



INSPIRE

D5.1 Specification of online collaboration and knowledge sharing environment

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Consortium

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Executive Summary

This deliverable reflects upon the State-of-the-Art (SoTA) review and most importantly the specifications for the online collaboration and knowledge sharing environment that will be utilized within INSPIRE project.

The core objective of Task 5.1: KSH and CoP collaboration infrastructure, is to setup an online collaboration space for partners, Knowledge Sharing (KSH) and the 12 Communities of Practice (CoPs) of the project based upon a self-hosted open-source project management and cloud storage solution.

This deliverable provides an initial SoTA review of such solutions that have been considered as potential candidates for implementing this infrastructure, and then proceeds with a summary of the final specifications and services that should be available for the support of knowledge sharing and the CoPs of the project which will be implemented and maintained throughout the duration of the project until the end.

Part of the work within this task also includes periodically maintain and update the respective infrastructure and will administrate overall user management, authentication and authorization aspects in order to manage user and group accounts for recruited CoPs, Consortium members, as well as for online support package delivery beyond CoPs.



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List of Acronyms

AB	Advisory Board
D	Deliverable
DoA	Description of Action
KSH	Knowledge Sharing
CoP	Communities of Practice
LDAP	Lightweight Directory Access Protocol
WP	Work Package
VPS	Virtual Private Server
CMS	Content Management System
VOIP	Voice Over IP
IMAP	Internet Messaging Access Protocol
SSL	Secure Socket Layer
GDPR	General Data Protection Regulation
HIPAA	Health Insurance Portability and Accountability Act
FOSS	Free and open-source software
CSP	Content Security Policy
HTTP	Hypertext Transfer Protocol
WBS	Work Breakdown Structure
ISMS	Information Security Management System
CPU	Central Processing Unit
ACL	Access Control List

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1 Introduction

This deliverable reflects upon the State-of-the-Art (SoTA) review and most importantly the specifications for the online collaboration and knowledge sharing environment that will be utilized within INSPIRE project.

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Most importantly, this deliverable is divided into the following core sections:

- **Usage Scenarios:** this section provides the stakeholders requirements of the different user group of the INSPIRE Community Platform e.g., Consortium Members, KSHs, and CoP members. This section is important because it denotes the different needs of the various users and provides the basis of how these will be tackled by the technical work.
- **State-of-the-art:** Gives an overview of existing solutions that have been considered as candidates for implementing the INSPIRE Community Platform and what have been the main attributes of consideration.
- **INSPIRE Technical Specification:** Provides a technical overview of the implementation approach and most importantly gives a detailed guide on how the usage scenarios and needs of the stakeholders defined in the earlier sections of this document will be fulfilled through the functionality provided by the INSPIRE Community Platform and the different systems and tools that comprise it. It also provides a step-by-step guide in terms of configuring the environment and customizing the different tools accordingly, particularly when creating a new CoP.
- **Main features of NextCloud, OpenProject and their Integration:** In this final section we portray some core functionalities of the two main platform utilized for the realization of the INSPIRE Community Platform, and how these are integrated.

2 Online collaboration needs

2.1 Glossary of key terms

2.1.1 Technical terms

CMS: Content Management System

VPS: Virtual Private Server

LDAP: Lightweight Directory Access Protocol

2.1.2 User roles

Consortium member. Employees of organisations that signed the INSPIRE Grant Agreement.

KSH – support manager. The Support Manager within each KSH is the first contact point for requests coming from outside the Consortium to each KSH. The Support Manager is a Consortium member. It will be the responsibility of the Support Manager to oversee and guide the creation of a new CoP, including the setting up of the online collaboration space of the CoP. The Support Manager assigns the CoP Facilitator for each CoP, who will receive admin rights for the CoPs collaboration and dissemination tools.

KSH – external expert. Each of the four Knowledge and Support Hubs is run by two Consortium members as well as three external experts. External experts are invited by the KSH leaders but do not form part of the Consortium.

CoP facilitator. The Community of Practice Facilitator is the person in charge to manage the CoP once it has been formally setup. The CoP Facilitator could be a person outside of the Consortium, belonging to the CoP directly. She or he are members of the CoP who take on a leading role in the management of the agenda and activities. As such they grant/revoke access to the collaboration space for CoP members.

CoP member. Usually, an organization which is participating in the CoP through one or several persons. Membership decisions are taken by the CoP Facilitator to grant access to the shared collaboration space.

2.1.3 Groups

In order to easily reach out or grant access to users based upon group membership, several groups can be defined:

- **Consortium members group.** Group including all persons working on INSPIRE from organisations that have signed the Grant Agreement.

