



D4.3 Möbius Book Functional Prototype

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Executive Summary

This Deliverable describes the technical developments on the implementation of the first functional prototype of the Möbius Book which consists of three major parts: the Möbius Creator's Toolkit, the Möbius Player, and the file format, which is an extension of the EPUB3 format. The Creator's Toolkit allows a user to assemble a Möbius book file, which can then be viewed with the Möbius Player. It is built as a web-application that uses responsive technologies and thus is compatible with all operating systems and can work well on various devices and screen resolutions (including tablets and mobiles). Existing Möbius books can be discovered in the Explore interface of the Player. The native prototype is a modified version of the Thorium reader¹ that accepts the Möbius extended EPUB3 format and allows to select the tracks the user wants to play back. In its current state, due to the lack of headtracking input, it only plays back static binaural. The mobile player prototype is a responsive application that allows users to fully experience the Möbius books. It can be used on any device and operating system. Users can select a book and choose if they want to have an audio-enhanced experience of reading the book or not. If they have selected the 3D Audio version, once they open the book the voice narration SFX and Music will start playing creating a more immersive

¹<https://www.edrlab.org/software/thorium-reader/>

experience into the books's world. Multimedia elements can additionally be encountered directly in the text of the book.

The Möbius file format is the Exchange format between the Creator's Toolkit and the Player. It is an extension of the EPUB3 format that allows to synchronize multiple audio tracks with the text. While plain EPUB3 only allows to add one audio track to the text that can be played back synchronized to the text if the player is capable of multi-modal reading (i.e., Thorium), the Möbius extension allows to add a sound effects track and a music track, so that the user can choose from the three tracks the ones that contribute most to their reading experience.

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Terminology and Acronyms

<i>EC</i>	<i>European Commission</i>
<i>EU</i>	<i>European Union</i>
<i>FP</i>	<i>Framework Programme</i>
<i>PMB</i>	<i>Project Management Board</i>
<i>PMP</i>	<i>Project Management Plan</i>
<i>STAB</i>	<i>Scientific and Technical Advisory Board</i>
<i>WP</i>	<i>Work Package</i>
<i>DAW</i>	<i>Digital Audio Workstation</i>

1. Introduction

The Möbius Book consists of three major parts, the Möbius Creator's Toolkit, the Möbius Player, and the file format, which is an extension of the EPUB3 format. The Creator's Toolkit allows a user to assemble a Möbius book file, which can then be viewed with the Möbius Player.

2. Möbius File Format

The Möbius file format is the Exchange format between the Creator's Toolkit and the Player. It is an extension of the EPUB3 format that allows to synchronize multiple audio tracks with the text. While plain EPUB3 only allows to add one audio track to the text that can be played back synchronized to the text if the player is capable of multi-modal reading (i.e., Thorium), the Möbius extension allows to add a sound effects track and a music track, so that the user can choose from the three tracks the ones that contribute most to their reading experience.

3. Möbius Creator's Toolkit Prototype

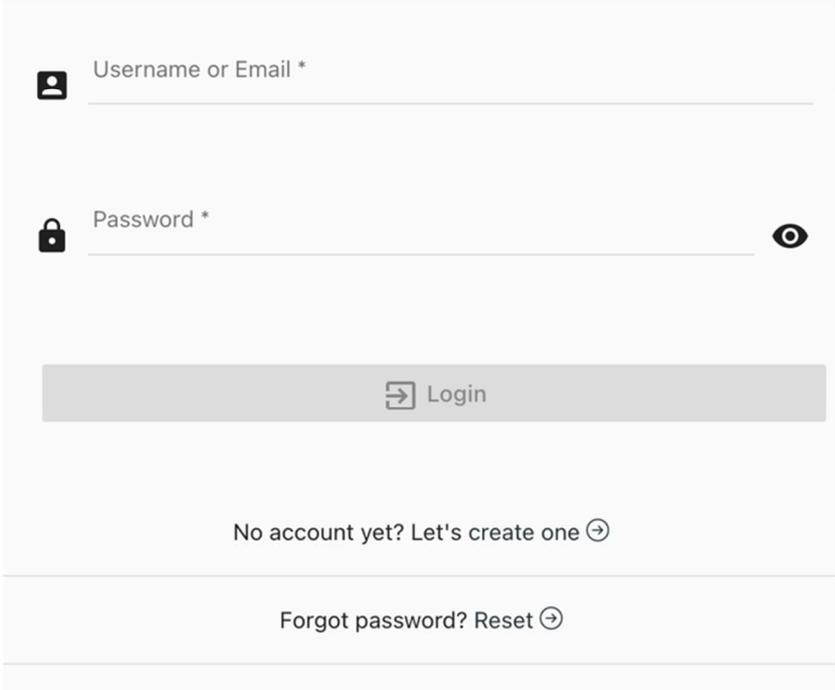
3.1 Möbius Creator's Toolkit Prototype

The Möbius Creator Toolkit is a web-application that enables prosumers to create Möbius books and manage the books they have created previously. Because it is built as a web-application, the Möbius Creator Toolkit is compatible with all operating systems. In fact, since it uses responsive technologies, the application can work well on various devices and screen resolutions (including tablets and mobiles).

The current version of the prototype is accessible at the following link: <https://mobius-creator.in-two.com/login>

Login

Sign in to your MOBIUS-CREATOR  account



The login form consists of two input fields: 'Username or Email *' with a person icon and 'Password *' with a lock icon and a toggle eye icon. Below the fields is a 'Login' button with a right-pointing arrow icon. At the bottom, there are two links: 'No account yet? Let's create one ' and 'Forgot password? Reset 

Figure 1: User login

Indeed, access control and security has been built in from the start and the Creator Toolkit requires users to be registered and to sign in into their accounts. All accounts are safe, secure, password-protected and backed-up daily. The application is deployed on IN2's servers and IN2 manages its operation. This includes the management of a deployment configuration that is scalable, using multiple instances and load management techniques in order to accommodate potentially large numbers of concurrent users. For monitoring the servers, containers and application we use Datadog² and a self-hosted instance of the TICK stack³. Depending on the applications we set-up a number of alerts to immediately notify operations and developers using e.g. webhooks or emails. We stream and manage logs centrally using a self-hosted instance of Graylog⁴. We also use Graylog to alert operations and developers on

² <https://www.datadoghq.com/>

³ <https://www.influxdata.com/time-series-platform/>

⁴ <https://www.graylog.org/>

application errors, analyse logs for example to identify security threats, and quickly troubleshoot problems.

If a user does not yet have an account, she can register and create a new one by filling in a short form. The account creation and management of the personal information shared at this step is done in accordance with the rules set up by the GDPR. A “Terms of Service” page has been created to explain to users the general conditions of the terms of use of the application and the privacy policy. A user will have to actively agree to the Terms before they can create the account. In case users have forgotten their password they can request to reset it.

Register

Create your MOBIUS-CREATOR  account

 Username *

 The username is part of the url of your account 0 / 30

 Email *

 Make sure that this is valid email, so you are not missing out.

 Password *

 Strong passwords include small and capital letters as well numbers. 

I agree to the MOBIUS-CREATOR [terms of service](#) 

You must accept the terms of service before you can proceed.

 Create account

Got an account already? [Login](#) 

 All accounts are safe, secure, password-protected and backed-up daily.

Once a user has logged in to the system they land on their homepage, from where they can navigate to their books, chapters and contents. Within the application the “book” is the overall container, which can have several “chapters”, which in term can contain several content items (e.g. text blocks, images, videos).

