

BIOMATDB

ADVANCED DATABASE FOR BIOMATERIALS WITH DATA ANALYSIS AND VISUALISATION TOOLS EXTENDED BY A MARKETPLACE WITH DIGITAL ADVISORS

Grant Agreement: 101058779

D4.2 Database and Marketplace Application Frontend and Backend (Phase 1)

(Additional Document to the Demonstrator)

DISCLAIMER: While the BIOMATDB Biomaterial Marketplace, Biomaterial Database and the Knowledge Base represent the actual deliverable, this document is an additional, public report intended to show the development progress of the solutions.



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Project description

Acronym	BIOMATDB
Title	Advanced Database for Biomaterials with Data Analysis and Visualisation Tools extended by a Marketplace with Digital Advisors
Coordinator	SYNYO GmbH
Reference	101058779
Type	Coordination and Support Action (CSA)
Programme	Horizon Europe (HORIZON)
Topic	HORIZON-CL4-2021-RESILIENCE-01-25 Biomaterials database for Health Applications
Start	01.06.2022
Duration	30 months
Website	www.biomatdb.eu
Consortium	SYNYO GmbH (SYNYO) , Austria, Coordinator Barcelona Supercomputing Center (BSC) , Spain University of Oslo (UIO) , Norway Universitat Politècnica de Catalunya (UPC) , Spain Tampere University (TAU) , Finland West Pomeranian University of Technology, Szczecin (ZUT) , Poland MINDS & SPARKS GmbH (M&S) , Austria Business Council of the Center Region & CCIC (CEC/CCIC) , Portugal Clust-ER Health (CLUSTER) , Italy National University of Ireland, Galway (NUIG) , Ireland Hospital Infantil Universitario Niño Jesús (FHUNJ) , Spain European Connected Health Alliance (ECHA) , Ireland Osnat Hakimi (Subcontractor), Israel Carla Verónica FuentesLópez (Subcontractor), United Kingdom Yannis Missirlis (Subcontractor), Greece

Deliverable

Deliverable number	D4.2
Deliverable title	Database and marketplace application frontend and backend (Phase 1)
Deliverable version	1.0
Lead beneficiary	SYNYO
Work package number	WP4
Work package title	DEVELOP: Database System, Data Analysis Tools, Web Applications, Backend Modules, and Multilingual Frontends
Due date of delivery	31.08.2023
Actual date of delivery	31.08.2023
Dissemination level	Public
Type	Demonstrator
Rights	BIOMATDB Consortium
Authors	Jakob Seper (SYNYO) Tilman Kerl (SYNYO) Jan Rodríguez (BSC) Miguel Rodríguez (BSC)
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Executive Summary

This deliverable is a demonstrator and therefore mostly consists of screenshots, showcasing the development progress of the different components of the solution. A distinction is made between three main components: biomaterial marketplace, biomaterial database and the knowledge base. Each of these has their own chapter illustrating the progress made so far. Overall, the current status of the different components has been achieved within the expected time-frame. The essential views and layouts have been developed. The placeholders currently used to fill the marketplace with content will in the next phases be replaced with details, products and images of authentic suppliers.

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1 Introduction

This demonstrator serves as a comprehensive overview of the current implementation status of the developed solutions within the BIOMATDB project. The subsequent content of this document aims to show the ongoing development progress mainly in form of visual representations.

1.1 Overview

The project encompasses three primary categories of solutions, each designed to address specific needs within the biomaterial ecosystem:

Biomaterial Database

Development wise, the Biomaterial Database can be divided into two key components: the frontend and the backend. The frontend presents a user-friendly interface for accessing and exploring biomaterials, while the backend is responsible for the provision of data for the frontends, including harvesting, extraction and pre-processing of biomaterial-related data.

Biomaterial Marketplace

The Biomaterial Marketplace aspires to offer a holistic platform containing diverse modules. The frontend serves as the user interface, providing a gateway to the marketplace's offerings. The backend, also named AdminBase, powers the operational functionalities of the marketplace and consists of a supplier and an administrator panel. Furthermore, the Advisors aim to provide guidance to users in terms of EU Project Collaborations and Fundings.

Help System and Knowledge Base

Recognising the significance of accessible support, various help systems across all developed solutions are foreseen. These systems are designed to empower users by providing comprehensive documentation, troubleshooting guidance, and insightful resources to navigate through the applications effectively.

1.2 Relation to other tasks and deliverables

This deliverable is related to the following other BIOMATDB tasks and deliverables:

Receives inputs from:

Table 1. D4.2 Input from other tasks and deliverables

Deliverable	Due Date	Input for D4.2
D3.1	28.02.2023	Advanced biomaterial database, data tools, marketplace and digital advisors concept
D3.2	31.05.2023	Database, data processing methods, tools and web application marketplace and specifications (Phase 1)
D3.3	30.06.2023	Web application backend and frontend specifications (Phase 1)
D4.1	30.06.2023	Database and web application system architecture (implementation status report)

Provides outputs to:**Table 2.** D4.2 Output for other tasks and deliverables

Deliverable	Due Date	Output from D4.2
D4.3	31.08.2024	Database and marketplace application frontend and backend (Phase 2)
D4.4	31.10.2024	Data integration, content creation and label integration report
D4.5	31.10.2024	Online knowledge base (KB) with manuals, FAQ, and screencast video tutorials

1.3 Structure of the deliverable

The structure of this additional report outlines the current developmental stage of the BIOMATDB solutions, with individual chapters dedicated to distinct components. [Chapter 2](#) presents the Bio-material Database, encompassing the data backend and frontend interface. [Chapter 3](#) showcases the Biomaterial Marketplace, detailing backend and user-centric frontend design. Lastly, [Chapter 4](#) focuses on the Knowledge Base, presenting the status of the different views.

2 Biomaterial Database

2.1 Data backend

2.1.1 Database

The Biomaterial Database will be document-oriented and will use Elasticsearch, which works well with searches and filtering of large and unstructured data. Elasticsearch serves as a centralised NoSQL database, functioning as a search engine. It is ideal to manage large and unstructured datasets efficiently, facilitating fast queries and searches within these vast collections of data. The platform offers a distributed, multi-tenant-enabled full-text search mechanism, accessible through an HTTPS web interface. Additionally, it employs schema-less data, eliminating the need for document and index interconnections [1]. The Biomaterial Database and Biomaterial Marketplace are both set to leverage Elasticsearch for their operations.

All PubMed articles and their metadata (MeSH, title, authors, journal, etc.) were already uploaded to Elasticsearch. As can be seen in [Figure 1](#), this amounts to 34.5 million publications. [Figure 2](#) and [Figure 3](#) show some query examples that can be performed.

In next steps, the automatically extracted relevant terms as well as other useful categorisations (is the article biomaterial related, is it coming from one of the selected journals, study type, etc.) will be added to each article.

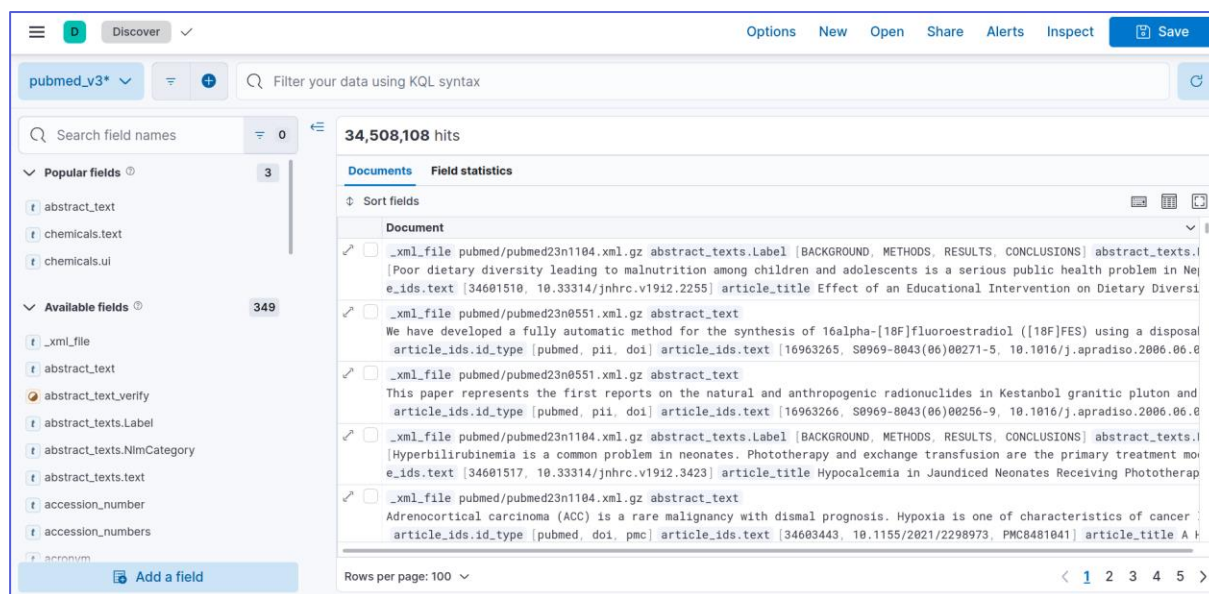


Figure 1. Elasticsearch features and user interface

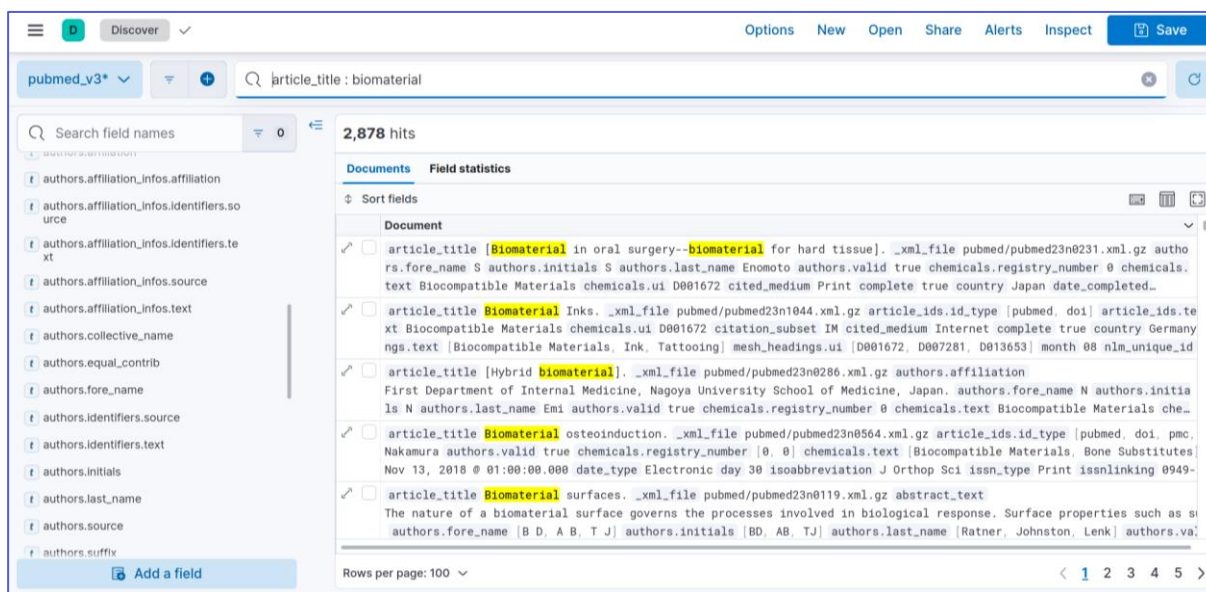


Figure 2. Results from querying documents that contain the term 'biomaterial' in their title

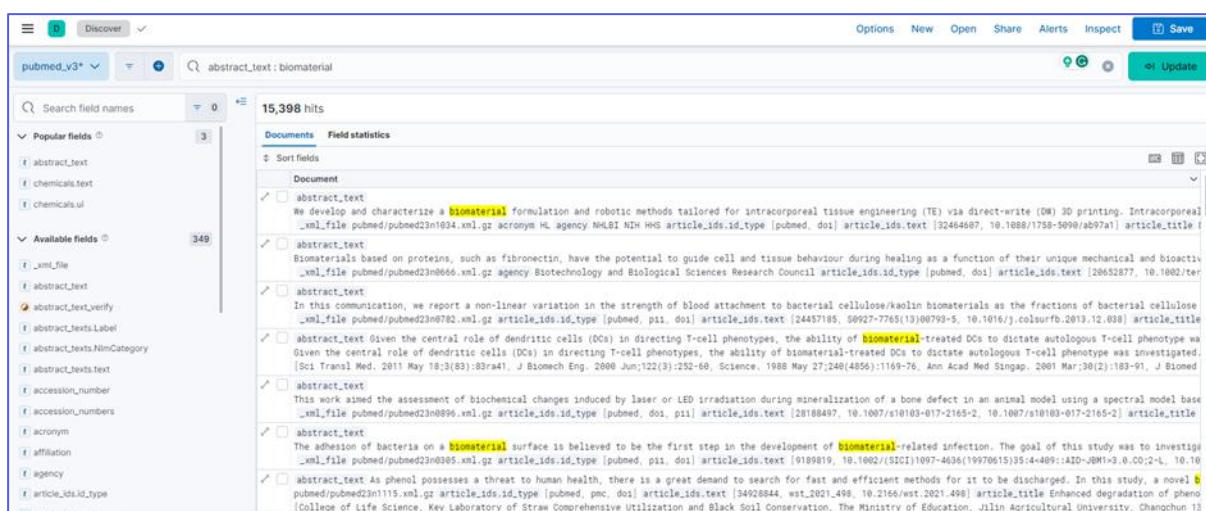


Figure 3. Results from querying documents that contain the term 'biomaterial' in their abstract

2.1.2 Relevant terms

The Named Entity Recognition (NER) annotation task for the Biomaterials Database will build on previous efforts involving chemical and biological entities, focusing especially on the chemical composition of biomaterials, to create a comprehensive dataset. Pre-annotations will be made by leveraging systems rooted in this previous work and will serve as foundation for the manual review, which biomaterials experts will refine to ensure accuracy and relevance (see Figure 4). These experts will play a critical role in the development of updated guidelines tailored to the field, facilitating the meticulous labelling of the new pre-annotated texts. The process of refining these pre-annotated documents will be carried out using Brat, an intuitive web-based text annotation tool enhanced by the capabilities of Natural Language Processing (NLP) technology.

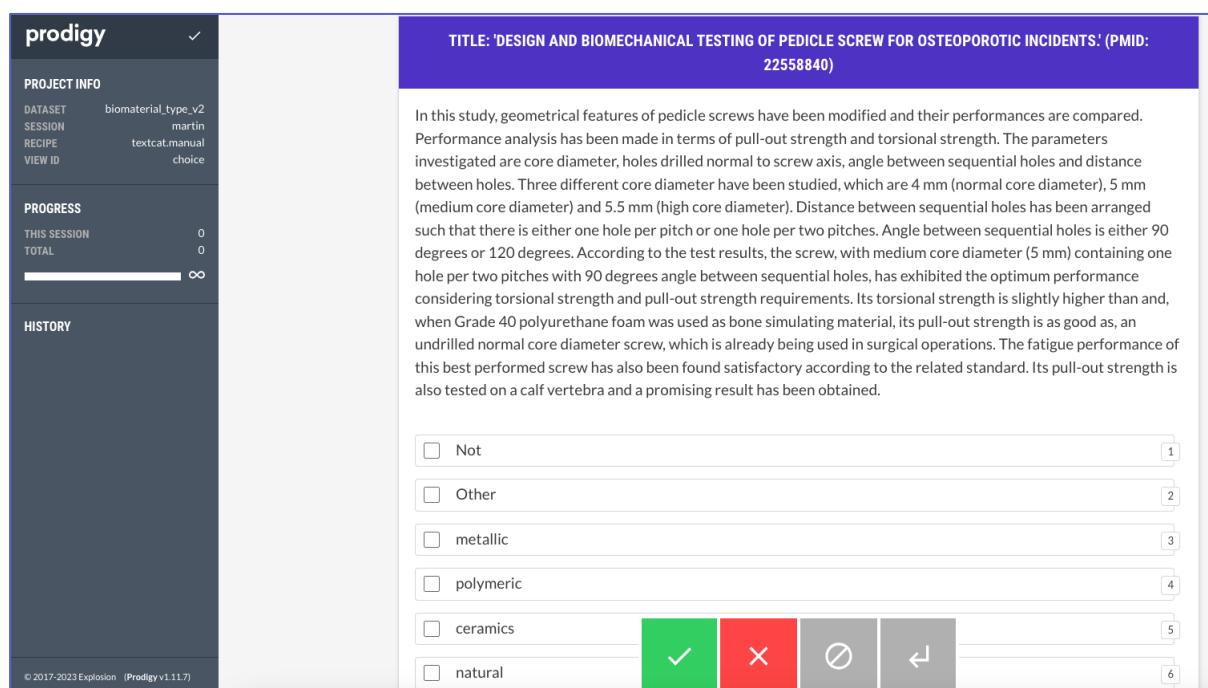


Figure 5. Example Prodigy's interface for biomaterial type content classification

2.2 Data frontend

The data-frontend is progressing well, the essential views have already been setup or layouts have been defined. Currently, the web-app works with dummy data to showcase its functionality and to prepare everything for the actual data.

Some features which have to wait until the actual data is ready are e.g., the search and visualisations. However, for both, the basic setup is already done and can be quickly adapted to the possibly new data (structures).

Currently implemented are (structurally):

- The start page including search
- The dashboard including some visualisation with dummy data
- Biomaterial list view
- Biomaterial detail view
- Literature view
- Event view
- Project view

The demonstrator for the frontend will be accessible via <https://devbiomaterialdatabase.com>.

