



D8.2 Online content repository

Project knowledge reservoir

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List of Abbreviations

CFD	Climate Farm Demo
NC	National Coordinator
PDF	Pilot Demo Farm
WP	Work Package
CFA	Climate Farm Advisors
DMP	Data Management Plan
UX	User Experience
UI	User Interface

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Abstract

This deliverable explains how Online knowledge repository will support Climate Farm Demo project activities during the following 7 years of the project duration. The aim of this document is to describe and elaborates on how Online knowledge repository is being built, how it will be managed, sustained and used by the end users, i.e. project consortium, farmers, advisors, researchers and all other interested stakeholders.

Development of this repository started by thorough research on users' needs and requirements regarding online infrastructure. As this product will intersect with all Work Packages and many project Tasks, it was important to find out as much as possible about what project members needs were and how they thought this repository should be done to satisfy their needs. Key users mapping was followed by two methodological researches, one focused on project partners representatives, national coordinators and advisors who were questioned via online questionnaire, while Work Package leaders and project coordination and management team was approached with in-depth one on one interviews. Questionnaire was the same in both formats as data could be compared and analyzed. The results of this research gave the development team the direction and guidelines on how to approach this task. Results were validated with the project management and coordination team.

After research, the document describes the main segments of the Repository which should be made to serve the needs of the project. It was not hard to realize what the most important elements of Online content repository should be. The first three segments of the list are: contents related to Demo farms and actors; contents related to Demo events; and contents related to Mitigation and Adaptation solutions. In addition to these three pages, other informative pages will follow. These will be described in more detail in document D8.3, which deals with the development of the project website.

Important part of the online content repository is the website's Backoffice, or segment of the Repository not publicly available to everyone, but is intended to be used by the project consortium, and external project partners that participate in project activities. This content will be accessible only for registered users with login credentials and will be a place for exchange of classified project data, reports, with option to monitor some of the project KPIs and have an overview on the project progress.

Data management of the Online knowledge repository is based on Data Management Plan described in Deliverable 9.1. and is adapted to the use of online infrastructure surrounding. Data produced, uploaded and exchanged in this repository will mainly be produced by project members with pre-approved access. Regarding personal data, it is planned that personal names and contact details of farmers and participants will be collected using controlled procedures. In some occasions, technical and financial data of certain stakeholders may be needed to fulfill task objectives.

Methodology used for the development of Online knowledge repository is adapted version of SCRUM, known as one of the most used agile frameworks. SCRUM was chosen because time for the development was very limited and development team was well aware of its advantages. Regarding technologies, core Online content repository functionalities were developed in Angular and Spring frameworks.

Although the next updated deliverable for this task is only due at the end of the project (M84), it is clear to the development team that main activities and implementation phases are yet to come, which means that a lot of modification and adaptation actions will take place for the Online content repository as it should serve the most of project activities and satisfy variety of user needs. Thus, iterations of improvements will certainly follow.

Chapter 1

1. Introduction

Chapter makes short introduction to Deliverable 8.2 and to Task 8.4. explaining “why” this work is important for the overall Climate Farm Demo project implementation.



Online content repository is seen as online infrastructure which have to support most of the project activities during its 7-year long duration. Indeed, Task 8.4 plays an important role in enabling work done in other Tasks and Work Packages to become visible, spread its reach and provide knowledge, results and outputs exchange during and after the Climate Farm Demo project is officially finished.

As this task and deliverable intersect with most of the activities at the project level, it was important from the beginning to consider all project members needs and requirements regarding Online content repository. Some of them were already known as Climate Farm Demo is a successor of Nefertiti project which also had its online knowledge repository, while some new requirements emerged during user requirements survey. Building this online knowledge repository on Nefertiti project as a ground stone made it easier to understand the benefits and shortcomings of previous one and to furtherly develop on this legacy.

This deliverable describes how Online knowledge repository for the Climate Farm Demo project is being developed, how it will serve to the project consortium members, external users and public, and what is the role of the content repository in achieving very ambitious project goals with final outcomes to accelerate the adoption of Climate Smart Farming (CSF) practices and solutions by farmers, and allow the adaptation of agricultural production systems to climate change in order to achieve a carbon neutral European agricultural sector by 2050.

Chapter 2

2. User requirements

Chapter is about user needs and requirements, how this data was collected and how it was used to provide insight about key Online content repository functionalities.



Although Climate Farm Demo Online content repository is planned to be built upon legacy of Nefertiti project outcomes and infrastructure, from the perspective of development team for this task it was very important to conduct proper inquiry about actual needs and requirements of the project consortium towards online infrastructure aimed to support and to enable to collect the huge amount of incoming project activities.

This was done during the first two months of the project implementation, by mapping all the potential user roles that we were able to predict. This was followed by targeting which stakeholders were most important to be heard, for gathering important input. In the same time assessment form and scenario were being developed after what assessment was ready to be conducted. During one month of inputs gathering, information were collected and classified, as a precondition for data analysis and validation of the main results produced.

2.1. User roles mapping

The first stage of user needs and requirements assessment was to map all potential user roles and stakeholders of interest for this task. Regarding that this was done at the very beginning of official project launch, many of those users were not actually involved and some of them even not aware of the project existence (e.g. farmers). The list of all roles mapped can be found below:

- 1) Project consortium members, from which:
 - 1.1) Project coordinators and managers
 - 1.2) National coordinators
 - 1.3) Thematic leaders
 - 1.4) Work Package leaders
 - 1.5) Task leaders
 - 1.6) Climate Farm Advisors
- 2) Farmers
- 3) Partnering organizations outside the Consortium
- 4) Users part of the supply chain in agriculture
- 5) Researchers in climate and agriculture topics
- 6) EU Commission representatives
- 7) Media representatives
- 8) Policy makers
- 9) Interested public (other)

In the ideal situation, all mapped Content Repository users should be involved in user needs assessment, but in order to meet our project commitments and timetable deadlines this was not possible at this project stage, which led us to the decision to select and target a group of key stakeholders available for assessment at this point.

2.2. Targeting key stakeholders

Having in mind that it was not possible to access all user roles, and that not all of them had the same importance for the project and this task, it was decided to focus on the most important ones, and the ones that we were able to reach.

For example, farmers are very important target group for this project and task itself, but at the period of Online content repository development, farmers still had not been approached and recruited which made it impossible to include them into the needs assessment. Their needs, and needs of other stakeholders not accessible at the given moment, were brought out indirectly, from other stakeholders who know them and work with them on a regular basis. For this farmer example, person who advocated farmers need were farmers advisors.

The group of four key stakeholders accessible for assessment at this point were finally selected:

- 1) CFD project Coordination and Management team
- 2) CFD Work Package leaders
- 3) CFD National Coordinators
- 4) CFD Climate Farm Advisors

This group was divided on primary and secondary, where primary stakeholders are project Coordination and Management team with WP leaders, while secondary group was made of NC and CFA, which were also representatives of the project Consortium member institutions.

The most attention was given to the primary group as these personas have the best overview of the project objectives and steps to come. It was decided that assessment with this primary stakeholders will be done through one-on-one online in-depth interviews, while secondary stakeholders' group was assessed through online questionnaire.

