

Regenerated Identities: A Collaborative Web-based Content Management System for Digital Humanities

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ABSTRACT

Regenerated Identities (RegID) is a web-based content management system for digital humanities (DH) scholars to curate, meta-tag, analyze, visualize, cross-reference, and publish large volumes of historical datasets. This article describes the development methodology of RegID, highlighting the underlying theoretical concepts driven by information studies and the results of participatory research that employs user-centered design and design thinking strategies. Focusing on African studies and slavery research as a case study, the development of RegID demonstrates that a thematic approach and understanding of users' needs and behavior of information interactions is important in developing such digital tools. Scholars' engagement in the design process helps address their unique challenges and workflows, which is unachievable through broad-spectrum content management systems such as WordPress, Joomla, or Wix. The user-centered design facilitated a more intuitive and efficient interface that provides a digital space for collaborative research. RegID is hosting over 20 projects addressing the technological challenges faced by scholars in the field.

Keywords

Content Management Systems; Information Behaviour; Human-Computer Interaction; User-centered Design; Participatory Research; Digital Humanities; African Studies and Slavery research.

1. INTRODUCTION

The application of computer science is vividly seen in DH research. A significant contribution has been made by web-based content management systems (WCMS) that help curate datasets and analyze and publish results on the World Wide Web. Nearly 50% of websites on the internet are created using WCMS [1]. WordPress, Joomla, and Drupal are among the popular WCMS that have helped develop hundreds and thousands of websites. According to the Web Technology survey report, WordPress alone supports 43.3% of all the websites on the internet, taking 62.7% share of available content management systems [2]. The flexibility of WCMS, along with community-based coding practice, has allowed the production of various open-source templates and third-party plug-ins that are adapted for multiple projects in DH extensively [3], [4], [5].

Generally, a WCMS has 3 components: 1) a file system organized by a file manager - this comprises of both the content, i.e., multi-media files and scripts in web-programming languages such as HTML, CSS, JS, and PHP; 2) a hosting server, and 3) database(s) such as MySQL and PostgreSQL. The interaction between these 3 components allows users to develop websites. The interface may vary for different WCMS for different types of users: website builders and general users.

The website builders can customize the WCMS templates or build websites from scratch. The general users are the ones who interact with the content of these websites on the internet openly, usually without any editing capabilities. Today, WCMS supports a broad spectrum of websites ranging from digital repositories to general information websites, including educational, e-commerce, and entertainment.

Although WCMS are immensely popular and widely used for DH projects, scholars have reported various challenges these tools present [6], [7]. Due to the specificity of DH project goals, broad-spectrum WCMS requires extensive customization that needs website builders (in this case, DH scholars) to have at least some knowledge of web programming in HTML, CSS, and/or JS. The required skill level increases with the complexity of the desired project output on the website. According to Liu et al., "many digital humanities projects need programming to achieve the desired effect, but often humanities scholars who are key to a project are not familiar with information technology." [8] After a comprehensive literature review of 28 articles, Liu et al. reported six primary challenges faced by digital humanities projects. These include 1) lack of software availability or insufficient functionalities, 2) problems with hardware to store data, 3) homogeneous datasets with limited standardization, 4) lack of institutional support, 5) limited funding opportunities, and 5) insufficient professional technical skills. Although some digital tools such as OMEKA (omeka.org) and Spatial Historians [9] are designed specifically for DH projects and can now address some of these challenges, a satisfactory solution is yet to be developed [10], [11].

To address the problems of WCMS for DH projects, Walk With Web Inc. (walkwithweb.org) developed a new WCMS platform called Regenerated Identities (RegID). Launched in 2020, RegID provides streamlined, online, user-friendly interfaces to website builders. Unlike traditional WCMS, RegID implements a thematic approach for project inclusion to leverage collaboration to support web database development and sustainability of the projects it hosts for African studies and slavery research. Through an extensive network of scholars, professional web developers, students, and support from public and private funding agencies, RegID allows the sharing of resources addressing software challenges, standardization, hardware, technical skills, and continued funding. This article provides a technical overview of RegID while describing the development strategies that demonstrate the application of computer science and information research with a special focus on human-computer and human-information interaction for DH.

