DiBiCoo Online Information System – Report on Version 1.0

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DiBiCoo – Digital Global Biogas Cooperation
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Executive Summary of D4.2

The purpose of this document is to describe the development process of the DiBiCoo Online Information System further called DiBiCoo Digital Matchmaking Platform (DMP) and present the first version of the platform (working prototype, API version: master-0x2-2-g6c5b8c3), which is publicly accessible online: https://dibicoo-matchmaking-tool.appspot.com/. Within this version all mandatory requirements (except DMP-AR-UAS-003, which will be implemented later, and DMP-GR-BER-003, which is implemented partially) defined in the confidential deliverable 4.1 are fulfilled. Optional (i.e. DMP-GR-DEP-003-2) requirements are to be implemented until the end of the project.

The development of the working prototype of the DMP is done in close collaboration with DiBiCoo project partners, considering remarks and suggestions for the platform operation, design and functionality. For the internal tracking of the development process Trello board (https://www.trello.com) is used. This prototype will be further developed and adjusted throughout the project´s lifetime. Feed-back, comments and evaluations also from stakeholders will be collected during the upcoming T4.3 Application and evaluation of the tool. This process will then be described later in D4.3 Report on the evaluation of the tool.

This deliverable also includes the DiBiCoo DMP user manual.

All impressions, feedback and suggestions how this platform can be further improved can be addressed to the DiBiCoo project team from Latvia University of Life Sciences and Technologies (vitalijs.komasilovs@llu.lv; aleksejs.zacepins@llu.lv).

Summary of the DiBiCoo Project

The **Digital Global Biogas Cooperation (DiBiCoo)** project is part of the EU's Horizon 2020 Societal Challenge 'Secure, clean and efficient energy', under the call 'Market Uptake Support'.

The target importing emerging and developing countries are Argentina, Ethiopia, Ghana, South Africa and Indonesia. Additionally, the project involves partners from Germany, Austria, Belgium and Latvia. The project started in October 2019 with a 33 months-timeline and a budget of 3 Million Euros. It is implemented by the consortium and coordinated by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

The overall objective of the project is to prepare markets in developing and emerging countries for the import of sustainable biogas/biomethane technologies from Europe. DiBiCoo aims to mutually benefit importing and exporting countries through facilitating dialogue between European biogas industries and biogas stakeholders or developers from emerging and developing markets. The consortium works to advance knowledge transfer and experience sharing to improve local policies that allow increased market uptake by target countries. This will be facilitated through a digital matchmaking platform and classical capacity development mechanisms for improved networking, information sharing, and technical/financial competences. Furthermore, DiBiCoo will identify five demo cases up to investment stages in the 5 importing countries. Thus, the project will help mitigate GHG emissions and increase the share of global renewable energy generation. The project also contributes to the UN Sustainable Development Goals (SDG 7) for 'Affordable and clean energy", among others.

Further information can be found on the DiBiCoo website: www.dibicoo.org.

Contents

List of Abbreviations

API	Application programming interface
CSS	Cascading Style Sheets
CSV	A comma-separated values
D	Deliverable
DMP	Digital Matchmaking Platform
EU	European Union
GDPR	The General Data Protection Regulation
KOM	Kick-off Meeting
LLU	Latvia University of Life Sciences and Technologies
SDG	Sustainable Development Goals

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1   Introduction to Digital Matchmaking Platform development process

DiBiCoo aims to mutually benefit importing and exporting countries through facilitating dialogue between European biogas industries and biogas stakeholders or developers from emerging and developing markets. This is supported through a digital matchmaking platform (DMP) and face-to-face capacity building mechanisms for improved networking, information sharing, and technical/financial competences.

There is currently no ready-to-use solution for efficient business partner matching in the biogas sector, therefore one of DiBiCoo project tasks is to develop such a digital matchmaking platform (DMP). This platform facilitates bi-directional partnership and is considered as an additional marketing option for EU companies as well as an asset for stakeholders in the importing countries to network and connect with European stakeholders (see Figure 1).
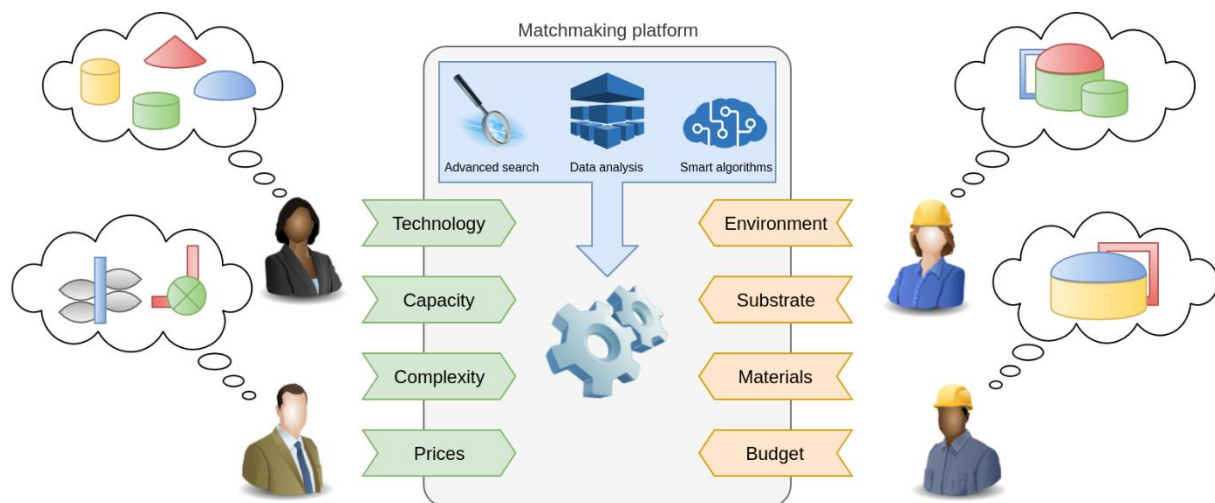

Figure 1. Concept of the matchmaking process

The DiBiCoo project partner LLU (Latvia University of Life Sciences and Technologies) is responsible for the DMP development process and deployment of the platform during the DiBiCoo project lifetime.

DMP follows the Agile development process, based on an analysis of the end user needs and consultations with the project partners and potential stakeholders. The tool development process is iterative, where the final solution evolves through close collaboration between cross-functional teams. That means that within the development process end-user groups will be constantly communicated and intermediate development results will be discussed. Valuable feedback and suggestions will be considered, discussed with stakeholders and integrated into the solution.