2.3. Assessment form and scenario design

In order to get consistent information, it was decided that for both primary and secondary targeted stakeholders the same questionnaire will be used. The difference was that primary group was assessed during online interviews which gave them opportunity to express themselves more elaborately and to tackle additional needs and requirements with additional sub-questions. On the other hand, secondary group was limited to online questionnaire, and had opportunity to express only in a writing form.

Assessment form was aimed to cover all important aspects of the user needs and requirements on one side, and not to be overwhelming neither too long as respondents should keep motivation to answer all of the questions asked. Final assessment form was made out of 11 questions, a combination of open-ended and closed ones with predefined answers. List of questions and proposed answers can be found in Appendix.

The assessment form was used for the purpose of building both Online Knowledge Reservoir and Project website so the questions were designed to serve both purposes. The assessment mostly was focused on functionalities, target groups, call to action, KPIs and part of it was connected with previous Nefertiti platform as a predecessor of CFD online infrastructure.

2.4. Assessment implementation

Response rate during the assessment process was high as stakeholders understood importance of expressing their needs for the purposes of the Online content repository and the project website development. Conducting an assessment lasted for one month as 9 in-depth interviews with primary rated stakeholders were held, while more than 15 representatives from different partnering organisations fulfilled the written form.

Impression after assessment was that for some stakeholders it was too early to list all of their requirements as they expect additional ones to arise when their project activities start in a full scale manner.

2.5. Gathered data analysis

After all involved stakeholders responded to the invite for assessment, collected data was classified and analyzed. Analysis was done in a quantitative and qualitative manner, as there were questions with quantitative and qualitative answers. The assessment form was the same for both groups of selected stakeholders as collected data could be properly compared. Analysis of data collected during online interviews took more time and, as expected, it generated more data in comparison to the written assessment via online questionnaire.

2.5.1. Main functionalities

Even before the end of analysis it become clear that some answers were highlighting and capturing the direction where opinions were going. As most important features of the Online content repository, following three were emphasized:

- 1) Demo Events
- 2) Demo Farms
- 3) Resources/Solutions repository

These were listed from almost everyone included into the survey and gave a strong signal about what categories should take main place into the design and planning activities for this task. Very similar result appeared regarding the question what should be emphasized as key messages to the end users when they visit the Online content repository.

2.5.2. Primary target groups

Regarding the target groups of the Repository and project website, following were top-rated:

- 1) Farmers
- 2) Farmers Advisors
- 3) Project Consortium

- 4) Partners of the 2 sisters projects (Climate Smart Advisor and the project funded under the topic HORIZON-CL6-2023-CLIMATE-01-4: Demonstration network on climate-smart farming – linking research stations)

There was a small difference between the first two places which showed for whom this project is aimed primarily and to whom we should focus while developing Online content repository.

2.5.3. KPIs to be monitored

When we spoke about monitoring the project activities and its KPIs for segments which can be monitored through Online repository, many answers were given, but two were constantly repeating, as specifically important to be monitored:

- 1) Number of registered demo events and demo farms
- 2) Number of demo event participants per role, event, per year, etc.

Others mentioned:

- 3) Number of resources/solutions downloaded
- 4) Number of website visitors
- 5) Number of knowledge objects/solutions produced and gathered
- 6) Number of farmers rewarded by incentives
- 7) NPS for events
- 8) Percentage of CO2 reduction at farms, etc.

Of course, some of the survey participants requested that not all the data from the Repository should be public, then to separate public from data should be available to pre-defined project roles only.

2.5.4. Interoperability

Respondents were aware of the idea promoted often from the EU Commission and some EU project coordinators, that knowledge, solutions produced and resources should be exchanged among projects and initiatives which act in the same or similar topics. Based on answers, most important projects and platforms for a potential sharing of knowledge are:

- FarmBook project
- ClieN Farms
- FairShare
- I2Connect
- Climate Smart Advisors (starting April 2023)

Others, also mentioned:

- HORIZON CL6-2023- CLIMATE-01-4
- IPM Works
- LIFE Carbon Farming
- Best4Soil

During first 6 months of Climate Farm Demo some progress have already been made for this purpose. Representatives of WP8 and FarmBook project development team already exchanged expectations and technical requirements to enable efficient knowledge repositories exchange. Also, it has been discussed with Climate Smart Advisors project coordinator how to integrate and use online infrastructure of both projects in a best possible way.

2.6. Outputs validation

Before design and development of the Online content repository started, outputs and main conclusions from the assessment were validated at several levels. Firstly, outputs were validated among BioSense team and WP8 leader as BioSense is responsible for the majority of WP8 activities dedicated to dissemination, exploitation and communication.

Second level of outputs validation was to check it with project management and coordination team, which was done during several dedicated online meetings organised with the WP leaders. After collected outputs were validated by these two instances, process was ready to enter the next phase of development.

Chapter 3

3. Content repository architecture

Chapter explains how Online content repository is structured, what are the most important segments and how they interrelate with each other.



Content repository architecture is designed to support Online content repository functionalities and to satisfy current and future requirements of the project Consortium members, as well as external end-users needs. This process started from mapping of the repository needed segments which formed later design and form of the repository. This was followed by development of repository wireframes, as low-fidelity structure with aim to gain approval and give broader understanding of what is planned to be made in later stages. This phase of development was done after its approval from the key stakeholder groups.

3.1. Mapping of content repository segments

As a starting point of this phase of development process, mapping Repository segments enabled development team and key stakeholders to understand and get an idea of how the Repository will be organized and made. Main source for mapping was user requirements assessment on the one side, and Nefertiti platform on the other. During an assessment, key stakeholders were involved and their answers to the structured questions gave first outlines of segments needed for the future repository.

As described in Chapter 1 of this deliverable, 3 main segments of the Repository appeared as the most prominent ones. Those are: segment for demonstration farms, segment for demonstration events, and segment for knowledge objects (i.e. solutions; resources). Fourth one could be called an informative segment, with all the subsegments related with informing the users about progress in CFD project. This includes monitoring and controlling activities.

This segmentation gave instructions about how the architecture of the Repository should look like and what should gain more attention and space in front of other development activities.

3.2. Development of repository wireframes

After segmentation was done and everyone included in the process had a clear idea of how the structure should be organized, development of wireframes followed. Wireframes are visual presentation of how content repository segments will be organized, and interoperate with each other's. Wireframes also gave first outlines of the Climate Farm Demo project website, as repository and website closely correlate with each other's and for the end users can seem to be the same thing.

With wireframes design, attention was paid to the front pages, visible to every user who visits the project website, and to back pages (Backoffice), visible and accessible to the predefined project roles with sort of an admin access to the content and functionalities stored over there. For example, it is meant for everyone to see and search Pilot Demo Farms by using several filters, while users with admin access, like Farm Advisors or National Coordinators, will be able to edit information about each Demo Farm, add new information, overview statistics about number of registered Demo Farms per country, per Thematic area, per year, etc.

3.3. Wireframes validation with key stakeholders

Validation of repository wireframes was a wise decision as changes at this stage are much more welcome and can be implemented with less effort as programming part still did not begin. Wireframes were validated firstly among Work Package 8 leader and its Task leaders. Second stage of approval was done with project coordination and project management team, as several development meetings with them were held in the process of assessment, design and initial development. After validation, certain changes were made in wireframes architecture, and the development was ready for the next phase.

