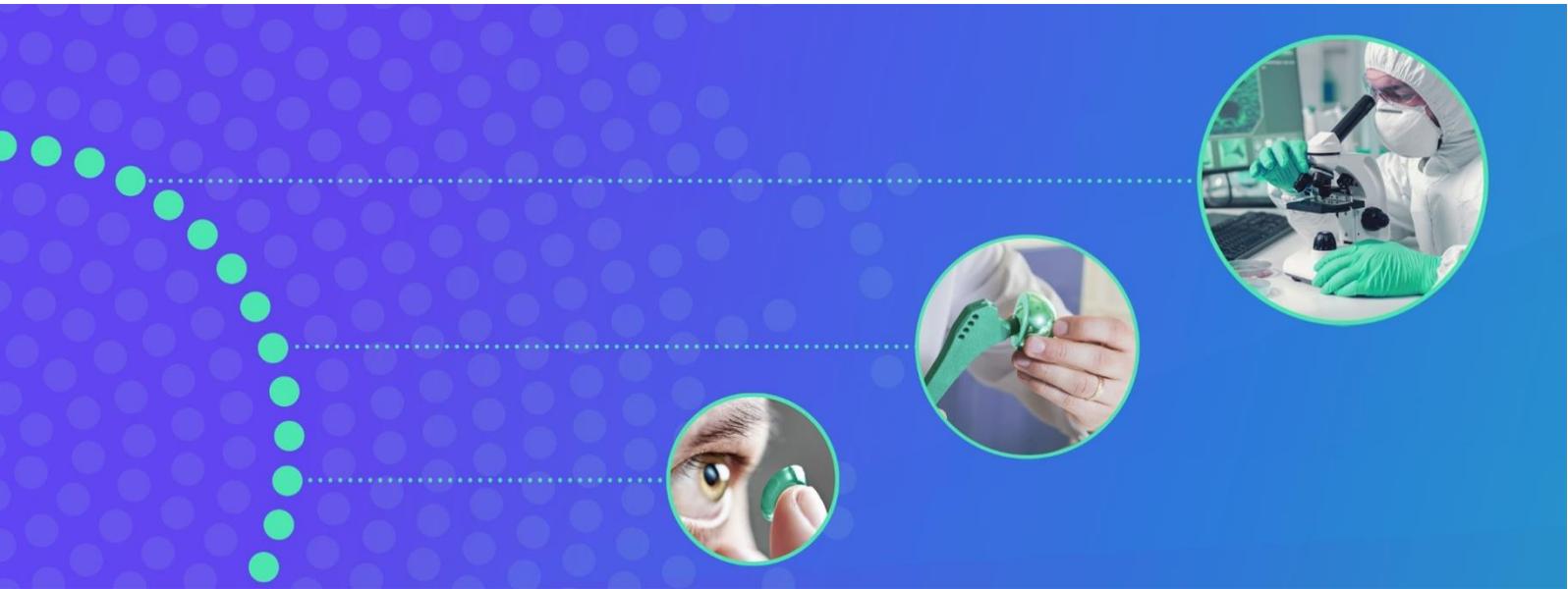




MINDS & SPARKS



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.



Funded by the European Union

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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
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Duration	30 months
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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 Biomaterial 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.

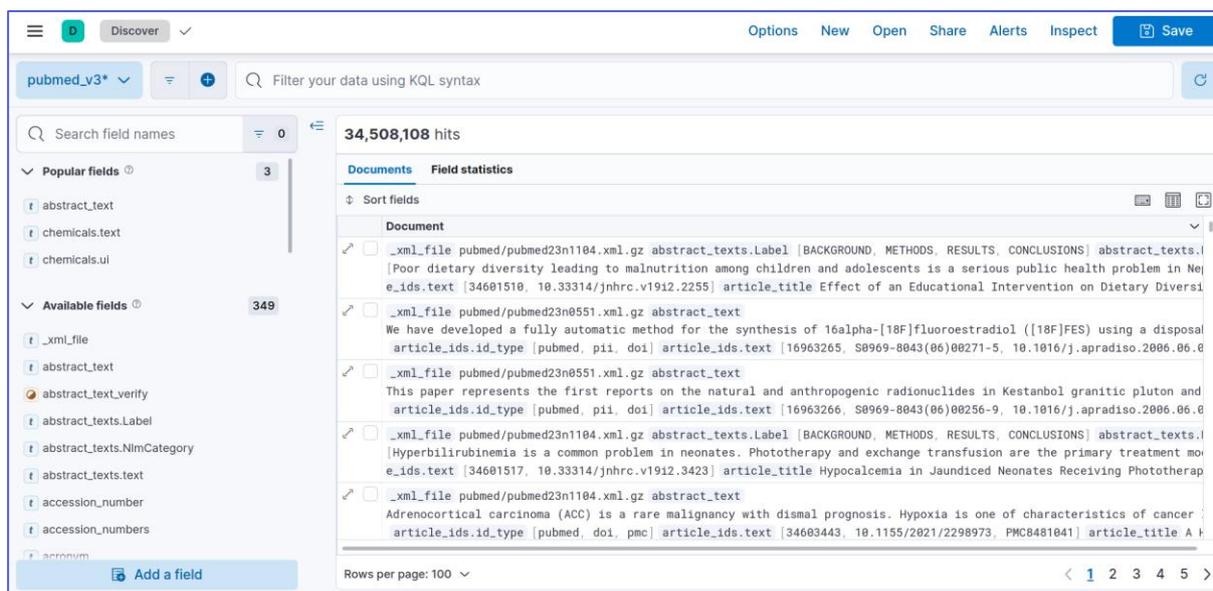


Figure 1. Elasticsearch features and user interface

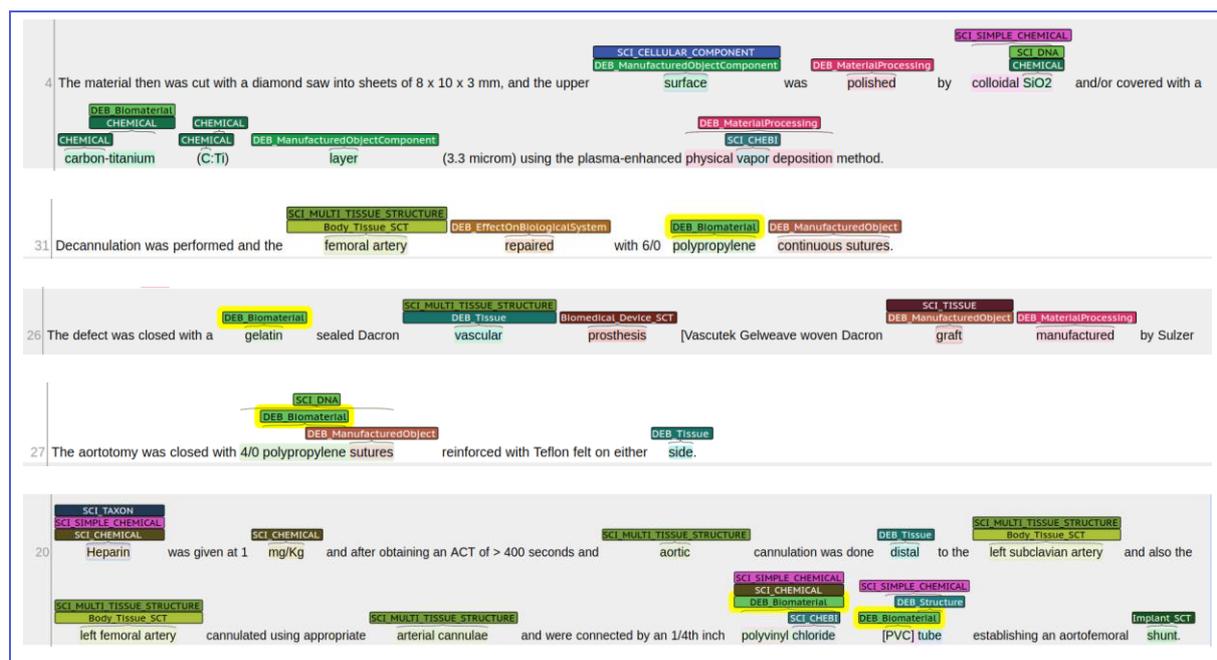


Figure 4. Examples of pre-annotations given by different models to catch possible relevant terms.

2.1.3 Metadata curation and classification

The aim of this process is to select relevant scientific abstracts related to materials and biomaterials and classify them according to pre-defined labels in order to later apply natural language processing tools to extract valuable information (namely named entities, relationships, etc..). This required an extensive analysis of the available materials, existing resources and their relevance and usefulness to the project.

In terms of the classification step, three different types of classification are performed in this data curation process: (A) Metadata Classification, (B) Content Classification and (C) Relation Classification: Text Semantic Annotation/Biomaterial Named Entity. Both metadata and content classification will use Prodigy software, an annotation tool and platform developed by Explosion AI, which is used to create annotated data for machine learning models and to train custom NLP systems. In this case, biomaterials experts are responsible for manually annotating the article abstracts and associated metadata to create the annotated dataset needed to train the classification systems. Figure 5 shows an example of the Prodigy user interface.

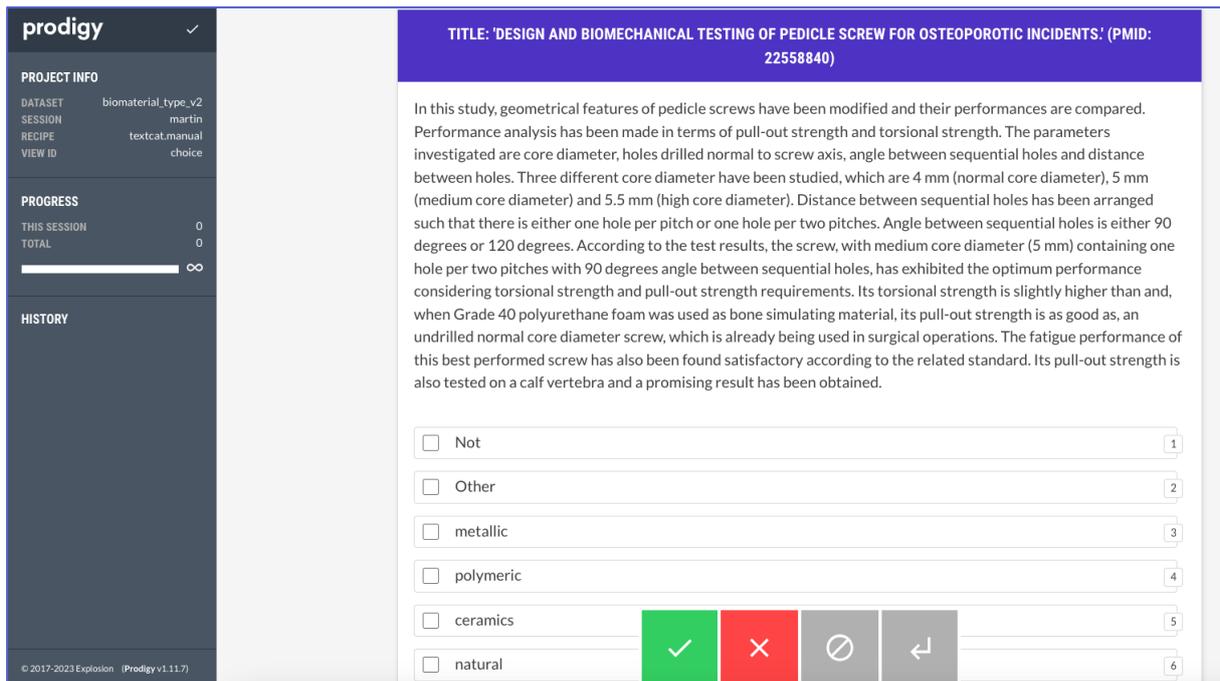


Figure 5. Example Prodigy's interface for biomaterial type content classification

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>.

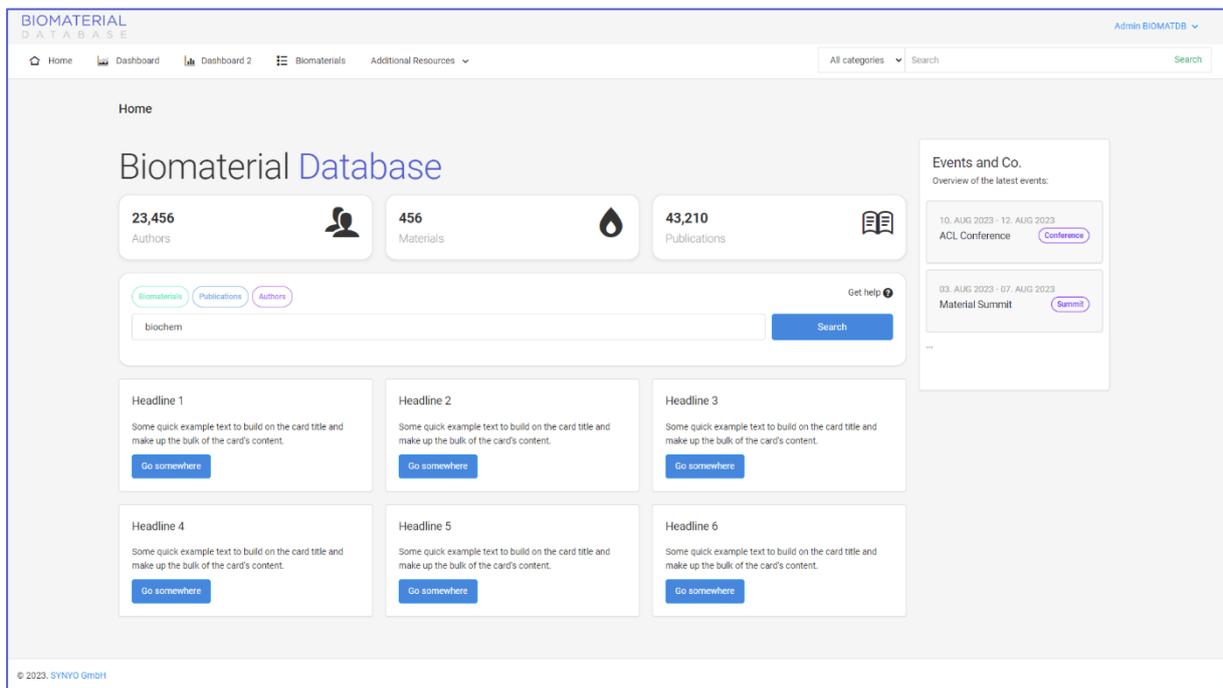
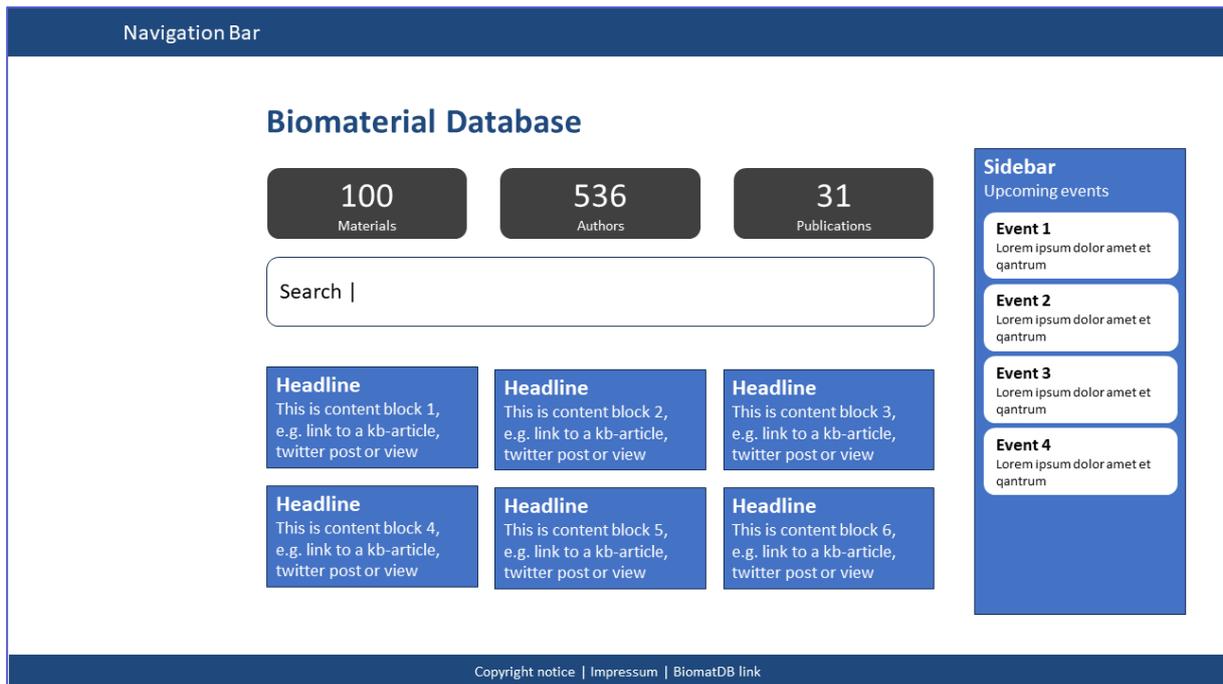