Within this report a developed platform prototype will be presented in a close relation to defined requirements, which are summarized in the confidential DiBiCoo deliverable 4.1. - The basic requirements of the digital matchmaking platform were thematically grouped as follows:

- General requirements:
  - o deployment requirements;
  - o user role requirements;

- o front-end requirements;
- o back-end requirements.
  - Matchmaking requirements:
    - o profile management requirements;
    - o category management requirements;
    - o global partner map requirements;
    - o matchmaking process requirements.
  - Security requirements:
    - o user authorization;
  - Additional requirements:
    - o user activity statistics;
    - o additional information.

2 General requirements

2.1 Deployment

This section is dedicated to describing the DMP deployment process. The deployment of a platform is its transformation from a packaged form to an operating and working state. Deployment implies implementation of a product into a production environment with corresponding level of service and reliability.

There are many system deployment options available nowadays. A system or a platform can be deployed on a local IT infrastructure (local server), on a rented infrastructure or in a cloud. The aforementioned solutions have both advantages and disadvantages. Local servers provide fast access to data; however, privacy concerns and security may be the issue. Rented infrastructure can be an option when the server in a particular location is preferred, but local servers cannot support large data flow. Rented infrastructure requires a trustful and reputable service provider, which can be costly. The last option is to use a cloud. Most cloud platform service providers also provide additional connective services to ease data input/output, organize data flow and support additional security options. Cloud platform cost is based on the number of requests; therefore, it can be fairly cheap for small-to-average web systems.

DiBiCoo DMP is deployed on a Google Cloud Platform - https://cloud.google.com/ (reference to requirement DMP-GR-DEP-001, DMP-GR-DEP-001-1). Google Cloud Platform, offered by Google, is a suite of cloud computing services that runs on the same infrastructure that Google uses internally for its end-user products. Google Cloud Platform provides future-proof infrastructure, which is secure, global, high-performance, cost-effective and constantly improving. Compliance with the GDPR is a top priority for Google Cloud (https://cloud.google.com/security/gdpr). Within the Google Cloud Platform, it is possible to choose different services, networking options, storage approaches etc. for the platform development and deployment.

At the end of the project (30.09.2022) the ownership of the DiBiCoo platform will be transferred to the Project partner FVB (German Biogas Associations - Fachverband Biogas e.V.) (reference to requirement DMP-GR-DEP-002), whilst during the development phase the platform's ownership falls under LLU team (Latvian University of Life Sciences and Technologies).

Ownership transfer for a Google Cloud Platform can be performed using the following steps:

1. share the project with a destination account using Permissions/Add Member/Is Owner,

2. accept invitation from destination account,
3. remove yourself from this project. (Permissions/Select your account/Remove),
4. a change of the billing account is needed too, in order to link it to the billing account of the new user after the transfer of ownership is completed.

It is possible to transfer DiBiCoo platform ownership options to any other user.

The DiBiCoo DMP is developed as an online platform which is constantly available online from any geographical location, where an internet connection is available (reference to requirement DMP-GR-DEP-003). Developers of the DMP are not responsible for the infrastructure where DMP is stored and deployed. Google Cloud Platform is managing the required resources needed for the DMP successful operation.

The DiBiCoo DMP consists of a back-end module and a front-end module. The back-end performs all required data processing and storage functionality and provides a RESTful API supporting all DMP functions. The front-end, in essence, is publicly available graphical user interface served as a static single page Web application. The front-end is communicating with the back-end using the provided API for accessing different data sets, structures and data logic (reference to requirement DMP-GR-DEP-004). By the definition API (application programming interface) is a computing interface which defines interactions between multiple software intermediaries. It defines the kinds of calls or requests that can be made, how to make them, the data formats that should be used, the conventions to follow, etc.

DiBiCoo DMP API follows best practices of RESTful API development and utilizes method and resource concepts from HTTP protocol to express user intentions. A few examples of available endpoints within the API can be found in Table 1:

Table 1: Available endpoint within the DMP API

Method	Resource	Description
GET	/api/enterprises	List of public company profiles
GET	/api/enterprises/12345	Details of public company profile with ID=12345
GET	/api/user/enterprises	List of company profiles registered by authenticated user
POST	/api/user/enterprises	Create new company profile for authenticated user
GET	/api/user/enterprises/98765	Details of company profile with ID=98765
PUT	/api/user/enterprises/98765	Update details of company profile with ID=98765
DELETE	/api/user/enterprises/98765	Remove company profile with ID=98765
GET	/api/user/enterprises	List of company profiles available for platform administrators

The developed Web-based user interface uses the aforementioned back-end API (reference to requirement DMP-GR-DEP-005), and can be publicly accessible by the provided link: https://dibicoo-matchmaking-tool.appspot.com/. The front-end will be described in more detail in chapter 2.3 Front-end.

Multiple services are integrated into the DMP. These services are considered mandatory for this type of web platform and include: user authentication, Google Maps service integration,

Google Cloud Storage integration for storage of user files and images, Google Datastore integration for platform data storage.

The online statuses of these services are managed and provided by the Google Cloud Platform (reference to requirement DMP-GR-DEP-003-1). The operation of these services may be limited temporarily or permanently for reasons such as maintenance work, systems updates, capacity issues or because of other Force Majeure circumstances.

The parameters for the operation of these services can be changed later by the new owner, aforementioned FVB, who will also be responsible for platform's maintenance and support.

2.2 <u>User roles</u>

Within the developed DiBiCoo DMP different user roles are available (reference to requirement DMP-GR-UR-001): platform administrator, authenticated user, anonymous user.

It is possible to use the system as an anonymous user for information browsing and searching for company profiles and applications. Log In / Sign Up is necessary for user authentication and it opens access to such functionality as creating a company profile and/or publishing an application/business offer and thereby participating in the matchmaking process.

