



RIS-ALiCE: Al-rich industrial residues
for mineral binders in ESEE region

DELIVERABLE D4.3

EITRM103040: ALiCE on-line registry prototype
report Lead beneficiary: Lucis, d.o.o.



LUCIS

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1. INTRODUCTION

The RIS-ALiCE project, funded by EIT RawMaterials, is aiming to create a network of relevant stakeholders in the area of currently unutilized and landfilled aluminium containing industrial residues and make use of them for low-energy cement production. By interlinking cement producers, waste producers, research institutions and other stakeholders in the field we aim to get one step closer towards the production and use of low-CO₂ cement clinkers which are produced with far less energy than cement that is on the market today.

Work Package 4 in the RIS-ALiCE project aims to develop an on-line registry of Al-rich waste materials in the ESEE region dedicated for cement plants and waste holders to help them better plan their future operations (Figure 1). At first, the work schedule in developing this registry was to review similar existing solutions (T4.1). The output of T4.1 served as a basis for the registry blueprints (T4.2), which allowed the creation of the actual registry prototype (T4.3). The primary purpose of T4.3 was to create and launch the registry prototype and populate it with data. This document will focus on describing the register's technical specification and data input procedures. In further steps, the recorded feedback will allow the RIS-ALiCE consortium to improve the initial registry prototype to better suit the needs of end-users (i.e. cement plants, waste holders/producers etc., T4.4), and to launch the final version of the registry to ESEE area (T4.5).

The RiS-ALiCE registry prototype will be accessed via RIS-ALiCE web page, but also directly via provided URL. This has not yet defined, as the domain is not purchased at the moment, but this will be arranged until the registry becomes final in M24. Therefore the registry, for the purpose of external testing, can be temporarily accessed (as in June 2020) via the following URL: <https://alice.dev.lucis.si/>.

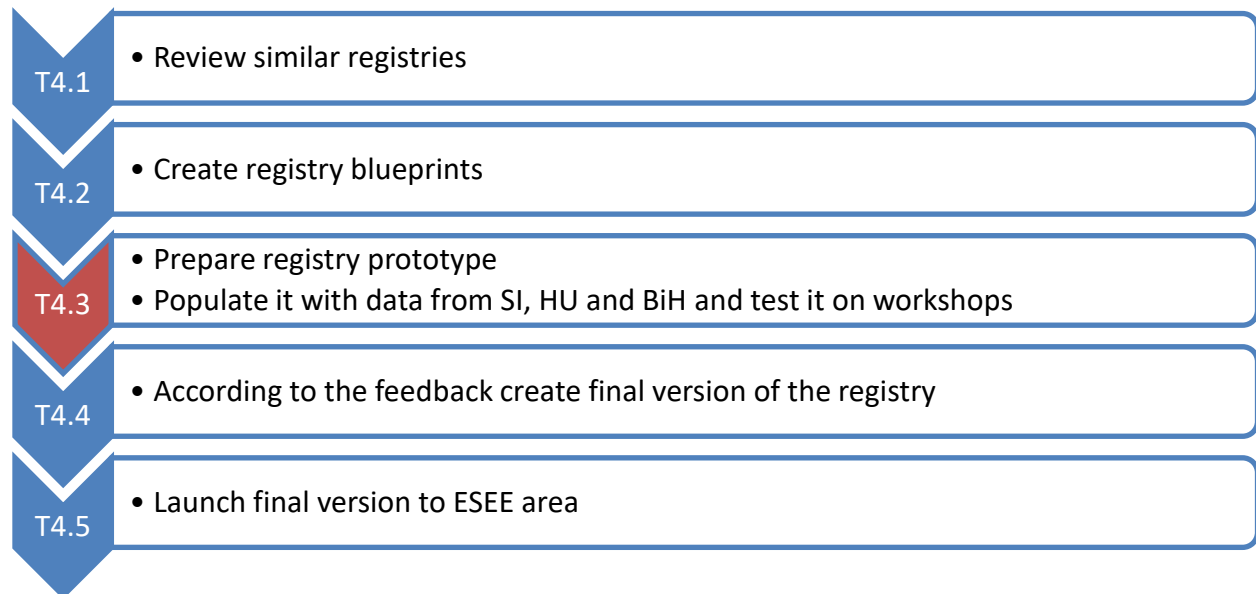


Figure 1. The workflow diagram for WP4. Activity in the chain of events towards the final registry described in this report is marked with red.

