

Next-Lab

Next Generation Stakeholders and Next Level Ecosystem
for Collaborative Science Education with Online Labs

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Releases of branded

Sharing and Tutoring Platforms (M12)

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Executive Summary

The Next-Lab project aims at promoting inquiry learning with online labs in schools, by providing teacher training and supporting the implementation of the Go-Lab Ecosystem in 30 European countries. Next-Lab relies on the software (the Go-Lab Ecosystem), which has been developed in scope of the Go-Lab project and has already reached a significant level of maturity. At the beginning of the Next-Lab project, the Go-Lab Ecosystem counted 7,000 registered users and this number is planned to double by the end of the project. This means that there is a big number of teachers across Europe relying on the Go-Lab Ecosystem and using it in their regular teaching practice.

In order to assure the availability, scalability, and the technical fitness of the Ecosystem in a long term, as well as its ability to handle a large number of users and data (which are expected in Next-Lab, GO-GA, and other follow-up projects), it has been decided to migrate the Sharing Platform (Golabz) from the Drupal 7 to the Drupal 8 system. The migration of the main interfaces and functionalities has been completed and the new platform has been launched on October 20th, 2017 (without any major issues or interruptions in the accessibility of the platform). The new Sharing Platform demonstrates a better performance than the old one (e.g., the page loading time is approximately five times faster) and it receives very positive user feedback. By the time of writing of this Deliverable (end of November 2017), the Sharing Platform is being further developed and fine-tuned according to the users' feedback.

This Deliverable presents the motivation for the migration to the new system (Drupal 8), as well as the advantages it offers, it gives insights into the requirements analysis conducted prior to the migration, describes the main migration milestones and gives an overview of the functionalities and workflows that have been migrated. Furthermore, it presents the work in progress and features that are planned to be implemented in the project year 2. In addition, this Deliverable gives an overview of how the new Go-Lab brand has been implemented in the design of the new Sharing Platform.

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1. Introduction

The Next-Lab project aims at promoting Inquiry-Based Science Education (IBSE) in schools, by offering access to the online laboratories and inquiry learning applications, as well as authoring facilities for science teachers. The Go-Lab Ecosystem, including the Authoring Platform (Graasp) and the Sharing Platform (Golabz), is being used by the teachers in 30 European countries (Next-Lab pilot countries), and beyond. At the beginning of the Next-Lab project, the Go-Lab Ecosystem counted 7,000 registered users and it is planned to reach a number of 14,000 users by the end of the project, from whom 7,000 will have created at least one ILS and 1,400 will use their ILSs in the classroom (thus reaching about 35,000 students). Having reached such success, it is crucial to guarantee the availability and the technical fitness of the Ecosystem in a long term, its ability to handle a large number of users and data (which are expected in Next-Lab, GO-GA, and other follow-up projects), and its correspondence to the requirements and expectations of the users.

At the beginning of the Next-Lab project, it has been decided to migrate the Sharing Platform (Golabz) from the Drupal 7 system to Drupal 8. This decision had several reasons: (1) At the end of 2015, Drupal announced that they were going to stop further development of Drupal 7 and would provide security support only. This meant that the further development of the Sharing Platform based on Drupal 7 would become problematic, if not impossible in a long term. (2) Drupal 8 offers a number of advantages compared to Drupal 7, which allow more flexible configuration and better performance of the platform (see [Section 3.1](#) for details). (3) The migration would help to close some technical gaps, which made the platform (based on Drupal 7) unstable, if confronted with an increasing number of users and an increasing amount of published content. All in all, the decision about the migration aimed to assure that the Sharing Platform can be further developed and sustained in a long term, and demonstrates high performance even by a large number of users and data.

This Deliverable aims to demonstrate the advantages for the end-users, which have been reached with the migration to Drupal 8 and gives an overview of the planned development of the Sharing Platform. [Section 2](#) of the Deliverable presents how the new Go-Lab brand has been implemented in the design of the new Sharing Platform, making the structure of the content clearer and giving the same look & feel to the Sharing and Authoring Platforms. [Section 3](#) concentrates on the migration of the Sharing Platform from Drupal 7 to Drupal 8. In the [Section 3.1](#), the reasons for this decision are discussed and the advantages of Drupal 8 are presented. In the [Section 3.2](#), an overview of the migration milestones is given. Finally, in the [Section 3.3](#), the migration of the interfaces and functionalities is described step-by-step. In the [Section 4](#), the work in progress and planned features are presented. The [Summary](#) gives a short outlook of the contents of the Deliverable and future planning.

2. The Go-Lab brand

2.1 Project and platform branding

At the beginning of the Next-Lab project, it was decided to keep the Go-Lab brand, applying it to both the community and the software platform (for details, please see the Deliverable D1.1 “Roadmap for outreach and impact” (M6), Section 6.2 “Branding and communication strategy”). Thus, the term “Go-Lab Initiative” has been introduced, uniting the projects developing and using the Go-Lab platform and promoting the Inquiry-Based Science Education approach among teachers. The term “Go-Lab Ecosystem” has been introduced to describe the Go-Lab platform, including the Golabz Repository, Graasp platform, Smart Gateway, project websites, and any other components of the platform. Finally, the Golabz Repository has been renamed to the Go-Lab Sharing Platform and the Graasp platform has been renamed to the Go-Lab Authoring Platform. The term “Go-Lab Sharing and Authoring Platforms” can be used as a synonym to the “Go-Lab Ecosystem”. The following table (Table 1) provides an overview of the terminology.

Table 1: The terminology used in Next-Lab

Term	Synonyms	Explanation
Go-Lab Initiative	-	The initiative of the former Go-Lab (and current Next-Lab) consortium, uniting Go-Lab, Next-Lab, SiWay, GO-GA, and other projects
Go-Lab Ecosystem	Go-Lab Sharing and Authoring Platforms; Go-Lab Platform	The software platform including the Sharing Platform, the Authoring Platform, the Smart Gateway, and the project websites
Go-Lab Sharing and Authoring Platforms	Go-Lab Ecosystem; Go-Lab Platform	The software platform including the Sharing Platform, the Authoring Platform, the Smart Gateway, and the project websites
Go-Lab Platform	Go-Lab Sharing and Authoring Platforms; Go-Lab Ecosystem	The former name of the Go-Lab Ecosystem (which is still being used by some partners)
Go-Lab Sharing Platform	Golabz Repository; Golabz	The Repository for Online Labs, Inquiry Apps, and Inquiry Learning Spaces
Go-Lab Authoring Platform	Graasp Authoring Platform; Graasp	The authoring platform for the creation of the Inquiry Learning Spaces

There also have been changes in the naming of the teacher training events and social media channels, which are not relevant for this Deliverable. For details, please consult the Deliverable D1.1 “Roadmap for outreach and impact” (M6), Section 6.2 “Branding and communication strategy”.

2.2 Design guidelines

For the Go-Lab Initiative and the Go-Lab Ecosystem a new design has been developed, including the new or adapted logos, an adapted colour scheme, new mascots, and other visual elements (for details, please see the Deliverable D1.1 “Roadmap for outreach and impact” (M6), Section 6.2 “Branding and communication strategy”).

The following design adaptations are especially relevant for the Go-Lab Ecosystem:

- The new colour scheme bringing look & feel of the Sharing and the Authoring platforms closer to each other, by introducing one new colour (slate blue) and adapting the two former colours (orange to bright orange and cyan to deep sky blue). (See figure 1)
- The new Go-Lab Initiative logo, including its simplified version to be used in the software: the Go-Lab icon. (See figure 2)
- Background templates and mascots, mostly used in the headers of the Go-Lab Sharing Platform (but also in the social media channels, etc.). (See figure 2)

The following figures visualise the design elements described above.