- **KSH [1|2|3|4] members group.** Four groups, one for each KSH consisting of the two Consortium members leading the KSH, 3+1 external experts, and CoP facilitator of each associated CoP.
- **CoP facilitators group.** Group consisting of all CoP facilitators across the 4 KSHs.

2.2 Office applications and file sharing

The online collaboration environment should provide the members of the CoP and the Consortium a protected space offering several services and functionalities. Although similar, the necessities between CoP members and within the Consortium is not identical. We estimate that the collaboration needs among CoP members do not require the full scale of services foreseen within the INSPIRE Project.

Table 1. Overview Online Collaboration Necessities

Overview Online Collaboration Necessities		
Functionality	INSPIRE Consortium	Community of Practice
Sharing of files	✓	✓
Co-authoring of standard Office documents (Word, Excel, PowerPoint, etc.)	✓	✓
Discussion forum	✓	✓
Shared calendar for scheduling events	✓	✓
Task planning and progress tracking	✓	

2.3 Dissemination

Communities of Practice need to communicate about their activities in general to the “outside” world. An easy to manage Content Management System should be available, such as WordPress, Drupal or similar that combines static and dynamic content pages. CoPs can then publish online a general description about their CoP/Members in combination with periodic updates.

2.4 Coordination channels within and across KSHs

An important aspect of the online infrastructure concerns the dissemination of information and coordination of activities across CoPs as well as between the CoPs and the INSPIRE Consortium. Notifications should be able to travel both ways: from the Consortium to the CoPs and vice versa: from the individual CoPs to the Consortium.

2.5 Single sign-on

It is unlikely that all infrastructure needs can be covered by a single software solution. Consortium and CoP members will need to use different applications including a cloud storage application, project management application, GenPORT, among possible others. Instead of having to create and maintain several user accounts for each platform individually, a single sign-on solution is necessary where users can be registered in a centralized fashion and different platforms can authenticate against the login-requests.

3 Usage scenarios

The following section describes common tasks to be carried out when creating and facilitating the online collaboration among CoP members, among INSPIRE Consortium members and between these two communities.

3.1 Community of Practice

3.1.1 Creating shared online collaboration space

A likely workflow will need to deal with the setting up of an online collaboration space for a Community of Practice.

It is the KSH Support Manager (1 Consortium member in each of the 4 KSHs) who will receive the request for setting up a new CoP collaboration space. The request includes at least one person – the CoP facilitator – who will receive the management rights for the CoP collaboration space. The KSH Support Manager also includes the CoP facilitator to the relevant groups (CoP facilitators, KSH members). Once the initial collaboration space has been setup and the CoP facilitator has received administrative rights for the space, s/he can start creating CoP member user accounts. When creating new user accounts, the platform sends out invitations to the users including an automatically generated password. The CoP collaboration space can be accessed only by its members, including the CoP facilitator and the KSH Support Manager who has initially setup the space. No other Consortium member nor KSH external experts have access to the CoP collaboration space by default.

An alternative approach for creating CoP member user profiles would be user driven. Once the CoP Facilitator can administer the collaboration space, CoP members can request access to it, which then are granted by the CoP Facilitator (or not).

The CoP facilitator as all other CoP members can create, modify, delete any file and/or folder within their collaboration space. For example, CoP members want to collaborate on a shared agenda word file or create new folders and files.

The CoP facilitator as well as all other CoP members have the same access rights to the calendar (create, modify, delete) and the discussion forum (create new threads and posts, delete/modify their own posts).

The CoP facilitator (and the KSH Support Manager) is the only user who can deactivate (or delete) a CoP member user account. A CoP collaboration space can only be deactivated (and deleted) by the KSH Support Manager who initially has created it.

CoP members can update the information of their user profile, including their organisational affiliation, a profile picture, their contact details, or online social networking profiles.

3.1.2 Using online collaboration space

After all new user accounts have been created, the CoP Facilitator creates a new discussion forum with a first welcome message. The welcome message is sent out as an email to all currently subscribed users of the collaboration space.

In the **file sharing** area of the CoP, the CoP Facilitator has created a folder and uploaded a document. S/he wants to notify all CoP members about this shared file and sends out another message via the discussion forum, containing the link to the shared file. Upon receiving the email, other users click on the link which opens the document in their browser, and they start to modify the document with track changes.

A further usage scenario concerns the sharing of documents from the CoP space with the Consortium or with KSH members. For example, the agenda of the CoP has been discussed among its members. A document has been created within the CoP file sharing space and CoP members want to invite the KSH leaders and the KSH external experts to comment on it. They send a message to the KSH leaders as well as the KSH external experts, sharing a link to the file to be commented upon.