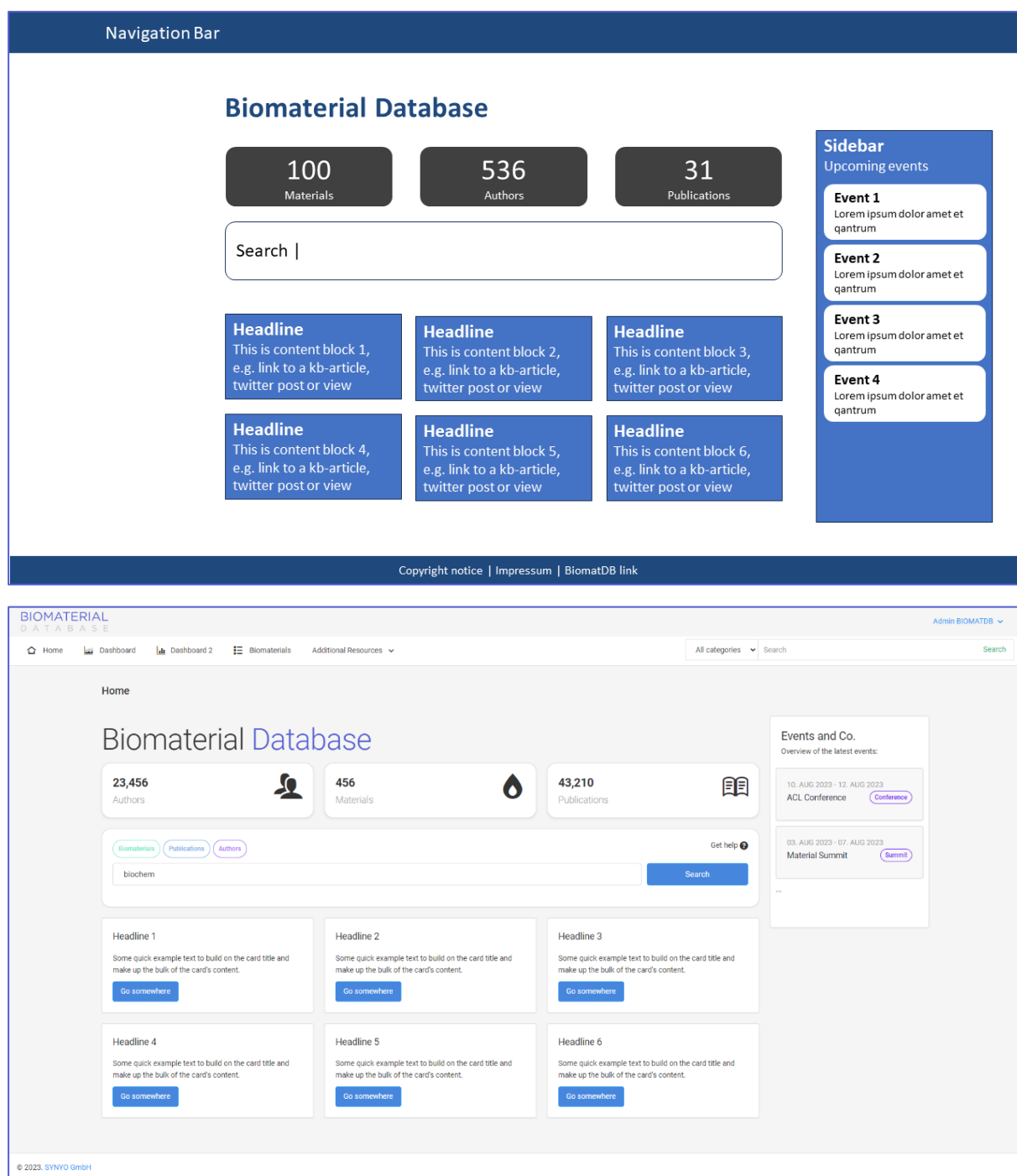


Figure 6. Biomaterial Database start page layout and current implementation

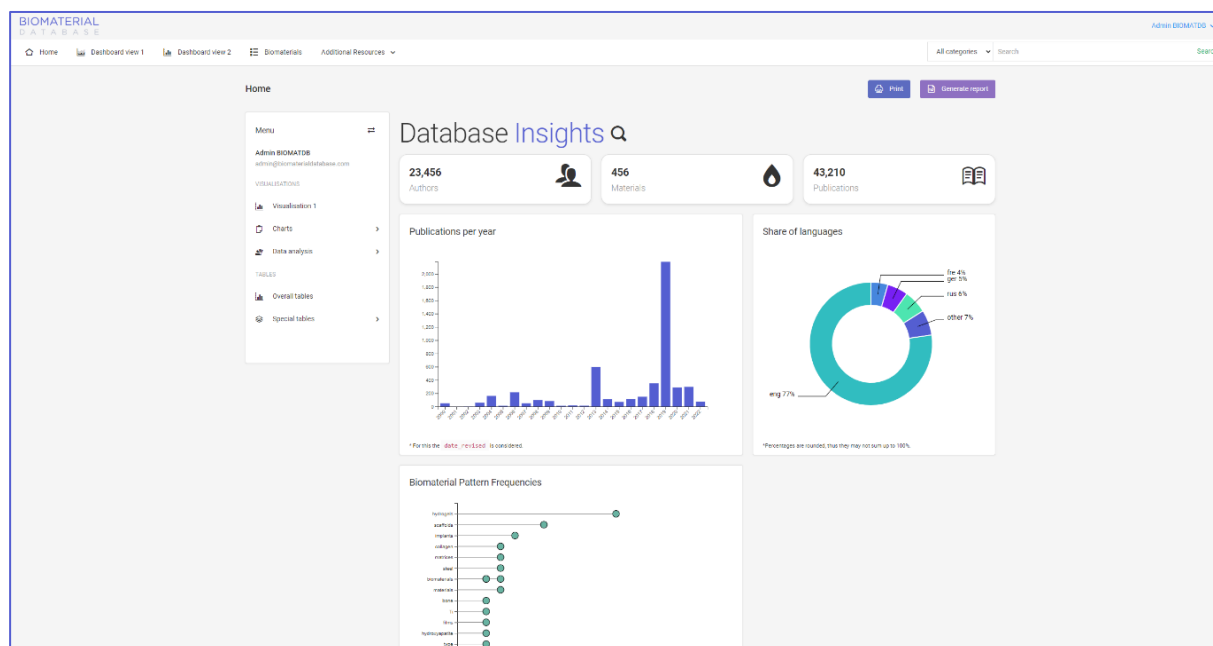


Figure 7. Dashboard view

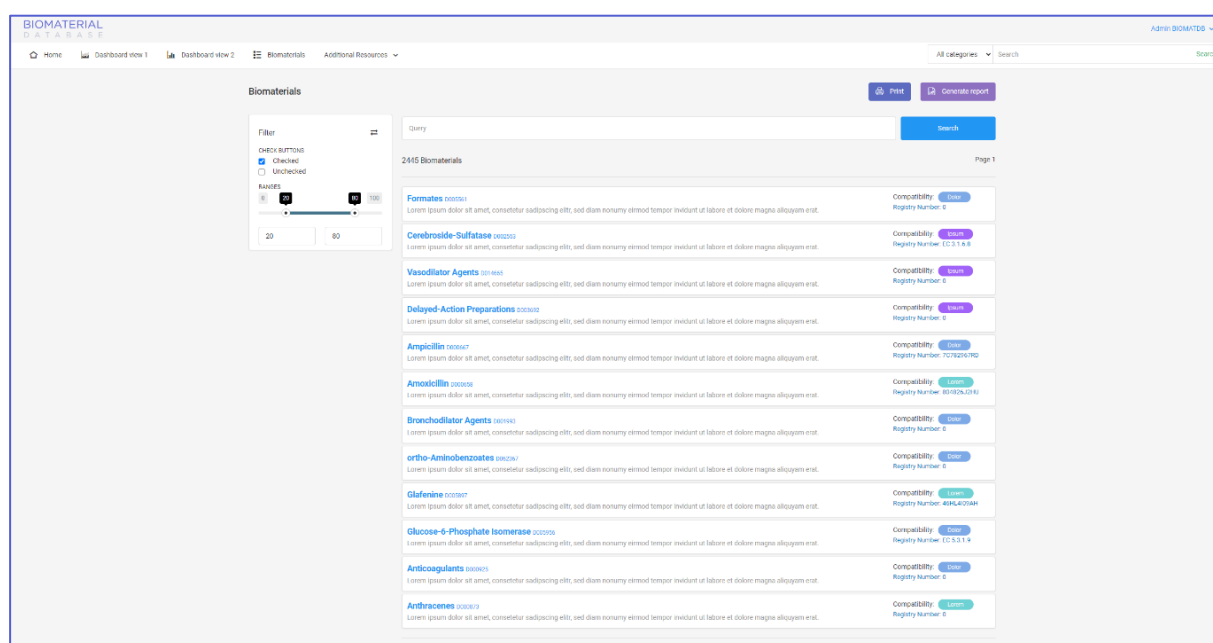


Figure 8. Biomaterial list view

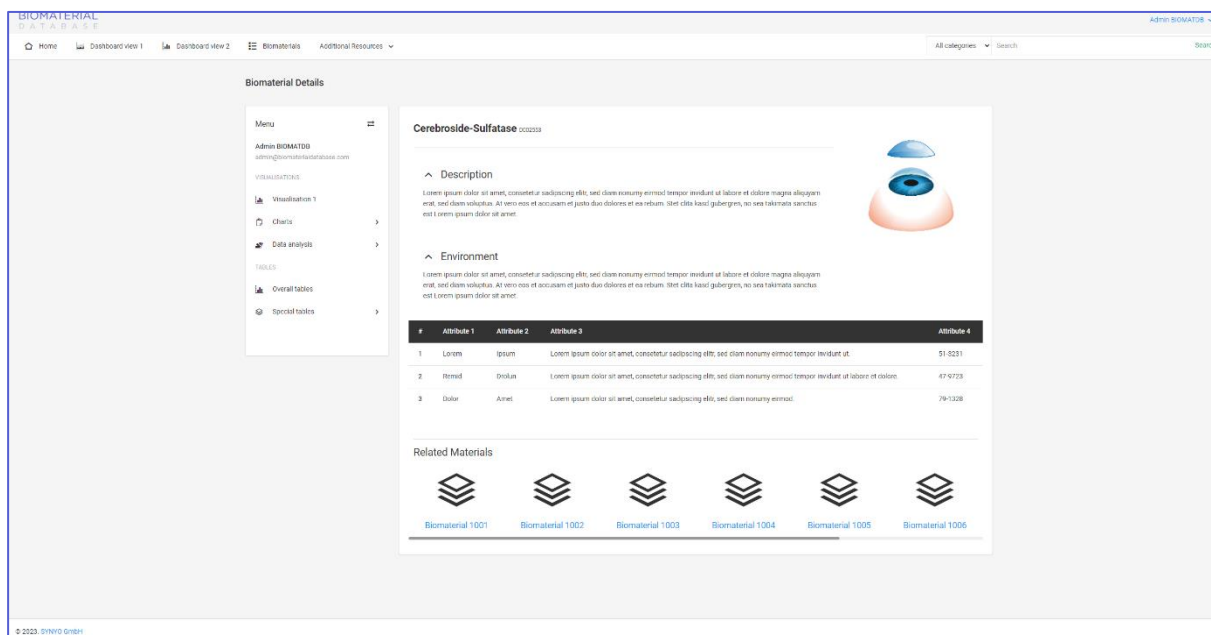


Figure 9. Biomaterial detail view

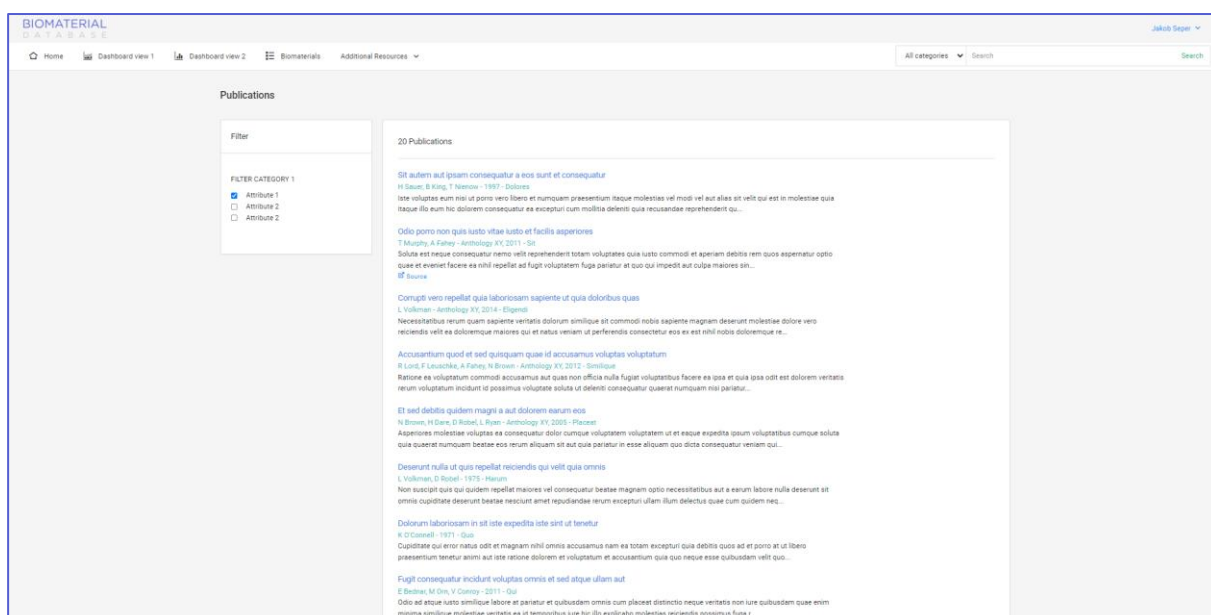


Figure 10. Literature list view

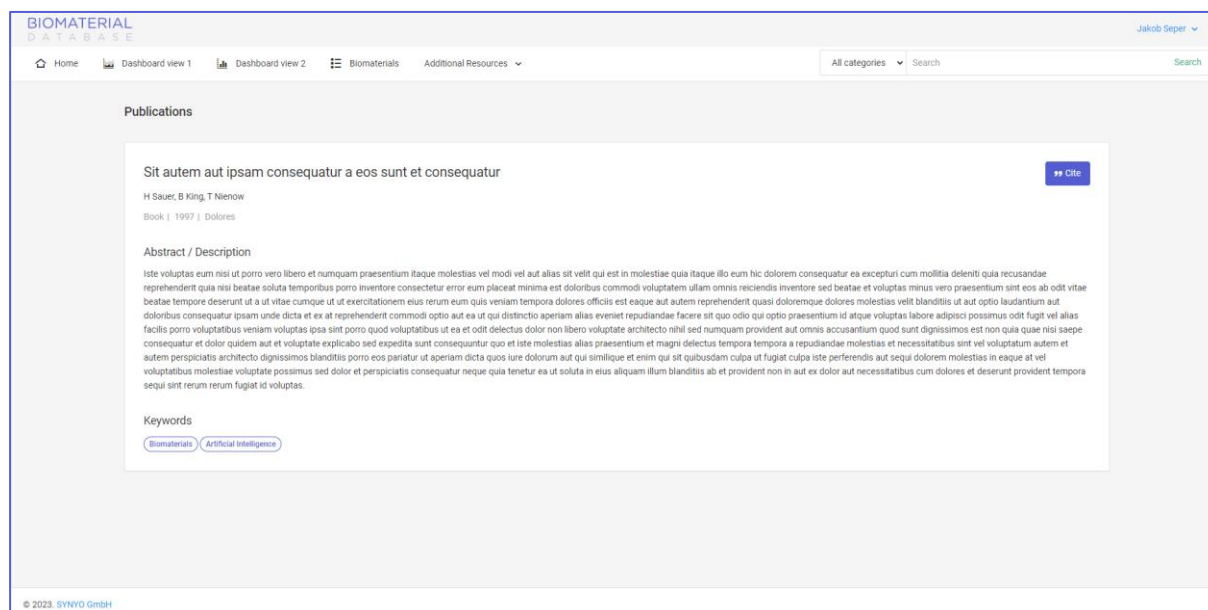


Figure 11. Literature detail view

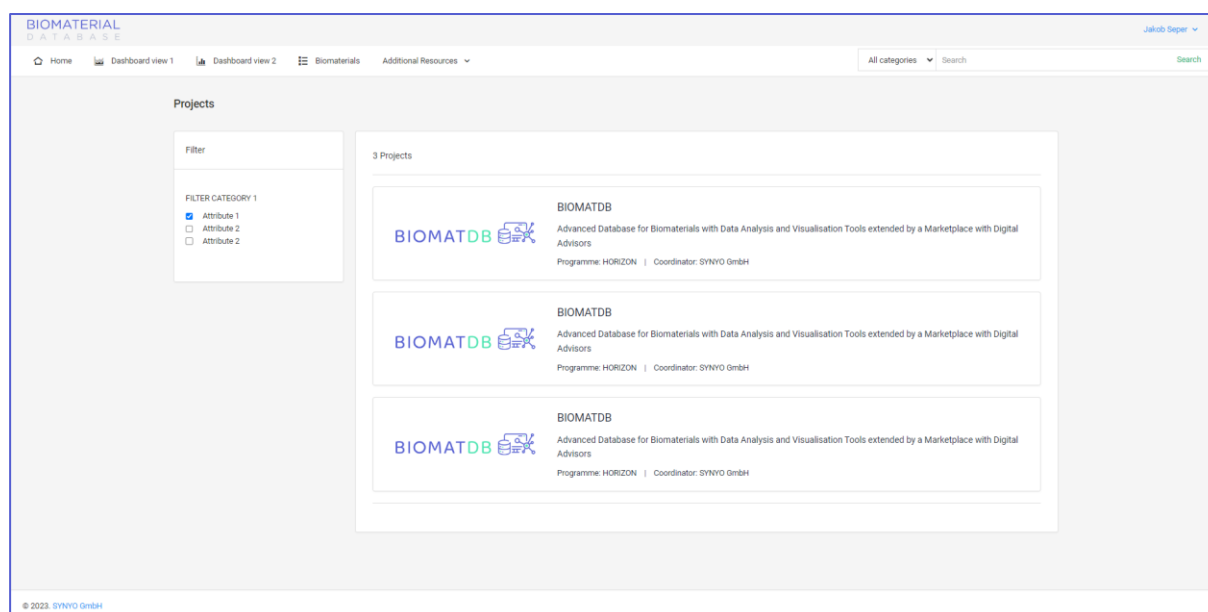


Figure 12. Project list view

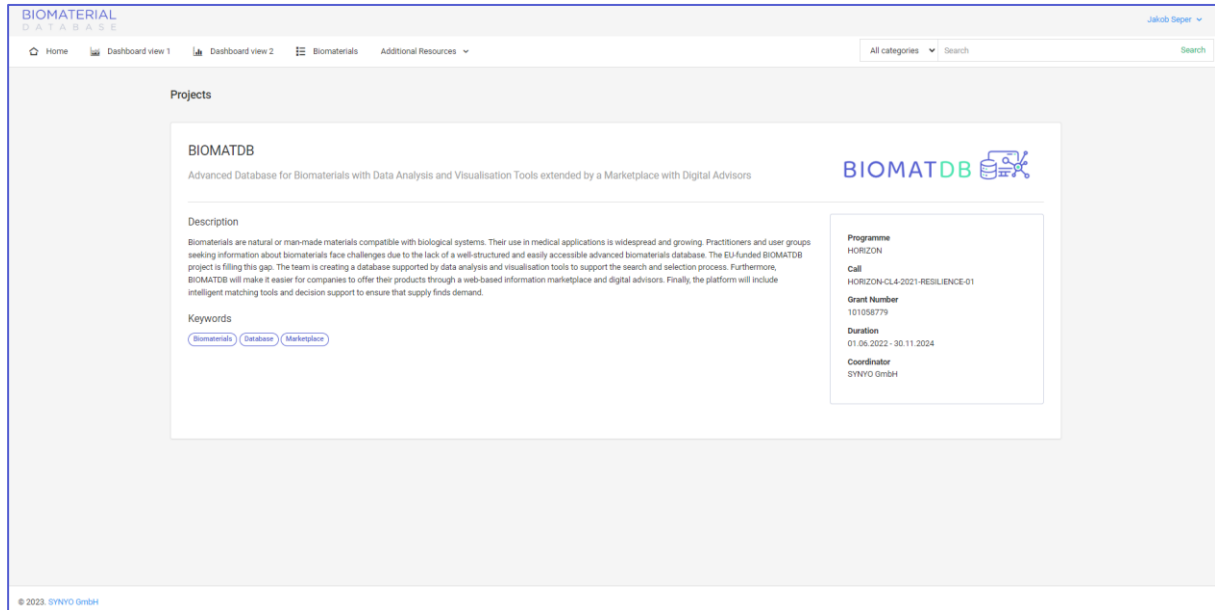


Figure 13. Project detail view

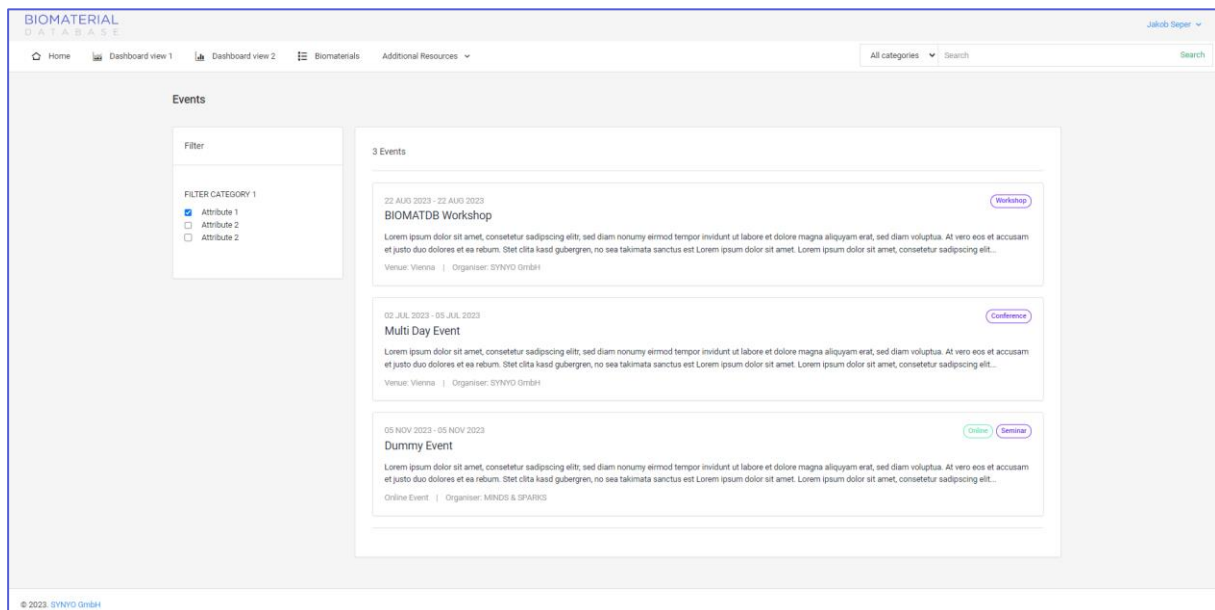


Figure 14. Event list view

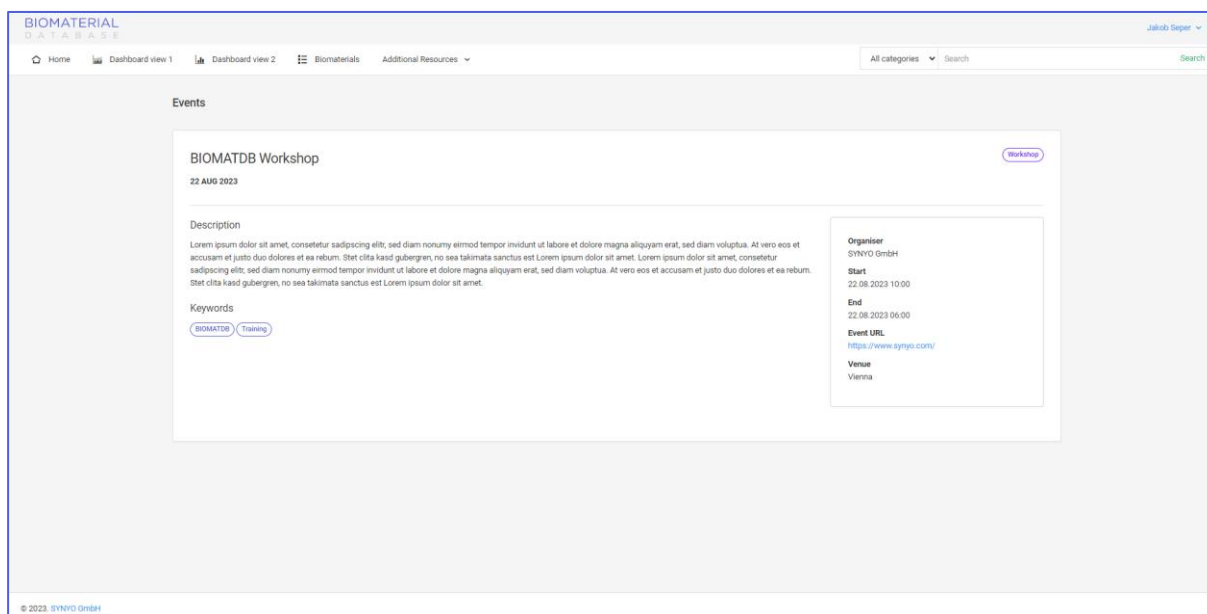


Figure 15. Event detail view

3 Biomaterial Marketplace

The frontend and backend components for the Biomaterial Marketplace are basically in place. At the moment, first versions are available on development servers and will undergo further internal testing before including external partners to the process. To demonstrate the functionalities, sample data has been added for the implemented modules. Still to be deployed on a development server are the Advisors.

Concluding, the implementation status of the Biomaterial Marketplace is the following:

Frontend

- All modules foreseen for Phase 1 in place
- Development version live on <https://devbiomaterialmarketplace.com> (restricted access)