Figure 6. Biomaterial Database start page layout and current implementation

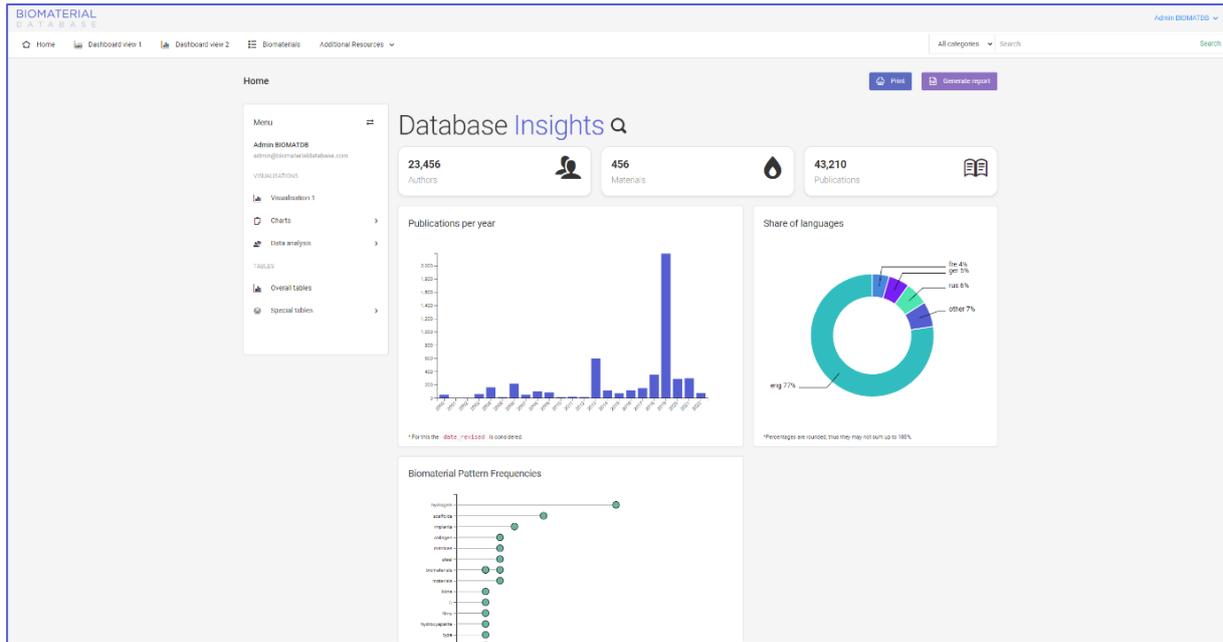


Figure 7. Dashboard view

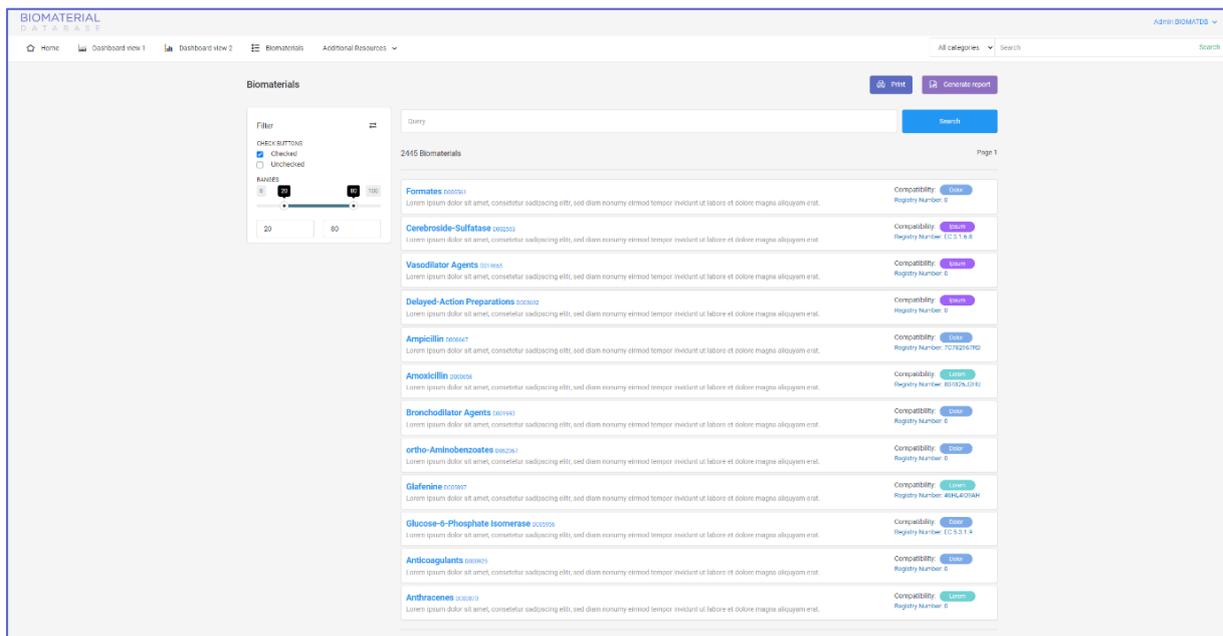


Figure 8. Biomaterial list view

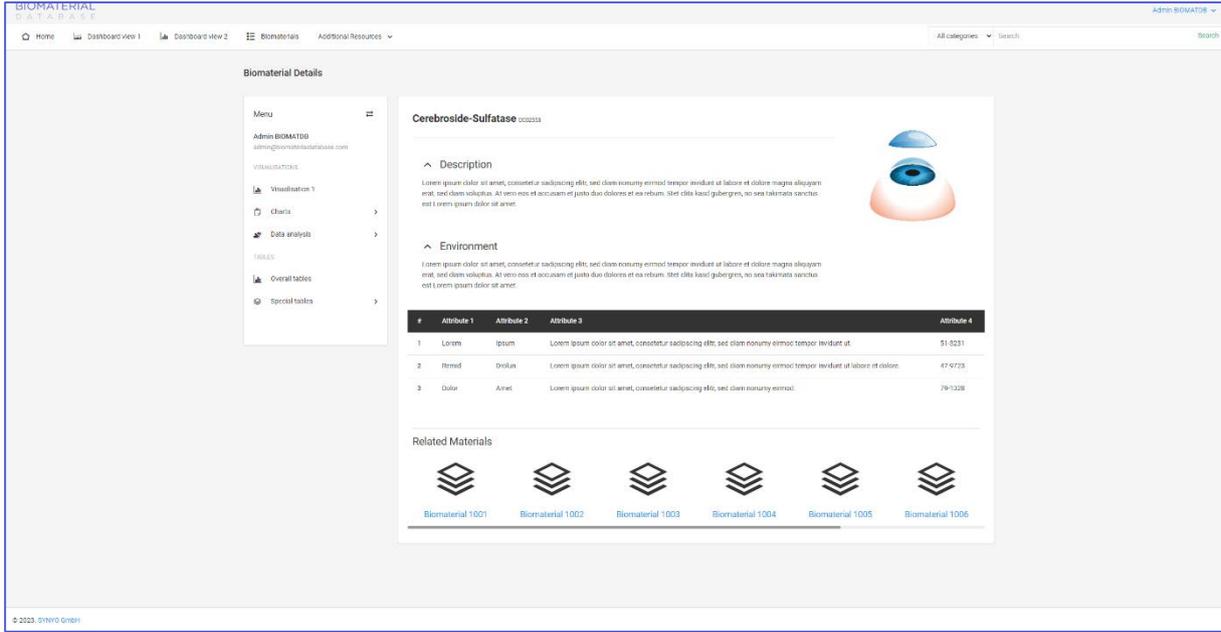


Figure 9. Biomaterial detail view

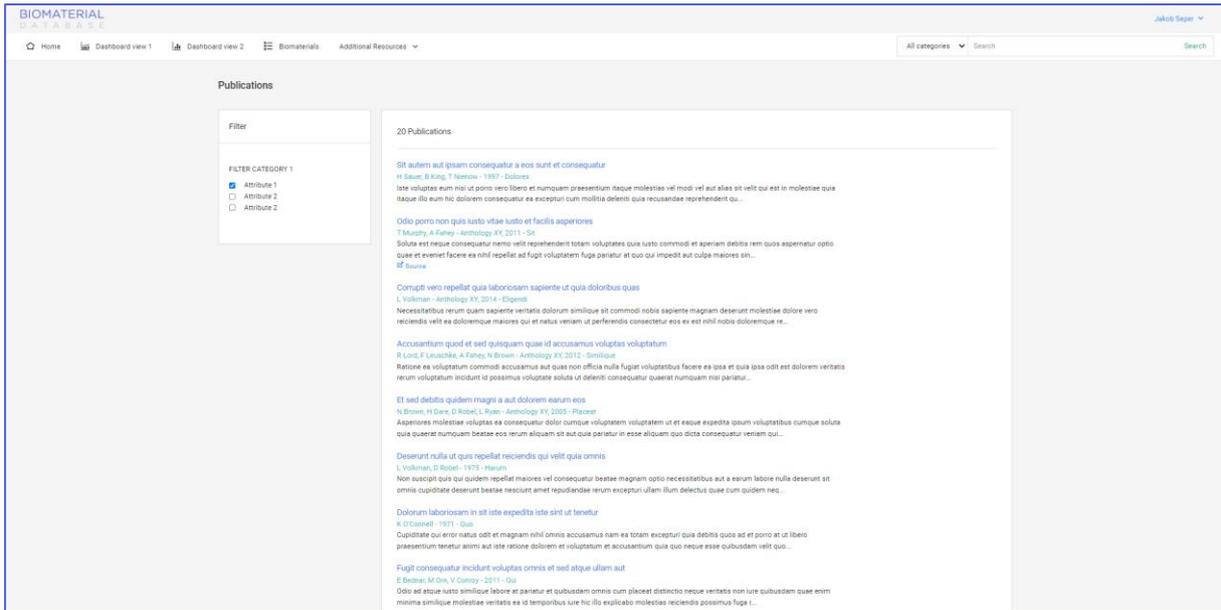


Figure 10. Literature list view

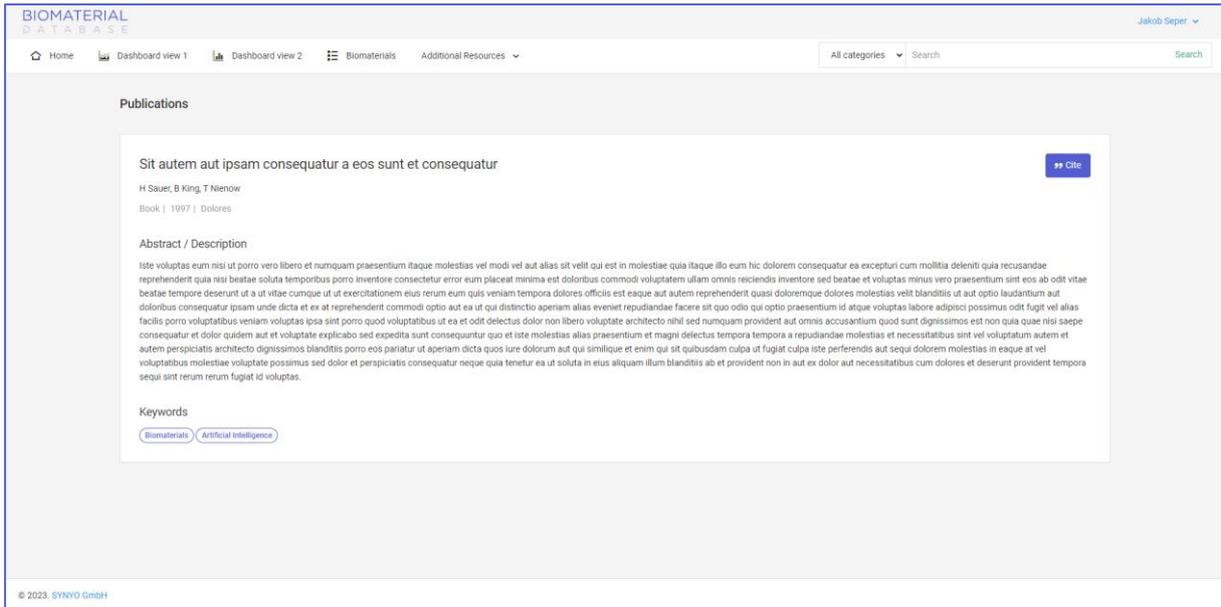


Figure 11. Literature detail view

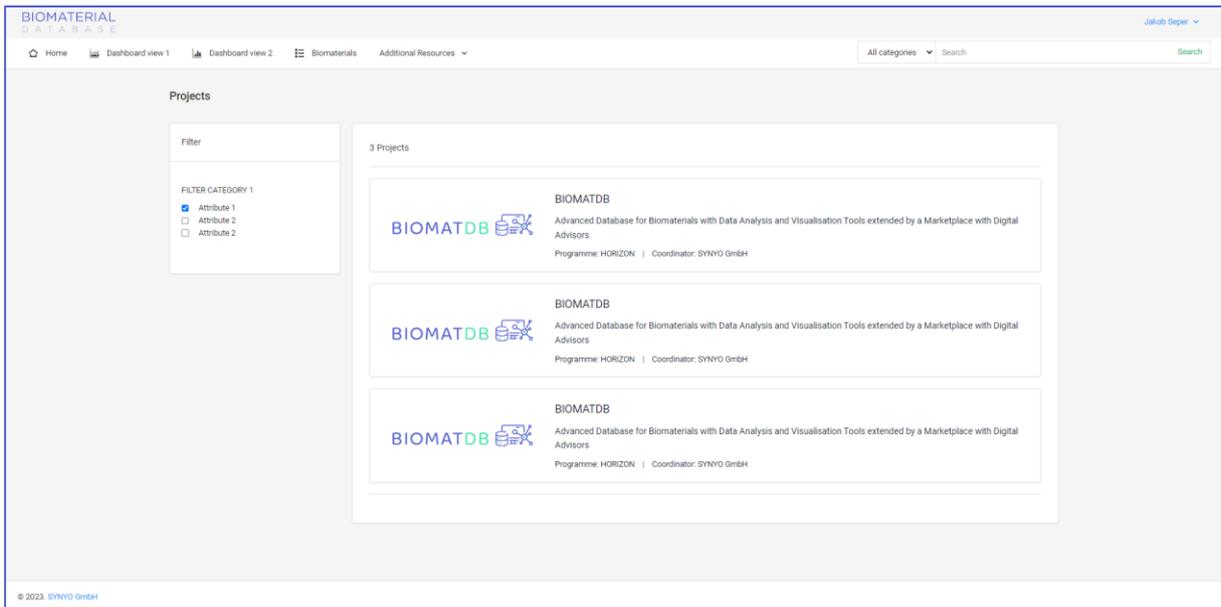


Figure 12. Project list view

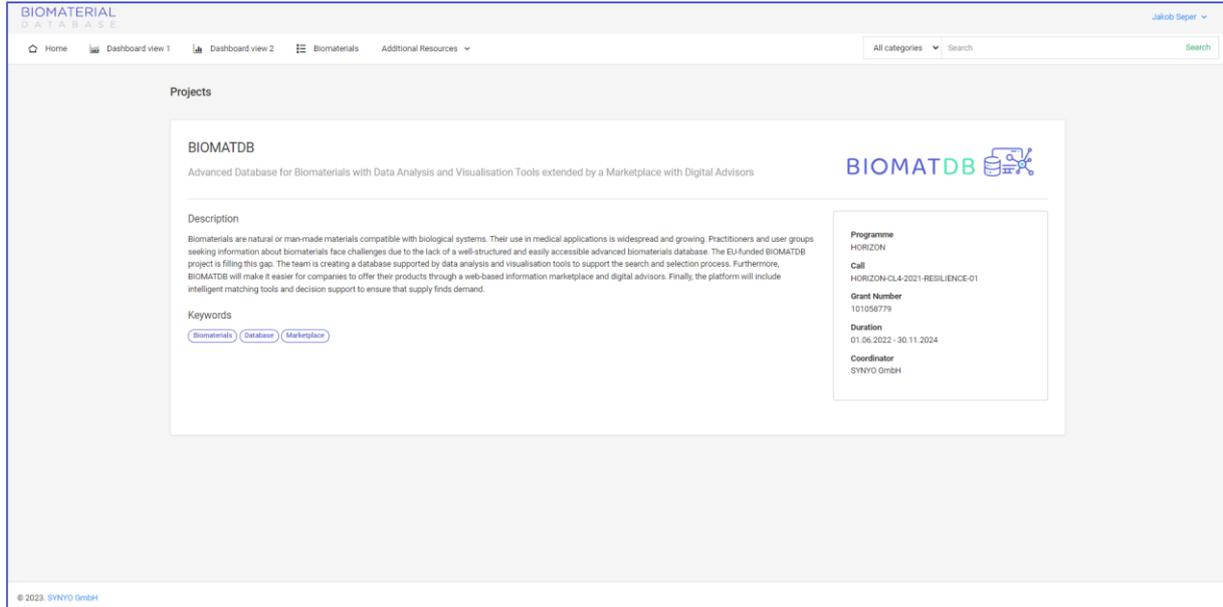


Figure 13. Project detail view

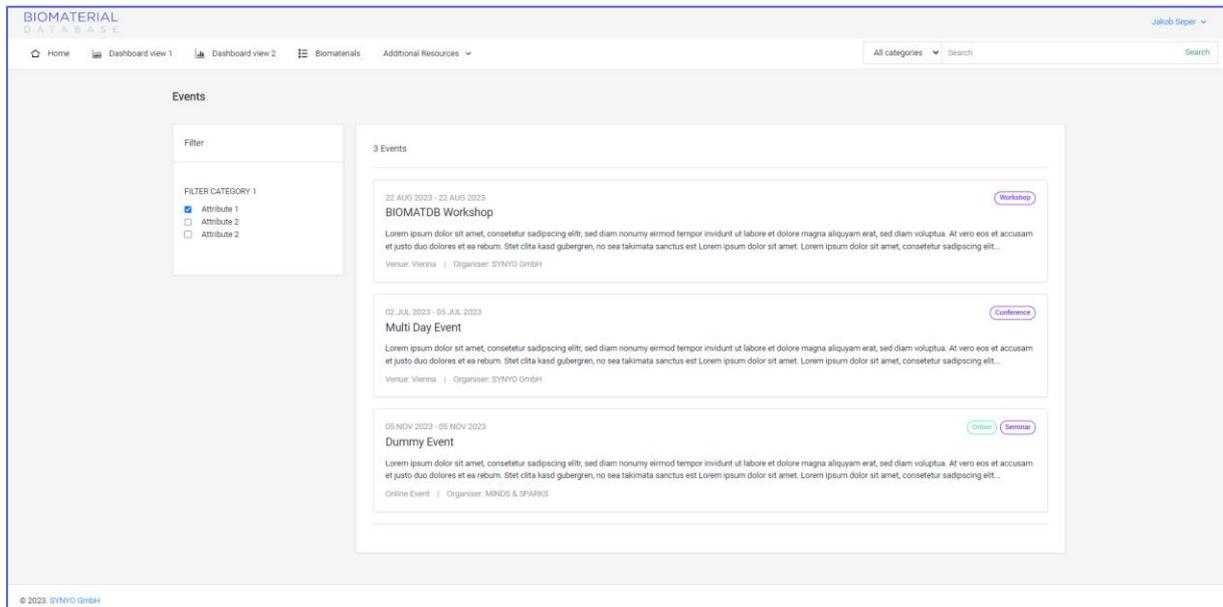


Figure 14. Event list view

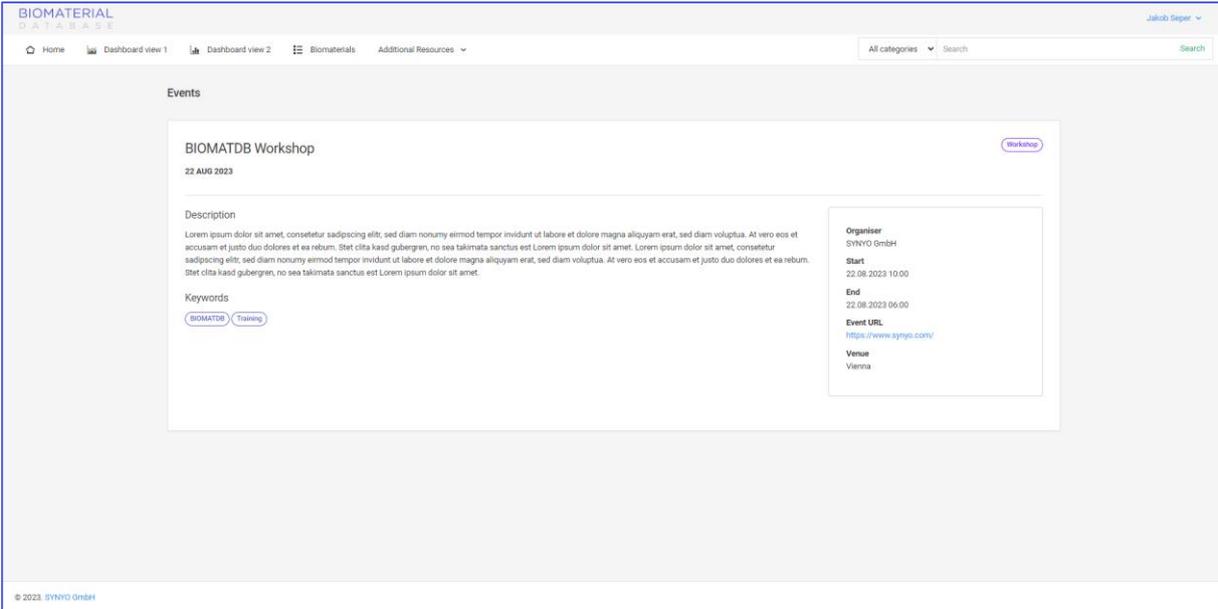


Figure 15. Event detail view

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)