Figure 1: Colour scheme used in the Go-Lab project (on the left) vs. the current colour scheme used in Next-Lab (on the right)

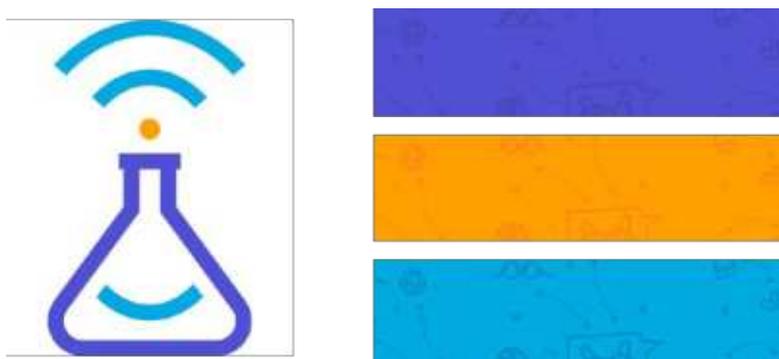


Figure 2: Go-Lab icon (on the left) and background templates (on the right)

The design guidelines and templates have been provided to the project partners, so they can use them in the software, as well as in the web and print materials.

2.3 Implementation in the software

The Go-Lab Sharing Platform has been implemented according to the defined design principles. The three colours have been applied as follows:

- Slate blue: for titles, filters and links, as well as in the header on the “Apps” page and on the individual app pages

- Orange: for buttons, as well as in the header on the “Labs” page and on the individual lab pages
- Deep sky blue: in the header on the “Spaces” page and on the individual ILS pages

Figure 3 presents the implementation of the new design in the Go-Lab Sharing Platform.



Figure 3: Go-Lab Sharing Platform interfaces: (1) “Labs” page, (2) Individual lab page, (3) “Apps” page, (4) “Spaces” page

The Next-Lab website is implemented using the same design theme as the Go-Lab Sharing Platform; the web presence of the Go-Lab Initiative in social media aligns to this theme as well. The Go-Lab Authoring Platform uses its original slate blue theme. The other software developed by the Next-Lab consortium (e.g., online labs and inquiry apps) has been redesigned (if it was necessary) and now uses the slate blue theme of the Authoring Platform, so all applications have the same look & feel, when integrated in an Inquiry Learning Space.

3. From Golabz 1.0 to Golabz 2.0

3.1 *Technical challenges and sustainability*

The first version of the Go-Lab Sharing Platform (further in the text: Golabz 1.0) was implemented based on the open source content management system Drupal 7. At the end of 2015, as Drupal 8 was released, the Drupal Association announced that they were going to stop further development of Drupal 7 and would provide support till the mid of 2018 only¹. This meant that the further development of the Go-Lab Sharing Platform based on Drupal 7 would become problematic, if not impossible in a long term. Also, in the autumn 2016, Golabz 1.0 showed some performance problems with the increasing number of the users and published content, which was the argument for reimplementing of the platform in a more efficient way at the same time.

Compared to Drupal 7, Drupal 8 offers several advantages. First, Drupal 8 established industry best practices by following the PHP conventions for object-oriented code, allowing easier development in a more structured way using abstractions, whereas Drupal 7 was programmed following the procedural paradigm. Second, Drupal 8 allows more flexible configuration management, allowing full control of the system configuration, which can be exported, stored in files, and versioned. Furthermore, Drupal 8 allows the decoupling of the frontend and the backend, which means that the frontend can be implemented independently and use different technologies, for example reactive systems. This provides such advantages as flexibility in terms of used technologies, scalability, and extendibility of the system, for instance, for mobile applications. Moreover, Drupal 8 has a better multilingual support by default, which is very important for the follow-up projects of Next-Lab, like for example GO-GA (Go-Lab goes Africa!), in which the Sharing Platform will be provided in multiple languages. Finally, due to its caching systems, Drupal 8 assures better server performance and better end-user experience.

Based on these arguments, it was decided to migrate the Sharing Platform to Drupal 8, in order to assure stable further development and maintenance in the future, to make the system designed to maintain high performance with the expected increased number of users, and, importantly, to improve the user experience in general.

3.2 *Platform migration milestones*

The preparation for the migration of the Sharing Platform on Drupal 8 started in February 2017 with the *requirements analysis*. In this phase, all functionalities and interfaces of Golabz 1.0 were analysed and for each of them it was decided, whether it should be migrated and, if yes, whether it should be migrated in its current state or it should be implemented in another, more efficient and user friendly way.

After that, the *data structure* of the new Golabz 2.0 has been defined. In the next step, the *authentication mechanism*, including the Single-Sign-On with the Authoring Platform, as well as the user profiles in the Sharing Platform, have been implemented. The next large step was the development of the *content publishing* workflows for online labs, inquiry apps, and Inquiry Learning Spaces. After that, the workflows for the *automated data migration* from Golabz 1.0 to Golabz 2.0 have been implemented.

¹ For details, see Drupal website: <https://www.drupal.org/core/release-cycle-overview#major>

The most sophisticated task was the development of the content *filter* (as Drupal 8 does not offer the same modules as Drupal 7, the filter had to be implemented from scratch), as well as the development of the *recommendation* mechanism (in Golabz 1.0, this relied on the ElasticSearch; however, in Golabz 2.0 it was decided to implement this feature within the system). Finally, after these central features have been set in place, the user interface design has been implemented and the system configuration has been completed.

After a final testing by the project consortium, bug fixing and fine-tuning, Golabz 2.0 has been launched on October 20th, 2017.

Figure 4 visualises the process described above.

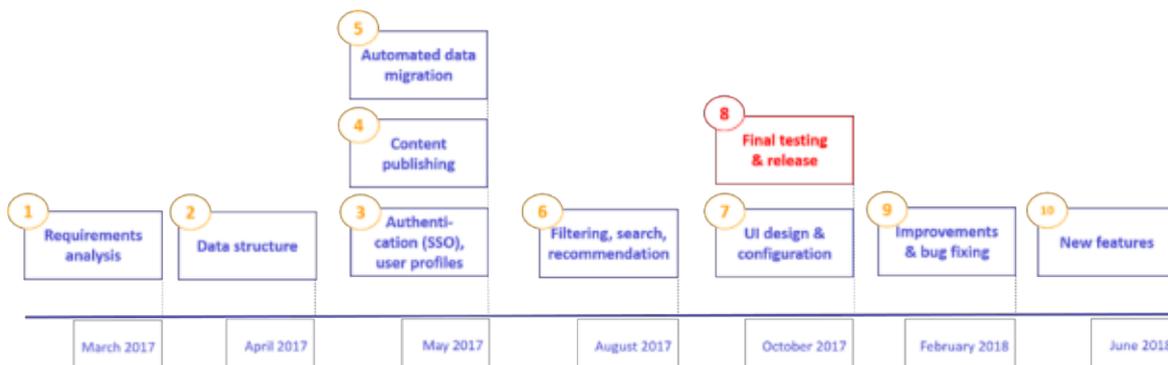


Figure 4: Platform migration milestones

In October 2017, the Golabz 2.0 has been released containing all main features and interfaces of Golabz 1.0. However, some minor features have not been implemented and some features still needed improvement. By the time of writing of this Deliverable, Golabz 2.0 is being further developed based on the user feedback and bug fixing is taking place. This process will continue until February 2018 (estimated); the new Next-Lab features (such as social features) are planned to be implemented by the mid of 2018.

In the following section, the migration process and results are described in detail, following the structure provided in Figure 4, starting from the step 1 (Requirements analysis) and up to step 7 (UI design and configuration). As the process in Step 8 (Final testing and release) is quite straight forward, it won't be specified in detail. The last two steps (Improvements and bug fixing and New features) are covered in Section 4 "Work in progress and planned features" of this Deliverable.

3.3 Migration and improvements

3.3.1 Requirements analysis

The main aspects of the requirements analysis were related to:

- The analysis of the data structure and content types
- Review of the content publishing workflows for online labs, inquiry apps, and ILSs
- Review of the filter and search functionalities
- Review of the navigation and usability of the platform
- Data migration planning (mapping of the fields in Golabz 1.0 and Golabz 2.0)

Both technical partners and partners working with teachers were involved in the requirements analysis, in order to assure that both perspectives were taken into account.

The screenshots of the Golabz 1.0 interfaces with highlighted question marks were provided to the partners and it was decided whether to keep a particular feature and whether to migrate it in its current status or reimplement it in a more efficient way.

Figure 5 provides some examples of the screenshots used for the analysis.