Chapter 4

4. Content repository Backoffice

Chapter describes what functionalities Repository Backoffice will have, who will be able to use it and how it is going to be organised



During initial planning it was predictable that Online content repository would consist of two larger segments. One was the content and functionalities visible to every user and accessible from the official project website hosted at domain www.climatefarmdemo.eu. Users with access to this public online space will be able to search Demo Farms, Demo Events, Solutions Repository, get information about the project progress and be updated about project activities. Second part was a common online space visible and accessible for registered users only, who got permissions and credentials from the general Content repository administrators. For the purpose of this deliverable we will call this part of the Online content repository – the Backoffice.

4.1. Definition of user roles

As previously explained, Backoffice is created for use by members with predefined project roles. Roles definition enabled development team to realize and make possible that every user role get appropriate access and appropriate admin right in order to fulfill its purpose in project and be able to achieve dedicated tasks.

After evaluation of user roles from the Climate Farm Demo Grant agreement, and evaluation of data gathered during user needs assessment, following user roles for the Online content repository were defined:

- Platform Administrator
- Project Coordinator / Project Manager / WP Leader
- National Coordinator
- Thematic Leader
- Climate Farm Advisor
- Farmer (potentially in future)

Platform Administrator role is made for a group of users who develops, adjusts, upgrades, and manages the Online content repository and official project website. Members of this group are BioSense Institute (BIOS) employees as this task is completely dedicated to BIOS development team. This group has possibility to:

- make changes in online content repository architecture
- add, edit or delete all content in the repository, in accordance with other project roles
- creates, share or take all accession rights to other user roles, in accordance with project coordinators and project managers
- have overview on all activities and content stored at Online repository

Project Coordinator / Project Manager / WP leader – is a group of users with highest rights for managing Online knowledge reservoir besides Platform Administrators. As users from this group are responsible for coordination and managing of key project activities, they have possibility to:

- add, edit or delete all manageable content at the repository
- creates, share or take all accession rights to other user roles
- have overview on all activities and content stored at Online repository

National Coordinator / Thematic Leader – this user group is right below Project Coordinators / Project Managers and get access by approval from this user group. National Coordinators are responsible for certain project activities at national level in their respective country. They take care about activities related with Demo Farms and Demo Events, and have authority to organize and manage those activities in their respective countries. Regarding Online knowledge repository, this means they will have possibility to:

- add, edit or delete all manageable content related to their respective activities for the country they are in charge of
- creates, share or take all accession rights to Climate Smart Advisors who operates in the country they are in charge of
- have overview on all activities and content stored at Online repository; can monitor data regarding Demo Farms, Demo Events and Solution Repository, and compare it per countries

Climate Farm Advisor – this group is linked to the National Coordinators in their country of residence and receives access authorisation from them. Advisors will be in charge of communication and management of Farmers in their respective country or region. They will have intense communication with primary group of the project – Farmers, and mainly be their representatives for the Online content repository as well. This means Advisors have possibility to:

- add, edit or delete content related to their respective activities regarding Demo Farms, Demo Events, audits and A&M solutions they are in charge of. This includes: registration of Demo Farms, registration of Demo Events, registration of audits, registration of A&M solutions in the repository; edition of all generated data
- in future stages of the project it might be possible for the Advisors to give certain access rights to the **Farmers** as they could operate data about their demo events and farms on their own. This is still open to discussion among project consortium and will prolong in future stages of the project

4.2. Functionalities of the Backoffice

Online content repository Backoffice functionalities should enable users among project Consortium to deliver all dedicated tasks, most of them not visible to the project wider audience. On the other hand, for some publicly visible content repository Backoffice will be an entry point. In accordance with project coordinators and managers, functionalities of the Backoffice are grouped in the following segments:

Upload of Demo Farms and Demo Events data during registration of Demo Event or Demo Farm, edition of this data, approval of registration (if registration is done by public users like Pilot Demo Farmers themselves); data deletion; overview on existing data/monitoring. This includes:

- predefined information about Demo Events and Demo Farms (when, where, about)
- reports about past event as post-event activity (outcomes, n. of participants, methods used, etc.)

Upload of Knowledge Objects (Solutions / Resources) Repository data during registration of the Solution, edition of this data, approval of registration (if registration of a solution is done by public users); data deletion; overview on existing data/monitoring. This data includes:

- predefined information about specific Knowledge Object (Solution)
- attachments related with a Knowledge Object

Content management of informative pages (News/blog section, Thematic area section, Living Labs section, Project deliverables section, Webinar section, Practice abstracts section, Related projects section, etc.) which includes adding, editing, deletion and sharing information per appropriate section.

Monitoring overview of the project KPIs which can be related with project online infrastructure (website and its Backoffice). It includes monitoring of:

- number of demo events (per country, thematic area, in person/online, per year)
- number of participants of events (per farm, country, thematic area, per year)

- number of registered demo farms (per country, thematic area, per year)
- number of knowledge objects in solution repository (per country, thematic area, per year)
- number of knowledge objects downloads/times opened
- number of website visits
- number of unique website visitors
- number of page views

Share point for data and reports: project management files (P.M. files) are stored in a dedicated space already created in a “Teams share point”. This dedicated SharePoint space is meant to store Work Package activities focused on outcomes and results (developed methods, guidelines, reports) which should be visible only to project teammates (project coordinators, national coordinators, advisors) and not to the public. Registered users should be able to use the predefined folders to upload, view and downloading different files formats. This functionality is still to be additionally discussed among the Executive Comity.

All above mentioned should enable defined project roles to successfully conduct their project activities and support fruitful knowledge and information exchange. It is expected that functionalities of the repository Backoffice will adapt and evolve as project members start using online infrastructure and deepen its focus on their planned activities.

4.3. Backoffice management

Repository Backoffice will be technically managed by Platform Administrators, i.e. BioSense development team. In the first stage of use, after Online content repository and website launch, BIOS team will deliver access credentials to the Project Coordinators, Project Management team and WP leaders. Successively, access will be given to National Coordinators and Thematic Leaders, and finally to Climate Farm Advisors.

By this activity, content management of the Backoffice will be shared with different roles among project Consortium which will led to the sense of ownership over the Online knowledge repository. This should increase engagement of users and deeper understanding of its core functionalities.

Every bigger scale change in the repository Backoffice will be also the responsibility of BioSense team. Also, all feedback, suggestions and eventual issues will be reported to the BIOS team who is in charge for this task. This team expects to receive useful information directly from users after the Online content repository and project website are planned launch at the end of March 2023 (M06).

Chapter 5

5. Management of data

Chapter is about how data at the project will be collected, organised, protected and presented to all interested parties.



Main aim of the Online content repository is to enable and enhance knowledge exchange, cooperation and share of information among all Climate Farm Demo stakeholders, in or outside of the project Consortium. This will be done by making online infrastructure and by gathering important data closely related with planned project activities. It is of significant importance that this data is properly collected, organized, stored, secured and offered to all interested parties. One of the most important assets in this subject is Data Management Plan (Deliverable 9.1) which defines how we plan to deal with this important task. Important segment of DMP and Online content repository is how we will deal with personal data and how we secure that all collected datasets are organized to be safe and sound, while respecting all GDPR guidelines.

5.1. Data management plan

Climate Farm Demo Data Management Plan (Deliverable D9.1.) outlines the process of data management, and describes the data which will be collected, generated, processed, and reused within the Climate Farm Demo project. Furthermore, it defines a strategy to make the data within this project findable, accessible, interoperable, and reusable, and to harmonize its activities with the principles of efficient data management which entails management of data at every stage of the data lifetime - from the early stages of data access, data collection, data reuse to data storage, even deletion when necessary.

