



D6.2

MIRRI-CWE Platform – Preliminary version



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Abstract:	<p>This document briefly presents and describes the work and results obtained in the project IS_MIRRI21 as the preliminary version of the MIRRI Collaborative Working Environment platform.</p> <p>This description is synthetic as the deliverable was proposed and approved as of OTHER type. It means that the deliverable is constituted by a set of software modules, installed and fully functional in servers owned or made available to MIRRI, which jointly form the preliminary version of the MIRRI collaborative working environment.</p> <p>Furthermore, in this document the consortium reports decisions taken in consortia for the platform development technologies, architecture, among other relevant aspects that led to the achieved results.</p>
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	Confidential (for the Consortium and EU Commission Services only)	

Abstract

This document presents the modules and functionalities implemented for the Collaborative Working Environment (CWE) of the Microbial Resource Research Infrastructure (MIRRI) in its preliminary version. The process of architecture definition and functionalities implementation was performed on the sequence of the work previously developed for requirements elicitation, which was reported in the ***Deliverable 6.1 - Report on the design and technical requirements of MIRRI-CWE.***

It includes a general description of the CWE and of its features (gates) and modules along with a more detailed and illustrated presentation of the functionalities made available in each module.

This effort was carried out starting from the definition of the CWE as described by the documents delivered by the MIRRI project in its preparatory phase, by the proposal for the [IS_MIRRI21](#), by the Deliverable 6.1, for which many researchers, both computer scientists and biologists from the partner institutions, have contributed bringing their expertise and point of views. All these sources served as a basis for the regular and constant discussion among the [IS_MIRRI21](#) partners, particularly those involved in WP6, resulting on technical decisions about, among many other aspects: the most suitable, sustainable and scalable technologies for software implementation; the CWE architecture; the use and integration of existing open (source) solutions; the re-utilization of existing software modules/platforms, particularly those developed in previous EU projects; the easiness of maintenance and information management in the CWE; the CWE platform security; the openness and open access of MIRRI data provided via the CWE.

The team responsible for the implementation also considered with highest priority the aspects relative to the user interaction, user interface and user experience, considering the wide universe of MIRRI users and stakeholders. The experts on user studies and user experience brought their contribution for the development team, by orienting and technically supporting and validating the implementation, despite more exhaustive and complete user studies are foreseen to be performed with the final version of CWE.

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List of Acronyms

AAI - Authentication and Authorization Infrastructure

CC - Culture Collection

CCU - Central Coordination Unit

CWE - Collaborative Working Environment

GDPR - General Data Protection Regulation

HTML - Hypertext Markup Language

mBRCs - microbial Biological Resource Centres

MIRRI - Microbial Resource Research Infrastructure

MoU - Memorandum of Understanding

PDF - Portable Document Format

QMS - Quality Management System

RI - Research Infrastructure

TNA - Transnational Access

UI – User Interface



1. Introduction

1 Introduction

This is a companion document for **Deliverable 6.2 - MIRRI-CWE Platform - Preliminary version** and briefly reports on the design and technical implementation of the first version of the common virtual interface for Microbial Resource Research Infrastructure (MIRRI) and the provision of its services in the form of a Collaborative Working Environment (CWE) platform (www.mirri.org). It is the single-entry point for the related pan-European infrastructure, with dedicated customer service facilities and defined rules to guarantee responsiveness (automatic responses formulated when services are requested or inquiries sent, rules for follow-up with users on the ordered service, etc.).

The CWE platform was officially launched in March 2021, before the expected deadline, in order to promote, as early as possible, MIRRI's visibility but also to start supporting some of its activities. Even though, in its preliminary version, the CWE constitutes the achievement of a fundamental platform for the MIRRI as a research infrastructure, as it supports the operation of remote services, taking advantage of the new technologies for communication, particularly internet-based technologies. Also, new technologies for communication and for information storage, access and processing, ranging from cloud computing to the advanced databases, data analytics or data interoperability and security, among many others, were used and adopted. Indeed, the platform launched in March 2021, has been updated with new information and functionalities, as it is considered evolutive until its final version to be achieved by the end of **IS_MIRRI21** project. This evolution consists in the addition of new modules and functionalities, further to the update of existing ones, bug correction, etc. Furthermore, the dynamic information included in the CWE is being constantly updated, via the backend applications provided as tools for the MIRRI IT officer and other content curators and CWE administration team.

In terms of strategy for implementation, the partners involved in the technical tasks have followed, as much as possible, the list of requirements but also the **IS_MIRRI21** consortium partners' decisions, in particular those coming from the work packages directly linked with the WP6, as they are the feeders and the drivers for CWE modules implementation and validation. Not less important, are the guidelines and recommendations of the **IS_MIRRI21** Management Backoffice (future, MIRRI Central Coordinating Unit – CCU).

The prioritization of implementation for the Gates and corresponding modules (see [Section 3](#)) was established by analysing multiple aspects: the urgency for MIRRI to have a valuable presence on the web; the most relevant information about MIRRI to promote its activities; the need of some more immediate tools to support both for **IS_MIRRI21** and MIRRI activities; etc.

Considering the above points, the development of the preliminary version of CWE had to address functionalities and modules in all the CWE gates.

For the remainder of this document, Chapter 2 presents an overview on the initial structure proposed for the CWE, structured in four major pillars (henceforth called Gates), which reflect the thematic arrangement for the information, functionalities and features to be made available for the MIRRI stakeholders: (1) Gate to Research Infrastructure Information; (2) Gate to Resources, Data & Services; (3) Gate to Collaboration & Experts; (4) Gate to Training & Education and one 5th Gate (the Transversal Gate) containing features and functionalities more transversal to the entire CWE platform, like for example the modules for user registration and authentication.

Chapter 3 briefly presents the gates, the respective modules that were addressed, and their implementation.

Chapter 4 closes this report with the conclusions and future work for the implementation of the CWE final platform.



2. The MIRRI CWE Platform

2 The MIRRI CWE Platform

The MIRRI CWE is a platform for MIRRI members and other stakeholders, during and beyond IS_MIRRI21 project, by which all can communicate and access information in a time-efficient way. Furthermore, it delivers to the users a set of functionalities and tools to support their activities in the context of MIRRI. It is the main interface of MIRRI for the users and stakeholders, currently accessible on MIRRI's website (www.mirri.org). The CWE also serves as valuable support for MIRRI in its mission of microorganisms' worldwide research and contribution for future generations of researchers.

As introduced in the previous chapter and in other IS_MIRRI21 deliverables, the project consortium members have agreed on implementing a modular platform, constituted by four main gates with all the respective modules integrated and accessible as a single and unique virtual work environment, namely:

- Gate to Research Infrastructure Information,
- Gate to Resources, Data & Services
- Gate to Collaboration & Experts,
- Gate to Training & Education



Figure 2-1 - MIRRI Collaborative Working Environment. Schematic representation of the virtual platform to give centralized access to the MIRRI data, expertise, and services.

One fifth gate was considered transversal to the entire CWE, as it contains modules and functionalities to be inherited by the other gates, like for example for user registration, user information management or user authentication and authorization. The following sections will further detail each Gate.

2.1 Gate to Research Infrastructure Information

This gate holds two main modules. The first one implements the exposure of information for users about MIRRI and its activities, including access to the MIRRI Newsletter, calls for transnational access (TNA) and additional features, such as the provision of links to other research infrastructures. The second one is a restricted Area, where registered MIRRI Members and Partners will have access to internal documents and reports, further to some additional functionalities like for example an agenda and calendar system, for events scheduling management, or a multichannel configurable chat system for the registered users to interact directly and in real-time.

2.2 Gate to Microbial Resources, Data and Services

This gate is the central access point for the MIRRI users to access:

- (1) information on the available microbial genetic resources,
- (2) their integrated, curated, and metadata (following FAIR criteria) and
- (3) highly specialized scientific services.

One of the main modules included in the MIRRI CWE, under this Gate, is the MIRRI Information System (MIRRI-IS) deploying an integrated, high-quality, automatically validated, manually annotated, semantic-rich, non-redundant microbiological resource database, providing all relevant information and associated contextual data (metadata) about any particular microbial resource.

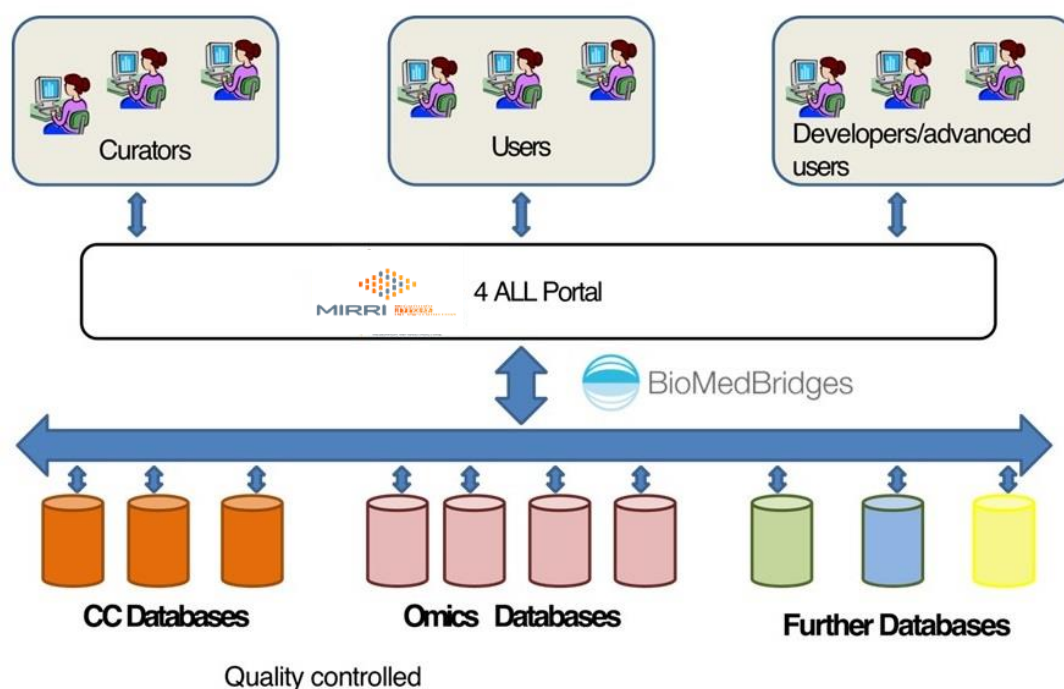


Figure 2-2 -The MIRRI Information System (MIRRI-IS) will provide access to quality-controlled information from CC databases and integrate these data with “-omics” databases, as well as databases of other related domains.

Users will also have access to state-of-the-art technological services, using a platform that operates according to the requirements of bioindustry (i.e., confidentiality, legal guarantees, appropriate charges, data right issues, and courses on quality management).

2.3 Gate to Collaboration

The main module included in the Gate to Collaboration is the MIRRI Expert Cluster platform that will provide a unique environment for researchers in life sciences to exchange knowledge. The “MIRRI Expert Clusters” will be organised around the typical key-activities of microbial Biological Resource Centres (mBRCs) to support research, development and innovation processes, driven by the needs and requests of the users. For this, the platform will provide:

- Cluster sections aligned with the stakeholder demands (e.g., Applications & Technologies, Legal issues, Taxonomy, IT & Data management, etc.);
- Pool of experts selected to provide an extensive range of responses and knowledge;
- Cluster tools selected for optimal and efficient intercommunication and exchange of knowledge and experience;
- Highly automated request matching, enabling a multilayer reply to incoming requests.

Nevertheless, this gate is also aimed at promoting and nurturing the collaboration and more intense (and centralised) knowledge sharing among the mBRCs. On a third point of view, this gate may constitute a reference entry point for collaboration between the mBRCs and companies owning their own R&D centres on microbiology.

The second main module manages and exposes the MIRRI's related events and respective information, including the links for access. In this module, the information published and disseminated concerns the events organized by or attended by MIRRI members and those promoted by external institutions under the scope of MIRRI.

2.4 Gate to Training and Education (T&E)

This Gate provides extensive access and information to the MIRRI's training and education (T&E) offer, supporting mBRCs to improve their strategic training offer (Figure 2-3), whilst acting as effective models of open innovation.

The exposure of each MIRRI T&E offer is performed according to an established form template, including, among other things, the direct connection to the respective dedicated platform/site.

