Enriching Europeana with user transcriptions and annotations (EnrichEuropeana)

Milestone 1: IIIF based viewer

1. INFORMATION ON THE ACTION

Grant Agreement N°	INEA/CEF/ICT/A2017/1568419
Action Title (Art. 1 of G.A.)	Enriching Europeana with user transcriptions and annotations (EnrichEuropeana)
Action number (Art. 1 of the G.A.)	2017-EU-IA-0142

Editorial Information

Revision	1.0
Date of submission	29.3.2019
Author(s)	Franz Brandl (ONB), Frank Drauschke (F&F)
Dissemination Level	public

Revision History

Revision No.	Date	Author	Organization	Description
0.1	14.3.2019	Franz Brandl	ÖNB	first draft
0.2	28.3.2019	Sergiu Gordea	AIT	review
0.3	29.3.2019	Giulio Andreini	NET7	review
0.4	29.3.2019	Lisa Phongsavath / Frank Drauschke	F&F	addressing review comments and refinements
1.0	3.4.2019	Sergiu Gordea	AIT	final version

Statement of originality

Co-financed by the Connecting Europe Facility of the European Union

This report contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

The contents of this publication are the sole responsibility of the authors and do not necessarily reflect the opinion of the European Union.

Table of contents

1. Introduction

This document describes the first version of the IIIF-based viewer that has been integrated into the Transcribathon platform as a milestone in the development of the EnrichEuropeana project. The image viewer along with the editor are the main points of interaction for the user, both facilitating the transcription of historical documents.

The IIIF standard is specially developed with the goals of supporting interoperability and enabling enriched access to image-based resources on the web. Nowadays, image-based resources, such as digitized manuscripts, photographs, books, newspapers or maps, have become fundamental for different research areas, including digital humanities, artificial intelligence and human-computer interaction. The standard provides specifications for shared server and client-side technologies, focused on enhancing user experiences in viewing, comparing, manipulating and annotating images. A large number of libraries, museums and galleries have already joined the community and adopted IIIF technologies in their web platforms during their early stages. Consequently, the Transcribathon platform has chosen to adopt the IIIF standard. This integration will facilitate consistent access to image-based resources from the repositories of individual content providers and aggregators, as well as allow the platform to conform to existing web standards.

The work presented in this document is part of the following Task in the description of action:

Task 1.3. Enhanced IIIF-based viewer
This task will integrate the International Image Interoperability Framework (IIIF) API for image handling on Enriching Europeana web platform. This will standardise the image delivery system and increase the quality of the image viewer, enabling greater and more interactive enrichment functionalities. Task 3.1 will assure that data imported into the platform are in line with requirements of the IIIF based viewer.

This Task is to replace the existing image viewer in the existing Transcribathon platform with a IIIF-capable one without losing any of the existing end-user functionality.

The main improvements and benefits by using a IIIF viewer are:

- faster image loading times, especially for large and high resolution images;
- the possibility to continuously zoom into images while keeping an optimal image quality, browser performance and loading speed;
- improved and adaptive visualization for mobile devices;
- compliance with web standards.

2. Evaluation of the IIIF-capable viewers

The sharing and interaction with image content has become extremely popular in the past few years. Within this context, various tools and viewers have been developed to display and interact with image content. Several browser-based image viewers have been extended to support the presentation of IIIF resources.

In order to integrate an IIIF viewer in the Transcribathon platform, the first step was to evaluate the possibility to reuse an existing open source tool rather than to develop a new custom tool from scratch. An evaluation of four different image viewing clients was carried out.

The evaluation was based on the functional, technical and strategic aspects related to the implementation and maintenance of the platform. In particular, the following parameters were taken into account during the evaluation:

- the possibility to preserve the interaction and the user experience of the existing image viewer;
- the ability to customize the viewer's look and feel;
- ease and possibility of integration into the Transcribathon platform;
- availability of the communication API needed to integrate the tool;
- availability of a wide developers community;
- availability of documentation;
- the frequency and updating of commits on the codebase.

The goal was to build an integrated solution that supports both types of documents, regular jpegs or tiled high-resolution images available though IIIF API. The type of the document should not affect the user interaction. The main visible impact within the transcribing activities being related to the technical quality of the original documents (e.g. image resolution, DPIs).