In compliance with the Open Access strategy of Horizon Europe, Climate Farm Demo will predominantly facilitate the re-use of anonymised data collected during the project, through data deposited on free data sharing platforms, making the dataset available at the Online content repository and project website.

DMP sets out the management of data referring to the data which is foreseen to be collected, reused, or produced within the scope of the Climate Farm Demo project. Addressing FAIR principle (making data Findable, Accessible, Interoperable and Re-usable) will consider the following:

- management of data during the project lifetime as well as after the project's end
- protection and archiving of data during the project lifetime as well as after the project's end
- procedures for data collection, reuse and creation within the project
- data sharing or making data available to public (open access)
- standards for the handling the data and metadata
- description of datasets

By the DMP it is foreseen that the following types of data will be generated or reused during the project duration:

- a) documents (documents, measurements, interviews, surveys, reports, briefs, guidelines, publications) in .pdf, .pptx, .txt, .jpg, .png, webp, and similar formats;
- b) database in CSV format;
- c) videos in MP4 format;
- d) pictures,
- e) spreadsheets,
- f) web and social media contents.

This list is not final and through the course of the project it will presumably extend.

As stated in the Grant Agreement, Climate Farm Demo project aims to reuse existing datasets already produced in previous or actual research projects, especially NEFERTITI, ClienFarms, LIFE CARBON FARMING, FAIR SHARE and EJP SOIL as well as the “sister project” namely CLIMATE SMART

ADVISORS, and the project funded under “HORIZON-CL6-2023-CLIMATE-01-4: Demonstration network on climate smart farming – linking research stations”. If so, a Memorandum of understanding will be drawn up between the projects in which the reuse of these existing datasets will be outlined.

The data both generated and reused within the CFD project will be utilized by various users, from scientific community, other sister projects, policy makers and end-users. All outputs that are to be made publicly available to the public (project reports, deliverables, scientific papers, solutions, demo farms and demo events data) will be incorporated on the Climate Farm Demo website. Results and other relevant outputs will be made public on both Online content repository and project website. Part of data concerning project monitoring interesting only for project Consortium will remain available only to CFD project members with predefined user roles in the project Backoffice.

Majority of data produced and collected across most of CFD Work Packages, will be easily findable in the project Online content repository and project website. Data will be classified and searchable through filter criteria and, for some segments, via text search using keywords. User navigation in the Online content repository and project website will be done in accordance with User Experience standards in order to provide every end-user with easily findable segments of content.

5.2. Management of personal data

The project will comply with GDPR, concerning processing of personal data, consent, breach notification, right to access and right to be forgotten. CFD will secure the highest ethical standards and legal restrictions regarding personal data. This DMP sets the guidelines of the procedures for the data collection, operation, and storage. Personal data will be processed according to the provisions of the GDPR. No processing of special categories of personal data as defined in Article 9 of GDPR4 are anticipated to be collected.

At this point, plan for collection of personal data for the purposes of the Climate Farm Demo project is based on the following:

For the members of the project Consortium:

- names and surnames
- contact details (email, phone number, country of residence), and
- basic information of the person’s employer, i.e. project partner organization

For the users outside of the project Consortium, i.e. Demo Farmers, Researchers, Policy makers, Demo Event attendees, etc.:

- names and surnames
- contact details (email, phone number, address/country of residence, geolocation of the farm)
- basic information about type of activities they conduct in their business
- languages they understand and speak

For users who will give (share) their personal data in the Online content repository, they will have an opportunity to choose whether they want or not for this data to be publicly visible in the project website. E.g. Demo Farmer who register they farm in the Online content repository, will be asked to choose whether they want they contact details to be visible in Farm presentation page, or hidden.

Personal data, as other types of data, will be appropriately stored and secured in BioSense servers. Personal data of users who opted not to share their private information publicly at project official

website, will be stored and kept available only to project Consortium members with appropriate admin access given and approved by the CFD project coordination and project management body.

5.3. Data storage and security

All data gathered for the online content repository during the CFD project duration will be stored in BioSense Institute servers. BIOS Data Center is backed with several protection protocols. It has backup power supply in case of electricity power cuts supported by UPS (Uninterruptible Power Supply) and power aggregates, fire protection system and protected physical access to the server space, accessible only by authorized BioSense Institute employees. Virtual access to the database and servers is possible only via SSH (Secure Shell) client network communication protocol that enables two computers to communicate. Access is possible only from specified web addresses while authentication is done by SSH keys. Database servers are separated from applicative ones, with daily, weekly and monthly backups, to prevent any major data loss.

Communication between web browser and servers for the website domain is done exclusively by HTTPS protocols (Hypertext Transfer Protocol Secure), with Let's Encrypt TLS (Transport Layer Security) Certificate. TLS is an authentication and security protocol widely implemented in browsers and Web servers, while Let's Encrypt is a free, open certificate authority provided by ISRG (Internet Security Research Group).

Access to WordPress management administration is possible only from BioSense Institute Network, or via BioSense VPN (Virtual Private Network) approved to user by BioSense web security team. This makes management of content at WordPress pages very secure and under strict control.

Regarding users login to CFD Backoffice, it will be possible only for predefined user roles. List of people filling these roles will be registered by the website administrators (BIOS) and their credentials will be shared in a secure way. To prevent unregistered and unwelcome users or bots to enter Backoffice, LLAR (Limit Login Attempts Reloaded) will be used as this system block unregistered users from multiple attempts to broke into project admin pages.

5.4. Database architecture

Data architecture is based on data segments used to organize content by FAIR principles of data management. Main data segments in CFD repository structure are based on:

- Data segment related with Demo Farms
- Data segment related with Demo Events
- Data segment related with Solution Repository (Knowledge Objects)
- Data segment related with Information about the CFD project
- Data segment related with News and updates on project activities
- Data segment related with generated project results and outputs

In general, architecture at web server is divided in Frontend – visible for users who visit public domain, and Backend for implemented business logic. Frontend is implemented by application of Angular Framework, while Backend is developed by using Spring Framework.

For data storage Postgre SQL relational database is used, while all files like images, pdf files, documents, etc. are being saved at MongoDB database. The whole repository is placed at Tomcat web server, while Nginx is used for proxy server. Data repository architecture is visually shown in the picture bellow.