The CoP Facilitator or any CoP member creates a new **calendar event**, setting up the next CoP meeting(s). As this is an event which only concerns the CoP members, users can decide if their event will be public or private. A “public” event means that the event is visible on the CoP calendar in general including people outside the INSPIRE Consortium members and outside the actual CoP. Public events are useful in case the CoP opens seminars or other events to the wider community, i.e., other members of their parent organisations or policy makers. As the calendar has a link that provides access to its public entries over the Internet, anybody interested in the public events can see those. A “private” event means that the event is only visible to the members of the specific CoP. A notification – in the format of a calendar invitation - is sent to the CoP members via email. A notification will be sent to the CoP members of the upcoming meeting one day before.

Given the public calendar events, it will be easy to aggregate events across CoPs and the Consortium to obtain an overview of all the ongoing activities. The INSPIRE Dissemination and Communication Partner can then easily write summary updates on the different activities across CoPs.

3.1.3 Creating a public profile of the CoP

The CoP needs to create a public profile online showcasing their member organisations and associated people, their thematic focus and ongoing activities. The online presentation combines static elements (description of CoP) with more dynamic elements (Blog entries)

about the ongoing activities and results of the CoP work. Similar to WordPress, Drupal or other Content Management Systems, it should be easy to combine text and images when creating content, to showcase for example meetings and members or snapshots of collective work. For the CoP Admin it will be easy to link their public profile to their social networking profiles.

The CoP Admin is the initial administrator of the CoP online profile. S/he can easily assign other CoP members to be editors for the content of the CoP online profile. Different members of the CoP should be able to easily post periodically new material online.

3.2 Communication between Consortium and CoPs

3.2.1 CoP to Consortium

CoP members want to disseminate an upcoming event or a result of their work to their KSH, the INSPIRE Consortium and other CoPs globally. A CoP member creates the notification, usually consisting of a title, and more detailed text. In addition, she specifies the dissemination level for the message: “other CoPs within the same KSH”, “all other CoPs”, “Consortium”. The message is then sent off and routed via some mechanism to the specified recipients.

3.2.2 Consortium to CoPs

A work package or task leader of the INSPIRE Consortium needs to send out a notification regarding an upcoming research task or event to CoPs. It should be possible to identify which specific CoP or collection of CoPs should receive the notification.

The Project Manager needs to send out a reminder to all CoPs across all KSHs including the Consortium member and external experts in each KSHs.

A KSH Admin (or the INSPIRE Project Manager) needs to forward a received notification of one CoP to all other CoPs.

3.3 Consortium online collaboration space

Usage scenarios for Consortium members cover standard online collaboration needs. Consortium members need to create or upload common Office documents (Word, PowerPoint, Excel) and be able to collectively edit those (including adding of comments).

The Consortium also needs a calendar to share project relevant events, including upcoming internal and external conferences or workshops of interest, as well as different activities across the KSHs and CoPs. A mechanism should be setup to link other calendars (from each CoP and/or KSH specific events) into the central, “root” calendar (each with their own name/color code of INSPIRE).

For project management, the scheduling of tasks and Consortium member responsibilities should be uploaded to a project management software, showcasing the deadlines and inter-dependence of tasks among partners (with a Gantt Chart or similar). Deadlines for project deliverables need to be attached to files and tasks.

3.3.1 Knowledge and Support Hub

The INSPIRE project has 4 Knowledge and Support Hubs that are led by two Consortium members and 3 external experts + a data expert. The external experts are assigned by the KSH Leaders and need to be granted access to a reserved file sharing space. External experts that are members of the KSH but are not part of the Consortium should be able to create/edit/delete files within their KSH but not have access to all other Consortium files (e.g., Grant Agreement or other private deliverables). KSH experts do not have access to files beyond their own KSH and are thus not able to open files that belong to another KSH.

The KSH leaders are in charge of adding or removing KSH external experts to their shared collaboration space.

The description, agenda, members (Consortium + external experts), associated CoPs of each KSH will be published on the INSPIRE website.

4 State-of-the-Art of online Collaboration Environments

Online collaboration enables better communication and workflow between participating members which directly improves productivity, process efficiency, and participant satisfaction. There is a plethora of benefits and advantages of online collaboration tools which are documented and recorded in various resources¹²³ and therefore will not be the emphasis of this section. Online collaboration is a critical and important aspect for INSPIRE project, considering the needs for a productive and usable collaboration working space among the partners, for the Knowledge Sharing (KSH) and the 12 Communities of Practice (CoPs) of the project.