The platform administrator is responsible for the management of the company categories, approving company profiles and reviewing applications/business offers. There is no limit in the number of administrators. The administrator(s) for the project lifetime will be defined during the next SCM. After the project ends, FVB will be responsible for the Administrator user definition. See Figure 2 below for a summary of all user roles. Each function requires a minimal authorization level, for example, any user can view published company profiles, but only authenticated users can create their own, and only administrators can approve or reject them.
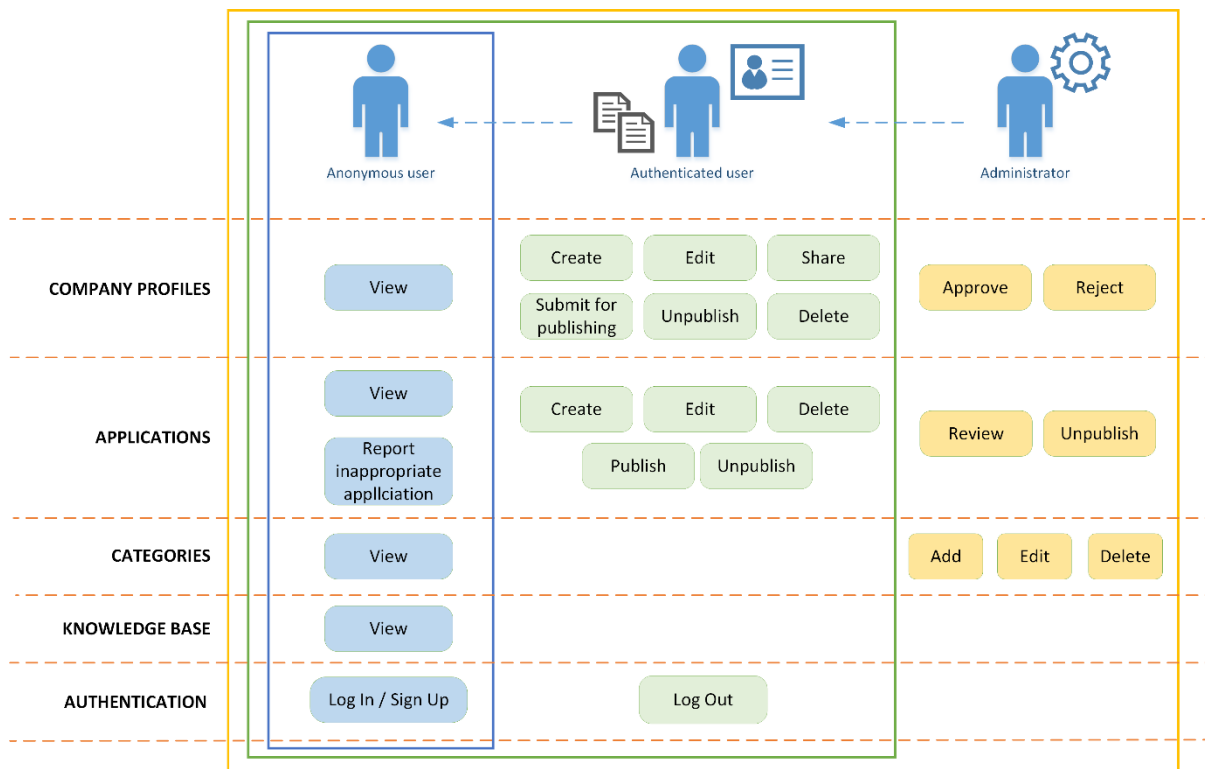
Figure 2. Summary of a user roles within the DMP

DMP's functionality is personalized based on the user's role (reference to requirement DMP-GR-UR-002). If the administrator role is mainly used for management purposes (see Figure 3, squared with blue), then authenticated users can create a new content in the platform, like new company profile creation and submission of applications (see Figure 3, squared with red).
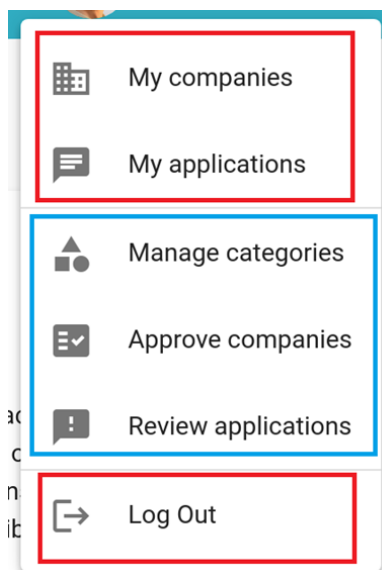

Figure 3. Possible user functions in the DMP

At this moment all published content on the platform is available to any user, including anonymous users (reference to requirement DMP-GR-UR-002-1). The parts of the information requiring higher security and/or privacy levels are still under discussion. These features can be implemented in the future on demand.

It is possible to define an unlimited number of administrator users for the platform. DMP solution uses authentication and authorization services provided by Auth0 universal platform (https://auth0.com/). Auth0 is a ready-to-use platform with a wide range of built-in user authorization related functionality and integration options. Auth0 is compliant with the GDPR (https://auth0.com/docs/compliance/gdpr) In particular, the DMP uses specific authorization flows for Web applications and completely delegates user credential handling and access administration functionality to the platform. From a development perspective usage of Auth0 platform removes the need to create custom solutions for secure user credential storage, user experience for Sign Up, Log In, Password recovery flows, and simplifies administration tasks.

The administrator role is assigned in the Auth0 platform by the DMP developers (reference to requirement DMP-GR-UR-003). The process of assigning the administrator rights is as follows: the user is invited to the Auth0 platform, and after his registration and invitation acceptance, the DMP developers can assign specific Administrator rights to this user.
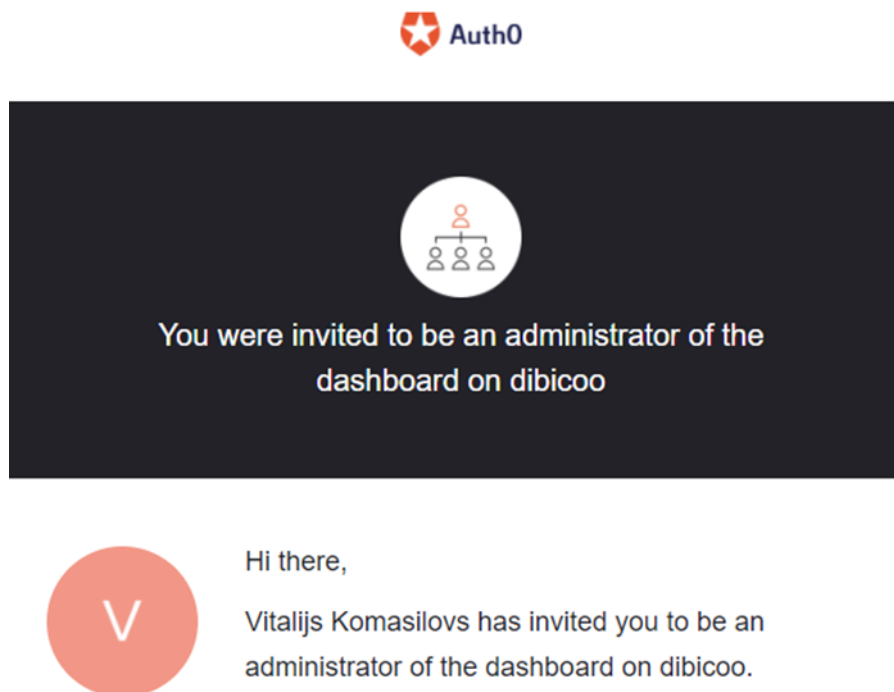
Figure 4. Example of Auth0 invitation to be an administrator

