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Cita:

María Gimena del Rio Riande, Elena González Blanco García y Martínez Cantón, Clara (2017). *EVI-LINHD, a virtual research environment for the Spanish-speaking community*. *Digital Scholarship in the Humanities*, 32, 171-178.

Dirección estable: <https://www.aacademica.org/gimena.delrio.riande/161>

ARK: <https://n2t.net/ark:/13683/pdea/NKg>



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# EVI-LINHD, a virtual research environment for the Spanish-speaking community

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## Abstract

Laboratorio de Innovación en Humanidades Digitales (UNED) has developed Entorno Virtual de Investigación del Laboratorio de Innovación en Humanidades Digitales (EVI-LINHD), the first virtual research environment devoted mainly to Spanish speakers interested in digital scholarly edition. EVI-LINHD combines different open-source software for developing a complete digital project: (1) a Web-based application markup tool—TEIscribe—combined with an eXistdb solution and a TEIPublisher platform, (2) Omeka for digital libraries, and (3) WordPress for simple Web pages. All these instances are linked to a local installation of the LINDAT/Common Language Resources and Technology Infrastructure (CLARIN) digital repository. LINDAT/CLARIN allows EVI-LINHD users to have their projects deposited and stored safely. Thanks to this solution, EVI-LINHD projects also improve their visibility. The specific metadata profile used in the repository is based on Dublin Core, and it is enriched with the Spanish translation of DARIAH's Taxonomy of Digital Research Activities in the Humanities.

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## 1. Introduction

Although digital humanities (DH) has been defined from a disciplinary perspective in many ways, it is a field still looking for its own objects, technologies, and methodologies (del Rio Riande, 2016a, 2016b). Its development in the Spanish-speaking countries is no exception to this process and, though it is complex to trace a unique genealogy for Spain and Latin America (Gonzalez-Blanco García, 2013; Spence and González-Blanco García, 2014; del Rio

Riande, 2016a), the emergence of DH laboratories like Laboratorio de Innovación en Humanidades Digitales (LINHD)<sup>1</sup> and associations in Mexico Red de Humanidades Digitales (RedHD),<sup>2</sup> Spain Humanidades Digitales Hispánicas (HDH),<sup>3</sup> Argentina Asociación Argentina de Humanidades Digitales (AAHD),<sup>4</sup> and Colombia Red Colombiana de Humanidades Digitales (REHDI)<sup>5</sup> (Galina *et al.*, 2015) make it clear that research has become increasingly 'global, multipolar and networked' (Llewellyn Smith *et al.*, 2011) and that the

academic field of Spanish DH is aiming at a global outreach in search of virtual open spaces for shared work.

## 2. Virtual Research Environments

Virtual research environments (VREs)—defined by Fraser (2005) as ‘a framework into which tools, services and resources can be plugged’—facilitate the work of researchers and users from different communities in virtual spaces where they can develop, store, share, and preserve their digital projects. VREs have become central objects for the DH community, as they help global, interdisciplinary, and networked research, taking profit of the progress in ‘data production, curation and (re-)use, by new scientific methods, through changes in technology supply’ (Voss and Procter, 2009). DH Centers, laboratories, or less formal structures such as associations benefit from many kinds of VREs, as they make simpler and much more visible the research activity. The focus and implementation of each of these VREs is different, as Carusi and Reimer (2010) have shown in their comparative analysis, but there are some common guidelines, philosophy, and standards that are generally shared (as an example, see the guidelines of TGIR Huma-Num, 2015).

It is well known that VREs are not uncommon in the DH world, especially in areas like digital scholarly edition (DSE), where we can find many pioneer VREs—such as TextGrid<sup>6</sup> (Neuroth *et al.*, 2011), E-laborate,<sup>7</sup> or TPen<sup>8</sup>—and also tool suites like Ediarum,<sup>9</sup> which combine their own developments with edition software such as Oxygen.<sup>10</sup>

## 3. EVI-LINHD, ‘Un entorno al alcance de todos para crear proyectos en Humanidades Digitales’

Since 2015 the first DH Center in Spain—LINHD—has been working on Entorno Virtual de Investigación del Laboratorio de Innovación en Humanidades Digitales (EVI-LINHD),<sup>11</sup> a VRE especially designed for Spanish-speaking users

(although open to the global DH community) interested mainly in DSE. Considering that DSE is still a quite unknown research line in Spain and Latin America, EVI-LINHD was especially designed for non-experienced researchers and students.