The aim of this section is not to provide a short-scale review of all online collaboration environments, but rather focus on a specific set, of the most prominent self-hosted open-source solutions towards collaborating online due to a set of benefits that have a high value for this project:

- **Cost-Effective:** There are many free open-source collaborative tools, many of them providing a freemium model, allowing teams to use the free version and scale it as per their business requirements. This cost is still relevantly cheaper than most proprietary software since users save on licensing and maintenance costs. Moreover, most open-source software requires less hardware power, so this brings additional cost savings.

¹ <https://www.wrike.com/collaborative-work-guide/faq/what-are-the-advantages-of-online-collaboration/>

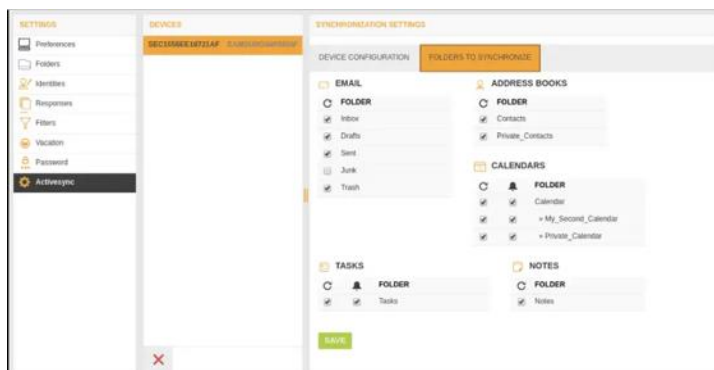
² <https://www.ideagen.com/thought-leadership/blog/5-benefits-of-online-collaboration-tools>

³ <https://www.teamly.com/blog/7-benefits-of-online-collaboration-tools/>

- **No hidden data misuse:** Accessing the source code provides reassurance that no hidden misuse of data going on in the code.
- **Flexibility:** Open-source software and tools provide flexibility and agility for the associated infrastructures. Open source enables technology agility, typically offering multiple ways to solve problems by facilitating collaboration, innovation, and development of new technologies. Source code can be accessed, tested with various systems, and make necessary updates to suit constantly evolving requirements.
- **Enhanced security:** Open-source software is more secure than propriety software. Through accessing the source code, issues, vulnerabilities, and bugs can be found and fixed. Moreover, open-source collaboration software is highly adaptive, which is why it can easily adapt to comply with data governance policies such as GDPR⁴ and HIPAA⁵.
- **No vendor lock-in:** Using proprietary software includes risks of locking in an organization when prices increase. Open-source software offers flexibility, allowing to onboard and offboard anytime, leaving data intact.

The main open-source solutions that have been selected and assessed, as possible candidates for INSPIRE collaboration platform are the following: (a) Kolab, (b) OpenProject, (c) BigBlueButton, (d) OpenPass, (e) NextCloud, and (f) Group Office.

4.1 Kolab (<https://kolab.org>)



Kolab provides a FOSS communication & collaboration solution that can be completely self-hosted. It is a free and open-source collaboration software that includes powerful scheduling, sharing, and resource management tools enabling people to work together effectively. It is a highly scalable and secure collaboration software

that allows sending emails, maintaining calendars, managing tasks, sending and receiving notes, tagging, and many more activities that help teams collaborate efficiently. It can work with multiple devices and operating systems and also can be translated into any local language. It consists of the Kolab server and a wide variety of Kolab clients, including KDE PIM-Suite Kontact, Horde Webfrontend, Mozilla Thunderbird and Mozilla Lightning with SyncKolab extension and Microsoft Outlook with proprietary Kolab-Connector Plugins. Kolab adds intelligent interaction between the components, a web administration interface, management of free-busy lists and more. Major components of the Kolab Server are OpenLDAP, Postfix, Cyrus IMAP, Apache, SASL, and OpenSSL. It supports mixed client environments (Outlook/KDE) because of an open storage format. Any email client speaking

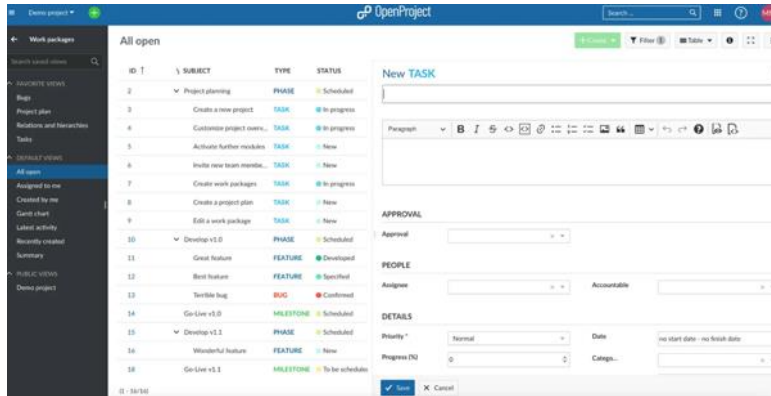
⁴ <https://eur-lex.europa.eu/legal-content/EL/TXT/?uri=CELEX%3A32016R0679>

⁵ <https://www.hhs.gov/hipaa/index.html>

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standard protocols can be served. Kolab2 Server uses the OpenPKG environment to provide a constant base across multiple platforms and distributions.