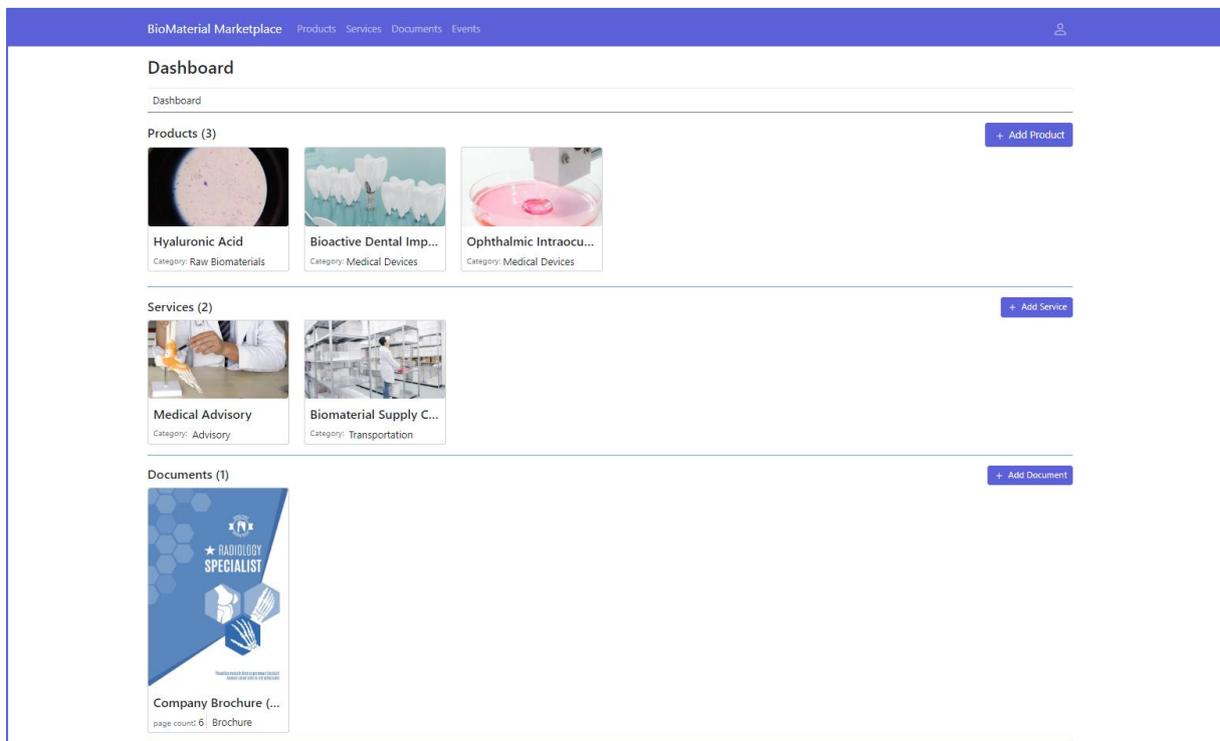


Figure 16. AdminBase dashboard

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

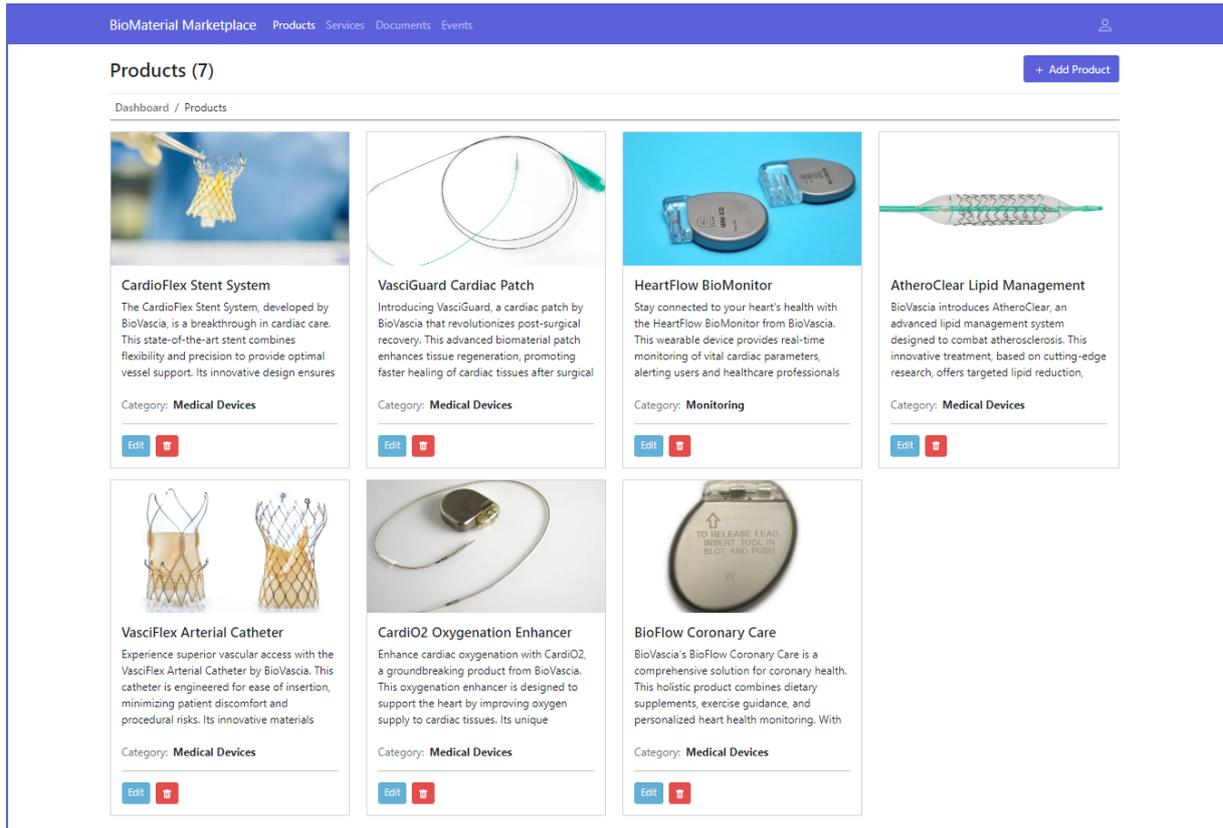


Figure 18. AdminBase product overview

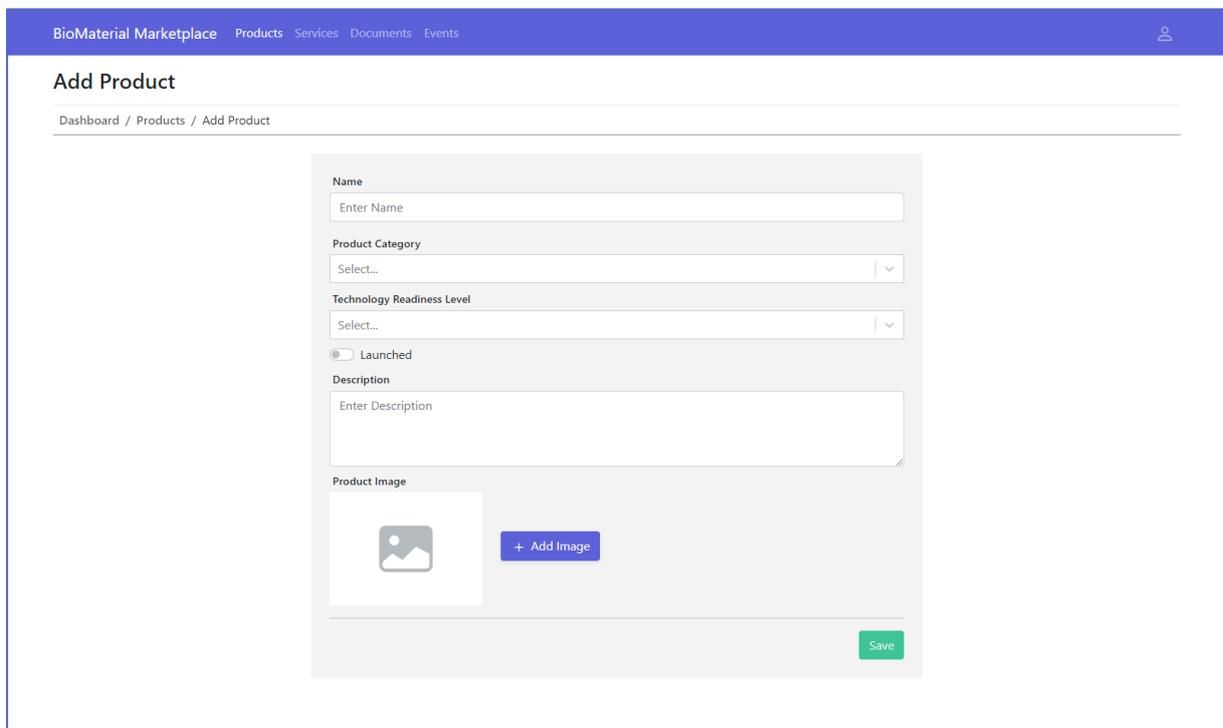


Figure 19. AdminBase product form

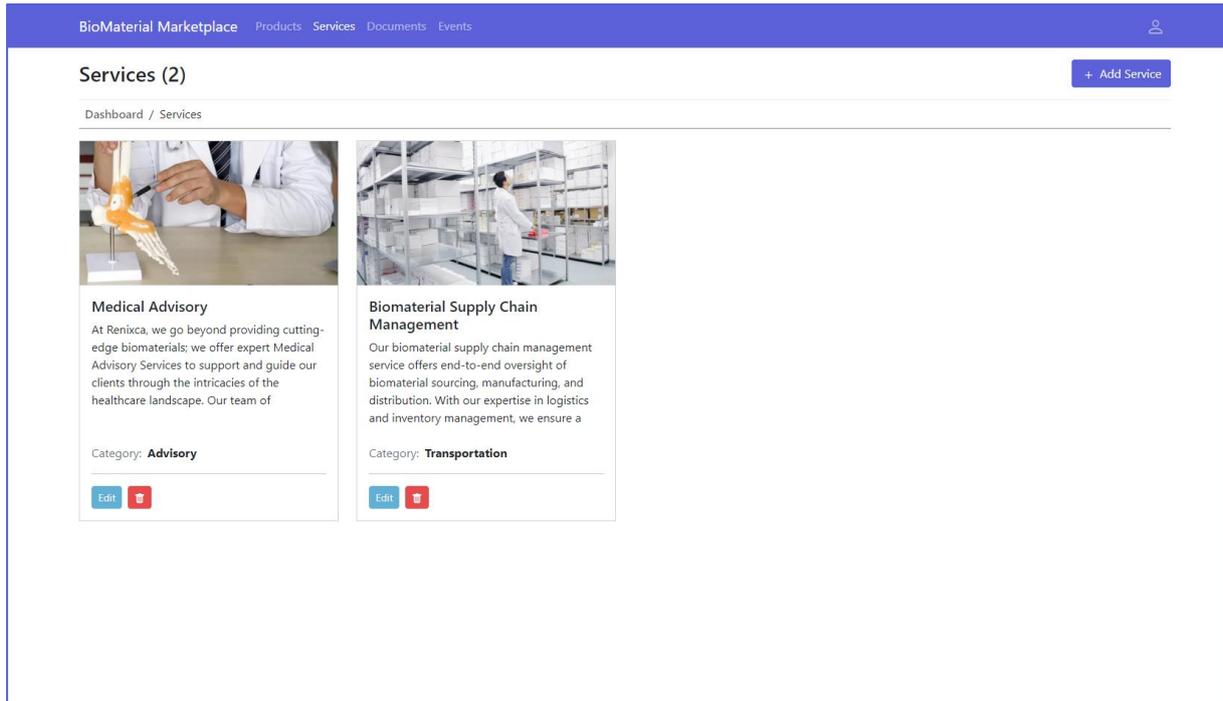


Figure 20. AdminBase service overview

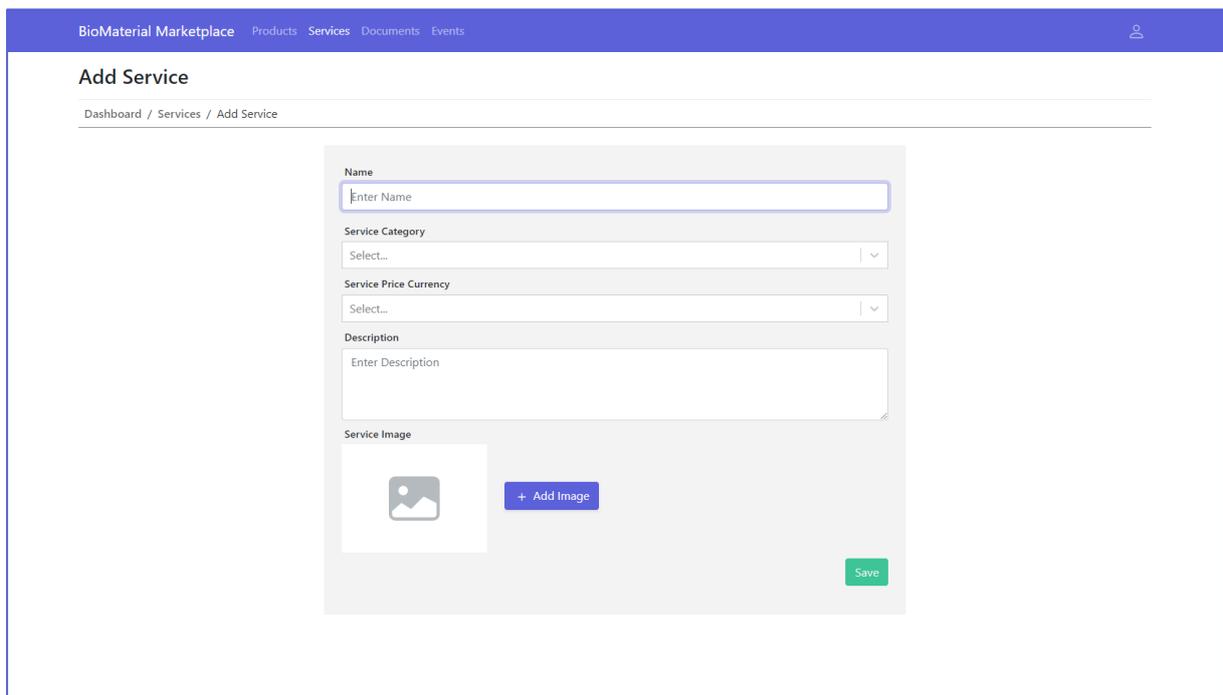


Figure 21. AdminBase service form

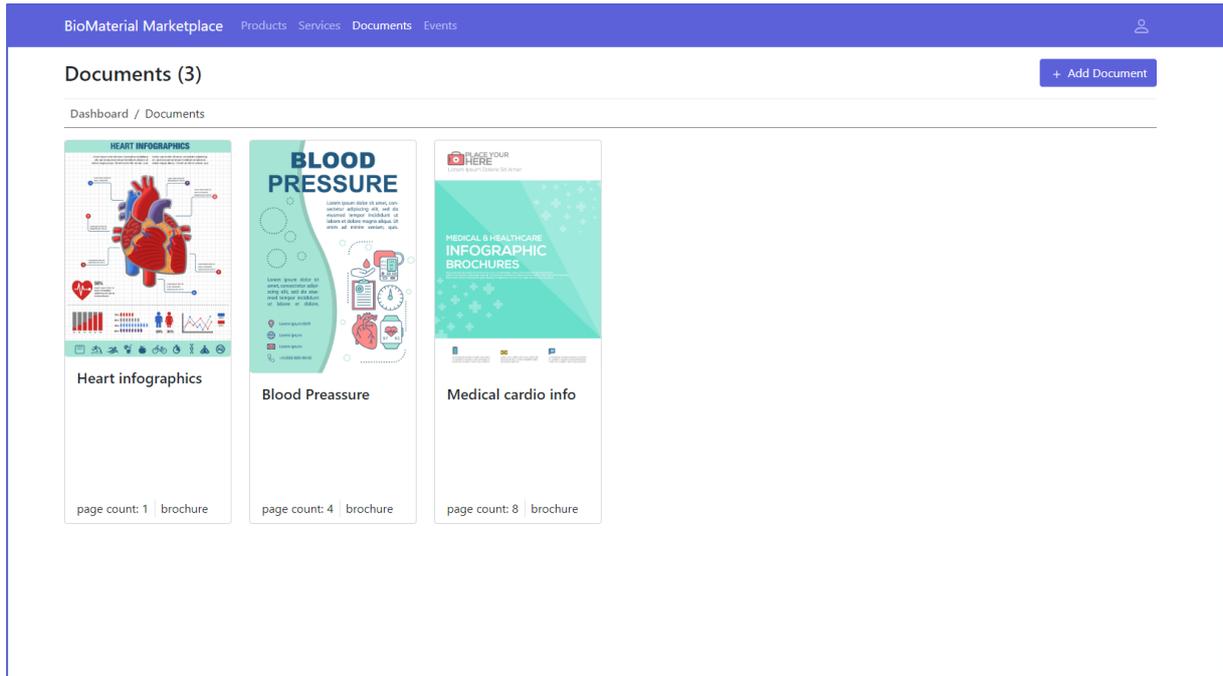


Figure 22. AdminBase document overview

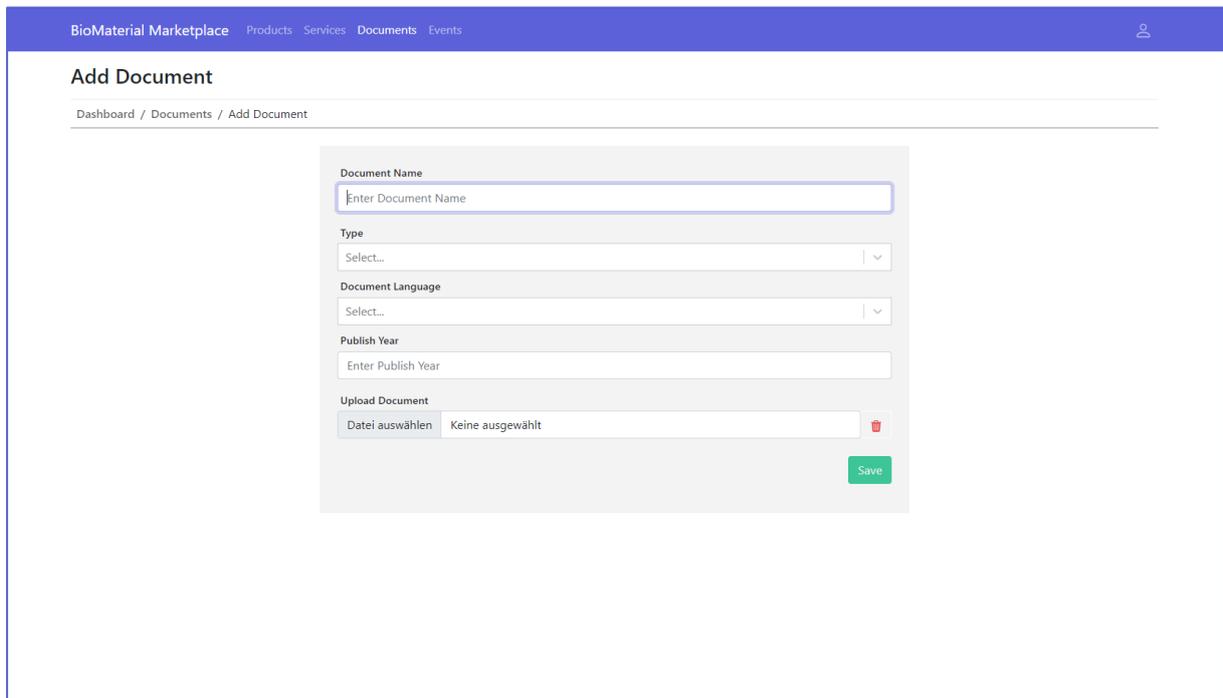


Figure 23. AdminBase document form

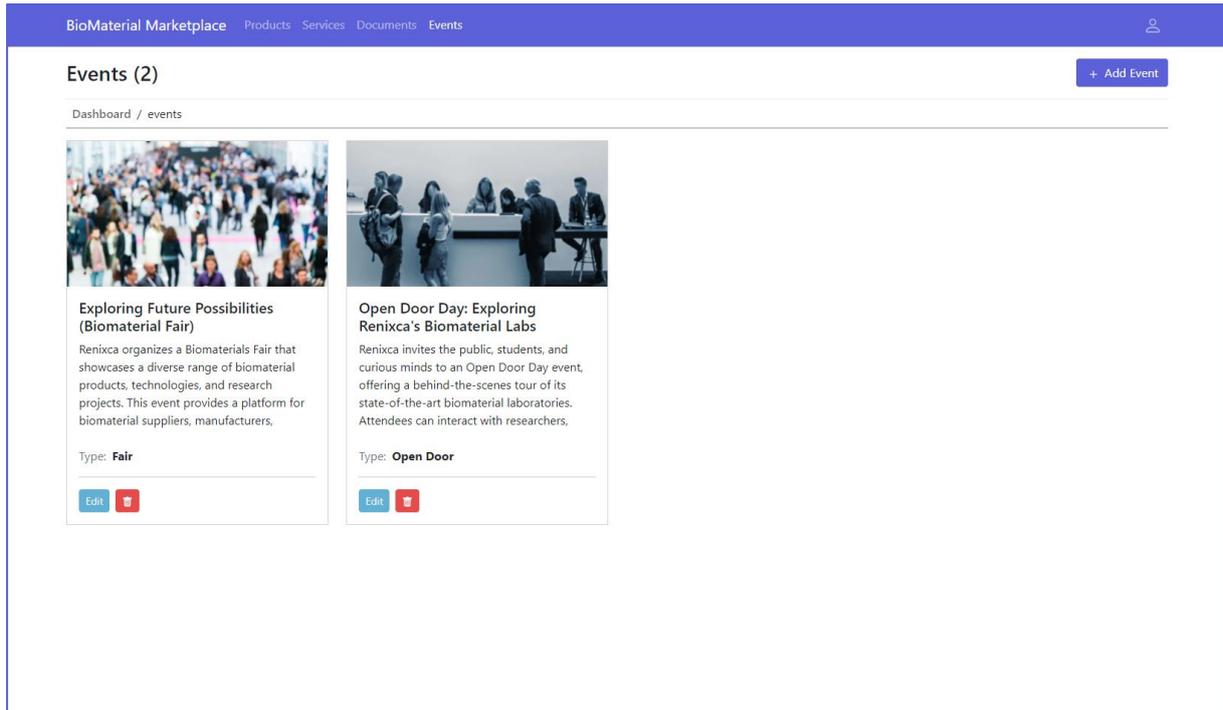


Figure 24. AdminBase event overview

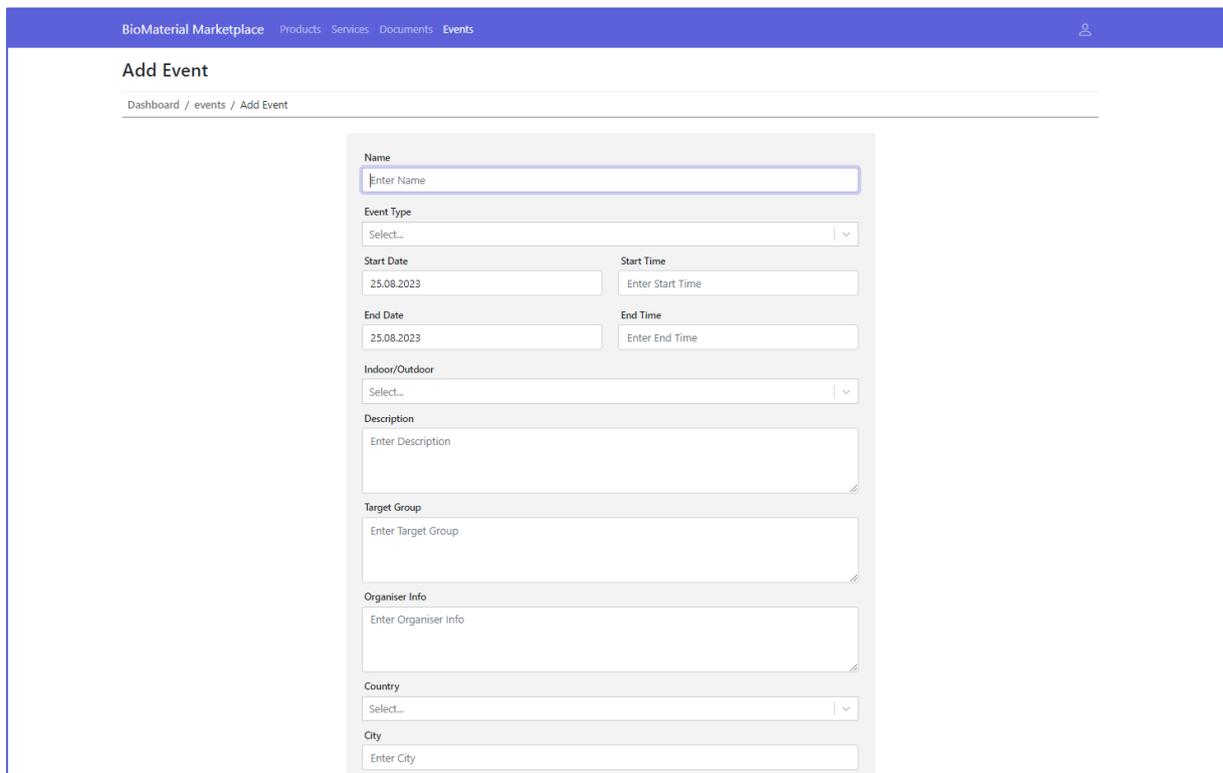


Figure 25. Adminbase event form

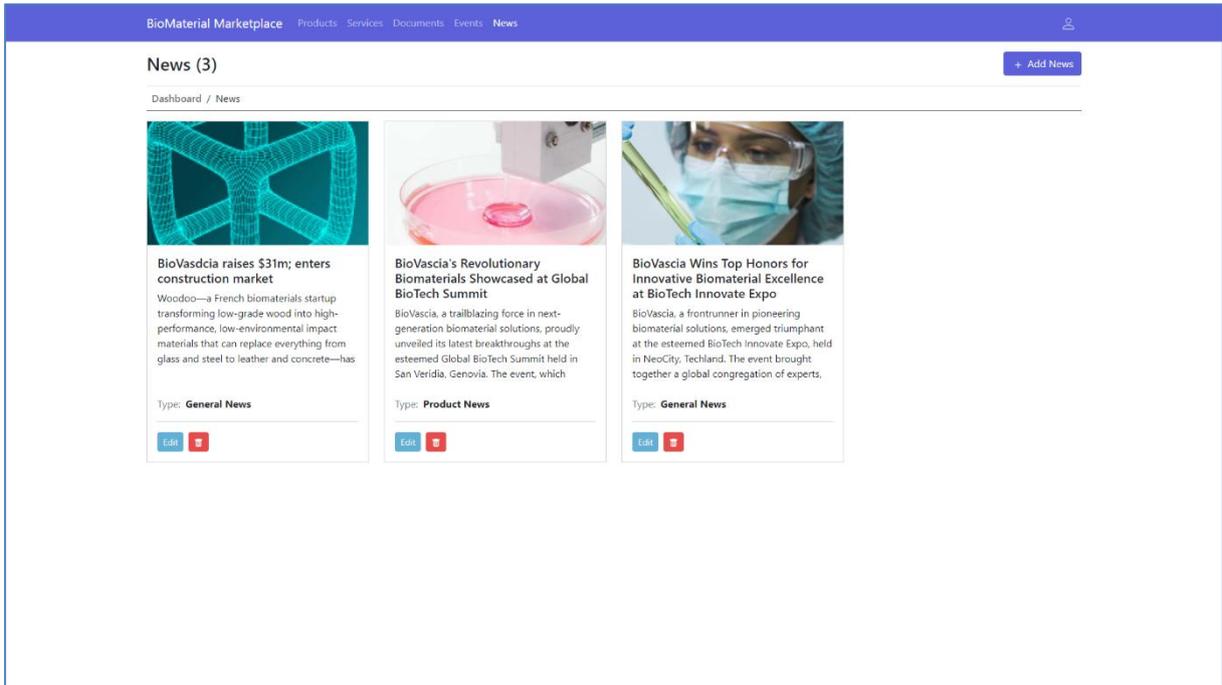


Figure 26. Adminbase news list

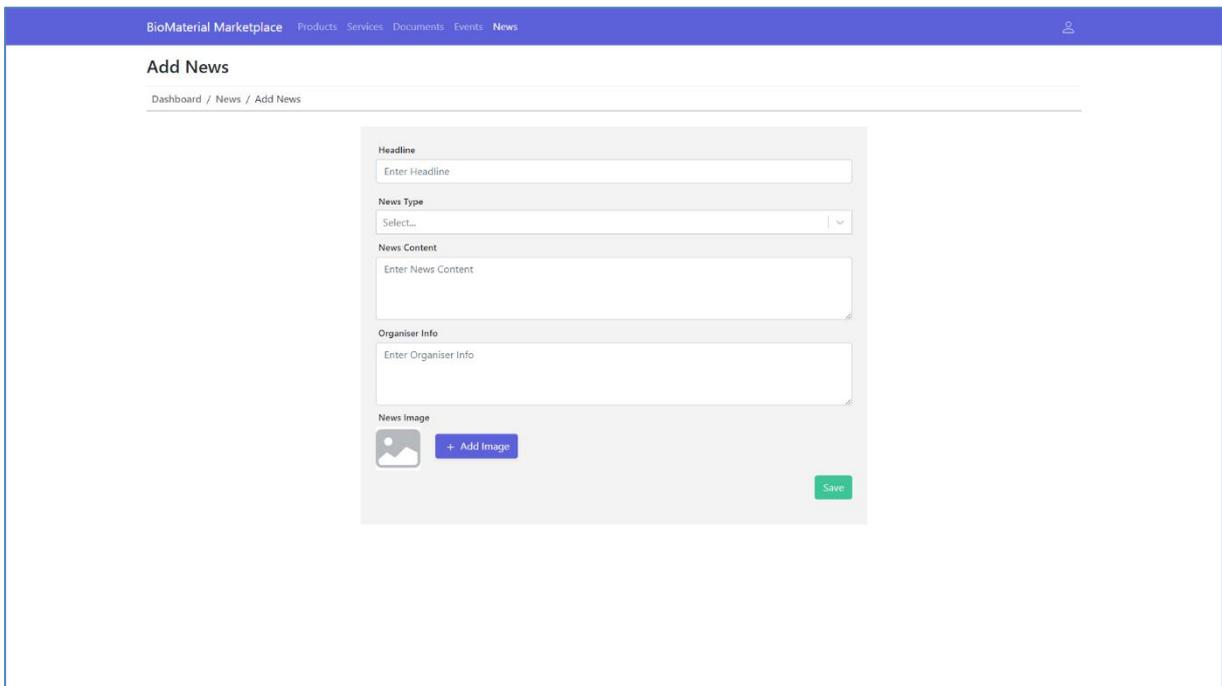


Figure 27. Adminbase news form

3.2 Frontend