The functionalities and respective requirements elicited for this gate took into consideration the following:

- Profit from the vast expertise of Partner mBRCs in various services, research areas and types of holdings to design and run high-quality T&E courses;
- Bridge the current gap between the T&E offer and industry demands by implementing new advanced and tailored courses, and making them available at one single place, for easier access and selection;
- Increase awareness of the T&E offer by advertising courses online, both through the CWE and on course lists;
- Increase course attendance by encouraging Continuous Professional Development (CPD), improved cost-effectiveness, and widening its offer to prospective trainees in remote locations via online programs;
- Improve T&E quality by constantly updating and reviewing contents, implementing candidate selection and evaluation;
- Contribute to the development of portfolio-based professional competencies that will permit the development of unique profiles of skills and capacities in jobs for the future, such as microbiology managers¹, through the flexibility, comprehensiveness, and accreditation of its T&E offer. Hence, training will be based on the novel concept of “scientists as managers”. In addition, this will also facilitate the mobility between CPD

¹ Paterson, R.M.R. et al. 2017. Microbiology Managers: Managerial Training in the Rltrain Project. Trends in Microbiology **25**, 425-428

schemes and post-graduate (Master and PhD) degrees offered by the Higher Education Institutions;

- Consolidate the T&E training offer in a harmonized course structure and high-quality content delivery, thus contributing to the creation of a trusted MIRRI label.

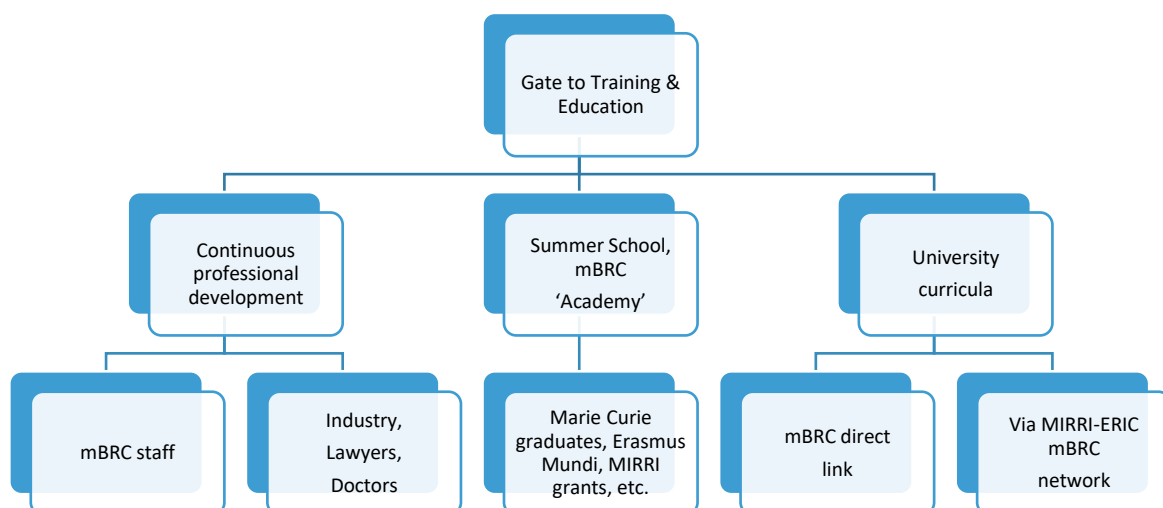


Figure 2-3 -MIRRI strategic vision to enhance T&E to improve knowledge transfer, CPD and Europe’s competitiveness.

2.5 The Transversal Gate

On the course of the work for requirements elicitation by gate, some commonalities were identified among them in terms of requirements and functionalities. For that reason, a fifth, transversal gate was created with the goal of including all such common requirements. This is the Transversal Gate. As its name suggests, it contains modules, functionalities and requirements which are transversal to the entire CWE and are not gate/module specific.

Features and functionalities permanently present in the CWE portal, like disclaimers, links for social media, accessibility features considering multiple device and user needs, the storing of personal data according to the General Data Protection Regulation (GDPR), among many others, are requirements typically transversal to a web-based platform, independently of the specific functionalities and modules.

This Gate includes also the module for user registration, management, authentication, and authorization, constituting the “MIRRI Authentication System” - MIRRI AAI -, which will serve the CWE and its gates and modules, but may be used in the future as an authentication provider for other platforms.

Security features for the entire CWE are also included as part of this Gate.



3. The CWE Preliminary Version

3 The CWE Preliminary Version

Throughout this chapter, the modules and functionalities implemented and made available for the preliminary version of CWE are presented. For better organization, the modules are organised and presented in five gates including the Transversal gate that concentrates on functionalities and respective requirements common/transversal to the entire CWE platform, like for example requirements for information security, or general basic usability requirements, further to the CWE user management.

Gate 1 focuses on Research Infrastructure Information. Gate 2 focuses on the Resources, Data and Services. Gate 3 focuses on Collaboration and Experts. Gate 4 focuses on Training and Education. For each of them, in this CWE preliminary version, some modules (or all of them) were implemented.

Following the requirements survey (deliverable 6.1), multiple technical meetings were regularly held, involving, whenever necessary, non-technical partners to validate decisions using their scientific experience as future CWE users.

From these technical analysis and discussion meetings, some important decisions were taken, such as those relating to the architecture of the CWE platform. An example is the decision to implement CWE as a modular platform. Such an approach has multiple advantages:

- Ease updating and platform scalability. Modifications can be done in only one module, not impacting the functionalities and performances of other modules; for example, if a technology is no longer continued, the respective module can be easily replaced without affecting the rest of the platform.
- The use of the most appropriate technologies for the implementation of features and performance optimization for each module.
- Easier (re)use of existing and accessible software components (open source or developed in previous projects), which provide the desired functionalities for the respective module.
- The use of already tested software with less probability of errors and the need to fix bugs.
- Faster development of the CWE platform.

For example, for Gate 2, under a free use agreement established between MIRRI and BioAware SA, the BioMICS software was used and modified to implement the Microbial Resources Catalogue module (MIRRI-IS).

Another example is the agreement established with the INSTRUCT-ERIC for the utilization of ARIA software as the module for management of application for the transnational access program (TNA), a pilot service promoted by MIRRI (<https://apply.mirri.org/submit-proposal/>). In this case,

there is the advantage of establishing cooperation and interaction with another research infrastructure in Europe in order to obtain cost-efficient results.

This approach naturally implies the additional effort of specifying and implementing, with security and adequate performance, the respective interfaces and communication between modules.

Bearing in mind the objectives expected for each Gate in this preliminary version of CWE, the team has organised meetings and interviews with the stakeholders more directly related to each Gate, in particular those who are members of **IS_MIRRI21** project. Their feedback and suggestions were crucial for the implementation and fine-tuning of functionalities.

This collaborative teamwork allowed the clarification and decision taken on dubious interpretations of requirements, and led to the identification of potential new needs for the CWE user profiles under consideration.

3.1 Transversal Gate and User Interface

The Transversal Gate contains modules and features that are supportive or transversal to the entire CWE.

For this preliminary version, this Gate had to be also worked on and developed, since it contains important modules for the functioning of others.

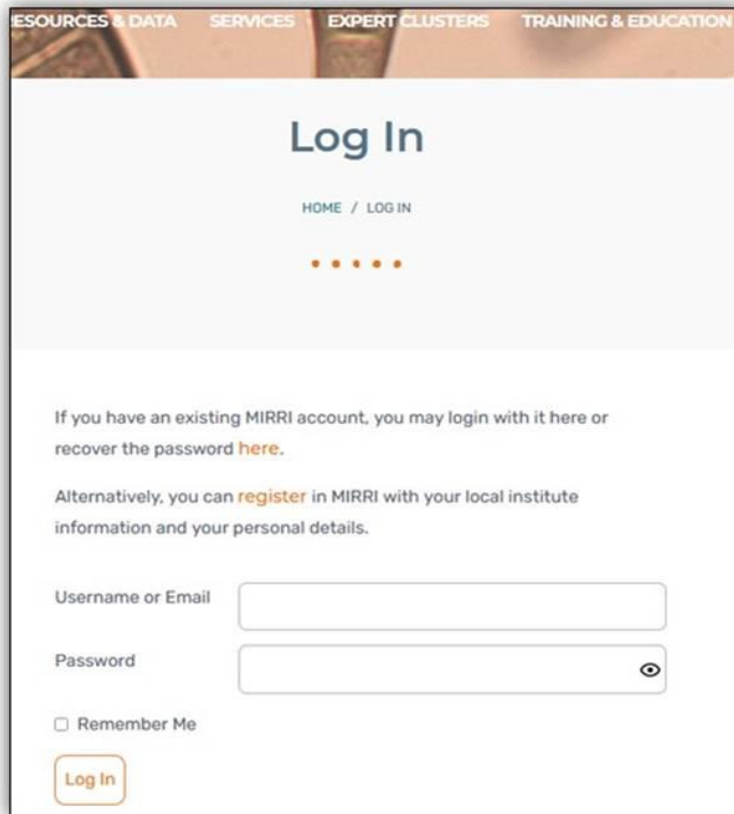
CWE User Management, Authentication and Authorization Module.

This module allows the registration and maintenance of user information, but also the management of authentication and authorization access for the use of restricted functionalities in the CWE. Prior to the implementation of this module, the **IS_MIRRI21** partners analysed and discussed possible solutions. Aspects such as the possibility of the user to use pre-existing registrations on platforms such as Google, ORCID and others, were considered, as well as the use/integration of the authentication to be provided by the European Life Science Research Infrastructures (LS RIs), - LS Login, provided by EOSC Life²-. The hypothesis of using LS Login is the one that generated the most interest, but there is some delay in the formal and official availability of access to that platform, which does not fit with MIRRI's need to make its CWE platform available. Therefore, the option was to create an authentication and user management system proprietary to MIRRI.

In the future, this authentication module can be updated to integrate user authentication from Single Sign-On systems, such as LS Login, Google, ORCID, etc.

A simple and intuitive interface, implemented following the User interaction rules, is available for user login, providing also access for password recovery or to the registration form.

² <https://lifescience-ri.eu/ls-login.html>



The screenshot shows a web page with a navigation bar at the top containing the following items: ESOURCES, DATA, SERVICES, EXPERT CLUSTERS, and TRAINING & EDUCATION. The main heading is "Log In". Below the heading is a breadcrumb trail: HOME / LOG IN, followed by five orange dots. The form contains the following elements:

- A paragraph: "If you have an existing MIRRI account, you may login with it here or recover the password [here](#)."
- A paragraph: "Alternatively, you can [register](#) in MIRRI with your local institute information and your personal details."
- A label "Username or Email" next to a text input field.
- A label "Password" next to a text input field with a toggle icon on the right.
- A checkbox labeled "Remember Me".
- A "Log In" button.

Figure 3-1 – The CWE user login form.

By filling the registration form, the user provides information that permits MIRRI CWE's manager, in Back office, to access the registration request, attributing the appropriate user profile, which defines the access rights over the entire set of CWE's functionalities.

HOME ABOUT MICROBIAL RESOURCES & DATA SERVICES EXPERT CLUSTERS TRAINING & EDUCATION NEWS EVENTS LOGIN

Register

HOME / REGISTER

•••••

Your data will be stored by MIRRI in order to process your membership and provide services. More information available at our [Privacy Policy](#).

Account Information

Username *

E-mail *

Password *

Repeat Password *

Personal Information

Title *

First Name *

Last Name *

Nickname *

Contact Information

Phone | Mobile *

Country *

State | Province

Address

Website

Figure 3-2 – The user registration form.

Additionally, this module implements the multiple user profiles defined and established by MIRRI to manage and control the access rights, according to the user affiliation, the role in MIRRI, etc. At the time of accessing the user registration, the MIRRI admin and/or the MIRRI CCU decide and manually attribute, using back-office functionalities, the appropriate user profile and the respective role in CWE.

After analysing the current needs, the following user profiles were identified and implemented:

- **Partner** - users affiliated to a partner organisation, including users affiliated to a member or observer intergovernmental organisation or to organisations signatories of a "Partnership MoU" and users qualified as an individual partner.
- **Academia Member** - users affiliated to an academic or research organisation or to a public, non-profit organisation from a member or observer country (others than "Partners").
- **Academia Non-Member** - users affiliated to an academic or research organisation or to a public, non-profit organisation from a non-member or non-observer country
- **Industry Member** - users affiliated to a private, for-profit company from a member or observer country.
- **Industry Non-Member** - users affiliated to a private, for-profit company from a non-member or non-observer country.
- **Moderator** - users with access to the functionalities to moderate forum topics.
- **Administrator** - users with full access and administration rights.

The implementation of this module allows to associate several profiles to a single user when required. New profiles with other type of access permissions can be added in the future if needed.

Other modules in Transversal Gate

This gate also implements important features for the entire CWE, like for example those related to security and functionalities of back-office to be used by CWE administrators. Additionally, other requirements were also implemented and made available in the preliminary version of CWE, which were considered under the Transversal Gate:

- Links to sites/pages
- Disclaimer and links
- Device independent accessibility and responsiveness
- Platform Visitors Monitoring (in back-office using analytics tools by the administrators)
- Store of aggregated user data (as referred above the user's information registration is securely stored in Database, under the GDPR rules, for later use).
- MIRRI data policy visibility.

3.2 Gate 1 - The Research Infrastructure Information

3.2.1 Module 1 - Public Website

MIRRI's public website, accessible via the URL <https://www.mirri.org>, also serves as a web access portal for the CWE platform.