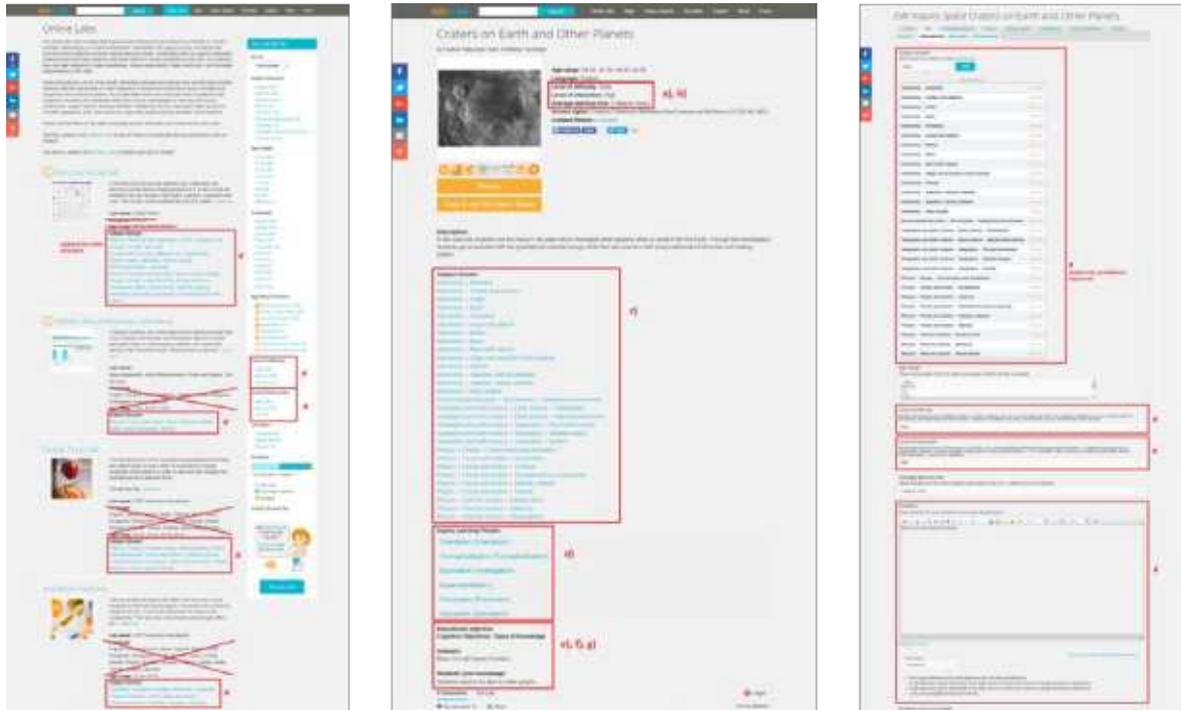


Figure 5: Sample screenshots used for the requirements analysis

As the result of the requirements analysis, the content publishing workflows have been simplified and the number of entry fields (to be filled in by the lab owners and teachers publishing ILSs) has been significantly reduced. Furthermore, the interfaces have been restructured and some elements (which were not widely used during the Go-Lab project) have been removed. Together, this has resulted in simplified and clearer interfaces. Finally, the amount of data stored in the Sharing Platform could be significantly reduced.

The following sections provide insights into the improvement of the data structure and processes, as well as the resulting improvements in the system performance and usability.

3.3.2 Data structure

During the migration to Golabz 2.0, the data structure of the system has been improved. The structure of the taxonomy terms (used for the filters) has been revised: the spelling of the terms has been unified, the duplicates have been removed or renamed, and the granularity of the taxonomies has been reduced (where it was necessary), to allow a more efficient filtering. For the uploaded files, the file names and sizes have been standardized, so all files have the same format and do not exceed the given size limits (which significantly reduces the space used on the server). Importantly, in Golabz 2.0, the users (online lab owners and ILS publishers) can create, access and edit own content via the user profiles, where their content is listed (in Golabz 1.0 the content owners have been referenced in the text fields or as a content type, so they were not able to access and edit own content; see [Section 3.3.3](#) for details). Finally, unified user roles have been defined for content editors and content reviewers.

All these improvements led to a better performance of the system, which now loads approximately five times faster than it did before. The following table provides an overview of some performance indicators, comparing Golabz 1.0 and Golabz 2.0, and indicating the performance difference in percent.

Table 2: System performance indicators

URL (if applicable)	Golabz 1.0	Golabz 2.0	Difference (%)
Database backup size			
	263.1 MB	40.7 MB	-85%
Database running system			
	474.6 MB	128.7 MB	-73%
Requests to the database			
/home	64	43	-33%
/labs	75	42	-44%
/lab/* (page)	149	42	-72%
Data transferred			
/home	3.1 MB	974 KB	-69%
/labs	2.1 MB	1.0 MB	-52%
/lab/* (page)	2.4 MB	743 KB	-69%
Total loading time			
/home	9.64 s	1.48 s	-85%
/labs	3.51 s	1.88 s	-46%
/lab/* (page)	7.78 s	1.55 s	-80%

3.3.3 Authentication and user profiles

In Golabz 1.0, there was no possibility for the users to login to the Sharing platform, so there were no user profiles, except the admin accounts, which were used by the project consortium members. In order to give more ownership to content providers, in Next-Lab, it was decided to give the users (lab owners, app creators, ILS publishers) access to their published content, so they can view and edit this content at any time. This decision required the implementation of the following features:

Shared authentication (Single Sign On) with Graasp. Now, if clicking sign in/ sign up button in Golabz, the user is redirected to Graasp, where she can login using her e-mail address or her Facebook or Google+ account. After having logged in, the user is automatically redirected to her user profile in Golabz (See Figure 6).

User roles. Golabz 2.0 features seven user roles: admin (used by IMC staff), three editor roles (Lab Editor, App Editor, ILS Editor), and three reviewer roles (Lab Reviewer, App Reviewer, ILS Reviewer). This allows flexible assignment of the user roles to the users. One user can have several roles: for example, the project coordinator has all three reviewer roles to be able to review all new content before publishing; a lab owner, who also publishes ILSs, can have lab editor and ILS editor roles.

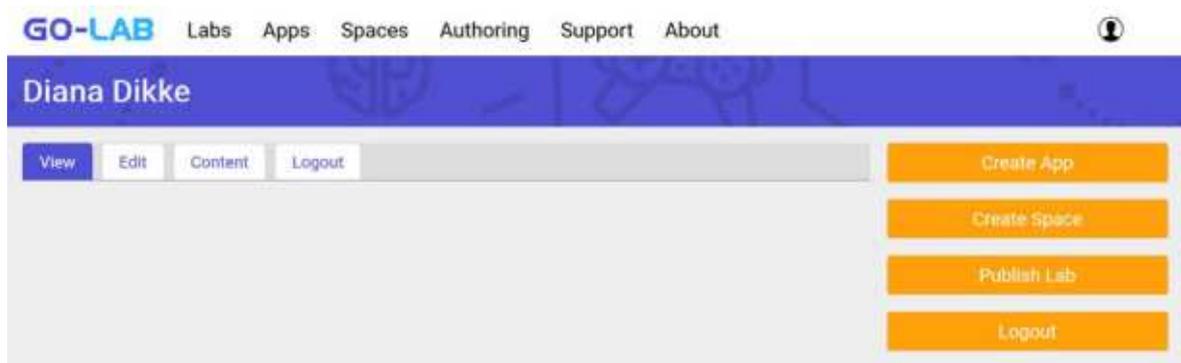


Figure 6: User profile in Golabz 2.0 (lab editor, app editor, ILS editor roles)

User interface adapted depending on the user role. The user interface of Golabz 2.0 adapts depending on the user role: for example, a reviewer has access to more interfaces than an editor (e.g., a reviewer has access to the content of other users, revision information, direct publishing, etc.), or a lab editor does not see the “publish app” button, which is visible for an app editor.

User profiles featuring own and assigned content. In the user profile, the users can view and edit their own published and unpublished (draft) content (“own” means that the content was created by the user). The content is also accessible for the content reviewers (who review new content before publishing). Moreover, the users will be able to view assigned content (“assigned” means that the content was created by another user, and the current user was mentioned as an owner or a contact person). (This feature is work in progress; currently only own content is displayed). Figure 7 presents an example of a user profile.