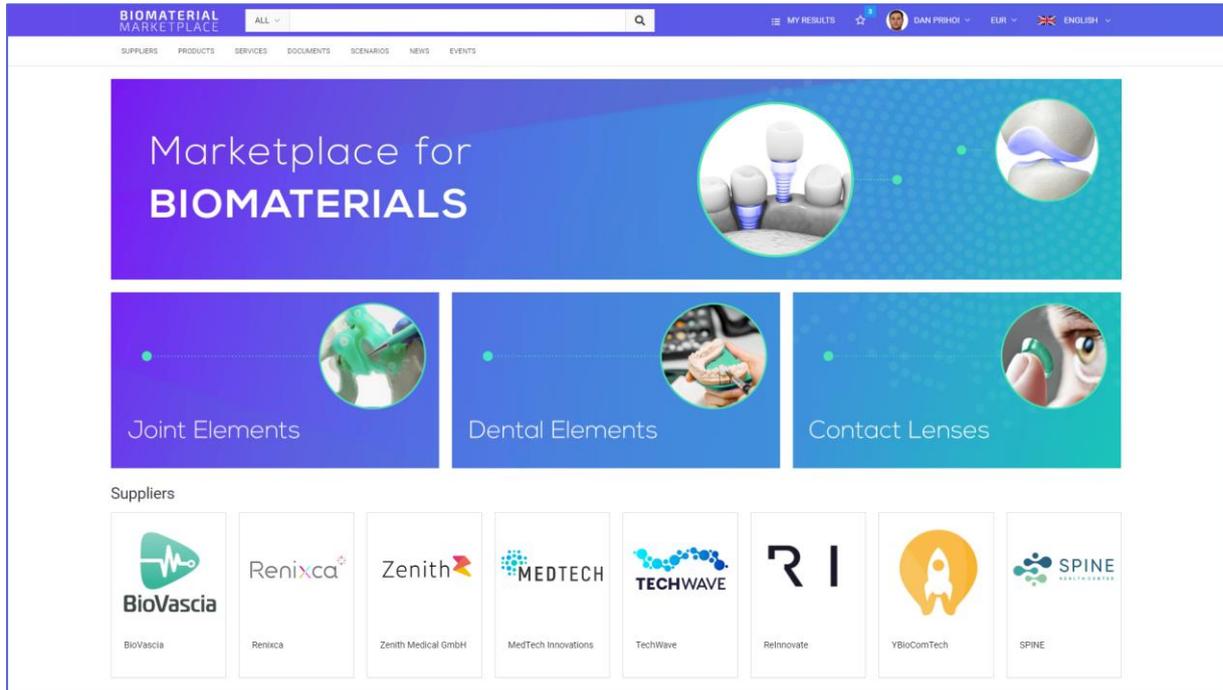


Figure 28. Biomaterial Marketplace start page

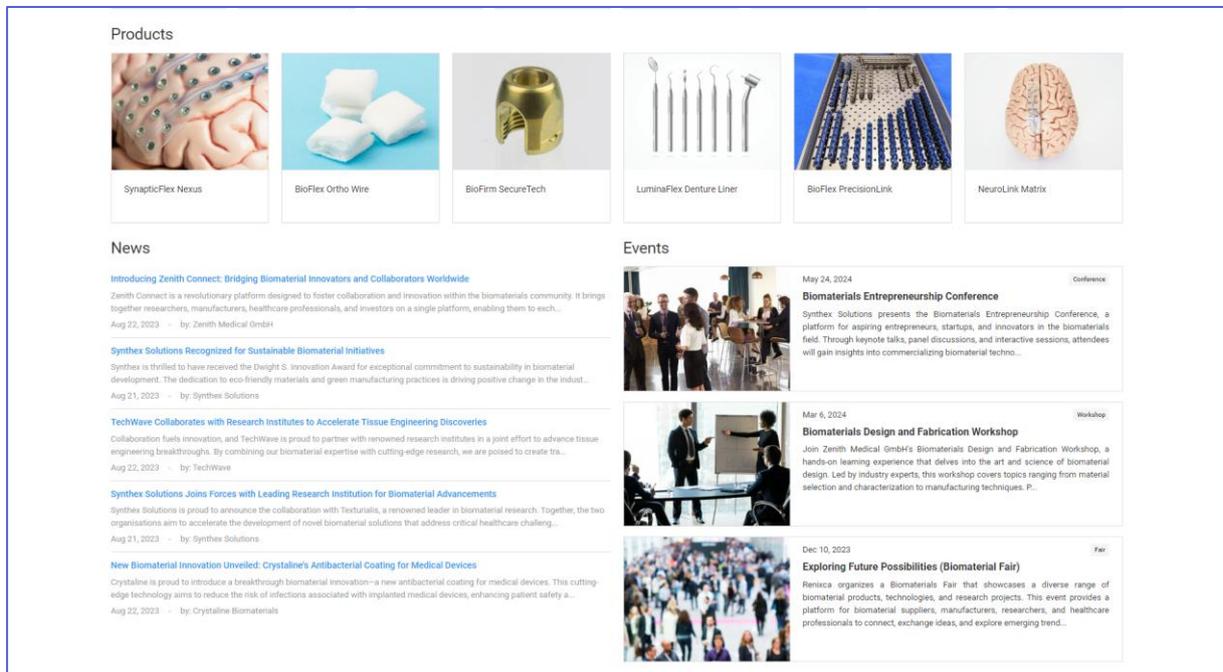


Figure 29. Continued Biomaterial Marketplace start page

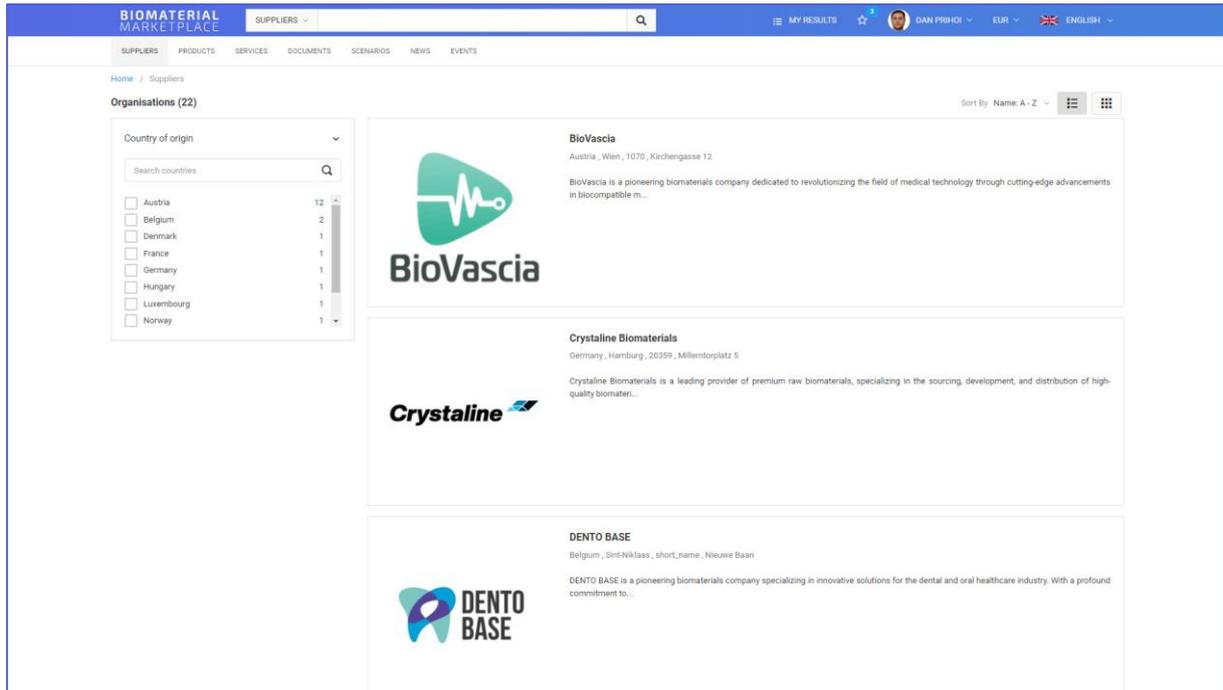


Figure 30. Supplier list view

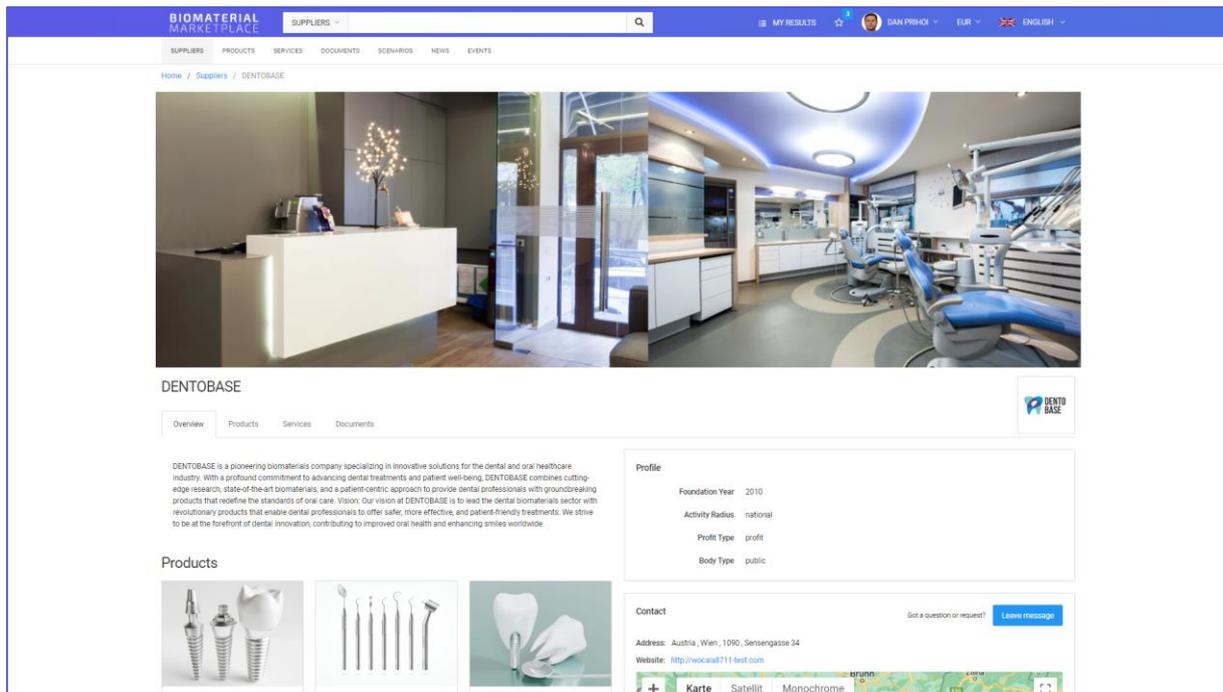


Figure 31. Supplier detail view

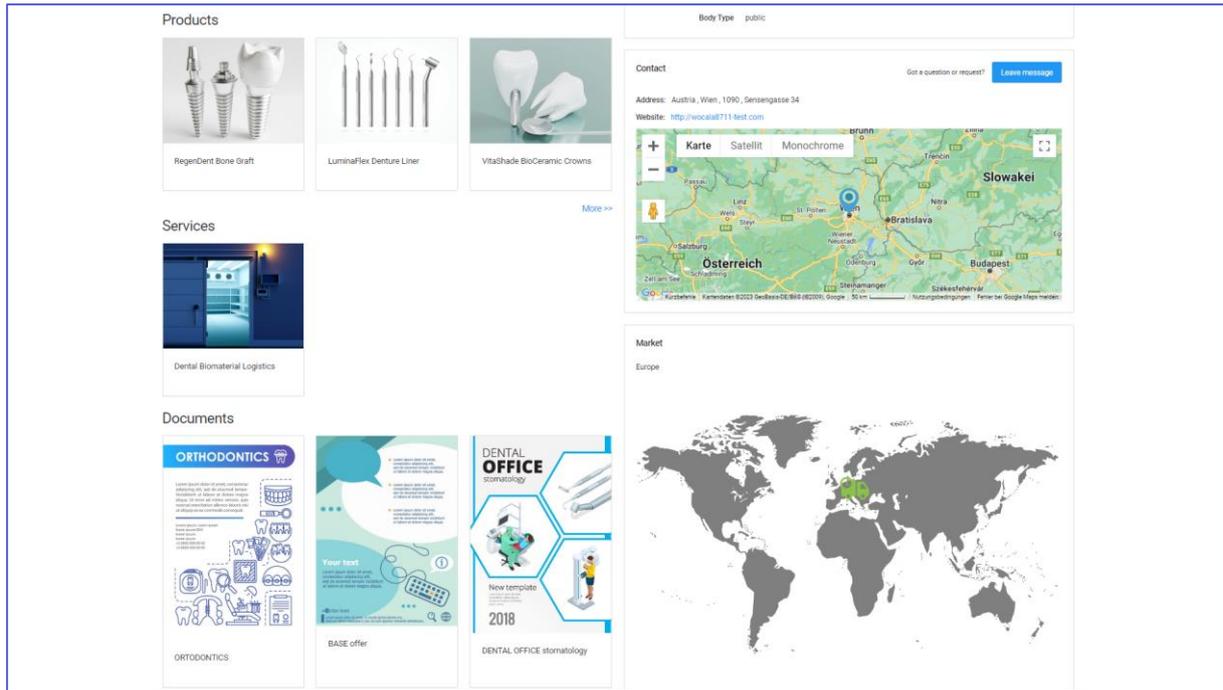


Figure 32. Continued supplier detail view

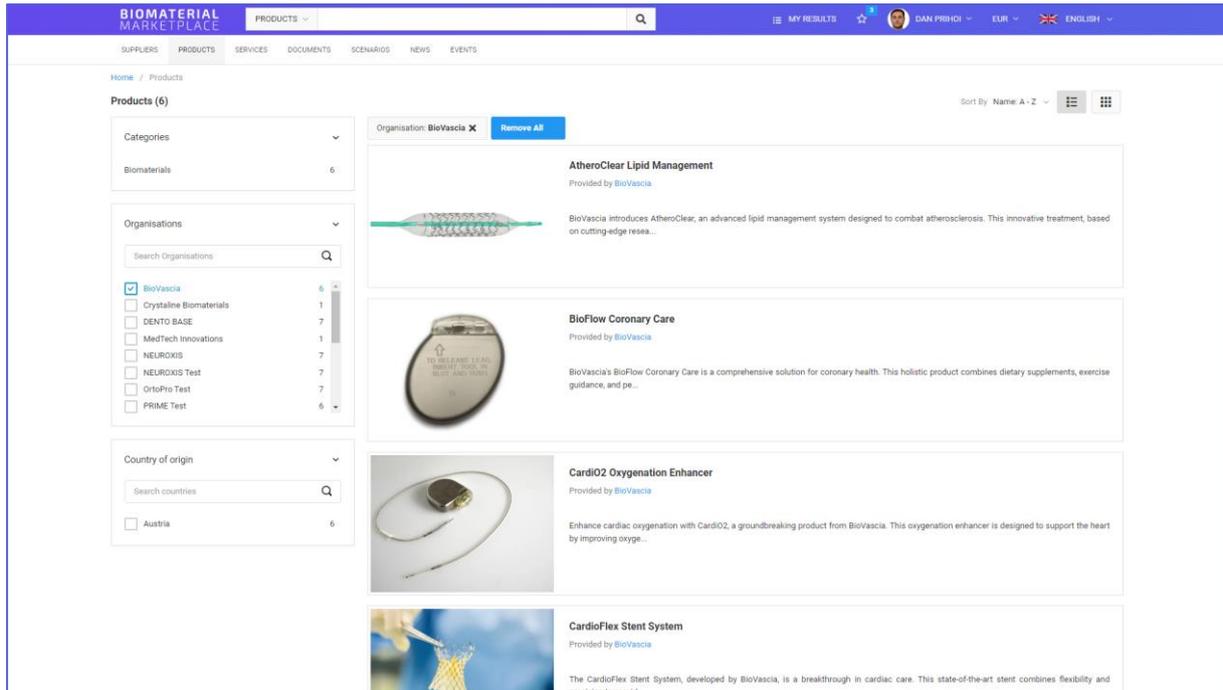


Figure 33. Product list view

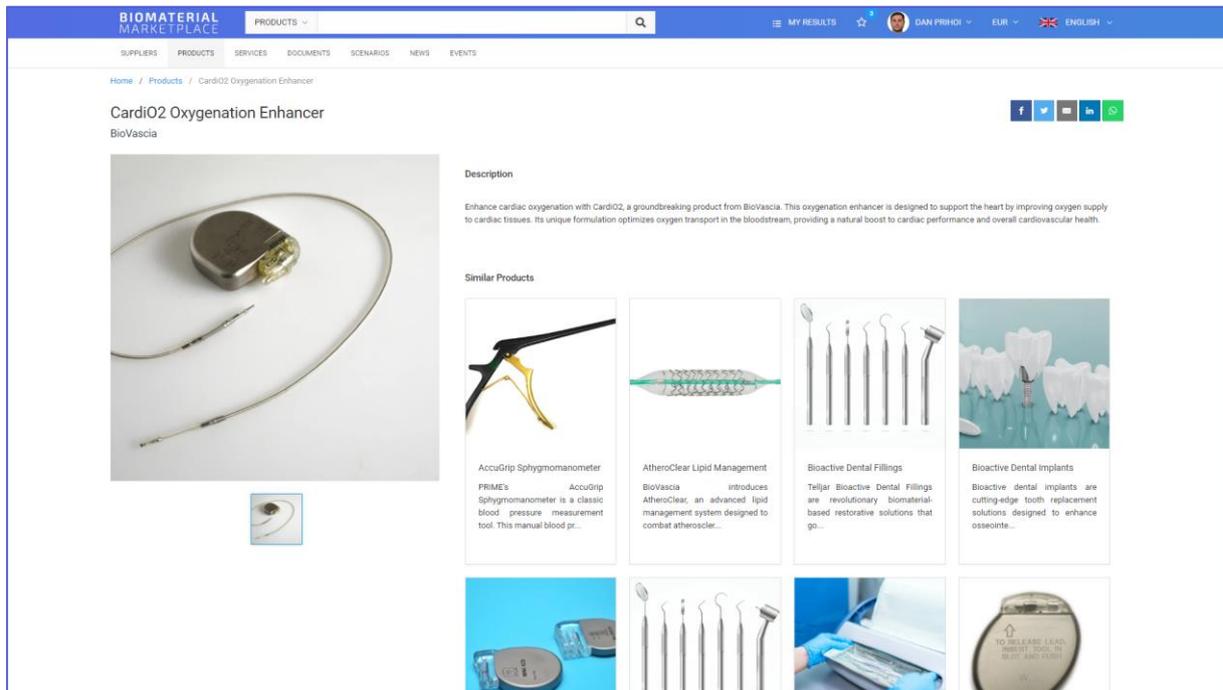


Figure 34. Product detail view

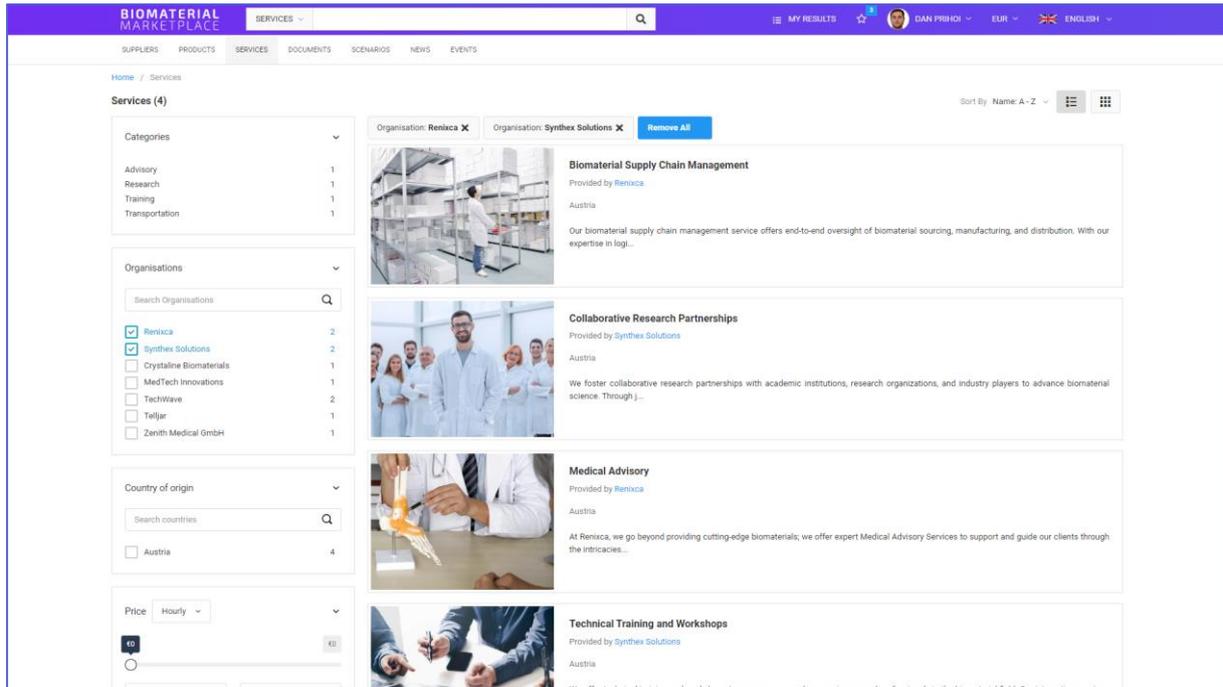


Figure 35. Services list view

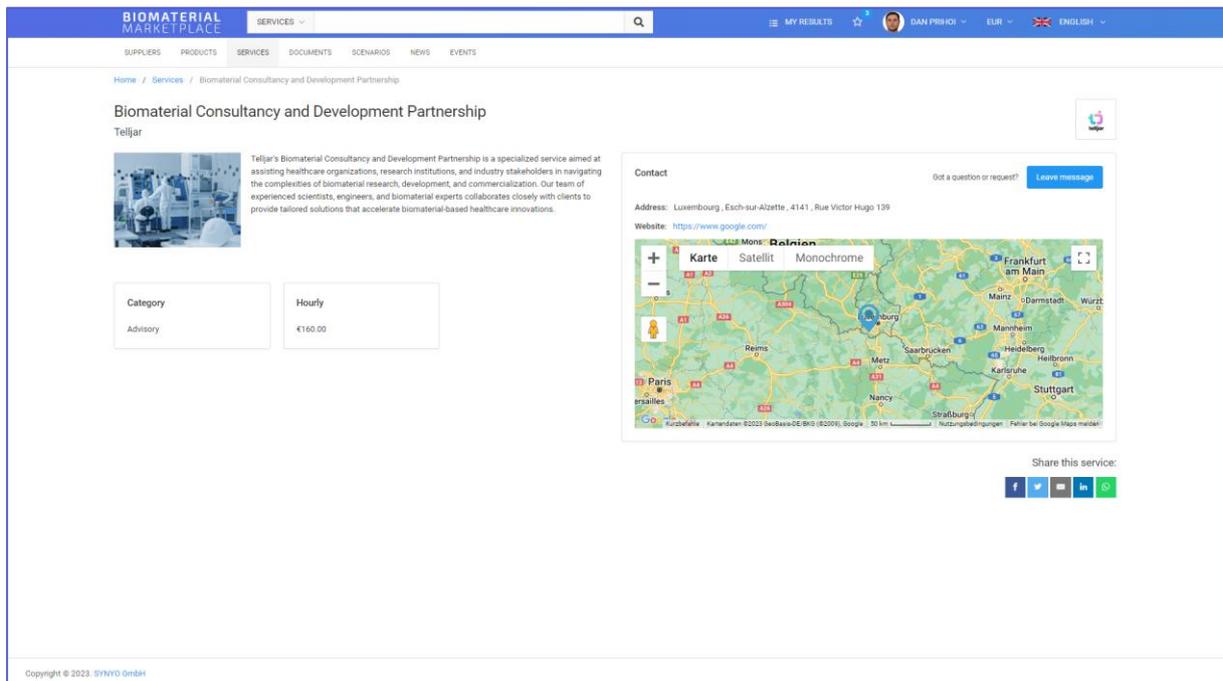


Figure 36. Service detail page

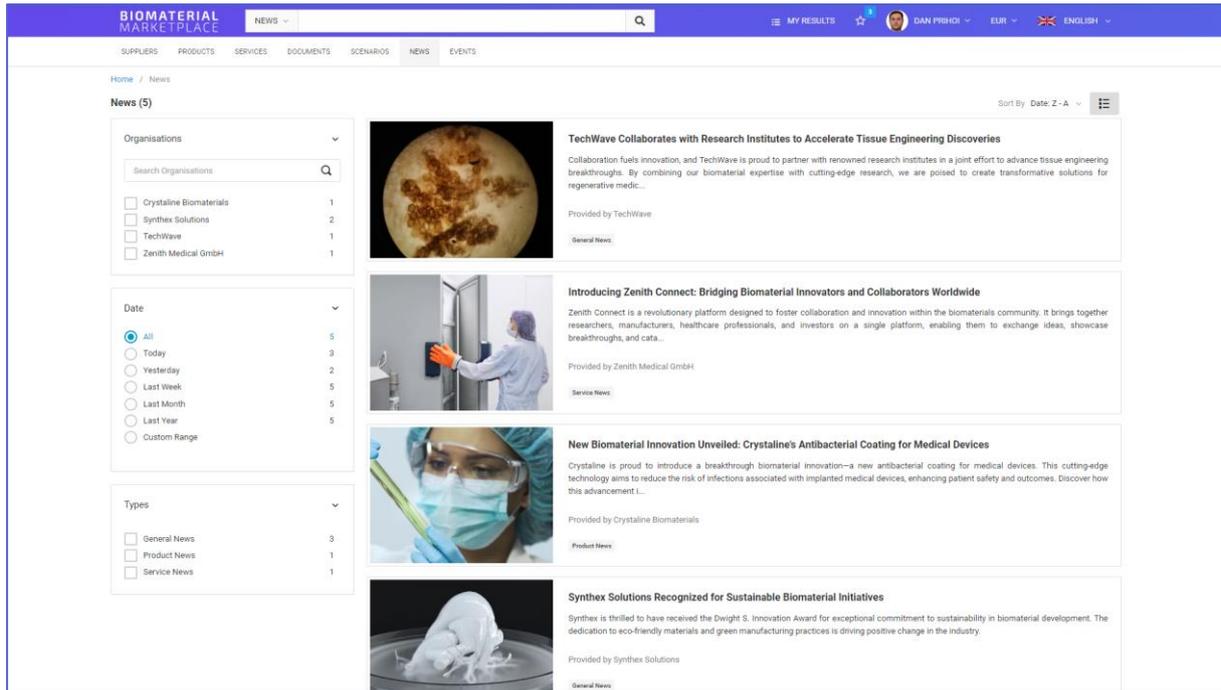


Figure 37. News list view

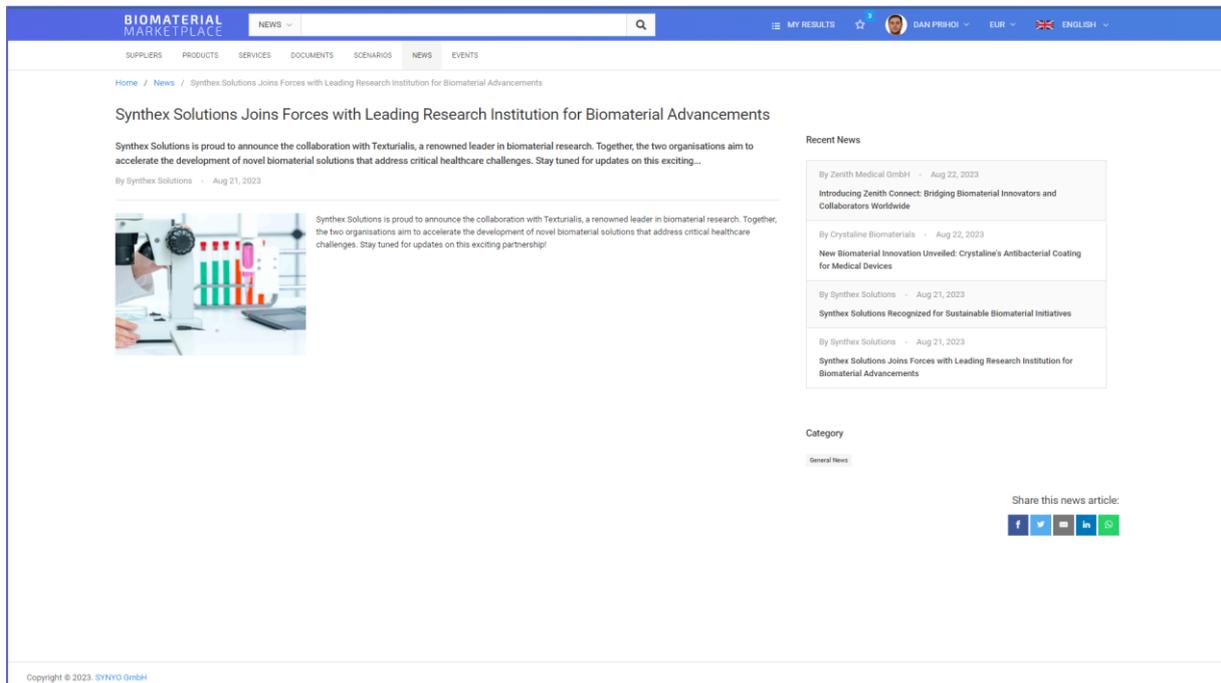


Figure 38. News detail view

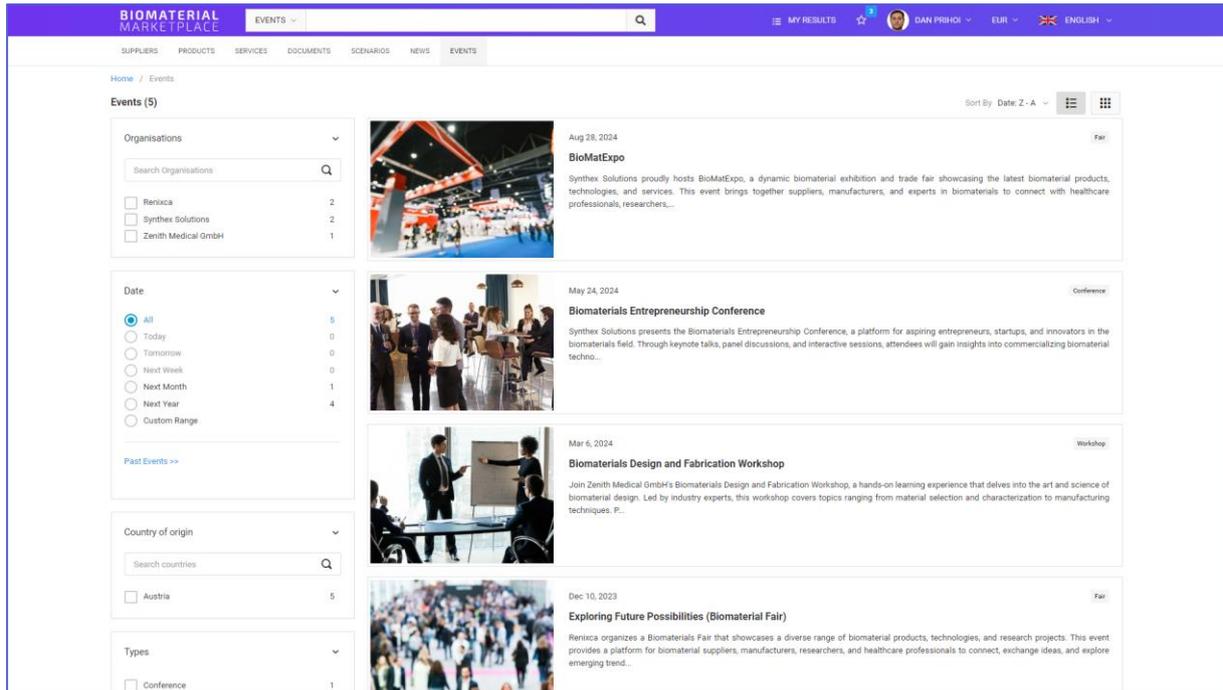