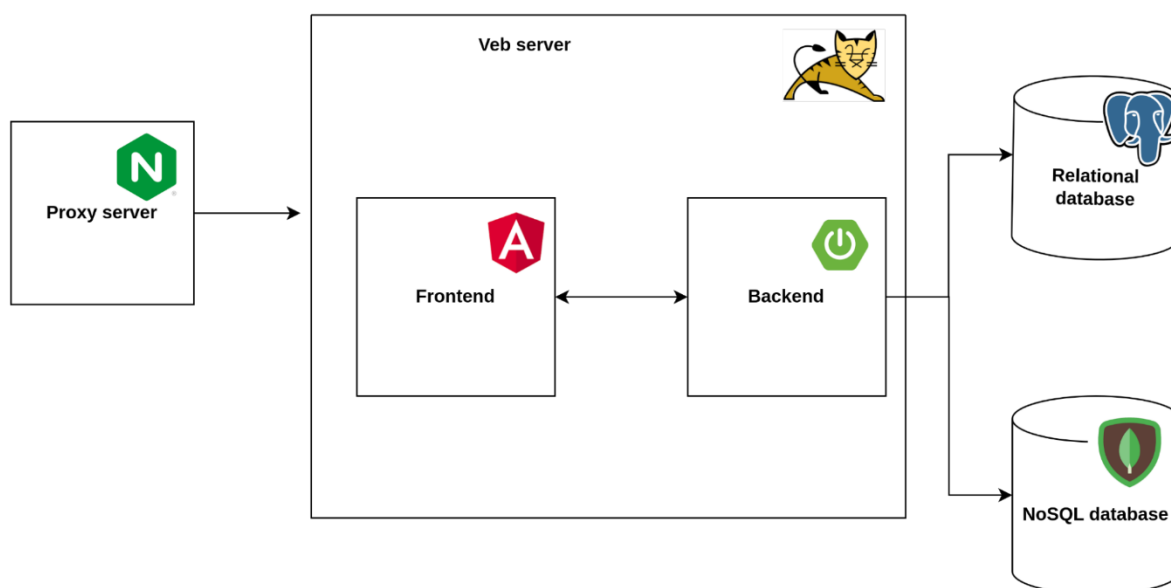


Figure 1. CFD Database basic architecture

Every predefined user role has its own profile which is connected with the country where they belong. For each country, official languages list is defined. At this point we do not exclude possibility that this online infrastructure will be shared with other emerging sister projects which means that we might have users originally from projects other than CFD. User can belong to several different projects (e.g. Climate Smart Advisors). On each project user performs specific role. In CFD project those can be CFA, NC, TL, etc. Also, each project will have defined list of partners. Scheme of Database related to users with access to Backoffice Dashboard can be found bellow.

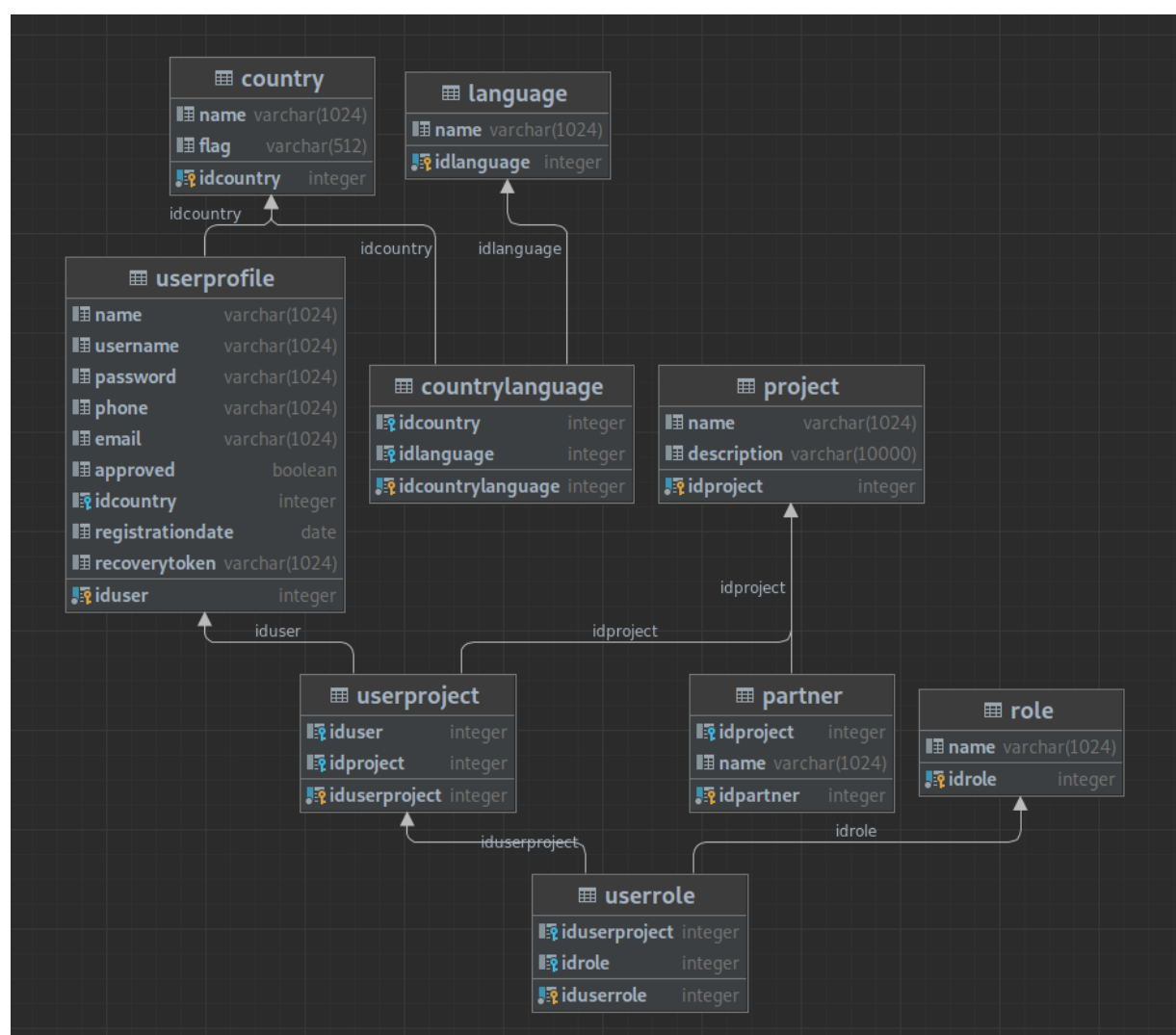


Figure 2. Data architecture of user roles

Besides basic data about Demo Farms (title, address) which are saved in Demo Farm tables, every Demo Farm is connected with the Thematic Area(s) it belongs to, each has one farm type and style of management (farm management table). Additionally, for each Demo Farm can be found data about the project to which it belongs, partnering organisation, country where it is located, language they use and which user (specific CFA or NC) registered it to the database. Scheme for Demo Farms can be seen below:

