BSLISE directory: innovating global mapping and organization of LIS schools

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Abstract

Introduction. The building strong library and information science education (BSLISE) initiative seeks to strengthen the global library and information science (LIS) community by developing an international directory of LIS education programs.

Method. Evolving from the MAP project, the BSLISE directory consolidates and adapts data into a new framework using open-source software. This framework incorporates principles of citizen science and open science, focusing on user-friendly design and integration with existing systems.

Analysis. Data analysis revealed varied regional representation and gaps in accessibility. The directory is structured around organizations, programmers, and users to facilitate learning and knowledge dissemination. Data curation routines and privacy controls ensure data quality and confidentiality.

Results. The directory provides a comprehensive resource for LIS education, incorporating user feedback for continuous improvement. Future developments include integration with RoR and enhanced data categorization. The directory aims to foster international collaboration and incorporate diverse cultural perspectives, benefiting from regular updates.

Conclusion. The BSLISE directory centralizes global LIS education resources, supporting international collaboration and knowledge sharing. Its open-science approach ensures ongoing relevance and adaptability to the global academic community.

Introduction

The building strong library and information science education (BSLISE) is a working group of IFLA that was commissioned in 2018 to develop a set of guidelines for the global library and information science (LIS) community. The BSLISE guidelines serve as a framework for developing LIS education programs, which stakeholders can use for planning, developing, and assessing the quality of LIS education and identifying the necessary knowledge areas for LIS professionals to apply and continue to develop (Chu & Raju, 2018). As part of the guideline development process, a subgroup was formed to design a map project to capture data from global LIS programs and create a visualization of their geographic locations. This map project was populated with data submitted by the global LIS community through a series of surveys released in 2019 and 2020. The call for data submission was shared internationally with the LIS community. The data was cleaned and added to a database used to build the map, which was then introduced and mapped using Visão, an open-source geographic information system (GIS) software hosted by IBICT. The map project's objective was to enable users to focus on a specific geographic area, country, or region and view the available LIS programs within that specified area, as well as other pertinent information. It also aimed to allow employers to quickly find LIS schools and obtain additional information about a candidate's qualifications (Nuria et al., 2022).

However, it was noted that the map primarily addressed geographic access while leaving open additional opportunities for accessing the dataset and improving participation of LIS programs in the project. The main issue was access to textual content, such as detailed descriptions of each program or course, providing deeper insights into their actions and activities. Furthermore, improvements were identified regarding access and discoverability of information, such as the application of thematic filters and individualized access to the page of each school, program, or course. Lastly, the need for a structure that would allow institutions to independently submit and update their data was also considered, promoting greater autonomy and reliability of the information provided. The *BSLISE Directory Project* is an expansion of the Map Project.

Lists of people or organizations which are typically arranged in alphabetical or classified order, providing addresses and other details are generally characterised as directories (Cunha, 2001). For legal entities, this includes the address, names of executives, offered products and services, and similar information. The importance of a digital platform offering a directory structure lies in its ability to centralize essential information, providing a unified point of reference that optimizes data management and access. This mechanism facilitates collaboration among various actors by promoting informational accessibility for all involved. Furthermore, the centralization of information supports interoperability between different systems and platforms, enabling effective compatibility and sharing of critical information. A notable example of a directory is the *Registry of Research Data Repositories* (re3data) (https://www.re3data.org/), which centralizes research data repositories, contributing to discoverability and information preservation.

Given this context, the research focused on organizing an informational structure that supports strengthening the international quality of LIS education and fosters the exchange of information among international schools.

Methodology

To achieve the project's objective, the team adopted different approaches. The informational perspective focused on organizing and structuring the data already gathered as part of the map project and understanding the features necessary to provide the new service. Regarding the computational aspects, the main proposal was to identify an open-source software that would meet the informational requirements. Strategically, the project's results aimed to retain the MAP's most valuable functions, so this was kept in mind throughout the entire process. Finally, the group validated the proposed information architecture.

The first activity was to organize the existing information and understand the available possibilities. The group used the IFLA regional division to prepare a visual presentation of the courses and universities. It was then determined that a directory approach would best fit the informational needs.