The candidate solutions were selected from the tools referenced on the official website of the IIIF community, and included the following client image viewers:

- **Universal-Viewer** was initially developed with the goal of providing an integrated solution for rendering multimedia content (including image, audio, video and pdf document) published with free access by Cultural Heritage institutions. Following the explicit request of the British Library, the viewer was enhanced with the support for IIIF standard.

- **Leaflet** is a javascript library developed with the goal of providing the best user experience when rendering and interacting with online maps. Leaflet was designed to offer support to all major desktop and mobile platforms. It also provides a mature solution for extending and customizing its functionality though the development of new plugins.
- **OpenSeadragon** is an image viewer capable of rendering and interacting with high-resolution zoomable images. It provides built-in support for different zoomable image formats, including support for IIIF Image API.
- **Mirador Viewer** was developed to allow end users to compare and annotate images from various repositories dispersed through the world. It is based on OpenSeadragon image viewer and integrates support for IIIF and Open Annotation standards.

2.1 Evaluation

The evaluation of the technical solutions was performed by building a minimal viable prototype using each of the aforementioned tools. The main features implemented in these prototypes include:

1. the visualization of images accessible through the IIIF ImageAPIs,
2. the possibility to switch to full screen presentation mode, and
3. the integration of the transcription editor as overlay.

Furthermore, the support for customization was evaluated by assessing how easy is to update the styling and the interaction (i.e. by changing icons, adding new actions, repositioning of GUI controls). The support of developer communities is relevant when extensions need to be implemented to existing software. It is also important for ensuring long term maintenance of software tools.

The overview of the evaluation results is presented in Table 1, where the assessment for the strengths and weaknesses of individual IIIF viewers is briefly summarized.

Table 1: Overview of IIIF-capable viewers

Viewer:	Mirador	Universal-Viewer	Leaflet	OpenseaDragon
IIIF PresentationAPI	+	+	-	-
IIIF ImageAPI	+	+	+(only with plugin)	**+**
Customizability	-	-	+	**+**
Stylability	+/-	-	+	**+**
Developer Community	+(63)	-(21)	-(iiif-plugin)(4)	**+(102)**

Displaying images accessible through the ImageAPI as well as PresentationAPI is straightforward in the case of Mirador and Universal-Viewer**.** Even though these two viewers offer way more capabilities, many of them does not overlap with the requirements for the transcribathon platform. Given the fact that these tools are difficult to extend and maintain, they were not considered to be the best options for implementation of the current task.

Although OpenSeadragon and Leaflet do not provide yet a built-in support for IIIF PresentationAPI, the rendering of images accessible through IIF ImageAPI is straightforward. The codebases of these tools are well organized and consequently, only low efforts were needed to implement support for interpretation of IIIF manifest files.

OpenSeadragon was found to be the most suited technology, as it provides the best performance and it takes less effort to extend and customize the viewer. It has also the support of the largest developer community.

3. Viewer within the Transcribathon Platform

The image viewer on the Transcribathon platform is the key enabler for end-user activities, facilitating the transcription and annotation of chosen documents. One of its major strengths is in the ability to operate in full-screen mode, allowing users to access documents in high-definition format. It also provides an immersive user experience when transcribing and annotating historical documents.

In order to collect together the requirements for the enhanced IIIF viewer, the functionalities already provided by the existing image viewer has been assessed in depth. The first goal was to determine which of its features needed to be preserved in the new version of the Transcribathon platform. Additionally, feedback received from previous Transcribathon events was analyzed in order to establish new user requirements. A number of the user concerns were related to the need to enhance the readability of digitized documents by using common image processing techniques like changing contrast, brightness or colour saturation.

The overall usability, attractiveness and innovation are the key considerations driving the design of the enhanced IIIF viewer. Improvements and new features were ascertained by carrying out user-experience evaluations, taking into consideration feedback from experienced users and by reviewing features provided by similar web platforms.

The new version of the Transcribathon platform is currently under development, where the first official release is expected in July 2019. Consequently, the IIIF based viewer has been deployed in the development and test environment of the current website, which is publicly accessible though the URL: https://dev.transcribathon.com/.