This is the main entry point for MIRRI's tools and services offered via the CWE.

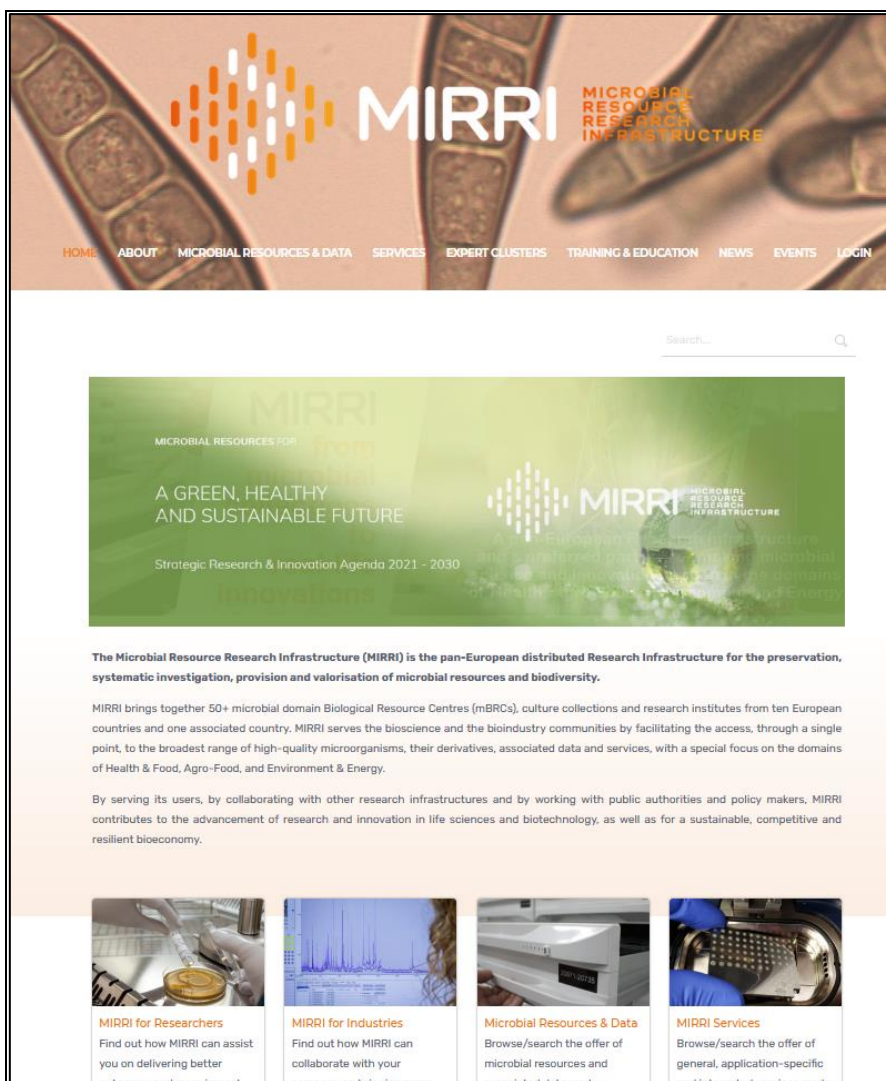


Figure 3-3 – The CWE Gate 1 and MIRRI’s portal home page.

Here, MIRRI presents information about:

- the research infrastructure, its mission, history and strategic agenda;
- the geographic area, presented by referring the countries and partners, as well as the observers, actually integrating the infrastructure;
- the governance and people, by exposing the people integrating the management back-office, the assembly of prospective members, the national coordinators forum and the boards (Advisory and Ethical);
- the legal and regulatory information (Statutes, Access Policy, Partner Charter and associated policies, Privacy policy and General Data Protection Rights/GDPR);
- the projects and partnerships ongoing or finished;

Materials for download by the MIRRI stakeholders are available at a public repository, consisting of position papers, scientific publications, communication materials and newsletters. All these

contents are constantly updated using the edition and management functionalities provided in CWE backend application.

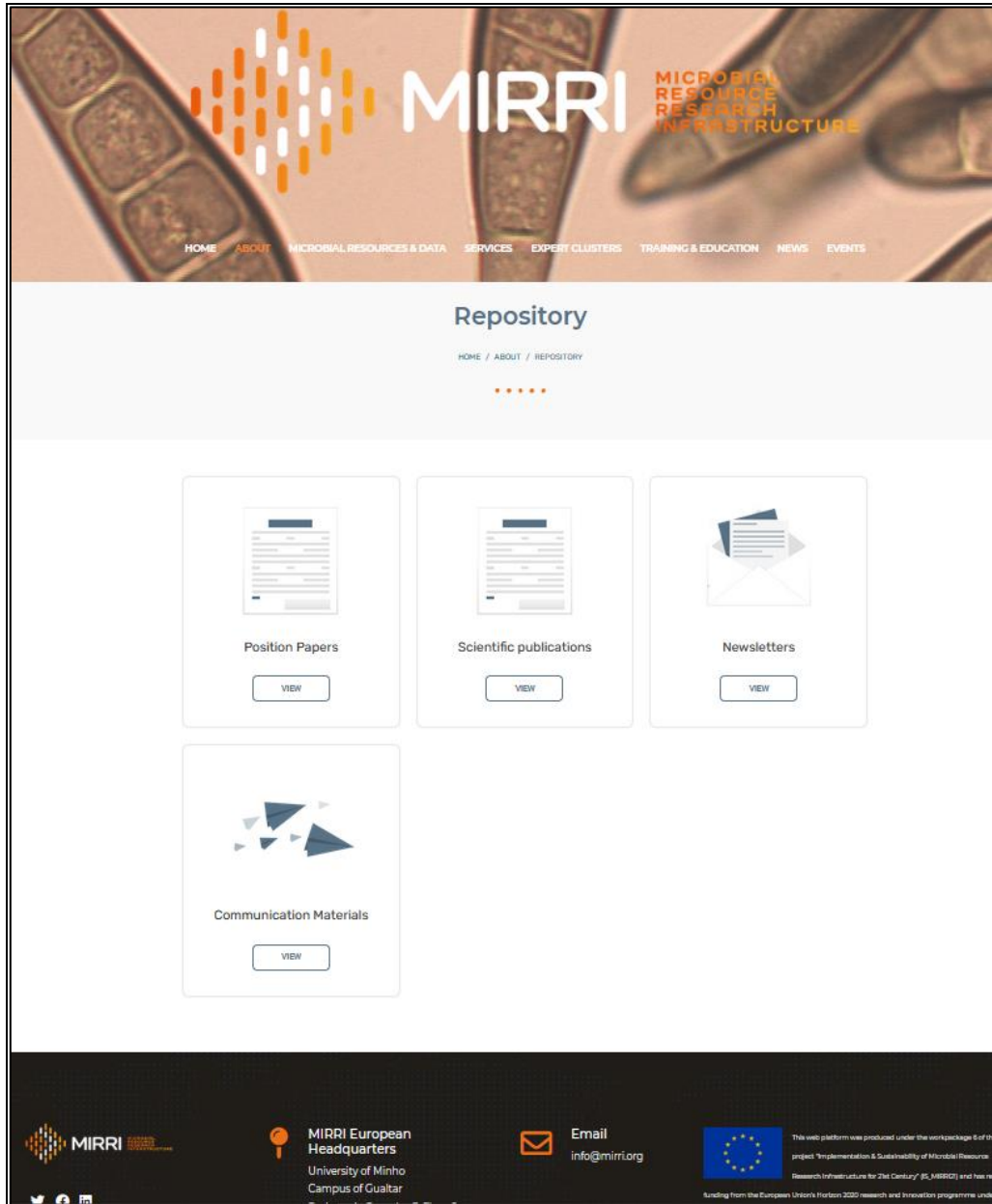


Figure 3-4 – The CWE repository access.

MIRRI's contacts and a form for direct sending of fast messages are also provided in a dedicated section.

MIRRI's related news and events may be edited in the backend, by the nominated manager, and are published in two separate sections of the MIRRI Portal. The events may be presented in different ways: by month, week, day or a sequential list. One small calendar presented in the homepage allows direct access to the current events.

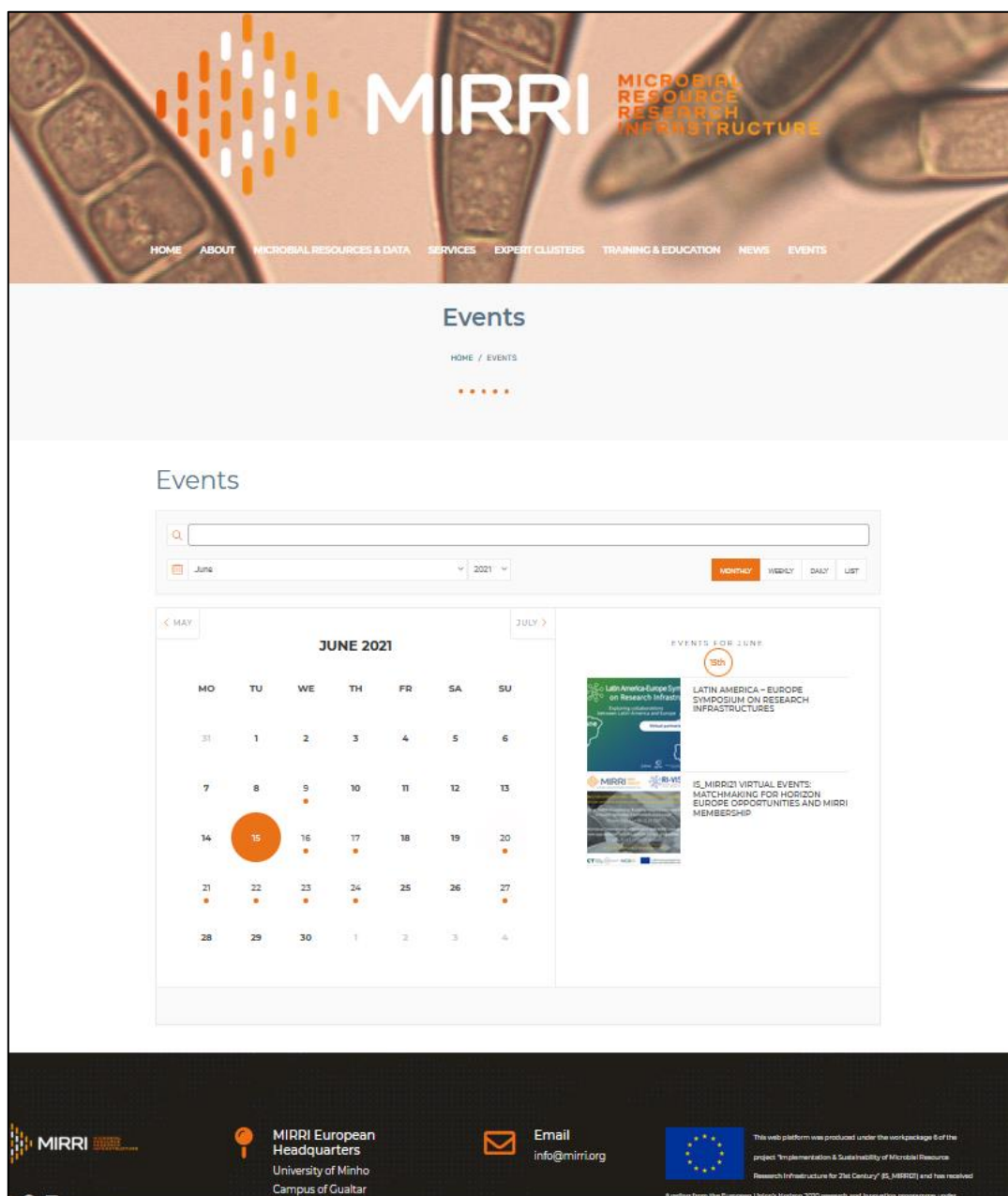


Figure 3-5 – Aspect of the events page in the CWE (monthly view).

As referred above, the portal is also the entry point to the other gates and corresponding modules:

- Microbial Resources & Data and Catalogue of Services
- Collaboration and Experts Clusters
- Training and Education

For all of them, an introduction is shown and the access to the respective supportive software application is provided seamlessly.

Lastly, it is important to report that the entire portal is fully responsive. It is, therefore, fully usable in different sized devices and compatible with all modern browsers.