Backend (Adminbase)

- Supplier panel in place
- Development version live on <https://biomaterialmarketplace.devadminbase.com> (restricted access)

Advisors

- To be finalised and deployed on development server

3.1 Supplier Panel (AdminBase)

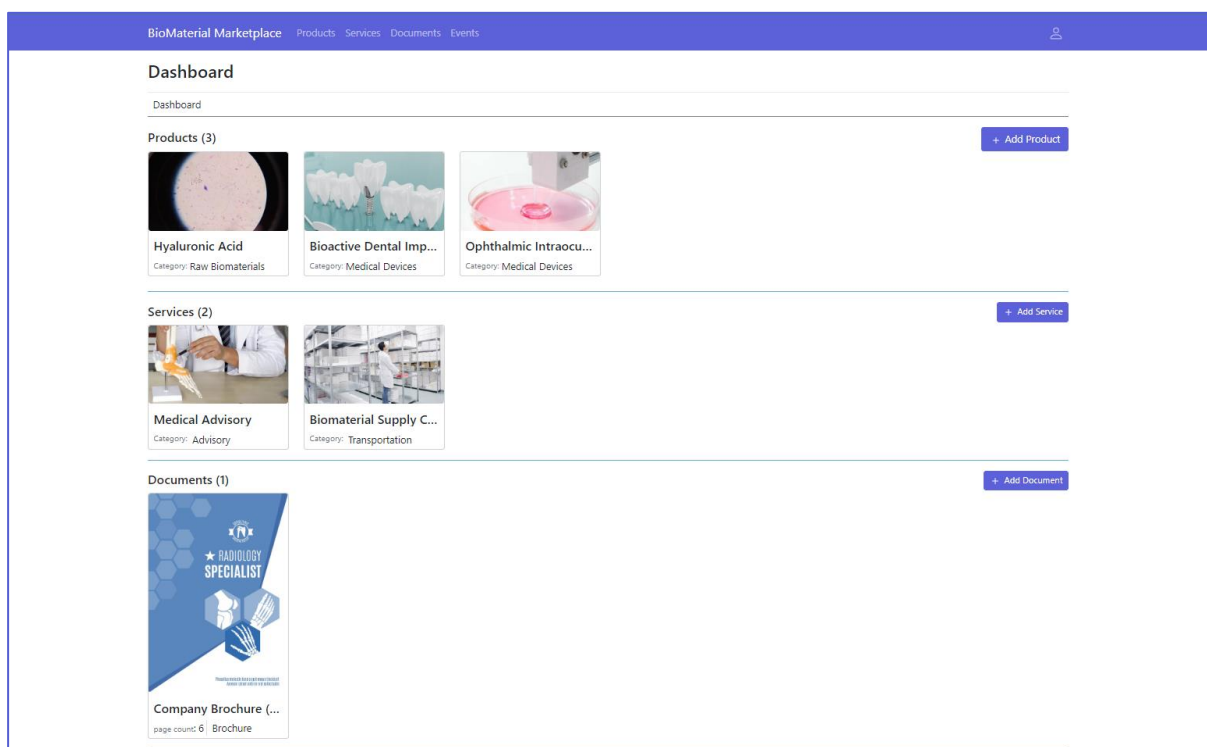



Figure 16. AdminBase dashboard

BioMaterial Marketplace
Products
Services
Documents
Events

Profile

Dashboard / Profile

Overview



Renixca
Renixca is a cutting-edge biomaterial company dedicated to developing innovative synthetic materials for medical and industrial applications. Our team of scientists and engineers work tirelessly to create bioengineered products that enhance the performance of medical devices, tissue engineering, and regenerative medicine. We strive to revolutionize the biomaterial sector by offering sustainable and customizable solutions to meet the evolving needs of the healthcare and biotechnology industries.

Foundation Year	2018
Currency	EUR
Activity Radius	INTERNATIONAL
Body Type	PRIVATE
Profit Type	PROFIT
Person Type	LEGAL

Contact Data

Netherlands, Utrecht, 3584 CS, Heidelberglaan 6




Figure 17. AdminBase organisation profile

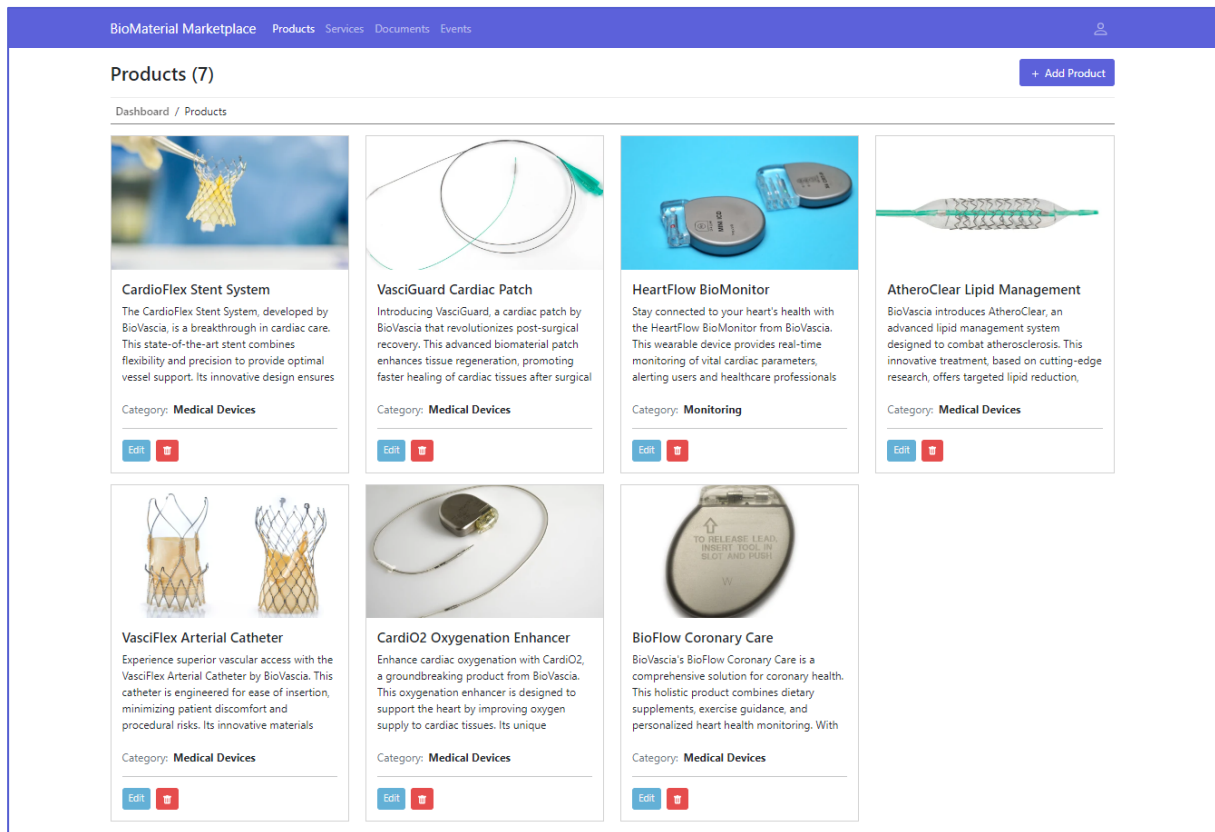


Figure 18. AdminBase product overview

BioMaterial Marketplace Products Services Documents Events

Add Product

Dashboard / Products / Add Product

Name
Enter Name

Product Category
Select...

Technology Readiness Level
Select...