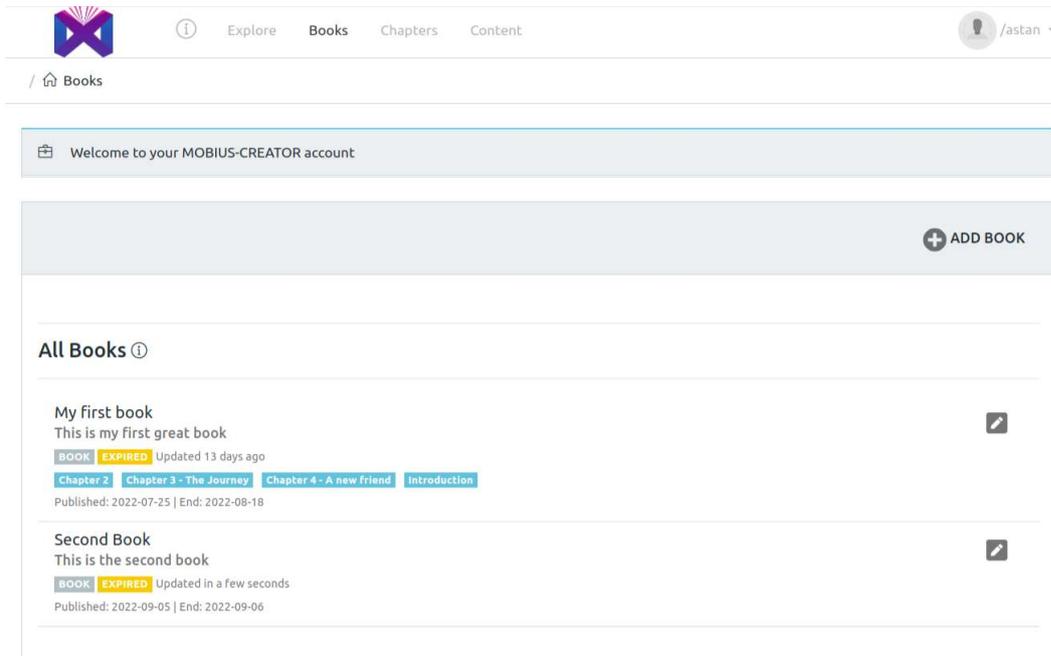


Figure 3: Creator Toolkit - Books menu (default interface)

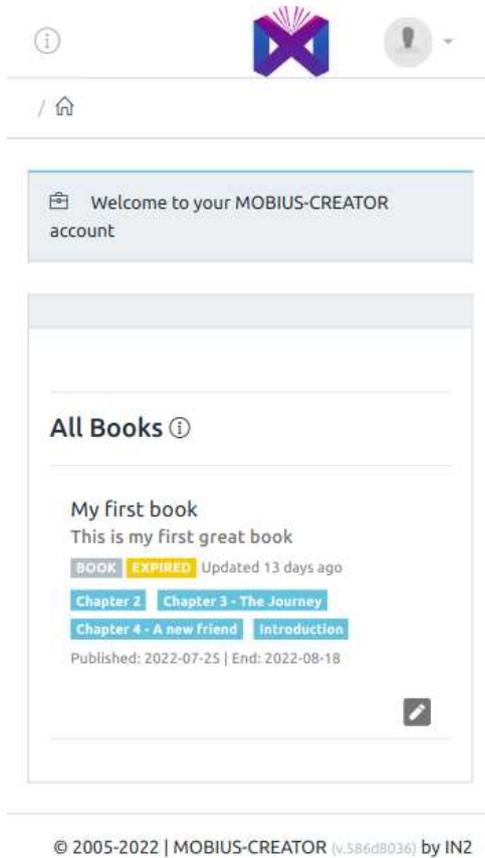


Figure 4: Creator's Toolkit: Books menu (mobile view)

Registered prosumers can customise their profile by adding a picture, description and external links to where their other works can be found. As their account for the Creator toolkit is linked to the Player, they can also specify which genres they find more interesting in order to personalise their book recommendations.

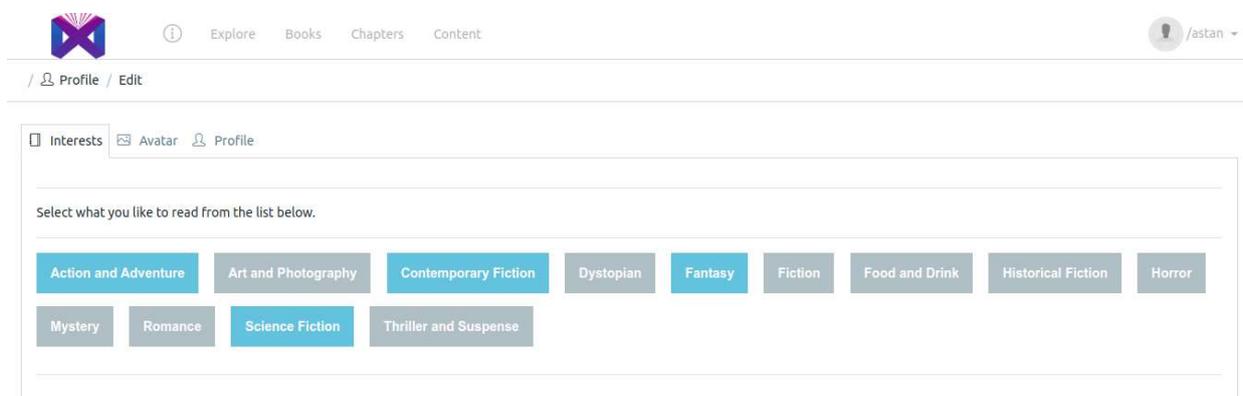
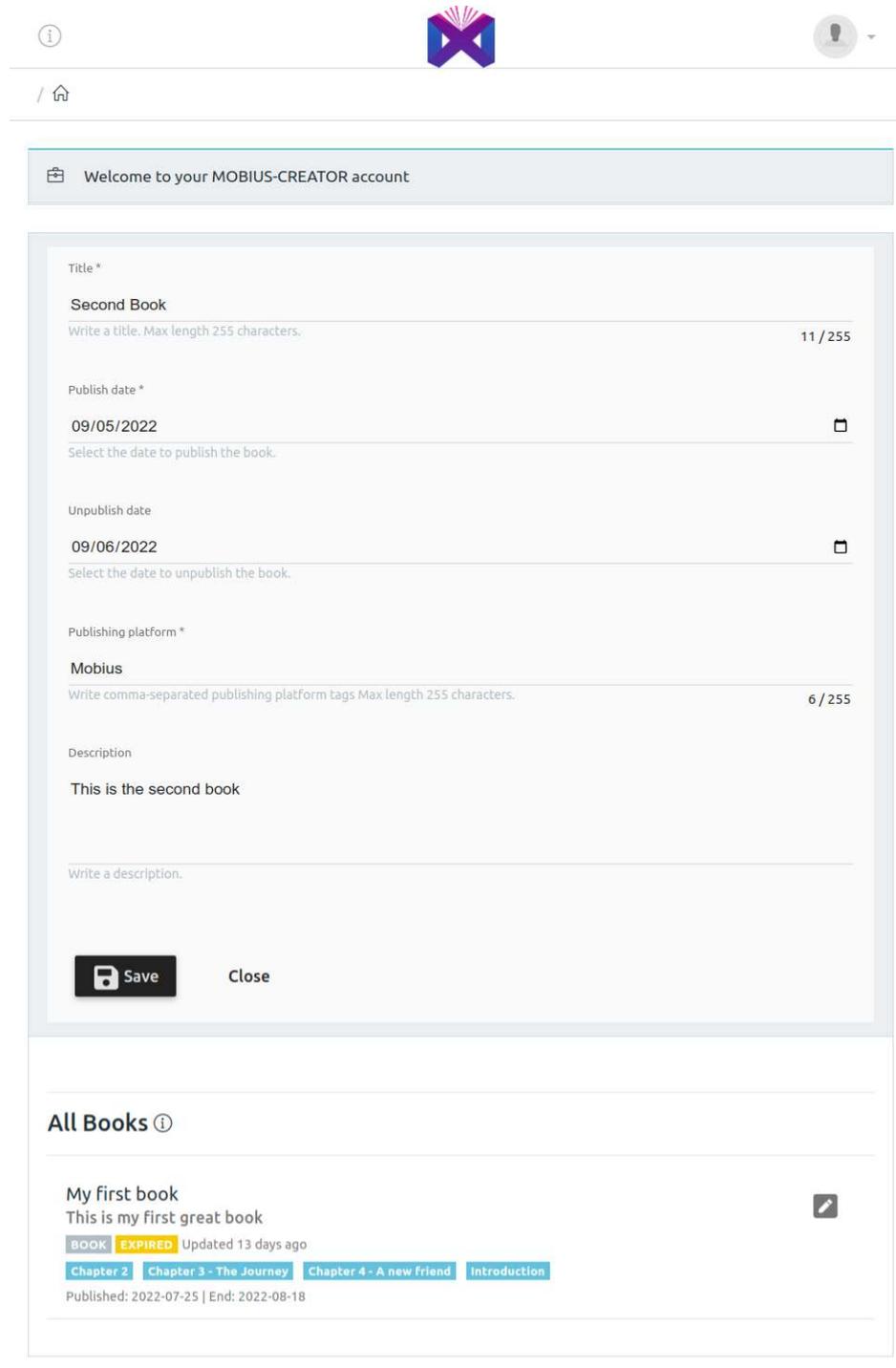