3.2.2 Module 2 - Partners Area

Following the decision of implementing the CWE based on a modular architecture, the IS_MIRRI21 partners have deployed, configured, and made available, an app-based solution for the module of “partners area”. It is based on Synology®, a software designed to share apps remotely, and is now available via the URL <https://synology.mirri.org>

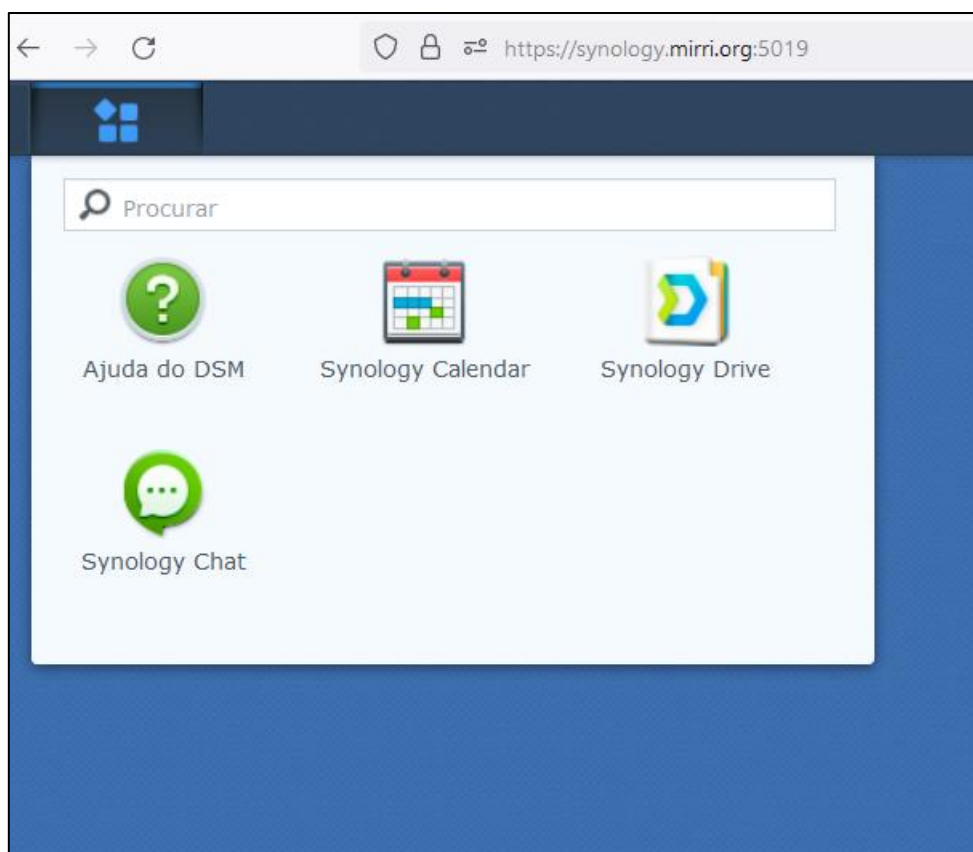


Figure 3-6 – Aspect of the main interface for the apps in partners area.

In this module, the registered users have access to a set of tools and functionalities, which have already been widely used by IS_MIRRI21 project partners for collaborative work:

- Document management system (Synology Drive): provides a fully configurable structure of folders to store and share documents categorized according to the subject, work package groups, etc; it also permits the collaborative edition of documents with compatibility for the most common Microsoft and Google formats. Other important file formats, like PDF and the most common image file format are also supported.

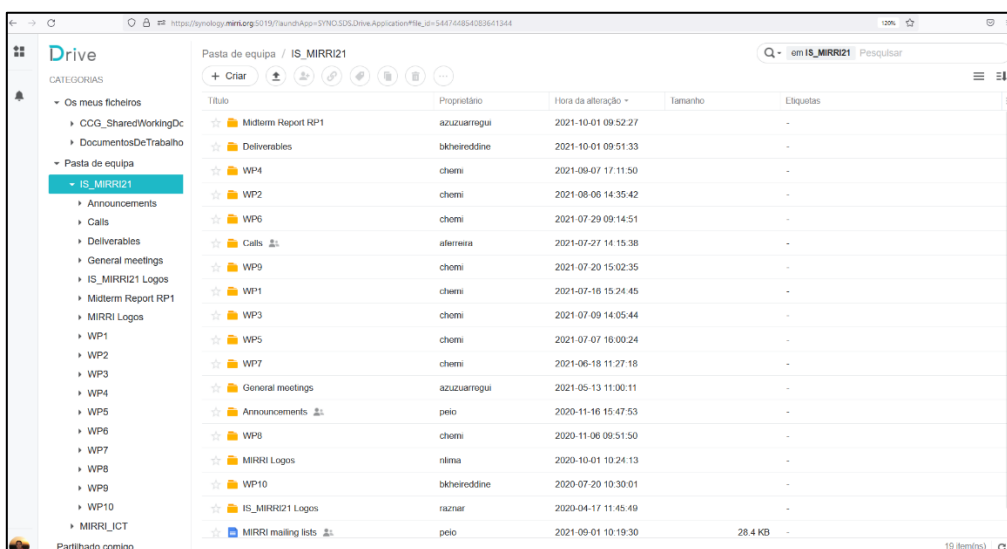


Figure 3-7 – Aspect of the folder structure and related information in MIRRI's Synology Drive.

- A Calendar system (Synology Calendar): for registration of common events and meetings, joint management of agenda per group of users, automatic notification of changes in the agenda via email, etc; this tool is of major importance, for example for the scheduling of project meetings and events.

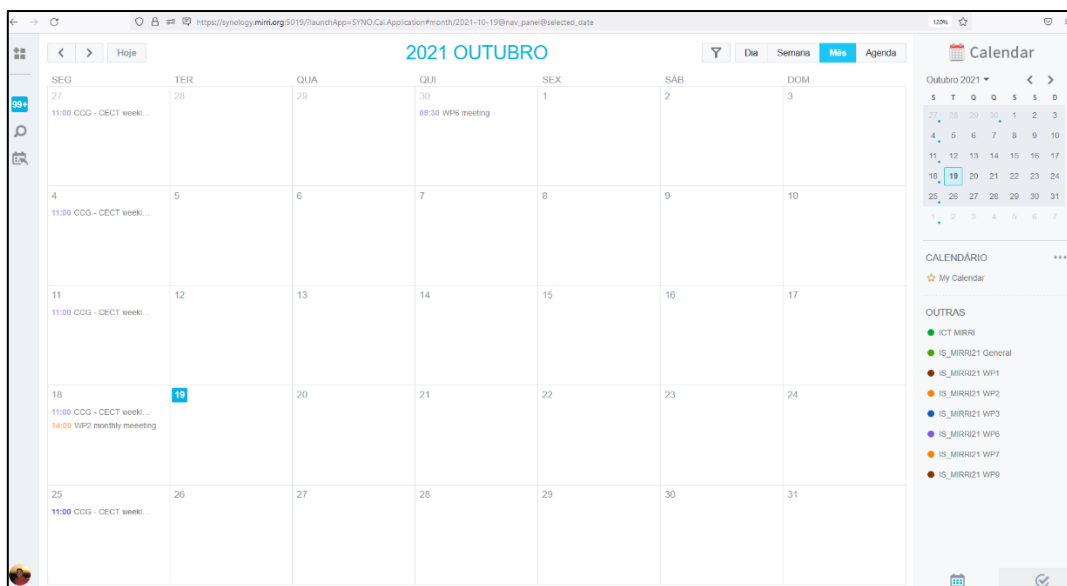


Figure 3-8 – Aspect of the visual interface for the calendar in MIRRI's partners area.

- A Chat solution (Synology Chat): this tool is useful for direct and online contacts between/among registered users. It gives the possibility of creating dedicated channels for the users to join and have online short discussions. The chat may also happen in a one-to-one connection between two users who may, for example, need to discuss some topic while collaboratively editing a document.

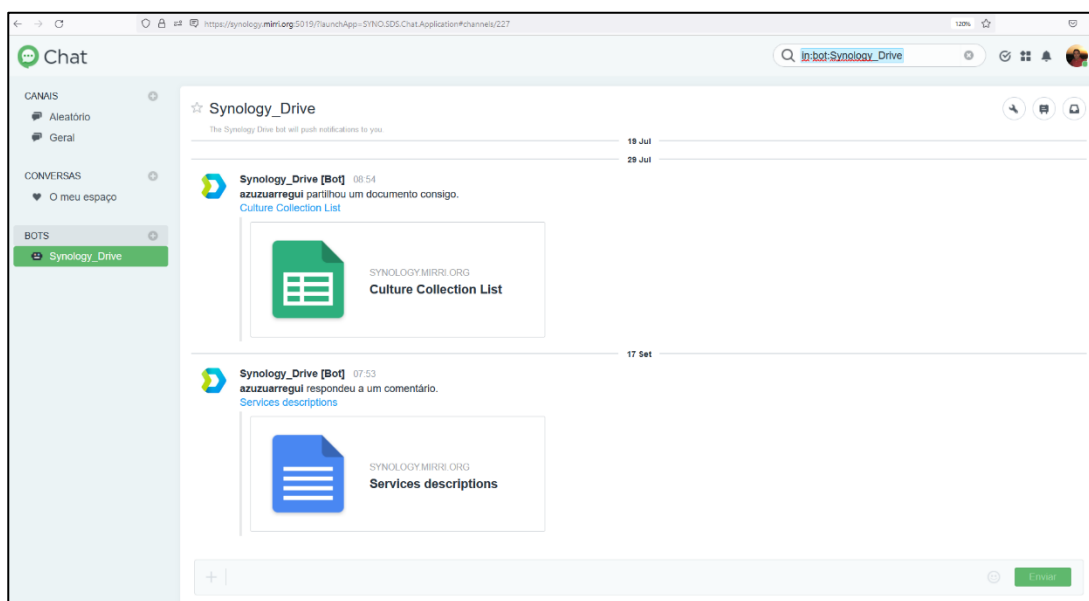


Figure 3-9 – Aspect of the visual interface for the Chat in MIRRI's partners area.

Other modules/apps may be added in the future as needed, but those already provided were considered the most important and the corresponding functionalities implementing the requirements enumerated in deliverable 6.1.

Furthermore, this module is implemented and in use, but still not seamlessly integrated in the CWE. It is accessible at <https://synology.mirri.org>. Its integration is one of the tasks to be performed to achieve the final version of CWE (Milestone M6.3 *Final version of the MIRRI CWE platform*, due on month 36).

3.3 Gate 2 - The Microbial Resources, Data and Services

As introduced before this gate holds three main modules: Module 1 – Microbial Resources; Module 2 – Data and Module 3 – Services.

3.3.1 Module 1 - Microbial Resources

The module 1, *Microbial Resources*, exposes MIRRI's Catalogue of microbial resources and respective areas of application. The module 1 may still be updated with more information regarding MIRRI members providing the Microbial resources, even though this information is contained in the Data available from the MIRRI Catalogue. Indeed, Module 1 gives direct access to Module 2 (*Data*) by following a hyperlink at the bottom of the same page.

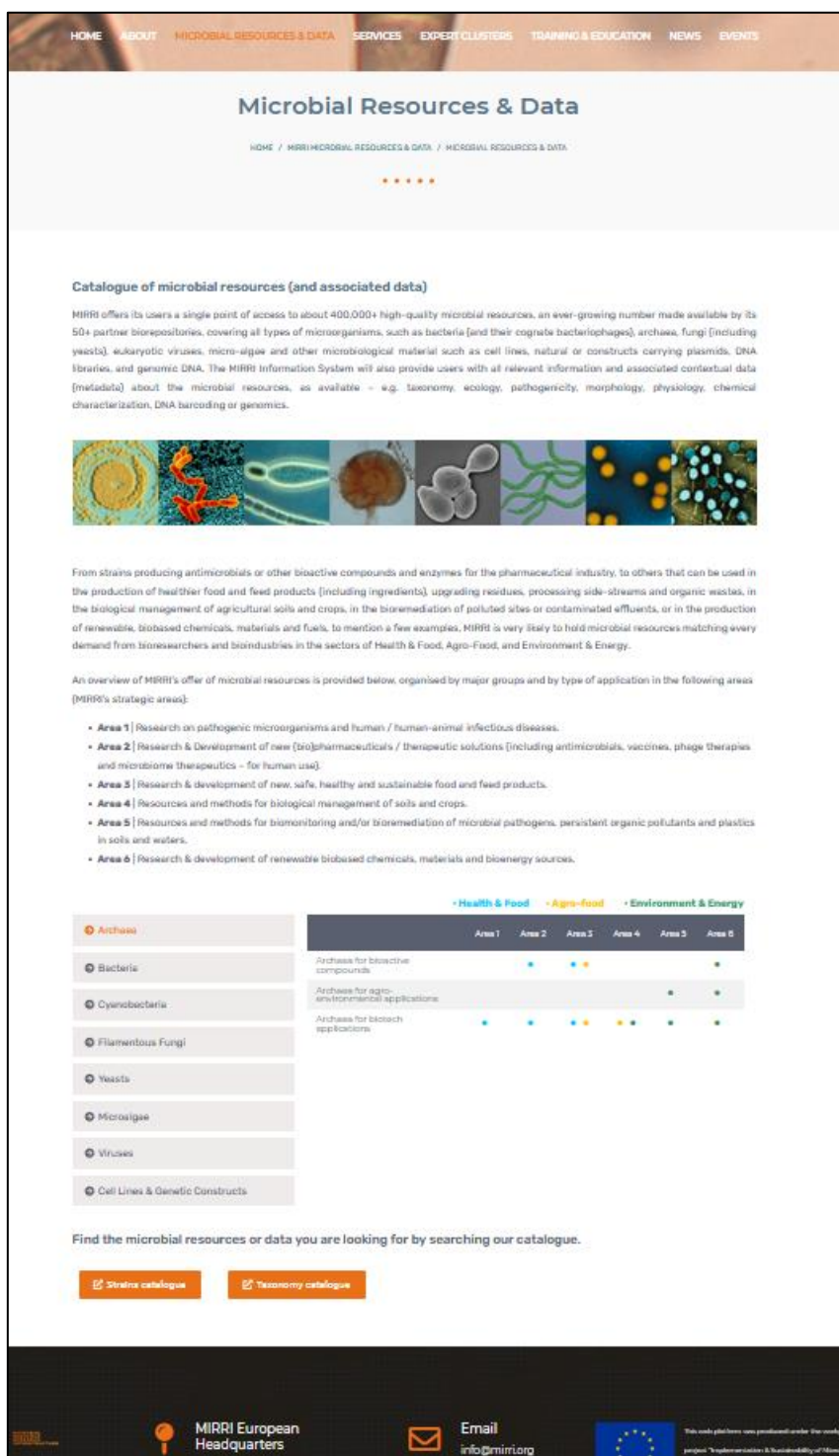


Figure 3-10 – Catalogue of microbial resources and access to the associated Data.