3.1 Enhanced image visualization

Although the existing image viewer responds to the main user needs and can soundly display and interact with images, it lacks the ability to process and display high-res tiled images or information from IIIF manifests.

As sketched in Image 1, the existing image viewer (currently used in Transcribathon platform) provides the following functionalities:

- Zoom in/out (20-800%), seamless smooth zoom.
- Left/right rotation of images in 90° steps.
- Panning: image position adjustment with the mouse.
- Default view: resets the dimensions and the position of the image.
- Full-screen mode.
- Transcription editing box as overlay on full-screen image (editor box is scalable and movable over the whole canvas).
- Next-/Previous-Page based navigation.

Image 1: Existing image viewer operating in full-screen mode with transcription box overlay.

As the first step of development, the functionalities mentioned above needed to be integrated into the IIIF based viewer. OpenSeadragon already has the following functionalities built-in: Zooming, Panning, Rotation, Default-View and Full-Screen mode. However, the integration of a transcription box as an overlay needed to be implemented as a custom solution.

The new functionalities supported by the IIIF viewer include image processing capabilities, which aim to improve the readability of text. Many of digitized historical documents are difficult to decipher as the script is often not clearly visible.

These image processing functionalities were implemented by using CSS3 image filters which are well supported by newer versions of popular web browsers.

As shown in Image 2, the additional controls were introduced in the interactive toolbox, allowing end users to manipulate the contrast, brightness and saturation of the displayed image. A function for inverting image colors will be also included in the following version of the IIIF based viewer.
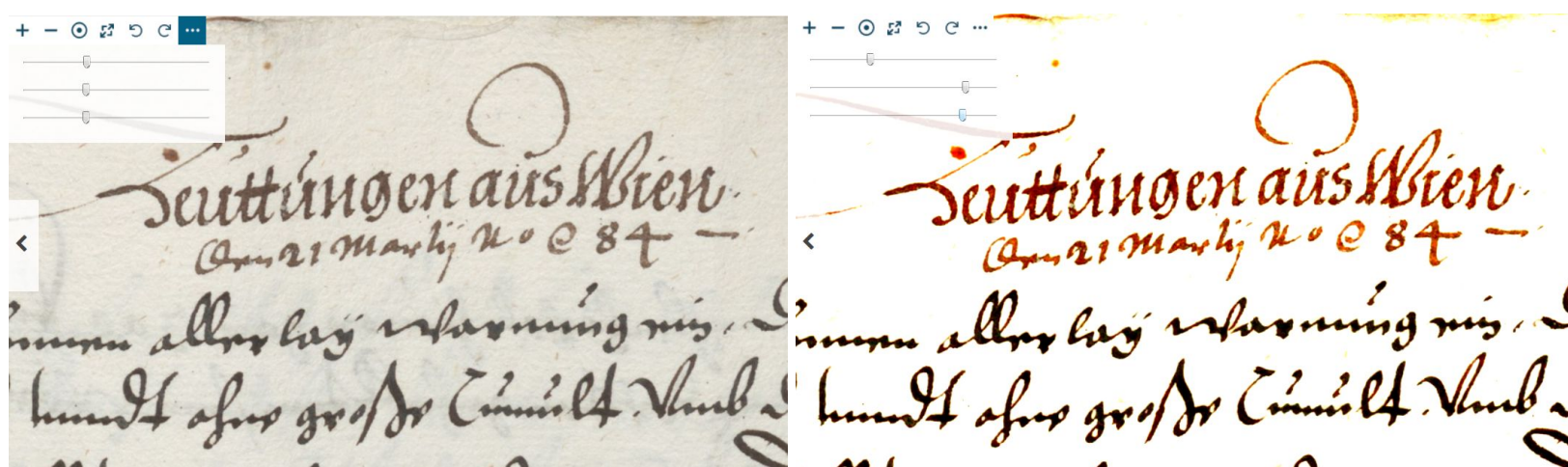
Image 2: Example of image manipulation used to improve text readability:
https://dev.transcribathon.com/en/documents/id-10003/item-95662/