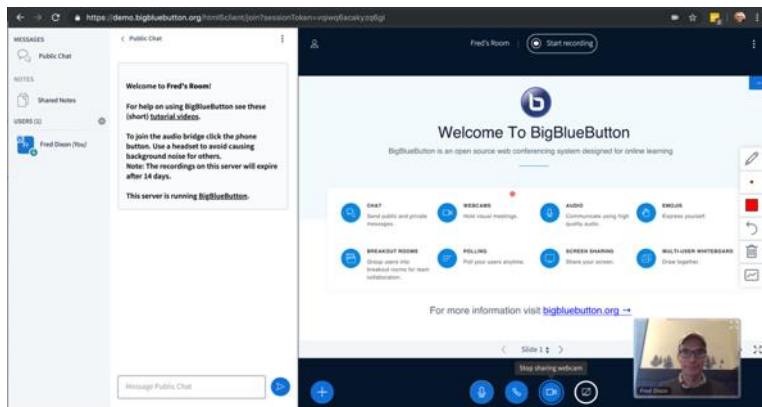
4.2 OpenProject (<https://www.openproject.org>)



OpenProject is an open source and free project management software that allows a team to collaborate, starting from project initiation to closure. It enables to plan, collaborate, communicate, and document several projects efficiently. Its workflow features allows sharing timelines and collectively prepare and

visualize a project plan with the entire team, resulting in transparency during the entire workflow management process. Task management and team collaboration in Openproject makes it easy to manage and organize tasks to complete critical milestones and achieve desired productivity organization or project. As its open-source community edition is 100% free, it can prove to be an affordable option for start-ups and small-sized enterprises.

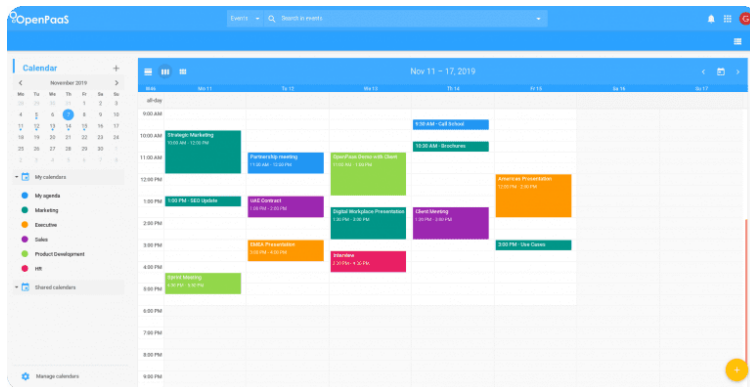
4.3 BigBlueButton (<https://bigbluebutton.org>)



BigBlueButton is an open-source collaboration software that helps institutions conduct virtual classrooms. BigBlueButton is an open-source web collaboration software utilized by education organizations for e-learning and training. The software offers numerous options for customization and integration as

per requirements of the users. BigBlueButton enables users to conduct web-conferencing and share documents, audio, and video files for online learning. The software's "whiteboard" feature allows presenters to mark valuable topics in the presentation. In addition, its "polling" feature engages learners and helps the presenter to receive feedback. BigBlueButton's "desktop sharing" feature extends beyonds slides and allows moderators to share their screen with the audience enabling a better understanding of topics. BigBlueButton supports multiple users in a video conference with no cap on numbers of active webcams. The software also supports voice conferencing via Voice Over IP (VOIP) without additional hardware requirements. Although it's marketed as teaching software, it can be used as a video conferencing app by organizations. Finally, BigBlueButton offers integration possibilities with NextCloud.