After the invitation, the user is requested to accept or decline the invitation (see Figure 5).
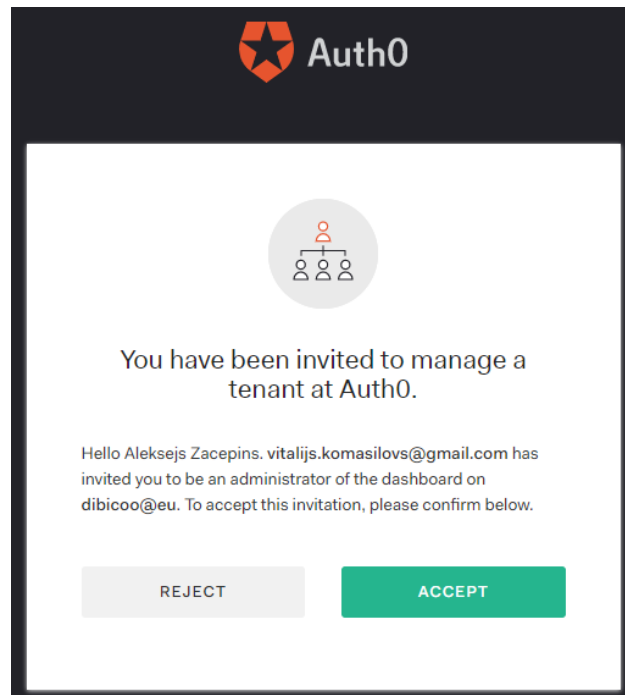
Figure 5. Example of the screen to accept or reject the Auth0 invitation

The DMP is not limiting the possible number of administrator and authenticated users (reference to requirement DMP-GR-UR-004).

2.3   Front-end

At this stage DiBiCoo DMP web based front-end user interface is developed (reference to requirement DMP-GR-FER-001).

Different technologies and frameworks are used for the development of the user interface: Angular version 9 and Angular Material design version 9. Angular is a TypeScript-based open-source Web application framework led by the Angular Team at Google and by a community of individuals and corporations. Material is an adaptable system of guidelines, components, and tools that support the best practices of user interface design.

During the development phase of the platform the incremental development approach was used (reference to requirement DMP-GR-FER-002). There is a production version of the DMP built from a stable source code branch and implemented for the end users. The development versions are deployed on internal infrastructure and are used for error fixing and/or testing of new features during the development process.

Source code of the platform is kept within Git version control system of Bitbucket service (https://bitbucket.org/) and follows GitFlow code management approach where master code branch is reserved for stable code ready for production, and feature / bugfix branches are used during development and local testing.

To minimise system downtime during releases, a new version is installed in background mode and only then traffic is migrated to the new version. In case of failure previously working versions are available for service (reference to requirement DMP-GR-FER-003).
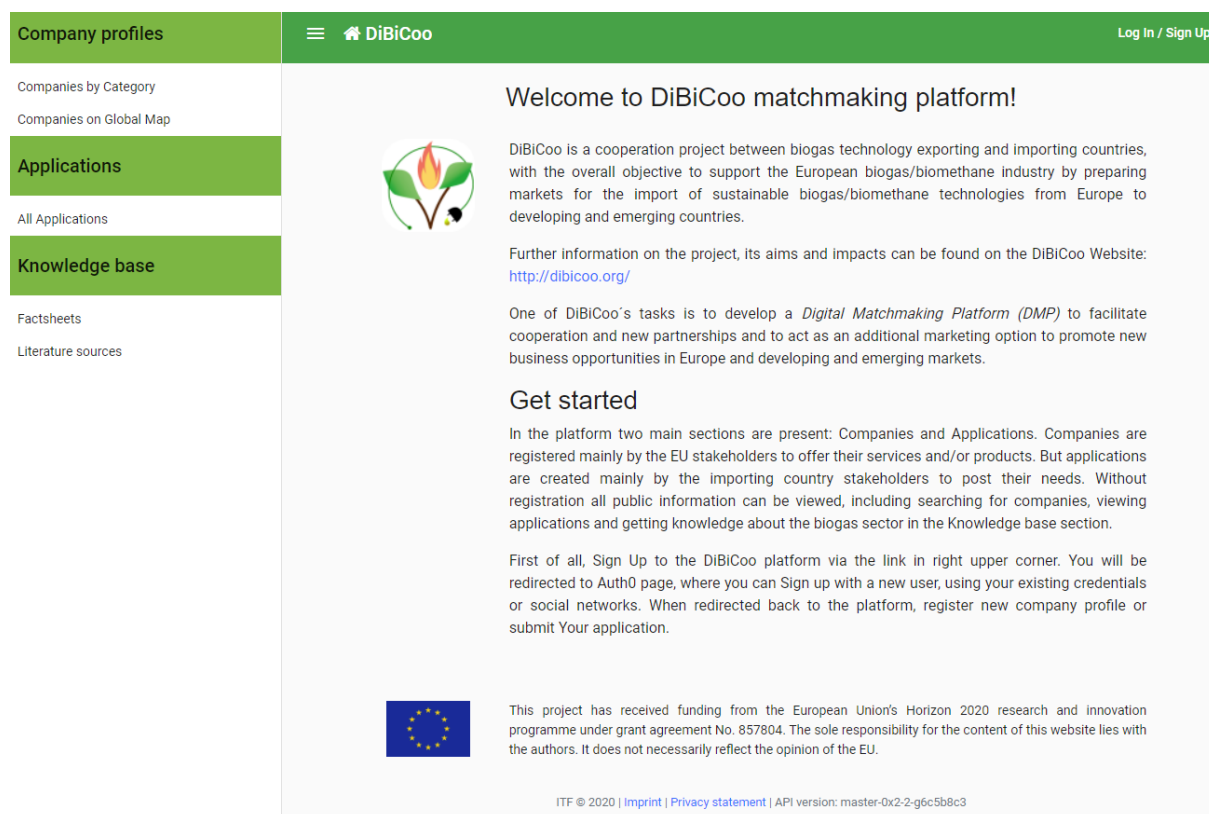
Data is stored separately from the Front-end and Back-end module, therefore, it is not affected by rolling updates. Nonetheless, to completely exclude the risk of losing data, the database is being backed up before rolling each update.

