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Rapid development of an art history web portal using the WordPress platform

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Abstract. *The article presents the experience in choosing and using WordPress in the rapid creation of a web portal within the Art History domain for the applied research project called "Modernist Nova Gorica and its contexts - Modmapng". An analysis of related projects has shown that the WordPress platform is often used in this domain. Moreover, our results and experiences are extremely positive, in particular, the web portal, along with its large set of add-ons, was easy to configure for both administrators and developers and it is easy to use for the end-users. Article additionally presents an analysis of extent to which authors followed the digitization model when establishing a web portal.*

Keywords. Art History, web portal, rapid web development, WordPress

1 Introduction

As part of the applied research project "Mapping urban spaces of Slovenian cities in the historical context – Modernist Nova Gorica and its contexts – Modmapng", we developed a web portal accessible at www.novagoricaart.si, based on the WordPress platform, to enable interested audiences free access to the results of the comprehensive scientific historical investigations of post-war urbanism, modernist architecture and fine arts of Nova Gorica, Slovenia. The project is a continuation of a similar project, done in another Slovenian city – Maribor, which resulted in the Maribor Art web portal, accessible at www.mariborart.si. The latter was developed in Liferay Java based portlet technology, which, in the long-term, proved to be challenging to develop and maintain. Thus, for the sake of developing the new web portal from scratch, we evaluated the WordPress platform, to prove if it is the right tool for the project, since, supposedly, it enables the rapid development of custom functionalities required by the project.

The structure of the article is as follows. In Chapter 2, we provide theoretical background for Digitization efforts in the Cultural Heritage domain. Chapter 3, we provide a short overview of similar art history portals, and the technologies with which such portals were developed. In Chapter 4, we make an overview of the background of the novagoricaart.si project and main functionalities, which were agreed to prior to the development of the new web portal. In Chapter 5, we describe the main concepts of the WordPress ecosystem. In Chapter 6, we provide a list of used plug-ins, theme and other technologies, which were embedded into the web portal. In Chapter 7, we make a comparison of plug-ins, which provide the means for visualizing large pictures and embedding them with multimedia. In Chapter 7, we portray the technical background for the development of the web portal. In Chapter 9, we outline the process of developing the web portal, along with the communication of non-IT stakeholders in the project. In Chapter 10, we evaluate to what extend we followed the digitization model when implementing the web portal. The last two Chapters of the article are the Conclusion and References.

2 Digitization of Cultural Heritage

Art History works are the part of Cultural Heritage, which by definition designates a monument, group of buildings or site of historical, aesthetic, archaeological, scientific, ethnological or anthropological value (Ivanova, Dobreva, Stanchev, & Totkov, n.d.).

When speaking about Digital Heritage, we have to take into the consideration three building blocks (Belhi, Foufou, Bouras, & Sadka, 2017; Ivanova et al., n.d.; Valtysson, 2017), which are vital for sustainment of Digital Heritage: 1) Digitization, which is the process of converting analogue objects into digital sphere, 2) Access, which addresses the provisioning of efficient and intuitive resource discovery tools, 3)

Preservation, which guarantees that digital objects created in the past are available now and in the future as well.

Another important aspect within the digitization of the Cultural Heritage are metadata, with the main purpose to be used in the process of resource discovery (Ivanova et al., n.d.). Several types of metadata exists, for instance 1) descriptive, e.g. title, author, extent, subject, keywords, 2) structural, e.g. unique identifiers, page numbers, table of contents, 3) technical, e.g. file formats, image resolution, 4) preservation, e.g. archival information, 5) legislative, e.g. ownership, copyright. Metadata can be stored in different formats: 1) separately as an XML or HTML resources, 2) in a database linked to the resource, 3) as a part of the record in a database or 4) embedding the metadata in the Web pages.

Another model for Digitization of Cultural Heritage is consisted of (Preuss, 2016): 1) Content Specification, which answers questions such as what is the purpose of digitization, what kind of content needs to be transformed, what kind of digital use is anticipated, do legal limitations apply, etc., 2) Digital Cataloging, which refers to creation of information about the digital content, including metadata, 3) Digitizing, which refers to the creation (and not transformation) of digital representations, 4) Digital Presentation, which refers to the provision of access to digital content, more specifically to digital tools which are needed, e.g. viewers for images, multimedia players and so on, 5) Digital Backup, which is realized by securing online database with appropriate infrastructure and security mechanisms, 6) Digital Preservation, which refers to the preservation for the foreseeable future and it includes ongoing measures to ensure technical and organizational endurance.