3.3.2 Module 2 - Data

This module integrates the CWE and constitutes the actual version of MIRRI Information System (MIRRI-IS). As referred before, it was implemented by customising the BioLMICS framework (user interface, Database structure, tables and management interface, addition of new

functionalities like for example the “free search”, etc), and is actually running in a server owned by BioAware SA. It is completely integrated in the CWE platform and the end-users do not have the feeling that two different systems are being used. The current version of the data contains 154 000 strains and associated data provided by culture collections that are partners of MIRRI.

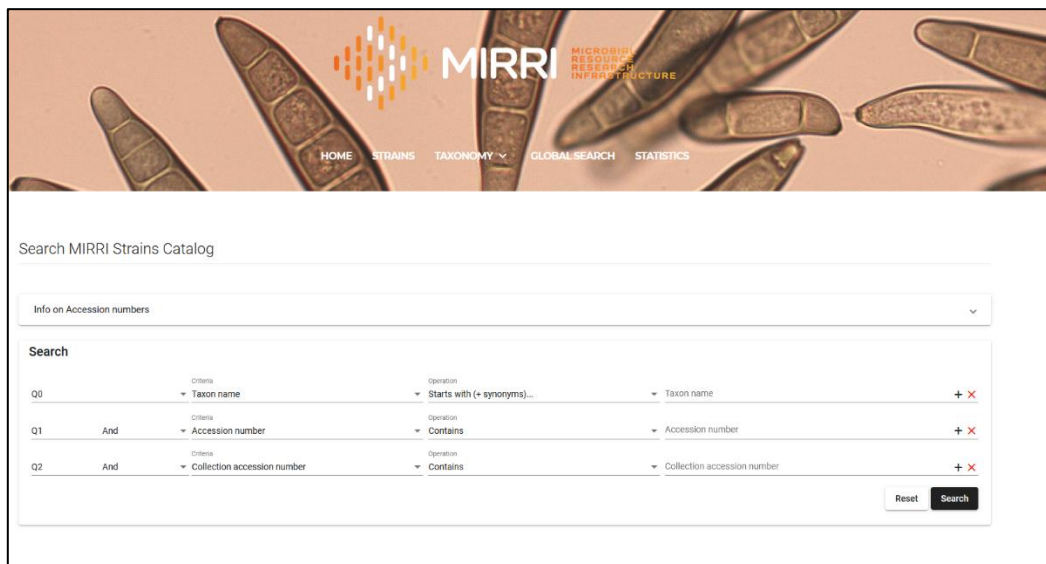


Figure 3-11 – Aspect of the interface for searching strains in the MIRRI’s catalogue

Furthermore, this module also contains functionalities to search for Virus and Non-Virus taxa. The taxonomic database contains more than 545 000 data entries and information about synonymies and other taxonomic data points of interest.

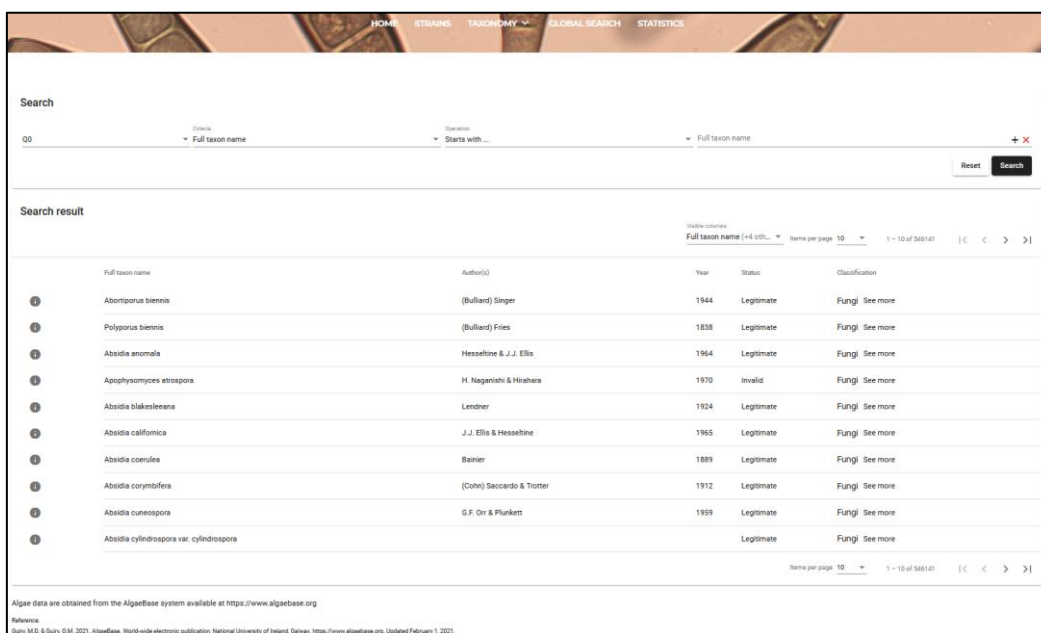


Figure 3-12 – Aspect of the interface for searching non-virus taxonomy in the MIRRI’s catalogue

This module innovates by presenting advanced functionalities, like for example the possibility of performing some statistics over the data records, permitting, among other, the presentation of graphical and easy to read presentation of similarity matrices between the available strains of the database. It also provides hierarchical clustering of all the strains belonging to a given species or genus. This tool can also be used by the CCs to evaluate the identity of their strains and compare them to the ones of the other strains of the same species or genus.


← MRRIO132871	
Accession number	MRRIO132871
Taxon name	<i>Phellinus gilbonensis</i>
Comment on taxonomy	Species with hamate setae and resupinate basidiomata belongs to the Ph. caribaeo-quebecicus clade, together with <i>P. ellipsoides</i> and an undescribed species from Ecuador.
Organism type	Fungus Fungi <input checked="" type="checkbox"/>
Literature	Parasit Hymenochastaceae associated with trees showing wood-rot symptoms in the Garden Route National Park of South Africa
Collection accession number	MCCU 52025
Other culture collection numbers	CBS
Equivalent strains from different collections	MRRIO28010
Strain from a registered collection	no
Status	Herbarium strain
MTA files URL	https://com.beilab.be/files/documents/T442_MTA.pdf
Nggpa protocol restrictions and compliance conditions	strain probably in scope, please contact the culture collection
Dual use	no
Restrictions on use	For commercial development a special agreement is requested
Risk group	1
Quarantine in Europe	yes
Country	Gabon
Coordinates of geographic origin	
Geographic origin	Monts de Cristal National Park, Kikoukélé hydroelectric area, Sautaine, Gabon
Isolation habitat	Güinea-Congole rainforest
Substrate of isolation	dead standing trunk, unidentified angiosperm
Collector	Desock Corp, Université Catholique de Louvain, Mycotèque de l'Université catholique de Louvain, Yombiyeni Providence, Institut de Recherche en Ecologie Tropicale (IRET), Centre National de Recherche Scientifique et Technologique (CNUASST), Département de Biologie et d'Ecologie des Plantes
Collection date	10/04/2009
Isolator	Desock Corp, Université Catholique de Louvain, Mycotèque de l'Université catholique de Louvain
Isolation date	10/04/2009
Depositor	Desock Corp, Université Catholique de Louvain, Mycotèque de l'Université catholique de Louvain

Figure 3-13 – Partial view of a strain data visualisation

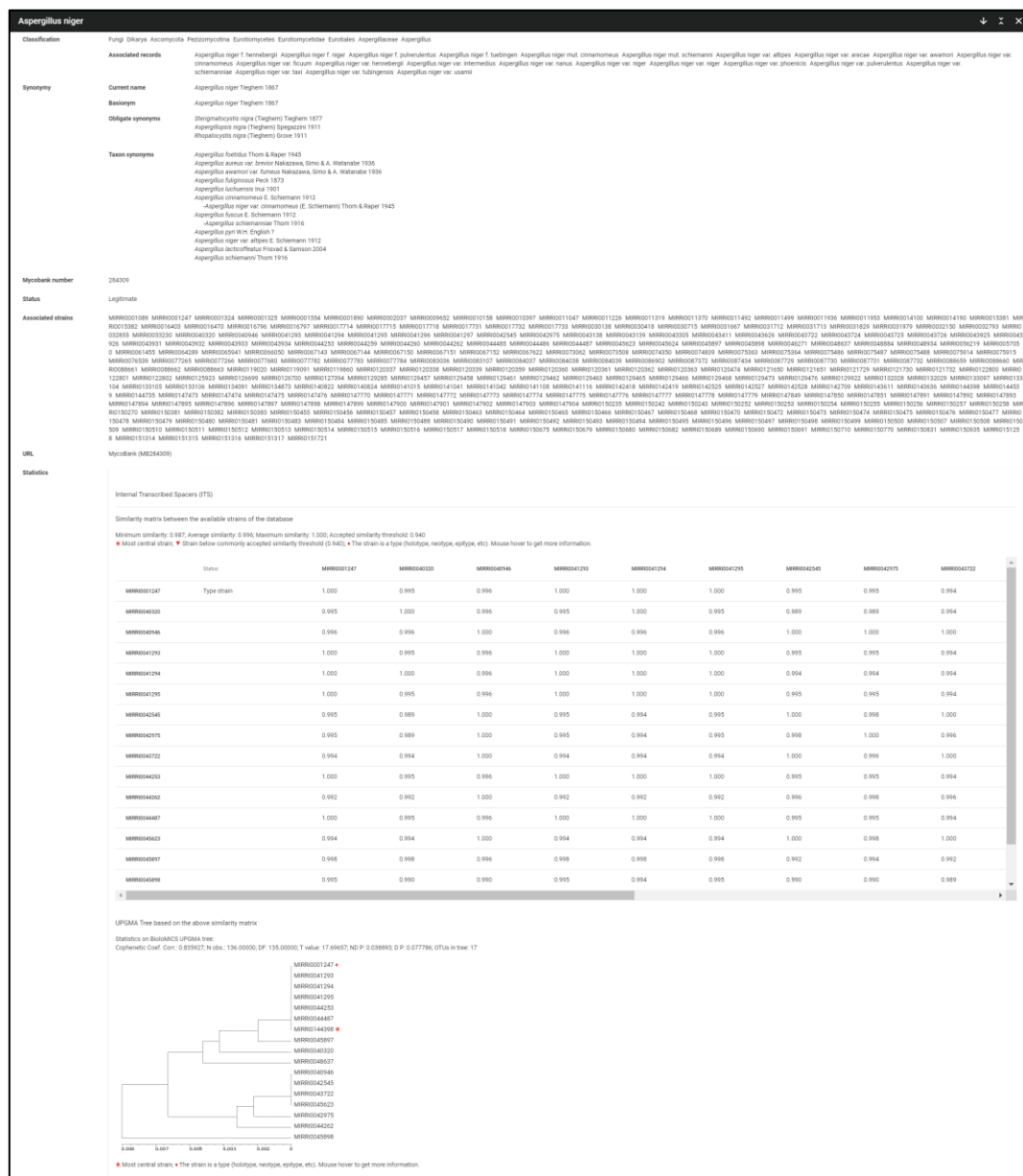


Figure 3-14 – Partial view of a species level data visualisation including hierarchical clustering of strains belonging to a given species

For all collections that already use BioloMICS for the daily management of their data, scripts have been written to import strains, sequences, media, bibliography and other data in the MIRRI database.