The Front-end is developed to be used on different devices with different screen sizes and on different platforms like desktop, mobile, tablet. The Front-end design is built to be responsive (reference to requirement DMP-GR-FER-001-1). Responsive web design is an approach to the web design that makes web pages render well on a variety of devices and window or screen sizes.

During the Front-end development, the use of common UI control and components that are easy to access and use are considered (reference to requirement DMP-GR-FER-001-2). This enables the usability of the developed user interface. Visual design is based on the DiBiCoo developed visual strategy.

The first page which is displayed to users when they reach DMP is the introduction or front page (reference to requirement DMP-GR-FER-004).

DMP initial front page is shown below:
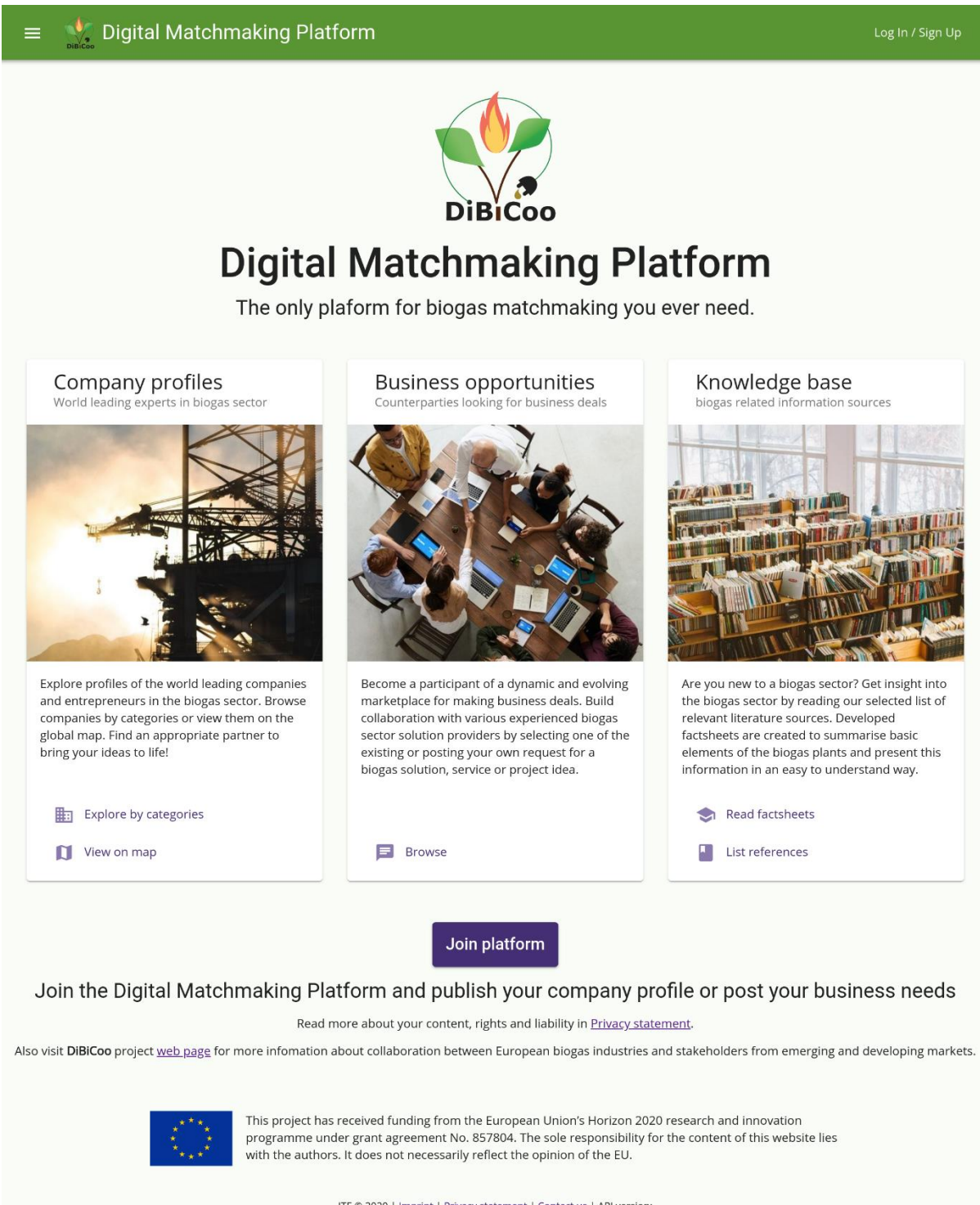
Figure 6. DMP front page

On the left side (Menu) the Company profiles, Applications and Knowledge base sections are displayed. In the middle static information is provided, which includes basic information about the DiBiCoo project, a link to the DiBiCoo website, information about the DMP itself and some elements that are required by the EU (logo, funding information). At the bottom, the API version is displayed together with an Imprint and Privacy statement.

During a discussion with all project partners some changes to the front page were suggested. One important change was also related to the title of the ´Application section´. The consortium agreed to rename this section into ´Business opportunities´. See updated front page below:

Figure 7. Updated front page of the DMP

2.4 **Back-end**

This section is dedicated to describing basic Back-end development features. In software engineering, the terms Front-end and Back-end refer to the separation of concerns between the presentation layer (front end), and the data access layer (back end) of a piece of software.

Within the DMP back-end is considered as the operations for the DMP graphical user interfaces of other external tools.

First feature is the import of the initial company category list that is accepted by the Project partners (reference to requirement DMP-GR-BER-001). The number of possible categories is not limited. Each category also supports sub-categories without any limitations. Category list is imported from the company survey summary, which is provided in the .csv format. Basically, this initial list should be imported only once as categories can be managed also in the DMP front-end by the platform administrators.

Import feature is developed also for the initial company profile import (reference to requirement DMP-GR-BER-002), as first input for the platform is collected during the Stakeholder survey which is conducted within the Work Package 2 and Task 2.1 (https://www.survey-monkey.de/r/5KHT7YP). Company profiles and contact details provided during the survey are imported to the DMP from the survey summary .csv file. After the platform's deployment, each company's responsible person will get a notification to access, modify or delete inserted data.