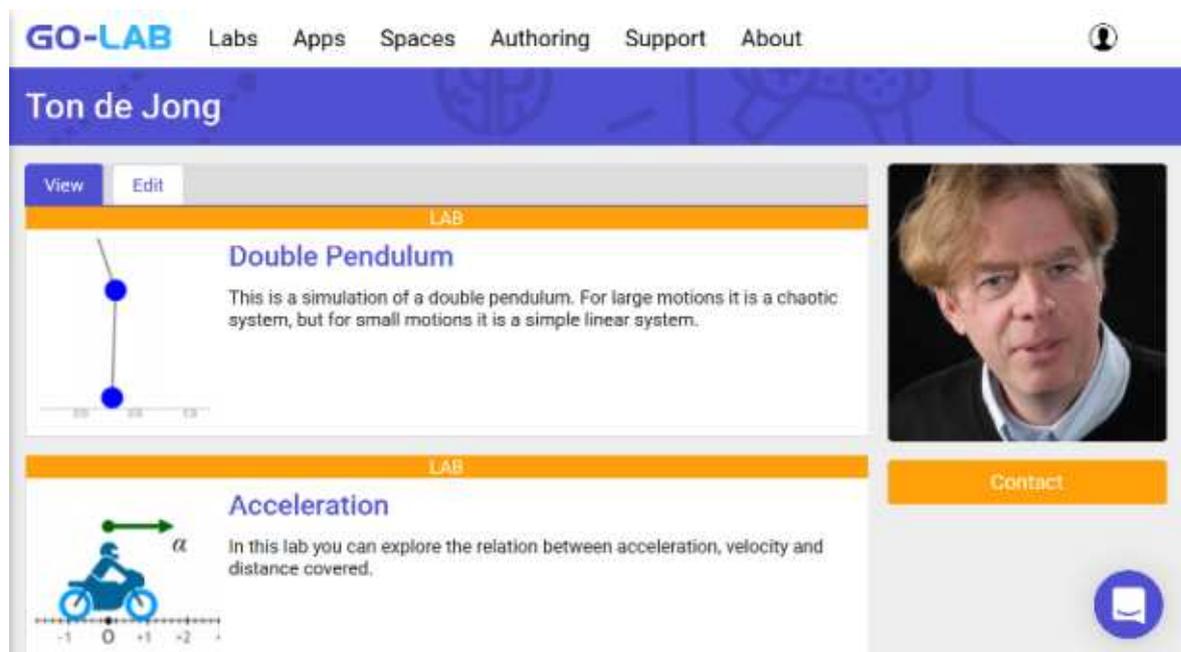


Figure 7: User profile listing own content

Interfaces to view, edit, and publish content of other users. Users having an editor role are not able to publish their content directly, but submit their content for publication and a reviewer will check its quality before publication. The reviewers receive an email notification,

when new content has been submitted. They have access to the content of other users (labs, apps, and/or ILSs – depending on the reviewer’s role), and can view, edit, and publish it. Usually, the reviewers do not introduce any major changes in the content themselves, but instead use the “Contact” button, to ask the content creator to make the necessary changes. Figure 8 shows the reviewer interface, listing the available content.

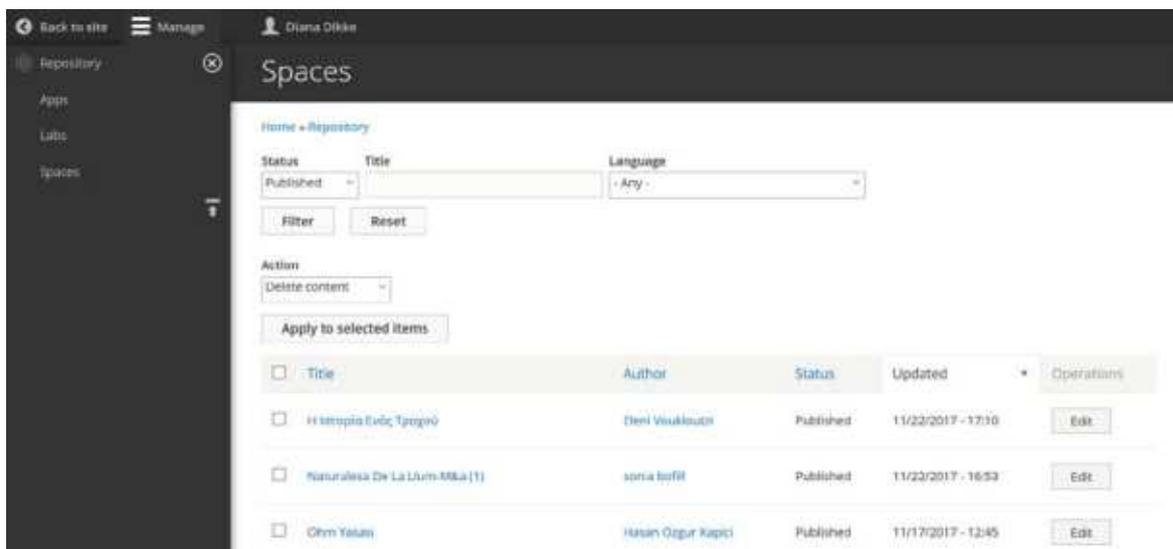


Figure 8: Reviewer interface listing all content

3.3.4 Content creation

The forms for submitting labs, apps, and ILSs have been significantly simplified. This has been achieved by reducing the number of fields which have to be filled in by the users, by introducing more convenient field types and autocompletion function in most of the fields, as well as by providing configurable default values, where applicable. Furthermore, in Golabz 2.0, different revisions of the content are saved. The revision description can be edited by the user (for example, to document what has been changed) and it is possible to restore a previous revision by the reviewer, if needed. The following paragraphs describe the changes in lab, app, and ILS submission forms in detail. In this section, screenshots are provided to illustrate some parts of the submission forms. Screenshots of the entire forms can be found in ANNEX A of this document.

3.3.4.1 Lab submission form

In Golabz 1.0, the lab submission form contained five tabs: General, Educational, and Technical [information], Big Ideas [of Science], and Screenshots. In Golabz 2.0, all fields are presented on the same page, collected in the folding tabs General, Educational, and Technical Information, which can be opened simultaneously (See Figure 9).

Many entry fields, which were available in Golabz 1.0, have not been migrated to Golabz 2.0, as analysis of their use and user feedback in participatory design activities during the Go-Lab project showed that their added value to the system did not outweigh its negative effect on the user experience. In many other cases, the type of the entry fields has been changed, to make their use more convenient and improve the user experience. The decision about the migration of the fields and/or about the change of the field function was taken by the project coordinator, technical coordinator, and the product manager of Golabz, taking into account the advice of the partners specialising in participatory design and partners

working closely with teachers. An overview of migrated fields and changes is provided in Annex B.

Generally, the lab submission form became clearer and handy, allowing the lab owners to submit online labs with less effort. Figures 10 and 11 provide some examples demonstrating the entry fields in Golabz 1.0 and Golabz 2.0 in comparison.