2. BACKGROUND

DH for African studies and slavery research dates to the late 1990s with the publication of Gwendolyn Midlo Hall's Afro-

Louisiana Slave database and David Eltis' Slave Voyages dataset [12], [13], [14], [15]. Their initial publication was in CD-ROM format and later converted to websites. These pioneering projects demonstrated the potential of digital technology in the field, motivating other researchers to curate datasets and publish similar websites. Hall argues that digital databases can "answer questions that cannot be answered using more traditional methodologies, can partially or tentatively answer others and can help answer still others, combining quantitative calculations with the findings of other disciplines, including archaeology, anthropology, linguistics, and geography, as well as traditional" [16]. These two projects foreshadowed the publication of hundreds of websites on African studies and slavery research [17], [18].

The increase in information in digital spaces has helped shape our understanding of the African continent, its rich history, and the spread of diverse cultures into the diaspora [19]. Research websites such as Enslaved.org, LiberatedAfricans.org, and EquianosWorld.org, among others, have achieved new levels of conceptualization and visualization of historical information on African slavery in an accessible and informative manner [20], [21], [22], [23], [24]. Most websites, including the Afro-Louisiana Slave dataset and Slave Voyages websites, rely on primary source material. The development methodology of these websites usually depends on the collection of digital items, followed by the preparation of metadata, its management, and its online publication on research websites [25]. Hall started her research with historical manuscripts in a courthouse in Pointe Coupee Parish, Louisiana [26]. Eltis's team-built Slave Voyages based on the archival work of Philip D Curtin, Herbert S. Klein and other scholars [13]. Most digital projects start with archival work of critical investigation of primary source material that is also the top-ranked source of information for historians [27], [28], [29], [30].

The exponential increase in digitized material has required better data management systems. Usually, these DH projects are team efforts involving scholars with limited computational skills. Although WCSM, such as WordPress, Omeka, and Spatial Historian, has allowed website builders to create a digital presence for their projects, the analogue "best practices" require a variety of open source tools (such as Google Drive, Google Docs, etc.) that are highly tedious [25], [31].

3. METHODOLOGY

The development of RegID employed participatory research in association with User-Centered Design (UCD) principles [32], [33] from Human-Computer Interaction and Design Thinking Research [34], [35], [36], [37]. These theoretical models promote the inclusion of users in the development process of a digital platform. Vaughn and Jacquez explain that participatory research "uses systematic inquiry in direct collaboration with those affected by an issue being studied" who may not be exceptionally trained in the research focus [37]. For RegID, these participants are DH scholars, especially historians or graduate students working in African studies and slavery research. The participants for this work include team members of individual projects — Freedom Narratives at York University, Meta Reality at Trent University, Serviçais Registers at the University of Toronto, and Liberated Africans in the Digital Slavery Research Lab at the University of Colorado Boulder. The principal investigator (historian) and at least one research graduate student from every project were included.

Multiple design sessions, meetings, and unstructured interviews were conducted with the team members of these projects to identify the workflow implemented for their historical research practices. These teams used a combination of open-source tools, including Google Drive, Google Docs, Google Sheets, and Adobe Acrobat Pro, to identify historical digitized documents, curate meta-data, and produce a relational datasheet that can be imported into a website's database [23], [25], [31]. In earlier publications, team members developed a scheme of meta-data organization, categorized into 4 datasheets: 1) a recorded list of people in digitized primary sources, 2) identification of events linked to these people, 3) documents meta-data for digitized documents, 3) a list of places where events took place, 4) meta-data for digitized documents along with a PDF of the documentation [22]. The team members manually achieved the interconnection between these 4 categories, resulting in mistakes and being extensively time-consuming.