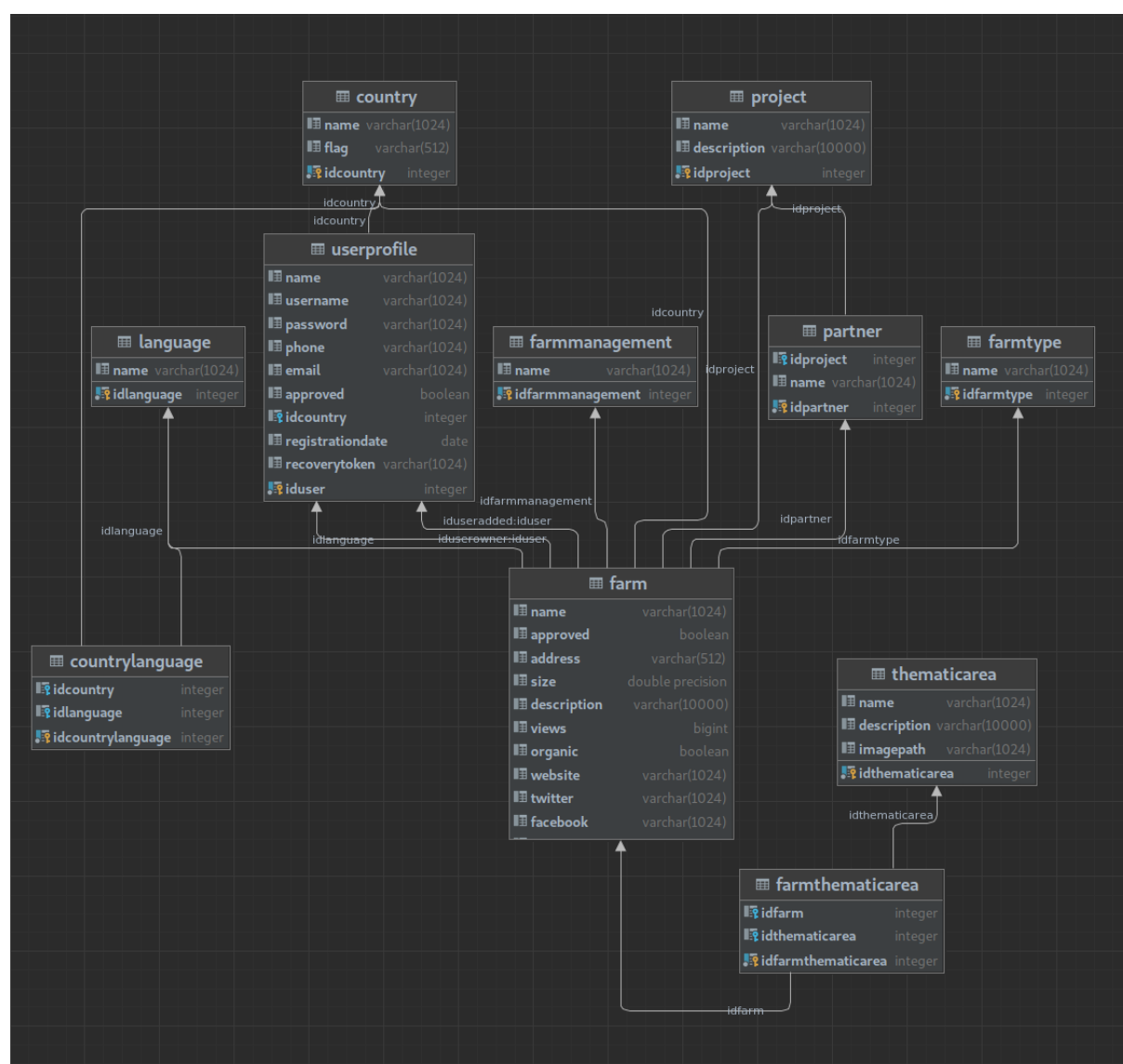


Figure 3. Data architecture of Demo Farms

Except basic data about Demo Events stored into its data table, Demo Event in database is connected with country, with Demo Farm where event will be organised, Thematic Areas, sectors (demonstration topic table), plus with other tables which contains codebooks (objective, target groups, promotion activity). Besides that, every event will be connected with its registered participants. Part of this scheme is shown bellow.

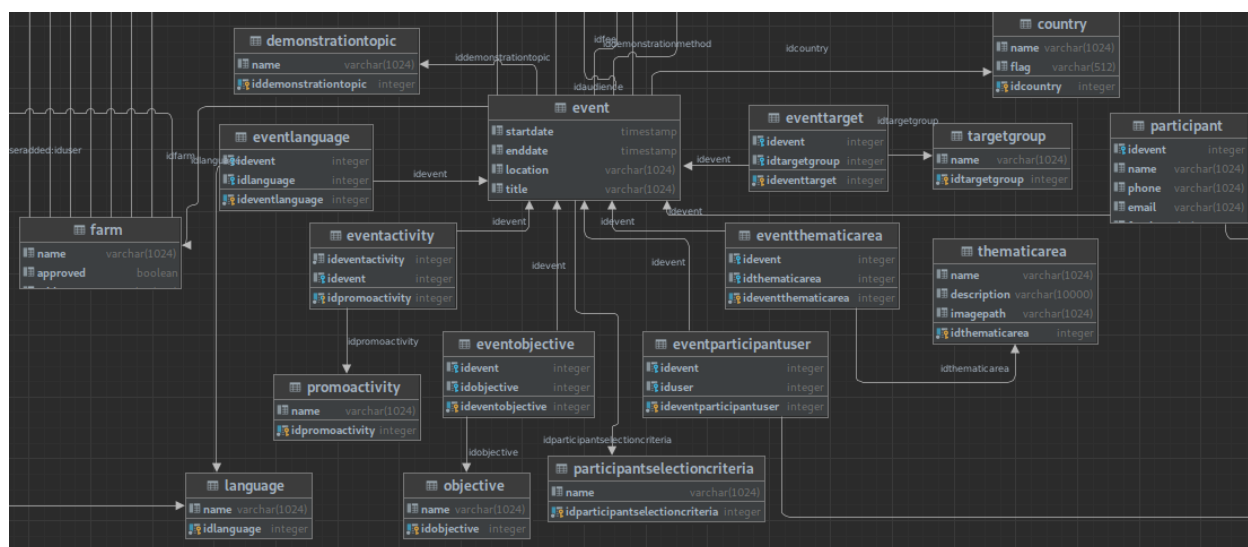


Figure 4. Data architecture of Demo Events

Each Solution in Repository, in database also called Knowledge Objects, is connected with its project, object type, Thematic Areas, tags, language and with registered user who added this solution to the Repository. Knowledge object can also be connected with Demo Farm or Demo Event where is created/presented. Scheme for this part of Database can be seen below:

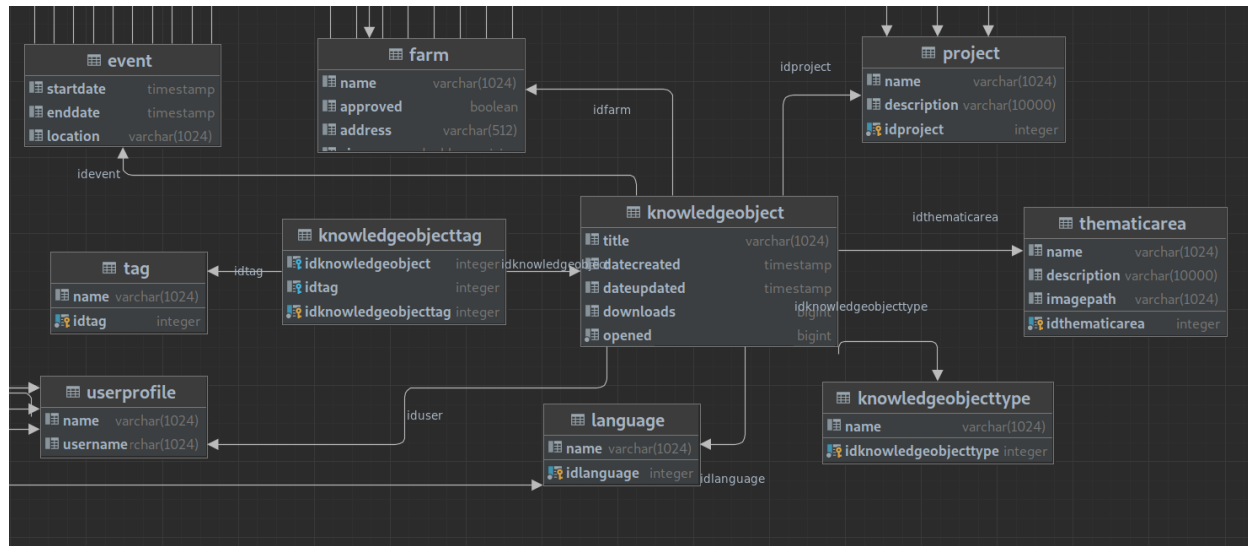


Figure 5. Data architecture of Solution Repository

Current Database scheme could be adapted if users and data roadmaps change as a result of new requirements from the project Consortium.