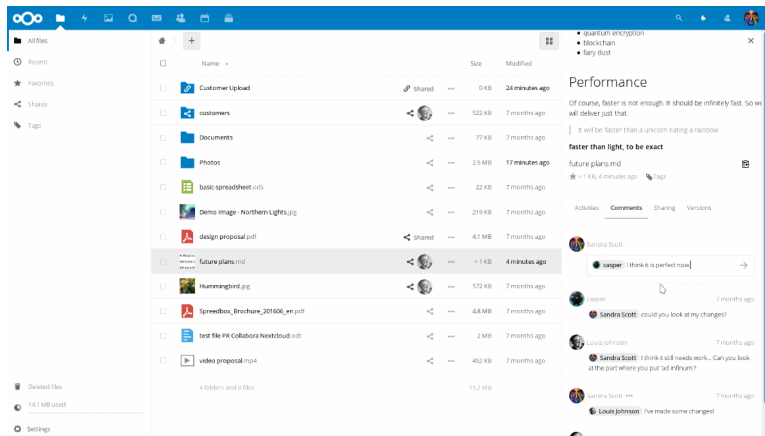
4.4 OpenPaas (<https://open-paas.org>)



OpenPaas is a free and open-source collaboration suite that helps teams to stay connected and work together with ease. It allows secure file sharing, video conferencing, scheduling, and maintaining calendars, and many more facilities that enable faster, efficient, and smarter team collaboration. As its on-premises

license is free, it can be hosted on own-servers and therefore have full control over data's security.

4.5 NextCloud (<https://NextCloud.com>)



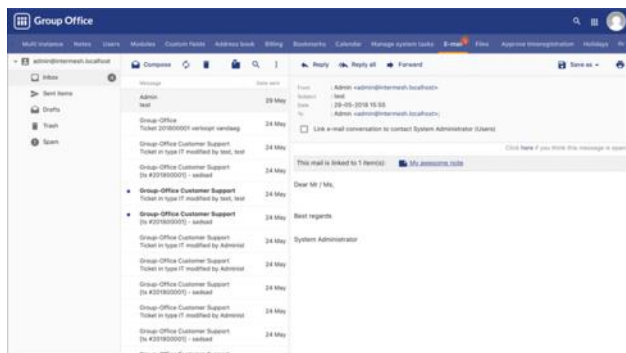
NextCloud Is a self-hosted open-source collaboration software that helps you take your team productivity to the next level and gain control over your data. It's an on-premises content collaboration platform with features similar to Dropbox and GoogleDrive, but an extra layer of security and privacy. It hosts several unique and innovative security

technologies, such as advanced server-side protection, end-to-end integration, client-side encryption, enterprise-grade key handling, etc. This is why it's popular in many highly regulated sectors for its commendable security features. NextCloud is a file sync and share application offering a variety of online collaboration tools.

Furthermore, It allows syncing files from desktop/laptop/tablet/phone with a remote server, sharing them with other NextCloud users or giving public access to them, editing office documents online, managing calendars, tasks, conducting surveys, creating forms, mounting external directories, sharing files with other NextCloud instances through 'federation sharing', etc.

NextCloud is introducing new features such as monitoring capabilities and full-text search, as well as audio/video conferencing. Since the software is modular, it can be extended with plugins to implement extra functionality.

4.6 Group Office (<https://www.group-office.com>)



Group Office is a free and open-source collaboration software that allows sharing projects, calendars, files, and emails with teammates and clients. It is a fully customizable app with versatile features, and its ease of use is a good choice for teams to collaborate and work together efficiently. In addition, the software features a free basic community version and options for paid advanced modules to enhance its

functionality.

4.7 INSPIRE Community Platform

Based on the above features and tools reviewed, the most prominent candidates for the realization and implementation of the INSPIRE Community Platform (i.e., Knowledge Sharing Hub), have been the NextCloud Platform integrated with the OpenProject for supportive project management features.

There are many benefits for utilising NextCloud as the primary solution for INSPIRE and these are divided into different aspects:

- a. **Cost-Effective:** NextCloud is an open-source platform, which means that it is free to use and can be installed on any server. This makes it a cost-effective solution for INSPIRE project that needs a cloud storage platform.
- b. **Data Control:** With NextCloud, users have full control over their data, which means that they can decide where their data is stored and who has access to it. This is particularly important for INSPIRE that needs to comply with data protection regulations.
- c. **Collaboration:** NextCloud makes it easy for users to collaborate on files in real-time. This can improve productivity and efficiency in the workplace, as teams can work together on projects and tasks without needing to be in the same physical location, which is essential for the Knowledge Sharing Groups and Communities of Practice of INSPIRE.
- d. **Security:** NextCloud takes security seriously and provides a range of tools and features to ensure that data is protected. These include two-factor authentication, encryption, and integration with external authentication providers. By default, NextCloud provides protection against brute force attacks. The open-source cloud's web interface can be secured thanks to Content Security Policy 3.0 (CSP). The HTTP security feature allows server-side rules for accessing the files that need to be defined. NextCloud provides a range of security features and tools to ensure that data is protected. This can give INSPIRE users' peace of mind, knowing that their data is secure and protected.