3.2 Transcribing documents

The IIIF based viewer is has been deployed and is running in the test environment (i.e. http://dev.transcribathon.com). User registration is a prerequisite for transcribing documents. The best user experience for transcription activities is achieved when enabling the full-screen mode. The editor is enabled by clicking the pen control in the viewer's toolbar. All image processing functionalities are also available on the toolbar to help improve the document's readability.
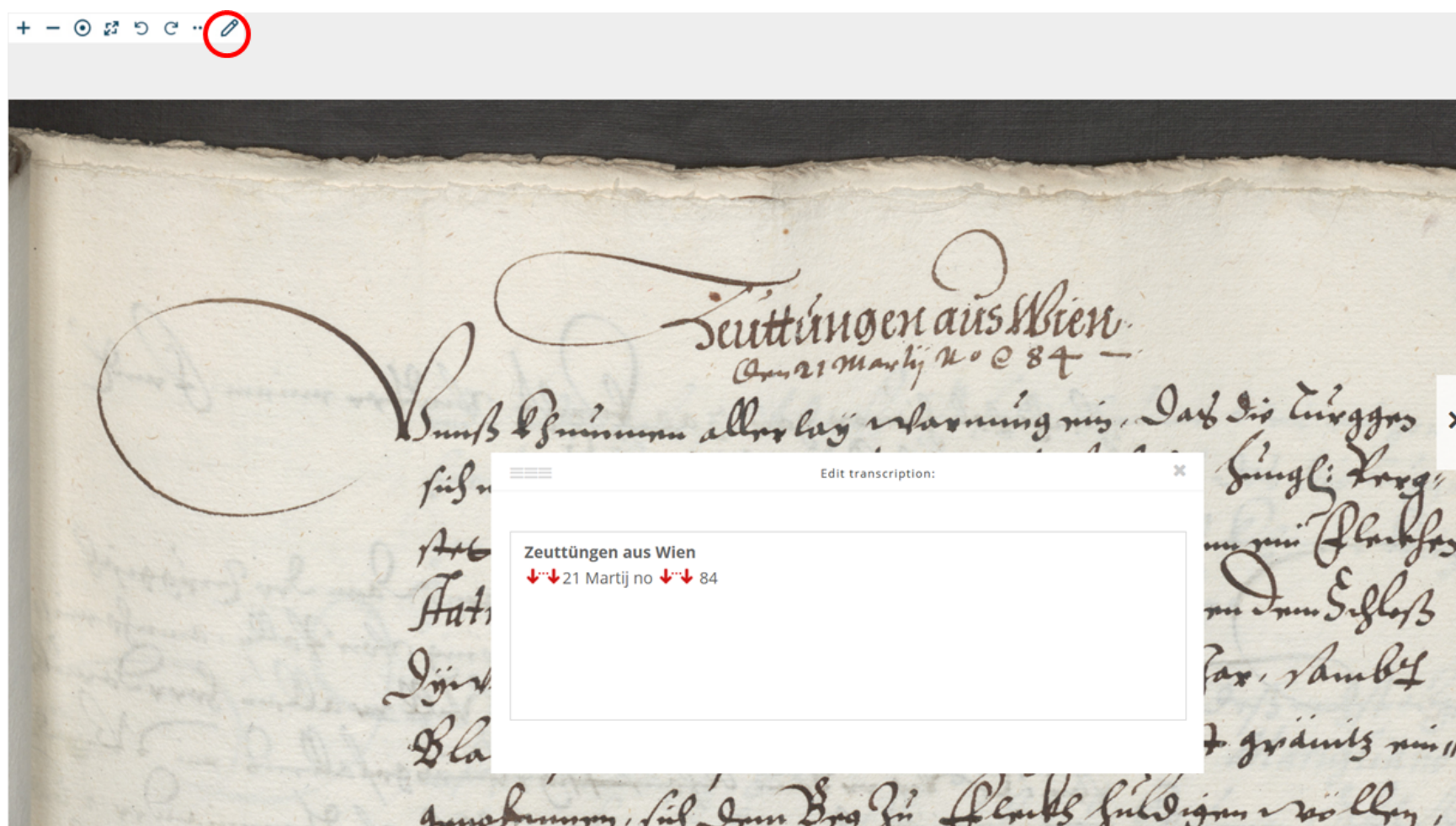
Image 3: Viewer in full-screen mode with transcription box

3.3 Integration within Transcribathon Platform

The web portal of Transcribathon platform is developed on the top of the open source Wordpress CMS. Consequently, the integration of the IIIF based viewer is implemented as a Wordpress plugin. This solution enables a clear separation, at the source code level, between the functionality of the IIIF based viewer and the other components of the Wordpress framework. Moreover, it facilitates the reusability of the viewer and its long term sustainability through the community support.