To allow the Culture Collections (CC) that do not use the BioloMICS Software for their catalogues to include their strains data in the MIRRI-IS, the data uniformization was identified as a mandatory task. For that, the ICT taskforce of the IS_MIRRI21 project decided to elaborate the specification of data records, as well as an Excel file template, composed of several thematic sheets, to be used by the CCs to prepare and provide the strains data.

Even though detailed specifications and the provision of templates have been given to the CCs, provided data still present some errors/inconsistencies. To help the CCs analyse the compliance of their data and validate before importing to the MIRRI catalogue database, an auxiliary validation tool was implemented and made available online at <https://tools.mirri.org/tools/validator/>. Intensive manual curation has also been done on all the datasets provided by the collections and feedback given to them in order to improve future resubmissions of data.

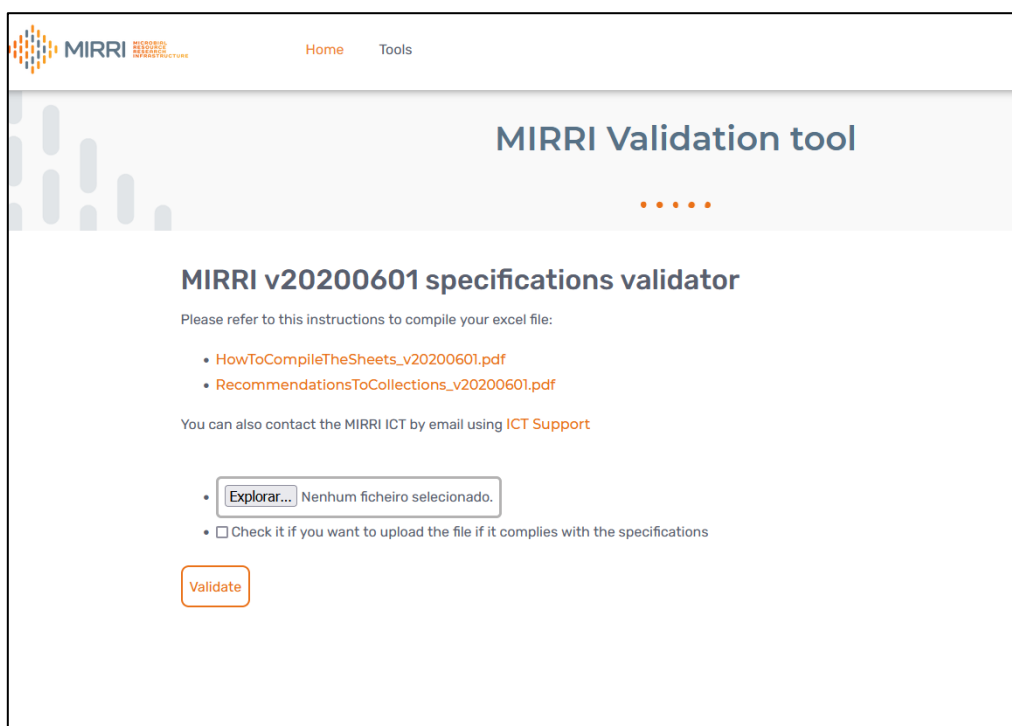


Figure 3-15 – User interface for input of Data file for validation

Validation Tool

This tool applies a validation process to validate and standardize the data provided by the CCs before adding them to the MIRRI-IS catalogue. It consists of two components: a configurator and an interpreter. The configuration file defines the validation steps for each data item, while the interpreter applies such steps to the provided data, outputting a report with the detected errors. For each microbiological resource (strains and viruses), there is a configuration file establishing the rules to be validated.

There are two possible categories of errors detected: on the Excel file structure and on the information. Regarding the Excel file structure, the main issues faced are related to missing columns. The second type of errors relates to the provided fields like, for example, a field where a number is expected and that contains alpha-numeric values. Each error has a code, a message, and an acronym associated with it. The validator uses the code to link the validation step to an error message and the acronym to group errors related to the same Excel sheet. Since structural

errors would imply information errors, the validation process is interrupted if they are detected. The process of information validation only continues once the CCs fix all structural errors. The error logger outputs a PDF report with a list of errors grouped by acronym. This list is limited to a certain number of errors to avoid displaying too much information at once. As the CCs fix the reported errors, the logger will output the remaining errors.

The screenshot shows the MIRRI Validation tool interface. At the top, there is a navigation bar with 'Home' and 'Tools' links. The main heading is 'MIRRI Validation tool'. Below this, the tool is identified as 'MIRRI v20200601 specifications validator'. A message addresses the 'Dear Curator of Culture Collection' and states that the provided Excel file 'TUCC_DATABASE_2020_11_30_V2.xlsx' contains errors. It provides instructions on how to proceed, including links to help documents and contact information for ICT Support. A section titled 'Check the error and fix them before submitting them again:' contains two tables of error messages.

Excel File Structure

Identifier	Error Message	Error Code
-	The 'Geographic origin' sheet is missing. Please check the provided excel template.	EFS02
-	The 'Ontobiotope' sheet is missing. Please check the provided excel template.	EFS06

Literature

Identifier	Error Message	Error Code
-	The 'ID' column is a mandatory field in the Literature sheet.	LID01
-	The 'First page' column is a mandatory field. The column can not be empty.	LID15

At the bottom of the error list, there is a 'Try again' button.

Figure 3-16 – Example of visualization of the results of Data validation

The validator is already being updated to be used for the Virus data validation by the CCs, which will constitute, together with some functionality's improvements and additions, an evolution of the Module *Data*, towards the final version of CWE.

Dynamic webservices for data sharing

In order to share data with third parties and to allow the seamless integration of data by the automated validation tool, a new and dynamic webservice system has been implemented within the BioloMICS software. It uses the "OpenAPI Specifications", formerly known as the Swagger Specification and is available at <https://webservices.bio-aware.com/mirri/index.html>. With this important tool, all data present in the MIRRI catalogue are available in a FAIR context. Code samples have been written and made available via [GitHub to](#) interested end-users. The

webservice are called dynamic because they can be changed and adapted on the fly and without extra programming to the needs of the administrators and end-users of MIRRI.

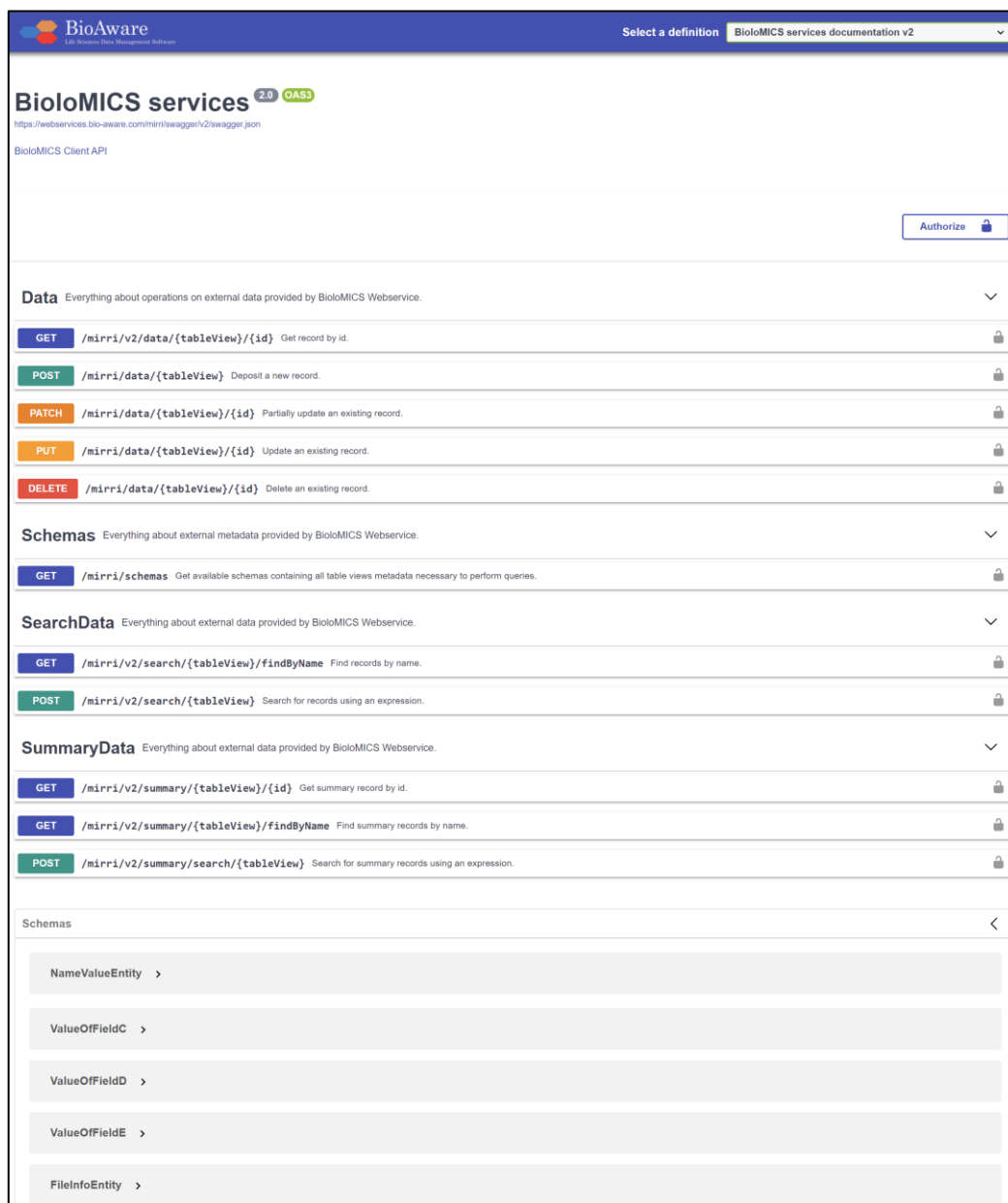


Figure 3-17 – Dynamic webservices based on OpenAPI Specifications formerly known as the Swagger Specification allowing FAIR sharing of data

3.3.3 Module 3 - Services

Module 3, *Services*, is aimed at enabling access to services offered by mBRCs and the RI, including transnational access (TNA) to laboratories (that is also an objective of the [IS_MIRRI21](#)

project), state-of-the-art experimental facilities, services and a wide variety of microbiological resources.

As implementation for this module, CWE already contains the exhaustive and complete presentation of services provided by MIRRI, both general and application specific.

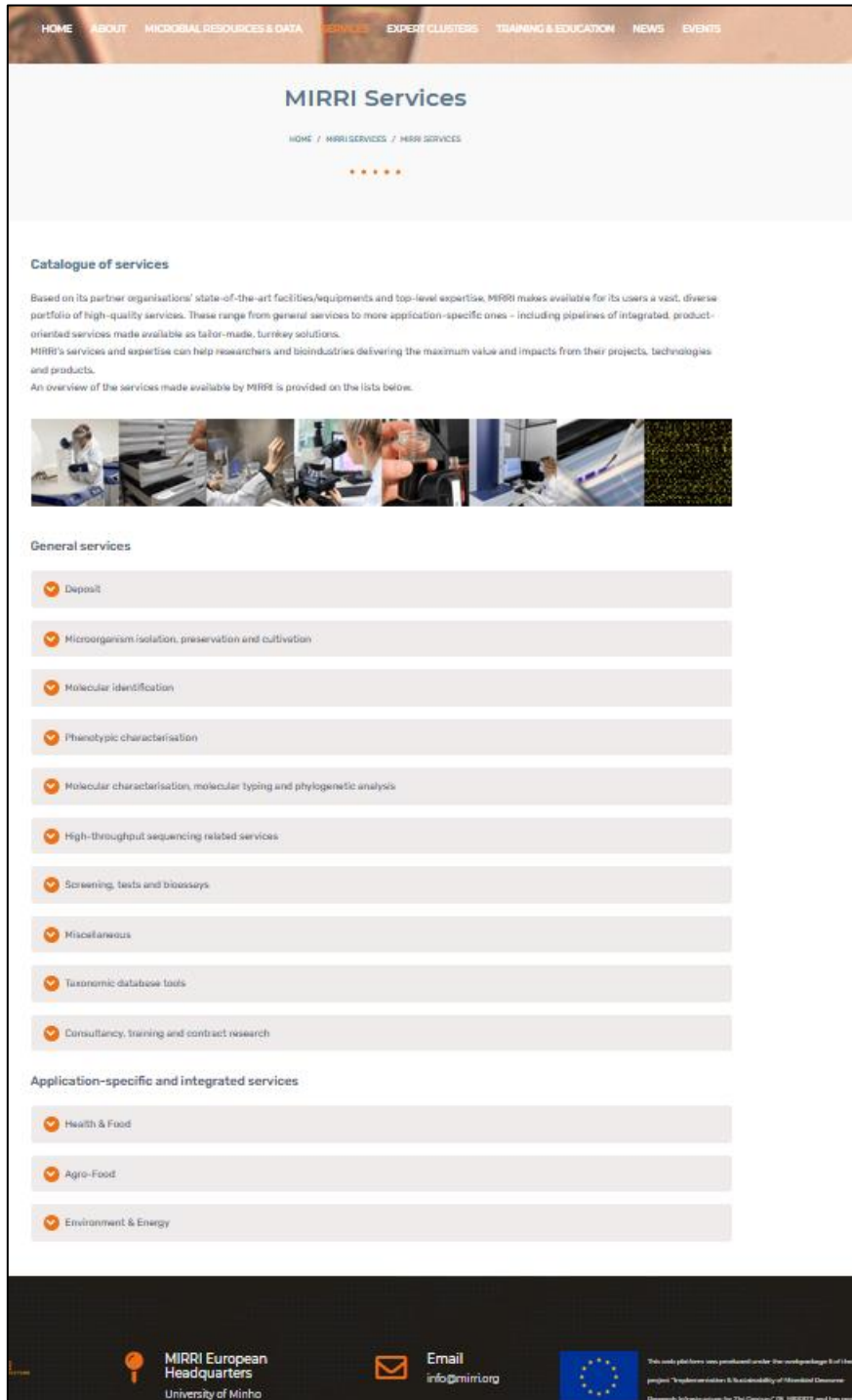


Figure 3-18 – The actual presentation of MIRRI's catalogue of services

Improvements on the information provided and its presentation will be implemented in this module for the final version of CWE.