1.1 AIM AND PURPOSE OF THIS DOCUMENT

The aim of the deliverable D4.3 (that is the *Registry prototype*) is to build the first implementation of the RIS-ALiCE registry. For this, the data structure, content, validation protocols, material valorisation methods, user rights and other IPR issues, described in document D4.2 document, were implemented in D4.3 registry prototype and are now ready for the initial end-user testing. Later on, as usually is the case with the software user manuals, the software platform, user interfaces, data searching and retrieving methods will also be described.

The scope of this document is to specify the registry prototype from a technical and user perspective. However, the project consortium will populate the RIS-ALiCE registry with data in later stages of development, when we assume the potential upgrades and fixes will also arise. This iterative process will allow us to fine-tune the register, leading us to achieve its full usefulness. We expect the final version of the registry might differ from what we are now presenting in the document, as it will depend on the end-users feedback.

2. METHODOLOGY

1. We developed the registry prototype by following the waterfall model. Based on the input document, marked in D4.2, we designed and then implemented the registry itself.
2. The waterfall model is useful when building a well-defined, documented and accurately scoped product, as it was in the case of RIS-ALiCE registry.
3. A typical waterfall process goes as shown in the Figure 2.
4. Currently (as in June 2020) the registry is implemented and internal verification was conducted by LUCIS. In the second part of 2020 we will conduct external verification stage, which will be done by RIS-ALiCE partners and other interesting stakeholders. Future phases of RIS-ALiCE registry development will most likely adopt an agile development methodology (i.e. SCRUM). Shorter development cycles, which iterate over end-user requirements, end up with a more refined and user-friendly product.

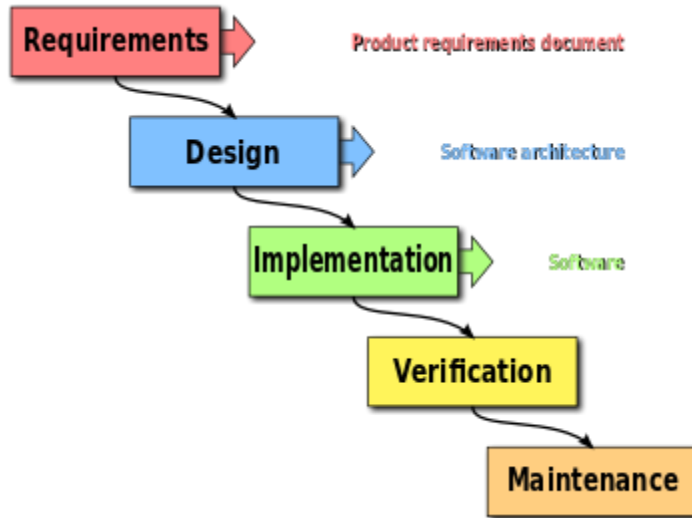


Figure 2. The waterfall process for registry implementation.

3. RIS-ALICE REGISTRY PROTOTYPE

The registry prototype was build following the waterfall model:

1. **Requirements** based on document D4.2 (i.e. *Registry prototype blueprints*);
2. **Design**, including the high-fidelity wireframes, representing the mockups, and defining the data model based on #1.
3. **Prototype software implementation**, developed by Lucis.
4. **Verification has two stages:**
 - a. Internal testing (done)
 - b. External testing (to be done by consortium partners)
5. **Maintenance** (TBD)

3.1 WIREFRAMES/MOCKUPS

Using high-fidelity wireframes or mockups makes the process of implementing a software product more straightforward and faster as the developers can follow a graphic representation of the end product.