3 Art History Portals

In order to determine the popularity and to identify best practices of WordPress implementation in the Art History domain, we analyzed the most popular Art History websites (Agarwal, 2019; Price, 2019), and found out that a significant part of them are based on the WordPress platform, for instance, History of Art at Oxford University, Art History at the University of Manchester. Most of the portals use multimedia (pictures, audio and video) content to present the content. Among common functionalities within the pool of such websites is the ability to represent history in the form of an interactive timeline (Metropolitan Museum of Art, 2019), see Figure 1.

The WordPress platform also proved to be suited for developing websites for libraries (American Library Association, 2019), since it enables the possibility to prepare basic websites without the need for programming. Moreover, WordPress is used in various University History Museums, for instance, University of the West Indies Museum and International Council of Museums Committee for University Museums (Ilina, 2018).

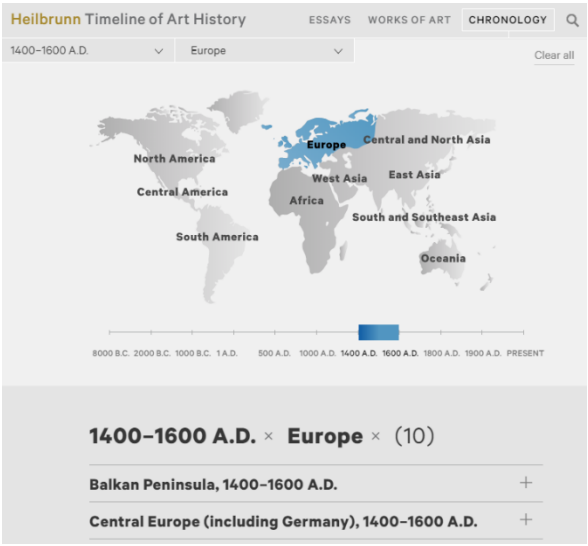

Figure 1. An example of interactive timeline functionality – Metropolitan Museum of Art

Along with WordPress, another Content Management System (CMS), suitable for a variety of digital exhibit needs, is Omeka (Puckett & Leslie, 2016), which is designed specifically for ease of use by librarians, archivists, and other information professionals. However, compared to the large and robust ecosystems that are available for other large CMSs like WordPress, Joomla, and Drupal, Omeka is fairly moderate, with small community support, plug-ins, developers, and users (Avgoustinos, Papaioannou, & Gouveia, 2019).

In a project called Rural Alaska Cultural Media (Acemah, 2014), developers used a hybrid approach, using both the WordPress and Omeka platforms to create an interactive web portal for engaging scholars, rural Alaskan youth and teachers, in creating and viewing films surrounding Alaskan culture and history.

Another WordPress based history related portal (Terry, 2019) provides access to nearly 400 interviews from nineteen oral history projects. The authors claim that the WordPress platform proved to be inexpensive and enabled a dynamic page functionality with embedded and fully operative searchable interview audio and text.

4 Project Background

Novagoricaart.si integrates the results of the applied research project, which includes artistic and historical approaches to the study of urban history in the case of the Second World War in the newly formed town of Nova Gorica on the far western edge of today's Slovene territory. The results are freely accessible to the wider professional and lay public through the

website. The project's methodology envisages field work, together with the documentation of architectural and artistic monuments, the study of archival, written and visual sources, their analysis and comparison, and is upgraded with modern methods of digital humanities to accommodate the widest possible audiences, since basic artistic and historical research was usually accessible only to a narrow circle of interested individuals. To this end, one of the goals of the project was to create a web portal with historical content, presented in a simple, and explicit manner. The project is a collaboration of 1) The France Stele Institute of Art History at the Scientific Research Centre of the Slovenian Academy of Sciences and Arts, 2) The Department of Art History at the Faculty of Arts, University of Maribor and 3) The Institute of Informatics at the Faculty of Electrical Engineering and Computer Science, University of Maribor.