One of the main values of the DMP is data that is provided by the platform users. In order to ensure data integrity, it is required to perform data backups constantly (reference to requirement DMP-GR-BER-003). In information technology, a backup, or data backup is a copy of computer data taken and stored elsewhere so that it may be used to restore the original after a data loss event. At this moment, while DMP is not widely used, data backups are performed manually in the Google Cloud Platform using the Datastore export function. Exported datastore can also be saved locally for increased safety. It is planned to implement automatic backup of data on a daily basis in one of the future releases.

The back-end data can be accessed by using the developed API (reference to requirement DMP-GR-BER-004). These API can also be used by external systems in order to manipulate (read, create, modify) data from DMP. The Front-end Web application is using the same API for its functionality.

Creation and editing (reference to requirement DMP-GR-BER-005) of the company profiles requires the user to be authenticated using Auth0 authentication service which also provides the possibility to use Google Account as user identity.

The company profile life cycle statuses include: draft, pending, published, rejected (reference to requirement DMP-GR-BER-006). Created company profile, at first, is in "draft" status, and requires a consent from the profile creator to publish it. After consent, the company profile becomes "pending", and is awaiting evaluation from the DMP administrator. A company profile is published online only after the DMP administrator reviews and accepts it. If there is some inappropriate information (such as misuse of logo or counterfeit and malicious information) the administrator can reject the publishing of the company profile (reference to requirement DMP-MMR-PM-010). In case of rejection, the cause of rejection is provided to the company profile creator.

3 Matchmaking requirements

3.1 Company profile management

One of the main authenticated user functions of the DMP is creation and publishing of the company profile and this section will describe the company profile creation process.

Company profile creation is necessary for a successful matchmaking process in the future. A digital company profile is like a business card with primary information and data about the company which takes part in the digital matchmaking process.

Within the DMP, any authenticated user can create a company profile by filling in the registration form (reference to requirement DMP-MMR-PM-001).

This company registration form is divided into several sections with one or several input fields (fields marked with * are mandatory):

- Basic information
    - Name of the company*
    - Company profile
- Address information
    - Country*
    - City
    - Street and house number
    - Zip code
    - Checkbox to display company on the global map
- Contact information
    - It is possible to add different types of contact information: Phone, E-mail, Facebook, Twitter, LinkedIn, Other (at least one contact information is mandatory)
- Additional information
    - Website
    - Reference projects
    - Additional information
    - Inclusion of the company logo image
- Related categories
    - It is needed to check related company categories (at least one category is mandatory)
- Publishing consent*
    - Checkbox to approve that specified information is correct and can be published in DMP

The company profile is published online only after the DMP administrator reviews and accepts it (reference to requirement DMP-MMR-PM-009). Key information about the company (name, logo, contacts) is validated by the DMP administrator to prevent the abuse of property. The rest of the information is considered to be the user's responsibility.

Figure 8. Company registration form

Authenticated users can edit their previously created company profiles at any time (reference to requirement DMP-MMR-PM-002). If significant changes (example: change of the company title) are made to the published company profile, then approval by the DMP administrators is needed to re-publish the profile.

Company profile managers can unpublish the already publicly available company profile (i.e. the one approved by administrator previously) by unchecking the Checkbox in the Publishing section of the company profile (reference to requirement DMP-MMR-PM-003, DMP-MMR-PM-007). If a company profile should be published once again, a checkbox should be checked and approval procedure done by the DMP administrators should be performed again, like it is with a new company profile registration.

Company managers can delete the company profile at any time (reference to requirement DMP-MMR-PM-004). This operation can be done within the editing company profile and clicking the button "Delete". Delete operation will irrevocably delete all the information from the Company profile.

All managemental operations (creation, modification, deletion, sharing) with the company profile can be done only by the company profile manager (reference to requirement DMP-MMR-PM-005).

DMP does not limit the number of company profiles per user (reference to requirement DMP-MMR-PM-006). It means that one user can manage multiple company profiles.

There could be a situation, when an existing company profile manager has to be changed or an additional user should be added to the company profile manager list of the specific company. Within the DMP this is achieved through the company profile sharing option (reference to requirement DMP-MMR-PM-008). Company profile managers can share the existing company profile with any other DMP authenticated user by sending a special one-time link, which is auto-generated by the platform. When the link is activated by the target user, he is asked to accept the invitation to become a Company profile manager of the specific Company. Each company manager can view the list of active managers and if need change it: create new invitation, remove obsolete managers, leave company profile management himself.

It should be emphasised that content uploaded to the Company Profile will not systematically be pre-checked by DMP developers and/or administrators in respect to their content. Therefore, DMP developers and/or administrators cannot be responsible for the validity, legitimacy, accuracy, reliability, actuality, adequacy and/or completeness of the Profile Information.

3.2   Category management

This section is dedicated to the platform category creation and management within the DMP. Categories are used to describe the companies, their fields of expertise and afterwards will be used for matchmaking.