Additionally, this module also implements the access and tools to support the management of the Transnational Access program.

The Transnational Access Programme

The TNA programme aims to financially and logistically support the access of external users to the MIRRI partner institutions across Europe to carry out their research projects. This initiative offers access to a wide variety of microbial resources (products), laboratories and state-of-the-art facilities and technological platforms (services).

At present, the MIRRI TNA is supported by the [IS_MIRRI21](#) project and offers access to 14 institutions.

In the CWE, the TNA is presented and announced, with direct link for the corresponding section on [IS_MIRRI21](#) webpage, which constitutes a space with all information about the programme and description of each step of the first TNA call (published in November 2020). In the latter, MIRRI presents the detailed description of the TNA programme, the eligibility criteria, the access providers (List of partners and liaison officers), the TNA catalogue (List of Products/Services/Facilities), the TNA workflows, information on how to apply (Application step by step and timeline), information on how to submit proposal, the evaluation of proposals (score and evaluation, ranking methodology), the access (support provided before, during and after the access, User access contract negotiation), the reporting (confirmation of access, TNA activity report, User questionnaire and TNA feedback survey), the dissemination of results (EU policies about dissemination of results and acknowledgment), the associated TNA documents (links to download the guidelines for applicants, the TNA catalogue and the TNA flyer) and the information about the researchers awarded (Name, institution and pictures of the four TNA users awarded in the 1st TNA call 2021).

The screenshot displays the MIRRI website's interface for the Transnational Access Pilot Programme Platform. At the top, the MIRRI logo and navigation links (Home, About the project, Consortium, Resources, Project Platforms, News & Events, Contact) are visible. The main heading reads "Transnational Access Pilot Programme Platform". Below this, a news banner states "First Transnational Access call (January - April 2021)" and "The first TNA call is closed". A secondary banner mentions "MIRRI successfully concludes its 1st TNA call for proposals and thanks all applicants.....read more". The page is divided into a sidebar menu on the left and a main content area. The sidebar includes links for "The Programme", "Eligibility", "Access Providers", "TNA Catalogue", "Workflows", "How to apply", "Submit your proposal", "Evaluation of proposals", "Access", "Reporting", "Dissemination of results", "TNA Documents", and "Researchers awarded". The main content area features a large text block describing the TNA programme's aim to support access to 34 IS_MIRRI21 research infrastructures. It includes two columns of bullet points: "The Transnational access includes:" (Technical and scientific support, Administrative and logistic support, Access to products, services and facilities offered, In the IS_MIRRI21 TNA catalogue, Hands-on training needed to access the facilities) and "The TNA programme sponsors researchers:" (Access to IS_MIRRI21 research infrastructures including facilities, platforms, laboratories, standard consumables, chemicals and disposables, Travel expenses [one round trip/person], Subsistence [meals and accommodation for up to 30 days, weekends included], Shipping costs of project materials from the IS_MIRRI21 facility to the home institutions). A section titled "TNA funding does not include:" lists non-standard consumables and expenses required before or after the TNA visit. A note mentions a workshop held in September 2020. At the bottom, a map of Europe shows various countries with location markers and a play button icon.

Figure 3-19 – Main entry for the TNA pilot programme

The process of submitting proposals and evaluation is supported by a CWE module, seamlessly integrated into the website. This module was developed and customized using the ARIA software (<https://instruct-eric.eu/help/about-aria>), resulting from a collaboration protocol between MIRRI

and Instruct ERIC, signed by the partner Institut Pasteur as coordinator of the TNA programme. The collaboration agreement is indeed a Data Processing Agreement (DPA) and the Service Usage Agreement (SUA) signed with Instruct-ERIC to obtain the services of ARIA for two years, the time foreseen to develop the two calls of **IS_MIRRI21** TNA. As part of the implementation of ARIA as an online management tool for the TNA, the technical partners and the access officer assisted the deployment and testing of functionalities of the webpage and verification of all software's applications, setting up the TNA application platform, design of the webpage environment, testing of the functionalities of the portal and the review of the content. Moreover, the TNA access officer also assisted the liaison officers and the reviewers in the navigation through this CWE module and coordinated that the proposal evaluation and selection processes were performed efficiently and on-time.

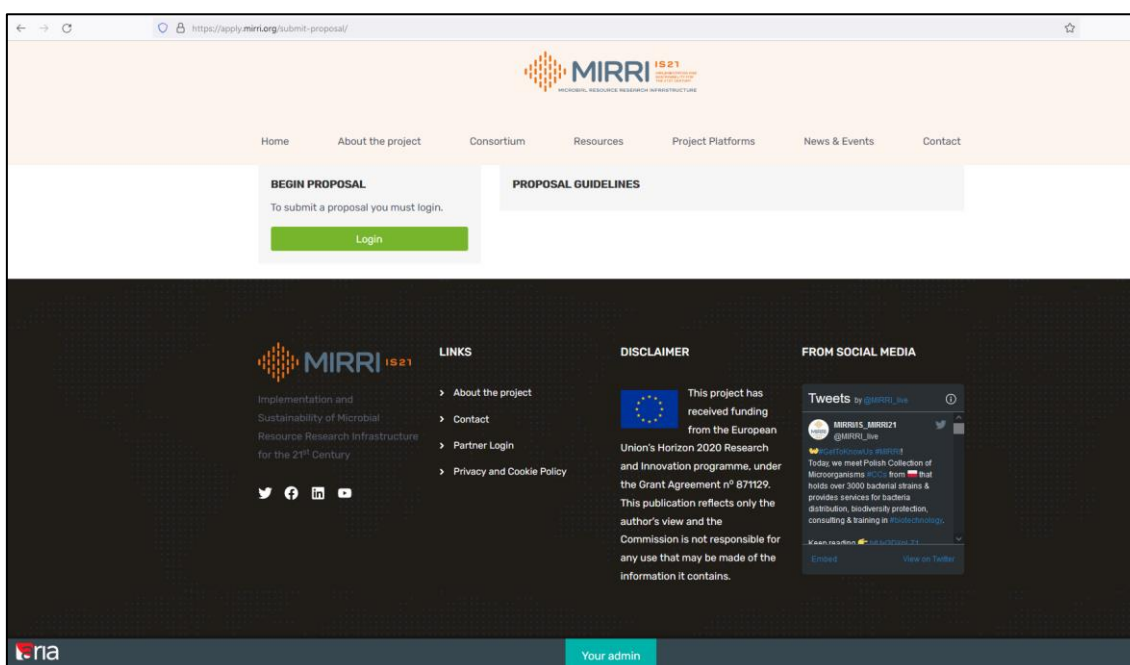


Figure 3-20 – Access to the Platform for TNA application

This module went live on February 2021, almost simultaneously with the launch of the first TNA call, and the projects submitted through this online platform <https://ismirri21.mirri.org/project-platforms/tna/> were checked for eligibility and technical feasibility by the access and liaison officers. Afterwards, projects were dispatched to the reviewers (USP members) who were specialists in the research areas of the projects. They scored the proposals online according to a form also available in this module of CWE.

3.4 Gate 3 - Gate to Collaboration and Experts

The focus of the Gate to Collaboration and Experts is to provide the MIRRI Expert Cluster platform. Such platform is part of the CWE and its constituent modules provide a unique environment for researchers in life sciences to exchange knowledge, further permitting other stakeholders to access the researcher's expertise and knowledge. The MIRRI Expert Clusters will be organised around the key-topics of mBRCs' activities to support research, development, and innovation processes at the demand of the users.

For this, the platform will provide:

- Cluster sections aligned with the stakeholder demands (e.g., Applications & Technologies, Legal issues, Taxonomy, IT & Data management, etc.);
- Pool of experts selected to provide an extensive range of responses and knowledge;
- Cluster tools selected for optimal and efficient intercommunication and exchange of knowledge and expertise;
- Highly automated request matching, enabling a multilayer reply to incoming requests.

3.4.1 Module 1 - Expert Clusters

This module is implemented and integrated in CWE. It presents MIRRI's clusters of expertise and it gives access to two software applications: the first one is a forum and the second one is a system for management of on demand expertise provision.

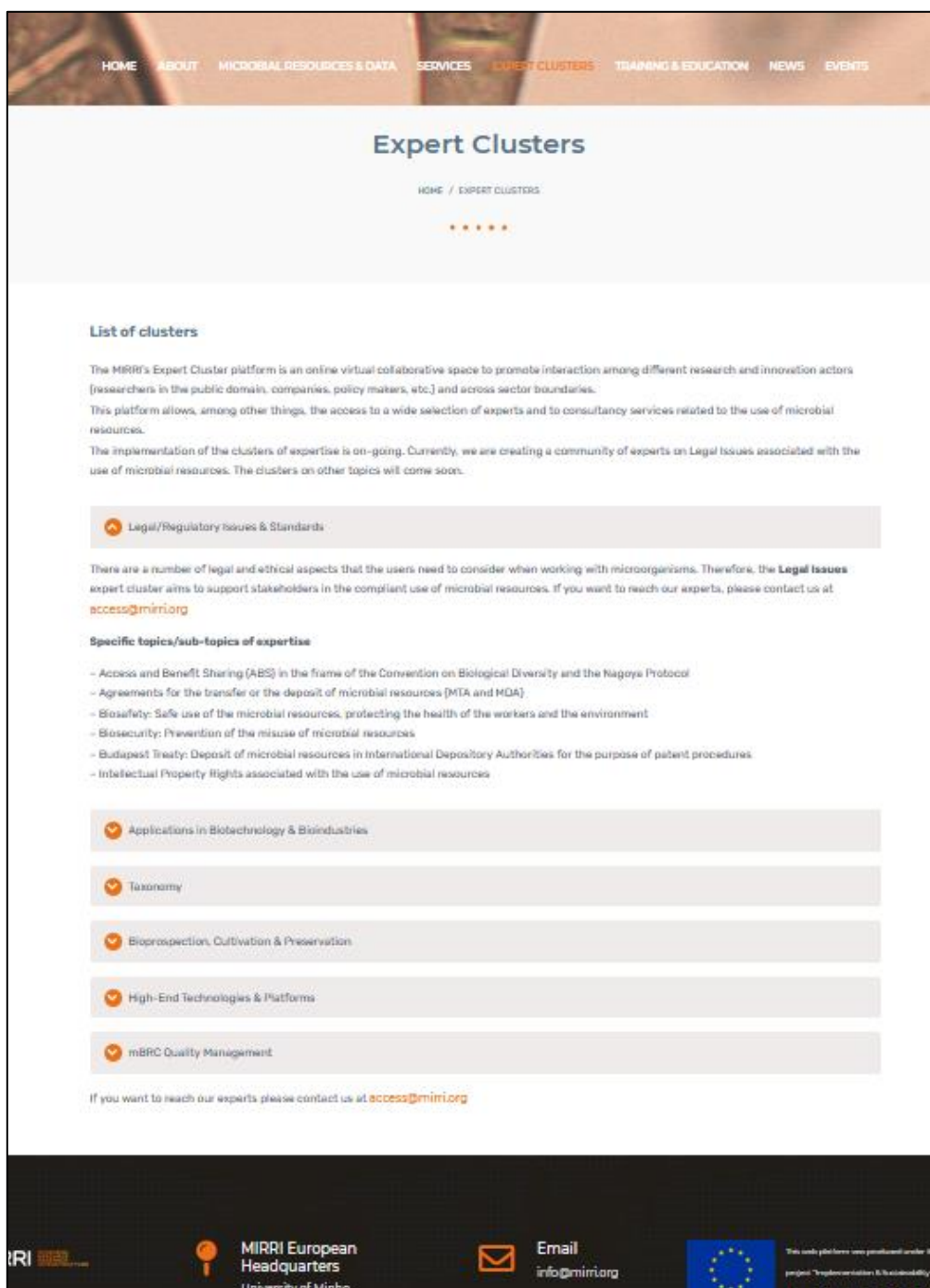


Figure 3-21 –MIRRI’s Expert Clusters module in CWE

The forum

The forum is a software module completely integrated in CWE and implementing the features and functionalities necessary for public discussions and sharing of information related to the clusters of expertise defined in MIRRI and moderated by experts.