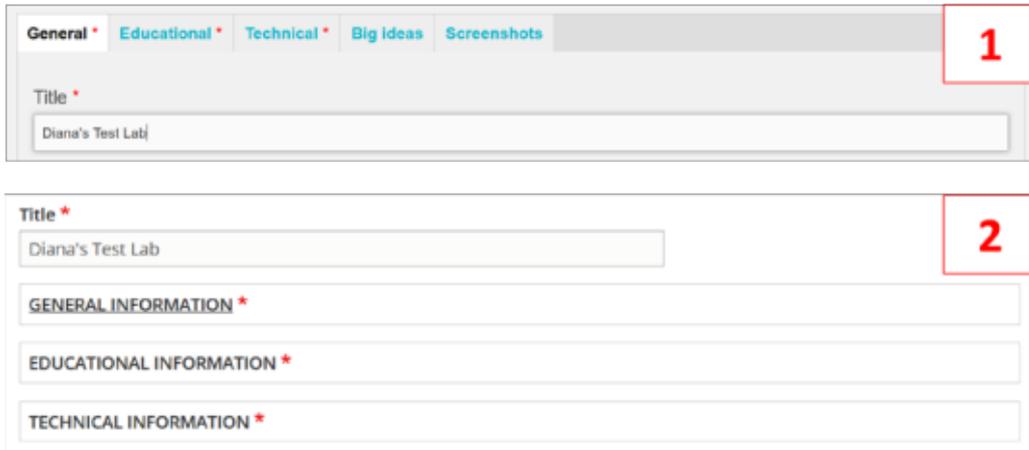


Figure 9: Lab submission form in Golabz 1.0 with five separated tabs (1) and in Golabz 2.0 with three folding tabs on one page (2)

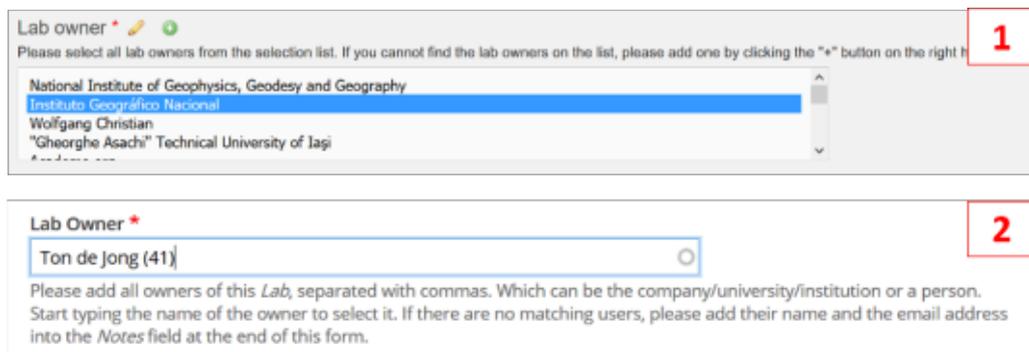


Figure 10: “Lab owner” field in Golabz 1.0 (1) and Golabz 2.0 (2)

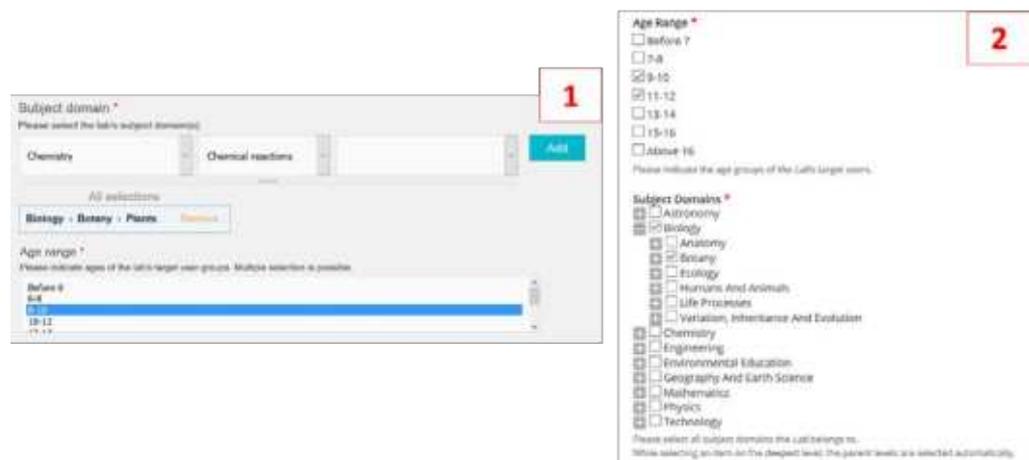


Figure 11: “Subject domains” and “Age ranges” fields in Golabz 1.0 (1) and Golabz 2.0 (2)

3.3.4.2 App submission form

In the app submission form, there have been no significant changes. In Golabz 2.0, the fields have been summarized in two folding tabs (General Information and Technical Information), in order to provide a better structure. Some of the field functions have been changed. Please see ANNEX B for the overview of the changes.

3.3.4.3 ILS submission form

As in the case of the lab submission form, the ILS submission form underwent significant changes. In Golabz 1.0, it contained four separated tabs: General and Educational [information], Big Ideas [of Science], and Screenshots. In Golabz 2.0, the fields have been collected in the folding tabs General Information and Educational Information. The technical Information tab contains information that mostly concerns the administrator and the reviewers, for ILS editors only the tick-box “Works offline” is visible on this tab.

A large number of entry fields, which were available in Golabz 1.0, have not been migrated to Golabz 2.0 and the function of some fields has been changed. Also here, the decision about the migration of the fields and/or about the change of the field function was taken by the project coordinator, technical coordinator, and the product manager of Golabz, together with the partners specialising in participatory design and partners working with teachers.

An overview of migrated fields and changes is provided in ANNEX B of this document. Figure 12 (below) provides an example demonstrating the entry fields of the ILS submission form in Golabz 1.0 and Golabz 2.0 in comparison.

The figure consists of two screenshots of the ILS submission form. The top screenshot, labeled '1', shows the Golabz 2.0 interface. It features a 'Show row' button in the top right corner. The main form area is titled 'ILS owner/creator' and includes a text input field for 'Please add all ILS owners.' with the value 'Diana Dikke'. Below this is a blue button labeled 'Add another item'. The 'Language' section has a dropdown menu with options: '- None -', 'Bolanian', 'English', 'Hindi', and 'H...'. The 'Access rights' section has a dropdown menu with the option 'Creative Commons Attribution (CC BY)'. The bottom screenshot, labeled '2', shows the Golabz 1.0 interface. It has an 'Owner' text input field. Below it is a text area for 'Please add all original authors of this ILS, separated with commas. Start typing the name of the owner to select it. If there are no matching users, please add their name and the email address into the Notes field at the end of this form.' This is followed by a 'Creator' text input field with a red asterisk. Below that is another text area for 'Please add all owners of this ILS, separated with commas. Start typing the name of the owner to select it. If there are no matching users, please add their name and the email address into the Notes field at the end of this form.' The 'Language' section has a dropdown menu with 'English' selected. The 'License' section has a dropdown menu with 'Creative Commons Attribution-Noncommercial (CC BY-NC)' selected. Below the license dropdown is a text area for 'Please specify the access, copy and reuse rights of your ILS. If you are not sure, use the license, which is selected in the list by default.'

Figure 12: “ILS owner/ creator”, “Language”, and “Access rights” fields in Golabz 1.0 (1) and Golabz 2.0 (2)

The new ILS submission process was tested with a focus group of teachers, who provided their feedback, which was considered during the fine-tuning of the system. During the process of testing by the focus group, 31 issues related to Golabz have been identified, all of which have been resolved. As of November 24th, 2017, 22 issues have been solved by improving the submission form, 8 issues became irrelevant, as the related fields have been removed, and 1 issue required no action (as this issue resulted from a misunderstanding because of an incomplete support text). Deliverable D4.1 “Report on participatory design activities and adoption”, (M9) provides a detailed report on the testing and the status of the issues.

3.3.5 Automated data migration

As described above, many data entry fields in Golabz 2.0 have been removed or renamed, or their function has been changed. This required mapping of the fields in Golabz 1.0 and Golabz 2.0 prior to the data migration, so the data could be accurately transferred from the old system to the new one. An automated data migration mechanism via JSON-files has been created. Furthermore, an automated data validation mechanism for the transferred content has been implemented. Generally, the data migration could be done quickly without any major issues. Thanks to the automated data migration and validation mechanisms, most of the data has been transferred without bugs or errors. Images have been converted to the same data format, resized, renamed, and placed in separated folders using the content type for the categorisation. Also, all other files have been renamed with unique identifiers, so no file can be replaced in case another file with the same name is uploaded. Titles have been changed and unified. URLs have also been changed and are now generated based on the content titles, so UTF-8 is strictly enforced and ensures that no content can become inaccessible.

3.3.6 Content filtering, search, and recommendation

One of the largest tasks was the implementation of the filter, as well as of the search and recommendation mechanisms. As Drupal 8 does not offer the same development modules as Drupal 7, the filter had to be implemented from scratch. While this required considerable efforts and changes in the backend, the functionality remained the same for the user. However, due to the extended caching mechanism, the loading time of the pages and the server load caused by the filtering mechanism could be significantly reduced, thus, achieving a better user experience with the same functionality.