Figure 39. Events list view

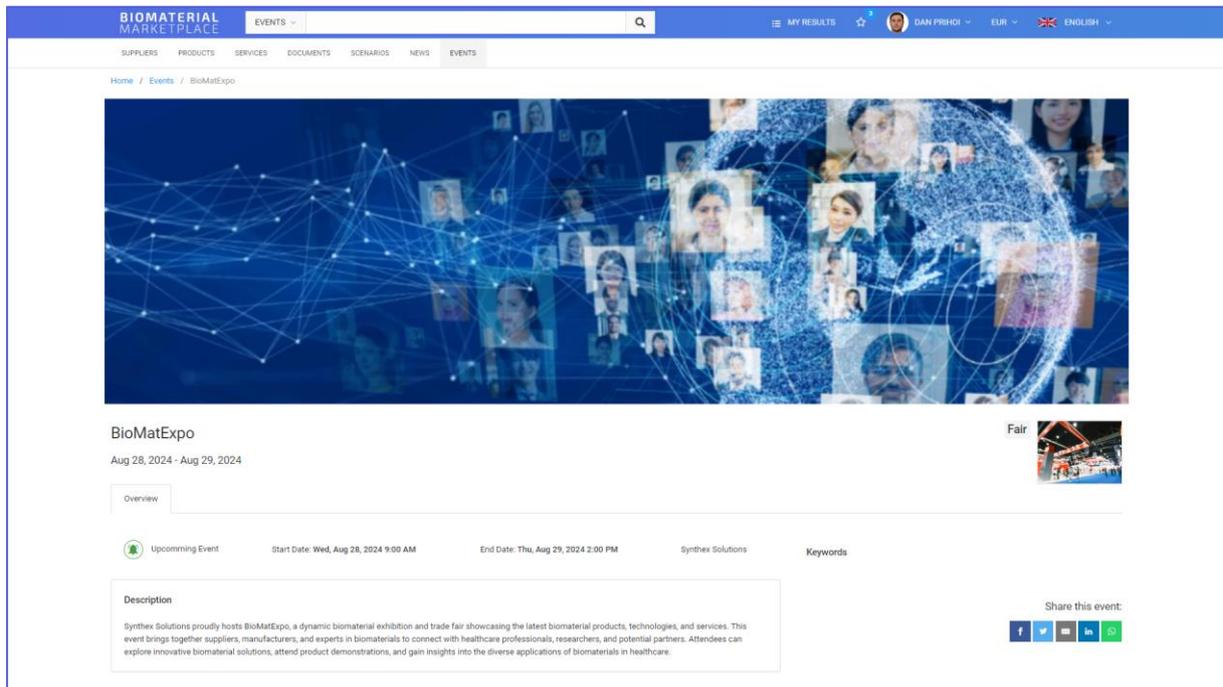


Figure 40. Event detail view

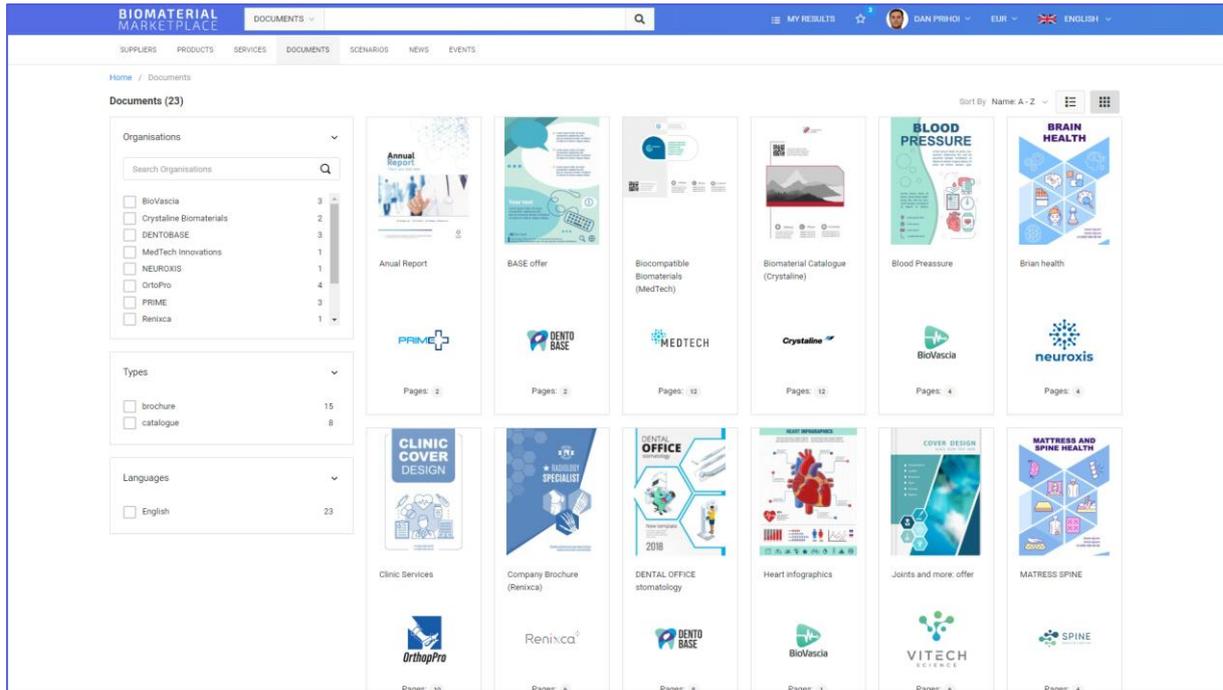


Figure 41. Document view

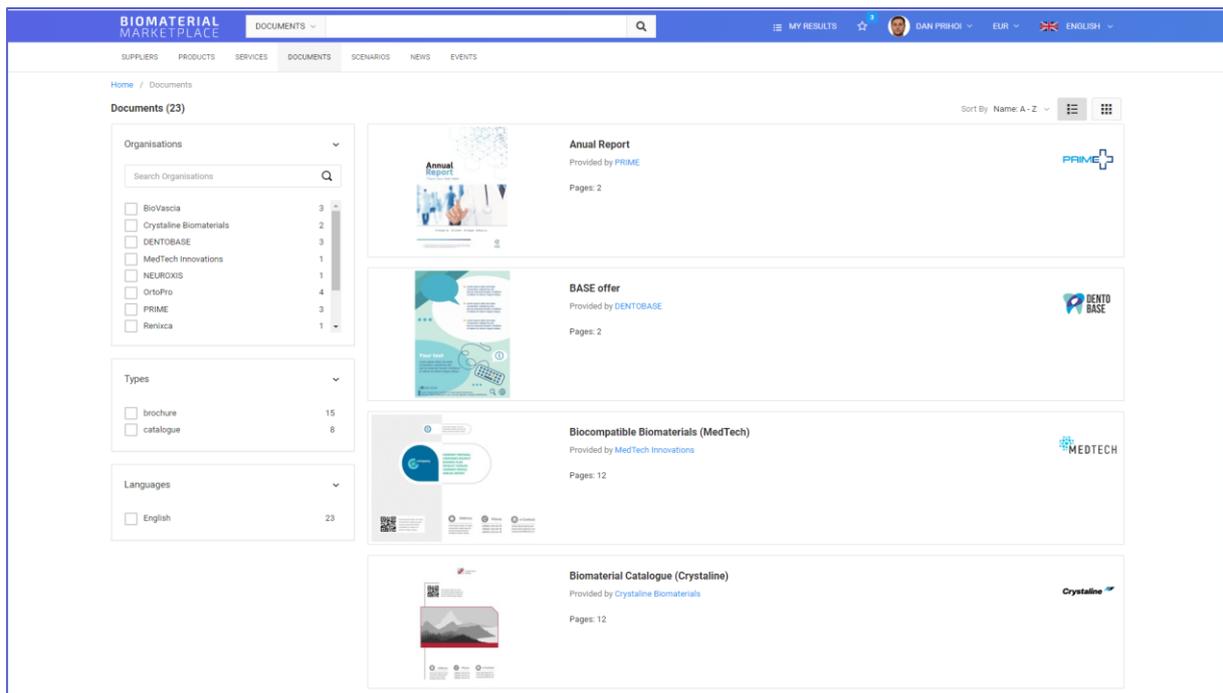


Figure 42. Document list view

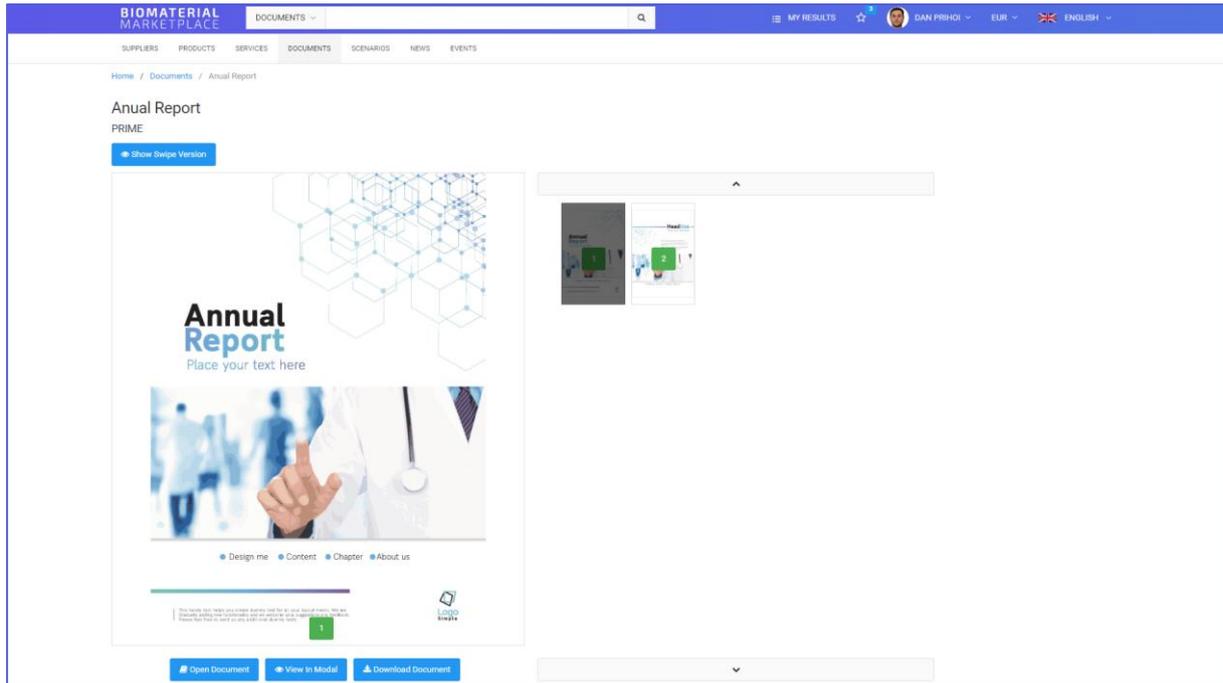


Figure 43. Document detail view

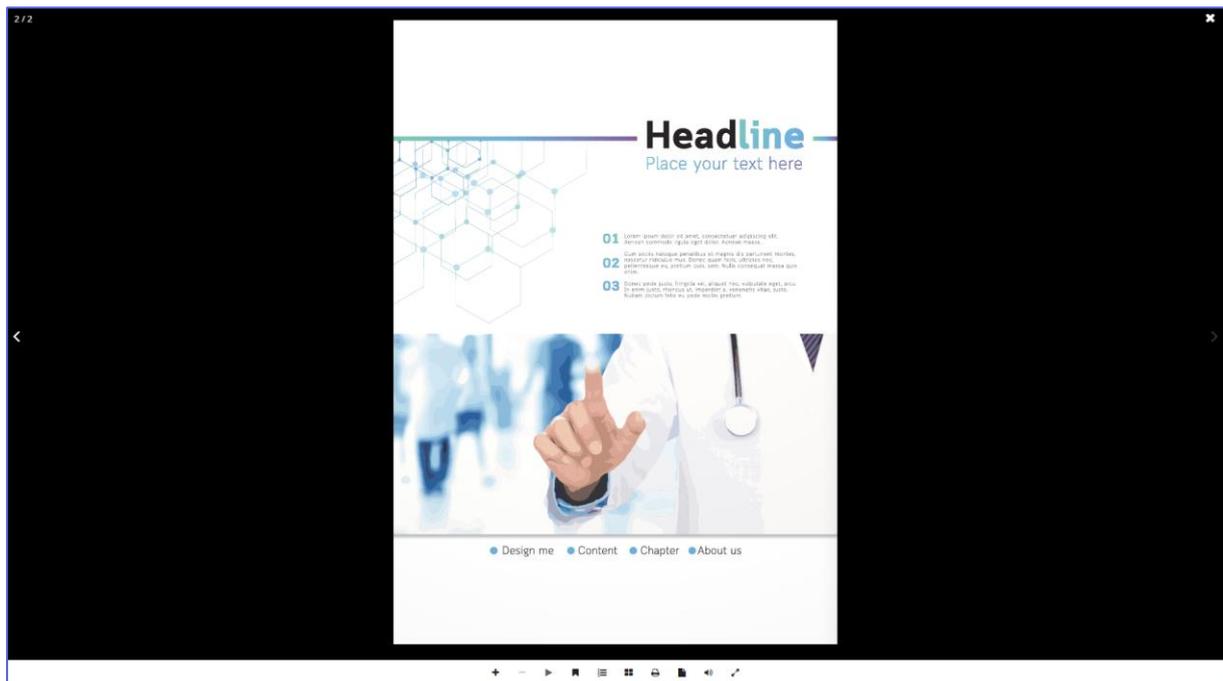


Figure 44. Document detail read view

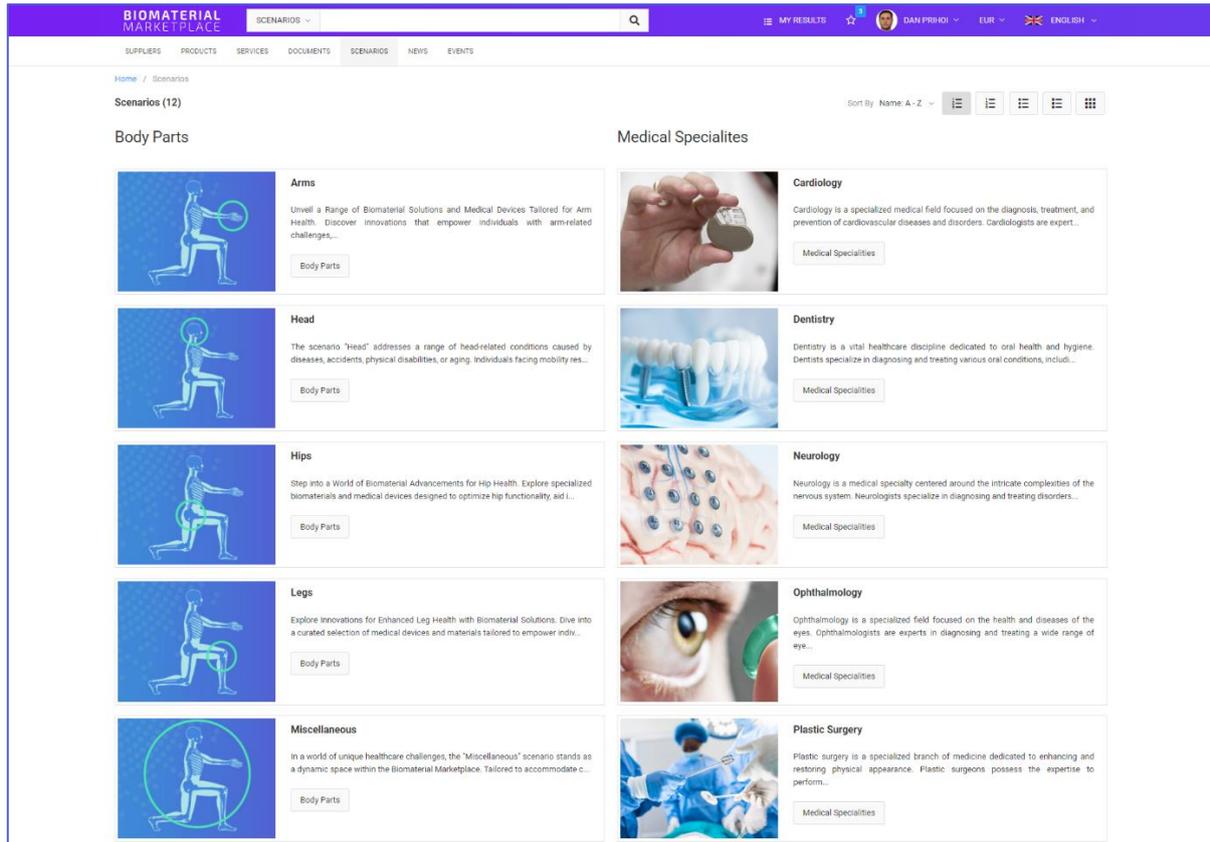


Figure 45. Scenario overview

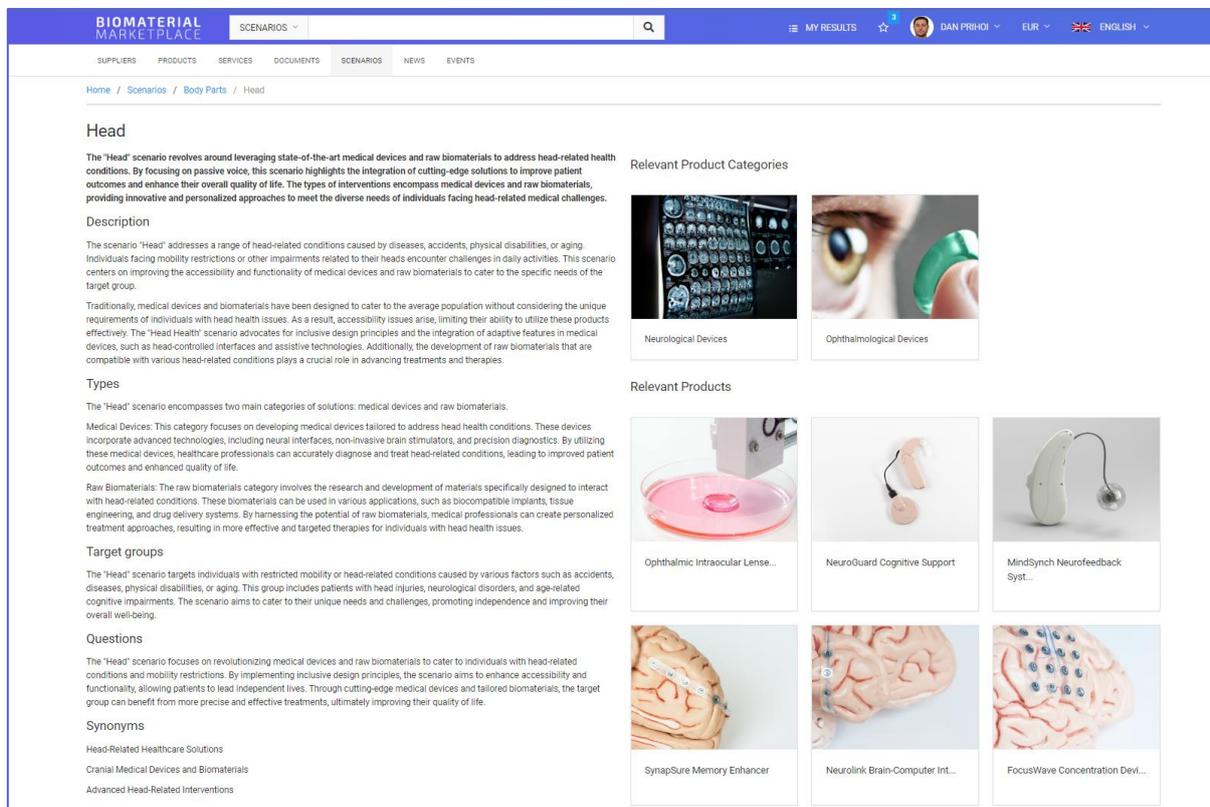


Figure 46. Scenario detail view

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. The top navigation bar includes the user name 'DAN PRIHOI' and the language 'ENGLISH'. The main content area is titled 'PROJECTS' and shows a list of 10,000 projects. The sidebar contains four filter sections:

- Call Types:** H2020-EIC-SMEInet-2018-2020 (2545), H2020-MSCA-IF-2014 (2722), H2020-MSCA-IF-2015 (2418), H2020-MSCA-IF-2016 (2506), H2020-MSCA-IF-2017 (2734), H2020-MSCA-IF-2018 (2750), H2020-MSCA-IF-2019 (2988), H2020-MSCA-IF-2020 (3316).