The data collected from transcripts and researchers' notes were analysed qualitatively, listing various challenges that the participants encountered in their information curation workflow. This led to the generation of multiple themes, such as the limitation of tools in curating the 4 datasheets with internal cross-reference, handling noise due to the manual data entry process in the context of controlled vocabularies, and the hierarchical assessment of work within large teams. To solve these challenges, a WCMS was proposed to automate the data creation process for website development for these projects. Moreover, the WCMS required a collaborative working environment for the teams, including experienced scholars and graduate students. The evolving nature of DH projects demands flexibility regarding data organization and content review mechanisms to correct mistakes or revise datasets to account for novel discoveries due to the continuous production of digitized historical primary sources.

4. REGID: A COLLABORATIVE WCMS

The RegID web interface offers a secure login gateway for researchers to access and edit research content using multiple web pages, which provide an interactive platform for curating, editing, and analyzing research content. RegID allows two types of users: 1) Project Director and 2) Researcher, with different editing access to web pages. The RegID platform is designed to reinforce "best practices" of conducting research in a collaborative digital team setting, similar to the author's previous work on the Decoding Origins Web Portal for Freedom Narratives and Language of Marks research groups [25]. The platform allows users to communicate through group chat and share sub-dataset collection features within the digital environment. Project Directors are enabled advanced privileges to publish datasets on the project's public website, create assignments, and monitor research activities on the RegID project repository. Every action on the system is logged and can be viewed by authorized users.

4.1 Back-End Organization

The RegID technical architecture comprises independent repositories for each project that follow an identical structure. This structure is divided into three components 1) the backend database, 2) The RegID editing platform, and 3) the front-end public website (Figure 1).

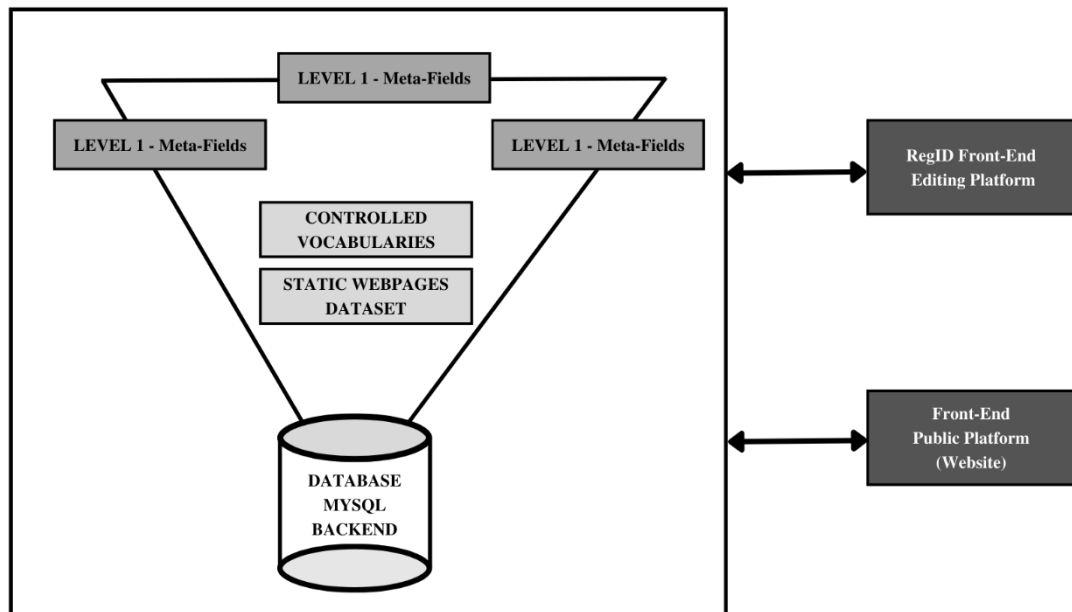


Fig 1: The organization of three major components of RegID.