The design of the site followed the prototype, assess and review (PAR) method (ROCHA et al., 2024), used in various IBICT projects. This method was applied to identify the most important information structures and was implemented using the spreadsheet already collected by the team members as a starting point. This phase established how the data would be consolidated and which attributes were most important to consider.

Another requirement considered during the project's execution was the use of an open-source software. Using an open-source software is important to foster collaboration and sustainability of the resulting directory in the long term, as it is intended to be operated and maintained by the global LIS community in the future.

IBICT has been working with open science since the 1990s and has experienced different approaches over the decades. One of the projects IBICT has worked on is the CIVIS *citizen science platform.* Once the team involved in the Directory's project analysed the requirements already defined, it was identified that CIVIS could be used as the basis for the new project. This platform is based on the European Commission's citizen science project (https://eu-citizen.science/) and is already multilingual, meaning that other languages could be incorporated in the future. The next steps focused on mapping the specificities that would need to be incorporated into the new system, as well as identifying which existing resources would not be needed in the future platform.

One of the features incorporated during the technology definition process was the online forms. As the intention was to allow users to self-register their schools and courses, this usability was very important. At the same time, it was considered that the submitted data would need to be validated before being made available online. This curation process was also one of the features already incorporated in the CIVIS platform. After all the requirements were verified, the CIVIS platform was defined as the base for the creation of the new BSLISE directory.

Another phase of the research was related to data preparation. The original data was in tabular format and stored in an online Google spreadsheet. In many cases, there was a cardinality problem where an organization contained more than one course, resulting in duplicated educational institution data, which generated inconsistencies and rework. This data had already been validated by the team, but the way the MAP was organized required that this duplicated data be retained. To import the MAP dataset into the Directory database, a Python script was built to define connections between organizations and the courses they offered. The resulting relational database was then checked in three additional aspects: whether the course URL existed, whether there was an image containing the organization's brand available online, and whether the latitude and longitude provided were valid. These verifications were used to ensure a more reliable dataset.

To develop the information architecture of the directory, the initial structure of CIVIS was used as a foundation, and the information fields were adapted to meet the specific needs of the LIS courses data. From the available fields, the following were selected:

- **Programs:** name, URL, description, qualification, theme, geographic scope, countries, organizations, contact, email, phone, profile image
- **Organizations or networks:** name, URL, description, organization type, contact, email, organization logo, location
- **Users:** name, title, email, country, biography, areas of interest, profile picture

This set of informational fields allows the data recorded in the directory to be used not only for visualization purposes but also for creating information refinement filters and establishing relationships between programs and organizations.

Finally, the proposed architecture was validated first by professionals involved in the MAP project and then by the BSLISE group. Comments and contributions were aggregated and incorporated if viable.