Figure 5: Profile menu - Selecting interests

From the Homepage, existing books of the user are shown in alphabetical order and a new book can be immediately created by clicking on the “Add book” button.



The screenshot shows the MOBIUS-CREATOR user interface. At the top, there is a navigation bar with an information icon, the MOBIUS logo, and a user profile icon. Below the navigation bar is a home icon and a welcome message: "Welcome to your MOBIUS-CREATOR account".

The main content area features a form for adding a new book. The form fields are:

- Title ***: "Second Book" (11 / 255 characters)
- Publish date ***: "09/05/2022" (calendar icon)
- Unpublish date**: "09/06/2022" (calendar icon)
- Publishing platform ***: "Mobius" (6 / 255 characters)
- Description**: "This is the second book"

At the bottom of the form are "Save" and "Close" buttons.

Below the form is a section titled "All Books" with a help icon. It displays a list of books:

- My first book** (edit icon)
- This is my first great book**
- BOOK EXPIRED** Updated 13 days ago
- Chapter 2** | **Chapter 3 - The Journey** | **Chapter 4 - A new friend** | **Introduction**
- Published: 2022-07-25 | End: 2022-08-18

Figure 6: Adding a new book

When creating a new book the user must specify a Title, a publish date (when a book will become public on the Möbius Explore library), and a publishing platform, which for the moment is restricted to Möbius. Optionally the user can also add a description of the book and indicate an “unpublish date” which represents a point in time when the book will be removed from the Möbius library, a useful feature if prosumers want only to give access to their book for a limited time only. After the changes are saved, the book becomes visible in the home screen and the user can proceed to bind your different chapters to the book.

From the navigation menu found at the top of the page the user can also select the “Chapters” section to see the chapters created and add new ones.

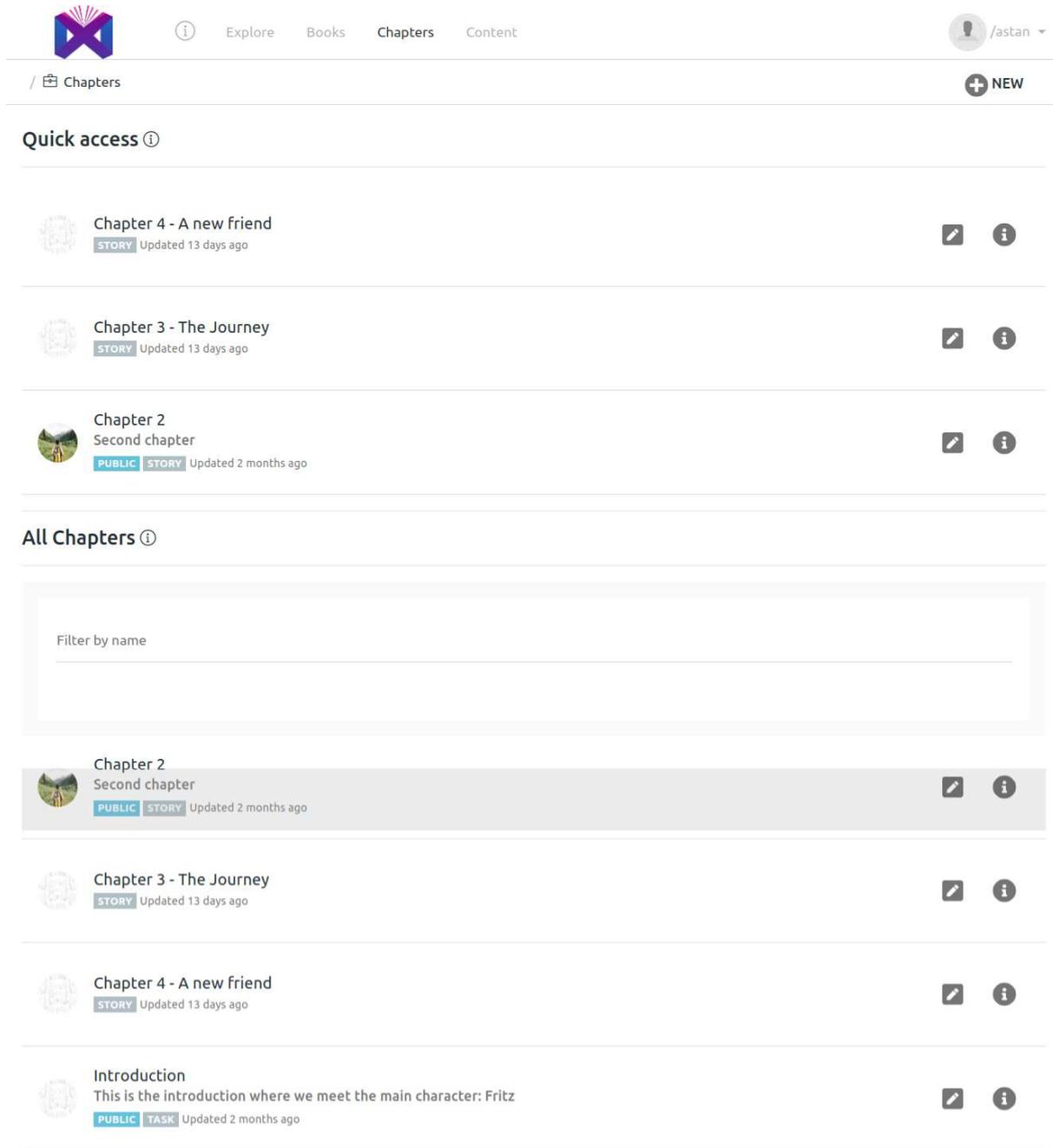


Figure 7: Creator's Toolkit: Chapters Menu

When adding a new chapter the user can specify a title, a description, and select if they prefer the chapter to be a 'Story' or a 'Collection'. A 'Story' can be used to collect a small number of ideas in a specified order, while a 'Collection' can be used to collect large number of ideas without a particular order. After the new Chapter is saved it becomes visible on the homescreen of the user and can be bound to any number of books.