- Category Types:** business models (2096), climatic changes (1706), ecosystems (2121), history (1265), machine learning (1235), oncology (1414), proteins (1727), renewable energy (1185).
- Organisation Types:** HES (72577), OTH (15423), PRC (72082), PUB (11958), REC (45627).
- Programme Codes:** EIC-SMEInet-2018-2020 (2481), H2020-EU.1.1. (7848), H2020-EU.1.3. (11804), H2020-EU.1.3.2. (9717), H2020-EU.2.1. (2673), H2020-EU.2.1.1. (2514).

The main content area displays a list of projects. The first project is 'Driving simulator for disabled people with scientific assessment of driving skills and indication to of adaptation to be made to the vehicle' (ID: 485105). The second is 'Condition Monitoring of Wind Turbine Drive-Trains via Non-Contact Acoustic Sensors' (ID: 701002). The third is 'Magnetic Diagnostic Assay for neurodegenerative diseases' (ID: 732678). The fourth is 'Online Dialysis Sensor' (ID: 662861). The fifth is 'Breakthrough self-charging remote monitoring device for smart rail freight wagons to enhance sustainability of railway sector' (ID: 868418).

Figure 47. Project overview

DEMO MARKETPLACE
DAN PRIBICI ENGLISH

16 Partners

9 Countries

24 Duration

€2,586,500 Total Budget

€1,810,550 Funded Amount

Progress

General Information

RCN: 242694

Title: An AI-Powered Visual Assistive Design IoT Pathway Platform to implement fast and optimal automated patient pathways and healthcare demand planning projects

Teaser: MYSPHERA has rolled out a game changing IoT location solution to track and manage patient pathways in real time. It automates the surgical process by means of tailored applications that empower staff with live patient flow data and notifications. As a result, the solution has...