Results and discussions

The first result achieved was the understanding that some regions were more represented in the MAP than others. This was possible due to a visual organization of all courses submitted to the MAP project. The tool used was a sunburst graphic structured based on the six IFLA regions: Asia-Oceania, Europe, Latin America and the Caribbean, Middle East and North Africa, North America, and Sub-Saharan Africa. The result is presented in Figure 1 below.
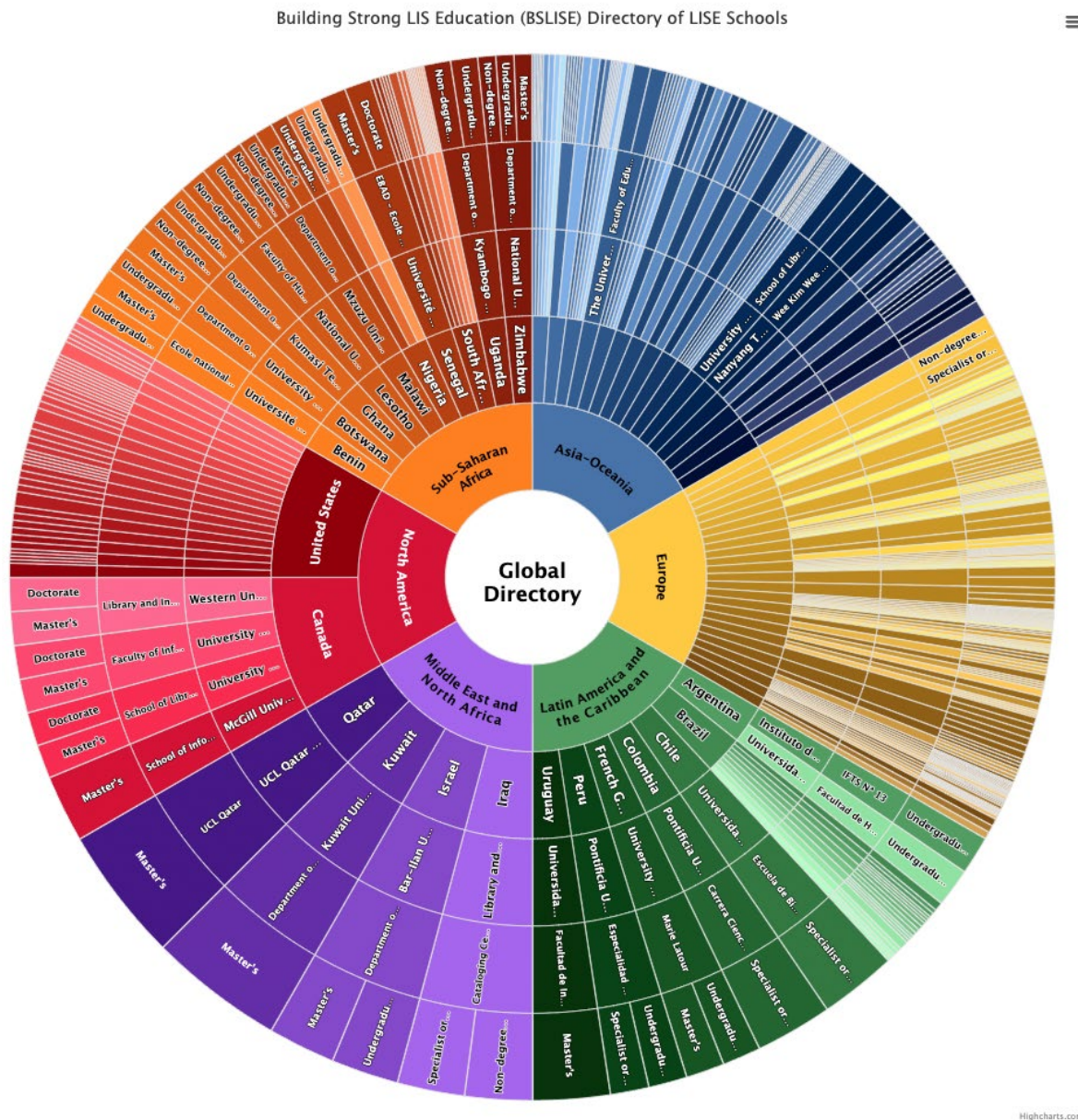

Figure 1. Sunburst graphic

The sunburst graphic highlighted that some regions were denser than others in terms of registered schools and courses, such as Europe and North America, by the other hand, Sub-Saharan Africa, and the Middle East show less representation, highlighting potential gaps in data collection. The tool used

effectively visualized density by region but could not identify duplicate entries. One aspect that the team working on the project understood was that the IFLA regions did not need to be a requirement for the project, as there would only be a visualisation filter generated automatically. Hence, this characteristic would not be incorporated into the first version of the repository.