Figure 8: Creating a new chapter

If the user clicks on a newly created Chapter this will be empty and she is presented with the options to either “Upload or Write” (manually uploading new text or media files) or “Discover or Save” (browsing the current account and selecting existing content to include or save a search).

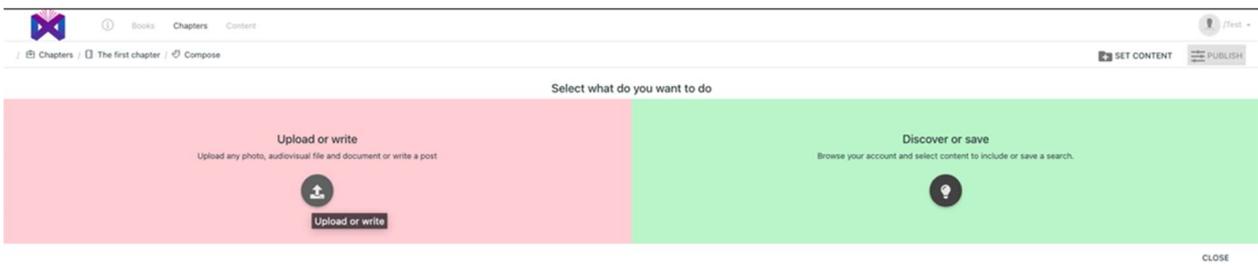


Figure 9: Selecting how to add content to the chapter (upload or re-use existing)

If the user decides to upload or write new content, a new form is presented. All the content that a user uploads can also be reused in different creations by that user. A user can choose if they want to write text, upload media, or a call to action.

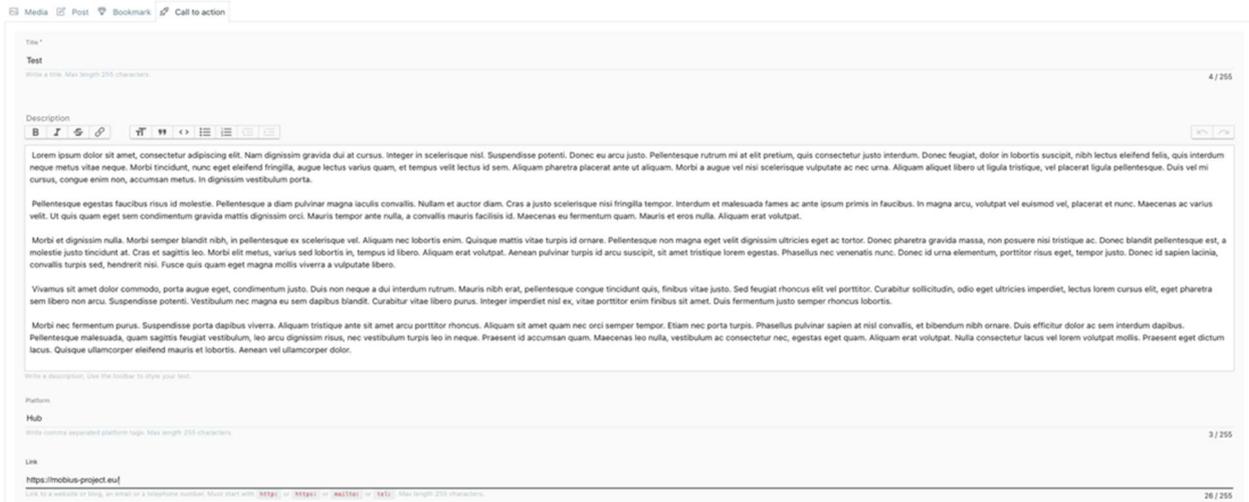


Figure 10: Adding a call to action element

There are several ways in which media, like photos or sounds, can be used in a chapter. The most simple way is to add media content items to the chapter directly. The user can upload photos, videos and sound files in various formats. Both single files or bulk uploads are possible. The user can add various metadata to the files, including tags, location, description, language information and external links. The system automatically transcodes the media files uploaded based on the detected type and creates versions of the files which are more mobile and web friendly.

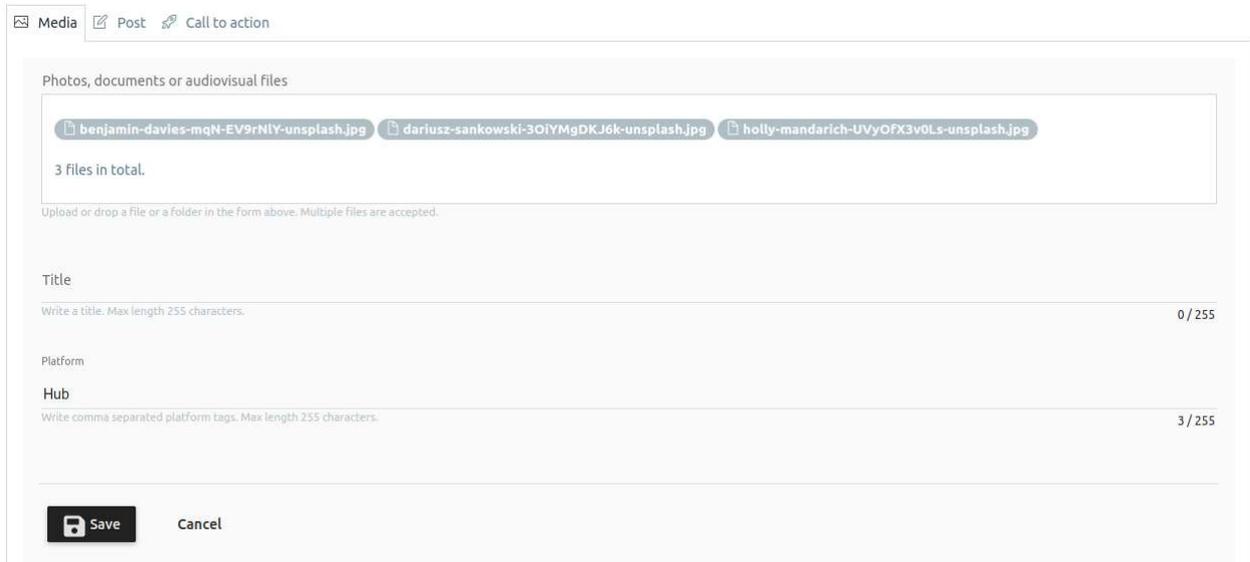


Figure 11: Adding media items in batch

Instead of uploading new media files or writing new text users can re-use the ones they have previously uploaded. To do this they can either (1) go to the Chapter they want to work on and select “Discover and Save” or (2) use the top menu to navigate to “Content”. Using the first

option, they can see all the content available in their account and add each individual photo to their chapter by clicking the “Add” button. Once clicked, the item is immediately added to the chapter and the button changes to “Remove”.