The general search mechanism (search by typing a word) in Golabz 2.0 has been implemented without using third-party software (Golabz 1.0 it relied on ElasticSearch). When typing a word, the search mechanism uses the title and the description fields, and displays the results for labs, apps, and ILSs on one page. Content that is newly added to the Sharing Platform is indexed automatically, so the displayed search results are up to date. The search function is being further developed, in order to provide even more accurate results, using the tokenizer to split text into individual words, transliteration make the search insensitive to accents and other special characters, as well as stemming the search terms to reduce inflected or derived words to their word stem.

The recommendation mechanism (recommendation of similar labs, as well as ILSs in which the lab has been used, based on the lab being viewed) has also been implemented from scratch, without using third-party software (such as ElasticSearch and custom NodeJS application used in Golabz 1.0). The recommendations are provided based on the values used in the metadata fields and the referenced entities, and are displayed on the right of a lab page in the boxes “Recommendations” (recommended similar labs) and “Used in these

spaces” (recommended ILSs). Also here, the caching mechanism has been used, in order to improve the system performance.

Figures 13 and 14 demonstrate the search and recommendation features in Golabz 2.0.



Figure 13: The search function in Golabz 2.0

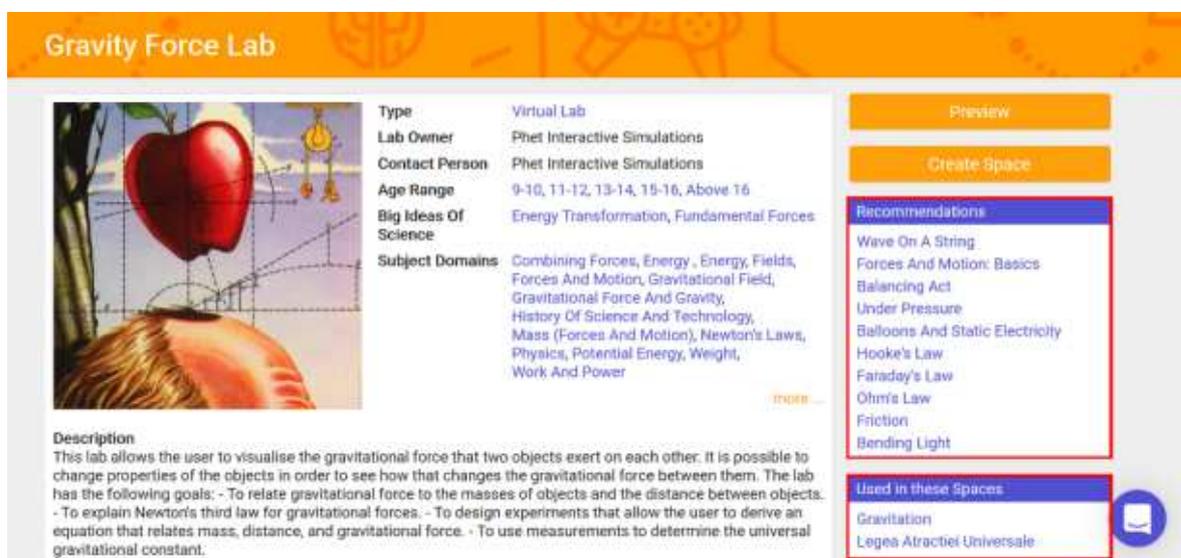


Figure 14: The recommendation function in Golabz 2.0

3.3.7 UI design and configuration

As described in Section 2 of this Deliverable, the new design has been implemented in Golabz 2.0. Besides the fresh visual appearance, some improvements have been made in order to simplify the navigation through the platform and to improve its usability, for example:

- On all pages (pages listing labs, apps, and ILSs and dedicated pages of labs, apps, and ILSs) the amount of content has been reduced. Pages are now displaying only the most important information. This provides a cleaner structure and a better overview of the content.
- Some part of the content is initially hidden and can be viewed by clicking “more” (please see Figure 14 above for an example of a lab page with hidden content). This avoids overloading pages with information.

- Some pages have been restructured. For example, in Golabz 1.0, the recommendations were displayed on the bottom of the pages, were hard to find and hardly noticed. In the new version, they are much more prominent as they are now shown on the right of the lab pages (see Figure 14 above).
- The status of the user (logged in/ logged out) is visualised on the top right of the page (the user icon can be either outlined, if not logged in, or filled, if logged in).

There have been many other minor changes in the design and configuration, which we do not list here, in order not to go into too much detail. Generally, one can say that the design change was a continuous process, which took place during almost the whole migration time and was conducted in collaboration with the project partners and the focus teachers.

Before the release of Golabz 2.0 in October 2017, the user interfaces and user roles have been configured, and the final testing by the consortium partners (taking different user roles) have been conducted. After some minor changes in the configuration and bug-fixing, Golabz 2.0 has been launched on October 20th, 2017.

3.3.8 Integrated helpdesk

As the Tutoring Platform did not raise users' interest during the Go-Lab project and the promotion efforts did not bring any tangible results, it was decided not to migrate the Tutoring Platform to the new technology (Drupal 8) and to provide the support and tutoring services using other means of communication. On the one hand, a Go-Lab teacher community featuring national groups and discussion forums has been implemented in Graasp, allowing collaboration between the consortium, the Next-Lab Ambassadors, and the teachers (see Deliverable D2.3 "Initial releases of the creation and personalization services, as well as the awareness, assessment, and reflection solutions" (M12)). On the other hand, a helpdesk (based on the Intercom software) has been provided in Golabz 2.0 and Graasp, forwarding users' contact requests to the experts from the Next-Lab consortium and to the Next-Lab Ambassadors (see Deliverables D2.1 "Specifications of the teacher-empowering facilities and activities" (M6) and D2.2 "Initial implementation of the teacher-empowering facilities and activities" (M9)). Figure 15 provides a screenshot of the helpdesk-app in Golabz 2.0.

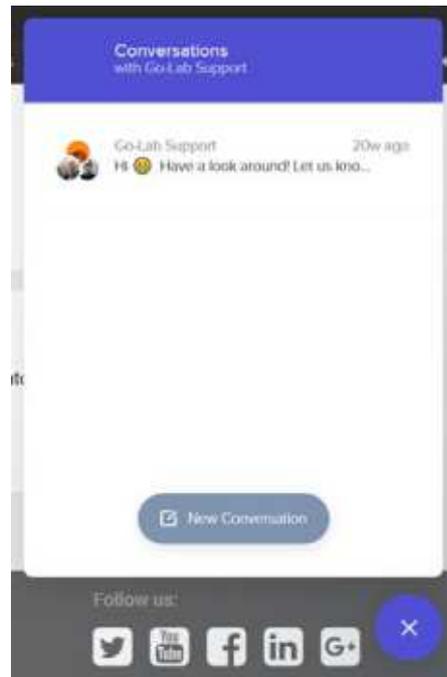


Figure 15: Helpdesk-app in Golabz 2.0

The Go-Lab community and the integrated helpdesk provide the necessary support to the users and allow keeping in touch with individual users, national groups, and the teacher community as a whole.

4. Work in progress and planned features

4.1 Work in progress

By the time of writing of this Deliverable (end of November, 2017), the improvement and fine-tuning of Golabz 2.0 is still in progress. The main features, which are currently in progress and which are planned to be implemented or improved in the next months include:

Bug-fixing based on user feedback. The platform is being actively used by the project partners and real users (teachers), who sometimes discover other sequences of actions, than those which were tested before the release. This leads to the need to improve the workflows, and adapt some functions and support texts. No major issues have been found so far. However, the improvement of the platform is a continuous process, needed to provide a high-quality system, corresponding to the users' expectations.

Reimplementation of the Next-Lab project website. The Next-Lab project website has been implemented at the beginning of the project in its draft version, based on the design of Golabz 1.0. Currently, the website is being reimplemented following Golabz 2.0 design and structure, and to provide some basic cross-platform navigation (which will be extended at a next step). The reimplementation of the project website is closely connected to the concept of the new Support page, as some of the content relevant for teachers will be moved to that page, whereas the project website will target political stakeholders, researchers, and general public.