Examples of mockups are presented on Figures 3-5.

ALICE

Username

Password

Register


New user? [Create an account](#)

eit RawMaterials Connecting matters

eit Regional Innovation Scheme

 This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation.

Figure 3. The mock-up of the sign-in form



Create your account

Company name

Company logo

Company type

- Waste producer
- Waste holder
- Recycling
- Waste collection
- Waste storage
- Waste transport
- Other


Short description

Webpage


Contact name

Contact phone


Contact email



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Innovation
Scheme



This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation.

Figure 4. The mock-up of company registration

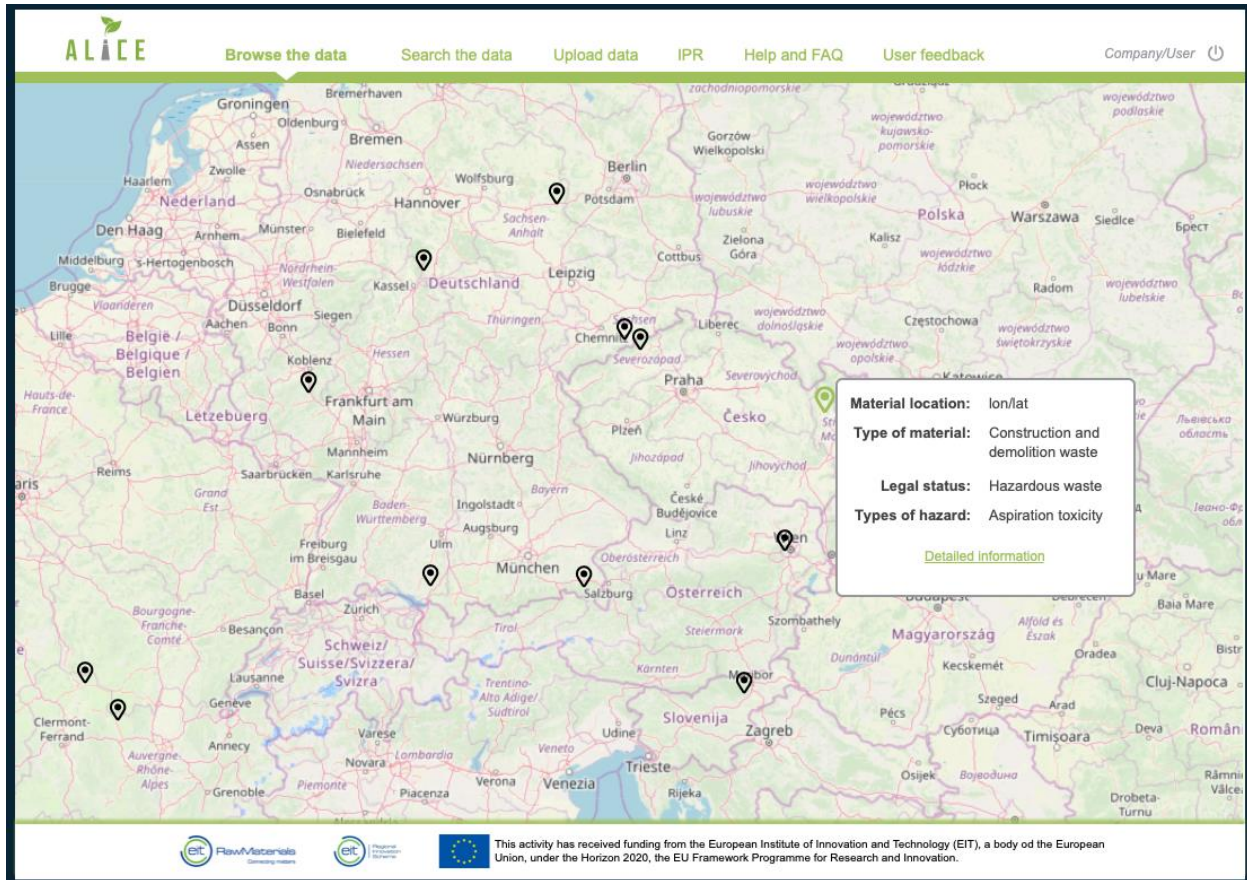


Figure 5. The mock-up of the map

3.2 ARCHITECTURE

The register is implemented by using all open-access software, including **PHP 7.3**, using relational **MySQL** database for storing the main configuration of the input details and the register data itself. The mentioned technology stack runs on a **Linux** operating system.