- e. **Customization:** NextCloud is highly customizable, which means that INSPIRE KSHs and CoPs can tailor the platform to their specific needs. This can include adding custom features, integrating with other tools and services, and creating custom themes and designs.
- f. **Integration:** NextCloud integrates with a wide range of third-party tools and services, making it easy to connect to other apps and services that users may be using.
- g. **Mobility:** NextCloud is designed to be mobile-friendly and works seamlessly across a range of devices, including desktops, laptops, tablets, and smartphones.
- h. **File Sharing:** NextCloud makes it easy for users to share files with others securely. Users can share files with individuals or groups, set permissions, and control access to their files.
- i. **Collaboration:** NextCloud provides a range of collaboration tools that allow users to work together on files in real-time. Users can comment on files, tag collaborators, and track changes to documents.

On the other hand, OpenProject is a pleasure to use for projects from proposal/concept to closing. Creating a Work Breakdown Structure (WBS) and timeline with generic resources is a great way to generate documentation needed for proposals.

it makes it very easy to create tasks, assign them to individuals, and create work packages within a project. There are many options available when creating a work package, which is very useful.

And also, it is possible to assign custom states to these work packages. Copying that proposal project to an active project is then a great way to jumpstart project planning with team awareness of timelines and requirements. Teams can interact with the project plan, adding their own features and tasks to complete deliverables. Creating custom WBS queries assists in focusing team members on items they are required to complete. And creating custom queries to the master Work Package list provides a way for executive members to view the active phases and status of milestones. Meetings can be logged in their own section, and wiki notes can be captured for reference. Finally, OpenProject has a very active and fully engaged community.

5 INSPIRE Infrastructure and Technical specification

5.1 Infrastructure Settings and Architecture

The INSPIRE Community Platform (a.k.a. Knowledge Sharing Hub) is comprised of various systems and platforms that will be deployed to Hetzner Cloud in order to ensure that resources can be freely allocated to and from other computers by the software, enabling maximum utilization and helping to prevent crashes.

The overall infrastructure is comprised of a PHP based MySQL database for the project data related to the NextCloud installation and a Ruby on Rails, Angular deployment for the OpenProject installation, and both hosted by Hetzner Online GmbH⁶, a DIN ISO/IEC 27001 certified company with an established Information Security Management System (ISMS). The data centre of Hetzner Online is located in Nuremberg, Germany and is highly secure. The premises are under 24/7 video surveillance and access is exclusively via electronic access control terminals with a transponder key and admission card only. Network security is ensured by multiple redundant connections to DE-CIX and Juniper Networks routers with an automatic DDoS protection system.

The server utilized is currently a CPX31 cloud-server: 4 core processors AMD CPU (dedicated vCPU Instances: Maximum performance with dedicated vCPUs. Ideal for CPU intensive applications like highly frequented web servers, video encoding, machine learning or research calculations.), 16 GB of RAM, 160 GB disk space, and 20 TB of traffic.

More specifically, the following systems are utilized for the overall INSPIRE infrastructure:

System	Version
Virtual Private Server (VPS) , is the main machine that hosts all the provided servers and systems.	Ubuntu 22.04, 8GB RAM, CPU 4 Cores, 150GB Disk Space, Apache 2.4, PHP 8.1, MariaDB 10.6, PostgreSQL 13.10.
NextCloud , this is the respective installation of the collaboration environment located at: https://colab.inspirequality.eu	v.26.0.1
Open Project , this is the installation for the project management environment locate at: https://op.inspire.innosystems.gr	v.12.5.2
Drupal , this installation hosts the main Web Site of the project, located at: https://inspirequality.eu/	v. 9.5.7
LDAP Server and LDAP Account Manager , this installation is provided to support the seamless integration of all accounts into the INSPIRE Community Platform, located at: https://ldap.inspirequality.eu	v.2.5.14, v.7.7

The main systems above and the overall high-level architecture of the INSPIRE Community Platform is provided in the figure below.