Reimplementation of the Support page. The Support page is available in the form it had in Golabz 1.0. It is planned to restructure the page and add some new types of content, beyond support materials, which are relevant for the teachers, for example: contact information of National Expertise Centres (NECs) and Ambassadors per country, announcements of international teacher training events, information about the latest platform updates, and so on. The idea is to have all information relevant for the teachers at one place, not distributed between different channels.

Improvement of the authentication process. Although the Single-Sign-On already works for the users, the authentication process still needs some improvement to require less user actions and, thus, less requests sent between Golabz and Graasp.

Improvement of the lab publishing process. The lab publishing process already functions well, with the exception of adding new users (lab owners, contact persons). Previously, in Golabz 1.0, this feature did not exist, as the new persons or organisations were added as content items in the text fields. In Golabz 2.0, all persons and organisations are handled as users. Currently, the new users can be added only by the administrator (a lab editor has to add a note for the administrator, containing the name of a person or organisation and an e-mail address to be added). A mechanism will be implemented, allowing the lab editors adding new users to the system (an approval by the administrator will be required).

Improvement of the ILS publishing process. The ILS publishing process has been significantly improved, when migrating from Golabz 1.0 to Golabz 2.0. However, there is still some potential for simplification. On the side of the authoring platform Graasp, the submission process will be simplified, so the users have to click only one button to be automatically redirected to Golabz, where they can edit the ILS submission form. This automatic redirection is important for the improvement of the reviewing process (see below), as the content will be created in Golabz only when the user actually saves the ILS publishing form in Golabz.

Implementation of the ILS-updating mechanism. Sometimes a user needs to update her ILS in Graasp and Golabz, for example, if the language of the ILS has been changed (in this case, the link to the ILS changes as well, which affects the information stored in Golabz) or if the title and/or the description of the ILS have been changed (which are stored in Golabz as well). In this case, it should be possible to republish the ILS from Graasp to Golabz, without creating a new content, so there are no duplicates and outdated ILSs.

Improvement of the reviewing process. The process of reviewing the submitted content (labs, apps, ILSs) is being improved, so the reviewers get notified via e-mail when new content is submitted (and importantly, in case of ILSs, so they are notified only if a final version, including the filled ILS publishing form, is submitted, but not if a preliminary version is sent from Graasp; see “Improvement of the ILS publishing process” above). Furthermore, a contact button has been provided, allowing the reviewers to contact the user directly, if the submitted content needs adjustments before publication. Finally, it is possible for the reviewers to list all types of content (labs, apps, ILSs) created by a certain user at one page (see “Content display by user” below).

Content display by a user. Currently, in the user profile, the content is displayed, which has been created by the user. In the future, all the content assigned to the user will be listed (including the content created by other users, where the current user is mentioned as an owner or a contact person). This will allow to get an overview of the content the user contributed to and to search for content by clicking on the user’s name.

Enhancement of the search function. Currently, if the user enters a term (or several terms) in the search field, the results are displayed, if this term is contained in the name or description of the content. In the future, the search function will be enhanced, so it also includes the taxonomy terms and the referenced entities like users or other content like apps or labs used in a ILS. Furthermore, an extended search engine like Apache Solr can be integrated, if required.

Automated update of language information. The Smart Gateway automatically checks the availability and metadata of the online labs and inquiry apps, which have been submitted to Golabz using the Smart Gateway service. In Golabz, a mechanism is being implemented, to automatically update the language information for labs and apps (which means, if a lab is translated in a new language, this language will be automatically added to the metadata of this lab in Golabz).

Disabling not functioning labs. As mentioned in the previous paragraph, the information about the availability of a lab is automatically checked by the Smart Gateway. If Smart Gateway discovers a broken link, such lab has to be checked by the project consortium and the link should be updated in Golabz (or the lab should be removed, if it is not available anymore). During the time of checking and update, the preview button is disabled, so the users cannot click on it and get an error message. At the moment, it is being discussed, if such labs have to be temporarily disabled completely, and/or deactivated for search only. When this has been decided, this decision will be implemented.

Implementation of the content badges. The content badges, such as “Go-Lab approved” badge, badges indicating if a lab requires Flash or Java, and a badge indicating if an app requires AngeLA to be enabled², will be implemented.

² As the new data protection legislation requires to disable AngeLA by default and make users activate it in their ILSs in Graasp, the AngeLA badges in Golabz will serve to inform the users if an app needs AngeLA to be activated in order to function as expected (this refers mostly to the learning analytics apps).

Extension of the REST interfaces. Some of the REST interfaces have to be extended with additional fields, in order to provide information about the content for the statistics on Graasp.

4.2 Planned features

Features described in the previous section, are already being developed or are planned to be implemented as soon as possible. This section lists the features that are planned for the project year 2. The following three features are planned to be implemented after the fine-tuning of the platform is completed:

- *Introduction of HTTPS protocol.* The HTTPS protocol will be introduced in Golabz and Graasp in order to increase the security level of the data exchange between the two platforms, especially in the user authentication process.
- *Implementation of social features.* In Golabz, some social features will be implemented allowing content rating and commenting by the users, as well as introducing new popularity indicators, which will allow more precise content filtering and search (the list of popularity indicators will be elaborated in the project year 2).
- *Implementation of a badges system.* In addition to the advanced user profiles (containing basic information about the user and related content), a badges system will be implemented in order to facilitate users' activity via gamification. The assignment of badges to the users' content will be based, e.g., on the content rating and the number of times the content has been copied/reused by the other users.

The following features are set on the development task-list, however, their feasibility and needed effort have to be checked first, before a final decision about their implementation can be made (to be elaborated in the project year 2):

- *Implementation of a reactive frontend.* As described in [Section 3.1](#), Drupal 8 can be "decoupled", which means that the backend and the frontend can be implemented independently from each other. The reactive frontend can be implemented using JavaScript, which will allow more flexibility in the configuration of the frontend, reduce the server load, and the amount of data transferred to the web client.
- *Implementation of a cross-platform navigation.* A cross-platform navigation (e.g. in a form of sidebar menu) would allow easier navigation between Golabz, Graasp, Next-Lab project website, and the Support area, truly uniting these platforms and websites into one ecosystem.
- *Implementation of ILS owner history.* This feature would allow to follow the history of the ILS creation and adaptation beginning with the first creator (the original ILS owner), over the users who have duplicated, adapted, and published the adapted ILS, up to the latest user who has published her adapted ILS. This would allow to identify the original owners of the content and to list them in the adapted ILSs.

Further features and improvements may be identified based on the users' feedback in the course of the project. The decision about the implementation will be taken by the project coordinator, the technical coordinator, and the product manager of Golabz, based on the importance of the features and the effort estimation.

5. Summary

In the first project year of Next-Lab, the Sharing Platform has been migrated to the Drupal 8 system, in order to improve the platform performance and to assure its technical fitness and further development in a long term. In this Deliverable, the migration process has been presented, starting with the requirements analysis, over the migration of the main interfaces and workflows, up to the platform launch in October 2017. Furthermore, an overview of the work in progress as well as of the planned functionalities has been given.

After the release, the new Sharing Platform received very positive feedback, but also some improvement suggestions, which have been included into the development roadmap. The main action points relate to the authentication process, as well as to the lab and ILS publishing processes. Furthermore, the search functionality has to be enhanced. Finally, several new features are planned to be implemented, such as social and gamification features, as well as the HTTPS protocol increasing the system security.

So far, the Sharing Platform has been tested by the consortium members in the full range of its functionalities; in addition, the focus teachers group tested the ILS publishing process; finally, some actual users of the platform have contributed their feedback and reported several bugs, which are currently being fixed. In the project year 2, it is planned to conduct usability testing in scope of participatory design activities, in order to identify further points of improvement and to evaluate the usability and performance of the Sharing Platform.

EDUCATIONAL INFORMATION *

Age Range *

Before 7

7-8

9-10

11-12

13-14

15-16

Above 16

Please indicate the age groups of the Lab's target users.

Subject Domains *

Astronomy

Biology

Chemistry

Engineering

Environmental Education

Geography And Earth Science

Mathematics

Physics

Technology

Please select all subject domains the Lab belongs to.
While selecting an item on the deepest level, the parent levels are selected automatically.