The application is built on **OctoberCMS** platform, using cutting-edge PHP technology stack, with **Laravel 5.5** at its core.

Such configuration allows high-performance, functionally complex code with quicker and easier maintenance and development. What is more, it enables us to expand its functionality by using **Laravel API**.

The backend enables users, upload forms and email content management.

The administrator can change the labels, sort orders and units in majority cases of the input fields.

The RIS-ALICE registry has security implicitly integrated. All connections will be safe, using an appropriate server site certificate and enabling https. All passwords will be kept in an encrypted manner.

The front-end portal enables:

- Registration, profile management, user management (for a company admin).
- Input/manage data is separated into the tabs for a better user experience.
- Upload files (pdf, png, tiff, doc, docx) and images.
- Browse and filter data in a tabular view.
- Display data on the **OpenStreetMap**, search/filter data by company name, hazards.
- Export to the xls file format is available.

Core components:

- **PHP:** The PHP (recursive acronym for PHP: Hypertext Preprocessor) is a widely-used open source general-purpose scripting language that is especially suited for web development, and can also be embedded into HTML (<https://www.php.net/manual/en/intro-what-is.php>)
- **MySQL:** The world's most popular open-source database. (<https://www.mysql.com/>)
- **OctoberCMS:** October is a free, open-source, self-hosted CMS platform based on the Laravel PHP Framework. Thousands of digital studios and freelancers all over the world love October for its simplicity, flexibility and modern design. (<https://octobercms.com/>)
- **Laravel API:** Laravel is a free, open-source PHP web framework, intended for the development of web applications following the model–view–controller (MVC) architectural pattern. (<https://laravel.com/>)
- **OpenStreetMap:** OpenStreetMap is a collaborative project to create a free editable map of the world. The geodata underlying the map is considered the primary output of the project. (<https://www.openstreetmap.org/>)

3.3 USER MANAGEMENT AND USER ON-BOARDING

User management

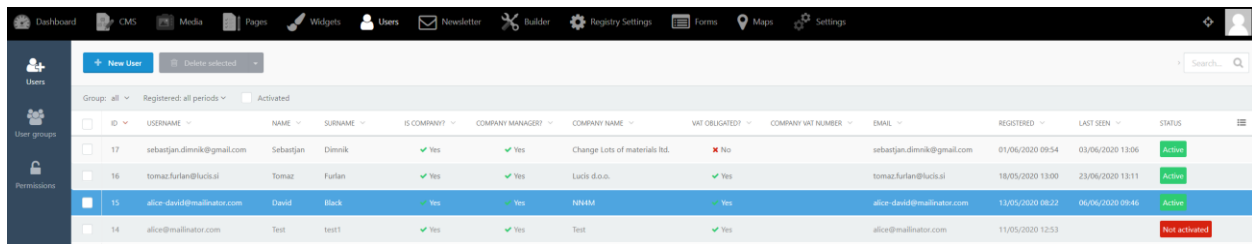
We have built the on-boarding and management functionality by keeping in mind the schematic representation (Figure 5) from the document *Registry blueprint*. We are developing the user management in October CMS which allows a fine-grained segmentation of users based on user groups and permissions.

User levels

- **System admin or root:** have permissions to administer the hosting operating system (Linux) and all infrastructure modules.
- **MySQL admin:** have permissions to administer the hosting database.