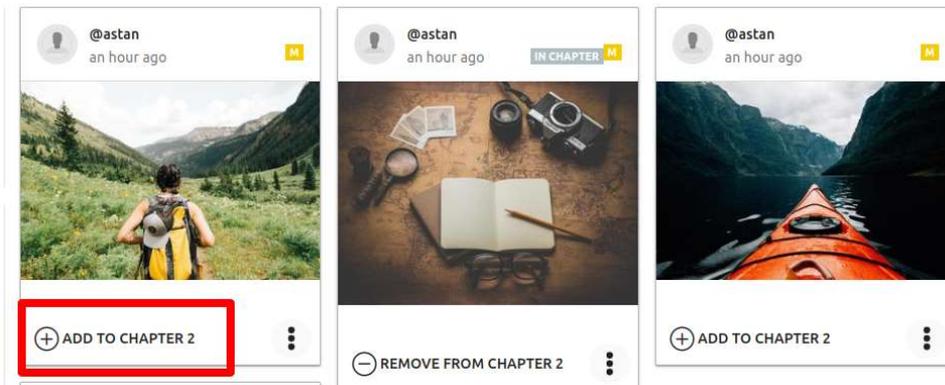


Figure 12: Selecting existing content to use in Chapter

If the second option is used, via the Content view, the user can browse or search its repository and add each item to any number of chapters they choose to. The dropdown menu is contextual and displays the last 3 chapters the user has worked on. If the chapter they want to add to the item is not one of those 3 they can click on the “show more” to see all Chapters and select the right one. By clicking on any of the chapters, the content item is added to it.

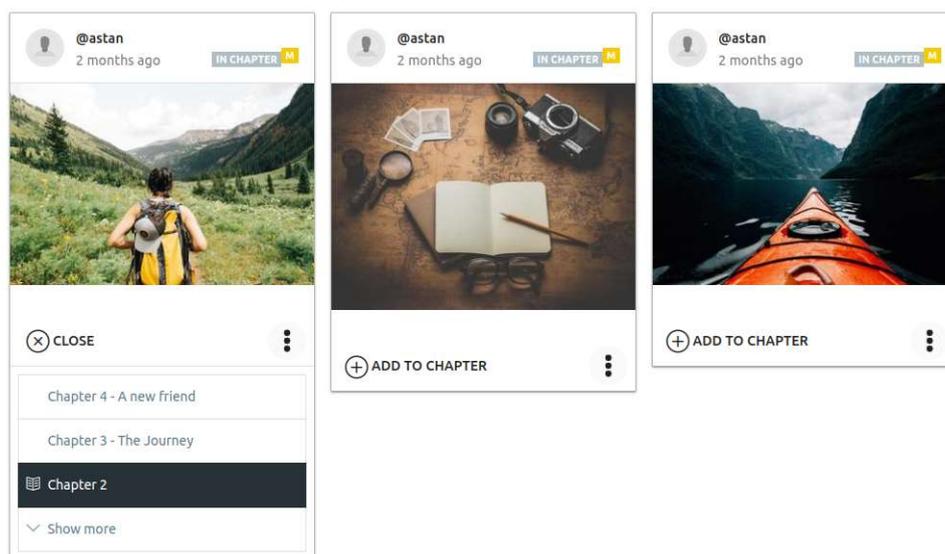


Figure 13: View of content items from the Content Menu

To find specific content items an advanced search is available including the capability of using different facets to filter the content. Searches can be saved and assigned to specific chapters as an automatic rule.

Each content item shows its creator, when it was added, and an indication if it is already part of a chapter. It also has several actions that can be performed on it: visualising in full, adding it to the trash bin, editing, copying its direct link and downloading it.

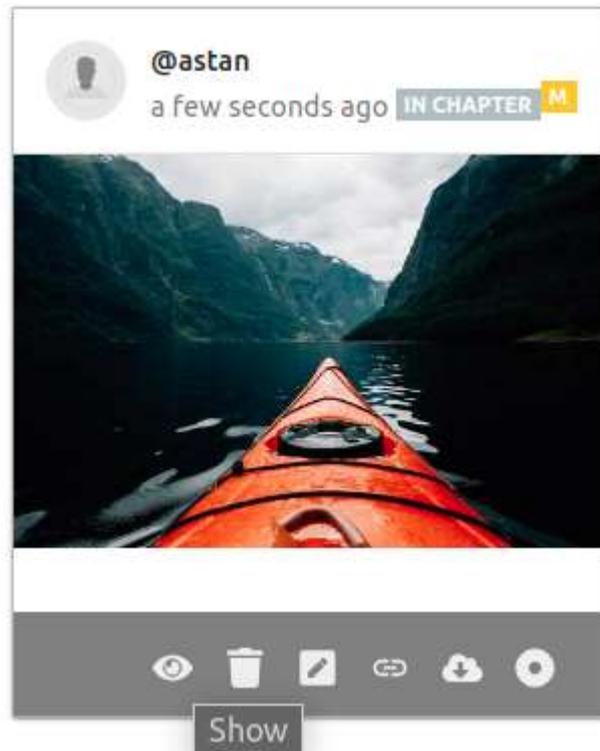


Figure 14: Details of options for a content item

Users can have photos or other media inserted at specific points in the text of a chapter. To do so they can embed a photo item directly into the description text of a post item, or simply add the media item to a chapter and arrange it in the right place by drag-and-drop.

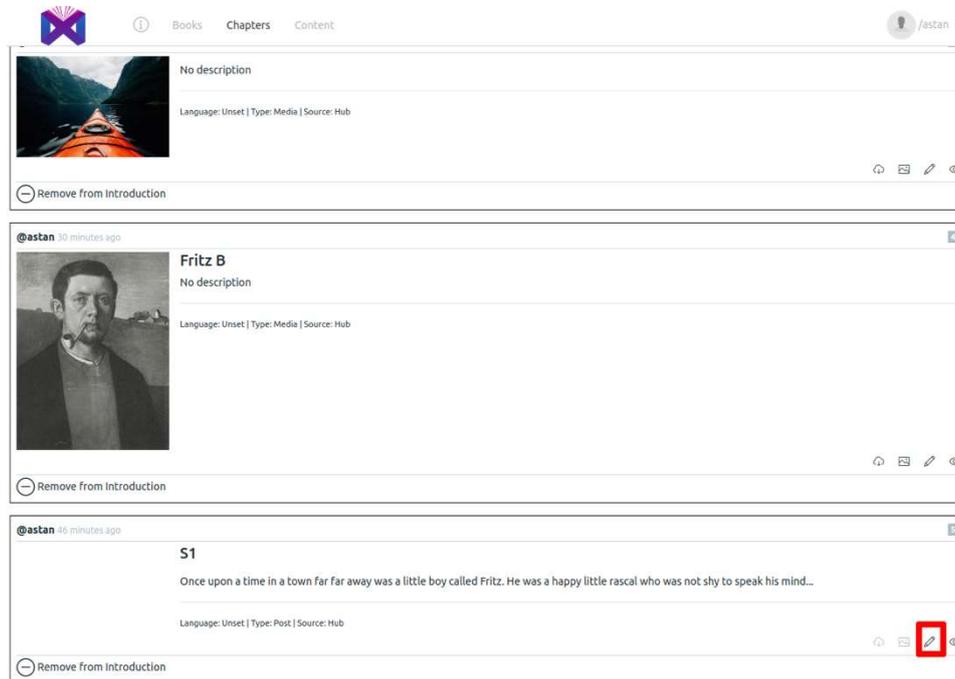


Figure 15: Arranging content items within a chapter

For each of their books, prosumers can get a link to allow their fans to contribute with content. A special user interface then allows people to upload content in relation to a book.