For the DMP administrator it is possible to create new root categories and subcategories of already existing categories (reference to requirement DMP-MMR-CM-001, DMP-MMR-CM-004). This can be done in the Manage categories section of the administrator user. While creating a new category Title (mandatory field), Description and Image can be provided.
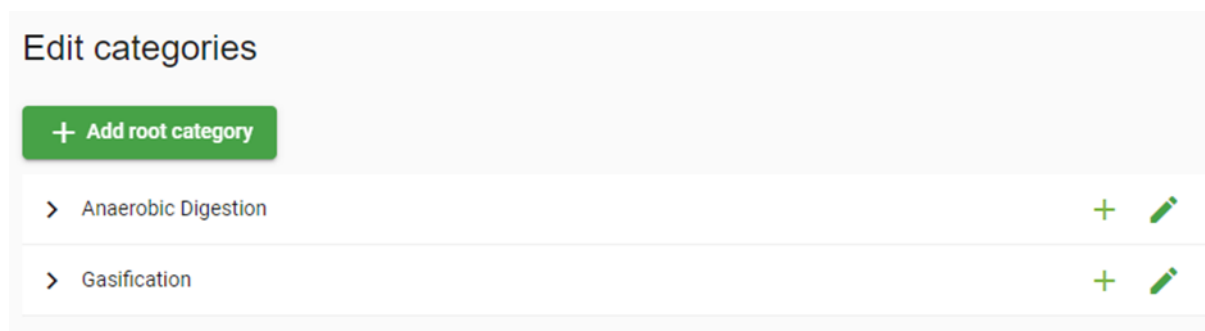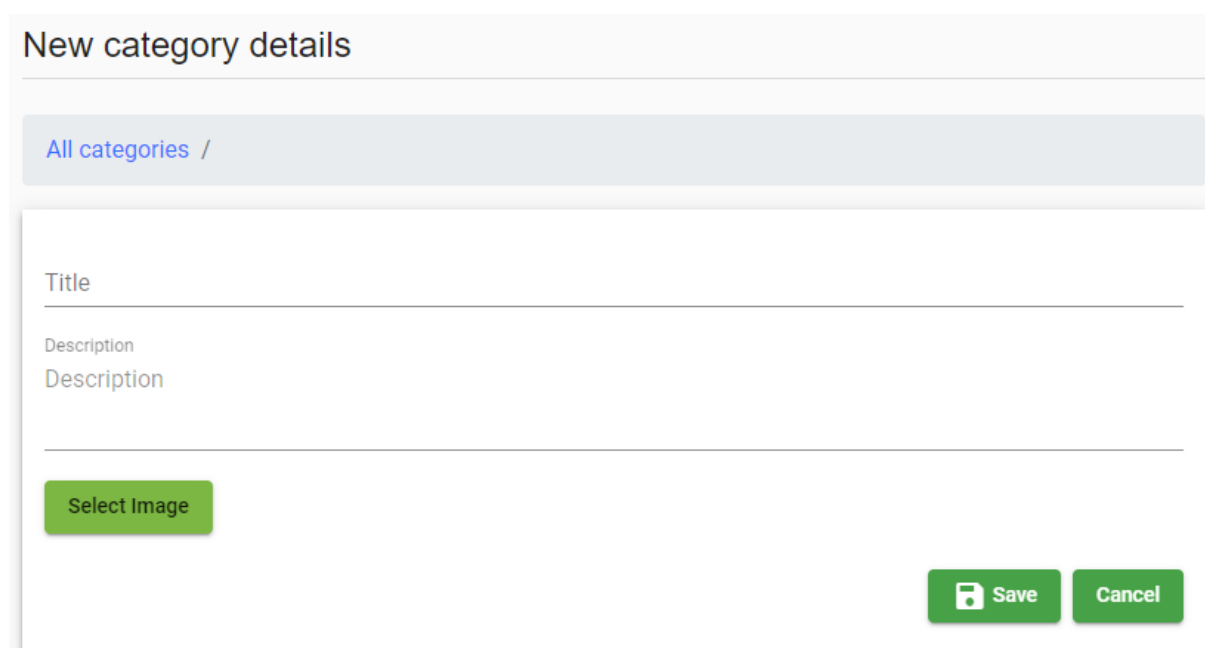
Figure 9. Category management

Figure 10. Definition of a new category

To ease the process of category management, initial categories are predefined in the DMP (reference to requirement DMP-MMR-CM-003). There are two root categories defined: Anaerobic Digestion and Gasification and then there are several layers of sub-categories.

3.3 Global partner map

One of the developed DMP sub sections is the Company Global Map (reference to requirement DMP-MMR-GPM-001). This map is developed to visualise the published company profiles on the global map and to enable the company profile search by the geographical location.

This feature is not mandatory to all company profiles and company profile managers can decide if they want the company profile to appear on this map (reference to requirement DMP-MMR-GPM-002). Users can filter companies which are shown on the map by using category filters (reference to requirement DMP-MMR-GPM-003).

For better user experience different colour schemes are implemented on the Global Map to distinguish between main company categories (reference to requirement DMP-MMR-GPM-004). Company placeholders of companies working in the anaerobic digestion sector are

marked with red whereas, companies working in the field of gasification technologies are marked in green.

3.4 Matchmaking process requirements

One of the main purposes of the developed DMP is to enable matchmaking between European biogas industries and stakeholders from biogas markets in emerging and developing countries and exporting countries. Currently in this first prototype level system, only basic matchmaking options are developed, but advanced algorithms will be further investigated and implemented online until the DiBiCoo project end.

For now, DMP users can search for a particular company using the search option (reference to requirement DMP-MMR-MMPR-001) or use a filtering engine (reference to requirement DMP-MMR-MMPR-002) which enables finding a registered company by browsing different company categories.

3.4.1 Security requirements

Each system or platform should be secure in regard to the user data safety and user browsing experience. Security measures are provided by the Google Cloud Platform and use user authentication service Auth0. Both platforms are GDPR compliant. User authorization and authentication process for the DMP is managed by external credential management service Auth0 (reference to requirement DMP-SR-Auth-001, DMP-SR-Auth-001-01). Auth0 provides the simplest and easiest to use User interface tools to help administrators manage user identities including password resets, creating and provisioning, blocking and deleting users. It means that DMP is not dealing with the user authorization and authentication process. The process for user authentication is demonstrated below in Figure 11:
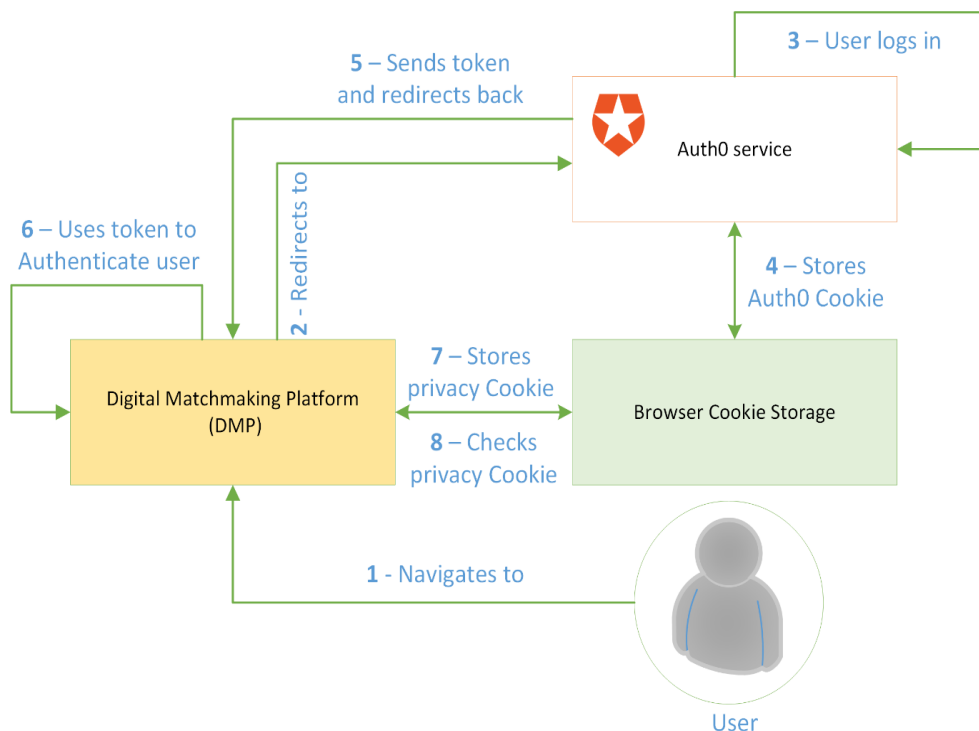

Figure 11. User authentication process

3.4.2 Additional requirements

One feature that was requested by the potential platform users is the monitoring of a user's activity on the platform. In essence, company representatives would like to get an anonymised summary of company profile visits.