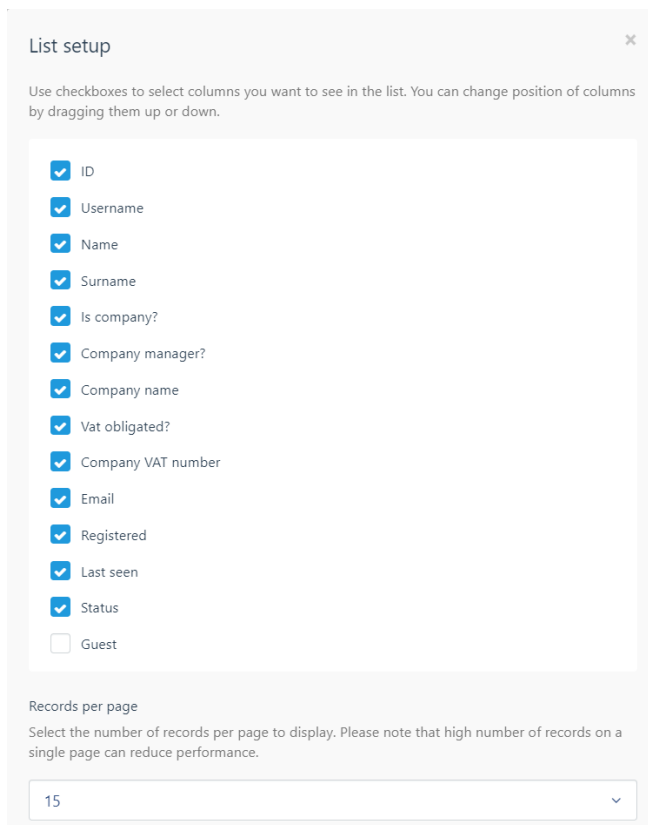
- **Registry administrator/root:** have permissions to manage October CMS (demo link: <http://alice.lucis.si/backend/backend>).
- **Registry administrator/power user:** Administer the registry functionalities and confirm new users and company admins.
- **Company admins:** Administer company account, including registered users and documents/data.

Figure 6 presents an example: Lucis d.o.o. company registry administrator. User displayed parameters are presented on Figure 7, user details on Figure 8, super-user flag ON as company administrator on Figure 9, user groups dialog on Figure 10 and permissions page on Figure 11.



ID	USERNAME	NAME	SURNAME	IS COMPANY?	COMPANY MANAGER?	COMPANY NAME	VAT OBLIGATED?	COMPANY VAT NUMBER	EMAIL	REGISTERED	LAST SEEN	STATUS
17	sebastjan.dimnik@gmail.com	Sebastjan	Dimnik	Yes	Yes	Change Lots of materials ltd.	No		sebastjan.dimnik@gmail.com	01/06/2020 09:54	03/06/2020 13:06	Active
16	tomaz.furlan@lucis.si	Tomaz	Furlan	Yes	Yes	Lucis d.o.o.	Yes		tomaz.furlan@lucis.si	18/05/2020 13:00	23/06/2020 13:11	Active
15	alice-david@mailinator.com	David	Black	Yes	Yes	NNMM	Yes		alice-david@mailinator.com	13/05/2020 08:22	06/06/2020 09:46	Active
14	alice@mailinator.com	Test	test1	Yes	Yes	Test	Yes		alice@mailinator.com	11/05/2020 12:53		Not activated

Figure 6. An example of users administrator page.



List setup

Use checkboxes to select columns you want to see in the list. You can change position of columns by dragging them up or down.

- ID
- Username
- Name
- Surname
- Is company?
- Company manager?
- Company name
- Vat obligated?
- Company VAT number
- Email
- Registered
- Last seen
- Status
- Guest

Records per page

Select the number of records per page to display. Please note that high number of records on a single page can reduce performance.

15

Figure 7. User displayed parameters dialog.

Figure 8. User details dialog.

Figure 9. Super-user flag ON as company administrator example.