☐ Launched

Description
Enter Description

Product Image
+ Add Image

Save

Figure 19. AdminBase product form

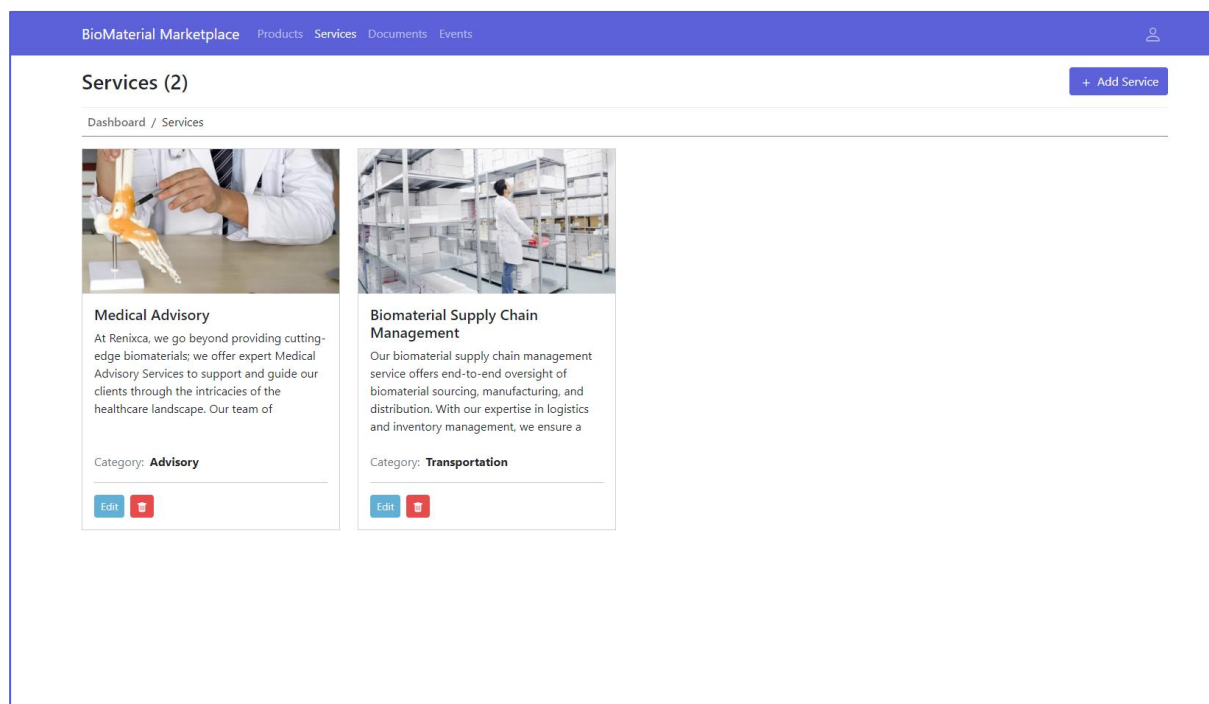


Figure 20. AdminBase service overview

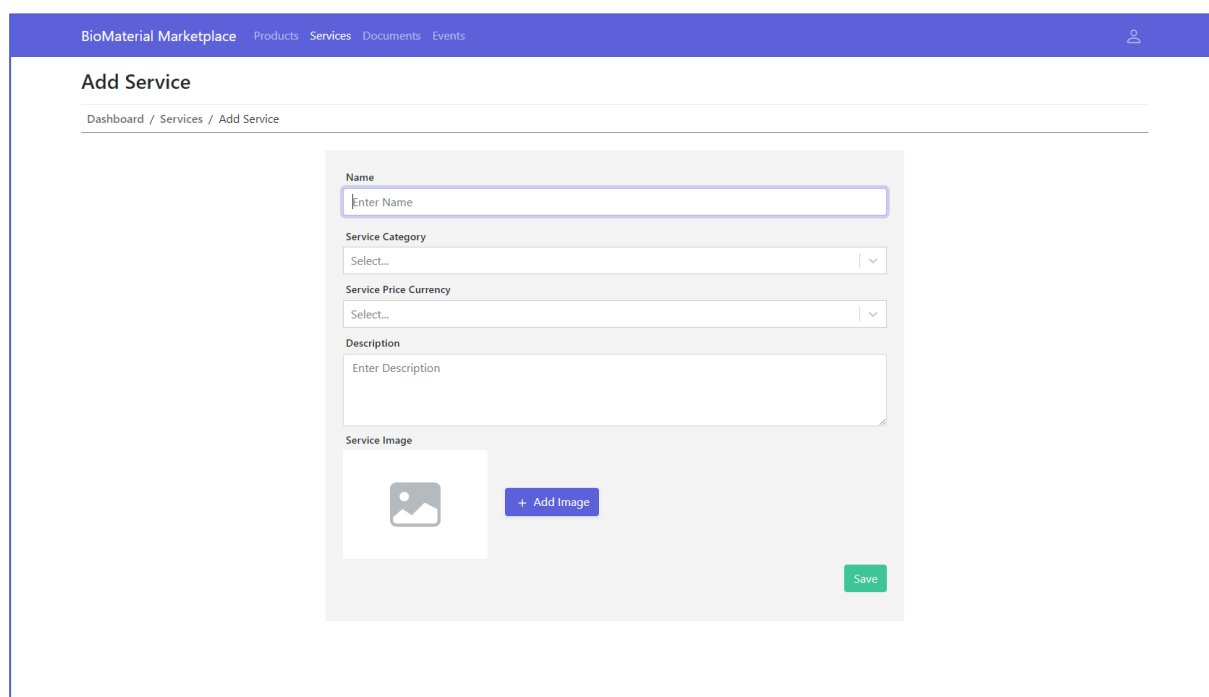


Figure 21. AdminBase service form

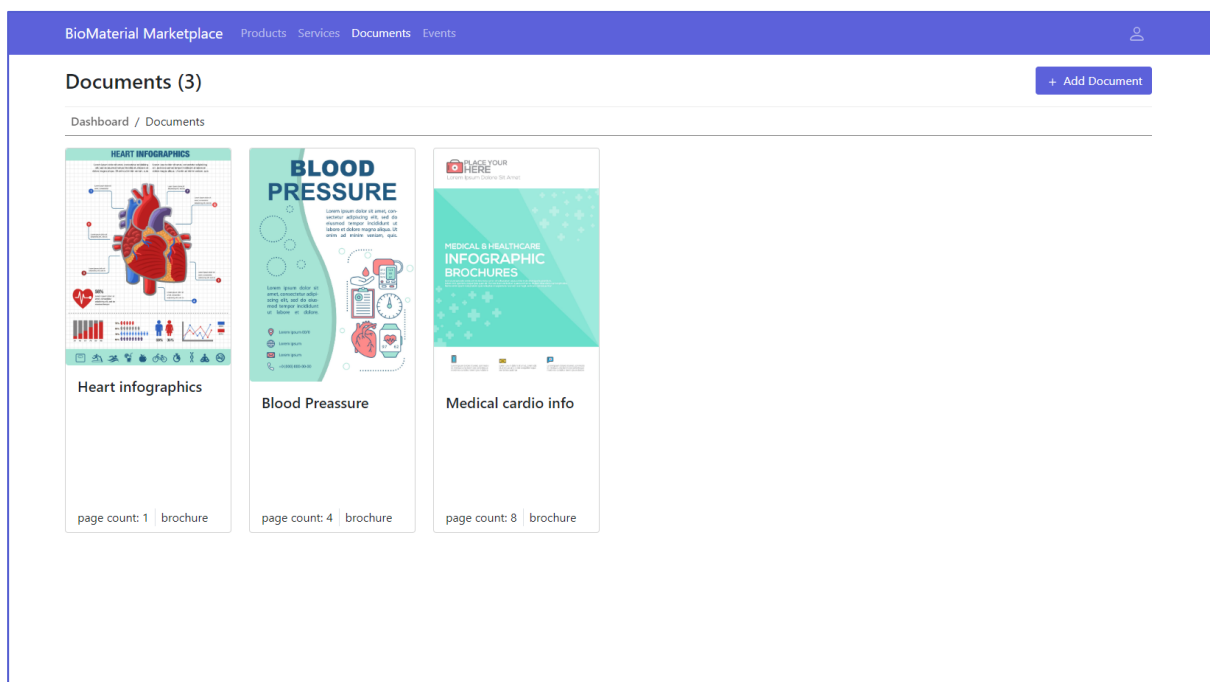


Figure 22. AdminBase document overview

The screenshot shows the 'Add Document' form. The header is the same as Figure 22. The form fields are:

- Document Name**: Text input field with placeholder 'Enter Document Name'.
- Type**: Dropdown menu with 'Select...' and a downward arrow.
- Document Language**: Dropdown menu with 'Select...' and a downward arrow.
- Publish Year**: Text input field with placeholder 'Enter Publish Year'.
- Upload Document**: File selection area with a button 'Datei auswählen' and a text label 'Keine ausgewählt'.

A green 'Save' button is located at the bottom right of the form.

Figure 23. AdminBase document form

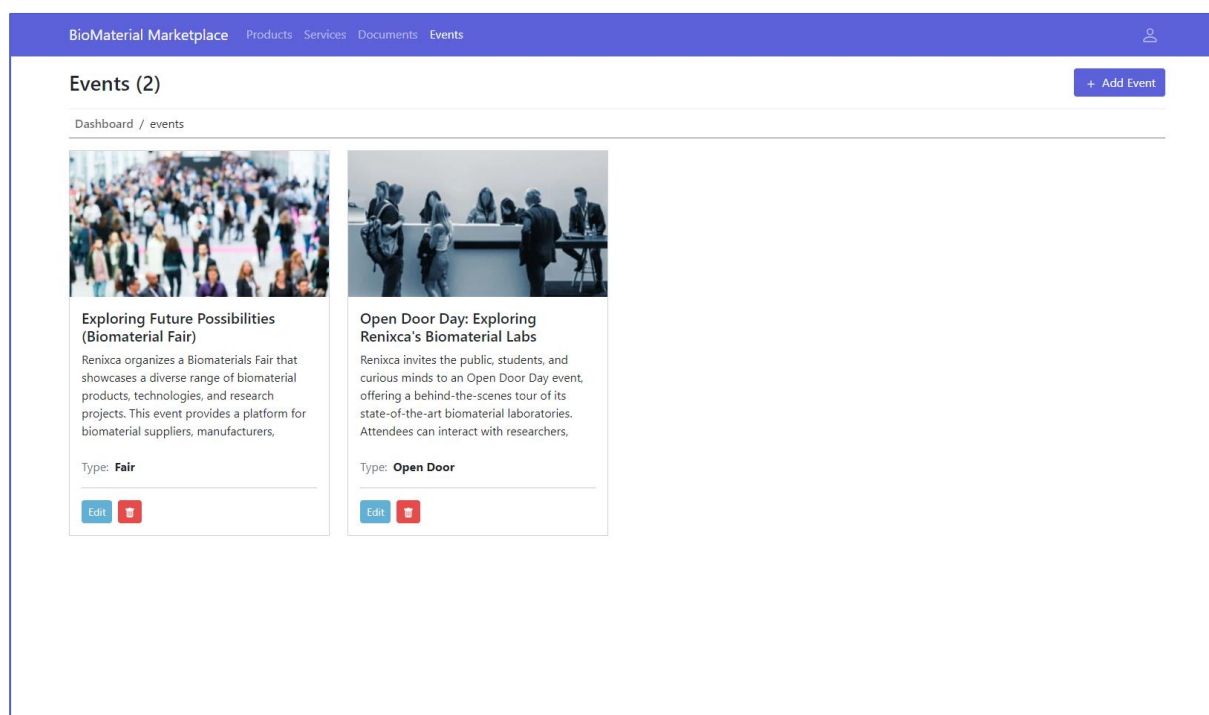


Figure 24. AdminBase event overview

The screenshot shows the 'Add Event' form. The breadcrumb trail is 'Dashboard / events / Add Event'. The form fields are as follows:

- Name**: Text input with placeholder 'Enter Name'.
- Event Type**: Dropdown menu with 'Select...' and a downward arrow.
- Start Date**: Text input with value '25.08.2023'.
- Start Time**: Text input with placeholder 'Enter Start Time'.
- End Date**: Text input with value '25.08.2023'.
- End Time**: Text input with placeholder 'Enter End Time'.
- Indoor/Outdoor**: Dropdown menu with 'Select...' and a downward arrow.
- Description**: Text area with placeholder 'Enter Description'.
- Target Group**: Text area with placeholder 'Enter Target Group'.
- Organiser Info**: Text area with placeholder 'Enter Organiser Info'.
- Country**: Dropdown menu with 'Select...' and a downward arrow.
- City**: Text input with placeholder 'Enter City'.