The web pages for RegID are developed using HTML, CSS, and JS; PHP is used to connect the web pages with the backend MySQL database [38]. The MySQL database is divided into 3 levels based on a meta-field collection. These levels represent relational data storing tables in MySQL databases. The RegID allows researchers to alter the content on their websites and curate datasets by facilitating direct edits to the backend MySQL database via a collection of web pages.

A dedicated team of professional developers, researchers, and students at Walk With Web Inc. supports the application of RegID, employing interactive learning methods [39], creating new web pages to serve various research groups' needs, and publishing them on respective project repositories on the fly. This mechanism constantly adapts the interface design to achieve project-specific goals and user needs. The public website displays the saved content on the backend database using the RegID editing platform.

The level 1 meta-fields anchor the complete dataset within a project repository. This level records the primary information the research project intends to record; for example, the Freedom Narratives project records personnel details such as name, gender, ethnonym, etc, in level 1 meta-fields, while Liberated Africans use level 1 meta-fields for cases or ship logs. Levels 2 and 3 support meta-fields that have a direct connection with level 1 meta-fields. The Liberated Africans project uses only one additional level to save sources (digital historical manuscripts and their meta-information). In contrast, the Freedom Narrative project saves sources in level 2 and the person's life events in level 3.

4.2 Input Types

The `ColumnName` records identifiers link the meta-field to the data-storing table in the MySQL database. At the same time, a specific combination of entries in the `FieldType` and

`Options` configures the RegID editing platform to display the appropriate input type on its web pages (Table 1, Figure 2). `Dropdown-CV`, `dropdown-CV-multi`, and `dropdown` input types are configured to record the unique identifier(s) from the controlled vocabulary table for one or multiple terms (separated by semicolon) in the level 1 data storing table. This way, any edits to the controlled vocabulary term or related details reflect immediately on the entire dataset, providing an efficient method of handling discrepancies in information between old and newly discovered sources, which is common in historical research. The entries in `text` type input meta-fields are coded to HTML special characters using PHP standard functions that are saved in the project repository MySQL database. The `status` column hides the meta-field from the RegID editing platform, while `indexpage` configures the order of meta-field display on the public website. The `Definitions` and `Technical` save detailed definitions of the meta-field and technical instructions for editing the meta-field, if any.

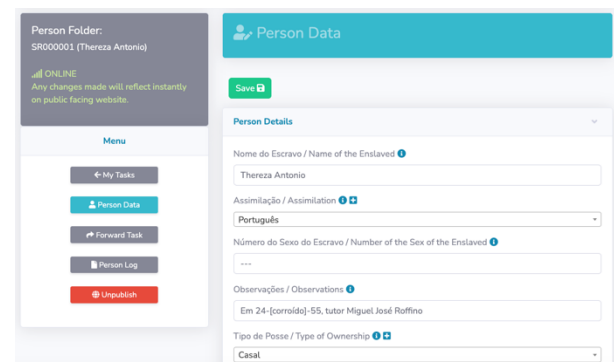


Fig 2: RegID editing platform showing person details (level 1) editing web page.

id	Title	Log	Main_Text	Read_More
1	Introduction	2021-02-13 by Paul Lovejoy	<p>This project on Gustavus Vassa (Oludah E...	<div> <p>His contribution is highligh...
2	Project History	2021-02-25 by Paul Lovejoy	<p><span style="font-family: helvetic...	<p><span style="font-family: helvetic...
3	Best Practices	2020-07-01 by Kartikay Chadha	<p>The Equiano’s World website is ...	
4	Copyright	2020-07-01 by Kartikay Chadha	<p>The goal of Equiano’s World is ...	
5	Logo and Images	2020-07-01 by Kartikay Chadha	<p>The design of www.equianosworld.org aims ...	<p>The design of www.equianosworld.org aims ...
6	Platform	2020-07-01 by Kartikay Chadha	<p>The "Equiano's World" webs...	

Fig 3: The organization of three major components of RegID.