Chapter 6

6. Methodology and technology

Chapter elaborates on methodology used for development of Online content repository and all technologies and tools used to build this digital product.



Online content repository was developed by using the latest frameworks and technologies for online IT infrastructure projects. This task and deliverable are based in Information Technologies (IT) where certain principles of work can be applied as planned scope would be implemented in a most appropriate way, by respecting strict schedule and given deadlines.

For this Deliverable and Milestone (74) time given was only 6 months to develop both Online content repository and Project website. Having in mind that official project started 1st of October 2022, user needs and requirements just started to appear. As most of the project activities not even started before the Online content repository and Project website should have been launched, it was a challenge for the development team to start implementation before the clear requirements were mature enough. The above has amplified the idea that the Agile framework is the best approach that fits the given state of work.

6.1. Development methodology

Usage of Agile frameworks during development of digital products is a well-known practice which showed successful for many IT projects at BioSense so far. The development team was aware of its benefits which made its implementation easier and with less obstacles.

For development of Online content repository we decided to use adjusted model of SCRUM methodology. Usually, SCRUM model consists of biweekly sprints which starts with sprint planning. After two sprint weeks, sprint reviews and sprint retrospectives are held which closes the one-iteration circle. Number of these biweekly iterations depends on what is being developed and on how big is the scale of the product scope.

SCRUM methodology for the purpose of development of Online content repository was adapted to shorter iterations as the timeframe was compressed due short deadlines for repository and project website launches. Iteration cycles were reduced from two weeks to one week each. This enabled development team to plan only one week ahead and adapt to the current progress in a very fast manner.

Except SCRUM sprints, sprint planning, sprint review and retrospective, a few other artifacts were included into the process. Some of them are Product Use Cases (i.e. User Stories) and Product Backlog which was divided into Sprint Backlogs at every Sprint Planning.

Product Use Cases or User Stories is listing with all potential user activities which can be predicted at the current moment. This means that we try to predict what a User might like to do when in contact with our product, to describe each case and later to multiply it with all User roles we defined during User needs and assessment.

A few Use Cases examples used for development of CFD Online repository and project website can be found below:

- 1) *Farmer / Farm Advisor wants to register his farm in Climate Farm Demo Online Repository as he would like to become part of the CFD Network and host Demo Events.*
- 2) *National Coordinator wants to have overview on all Demo Farms registered and Demo Events held in country per several criteria: specific Thematic Area; specific Farm Type.*
- 3) *Living Lab Coordinator wants to add / edit / update content about Living lab he is in charge for, at its Living Lab landing page.*
- 4) *Thematic Leader wants to add new Adaptation & Mitigation solution in CFD Solution Repository.*

Outputs from the list of all Use Cases were source of items for the Product Backlog.

Product Backlog is a list of items which contains all possible features and functionalities our product or service should offer to its users. Those items are properly described, and its scale should be defined as development team could plan how much time and resources (e.g. developers) is needed for each item to be developed.

Product Backlog is a general source of items to be used when preparing **Sprint Backlog** which is used only for one sprint iteration. Thus, Sprint Backlog contains only parts of the general Product Backlog and is as a result quite smaller in scale.

During CFD Online content repository one sprint iteration lasted from Monday to Friday, with Sprint planning on Monday, occasional short daily meetings during the week (when needed) and Sprint Reviews and Retrospectives on Friday.

Sprint Reviews were time slots when developers presented to the team and to dedicated Project Manager what has been done and achieved during the week. That was the opportunity for the team to discuss developed items and give their opinions about the work done. At these meetings was decided if developed items could be accepted as this, or seek additional improvements and adaptations.

Sprint Retrospectives were events happening after Sprint Review and were dedicated to evaluation of teamwork and work process itself. Frequency of meetings, internal communication, task delegation and overall team atmosphere were legitimate topics which were put into question when each member of the team felt a need to arise some of these topics for a discussion.

After initial development and Online content repository launch, Agile framework will remain in use by the development team. We expect that dynamic and frequency of SCRUM events will change as further development will enter into less pressured and less intensive phase.

6.2. Technologies and tools used

Several different technologies were used during development of Online content repository. By the meaning of the “Technology” term, we mean on different programming frameworks, programming languages, supporting services, web development platforms, plugins, hosting servers and other online infrastructure items.

Parts of the Online content repository which are related to content which describes the project, its progress, and updates about project activities, so called “Informative pages” were being developed via WordPress. WordPress is well known open-source system for content management based on PHP and MySQL databases. Its themes, elements and plugins provide developers with huge resource to use for different kinds of content repositories. Using WordPress system, development of informative pages is faster and more visually appealing. Also, management of content like news, social media feeds and photo/video publication is usually more straightforward and user friendly when done through WordPress platform.

Other part of the Online content repository which is more custom made and will serve closely to respond to CFD project needs was being developed mainly in Angular (frontend) and Spring (backend)

frameworks. Angular and Spring programming languages provided development team possibility to “build from the scratch” core functionalities needed for the purpose of enabling CFD main activities to be backed by its online infrastructure. At the first place here, we mean functionalities like Demo Events hosting, Demo Farms repository, and Solutions (knowledge objects) Repository. All three represent the core of project ongoing activities which will be used during the 7 year long project duration.

It was very important to make both of these Online content repository parts consistent and uniformed from the perspective of user interface. Attention was paid that visually and regarding the user experience (UX), both WordPress and Angular/Spring repository parts look as a whole and that users do not have obstacles when navigating from one to another. Both repository parts are accessible through www.climatefarmdemo.eu public web domain.

During the assessment, design and implementation phase, several different online tools were used to enhance development experience and results. Some of them are:

- TYPEFORM - tool for assessment via written online questionnaire: www.typeform.com
Typeform is a great research tool with extraordinary user experience (UX) which makes questionnaires fun and easy to participate.
- MIRO Boards – visualisation of ideas, wireframes and segments is very important part of development process. Having thoughts and structures visualised, builds common understanding of what needs to be achieved and keeps everyone updated. Visualisation board available at www.miro.com is a very user friendly tool for creating several boards, structures, roadmaps and items which can be easily shared among teams, partners and stakeholders. Also, it enables co-participation of team members who can also join and give their contribution.
- TRELLO – is a web-based application for creation of lists mostly designed in KANBAN style. This tool which can be found at www.trello.com is well known among IT community as it is easy to use, gives strong overview on Backlog and tasks, enables Sprint organization and equal participation of all included team members. It was used by BioSense team for work organization and tracking of progress made.
- FIGMA – Online content repository will be successfully used only if its user interface satisfies their needs and follow the best User Interface (UI) practices. Tool available at www.figma.com is one of the two nowadays most used collaborative interface design tools. It enables prototyping before even any first line of code is made, which significantly saves resources and reduces time invested into development. Figma was used by BioSense team to generate mockups for most web pages, those publicly available to broader audience as well for those accessible only to personas with preapproved access.