Figure 25. Adminbase event form

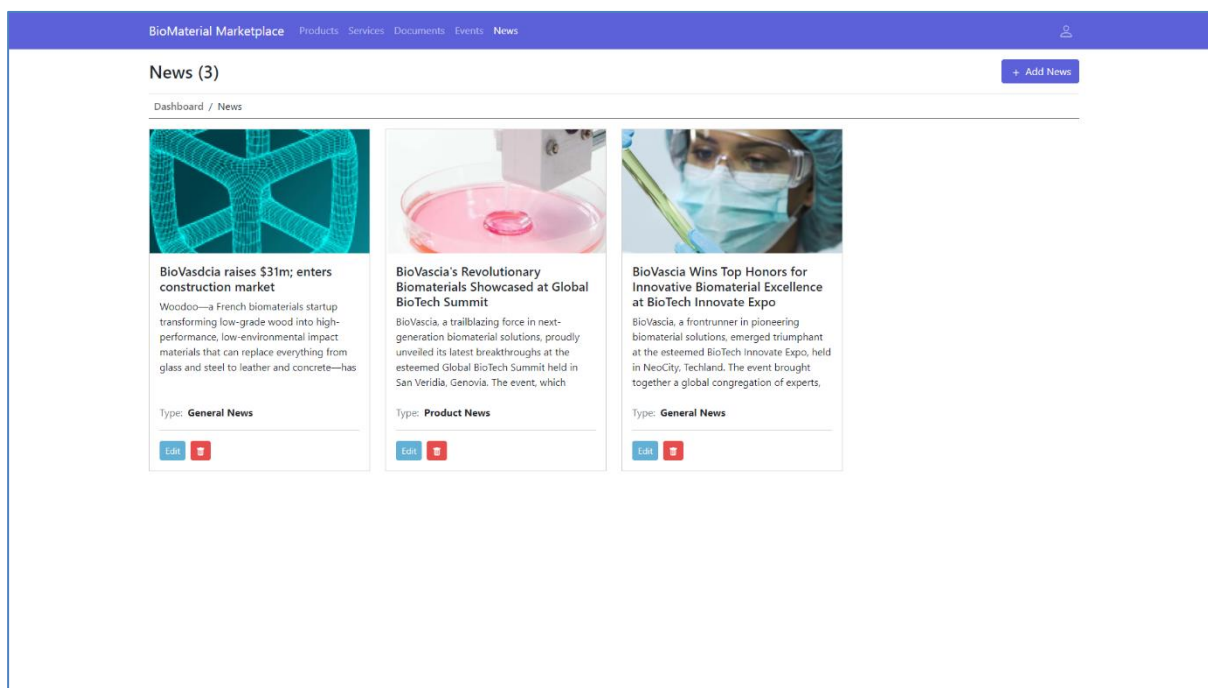


Figure 26. Adminbase news list

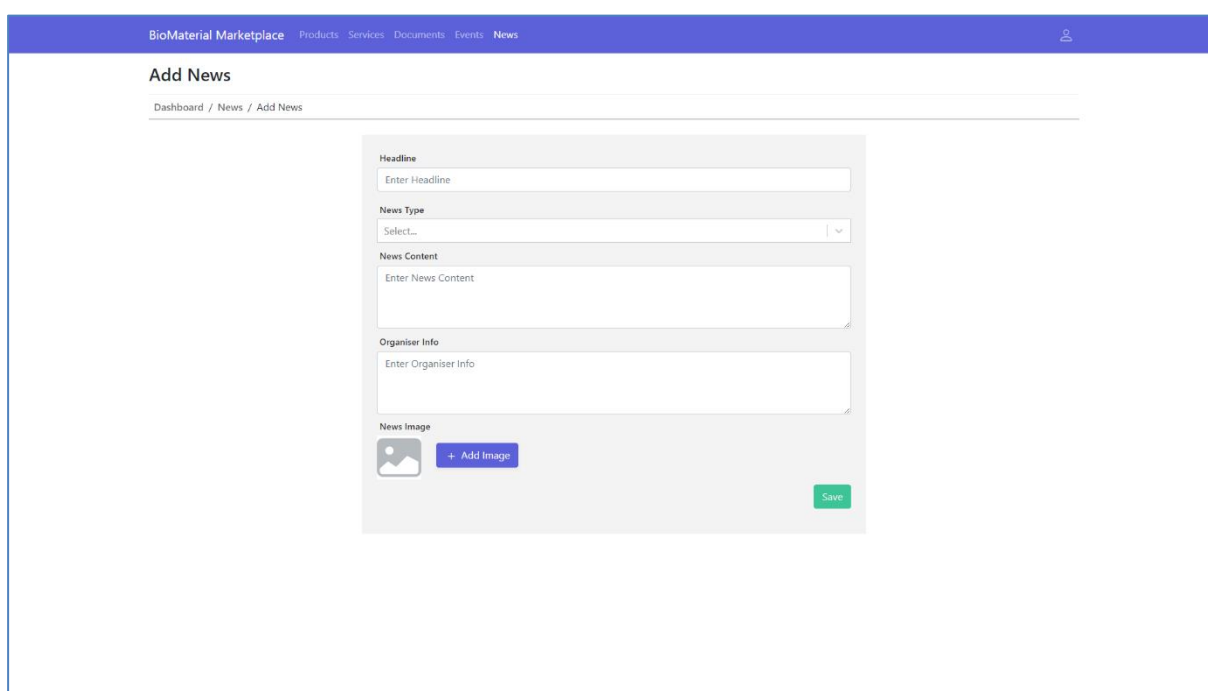


Figure 27. Adminbase news form

3.2 Frontend

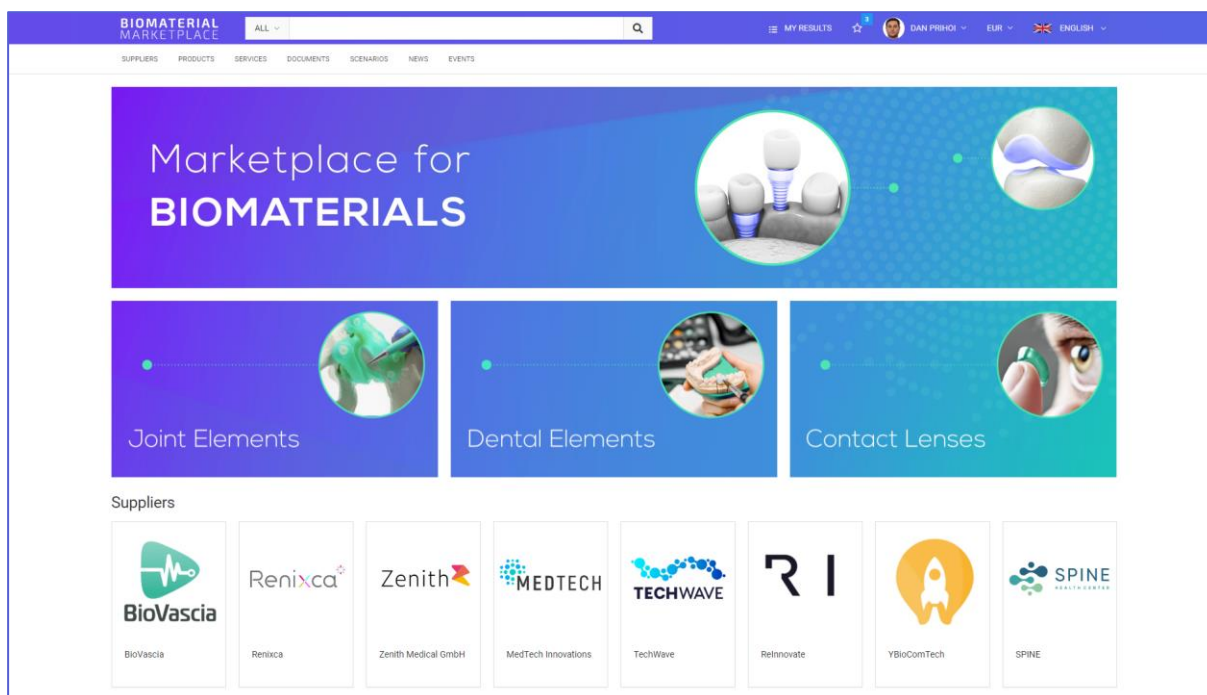


Figure 28. Biomaterial Marketplace start page

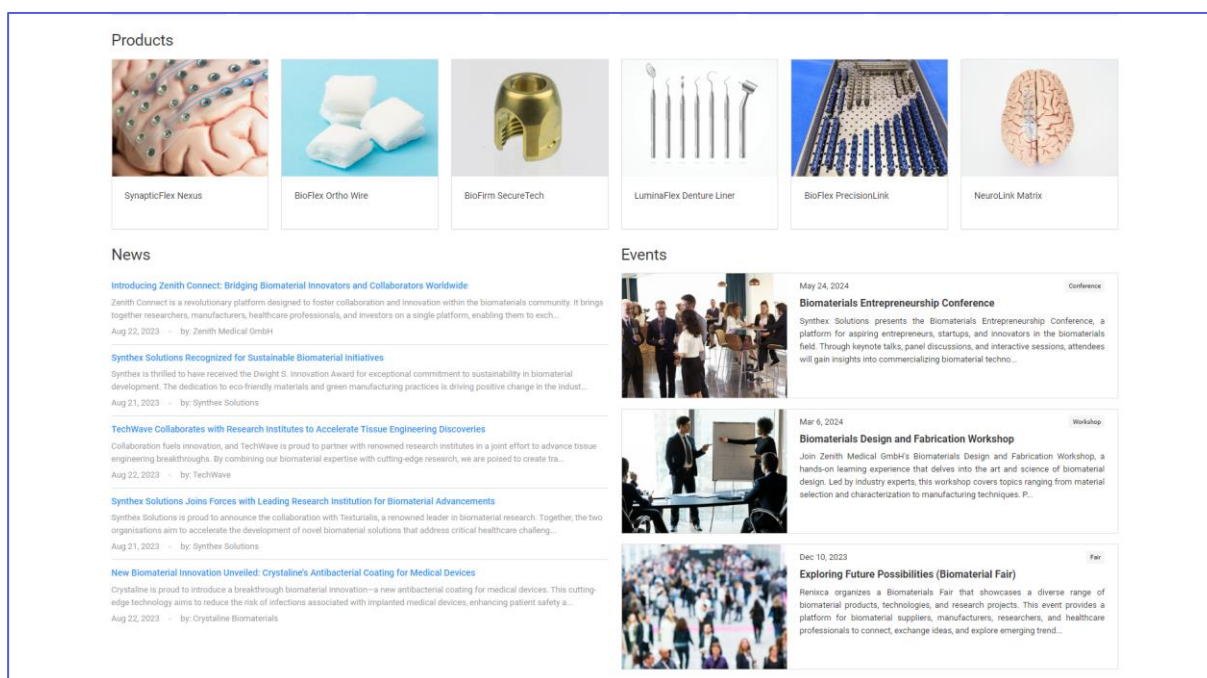


Figure 29. Continued Biomaterial Marketplace start page

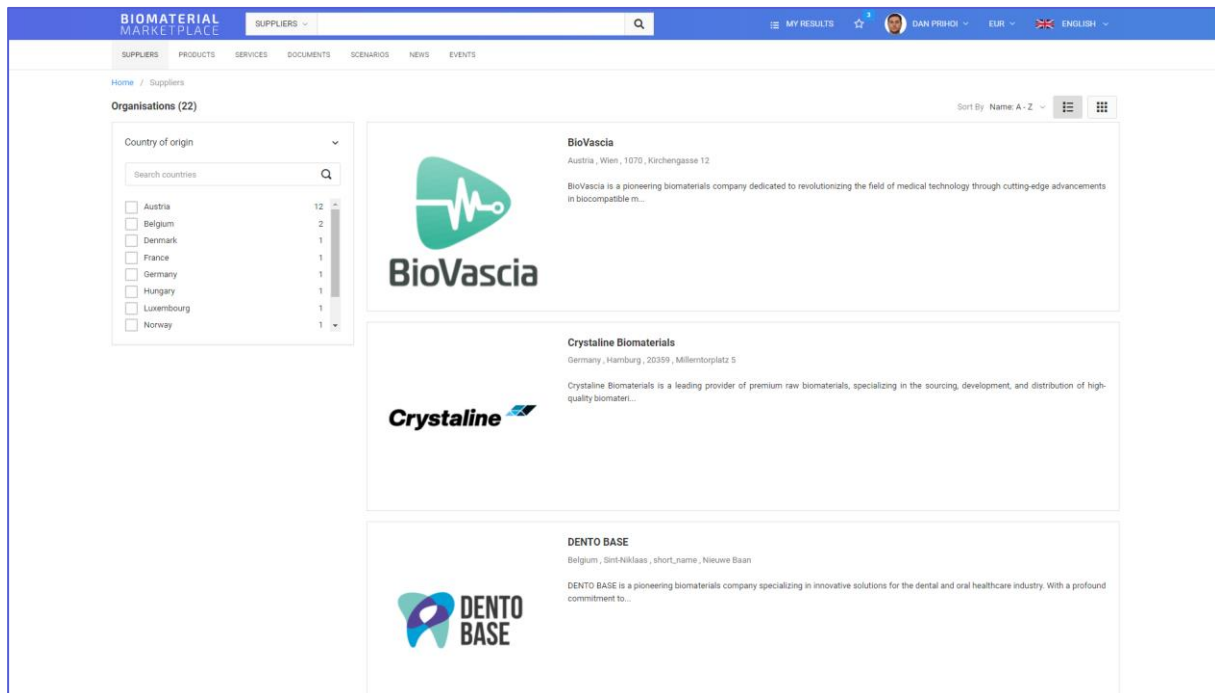


Figure 30. Supplier list view

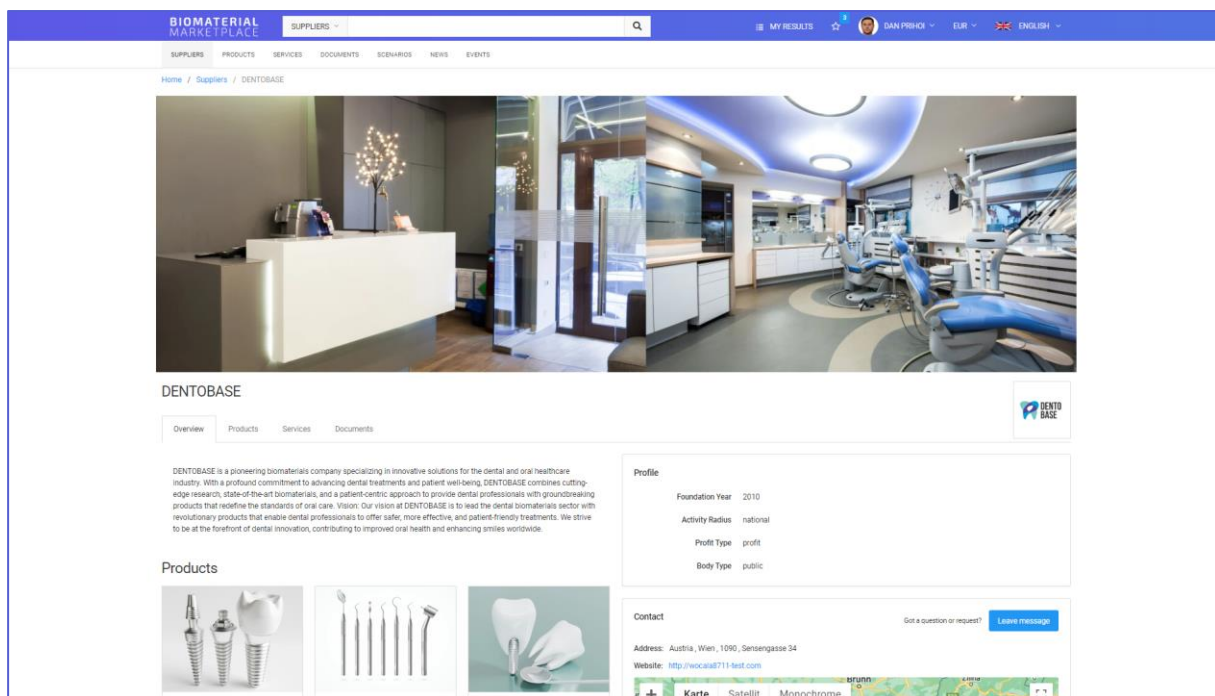


Figure 31. Supplier detail view

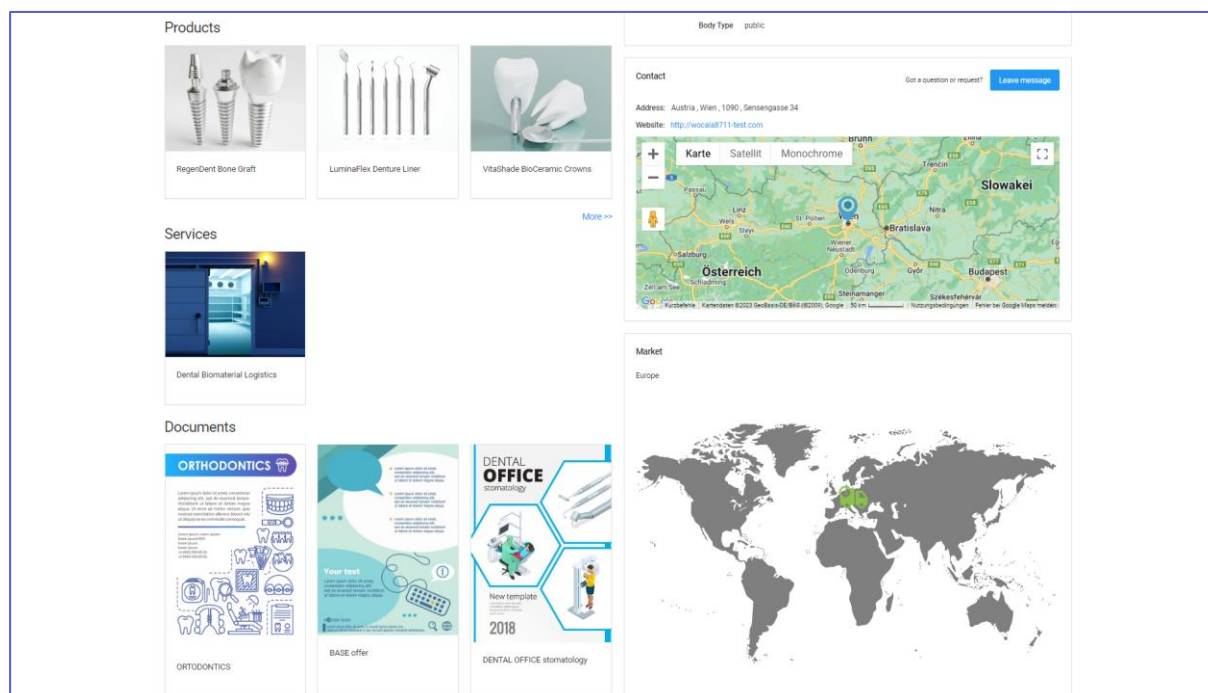


Figure 32. Continued supplier detail view

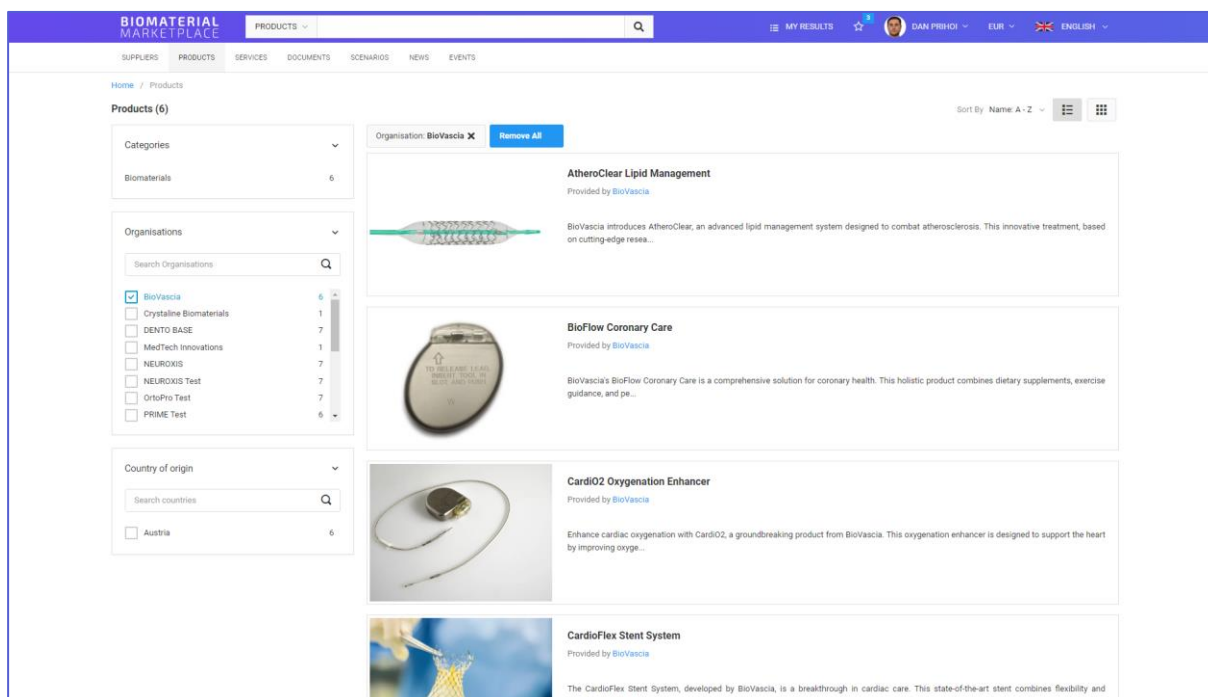


Figure 33. Product list view

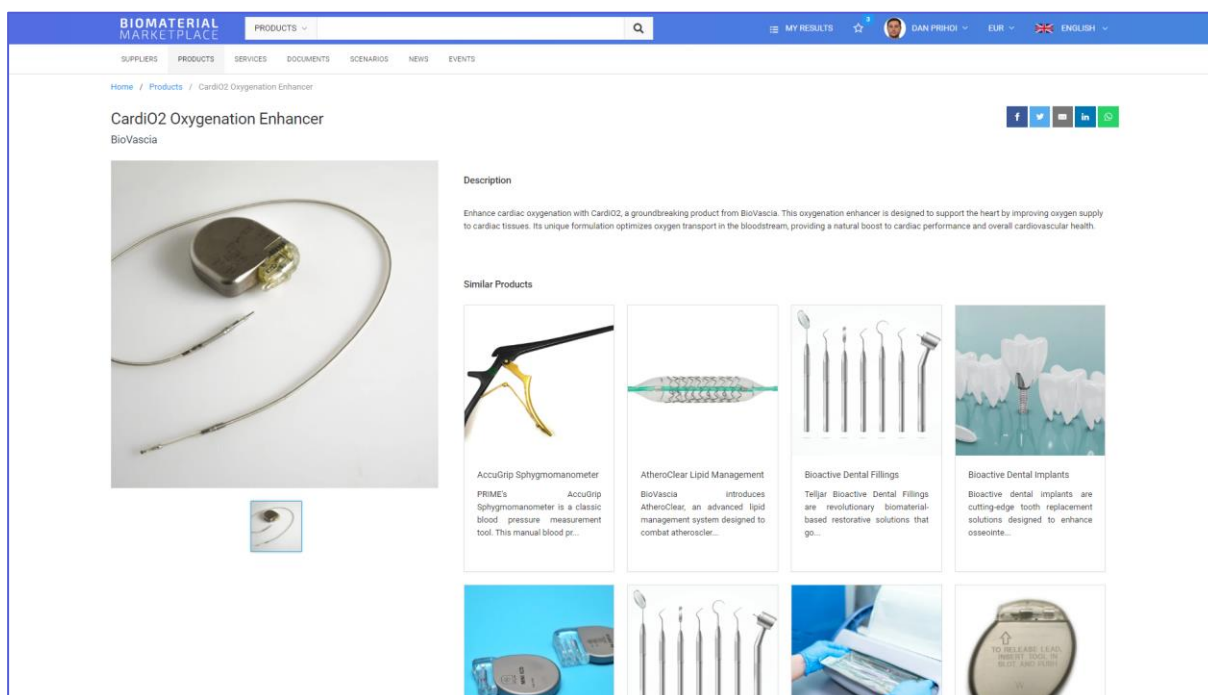


Figure 34. Product detail view

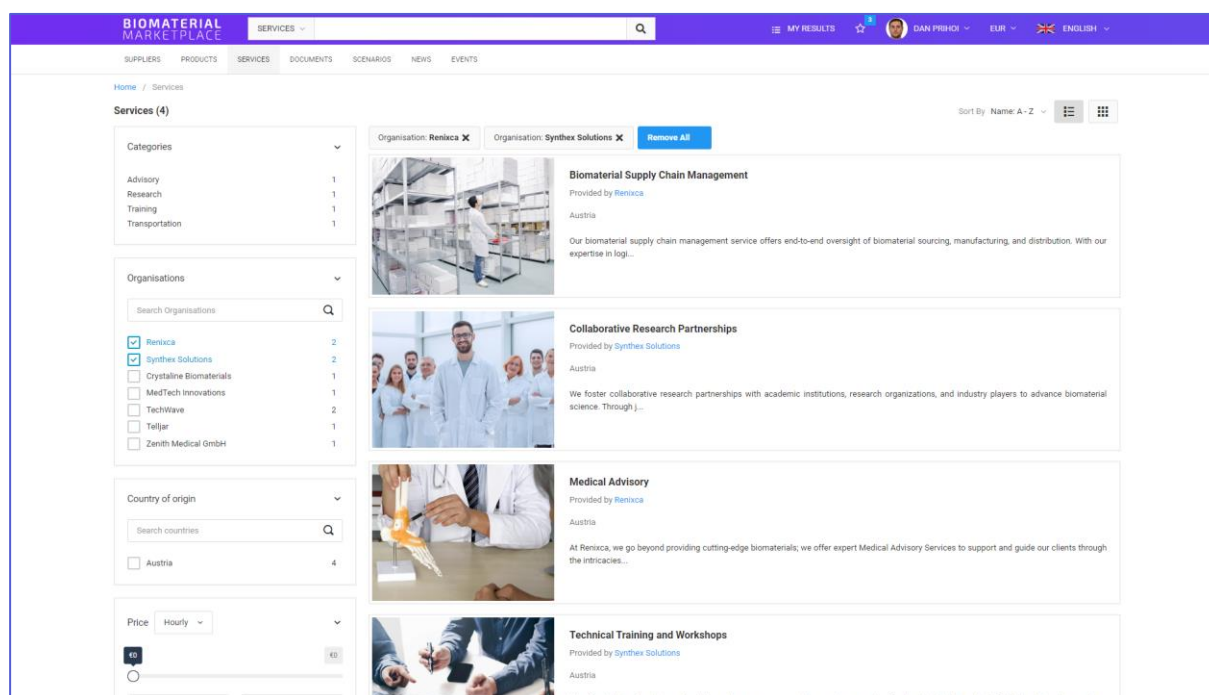


Figure 35. Services list view

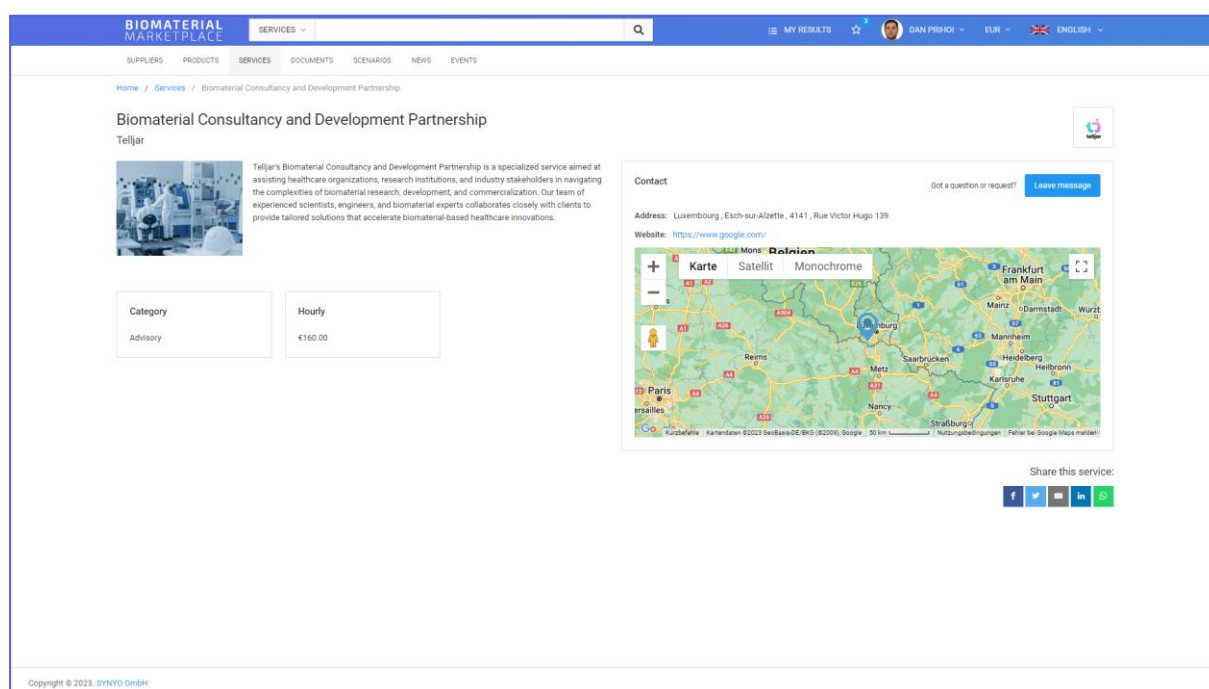


Figure 36. Service detail page

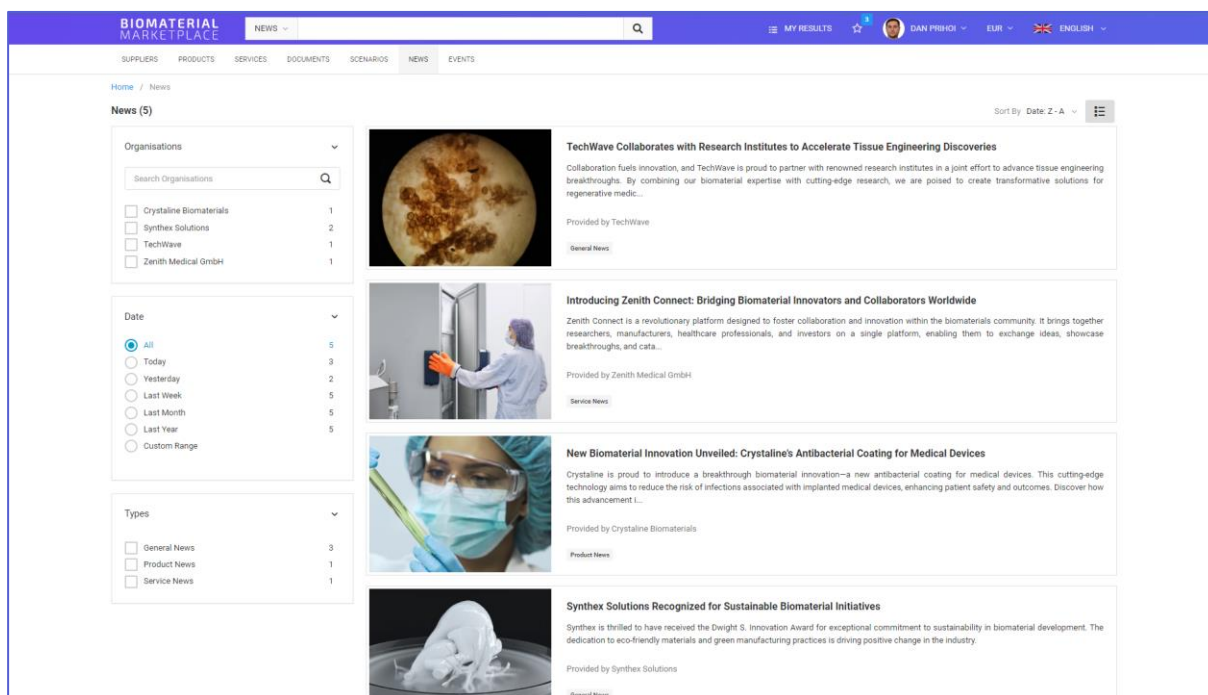


Figure 37. News list view

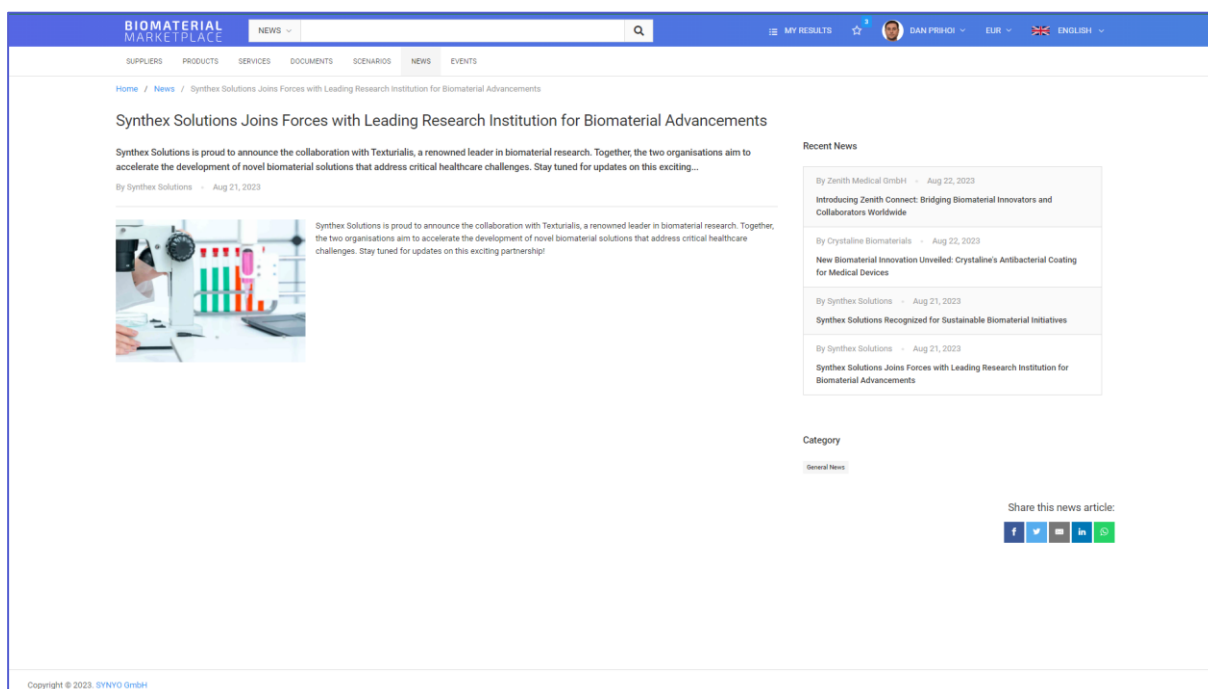


Figure 38. News detail view

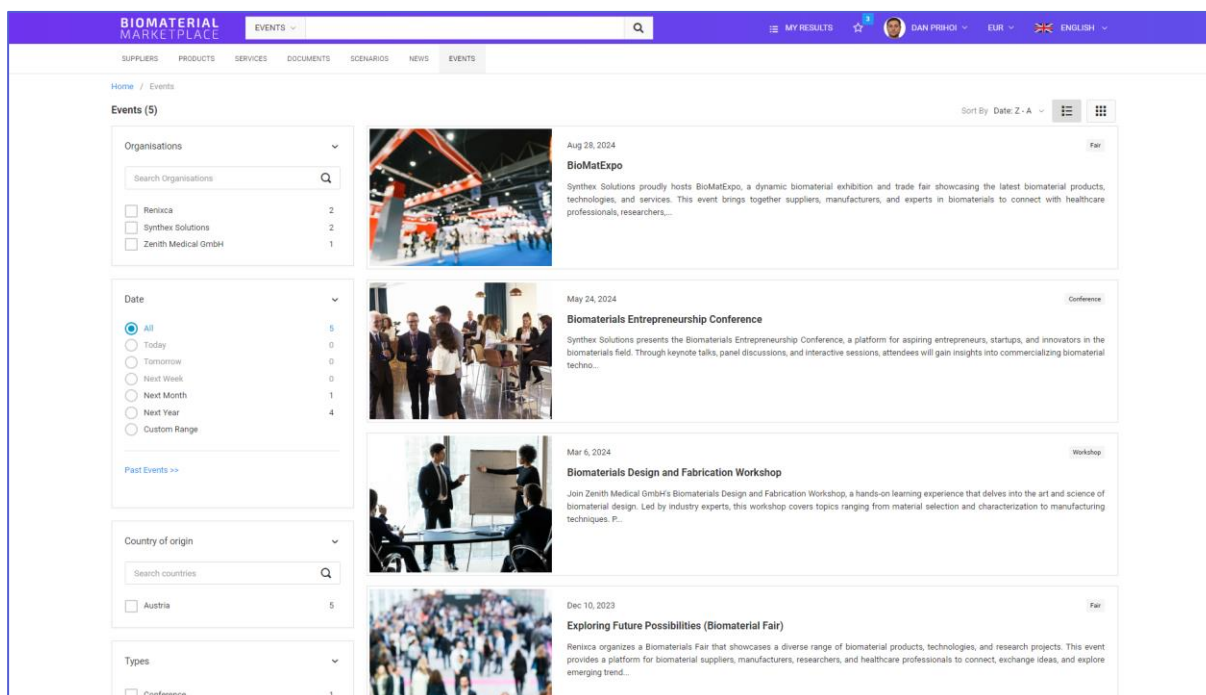


Figure 39. Events list view

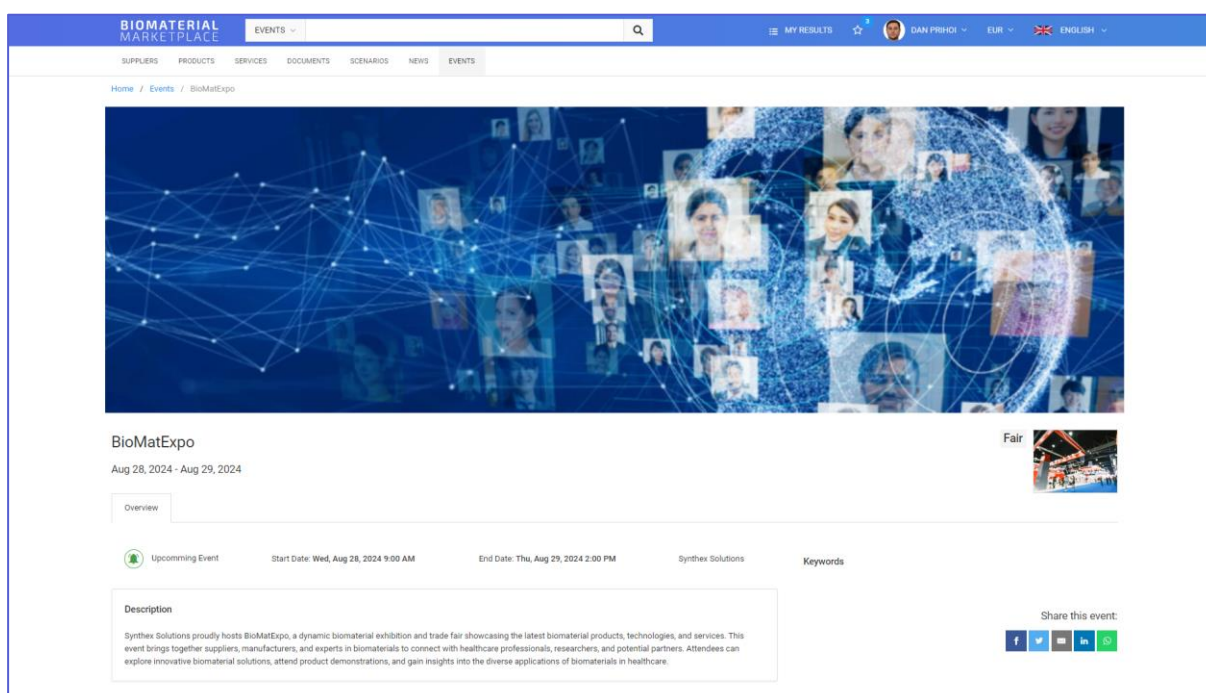


Figure 40. Event detail view

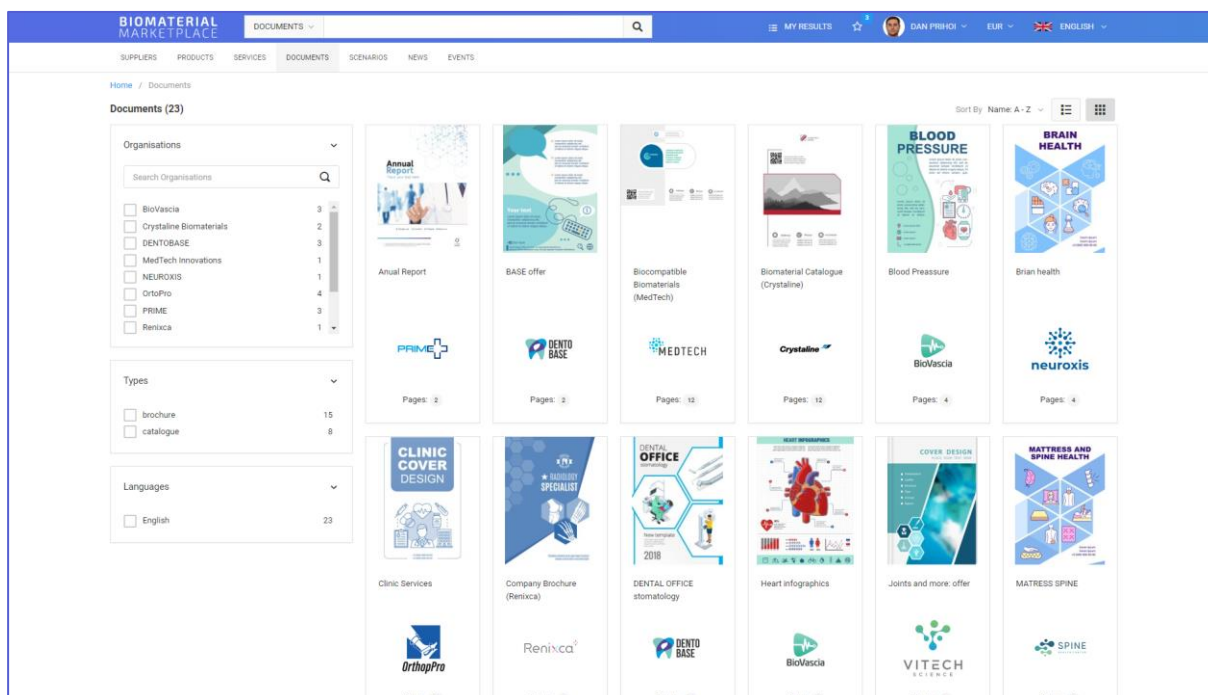


Figure 41. Document view

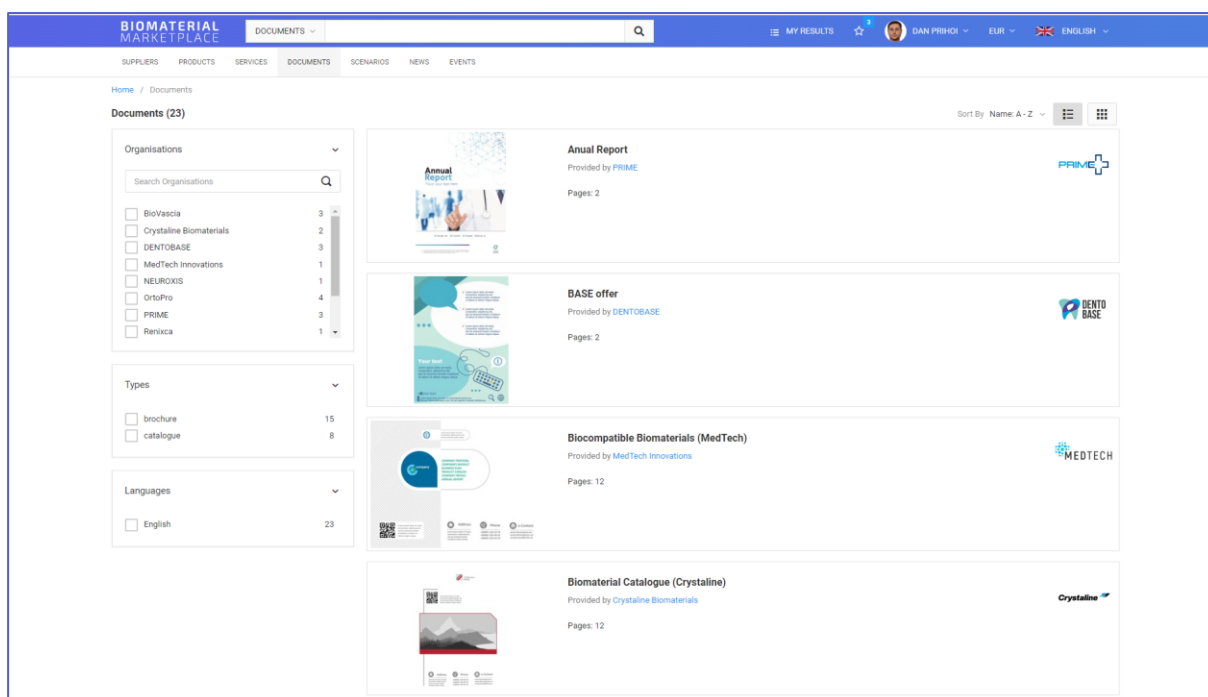


Figure 42. Document list view

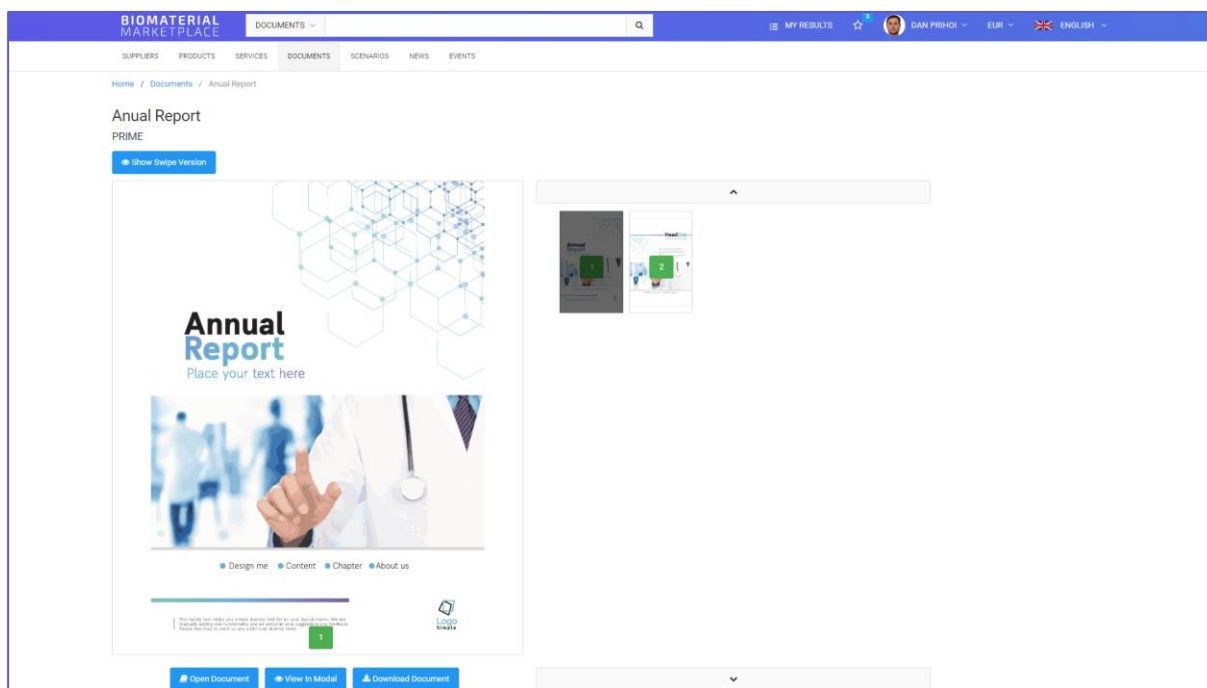


Figure 43. Document detail view



Figure 44. Document detail read view

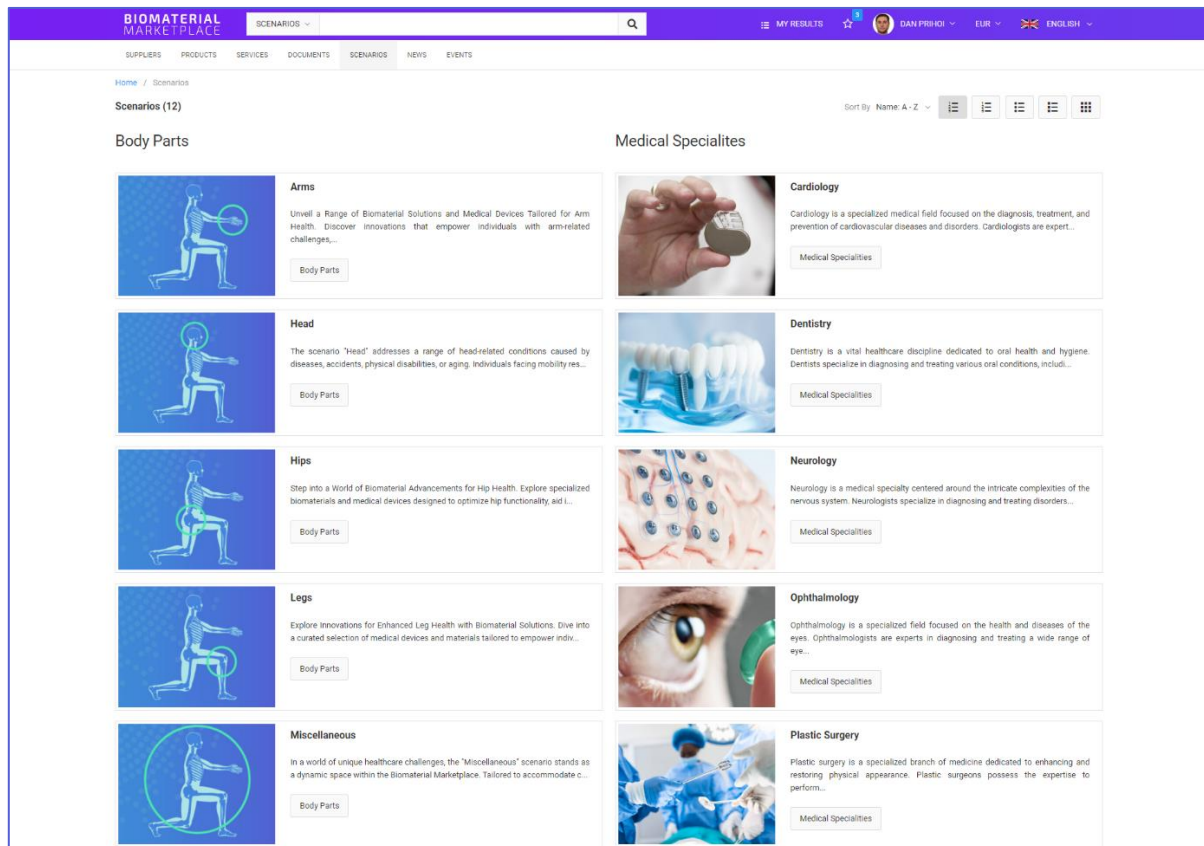


Figure 45. Scenario overview

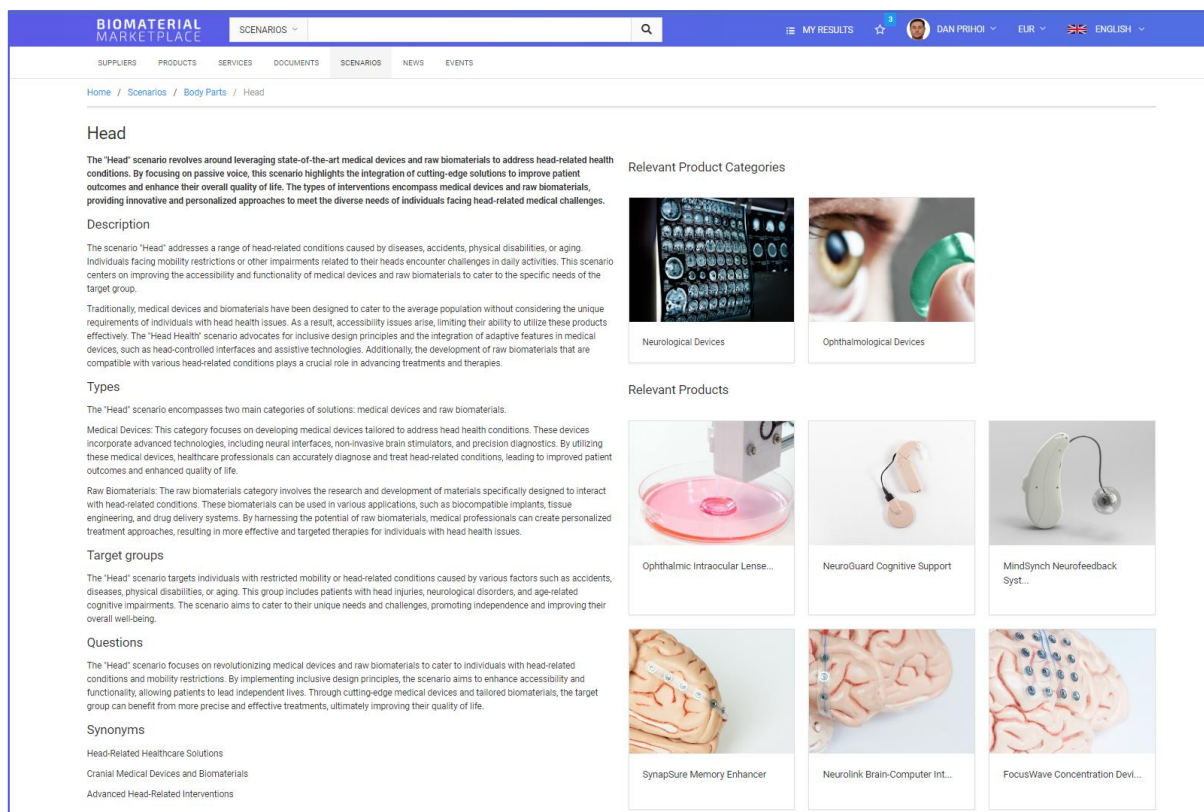


Figure 46. Scenario detail view

3.3 Advisors

The Advisors modules are currently under development. Once deployed, the Advisors will be available over the domain advisors.devbiomaterialmarketplace.com – initially for internal testing purposes, only accessible with valid credentials.