The source code of the developed plugin is publicly available within the project's github repository. It follows the conventions for Wordpress plugin development by having a clear separation between the components of the graphical user interface, the business logic and the user interaction. The main functionality of the viewer is implemented within the following files:
- **tct-image-viewer.js** implementing the viewer's configuration, navigation between documents and the image manipulation controls
- **fullscreen.js** implementing the functionality for the fullscreen mode, including the integration of transcription editor and image manipulation controls
- **openseadragon.js** implementing the rendering of images and IIIF resources

OpenSeadragon uses the Image API to access IIIF resources, therefore the reference to the IIIF Server needs to be configured.

The built-in support for the zooming functionality is implemented by loading higher resolution tiles though the ImageAPI, while the content is dynamically loaded for the displayed part of the document. Table 2 provides a short code sample showcasing the access and rendering of IIIF resources with the IIIF based viewer.

Table 2: Source code sample: Enabling support for IIIF resources

```
iiifViewer  = OpenSeadragon({

        id: id,

        sequenceMode: false,

        showRotationControl: true,

        prefixUrl: "/wp-content/plugins/tct-transcribe-viewer-iiif/assets/images/osdImages/",

        tileSources: {

          "@context": "http://iiif.io/api/image/2/context.json",

            // ImageAPI Endpoint of the IIIF Server

          "@id": "https://iiif.onb.ac.at/images/ANNO/fug15840321/z116567901_00000161",

          "height": 8388,

          "width": 5479,

          "profile": [

                "http://iiif.io/api/image/2/level2.json"

          ],

          "protocol": "http://iiif.io/api/image"

      },

        maxZoomLevel: 8,

        minZoomLevel: 0.3,

        autoHideControls: false

    });
```

4. Design mockups and future development

Following the activities detailed in this milestone document, we plan to further improve the user experience and interface of the IIIF image viewer in the coming months. User testing and users' interviews have revealed a number of user experience issues concerning the transcription activity. The new design will continue to address these issues to improve the overall usability of the tool.

The new interface will include a new tabs section that will allow users to access the main functionalities of the platform:

- The **transcription** tab (see Image 4) is where users will transcribe the text from the image.
- The **advanced settings** tab (see Image 5) will allow users make adjustments to the image in order to make it more readable and to make the transcription work easier. The parameters available to modify the image will be rotation, brightness, saturation, contrast as described in **3.1 Enhanced image visualization**.
- In the **metadata** tab (see Image 6), users will be able to read the full existing metadata of the document and the set of other documents it belongs to.
- The **enrichment** tab will allow users to add new information related to the image, including geo-tags and keywords.
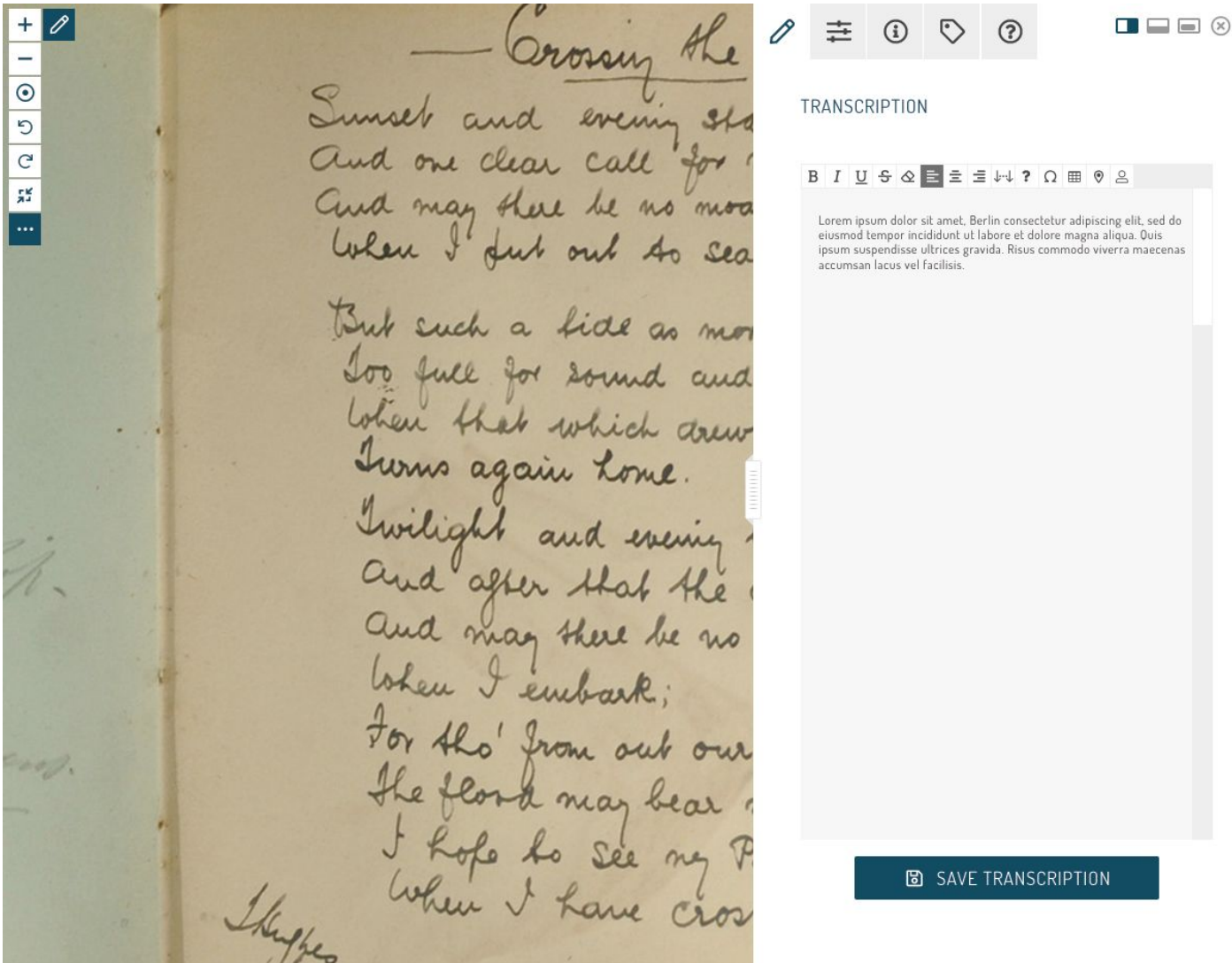