+ Create Delete selected Search...				
<input type="checkbox"/>	NAME	CODE	CREATED	USERS
<input type="checkbox"/>	Registry administrator	registry-administrator	2020-03-09 17:37:34	2
<input type="checkbox"/>	Registered	registered	2020-03-09 13:22:25	8
<input type="checkbox"/>	Guest	guest	2020-03-09 13:22:25	1
<input type="checkbox"/>	Company administrator	company-administrator	2020-03-09 17:38:11	5

Figure 10. User groups dialog.

+ New Permission			
ID	CODE	NAME	DESCRIPTION
4	comment	Commenting	
3	manage-data	Manage data	
2	manage-company	Manage company	
1	manage-all-users	Manage all users	

Figure 11. Permissions management system.

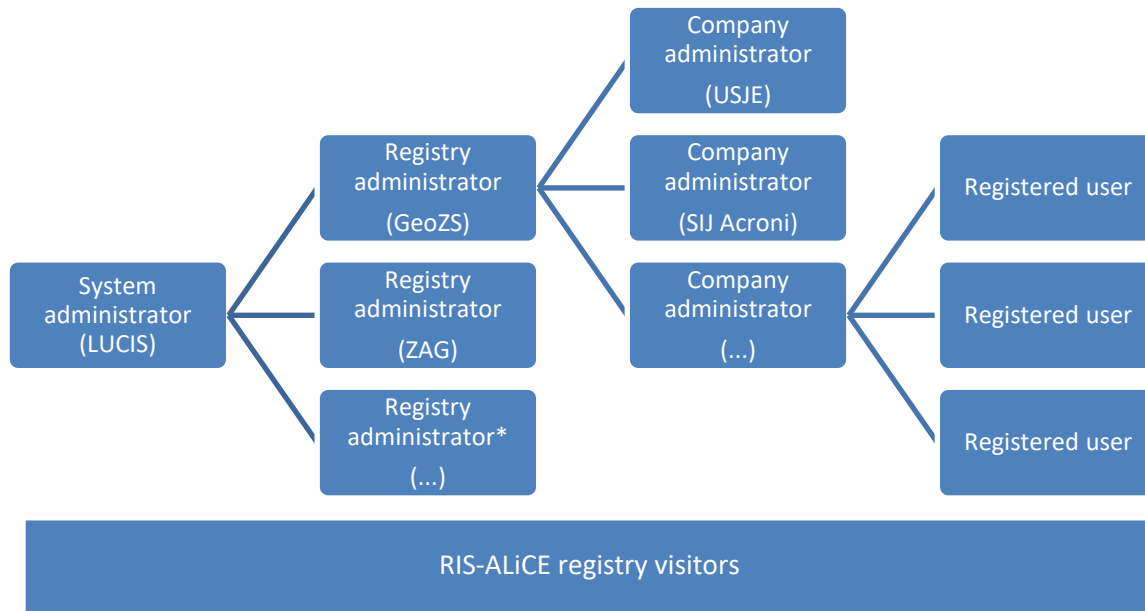


Figure 12. A schematic representation of RIS-ALiCE registry user management. * - another way for this can be arranged is that each country has its registry administrator (figure taken from RIS-ALiCE D4.2)

Users on-boarding flow

A new user begins their sign-up journey by clicking a *sign-up* button on the register landing page. Then, the user is requested to fill a set of data (personal, company, etc..., Figure 13). After one confirms the entered data by clicking on the button *register*, the request waits until the portal admin (company or registry) approves it. After user-approval and confirmation, the user receives a confirmation email, containing further instructions.

Registration

First name *

Last name *

Phone number

Company name

Web page

Short description

Upload company logo

Choose File No file chosen

Logo url

Address

Zip code

City

Country

please select

Email *

Password *

Repeat password

Register

Figure 13. New user sign-in page.