The following screenshots (Figure 47 and Figure 48) show the development progress of the Advisors module *EU Projects*. The aim of the module is to suggest the user opportunities for EU projects based on their provided organisation information.

The screenshot shows the 'DEMO MARKETPLACE' interface. At the top, there's a navigation bar with 'ALL' and a search icon. Below the header, the page is titled 'PROJECTS' with a breadcrumb 'Home / Projects'. A 'Sort By' dropdown is set to 'Name A-Z'. The left sidebar contains four filter sections: 'Call Types' (with a search bar and a list of H2020-EIC-SMEInet-2018-2020 to H2020-MSCA-IF-2020), 'Category Types' (with a search bar and a list of business models to renewable energy), 'Organisation Types' (with a search bar and a list of HES to REC), and 'Programme Codes' (with a search bar and a list of EIC-SMEInet-2018-2020 to H2020-EU.2.1.1). The main content area displays five project cards:

- Driving simulator for disabled people with scientific assessment of driving skills and indication to of adaptation to be made to the vehicle**
ID: 685105
From: Jul 1, 2015 to: Dec 31, 2015
This project involves the creation of a driving simulator for disabled people that can provide a scientific assessment of their driving skills and indicate the type of adaptation to be made to the vehicle. The product consists of three different components: a complex hardware...
Coordinator: unknown
Programme: unknown
- Condition Monitoring of Wind Turbine Drive-Trains via Non-Contact Acoustic Sensors**
ID: 701002
From: Mar 1, 2016 to: May 31, 2019
The EU Agency for Safety & Health is currently amending wind turbine standards (such as EN 50308) to ensure safer O&M tasks and increase the Probability Of Detection (POD) for wind turbine defects. ISO have also identified such issues, and in fact initiated the development of...