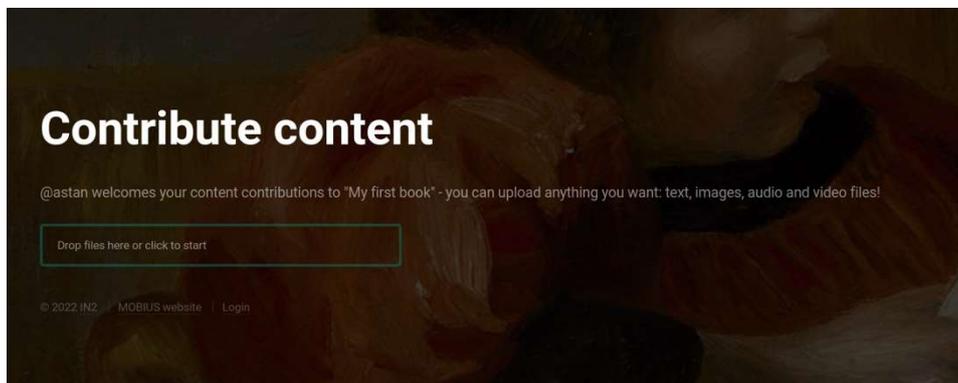


Figure 16: Public interface to allow fans to contribute content

3.2 Spatial Audio Composer Prototype

The Creator's Toolkit is a rich web application that allows users to create Möbius book files from text and audio input.

3.2.1 Workflow Overview

The current prototype represents the workflow from the text-narration alignment to the export of the Möbius file. The layouting and text recording are not part of it and have to be done with other tools, either the Visual Creator described in D3.1 or third-party tools such as Audacity⁵ (recording) or Sigil⁶ (layouting).

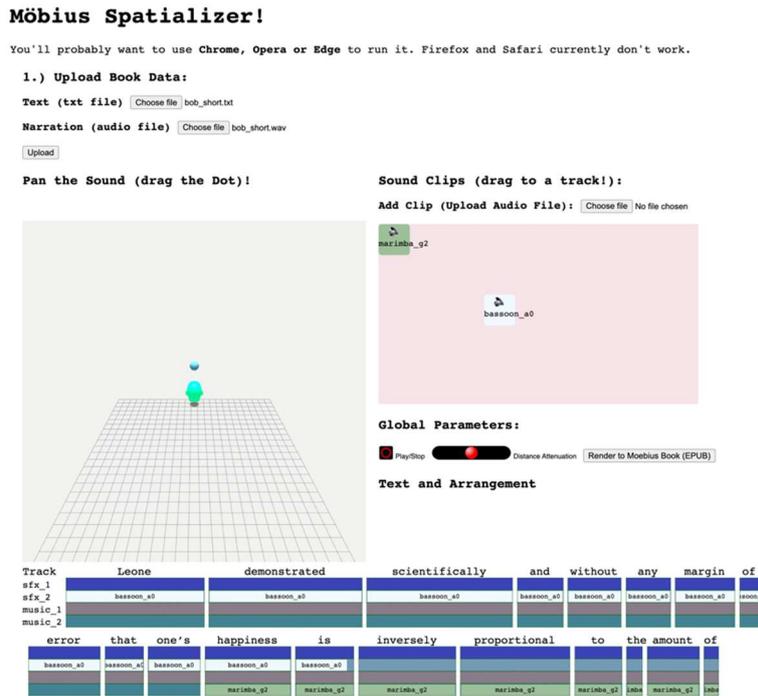


Figure 17 - Creator's Toolkit Overview

The user can upload the text and the pre-recorded narration, using the upload fields, as well as some audio sources that will end up in the audio clip tray. Text and narration need to match word by word.

⁵ <https://www.audacityteam.org>

⁶ <https://sigil-ebook.com/>

Möbius Spatializer!

You'll probably want to use **Chrome, Opera or**

1.) Upload Book Data:

Text (txt file) bob_short.txt

Narration (audio file) bob_short.wav

Figure 18 - Upload Field

Text and narration will be automatically aligned, and the user is presented a DAW-like view with various tracks. The “music” tracks will be rendered to the music track in the Möbius EPUB file, the “sfx” tracks to the sound effects track.

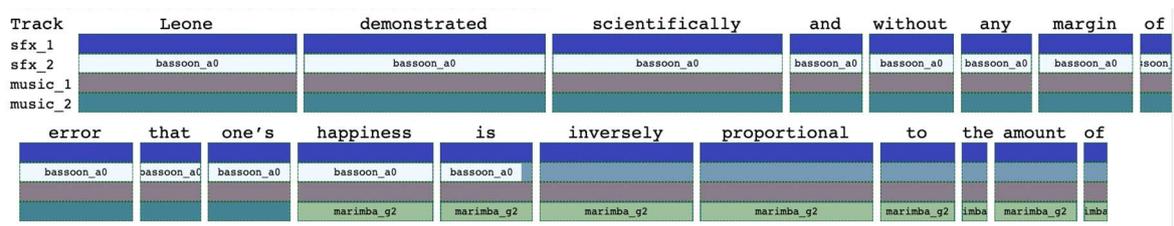


Figure 19 - Text-Aligned Audio Tracks

The additional audio sources can be dragged to the tracks and are played back in sync with the text.



Figure 20 - Sound Clip Tray

A 3D view of the space allows to place the tracks in the spatial domain. The user's central position is marked by a head model in the center, the tracks are marked by spheres whose color matches the color of the respective track. The spheres can be dragged to the desired position directly in the visualizer, either directly or using the 3-Axis handles.

Pan the Sound (drag the Dot)!

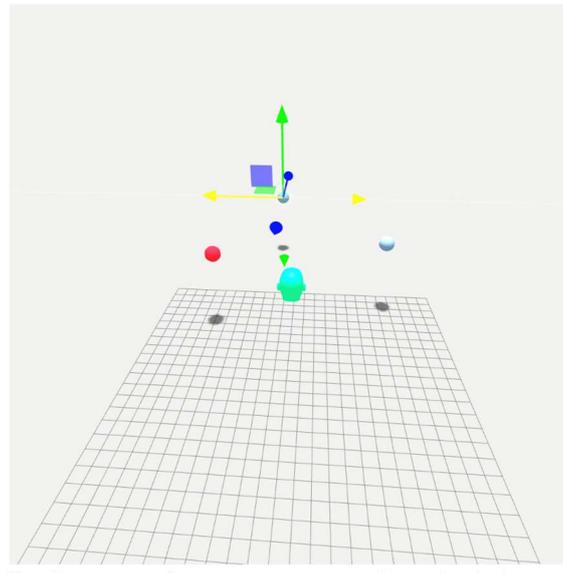


Figure 21 - Spatializer View

When the arrangement is played back, the progress is marked by highlighting the words, similar to the way the reading progress is marked in the player in multi-modal reading mode.