The content for static pages of the website (e.g., Introduction, Project History, Copyright, etc.) is also stored in relational table format on the MySQL database of the project repositories. The number of these content-storing tables varies depending on the scope of the website and any web pages that the website requires. Every static content-storing table follows a standard scheme in separate MySQL tables (Figure 3). The `id` in a static content storing table is an identifier unique for various sections of the public website, represented by rows. The `Log` is updated by the RegID editing platform when a user edits an entry. The `Main_Text` and `Read_More` record the textual content. These five columns are required for the RegID editing platform to edit the MySQL database, although additional columns may be added as necessary. The editing web pages adapt automatically.

Table 1: Combinations of entries in `ColumnName` and `Options` of the map file for various input types on the RegID editing platform.

INPUT ON MAP FILE		OUTPUT ON REGID EDITING PLATFORM
ColumnName	Options	
text	NA	Text input field
textarea	NA	Textarea type input
radio	yes;no;unknown	Radio button with options yes, no, and unknown.
		[Add multiple options separated by semicolon]
dropdown-CV	CV_table_name	Searchable Dropdown input type with list from MySQL independent Controlled Vocabulary table name
dropdown-CV-multi	CV_table_name	Multiple select options with a list from MySQL independent Controlled Vocabulary table name
dropdown	Researcher	Searchable Dropdown input type with a list of users with active access to the project

All multi-media files for the static web pages of the website are uploaded to the server. The file location and meta-details, such as file type and captions, are stored in another independent

MySQL table called `Upload_RegID`. A combination of columns `RefID` and `TableName` in `Upload_RegID` is used as a unique identifier to attach multimedia files to static sections of the website. `Log` is stored by the RegID editing platform similar to the content storing tables.

5. REGID PROJECTS

Since the launch of RegID in June 2020, twenty-two digital projects have been created or migrated to the WCMS; twelve of which contain historical research information on African slavery, and nine projects are either in archival or development state. Twelve websites have been completed and are currently online. Table 2 provides a list of completed projects along with their URLs and a report on average monthly unique visitors since the launch of every website.

Table 2: List of DH projects hosted on RegID

Completed Projects	Users /month	Launch Date	URL
Servicais Registers	277	June-24	ServicaisRegisters.org
US Anti-Slavery Laws	262	Mar-24	USAntiSlaveryLaws.org
Digital Humanities List on Slavery and African Diaspora	132	Feb-24	DHList.RegID.ca
Slavery Images	6139	Jan-24	SlaveryImages.org
Frontiers of Belonging	321	Aug-23	FrontiersOfBelonging.org
Liberated Africans	1185	Jul-23	LiberatedAfricans.org
African Regions	399	Oct-22	AfricanRegions.org
Language of Marks	341	May-22	LanugueOfMarks.org
British Public Monuments Related to Slavery	263	Apr-22	BritishMonumentsRelatedToSlavery.net
Equiano's World	2217	Mar-22	EquianosWorld.org
Slave Registers	816	Mar-22	SlaveRegisters.org
Visa Barrier	214	Nov-20	VisaBarrier.ca

6. CONCLUSION

This work demonstrates participatory research's potential in developing digital tools. The outcome is a WCMS with an intuitive web interface designed to support website builders in DH research with limited programming skills. This article sheds light on the user-perspective approach and the technical research component of digital humanities that most initiatives fail to report on. This research is also an example of an interdisciplinary research methodology, leveraging the well-established theories/concepts in information studies and library sciences to address the challenges in DH around data collection, management, and sharing.

The next step for this research will examine users' interaction with RegID WCMS. The usability assessment of the interface will be conducted in two domains: 1) interaction with design, i.e., content, placement and layouts, and 2) information organization on the interface to meet project-specific goals. The research will employ qualitative research methods combining participant interaction observation with semi-structured interviews to develop a report on recommendations that must be incorporated to enhance the overall usability of RegID. The development of RegID is ongoing as new projects are added to the repository for collaborative access to collaborative research content and original primary sources.

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