Coordinator: unknown
Programme: unknown
- Magnetic Diagnostic Assay for neurodegenerative diseases**
ID: 732678
From: Jan 1, 2017 to: Mar 31, 2020
MADIA aims at realizing a versatile and cheap diagnostic device based on magnetoresistive sensors, microfluidic device, ultra-small Magnetic Nanoparticles (MNPs) and advanced bio-chemical functionalization methods for the early and ultrasensitive in vitro detection of...
Coordinator: unknown
Programme: unknown
- Online Dialysis Sensor**
ID: 662861
From: Mar 1, 2015 to: Aug 31, 2015
End-stage renal disease (ESRD) is the most severe form of chronic kidney disease that is an incurable health failure. ESRD is a widespread health issue in developed countries and the patients have only two options: either receive permanent renal replacement therapy or undergo...
Coordinator: unknown
Programme: unknown
- Breakthrough self-charging remote monitoring device for smart rail freight wagons to enhance sustainability of railway sector**
ID: 868418
From: Jan 1, 2019 to: Nov 30, 2019
Railway plays a central role in European logistics and it is continuously growing. With the increasing importance of rail transport as the greenest mode, there is an urgent need on safety, efficiency, performance and availability to ensure its sustainability. Companies acting...
Coordinator: unknown
Programme: unknown

Figure 47. Project overview

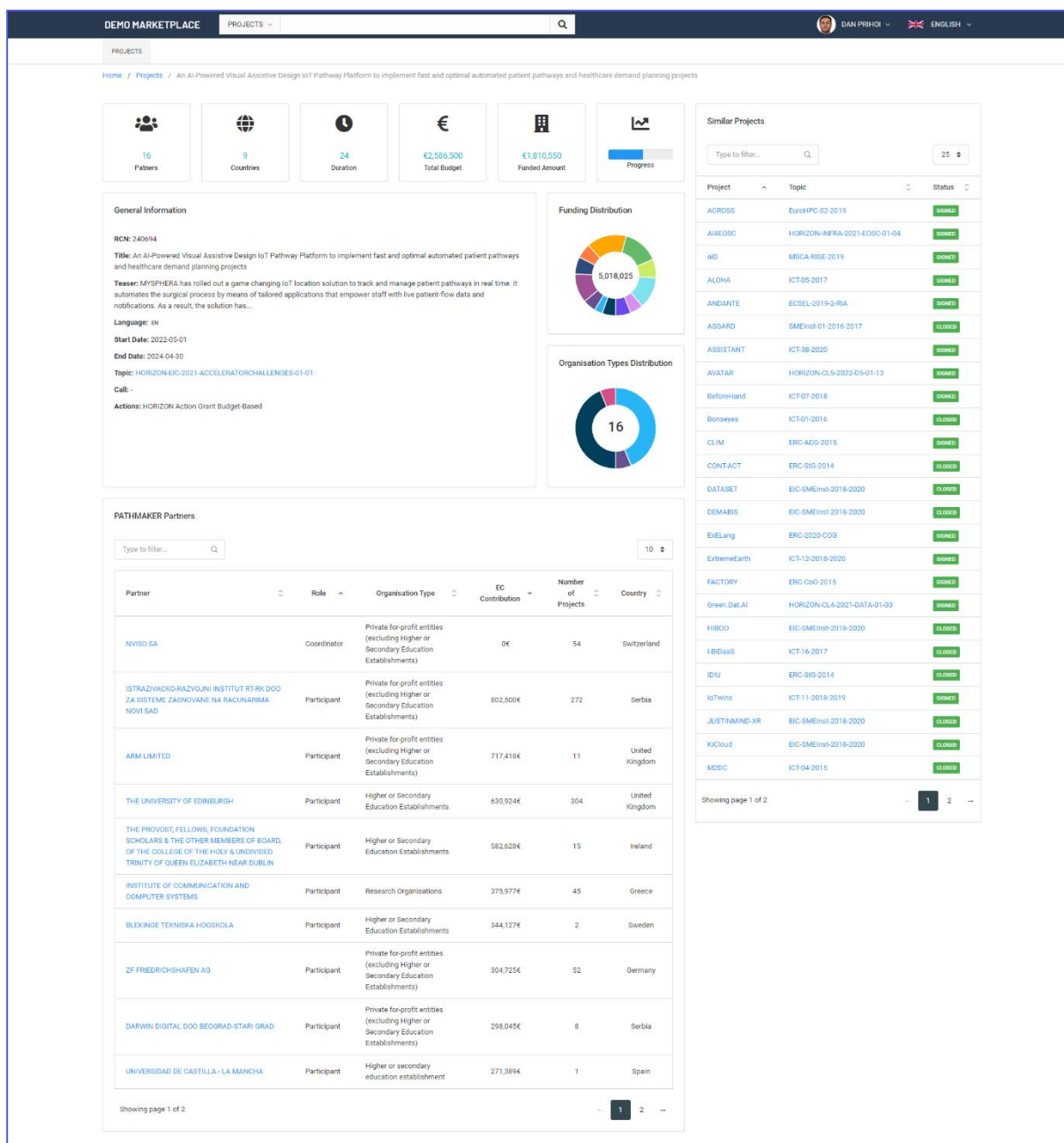


Figure 48. Project detail view

4 Help System and Knowledge Base

The knowledge base for the Biomaterial Database is already set up and currently live on help.biomaterialdatabase.com, containing sample data. The domain is not yet available for the public and can only be accessed by providing valid credentials. The other two help solutions are currently under development.