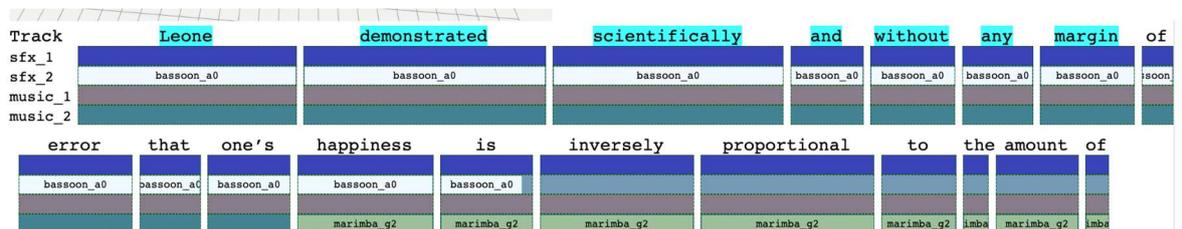


Figure 22 - Playback in Progress

If the arrangement works, the Möbius book file can be exported using the respective button.

3.2.2 Architecture Overview

Besides the text-narration alignment, the current prototype is mostly client-side JavaScript and WebAssembly. The narration and text are sent to the server, which calculates the alignment and sends it back as a JSON file to the local client. Spatialization is done in the browser using Eureka's spatialization libraries compiled to WebAssembly⁷ to increase overall performance (compared to pure JavaScript).

⁷ <https://webassembly.org/>

4. Möbius Player Prototype

Existing Möbius books can be discovered in the Explore interface of the Player. This can be accessed at: <https://mobius-creator.in-two.com/explore>

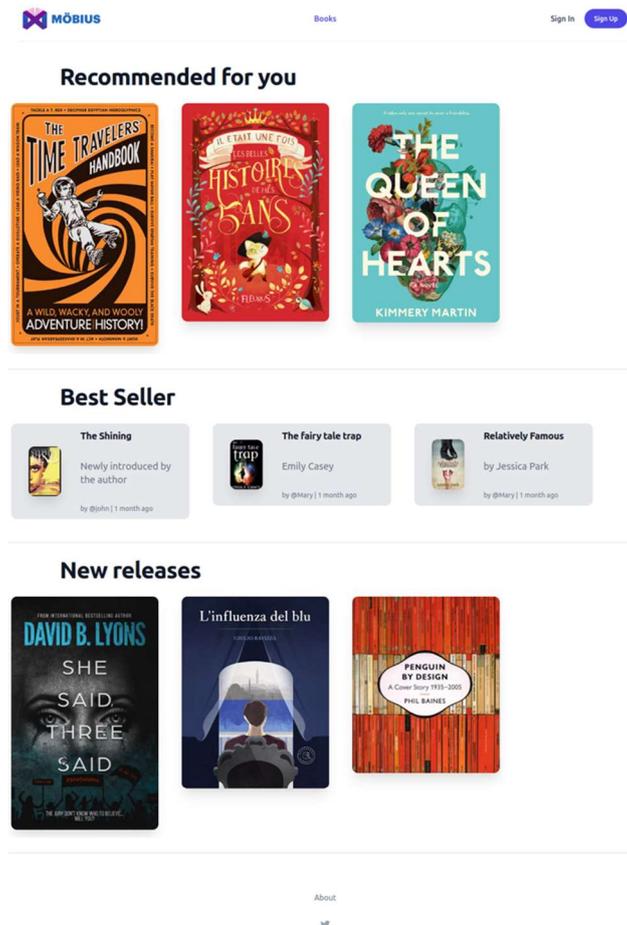


Figure 23: Möbius Player "Explore" interface

Without logging in all users can browse the collection of published books and experience any of them. Registered users can have a profile and select their preferences to adjust the recommended books they see in the Explore. Moreover, they can have a personal selection of books under "Library".

Personalise

Choose min 3 topics you like, we will give your more often content that relates to them.



Finish →

About



Figure 24: Personalising the reader's account

4.1 Native Prototype

The native prototype is a modified version of the Thorium reader⁸ that accepts the Möbius extended EPUB3 format and allows to select the tracks the user wants to play back. In its current state, due to the lack of headtracking input, it only plays back static binaural.

⁸ <https://www.edrlab.org/software/thorium-reader/>

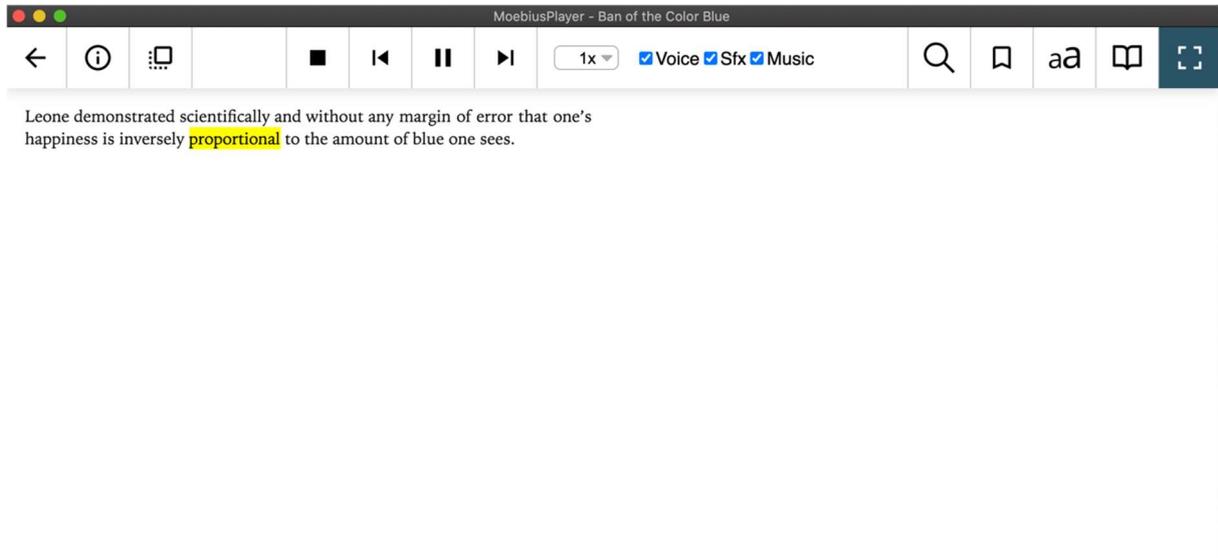


Figure 25 - Native Player Prototype Overview

Text and narration are played back in sync, with the current word being marked while it's read.

The user can choose the tracks they want to include in the audio part in any possible combination. Currently, this is limited to narration, sound effects and music.

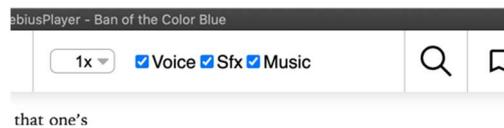


Figure 26 - Track Selection

The application also includes a simple bookshelf function that allows to view a collection of Möbius books.

