can be difficult for authors to become familiar with version control mechanisms, such as forking, that are required for reusing content. This was particularly the case for those authors who are less familiar with online content platforms. This can, in part, be addressed by ensuring the interface is user-friendly. But authors would also benefit from being guided through the process through training materials and guides.

One limitation on the effectiveness of the large-scale trials has been that the objectives and technical priorities were agreed prior to the project. This is common in externally-funded projects but places constraints on how fully a development project can adopt user-centered design and agile development processes. Despite this, large-scale evaluation was made possible through the trials combined with the continuous informal feedback tickets, it has been possible to tailor the project to reflect their comments and more closely align the platform to meet the needs of users who wish to collaborate and create open presentation decks.

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