Biomaterial Database Knowledge Base

- Successfully set up
- Using a ready-to-use software package
- Live with sample content on <https://help.biomaterialdatabase.com> (restricted access)
- Different layouts have been tried out

Biomaterial Marketplace Knowledge Base

- Under development
- Manually developed

AdminBase Help System

- Under development
- Manually developed
- With ticketing system

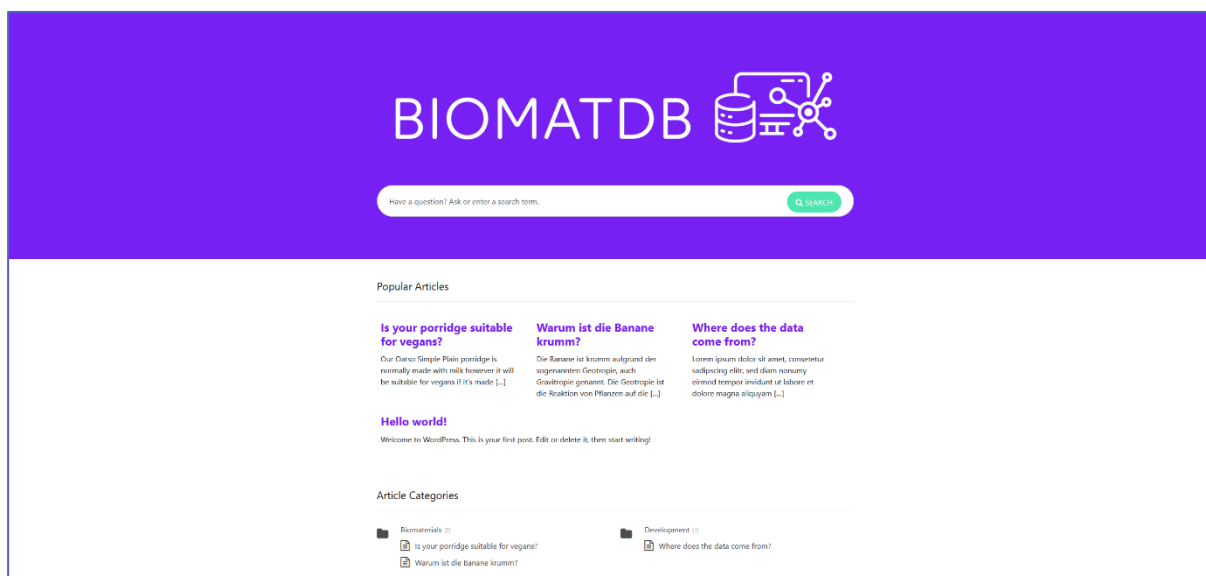


Figure 49. Knowledge Base start page layout option

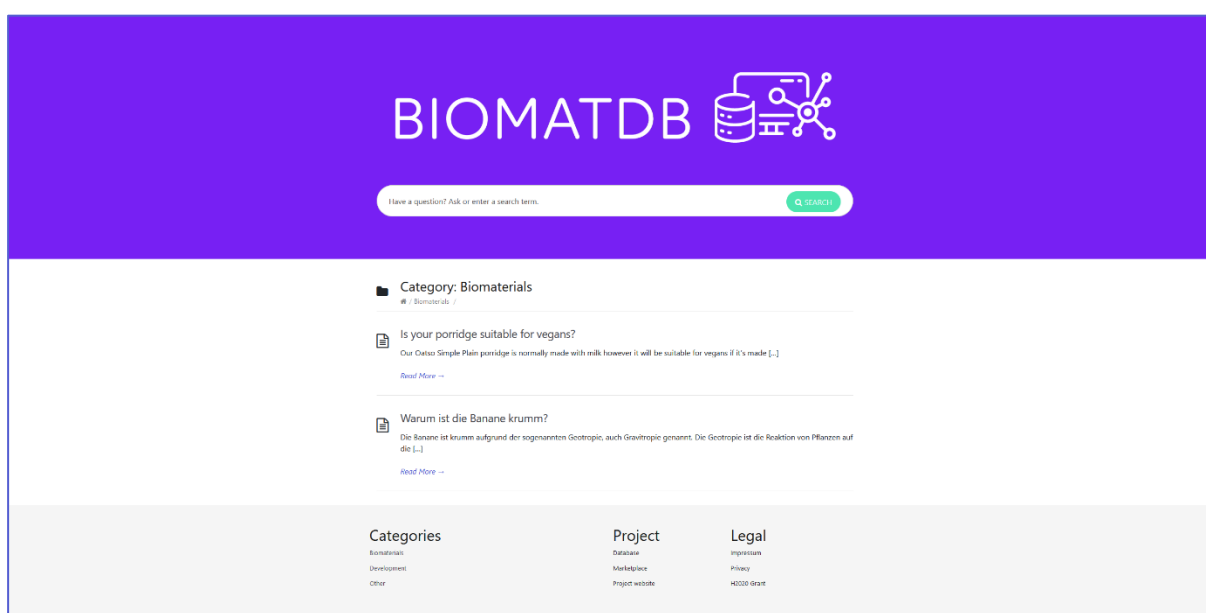


Figure 50. One category page layout options

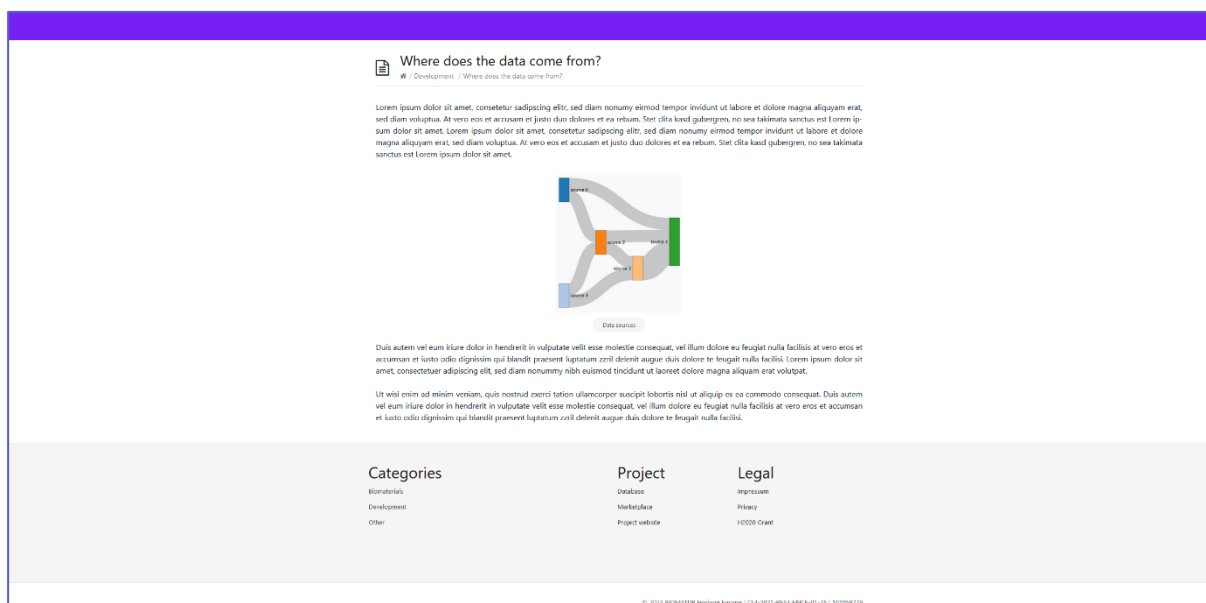


Figure 51. Article view with image option

Following, a different design and some new views, such as the all articles and all categories' sites, are presented.

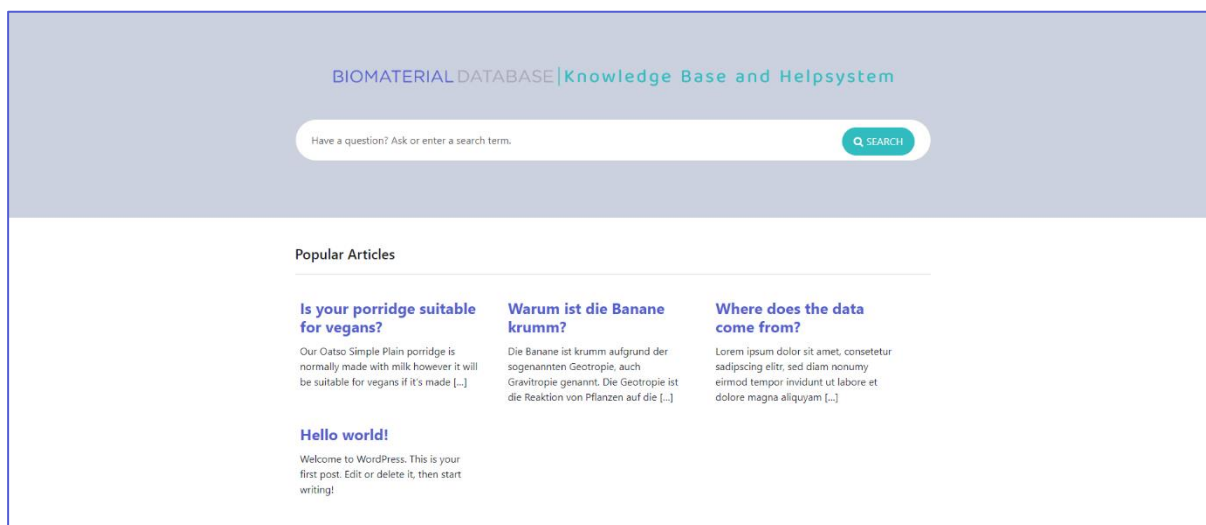


Figure 52. Start page layout and logo option

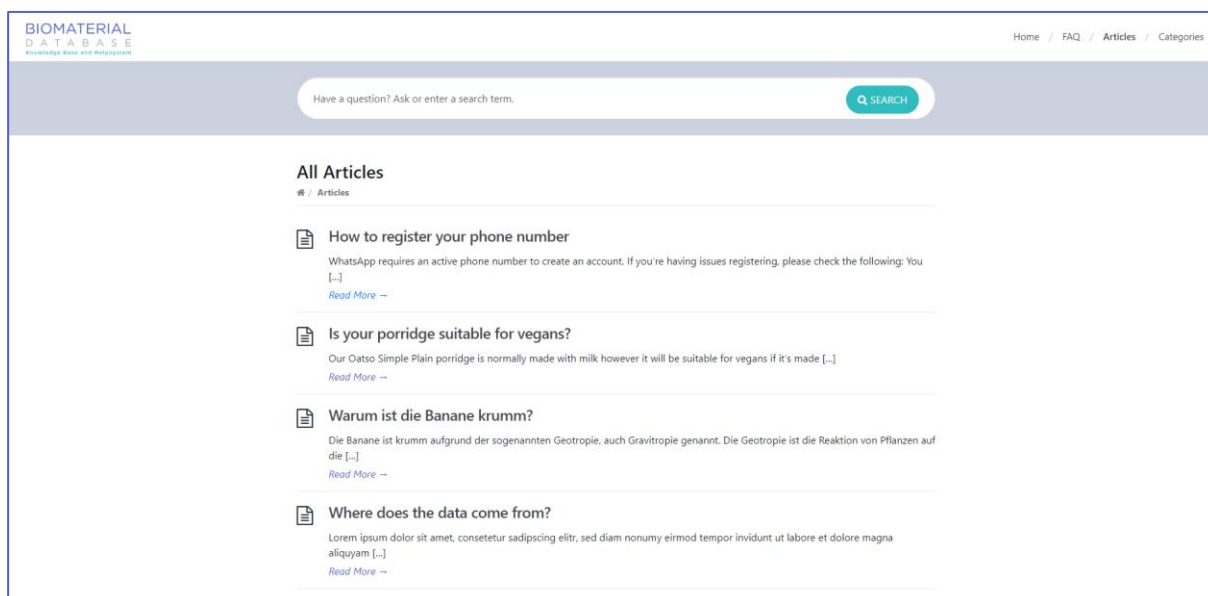


Figure 53. All articles view option

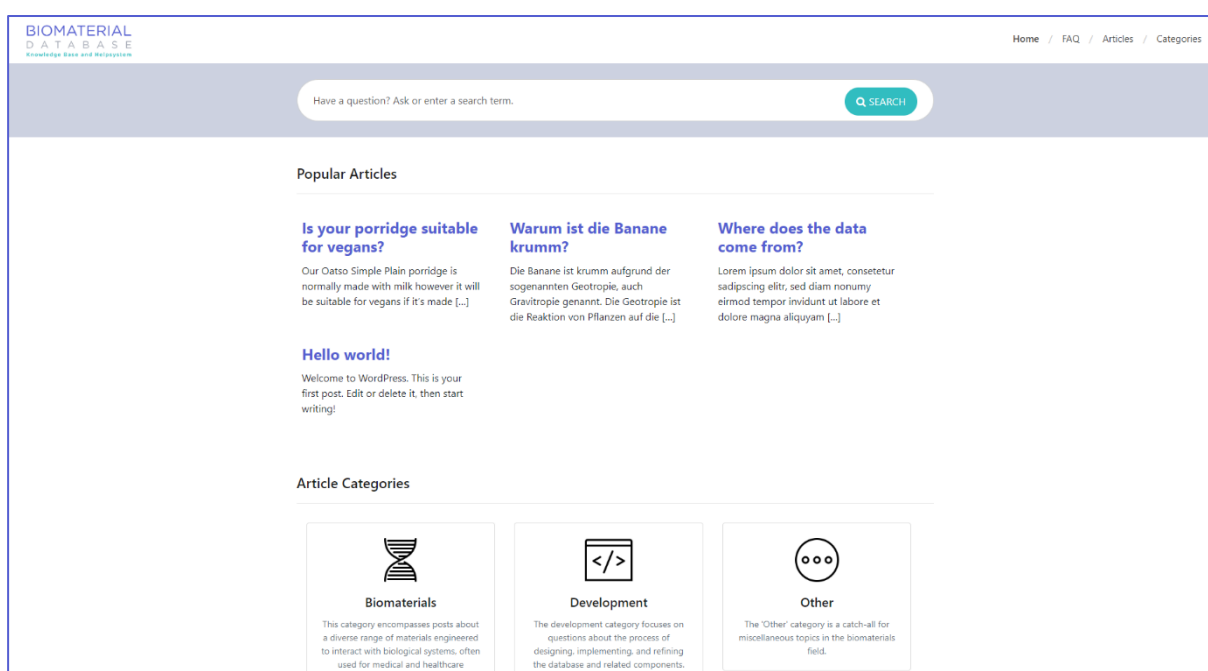


Figure 54. Alternative front-page layout

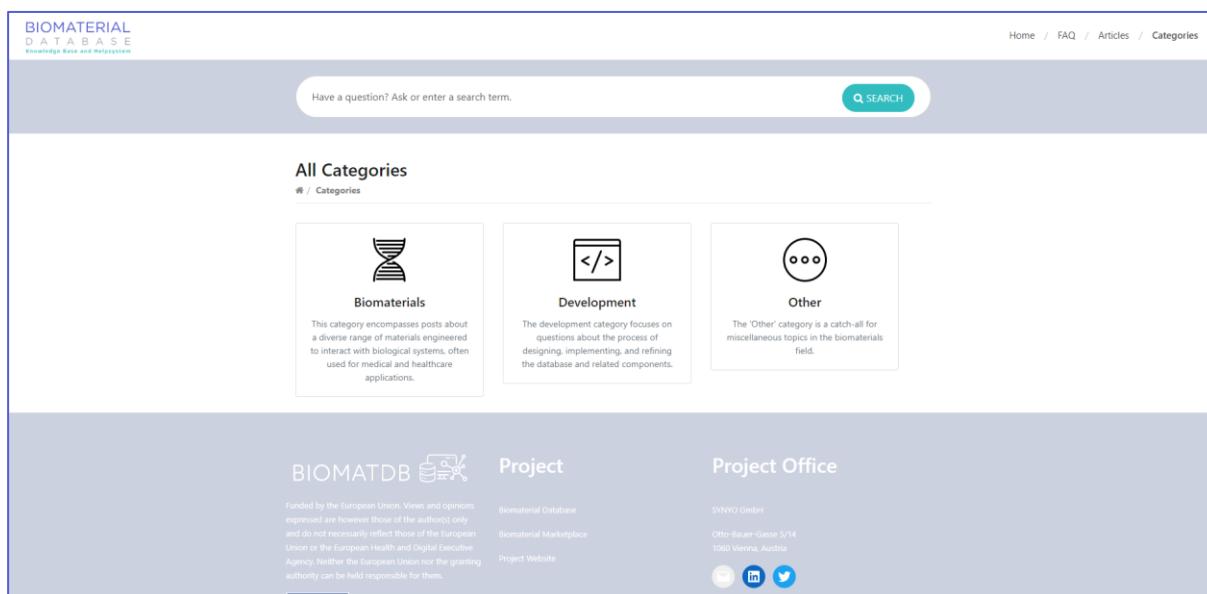


Figure 55. All categories

5 Conclusion

In conclusion, this additional report provides a tangible representation of the BIOMATDB project's progress, reflecting the dedication and effort invested in creating a robust biomaterial ecosystem. The additional report exemplifies the project's commitment to delivering user-centric solutions that cater to various needs within the biomaterial community. The visual representations and outlined components collectively offer a promising outlook for the project's future stages. This document showcased the evolving state of the project's key components, namely the Biomaterial Database, Biomaterial Marketplace, and the corresponding Help System and Knowledge Base.

It is evident that the development progress aligns with the expected time-frame, and the foundational views and layouts have been successfully established. While some of the content is yet to be filled, the fundamental infrastructure and interface elements have been established, laying a solid foundation for further development.

As this additional report represents a current status of an ongoing and permanent development, the displayed views in this document are subject to change at any time.

References

- [1] Elasticsearch (2023) What is Elasticsearch? | Elasticsearch Guide [7.15] | Elastic. Available at: <https://www.elastic.co/guide/en/elasticsearch/reference/current/elasticsearch-intro.html> (accessed: Aug. 25, 2023).

Websites

Bootstrap: <https://getbootstrap.com/docs/4.6/>

D3.js: <https://d3js.org/>

Cytoscape.js: <https://js.cytoscape.org/>

jQuery: <https://jquery.com/>

Laravel: <https://laravel.com/>

PHP: <https://www.php.net/>

Collabto: <https://www.collabto.com/>

Skype: <https://www.skype.com/en/>

PHPStorm: <https://www.jetbrains.com/phpstorm/>

HeidiSQL: <https://www.heidisql.com/>

Postman: <https://www.postman.com/>

Flask: <https://flask.palletsprojects.com/en/2.3.x/>

Prodigy: <https://prodi.gy/>

Brat: <https://brat.nlplab.org/>