EVI-LINHD offers users the possibility of creating three types of projects: (1) DSEs in XML-TEI with TEIscribe, combined with an eXistdb solution published through a TEIPublisher platform, (2) digital libraries with Omeka, and (3) plain Web sites using Wordpress. To facilitate the DSE work, a specific tagging tool—TEIscribe—was developed and integrated in EVI-LINHD. TEIscribe is a Web-based application implemented with Vaadin, an open-source Java framework.

One of the most important and relevant aspects of this VRE is that it allows projects to deposit and share their metadata in a LINDAT/Common Language Resources and Technology Infrastructure (CLARIN) repository. For this purpose, a specific metadata profile based on Dublin Core has been created. In this profile, the project’s metadata is defined through the implementation of the ‘Taxonomy of Digital Research Activities in the Humanities’ (TaDiRAH) Spanish translation (del Rio Riande, 2015).<sup>12</sup>

### 3.1. Technical details of EVI-LINHD

EVI-LINHD is hosted in an Ubuntu Linux Server with the classical LAMP configuration,<sup>13</sup> plus a Python and eXistdb 3.0RC solution.<sup>14</sup> EVI-LINHD’s core interface was built on Silex microframework using Twig<sup>15</sup> as template engine. Its development was based on the model–view–controller software design pattern paradigm, which is widely used in several areas such as engineering (Kupp and Makris, 2012), business intelligence (Romsaiyud, 2014), or Web application development (Drobi, 2012). See Figure 1.

There were two major challenges in the development of EVI-LINHD. The first one was to enable users to easily run their projects without any further configuration that would require technical expertise. The second one was to connect the authentication system of every project combining different ingredients or pieces of software in one Single sign-on. We call EVI-LINHD’s ingredients the different

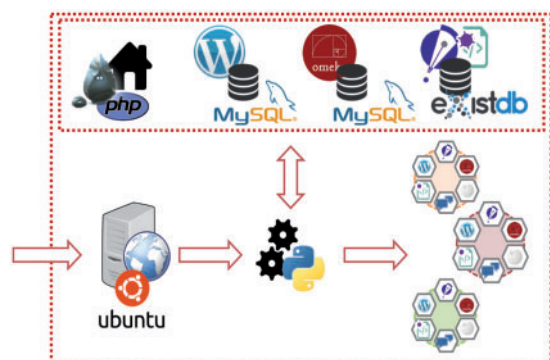


Fig. 1 EVI-LINHD's technological infrastructure

software instances that can be included on demand by the user. Depending on their needs, a new instance is created (for Wordpress or Omeka) or a service is reused and therefore shared (the TEIscibe scenario connected with an eXistdb installation). Once a user performs the demand of a project, the administrator examines it and, with a single click, the whole project is automatically deployed in EVI-LINHD. This means that both the installation and the configuration of every project are performed without any interaction between the user and the administrator. A set of scripts in Python fulfills this task, creating virtual hosts,<sup>16</sup> managing the services and performing system calls to complete the installation processes. For some operations with eXistdb collections, EVI-LINHD uses both the CLI and API that come along with eXistdb, and XQuery requests to perform some administrative operations within the XML database.

As expected, we had to ensure that only the authorized users could access their projects. The diversity of EVI-LINHD's ingredients obliged us to provide different solutions, from cryptographic tokens, such as JSON Web Token, to simpler ones (the so-called cookies), and hook them to every ingredient. Thus, we devised a Single sign-on process which relies ultimately on EVI-LINHD's authentication realm.

### 3.2 EVI-LINHD's interface

The design of EVI-LINHD's interface was built having in mind principles of usability, accessibility, and navigability (Norman 2005; Hallnäs and

Redström, 2002). Each page of the interface displays only the essential elements for the required functionality, leaving aside superfluous content that can deflect the attention of the user from its final objective. The amount of text is limited and has been replaced by significant icons with a minimal design that aim to help users find their way without the need of reading in a specific language and, therefore, adapting the interface to a multilingual context. The space allocated to each user account consists of two main pages showing the main features: the user home page that provides the information of the associated items and buttons to access to the main functions, and the project page that gives access to applications, messaging, and publication of data in LINDAT/CLARIN.