Data modeling leveraged IBICT's experience in setting up CRIS systems (Segundo et al., 2023) that use standardized international ontologies. The process integrates the requirements suggested by the BSLISE working group with the state of the art in modeling the organization and course entities. The final model is described in Figure 2.
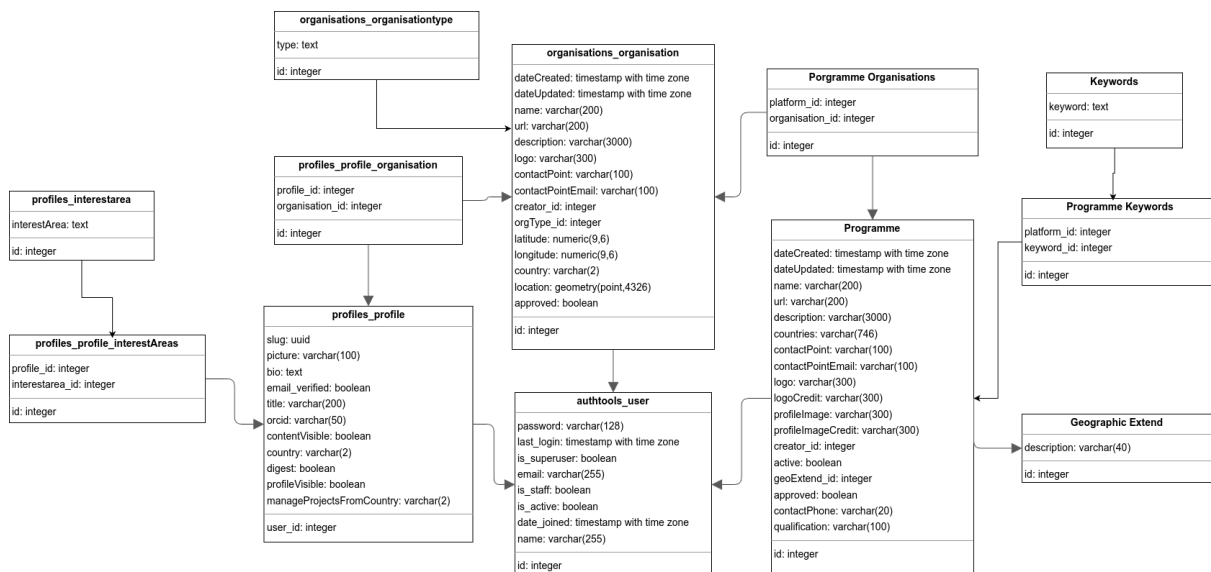

Figure 2. Main model

The visual proposal for the new directory considered that the platform should be easy to use and understand. The MAP project required the creation of manuals, which took some months to complete, and this was not the intention of the directory. Based on the three entities—organizations, programs, and users—a very clean information architecture was proposed, as shown below.

Figure 3. Prototype of information architecture

After applying the proposed data methods, the data obtained in the MAP phase was consolidated based on the directory proposal. More than 170 courses were registered and mapped according to the organizations running each course. Different metadata were mapped, and the organizations were categorized mainly into academic, governmental, and non-governmental.

The information architecture, supported by the pillars of '*organization, courses, and users*', has been strategic, as these three components encompass the main dimensions involved in learning and knowledge dissemination. Organizations provide an institutional reference point, ensuring credibility and a variety of options. Courses, in turn, are the informational core, representing the available educational offerings with varying levels, durations, and formats. Finally, users include both students and professionals interested in qualifications or updates, allowing the directory to be tailored to meet the needs and preferences of this audience. This triad ensures an integrative approach, facilitating efficient access to information in a way that aligns with the needs of the public.

Routines have also been implemented to curate the data entered by external users. The process runs as follows: the user registers their data on the platform, and the system checks that the email is valid and sends a notification to the registered email. There is also a *CAPTCHA* check to prevent attacks. Based on this automated validation, curators verify the data via *ORCID* or other sources and approve the user's registration.

Strict control is maintained over user privacy, allowing users to define at any time which data will be public and which will only be available to the platform's managers. Once approved, users can register organizations and courses, which will also go through the same curation process. The entire curation process is conducted directly on the platform, without the need for external controls.

The development of the BSLISE directory was supported by two key concepts: citizen science and open science. Regarding citizen science, the design of the directory highlights the use of two principles described by the European Citizen Science Association (2015): 1. citizen science projects actively involve

citizens in scientific activities, generating new knowledge and understanding and 7. data and metadata resulting from citizen science projects are made publicly available and, whenever possible, published in an open-access format. Both principles are closely aligned with the concept of open science. While the proposed information flow ensures that anyone aiming to contribute to the project can do so, it also guarantees that the submitted data adheres to the quality standards proposed by the BSLISE group. Additionally, every aspect of the directory is open, from the software used to store the data. All data related to submissions marked as public can be downloaded and integrated with other software or platforms.