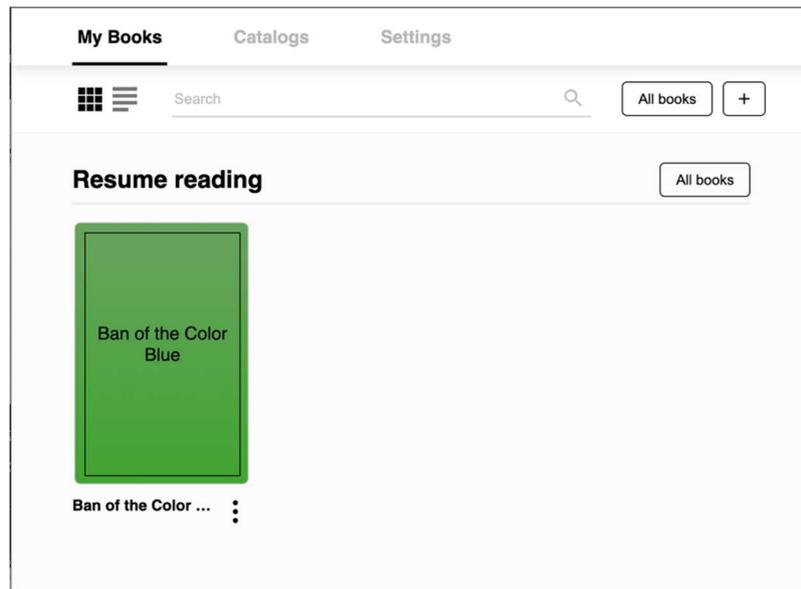


Figure 27 - Möbius Native Player Bookshelf

4.2 Mobile Prototype

The mobile player prototype is a responsive application that allows users to fully experience the Möbius books. It can be used on any device and operating system. Users can select a book and choose if they want to have an audio-enhanced experience of reading the book or not.

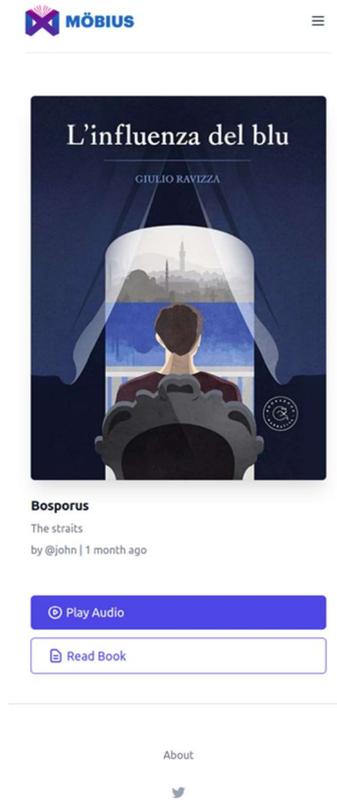


Figure 28: Book details in the mobile player

If they have selected the 3D Audio version, once they open the book the voice narration SFX and Music will start playing creating a more immersive experience into the books's world.

Bosporus

by @john | 1 month ago

⏸ 0:50 / 4:26 — 🔊 ⋮

The strait

Mehmet stood up and, with a deep breath, let his gaze wander above the strait. He looked at his right and saw the dark, vigorous Black Sea, immense in its unending power. All the copious amounts of water it received from the tributaries and the sky created the relentless tides of the Bosporus. The waves, one after another, were almost fighting each other with all their strength on the surface of the canal, in a dance of confidence and arrogance. The evident coldness and saltiness of the water down there was invigorating the agitated, cruel currents. The waves were of a perfect Prussian blue, hazy and incorruptible; the nervous foam was insufferably rebelling against the Mistral winds, and each ancestral, earthly force was trying to prevail on the other.

Figure 29: Opening a book in the mobile player

Multimedia elements can additionally be encountered directly in the text of the book.

Amet consectetur adipiscing elit pellentesque habitant. Nisi purus in mollis nunc sed id semper risus in. Ut faucibus pulvinar elementum integer enim neque. Bibendum ut tristique et egestas quis. At lectus urna duis convallis convallis tellus id. Tempus imperdiet nulla malesuada pellentesque elit eget gravida. A diam maecenas sed enim ut sem viverra. Enim sed faucibus turpis in. In tellus integer feugiat scelerisque varius morbi enim. Leo vel orci porta non pulvinar neque laoreet.



Figure 30: Mobile Player - multimedia use example

Alternatively, if the writer decides so, for instance because the pictures are not essential to the story, these can also be added in a more unobtrusive fashion. The reader will then just see a Möbius Book symbol which can be clicked.

Leaning on his left, Mehmet saw the incredible Boğaziçi Köprüsü, standing tall and fierce in all its brilliant architecture. A little more on the left, there was the Golden Horn, calm and pacific like precious, comforting memories are. Over there, the coastline was quiet, as if the wind and the tides made peace with each other, like two tired lovers that just discovered themselves. That precise strand of the coast appeared almost considerate and understanding, as nature laid down its arms and forgave its own havoc.



Figure 31: Mobile Player - Multimedia use unobtrusive

Upon click/tap on the symbol the content can be visualised. In this way it does not interfere with the smooth reading experience but allows for a deeper exploration of the contents on demand.

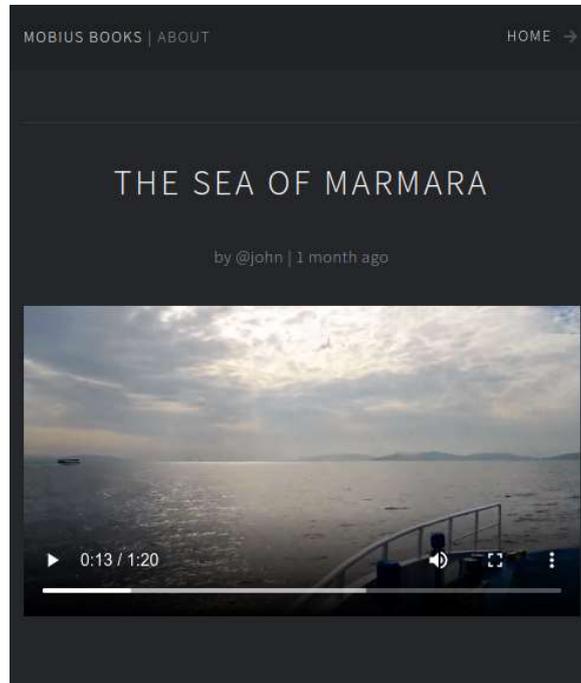


Figure 32: Mobile Player - opening the media collection when clicking on the Möbius icon (video example)



Figure 33: Mobile Player - opening the media collection when clicking on the Möbius icon (image gallery example)

At the end of each Chapter there are buttons that allow the reader to navigate either to the previous chapter or to the next.

dignissim. Molestie at elementum eu facilisis sed odio morbi quis. Elit at imperdiet dui accumsan sit. Ornare arcu odio ut sem nulla pharetra diam sit. Condimentum vitae sapien pellentesque habitant morbi tristique senectus et netus. Sed arcu non odio euismod lacinia at. Orci eu lobortis elementum nibh. Fermentum dui faucibus in ornare quam viverra orci sagittis. Viverra orci sagittis eu volutpat odio facilisis mauris. Mattis aliquam faucibus purus in massa tempor. Ullamcorper malesuada proin libero nunc. Sed risus ultricies tristique nulla aliquet enim tortor at auctor. Suscipit tellus mauris a diam maecenas sed enim ut sem.

← Cover

Next Chapter →

About



Figure 34: Mobile Player - Chapter navigation

5. Conclusion

In this document, we described the fundamental modules that are included in the first prototype of the Möbius book: the file format; the Möbius Creator's Toolkit; and Möbius Player. These modules will be integrated into a coherent, web-based tool in the next months.