In favor of improving the user experience, we limited the interface palette to two colors—gray and red—on a white background combined with a clean non-invasive typography (Roboto Sans Serif). The type of actions that can be carried out by the user is identified with different intensities of red: intense red is used for buttons that activate the main features or news in projects, and soft red is associated with actions of forms.

Accessibility is another element that was considered in the implementation of EVI-LINHD, in accordance with the accessibility guidelines for the Web 2.0 Content (WCAG 2.0). Just to mention a detail in relation to the interface color palette, it should be mentioned that the contrast ratio in the fonts and textual images is close to the recommendations of 4.5:1 and 7:1, respectively, which allows the correct visualization, even for users with visual problems.

EVI-LINHD's interface does not have traditional menus. Navigability has been reinforced by a breadcrumb trail, given its widespread use in the Web and advantages for users (Rogers and Chaparro, 2003; Bernard, 2003). The breadcrumb trail in EVI-LINHD's interface allows access to any page and to previously visited pages in the environment and lets users easily identify their functionality. See Figure 2.

Finally, it must be pointed out that EVI-LINHD's interface design is adaptable to different devices and screen sizes.



Fig. 2 Election of a project

### 3.3 TEIscribe: EVI-LINHD's XML-TEI editor

One of the most important contributions of EVI-LINHD to the VRE landscape is our visual tool for editing using the TEI, TEIscribe (González-Blanco *et al.*, 2016). TEIscribe is a Web-based collaborative editing tool for encoding XML-TEI documents in a concurrent way. As it was mentioned before, TEIscribe is implemented with Vaadin, an open-source Java framework. This tool had been designed and previously used for a collaborative edition work in BIESES project,<sup>17</sup> and its learning curve is quite low. Creating, modifying, and eliminating elements and their attributes are done with only a few clicks. Moreover, it has an intuitive and graphical design which allows the quick identification of errors during the editing process.

One of the most remarkable features of TEIscribe is that it allows users to create and update a set of collections. For each collection, users can directly edit a new document or upload a formatted document in XML-TEI. Since not all the DSE projects have the same encoding needs, each document in TEIscribe can be linked to a schema that establishes the TEI-file structure. In addition to this, the XML-TEI schema is completely customizable. For instance, documents belonging to a collection can be restricted to use a subset of TEI tags. The tool is connected to an eXistdb local installation, and to

the TEI Processing Model ToolBox (recently named as TEI Publisher) (Turska and Meier, 2016). An eXistdb plug-in links TEIscribe to our EVI-LINHD environment to allow the publication of TEI documents. Since eXistdb performs an automatic integration of the plug-in, there is no need to make complicated transformations to export the edited documents. TEIscribe was conceived as an open-source, user-friendly tool, a semi-graphical collaborative editor that combines an easy interface in which the inclusion of TEI tags help DH beginners in their encoding work and let them work collaboratively. The main advantage of TEIscribe is that it allows the creation of a complete TEI project, from encoding to publishing, since TEI Publisher is fully integrated in the EVI-LINHD environment and connected to TEIscribe. Consequently, it is possible to export a project to different output formats, such as XML, HTML, PDF, etc. See Figure 3.

### 3.4 LINDAT/CLARIN at EVI-LINHD: the repository

The last step offered by our VRE is the deposit of EVI-LINHD projects in our LINDAT/CLARIN repository. In this way, the project metadata can be shared among the research community, and fellow researchers can find the EVI-LINHD projects and use them to improve their own research. EVI-LINHD's LINDAT/CLARIN repository is a local