Image 4: Viewer in full-screen mode with interaction panel fixed on the right side of the screen. Transcription tab is selected.
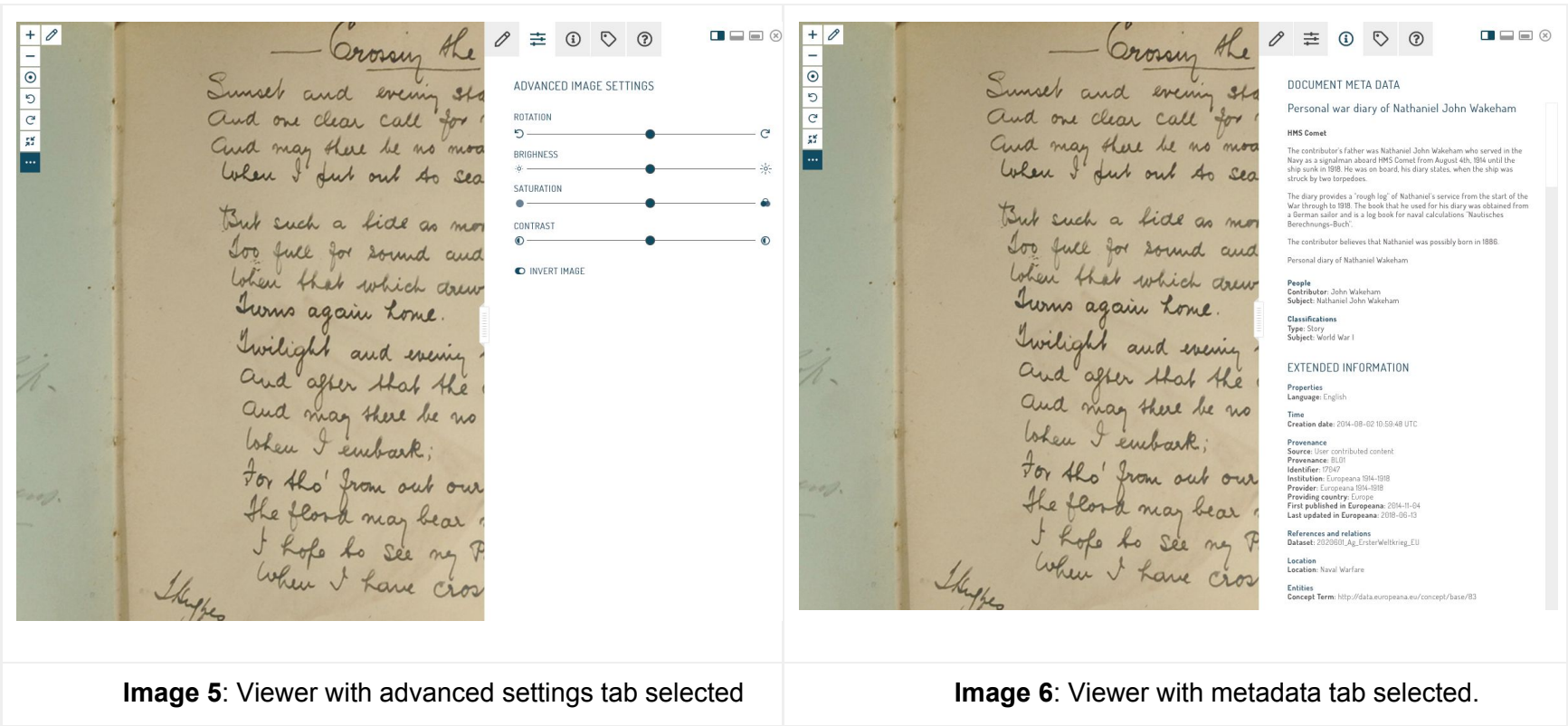

Image 5: Viewer with advanced settings tab selected

Image 6: Viewer with metadata tab selected.

It will be also possible for users to change the position of the interface, being able to have it fixed to the left, right or bottom of the screen, or floating as an overlay above the image (like the old version). This will allow users to customize the interface in order to make their transcription and reading activity easier.

Another improvement of the new interface will be the ability to mark a part of the image using a selection box and annotate what can be found in this selection.This can be used, for instance, to mark where drawings appear in a document and to describe them in detail.

5. Conclusions

As a result of the described activities, we have developed and integrated a new IIIF based image viewer into the Transcribathon platform of the EnrichEuropeana project. This viewer improves the platform's user experience by enabling faster image loading (especially for high-res images) and by providing new functionalities, including dynamic zoom and image manipulation. By ensuring the compliance with the IIIF standard, a better support for visualization of high resolution images is provided for desktops and for especially for mobile devices. The IIIF based viewer was implemented as a wordpress plugin and its core functionality is developed on the top of Openseadragon javascript library, ensuring so the compatibility with all major operating systems and web browsers.

The follow up version of the viewer will further enhance the user experience. It will provide access to the full transcription and enrichment functionality of the platform when operating in the full screen mode.

6. REFERENCES

Official webpage of **IIIF Community**: https://iiif.io/

Official Web Page of **Universal-Viewer**: https://universalviewer.io/

Wiki page of Universal Viewer on Github: https://github.com/UniversalViewer/universalviewer/wiki/About

Official Web Page of **Leaflet** viewer: https://leafletjs.com/

Official Web Page of **Mirador** viewer: http://projectmirador.org/

Official Web Page of **OpenSeadragon** (https://openseadragon.github.io/)

Tutorials for using **CSS3 Image Filters**: https://www.w3schools.com/cssref/css3_pr_filter.asp

Codebase for **IIIF based viewer** :
https://github.com/EnrichEuropeana/transcribathonEU/tree/iiif-plugin/wp-content/plugins/tct-transcribe-viewer-iiif