Our institute was also involved in creating the MariborArt Art History portal (see Figure 2), accessible at www.mariborart.si (Institute of Informatics, 2011), which can be seen as the predecessor of the Modmapng portal, and was developed using the Liferay Java based portlet technology, which, over the course of more than 8 years, proved hard to develop and maintain, since every single specific web portal functionality had to be developed from scratch; it lacked the comprehensive documentation, and many problems occurred which were caused by major updates to the Java platform.

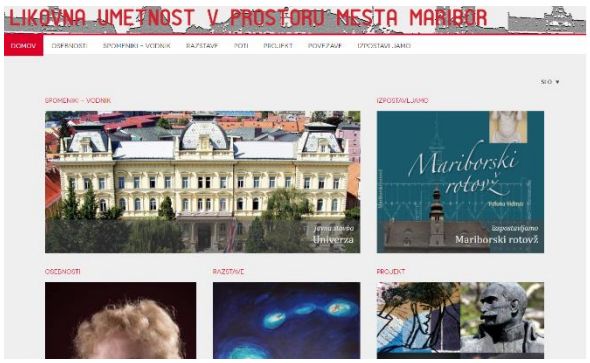

Figure 2. Mariborart.si web portal – a predecessor of the Modmapng project

The main functionalities of the Modmapng web portal are the ability to store the information about the artists (description, gender, birth and death dates and place, field of work, geographical scope, active period, and visual gallery), monuments (description, authors, century, materials and dimensions, style period, type and location), exhibitions (description and visual gallery) and trails (description and traffic directions among the related monuments along the way, depicted on a map – see Figure 3).

Figure 3. Depicting the trail traffic directions and monuments along the trail with mock data

Moreover, the web portal enables a detailed view of the frescoes embedded with the related data of the details, which occur when the portal visitor is hovering over the picture with the mouse. Other required functionalities were the ability to publish the info about upcoming art history events, and a couple of simple pages with the details about the project and its authors.

5 WordPress Ecosystem

WordPress is the most used CMS, backing almost 34% of all websites (W3Techs, 2019). It enables the creation of static sites, blogs of news related pages, forums, web stores and other custom functionalities. Moreover, more than 60% of all CMS websites are based on WordPress (W3Techs, 2019), see Figure 4.

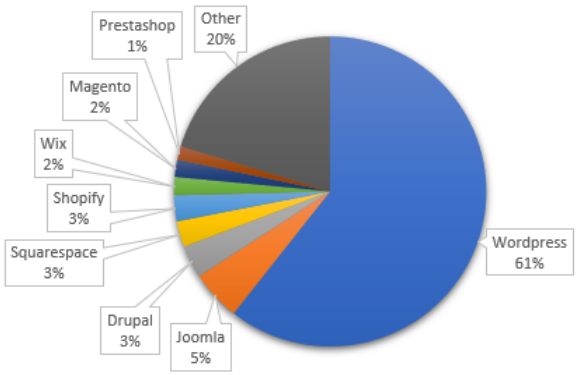

Figure 4. Market share of Content Management Systems, April 2019

WordPress started in 2003 as an open source GPL licenced blogging platform. WordPress's mission to ensure any non-IT person can create a website and scale it to enterprise clients with complex needs (e-commerce, multilingual) has endured to this day. The

WordPress security team comprises around 50 experts, and all new addressed security issues are pushed to all WordPress sites immediately (Cabot, 2018).

From the business perspective, WordPress represents a multibillion-dollar market with a huge user community. It offers the people to provide consulting services, like installing, configuring, migrating, fine-tuning the WordPress installations, as well as the ability to develop and sell plug-ins and themes. Plug-ins extend the core WordPress functionalities, while themes customize WordPress's look and feel. Moreover, around 2,000 hooks are available, which enable developers to provide custom functionality, without modifying the WordPress core. Each hook corresponds to a common WordPress event (e.g., saving a post or creating a user), and, in response to such events, plug-ins and themes can filter the current content and provide it to the user in a custom way. Around 47,000 plug-ins are available on the official WordPress repository (Cabot, 2018).

6 Used Plug-ins and Other Technologies

As a project requirement, it was necessary to find the most suitable solutions to the challenges of embedding the video, geographical directions and rich-data augmented photographs. In addition, the administration of the content had to be as simple as possible, and the data input efficiency also had to be guaranteed for average users without an IT background.

We used the Boston theme from FameThemes, which we customized further by creating a child theme. Additionally, we used over 30 plug-ins.