Combination of all of these listed technologies and tools created opportunity to develop digital products of interest for CFD project. We expect that during next project phases, additional technologies and tools will be incorporated to the current system.

6.3. Interoperability with other platforms

The development team was from the very beginning aware of the fact that interoperability is one of the important assets future CFD Online repository should be able to perform. Considering that there are now many EU funded projects in the agriculture sector taking place in parallel, some of them with similar overall agendas, interoperability becomes very important request for several important CFD stakeholders. Saving resources, efforts and multiplying reach are just some of the benefits when interoperability among project is made well.

Having all this in mind, question about interoperability was included in assessment form during user needs and requirements inquiry. Question was about which projects should we take into consideration when it comes to interoperability of the CFD project:

“With which topic-related projects CFD platform should connect, ie to be interoperable during the project's official duration?”

Most answers were connected with following projects:

- FarmBook,
- FairShare
- I2Connect
- ClieNFarms
- Climate Smart Advisors (starts at April 2023)
- The project funded under the call HORIZON-CL6-2023-CLIMATE-01-4: Demonstration network on climate-smart farming – linking research stations
- IPM Works
- Best4Soil

Majority of participants emphasized significance of interoperability with FarmBook project – <https://eufarmbook.eu/> as it is the platform with ultimate goal to collect all EU funded Horizon projects in Agriculture with collection of best practices and solutions for farmers and foresters. Interoperability of FarmBook platform with other topic-related EU projects is of high significance and interest for all included stakeholders as it broadens reach and outcomes of each side included.

To readily facilitate interoperability with FarmBook platform, development teams of both projects already held two online meetings and shared crucial information, including expectations, needs, database and technical information. FarmBook team have already shared list of metadata desirable to serve as a prototype for other projects which will connect to FarmBook at certain point. This information has been already taken into consideration by the BioSense team and is useful asset for further database infrastructure development.

We expect that interoperability will have first visible outlines by the end of 2023 or during 2024. Preconditions needs to take place for successful interoperability are, for FarmBook to finish its full platform development, and for CFD to produce enough valuable content which will be of interest for sharing it with FarmBook platform.

It is highly expected that intense interoperability will happen with Climate Smart Advisors project which will start at April 2023 and initial contact has been already made with its coordinators. Another project with very related topic is Climate Farm Experiments which is in process of selection. If granted, this project, along to Climate Smart Advisors, will very likely be very interconnected with CFD and its online content repository.

After CFD starts to produce and publish useful smart climate farming contents, discussion about interoperability are expected to happen with other topic-related projects like ClieNFarms, IPM Works, and potentially several others.

Chapter 7

7. Further development

Chapter describes future efforts planned to be done in order to make even greater value for the project out of Online content repository, as this is only its first version.



Launching of the CFD Online content repository and CFD project website is just the first phase of T8.4 development process. Letting end users “see, touch & feel” the online infrastructure made for them will be the best testing activity for its further existence. Although many efforts were invested so far into user needs and requirements assessment, BioSense team is aware that additional ideas, comments, suggestions and valuable feedback will come only after users try CFD Repository features, and experience its user interface in a real environment.

As stated earlier in this deliverable, development will continue in iterations which will be organized in more relaxed timeframe, with more time per Sprint, but with respect towards set processes and SCRUM events including: maintaining the Product Backlog, Sprint Backlog, Sprint Planning, Sprint Review and Sprint Retrospectives.

Focus on the following months will be on adapting the Repository to the user needs and fixing possible shortcomings and bugs which were overseen during first development phase. As Repository at the time of its official launch have low amount of content due to the fact that the majority of project activities are planned to generate contents at later stages of the project duration, hosting of arriving new data will be one of the focal activities for the Task 8.4. Above mentioned interoperability with other platforms will come in place after CFD project generates amount of data needed for meaningful exchange.

Due to lack of information about needs and requirements for certain of the project Tasks, it is expected that additional features will be requested from some WP and Task leaders in the following months and years. Those requests will be evaluated and elaborated with understanding and willingness to find the best solution in the highest interest of achieving CFD project objectives.

Trends and upgrades are happening fast in IT industry, so the people's expectation about their usages. By knowing this, it is planned that once per year (starting Year 2) complete online infrastructure, including its interface, be evaluated and upgraded to the latest industry trends, and to refresh the look and experience of its users.

Regarding online infrastructure maintenance, it will be a regular activity of the BioSense development team. This means that viability tests will be done on a regular basis, while any kind of problems or obstacles notified by the users will be handled in a very responsive manner.

Chapter 8

8. Conclusions

Chapter concludes this Deliverable with final words on T 8.4 current progress, its significance for the overall project and steps to come.



Climate Farm Demo project, during its 7-year long duration, is aimed to generate and collect great number of topic-related contents. To have everything going as planned, a strong and stable Online content repository is needed, and this is one of the main tasks of T8.4. In this deliverable it is described how this Repository was build, what are its core features, how it is interconnected with CFD project website, and how is going to be furtherly developed and maintained.

One of the high priorities for this project and especially for WP8 is that this Repository fulfills its purpose, meaning all project stakeholders, in and out of project Consortium, being able to use this digital product and helping them in implementing their project goals. Furthermore, having well designed, organized and maintained Online content repository, will be an added value to the whole project as Repository and project website are two digital artifacts which will be visible to the wider project community, and thus, one of its most recognizable features.

CFD Repository is developed upon experience of previous Nefertiti platform on one hand, and based on user needs and requirements assessment implemented during first 2 months of project activity. Open and direct communication, sincere search for useful users feedback and nicely designed communication flow should provide the right information to the development team. It also should lead to even greater satisfaction of end-users after feedback information from the real surrounding use and future Repository upgrade and development.

Appendix 1

Questionnaire for User needs and requirements assessment:

1. What features the new CFD needs to have in your opinion? (try to write at least 2, maximum 5)

Open-ended question

2. What should be the most important feature of the new CFD platform?

Event calendar

Farms overview

Resources database

News/blog section

Something else – write in

3. Who are the target groups of the new CFD platform?

Farmers

Project consortium / partners

EU commission

Wider public

Other – write in

4. In your opinion, who is the primary target group for the new CFD platform?

Farmers

Project consortium / partners

EU commission

Wider public

Others – write in

5. What call to action should be in focus at the new CFD platform?

Choose maximum 2.

Register a farm!

Search farms!

Register an event!

Search for event!

Look for resources (tools and materials)

Something else – write in

6. Something you would like us to keep from the Nefertiti and Farm Demo platform in a new solution?

Open-ended question

7. Something you would like us to change in comparison to the Nefertiti and Farm Demo platform?

Open-ended question

8. What KPIs for the project should we follow (regarding the platform)?

Open-ended question

9. Is there a content should be visible only for specific admin roles (such as Consortium members, National coordinators, Advisors, etc.) and not publicly visible at the platform. If yes, please specify which kind of content?

Open-ended question

10. With which topic-related projects CFD platform should connect, i.e. to be interoperable during the project official duration?

Open-ended question

11. Something else important we should know about your needs regarding the new CFD platform?

Open-ended question



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