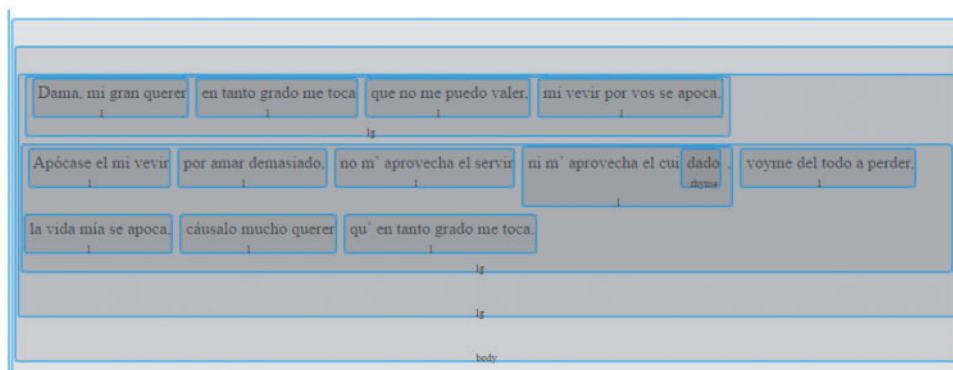


Fig. 3 TEI Scribe's interface

installation of the LINDAT-DSpace repository (Mišutka *et al.*, 2015; Smith, 2002). LINDAT-DSpace was developed in the context of the LINDAT-CLARIN project, which is part of the European CLARIN project. Thanks to this integration, data can be searched by the Virtual Language Observatory (VLO website, 2016), making EVI-LINHD's projects highly visible to the research community.

When EVI-LINHD projects are ready for being published, authors simply fill in a pop-up form in which all their personal information stored in the EVI-LINHD database are recovered (author, project title, and keywords). Authors may revise that information and also add new data. See Figure 4.

A major contribution to this repository is the extension of the Dublin Core metadata schema used by LINDAT with DARIAH's TaDiRAH revision and translation to Spanish (del Rio Riande, 2015).<sup>18</sup> The inclusion of three fields (Research Objects, Research Activities, and Research Techniques) is a significant contribution, as it lets users add more specific metadata for their DH projects. This integration is also important from the strategical point of view, as it combines the technology and research of the two main European infrastructures for DH, CLARIN, and DARIAH.

## 4 EVI-LINHD's Evaluation

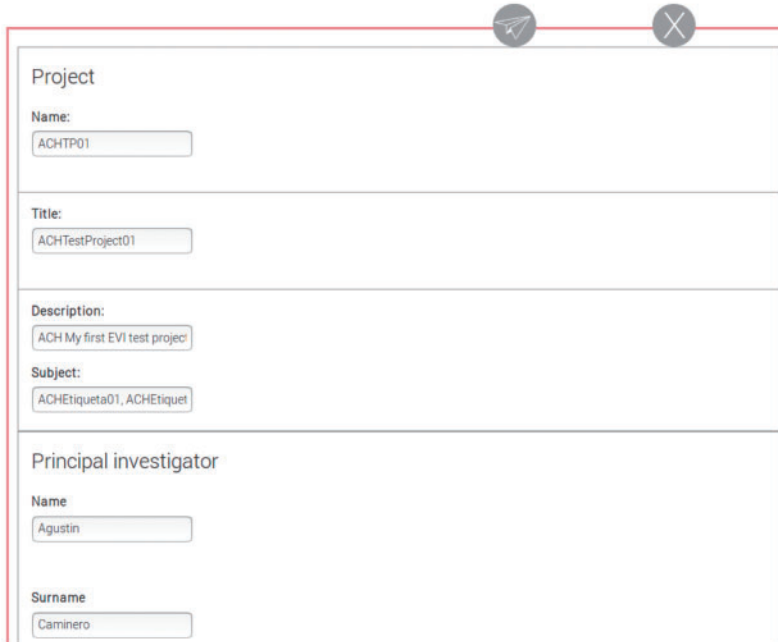
At LINHD, we consider very important to know about the users' needs and satisfaction. That is

why a user help window at the bottom of the screen is always shown in its landing page. This user help window is also a form where doubts about the VRE, questions, and improvement proposals can be formulated. To compare and analyze this information more accurately, a satisfaction survey<sup>19</sup> was sent to EVI-LINHD users at the end of January 2017.