Big Ideas Of Science

Energy Transformation

Fundamental Forces

Our Universe

Structure Of Matter

Microcosm

Evolution And Biodiversity

Organisms And Life Forms

Planet Earth

Please select **Big Ideas of Science** relevant for this Lab.

TECHNICAL INFORMATION *

Works Offline

Type *

Virtual Lab ▼

Please select the type of your Lab.

Preview Link *

This must be an external URL such as <http://example.com>.

Additional Materials

This must be an external URL such as <http://example.com>.

Technical Requirements

Adobe Flash

Java

If your Lab uses Java Applet or Adobe Flash, which may lead to some additional installation or configuration efforts, please specify it for the Lab users.

Support Students With Disabilities

Physical Impairments

Visual Impairments

Hearing Impairments

Learning Impairments

Please select the areas where the Lab can support students with disabilities.

Booking Required

Please specify if the Lab requires booking.

Registration Required

Please specify if registration is needed to use the Lab.

Embed Link *

URL *

This must be an external URL such as <http://example.com>.

Link text

Please add a link to an XML file. It allows to embed the Lab into an Inquiry Learning Space. The Lab must be an OpenSocial gadget. If not, please use [Go-Lab Smart Gateway Service](#) to create one using the [User Guideline](#).
Since the Lab may contain several links, only the first one will be used for the preview.

Save as unpublished

Figure 17: Lab submission form (Educational Information and Technical Information tabs)

Title *

GENERAL INFORMATION *

Image

 Keine Datei ausgewählt.

The App image is displayed as the main icon of the App.
One file only.
2 MB limit.
Allowed types: png gif jpg jpeg.
Images must be larger than 160x160 pixels. Images larger than 320x320 pixels will be resized.

Description *

B I  Format  Source

Text format: Basic HTML  [About text formats](#) 

Please provide a textual description of the App describing its primary aims and functionality.

Creator *

Please add all App creators, separated with commas.
Start typing the name of the owner to select it. If there are no matching users, please add their name and the email address into the Notes field at the end of this form.

Category *

Go-Lab Inquiry Apps 

Please select a category the App belongs to.

License *

Creative Commons Attribution-Noncommercial (CC BY-NC) 

Please select a license applicable to your App.

Phases

Orientation
 Conceptualisation
 Investigation
 Conclusion
 Discussion
 Student Dashboard
 Teacher Dashboard

Please specify all suitable Inquiry Learning Phases.

TECHNICAL INFORMATION *

Works Offline

Type *

Opensocial Gadget 

Please select a type of the App.

Source Code *

This must be an external URL, such as <http://example.com>.

Preview Link

This must be an external URL, such as <http://example.com>.



Figure 18: App submission form

Annex B

Table 3: Lab submission form: overview of the fields and changes

Field name	Golabz 1.0		Golabz 2.0	
	In tab	Field type	In tab	Field type
Lab title	General	Text	-	Text
Lab apps: title	General	Text	Technical	Text
Lab apps: URL	General	URL	Technical	URL
Lab image	General	Image	General	Image
Lab description	General	Text	General	Text
General information	General	URL	General	URL
Lab owner	General	Scrollable list	General	User
Contact person	General	Scrollable list	General	User
Current number of lab users	General	Text	<i>Not migrated (excluded)</i>	
Keywords	General	Comma-separated items	<i>Not migrated (excluded)</i>	
Go-Lab approved	General	Tick-box	<i>Not migrated (excluded)</i>	
Subject domains	Educational	Adaptable drop-down lists	Educational	Tick-boxes hierarchy
Language	Educational	Scrollable list	General	Comma-separated items
Age ranges	Educational	Scrollable list	Educational	Tick-boxes
Level of difficulty	Educational	Drop-down list	<i>Not migrated (excluded)</i>	
Average time of use	Educational	Drop-down list	<i>Not migrated (excluded)</i>	
Educational objectives: cognitive objectives	Educational	Tick-boxes	<i>Not migrated (excluded)</i>	
Educational objectives: processes	Educational	Tick-boxes	<i>Not migrated (excluded)</i>	
Educational objectives: Affective objectives	Educational	Tick-boxes	<i>Not migrated (excluded)</i>	
Educational objectives: Psychomotor objectives	Educational	Tick-boxes	<i>Not migrated (excluded)</i>	
Lab type	Technical	Drop-down list	Technical	Drop-down list
Preview	Technical	URL	Technical	URL
Level of interaction	Technical	Drop-down list	<i>Not migrated (excluded)</i>	
Booking required	Technical	Tick-box	Technical	Tick-box
Registration required	Technical	Tick-box	Technical	Tick-box
Technology label (Java/Flash)	Technical	Scrollable list	Technical	Tick-boxes
Technical requirements	Technical	Text	<i>Not migrated (excluded)</i>	
Supporting students with disabilities	Technical	Scrollable list	Technical	Tick-boxes
Additional supportive materials: title	Technical	Text	<i>Not migrated (excluded)</i>	

Field name	Golabz 1.0		Golabz 2.0	
	In tab	Field type	In tab	Field type
Additional supportive materials: URL	Technical	URL	Technical	URL
Big Ideas of Science	Big Ideas	Tick-boxes	Educational	Tick-boxes
Screenshots	Screenshots	Image	General	Image
Works offline	-	-	Technical	Tick-box

Table 4: App submission form: overview of the fields and changes

Field name	Golabz 1.0 (field type)	Golabz 2.0 (field type)
App title	Text	Text
Description	Text	Text
App image	Image	Image
App type	Drop-down list	Drop-down list
App creator	Scrollable list	User
Category	Scrollable list	Drop-down list
Licence	Drop-down list	Drop-down list
Source code: title	Text	<i>Not migrated (excluded)</i>
Source code: URL	URL	URL
Keywords	Comma-separated items	<i>Not migrated (excluded)</i>
Preview link	URL	URL
ILS phases	Comma-separated items	Tick-boxes
Works offline	-	Tick-box

Table 5: ILS submission form: overview of the fields and changes

Field name	Golabz 1.0		Golabz 2.0	
	In tab	Field type	In tab	Field type
ILS title	General	Text	General	Text
ILS image	General	Image	General	Image
Description	General	Text	General	Text
ILS owner/creator	General	Text	General	Comma-separated items (two fields: owner, creator)
Language	General	Scrollable list	General	Drop-down list
Access rights	General	Drop-down list	General	Drop-down list (renamed in Licence)
Student link: title	General	Text	<i>Not migrated (excluded)</i>	
Student link: URL	General	URL	<i>Not displayed (added automatically)</i>	
Keywords	General	Comma-separated items	<i>Not migrated (excluded)</i>	
Go-Lab approved	General	Tick-box	<i>Not migrated (excluded)</i>	

Field name	Golabz 1.0		Golabz 2.0	
	In tab	Field type	In tab	Field type
Subject domains	Educational	Adaptable drop-down lists	Educational	Tick-boxes hierarchy
Age range	Educational	Scrollable list	Educational	Tick-boxes
Level of difficulty	Educational	Drop-down list	<i>Not migrated (excluded)</i>	
Level of interaction	Educational	Drop-down list	<i>Not migrated (excluded)</i>	
Average learning time	Educational	Drop-down list	Educational	Drop-down list
Scenario	Educational	Text	<i>Not migrated (excluded)</i>	
Students' prior knowledge	Educational	Text	Educational	Text
Organisational requirements	Educational	Text	<i>Not migrated (excluded)</i>	
Additional supportive materials: title	Educational	Text	<i>Not migrated (excluded)</i>	
Additional supportive materials: URL	Educational	URL	<i>Not migrated (excluded)</i>	
Educational objectives: cognitive objectives	Educational	Tick-boxes	<i>Not migrated (excluded)</i>	
Educational objectives: processes	Educational	Tick-boxes	<i>Not migrated (excluded)</i>	
Educational objectives: Affective objectives	Educational	Tick-boxes	<i>Not migrated (excluded)</i>	
Educational objectives: Psychomotor objectives	Educational	Tick-boxes	<i>Not migrated (excluded)</i>	
Educational objective (disabled, not removed)	Educational	Text	<i>Not migrated (excluded)</i>	
Big Ideas of Science	Big Ideas	Tick-boxes	Educational	Tick-boxes
Screenshots	Screenshots	Image	General	Image
Works offline	-	-	Technical	Tick-box