User can sign-in by clicking the *sign-in* button on the registry landing page (Figure 14), and filling-out username and password:

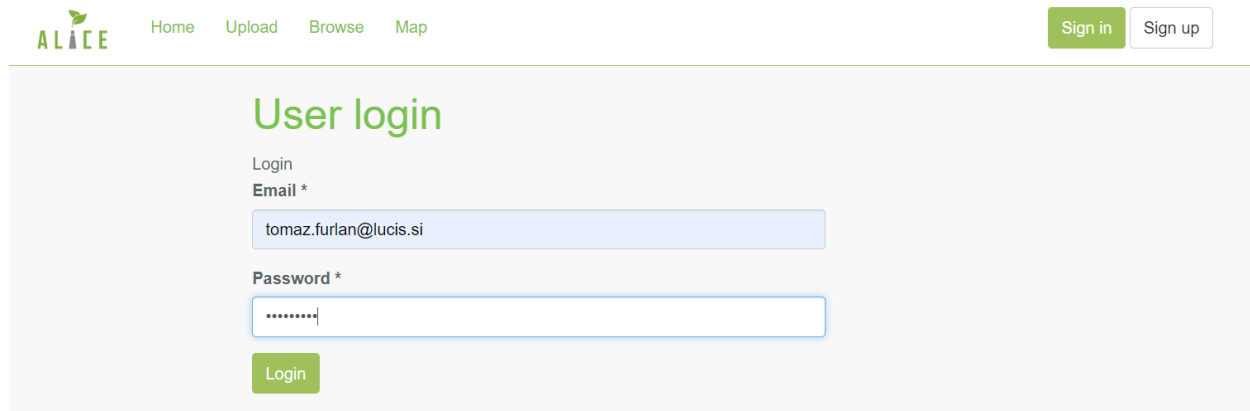


Figure 14. RIS-ALiCE registry login page.

3.4 WASTE, MESURAMENST AND LOCATION DATA UPLOAD

The central register form aims to upload all necessary data to add a new waste location, including all measurements, documents and location data as specified in the document D4.2 registry blueprint. For this reason an upload form has been prepared (Figure 15), where:

- mandatory fields are marked with a red dot,
- input fields are self-explanatory named to ease the input procedure,
- some input fields are dynamically generated to accommodate a wide range of measurements (Figure 16),
- location is defined by longitudinal and latitudinal coordinates (Figure 17) and
- additional documents can be uploaded as conformity proof etc. (Figure 18).

Legal status Location Quantities Chemical Mineralogical Physical Radiological Life-cycle assessment Additional data Data relevancy

Legal status

Data protection •

- Free to use by everybody
- Free to use by ALICE registered users only
- Data is not part of the registry

Type of material •

- Steel slag
- Fly ash (coal)
- Bottom ash (coal)
- Other type of ash
- Red mud
- Construction and demolition waste
- Mine tailings
- Mine spoils
- Mineral raw material
- test

Legal status of the material

According to the EC Waste Framework Directive

- Mineral raw material
- Inert waste
- Non-hazardous waste
- Hazardous waste
- By-product

Figure 15. An example of an empty data upload form.

ALICE Home Upload Browse Map

Legal status Location Quantities Chemical **Mineralogical** Physical Radiological Life-cycle assessment Additional data Data relevancy

Mineralogical composition of the material

Content of crystalline phases present in the amount higher than 5%

Name of the phase	Chemical formula	Content	wt%
<input type="text"/>	<input type="text"/>	<input type="text"/>	wt%
+ ADD PHASE			

Content of amorphous silica wt%

Content of respirable crystalline SiO₂ wt%

Content of amorphous phase wt% (XRD)

or

Figure 16. An example of dynamic input field.

ALICE Home Upload Browse Map Welcome, Tomaz ▾

Legal status **Location** Quantities Chemical Mineralogical Physical Radiological Life-cycle assessment Additional data Data relevancy

Location of waste

Latitude Longitude

Transportation options

Waste loading options

Truck
 Rail
 Ship
 Other

Conveying options

Pneumatic transport
 Conveyor belt
 Other

or

Figure 17. Location input dialog, containing longitudinal and latitudinal coordinates.