So far, we have collected twenty answers. Questions were focused on three different aspects: (1) user profile, (2) use of elements, and (3) user interface and interaction. From our still partial results, we can draw some conclusions. Regarding the user profile, both researchers and generic users are interested in the environment, and where 70% of our users are males, just 30% are females. The age span is almost evenly distributed from 22 to 57 years old. Finally, for 65% of the users, EVI-LINHD has been their first experience with a research environment. Most of the questions in the survey were focused on user interaction. Users could answer in a Likert-type scale of 5 degrees of agreement, namely, 'totally agree', 'partially agree', 'slightly disagree', 'partially disagree', and 'totally disagree'. For instance, when they were asked if the Web site design structure made the development of their research project easier, 45% of them answered 'totally agree' and 40% 'partially agree'. A mere 15% of the users answered 'slightly disagree'. Concerning the quality of the information EVI-LINHD provides during the deployment of a project, 40% of the users marked 'totally agree', 40% 'partially agree',



## Project: ACHTP01



**Project**

Name:

Title:

Description:

Subject:

**Principal investigator**

Name

Surname

**Fig. 4** EVI-LINHD's LINDAT repository form

15% 'slightly disagree', and only 5% 'partially disagree'. Finally, dealing with the way EVI-LINHD improves visibility and dissemination of research, 70% of the users answered 'totally agree' and 25% 'partially agree'. A mere 5% of the users answered 'slightly disagree'.

We are aware that, at this point, it is not possible to draw interesting and meaningful conclusions to EVI-LINHD's evaluation, given the number of answers to the survey, but it seems quite possible that dissemination and visibility are two of the most significant aspects in the users' choice of the environment.

## 5 Further Steps

EVI-LINHD was launched on July 2016 as a beta-testing environment and was officially launched on 19 October 2016.<sup>20</sup> From that moment until now (31 October 2016), the number of projects and researchers registered has been high (around fifty), and we have also worked on different instances through the pop-up chat window. Further improvements include the translation of the interface to English and the creation of a mailing list to solve and share questions on the VRE. A Google-based

analytics system will soon be integrated to track users' activity.

## Funding

This work was supported by the funding of the Ministerio de Economía, Industria y Competitividad of Spain for the project 'Laboratorio de Innovación en Humanidades Digitales: Edición Digital, Datos Enlazados y Entorno Virtual de Investigación para el trabajo en humanidades' (2014–2016) and also benefited from Acción Europa Investiga EUIIN2013-50630: Repertorio Digital de Poesía Europea (DIREPO), and the Starting Grant ERC-2015-STG-679528 POSTDATA, led by Elena González-Blanco.

## Notes

- Laboratorio de Innovación en Humanidades Digitales (LINHD): <http://linhd.es/>
- Red de Humanidades Digitales (RedHD): <http://www.humanidadesdigitales.net/>
- Humanidades Digitales Hispánicas. Sociedad (HDH): <http://www.humanidadesdigitales.org/inicio.htm>
- Asociación Argentina de Humanidades Digitales (AAHD): <http://aahd.com.ar/>
- Red Colombiana de Humanidades Digitales (REHDI): [www.rehdi.co](http://www.rehdi.co)
- See <https://textgrid.de>
- See <https://www.e-laborate.nl/nl/>
- See <http://t-pen.org/TPEN/>
- See <http://www.bbaw.de/telota/software/ediarum>
- For a close analysis of these digital editors and tools, see Spadini (2014, 2015).
- EVI-LINHD stands for Entorno Virtual de Investigación del Laboratorio de Innovación en Humanidades Digitales. <http://www.evilinearhd.com/>
- See <http://www.vocabularyserver.com/tadirah/es/index.php>
- LAMP is an acronym of the names of this model of Web service solution stacks original four open-source components: the Linux operating system, the Apache HTTP Server, the MySQL relational database management system, and the PHP programming language.
- This 'nightly building' version was necessary to deal with the TEI Processing Model. See <https://github.com/wolfgangmm/tei-simple-pm#installation>
- More information about Silex and Twig in <http://silex.sensiolabs.org/> and <http://silex.sensiolabs.org/doc/providers/twig.html>
- Documentation on virtual hosts in Apache can be found in <https://httpd.apache.org/docs/2.4/vhosts/>
- BIESES stands for Bibliografía de Escritoras Españolas: [www.bieses.net](http://www.bieses.net)
- Available at <http://www.vocabularyserver.com/tadirah/es/>
- The survey is still available (in Spanish) at: <https://goo.gl/forms/uCmDtlYBSv1HfzF12>
- All the information about this event can be found in <http://linhd.uned.es/en/noticias-en/EVI-LINHD/>

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