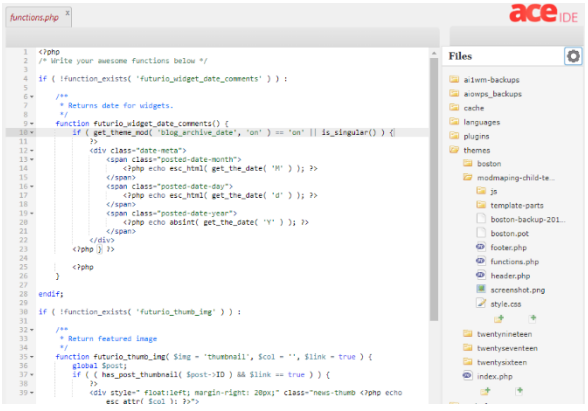

Figure 5. PHP development with AceIDE plug-in

We used the following plug-ins to ease the development of the portal: AceIDE (Integrated Development Environment with code syntax highlighting to ease the development of custom functionalities, see Figure 5), Adminimize (to provide the means to hide specific functionalities like backend menu items to different user roles), Advanced Custom Fields PRO (to enable the forms for storing specific data about specific post types like people, monuments, exhibitions and trails), All in One SEO Pack (to prepare search engine optimization related data for higher ranking in search engines), All in One WP Security (to bulletproof the web portal's security), ChildifyMe (to create a child theme which enables us to modify the look and feel without changing the parent theme so that updates will not override our changes).

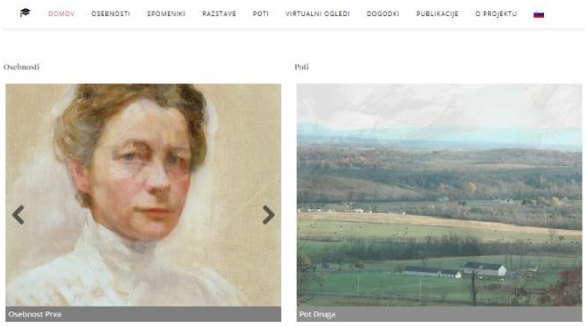

Figure 6. The home page of Modmapng project with a sample query of custom post types (people and trails), showed in the form of a Flexslider with mock data

Moreover, we also used Custom Post Type UI (to create specific post types), GDPR Cookie Consent (to show the cookie warning on a visitor's first visit), Image Map Pro (to enable data centric visualization of the frescoes), Insert PHP Code Snippets (to show Flexslider based dynamic sliders and querying the custom post types, see Figure 6), FacetWP (to enable simplified filters and lists of custom post types, see Figure 7), Loco Translate (to enable the translation of all plug-ins), Menu Icons (to show icons in the web page's menu), Relevanssi (to enable advanced custom field search), Wordfence security (a plug-in which provides extra firewall protections and provides free malware scans with updated content from their servers), and WPML Multilingual CMS (to enable multilingual content of the whole website). Out of all the plug-ins from the above list, 4 plug-ins were payable, namely Advanced Custom Fields PRO, FacetWP, WPML Multilingual CMS and Image Map Pro.

In the future, we are also considering the usage of XML, CSV and based importer plug-ins, in order to import huge datasets in the form of spreadsheets, which can speed up the process of importing the large chunks of data for artists, monuments, exhibitions and trails.

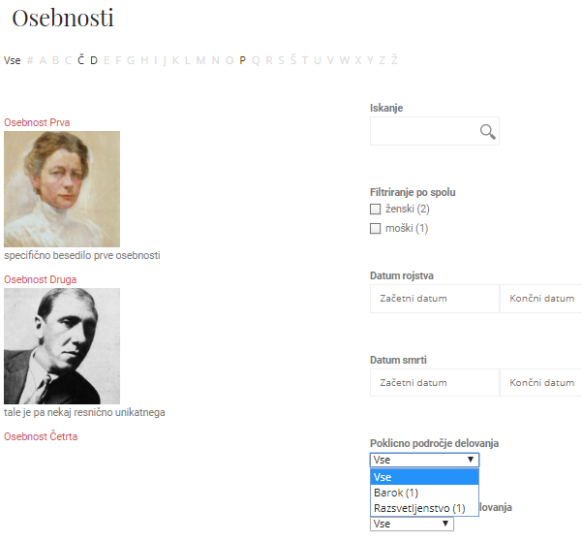

Figure 7. Filtering the custom post type "people" with the FacetWP plug-in and mock data

7 Visualizing Frescoes

We searched the WordPress plug-in directory with the following query: "interactive image zoom" and found the following plug-ins: Interactive Image Builder, Leaflet Map, Draw Attention, Image Map Pro, to name just a few.