Language: EN

Start Date: 2022-05-01

End Date: 2024-04-30

Topic: HORIZON-ERC-2021-ACCELERATORCHALLENGES-01-01

Call: -

Actions: HORIZON Action Grant Budget Based

Funding Distribution

5,018,025

Organisation Types Distribution

16

PATHMAKER Partners

Type to filter... 10

Partner	Role	Organisation Type	EC Contribution	Number of Projects	Country
NVISIO SA	Coordinator	Private for-profit entities (excluding Higher or Secondary Education Establishments)	DE	54	Switzerland
ISTRAZVAČKIHO RAZVOJNI INSTITUT RETIK DOO ZA SISTEME ZAŠTOVANE NA RAČUNARIMA NOVI SAD	Participant	Private for-profit entities (excluding Higher or Secondary Education Establishments)	802,500€	272	Serbia
ARM LIMITED	Participant	Private for-profit entities (excluding Higher or Secondary Education Establishments)	717,418€	11	United Kingdom
THE UNIVERSITY OF EDINBURGH	Participant	Higher or Secondary Education Establishments	630,924€	304	United Kingdom
THE PROVOST FELLOWS FOUNDATION SCHOLARS & THE OTHER MEMBERS OF BOARD OF THE COLLEGE OF THE HOLY & UNDIVIDED TRINITY OF QUEEN ELIZABETH NEAR DUBLIN	Participant	Higher or Secondary Education Establishments	582,628€	15	Ireland
INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS	Participant	Research Organisations	375,977€	45	Greece
BLEKINGE TEKNISKA HOGSKOLEN	Participant	Higher or Secondary Education Establishments	344,127€	2	Sweden
ZF FRIEDRICHSHAFEN AG	Participant	Private for-profit entities (excluding Higher or Secondary Education Establishments)	304,725€	52	Germany
DARWIN DIGITAL DOO BEOGRAD-STARI GRAD	Participant	Private for-profit entities (excluding Higher or Secondary Education Establishments)	298,045€	8	Serbia
UNIVERSIDAD DE CASTILLA - LA MANCHA	Participant	Higher or secondary education establishment	271,389€	1	Spain

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Similar Projects

Type to filter... 25

Project	Topic	Status
ACROSS	EuroHPC-02-2019	OPENED
AI4EBC	HORIZON-INFRA-2021-4-000-01-04	OPENED
AI4	MSCA-RISE-2019	OPENED
ALOHA	ICT-05-2017	OPENED
ANDANTE	ECSEL-2019-2-RIA	OPENED
ASGARD	SMEInst-01-2016-2017	CLOSED
ASSISTANT	ICT-38-2020	OPENED
AVATAR	HORIZON-CLS-2022-05-01-13	OPENED
Beforehand	ICT-07-2018	OPENED
Bonseyes	ICT-01-2016	CLOSED
CLIM	ERC-ADG-2015	OPENED
CONTACT	ERC-SIS-2014	CLOSED
DATASET	ERC-SMEInst-2018-2020	CLOSED
DEMABIS	ERC-SMEInst-2018-2020	CLOSED
EVELang	ERC-2020-COG	OPENED
ExtremeEarth	ICT-12-2016-2020	OPENED
FACTORY	ERC-Cog-2015	OPENED
Green Dat.AI	HORIZON-CL-4-2021-DATA-01-03	OPENED
HBCO	ERC-SMEInst-2018-2020	CLOSED
IBIDaaS	ICT-16-2017	CLOSED
IDU	ERC-969-2014	CLOSED
IoTwins	ICT-11-2018-2019	OPENED
JUSTINMIND-XR	ERC-SMEInst-2018-2020	CLOSED
KICloud	ERC-SMEInst-2018-2020	CLOSED
M2DC	ICT-04-2015	CLOSED

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Figure 48. Project detail view

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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

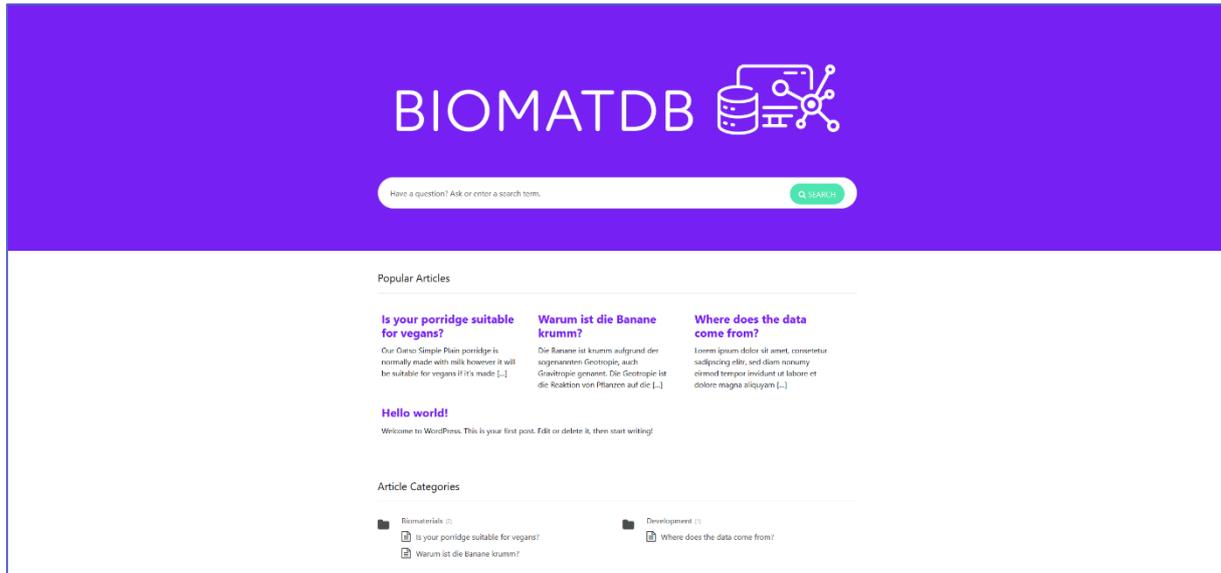


Figure 49. Knowledge Base start page layout option

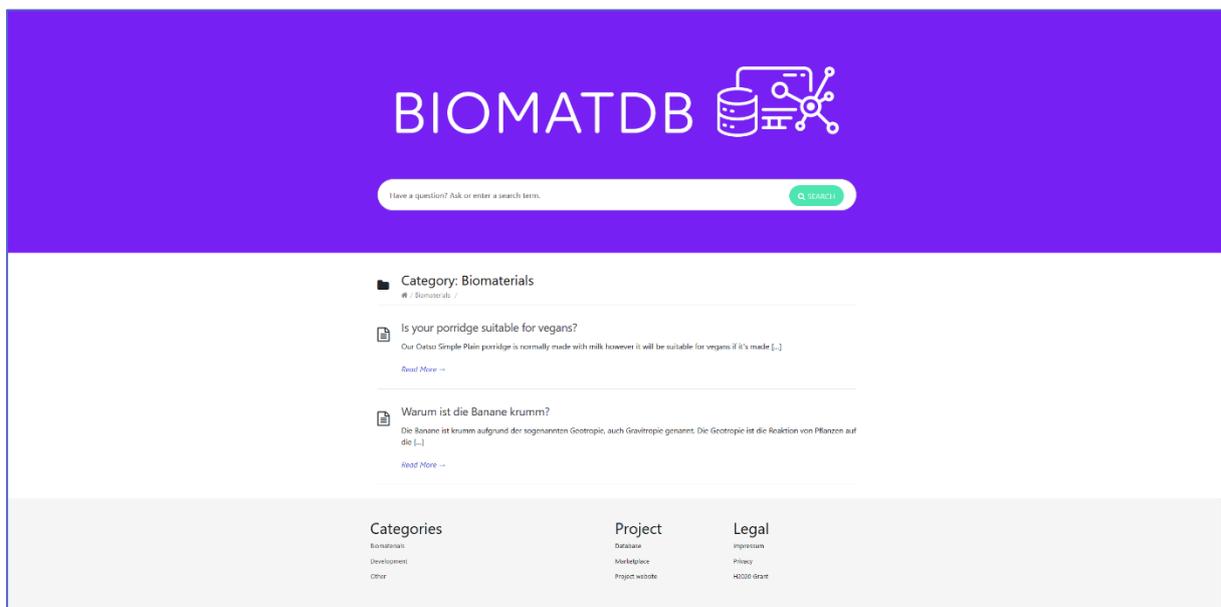


Figure 50. One category page layout options

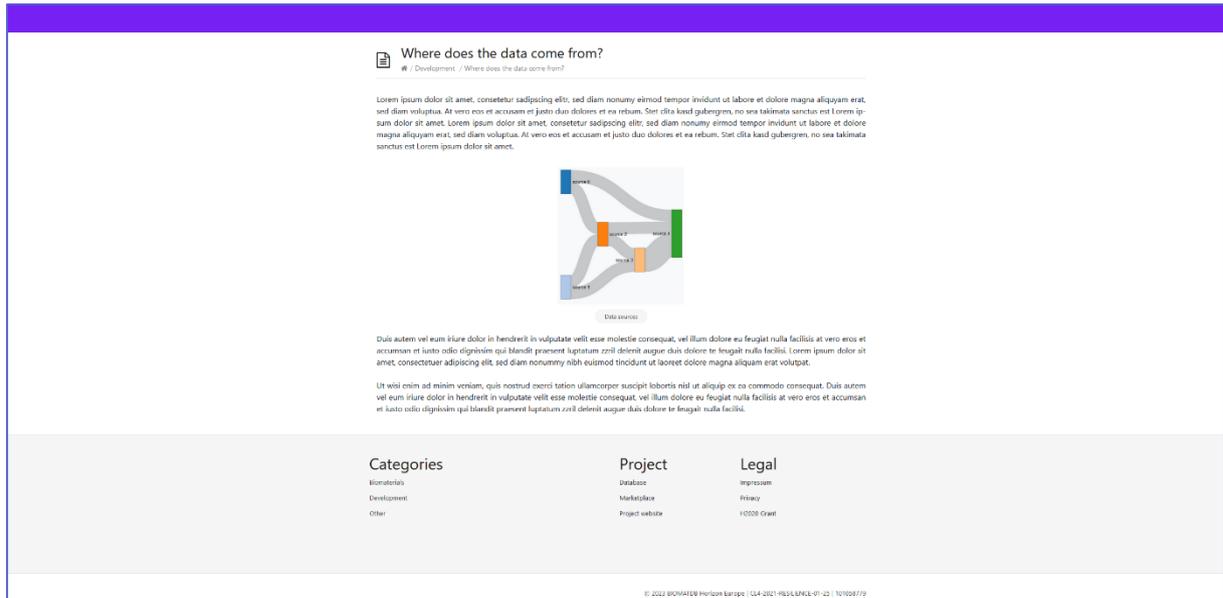


Figure 51. Article view with image option

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

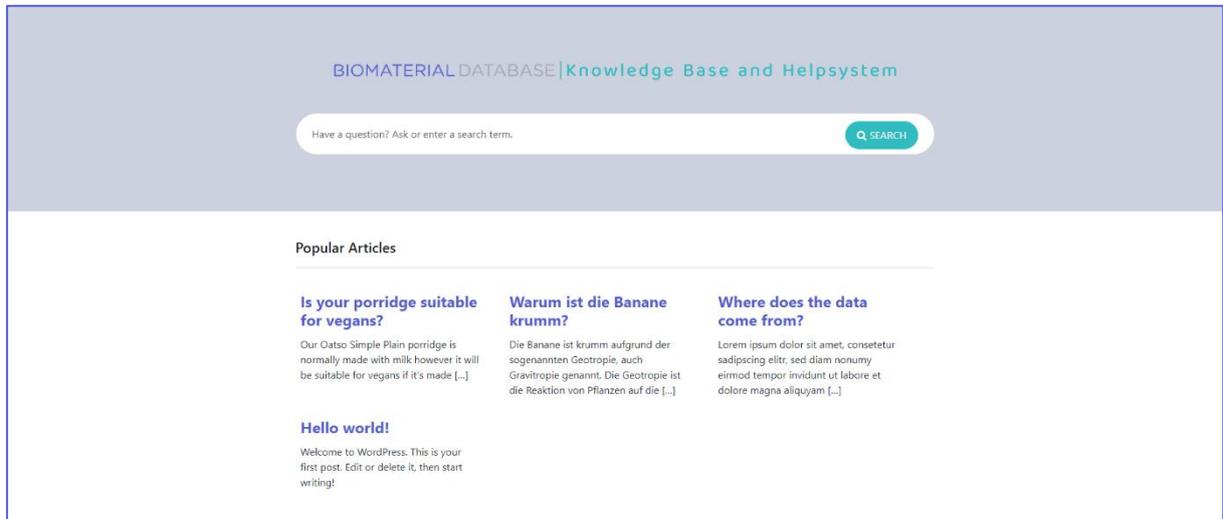


Figure 52. Start page layout and logo option

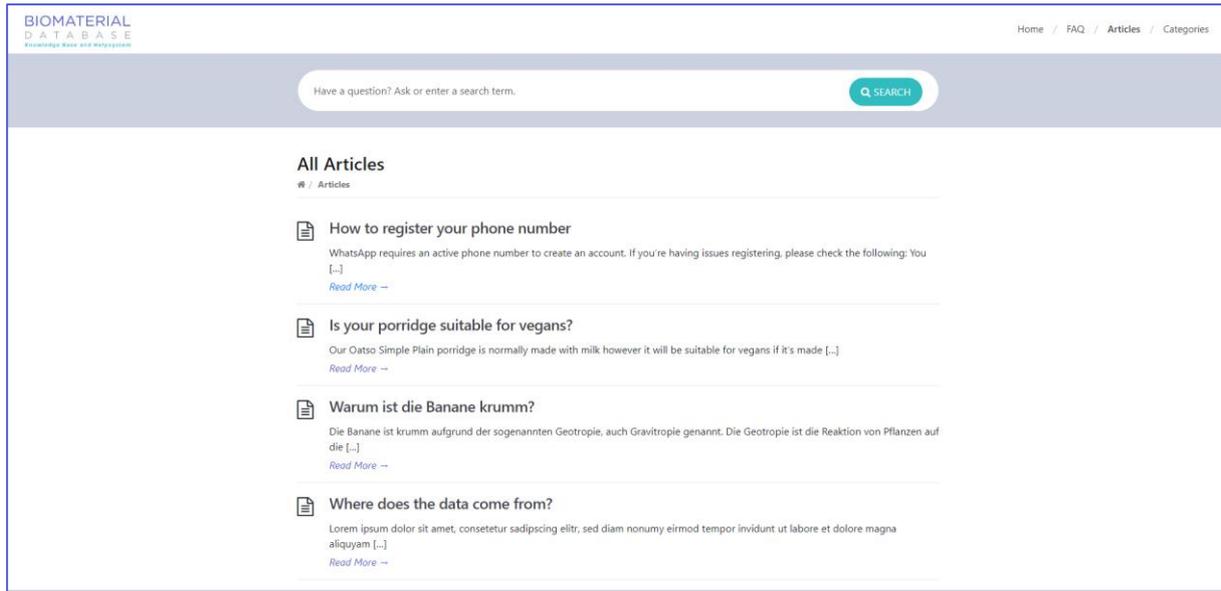


Figure 53. All articles view option

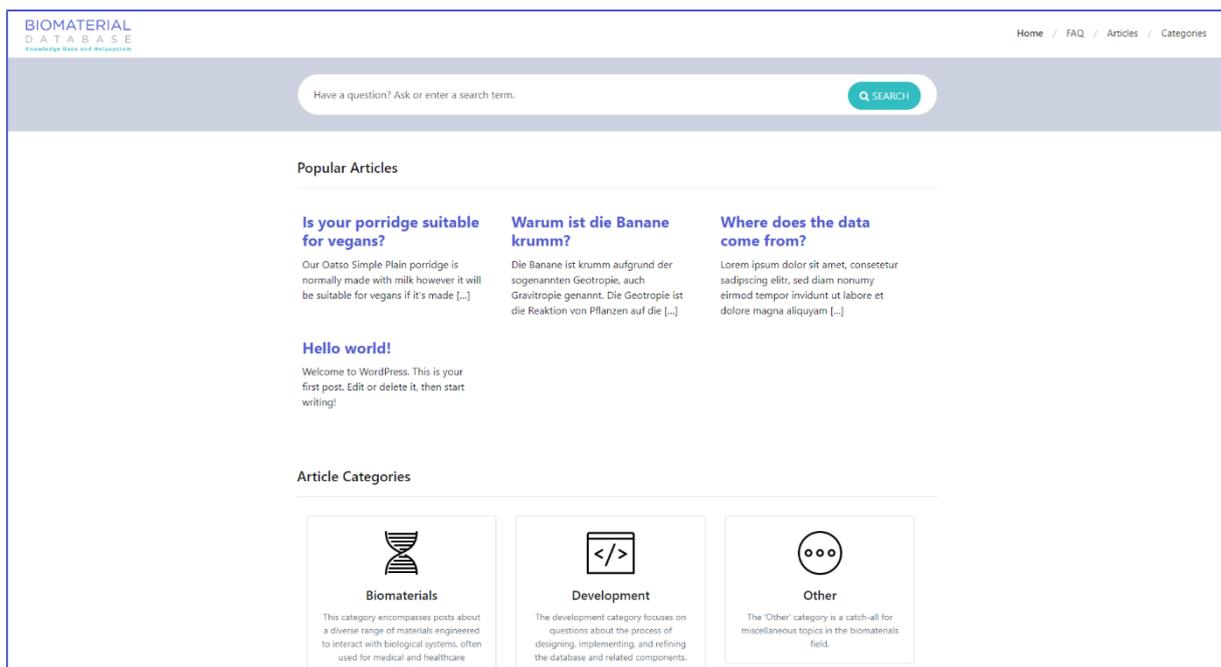


Figure 54. Alternative front-page layout

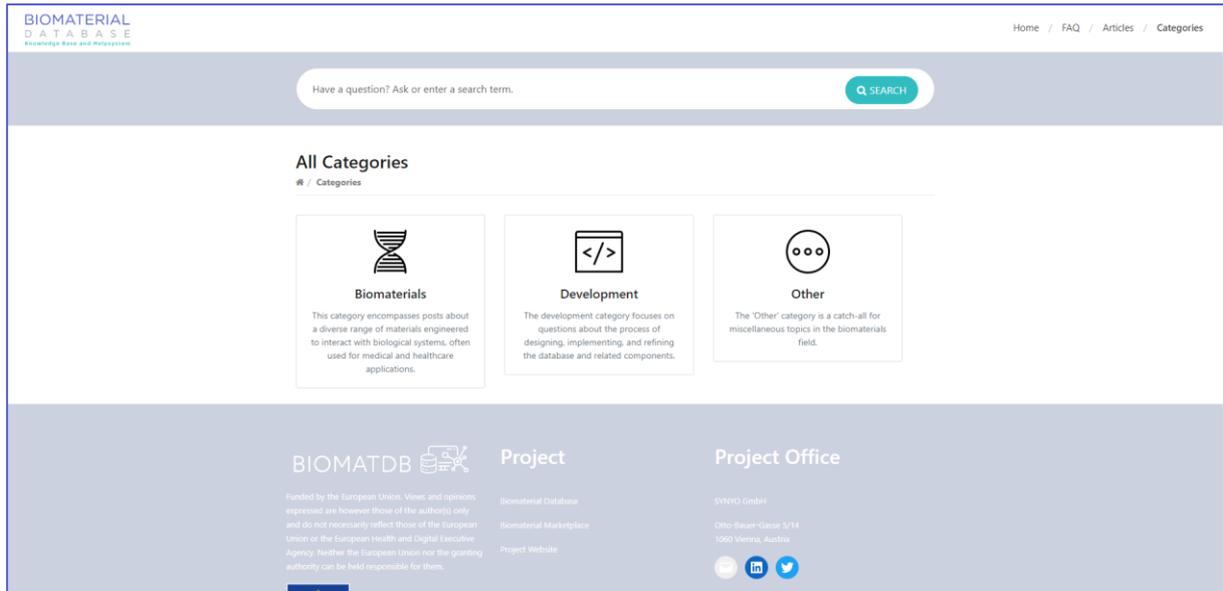


Figure 55. All categories

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/>