ALICE Home Upload Browse Map Welcome, Tomaz

Legal status Location Quantities Chemical Mineralogical Physical Radiological Life-cycle assessment **Additional data** Data relevancy

Additional data

Certificates
i.e. safety data sheet, technical specifications, waste assessment reports, etc.
Add a document

Laboratory analyses
Add a document

Photographs
Add a document

Other documents
Add a document

Create Create and close or Cancel

2020 - 2020

Figure 18. Additional documents input form.

3.5 SEARCH AND DATA VISUALIZATION

RIS-ALiCE registry enables the user to perform a detailed search over most of the inserted values. In case of a general search, a simple but powerful context search is available as well (Figure 19). When a specific search result is clicked, it is displayed in a detailed and ordered way, including a map (Figure 20).

ALICE Home Upload Browse Map Welcome, Tomaz

+ Add data Export Lucis

Company: Ownership: Created: all periods Type: all Material status: all Loading: all Conveying: all qnt: all numbers

COMPANY	MATERIAL TYPE	STATUS	CLASSIFICATION	OWNERSHIP	LOCATION	LOADING OPTIONS	CONVEYING OPTIONS	QUANTITY	STOCKPILE DATE	UPDATED BY
Lucis d.o.o.	Construction and demolition waste	Mineral raw material	12345 (ECHA)	sdf	lat: 46.23887000 lng: 14.35561000	Rail, sa	Pneumatic transport, Conveyor belt, Other	123123.24 t	12/04/2020	Larissa Bobkova Lagudin
Lucis d.o.o.	test	Hazardous waste	ssdf (ECHA)	sdf	lat: 46.05108000 lng: 14.50513000	Truck, Ship	Pneumatic transport, Conveyor belt	123123.24 t	12/04/2020	Larissa Bobkova Lagudin
Lucis d.o.o.	Construction and demolition waste	Mineral raw material	12345 (ECHA)	sdf	lat: 41.78170810 lng: 15.85164210	Rail, sa	Pneumatic transport, Conveyor belt, Other	123123.24 t	12/04/2020	Larissa Bobkova Lagudin
Lucis d.o.o.	Construction and demolition waste	Hazardous waste	asd (ECHA)	asd				0.00 t		Tomaz Furlan
Lucis d.o.o.	Steel slag	Mineral raw material	1234567 (0)	Lorem ipsum mundi orkodio	lat: 46.05694600 lng: 14.50575100	Truck, Rail	Pneumatic transport	50000.00 t		Tomaz Furlan
Lucis d.o.o.	Construction and demolition waste	Hazardous waste	asd (ECHA)	asd				0.00 t		Tomaz Furlan
Lucis d.o.o.	Steel slag	Mineral raw material	1234567 (0)	Lorem ipsum mundi orkodio	lat: 46.05694600 lng: 14.50575100	Truck, Rail	Pneumatic transport	50000.00 t		Tomaz Furlan

Displayed records: 1-7 of 7

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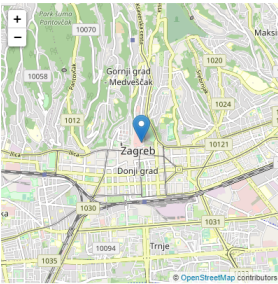
Figure 19. Search dialog.

ALICE Home Upload Browse Map Welcome, Tomaz ▾

Legal status Location Quantities Chemical Mineralogical Physical Radiological Life-cycle assessment Additional data Data relevancy

Location of waste

Latitude Longitude



Transportation options

Waste loading options

- Truck
- Ship

Conveying options

- Pneumatic transport
- Conveyor belt

Figure 20. Search result dialog.

4. FUTURE STEPS

Based on the recorded feedback, Lucis d.o.o. will prepare the final version of the registry (M24), which will be launched to the whole ESEE area by Vinča institute (VINS) with the help of all RIS-ALiCE partners.

5. CONCLUSIONS

This document presents the RIS-ALiCE registry prototype. Next development iterations will focus on fine-tuning of the current prototype until the final version is ready for roll-out.