We chose Image Map Pro (see Figure 7) because it offered the possibility to try the plug-in for free online, and because it met our demands.

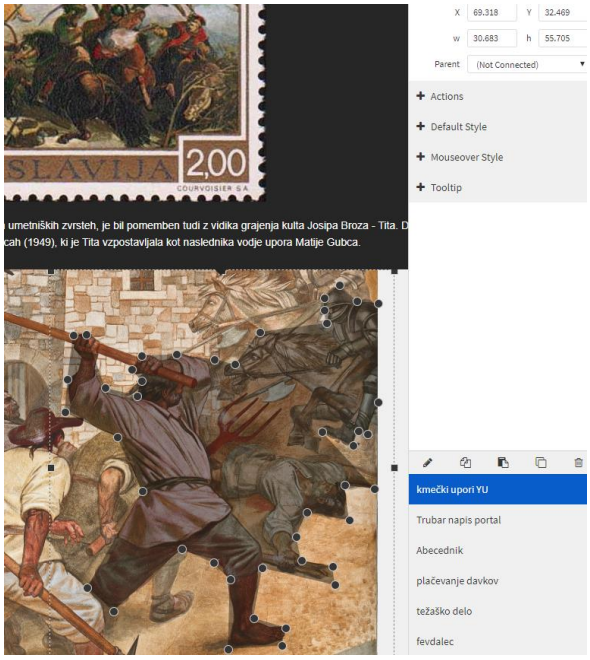

Figure 7. Editing an overlay for a fresco part and embedding it with visual and textual data

Image Map Pro offers zooming controls and easy management of interactive image maps by using the custom transparent shapes with related tooltips for embedding images with relevant visual and textual data. Creating a custom shape or polygon is a matter of simply clicking on the image to add the pins which form the polygon (see Figure 7). If the web site user hovers with a mouse over the image part where the polygon exists, the tooltip is then shown, which can contain videos, pictures and text (see Figure 8). Both polygons and tooltips are easily editable, since the plug-in enables custom tooltip position and feature rich style controls, so that even people without IT related technical knowledge can participate fully as content editors to edit their fresco interactive visualizations.

Figure 8. Data-embedded fresco with zooming controls

8 The Development Environment

For development purposes, and before migrating to the production servers, we used the Docker environment with Portainer user interface and Bitnami Docker WordPress image (Bitnami, 2019) to simplify the installation and setup of the development environment. With Docker environment being set up in advance, the whole WordPress installation requires only entering the database related data: Host name, db name and access data, and WordPress admin data. Further, volume for storing image specific data should be created and selected, ports configured and mapped properly, and bitnami/wordpress:latest image selected. The rest is up to the Docker environment to deploy the fully operative WordPress container. The management options of a deployed container can be seen in Figure 9.

It is possible to recreate, duplicate, edit, start and stop the container with a single click on an appropriate button. Moreover, it is also possible to view logs, access statistics and to access the bash console. All deployed containers are run by a single operating-system kernel and are, thus, more lightweight than virtual machines (Docker, 2019).

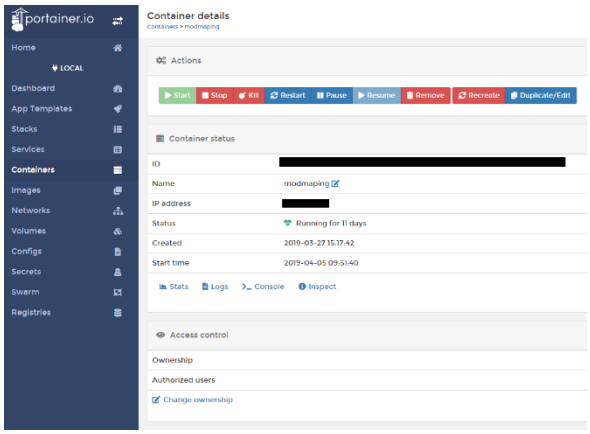

Figure 9. Managing a container within the Portainer user interface for the Docker environment

9 The Development Process

As seen from Figure 10, our development consisted roughly of the following activities. Firstly, we performed a kick-off meeting to define the main functionalities, and to prepare requirements` specifications. Later, we developed a prototype and presented it at a second meeting, where we fixed the data model for custom data types.