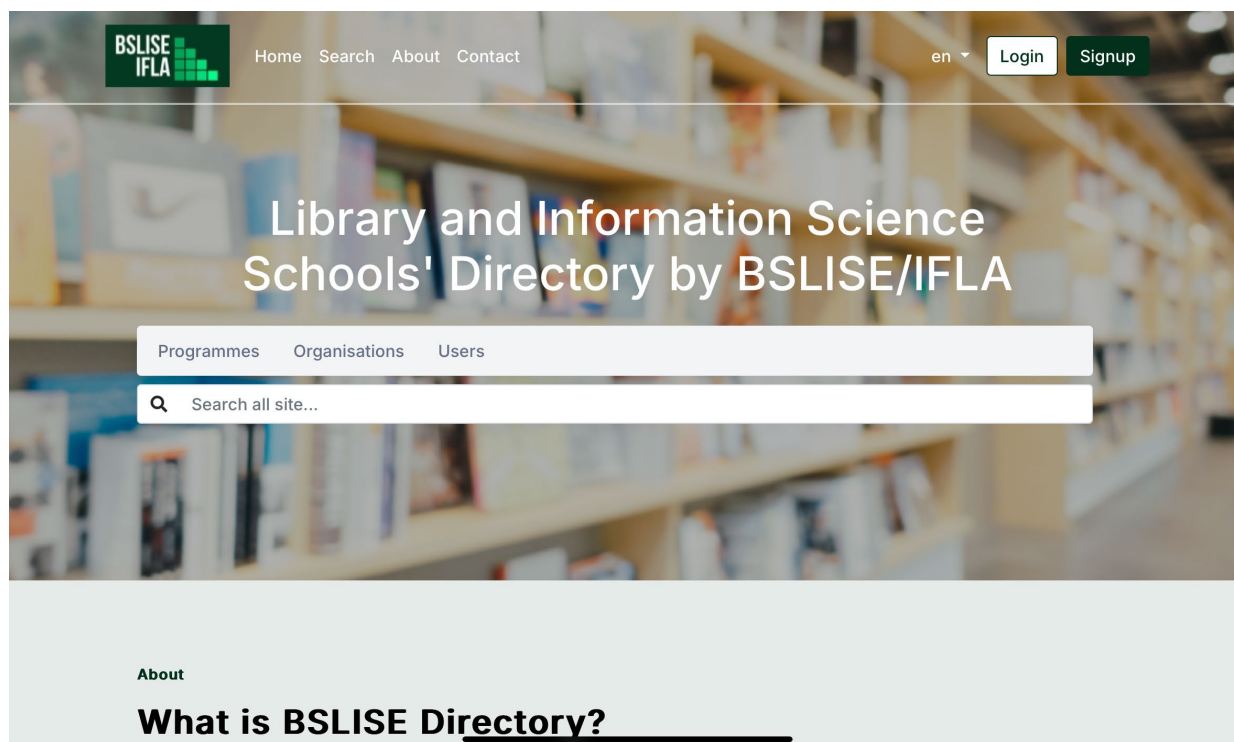The final version of the directory is shown below and will be accessible in the future using the link https://directory.bslise.org.

Figure 4. Screenshot of the directory's homepage

Finally, the members of the BSLISE group were able to access and provide input to contribute to the directory project. The group discussed the directory's characteristics as the project progressed.

Conclusion

The implementation of the BSLISE directory is a work in progress. New routines and adjustments continue to be made as the academic community becomes aware of the initiative and suggests improvements and new features. Also under construction are routines for integration with RoR, re-categorization of organization types to simplify data entry, and language customization for the emails sent to registered users in the directory.

Once the collaboration network is fully operational, there are plans to extend the system so that users can add curricula taught by the courses and educational resources useful to the academic community. For the LIS community, the directory can serve as a starting point for deepening international collaboration. The citizen science perspective allows the project to incorporate different cultural approaches, which could enhance the directory's adoption by the global LIS community. If successful, the directory will benefit from frequent data updates and validations.

It is important to highlight that the Directory project maintained the consistency of the data previously submitted to the MAP project. This was achieved because both projects were discussed and developed within the scope of the BSLISE group and followed the requirements established by the professionals involved in this initiative.

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