Within the DMP the function to count company profile clicks by the DMP users is implemented. This number is shown next to the company profile card to the company manager (reference to requirement DMP-AR-UAS-001). It is possible to show not only the number, but also group it by the country of origin or provide additional anonymised information (reference to requirement DMP-AR-UAS-002). This can be done using the cookies (not implemented at this stage). In case this functionality will be used later on for the DMP, the users will be informed about the use of these cookies immediately.

3.5 Additional information

As the development of the DMP is an agile process, new functional requirements can arise during the development phase. The development team is trying to implement new features as fast as possible to get feedback from the users. There are many additional features available in the DMP.

One section of the DMP is dedicated to act as a Knowledge base of the biogas sectors and markets (reference to requirement DMP-AR-AI-002). This section includes various Factsheets on biogas technologies previously developed by the DiBiCoo partners, as well as reports and analyses on market and framework conditions in Ghana, Ethiopia, South Africa, Indonesia and Argentina, as well as information on different funding opportunities for biogas projects and information on the European biogas market (reference to requirement DMP-AR-AI-001). Fact-sheets are organised with a navigation option (browsing Next, Previous) and provide the possibility to be downloaded as a PDF file (reference to requirement DMP-AR-AI-002-1).

4 DMP Business opportunities section

During the development process of the DMP, stakeholders defined a new requirement, that target country stakeholders also would like to actively participate in the platform. Stakeholders would like to publish so-called advertisements or business opportunities, describing particular services, products or a biogas project.

As a result, the so called "Business opportunities" section was developed. Submission of a new advertisement is available to authenticated users only. The creation form is divided into several sections with one or several input fields, fields marked with * are mandatory:

- General information
  - Roles of the counterparty*
  - Categories of companies*
  - Project idea*
  - Target country*
  - Target city
  - Target address

        o   Application due date*
- Contact information
  - o   Name of contact person*
  - o   Name of represented organization or company
  - o   Country*
  - o   City
  - o   Address
  - o   It is possible to add different types of contact information: Phone, E-mail, Facebook, Twitter, LinkedIn, Other (at least one contact information is mandatory)
- Detailed information
  - o   Relevant details about feedstock
  - o   Details about planned biogas utilization
  - o   Additional attachments relevant to the application
- Publishing
  - o   Checkbox to approve that specified information is correct and can be published in DMP

After filling in all the mandatory fields and checking the "Publishing" button "Save and Publish" should be clicked to publish the advertisement. Advertisements are not being reviewed by the DMP administrators and published without any content/liability check, but if any issues are found, afterwards they can be unpublished by the creators or by the platform administrators. Furthermore, any user can file a report to the platform administrators by clicking the Report button.
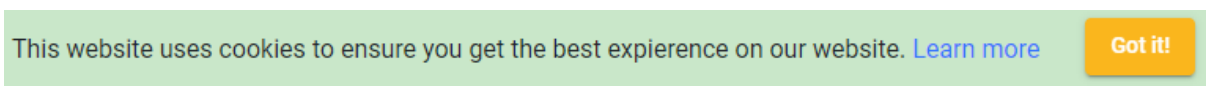
All user created advertisements are shown in the My application menu and are grouped by status (Published, Draft, Expired). All advertisements have an expiration date and after this date they are automatically removed from the Published list and transferred to the Expired list.

All published advertisements are available for any DMP user, including anonymous users.

5 <u>Cookies</u>

DMP meets the requirements of the GDPR, and one of the requirements is to inform users about the cookies collected during the browsing section. All users that would like to use the DMP platform are informed on the use of cookies and must accept the Privacy policy accepting DMP Cookies in order to be able to use the DMP.

On the DMP, cookie consent is presented to the user:

This website uses cookies to ensure you get the best expierence on our website. Learn more   **Got it!**

Figure 12. DMP Cookies consent message

At this moment no technical information is gathered from the user, but in the future it is planned to anonymously collect the regional location of the user (by the IP Address) and keywords used in the search fields. This will help to improve the DMP and provide summaries to the DMP company profile managers.

The Privacy statement further outlines this and is available on the DMP: DMP Privacy statement

In the future digital matchmaking platform functionality will be extended based on discussions and feedback of the stakeholders and end-users during the local workshops and other events, where DiBiCoo platform will be presented.

6 **Platform testing**

In general, software product testing is a method to check whether the actual product is in line with defined requirements and to ensure that software is operating without errors and is defect free. Testing involves execution of different components by manual or automated tools. The purpose of software testing is to identify errors, gaps or missing requirements in contrast to actual requirements.

Software testing is important because any regression bugs or errors in the software can be identified early and can be solved before delivery of the software product. Properly tested software product ensures reliability, security and high performance which further results in time saving, cost effectiveness and end-user satisfaction.

Typically, testing is classified into three categories:

- Functional testing
- Non-Functional testing (or Performance testing)
- Maintenance

At this stage of the DMP development process (when the overall platform functionality and structure is not fully established and is subject to change), the main focus is made on functional testing via unit tests. This type of testing minimises the risk of introducing regression errors while new features are implemented (when old existing functionality is broken by side effects of new functionality). Both, front-end and back-end are checked by unit tests, respectively 147 and 131 automated tests. Code coverage report states 85% and 81% statements covered by unit tests.

7 **User manual**

User manual or a user guide, also commonly called a technical communication document is developed for the DiBiCoo digital matchmaking platform to give assistance to potential users of the platform. The user manual describes the basic functionality of the platform and gives step-by-step instructions for completing a variety of tasks.

As the DMP development process is an agile process, the user manual also is a dynamic document, which changes together with the platform itself.

The link to the actual DMP user manual (ver. 09.09.2020) is here: DMP user manual

The DiBiCoo Consortium

COORDINATOR

PARTNERS FROM EXPORTING COUNTRIES

PARTNERS FROM IMPORTING COUNTRIES

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