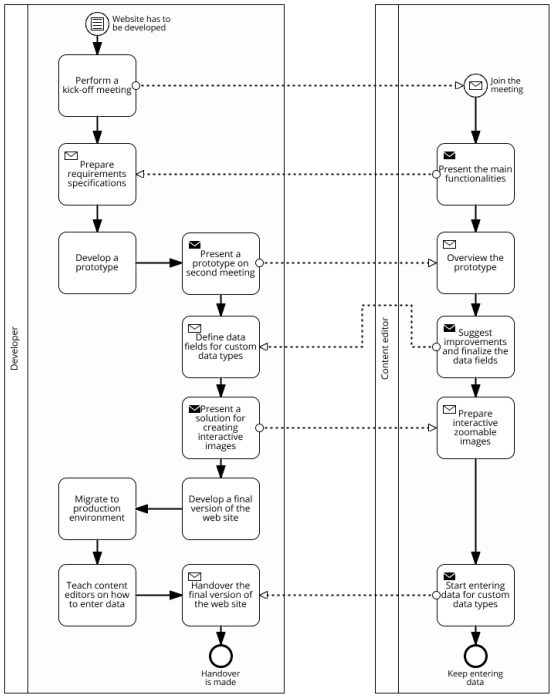

Figure 10. The development process presented in a BPMN notation

Further on, we also presented the solution for creating the interactive zoomable images using an Image Map Pro plug-in, which was described in more detail in Chapter 6. When we were approaching the later stage of development, we migrated from the development environment (see Chapter 7) to the production environment. We later showed content editors how to use the backend of the website and how to enter data properly. With the handover of the final version of the website we are still responsible for updating the WordPress core files and plug-ins constantly in order to prevent any future attacks on our web portal.

It is worth adding that the whole process was finished in 2 months, with 1 core web developer and 3 content editors partly assigned to the project.

10 Evaluation of Digitization Model Realization

Figure 11 depicts an evaluation of what extent we realized the Digitization model (Preuss, 2016) when establishing the Art History web portal.

Digitization component	**Realized?**	**What needs to be addressed in the future?**
Content specification	Fully	To check legal limitations of using digitalized presentations
Digital Cataloging	To some extent; all data is available publicly through Wordpress API	To apply standard metadata scheme for Art History domain, when it will be standardized
Digitizing	To some extent	More focus to ensuring efficient quality ratio of image and video resources
Digital Presentation	Fully, with WP compatible plugins	
Digital Backup	Fully, with WP plugins	
Digital Preservation	To some extent, by skilled Web Admins	We must follow preservation guidelines in the Art History domain

Figure 11. Evaluation of Digitization process

Like other similar projects, we focused on both administrative and digitization effectiveness, which is as our experience shows, guaranteed by the WordPress platform. On other hand, similar to other Cultural Heritage Digitization projects (Valtysson, 2017), portal we developed lacks user-centeredness on front-end and does not fully follow standard metadata schemes, so we sense a discrepancy between potential of digitalized cultural heritage and issues, concerning methods of digitization, standards, formats, metadata and preservation.

11 Conclusion

From technical point, WordPress implementation can cover all the digitization components without custom

programming. Project planning and organizational aspects are usually the sole reasons of the challenges concerning methods of digitization, standards, formats, metadata and preservation, which happens to be true also in other similar projects from other European countries.

The WordPress platform indeed enabled us a relatively simple and rapid development environment for meeting the complex demands of project stakeholders in order to store and visualize all the required metadata and data – from creating four custom post types to store custom data fields to display the data on interactive maps, and, further on, to visualize data on zoomable interactive pictures, and querying the custom post types to show the descriptions and featured images in the form of responsive sliders.

With its market share of over 60% of all CMS based websites and almost 34% of all web sites, we are not surprised that the development process was indeed relatively simple, and we did not run into any major setbacks. Moreover, since many other history related web portals are using WordPress as well, we can only recommend warmly using the WordPress platform when developing web portals for Art History and similar domains, especially in the case when the user-centric approach of managing the content is of paramount importance.

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