It permits the setup of both public and private forums, and the respective management of accessibility rights, depending on the registered user profile. Several profiles were defined by the

MIRRI partners and implemented in the Backend management application for attribution to each new registered user. The actual profiles for the forum are: **Administrator** (all rights), **Moderator** (quality control of answers, answer and delete posts, make sure all posts are responded), **Partner** (MIRRI partners are committed to participate in clusters by signing the partner Charter), **User** (external party that registers and post comments/requests and answers). The mapping of functionalities access per profile was also defined and implemented.

Despite being fully implemented to integrate this preliminary version of CWE, the forum is still in the test phase and in the process of attributing the moderators (one of the existing user profiles). After this phase, it will be made fully available for the CWE users to start interacting with MIRRI experts.

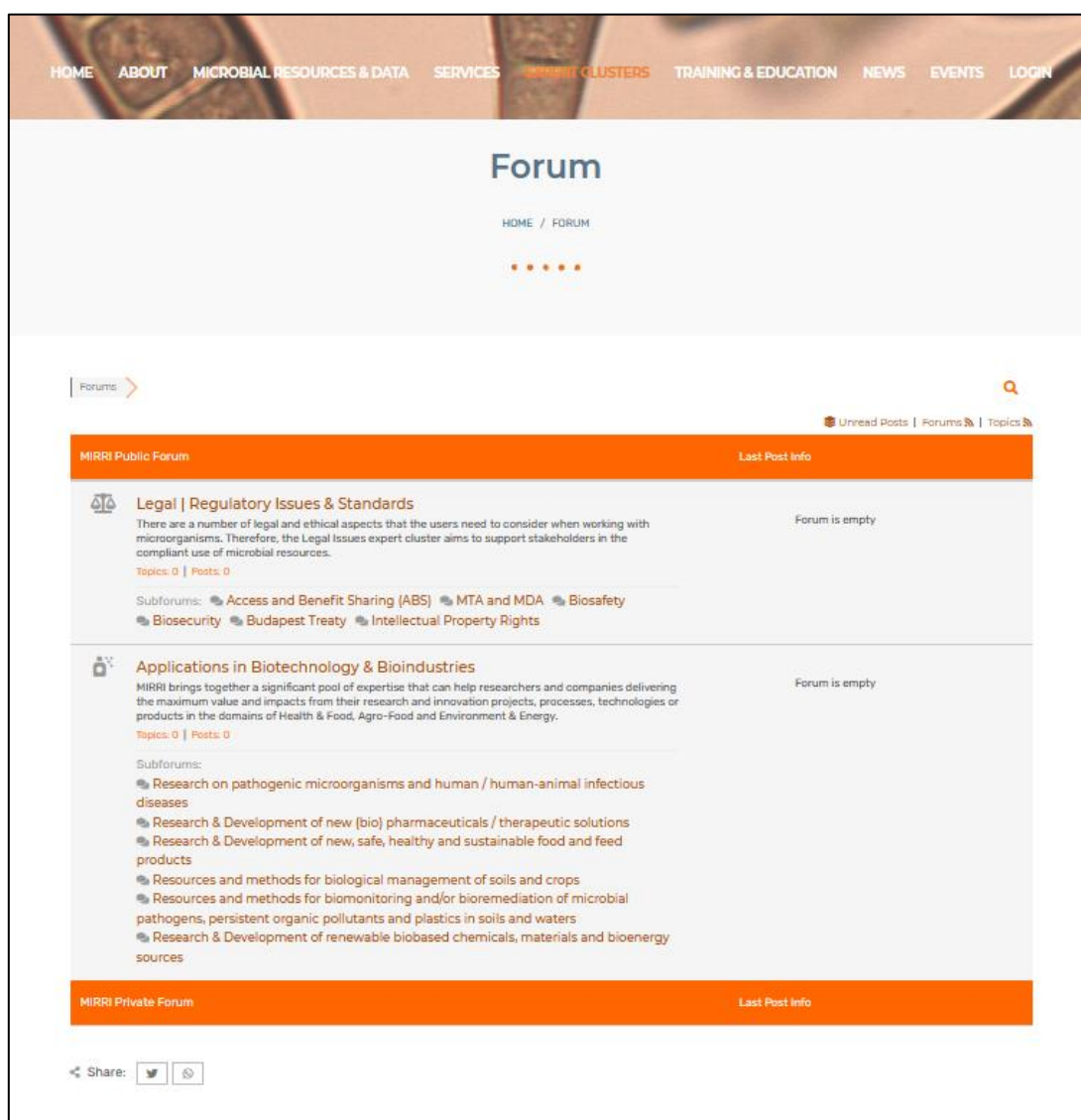


Figure 3-22 – The Expert Clusters forum interface.

Additional features allow, for example, the subscription to forums to receive automatic email notifications related to new posts or the sharing of posts in the most important professional social networks.

The system for management of expertise provision on demand

Another software to integrate the package of tools to be used for MIRRI's expertise provision is a system able to manage requests on a “one-to-one” basis, that for simplicity may be called a “ticketing system”. Apart from the forum, the aim is to make available a tool that permits MIRRI expert clusters to provide specific advices, support and information to MIRRI's stakeholders.

This software module is being implemented by the IT partners of the project. After a process of identification considering the requirements, the [IS_MIRRI21](#) IT partners have selected one open-source solution suiting the basis for implementation of the aimed features and functionalities. This approach complies to the proposed utilization, as much as possible and where possible, of open-source solutions and reusable software. It implies the installation on a MIRRI server. Its integration in the CWE will be totally transparent for the end-user. Furthermore, the user authentication, access and permissions are seamlessly managed by the CWE authentication system.

3.4.2 Module 2 - Events

The CWE, in its actual version, already contains a section to manage events. Via the backend application, the MIRRI Manager (IT officer) may add and modify MIRRI's related events. CWE users may opt for the visual presentation of events as a list, or as monthly, weekly or daily views. For the final version of CWE, subject to the discussion and decision among the [IS_MIRRI21](#) partners, some extensions may be considered, like for example the integration of plugins for event management systems, like Eventbrite for example.

The screenshot shows the 'Events' page of the MIRRI-CWE Platform. At the top, there is a navigation menu with links: HOME, ABOUT, MICROBIAL RESOURCES & DATA, SERVICES, EXPERT CLUSTERS, TRAINING & EDUCATION, NEWS, EVENTS, and LOGIN. Below the navigation is a header section with the title 'Events' and a breadcrumb trail 'HOME / EVENTS'. A search bar and filter options are present, including a calendar icon, two 'Select' dropdown menus, and buttons for 'MONTHLY', 'WEEKLY', 'DAILY', and 'LIST' (which is highlighted in orange). The main content area is titled 'Events' and displays a list of events for 'SEPTEMBER 2021'. Three events are listed:

- European Biotech Week (2021)**: The European Biotech Week comprises a weeklong series of events ... (27 SEP - 03 OCT, 08:00 - 18:00)
- BIOSPAIN 2021**: BIOSPAIN is the largest biotech event organized by a national ... (27 SEP - 01 OCT, 08:00 - 18:00)
- IFIB – International Forum on Industrial Biotechnology and Bioeconomy (11th edition)**: The Italian Cluster of Green Chemistry (SPRING), Assobiotec, the Italian ... (30 SEP - 01 OCT, 08:00 - 18:00)

Each event card includes a calendar icon, a brief description, dates, time, and a 'VIEW DETAIL' button. The footer contains the MIRRI logo, 'MIRRI European Headquarters', an email icon with 'Email info@mirri.org', the European Union flag, and a note: 'This web platform was produced under the workpa... project "Implementation & Sustainability of Microbi...'.

Figure 3-23 – The Events presentation (list view).

3.5 Gate 4 – Training and Education

The Training and Education (T&E) gate of CWE aims to allow access to MIRRI training programs for different categories of users (for example, scientists, industry professionals, young professionals, partners. etc.), contributing for the development of capacities in the scientific community and industrial users.

In the context of MIRRI, this gate aims at providing access, by e-learning methods, to online training courses and seminars. The content covers different aspects of the use of microbiological resources, and the access to official academic schemes, different learning materials and workshops, among others, improving the training for mBRC and Culture Collection professionals, among other potential trainees.

The actual version of the CWE implements features and functionalities to manage and present, as a catalogue, MIRRI's offer of training and education. Both the front-end in the CWE and the back-end management functionalities allow the edition and publication of the most important information for each T&E action, giving direct access to the portal and/or platform where additional information and/or content and e-learning functionalities are available. Furthermore, the entire catalogue is searchable, permitting the user to filter and easily select among the total offer, the training actions more aligned to her/his interest.

This component of CWE has been recently created and is under testing.

The integration of a proper Learning Management System (LMS) is possible but it will be subject to discussions among [IS_MIRRI21](#) partners, as the actual offer of T&E is very heterogeneous in terms of supporting tools, with different MIRRI members using different tools (Blackboard Collaborator, Moodle, ...). This implies standardization among MIRRI members, and may represent additional software licensing costs, which raises financial sustainability questions. To circumvent these constraints and make the MIRRI T&E offer available immediately, the decision was to publish the offer as a catalogue and link the user directly to the platform and LMS where each T&E action is being managed. This way, the institution and the trainers/teachers responsible for each T&E action don't have to get familiar with other platforms than those they are used to, and no additional installations, management and licences are necessary, in addition to those already existing in T&E institutions.

The actual implementation of T&E in the CWE addresses the three modules:

- Module 1 - *On-Site Training*, as it permits to publish, disseminate and give direct access to the contacts and responsible to the T&E.
- Module 2 - *MIRRI Specific Training*, as it permits the dissemination and access to specific training actions, like for example advanced training courses as blended learning combining the format of Small Private Online Courses (SPOC) with on-site training, or the European Specialization Course on Microbial Resource Centres (EuroMiRC).

- Module 2 - *Knowledge Base*, as it will permit the publication of content to support the T&E actions, including video materials to be developed under the IS_MIRRI21 and other types of content.



4. Conclusion and Future Work

4 Conclusion and Future Work

This report is a summary of deliverable 6.2 included in the European Commission management platform. Deliverable 6.2 is a set of software modules and associated content, with the respective backend applications, altogether constituting the actual preliminary version of CWE.

The CWE is constantly being updated with new features and functionalities, as the [IS_MIRRI21](#) partners address, discuss and decide on each Gate.

Important updates and next developments towards the final version will address all CWE Gates. For example, for the Gate for Microbial resources, Data and Services, the MIRRI-IS will be improved with more data and new features, providing the appropriate interfaces for accessibility and interoperability with other platforms. Part of these updates resulted from feedback received from the CCs. Also, for this gate, the additional tools for data validation by the CCs (for virus, plasmids, etc) will be published and made available to all. The work of the ICT team for data FAIRification (exploring synergies with the EOSC-Life project) will also be continued.

The presentation of information on MIRRI services will also be developed and complemented to meet the specification currently in development by MIRRI members in the context of the [IS_MIRRI21](#) project.

The tools for the collaboration and Experts' gate will be updated with new modules and functionalities, like for example the management solution for specific direct support access and provision by clusters experts.

The transversal gate will make available the registration and the profiles of users, implementing the specification for user access rules and rights to the other Gates and tools. The login, registration and password recovery will be made available in Gate 1. This is already under implementation and validation by the [IS_MIRRI21](#) partners and will be made available in the next release of CWE.

For all of these developments and implementations, deliverable *D6.1- Report with the design and technical requirements, characterization and knowledge acquisition of MIRRI* is a reference, in combination with the users and partners' feedback. At a later stage, deliverable *D6.4 - Report with the usability tests' results and user feedback*, will report on the users' feedback and the tests performed for assessing the CWE conformance to the requirements and needs of MIRRI stakeholders, eventually giving hints and clues for future developments and extensions to happen beyond the [IS_MIRRI21](#) project time-frame.



MIRRI IS21

IMPLEMENTATION AND
SUSTAINABILITY FOR
THE 21ST CENTURY

MICROBIAL RESOURCE RESEARCH INFRASTRUCTURE