⁶ <https://www.hetzner.com>

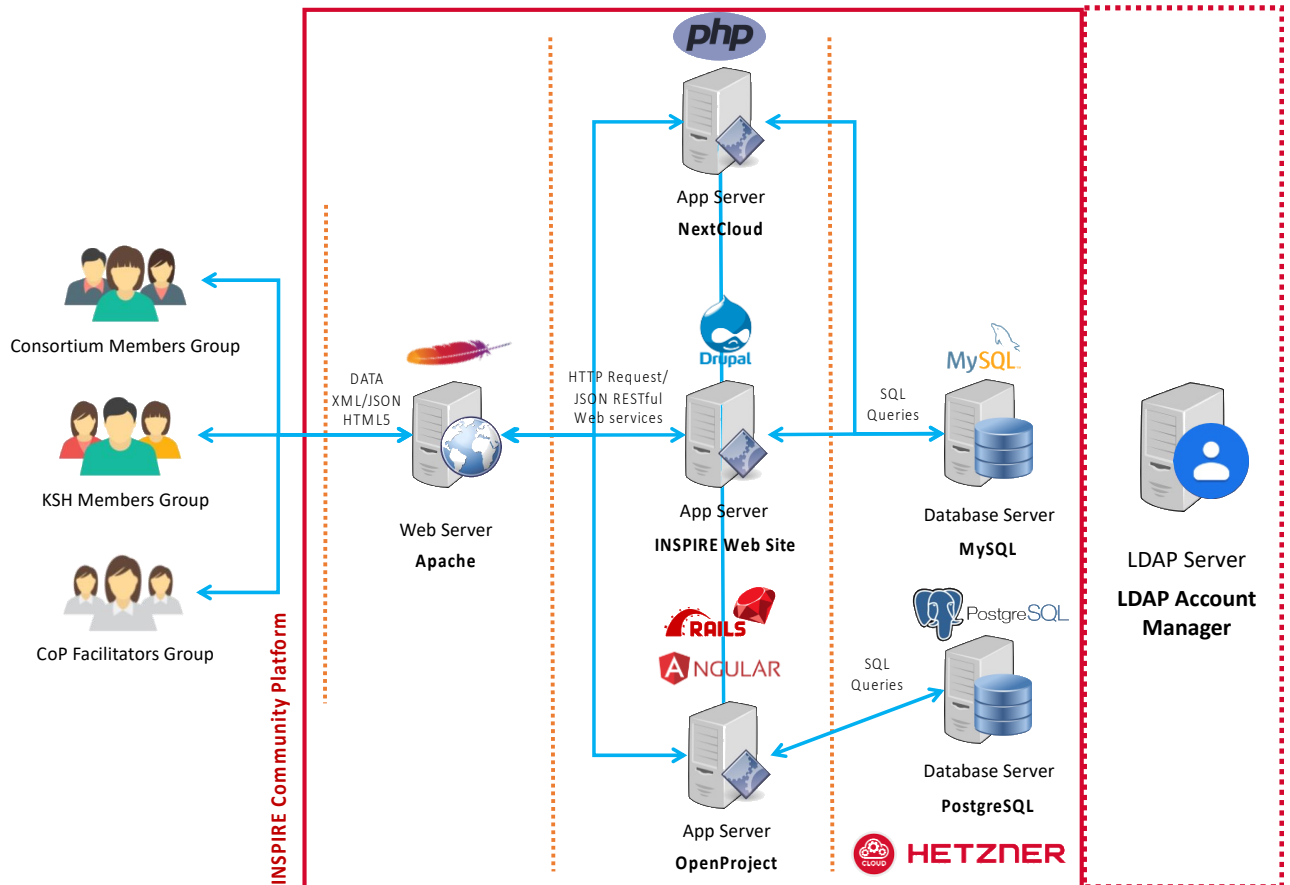


Figure 1. INSPIRE Community Platform High-Level Deployment Architecture

5.2 Usage Scenarios Configuration Approach

The aim of this section is trying to bridge the requirements of the usage-scenarios with the functionality provided by the selected platforms, in essence acting as an instructional guide for configuring the INSPIRE Community Platform as a whole. Towards this end the figure below provides a step-by-step guide for the configuration steps of a CoP (the KSH groups are considered “virtual” for the needs of the platform, not requiring specific functionalities), which are then explained in more detail in the sections further down the document.



Figure 2. Step-by-Step configuration guide for setting up a new CoP

More specifically:

- **Step 1:** The Super Administrators of INSPIRE Community Platform have to create the new CoP group from the User and Group Management of NextCloud. The title of the CoP would be sufficient at this point with the basic set of privileges provided to each new group by default.
- **Step 2:** The Super Administrators define a new or existing user of the platform as the CoP Facilitator, acting as the Administrator of the new CoP group. The CoP facilitator can now manage the users of the CoP group (i.e., the CoP members, etc.) by being able to add, modify and delete. Privileges of the CoP Facilitator can be revoked at any time from the Super Administrators of the platform.
- **Step 3:** A specific directory is created in the “root” folder structure of INSPIRE within NextCloud for the specific CoP. Each CoP has its own folder and access rights are given only to the members of the specific CoP group (e.g., the CoP Facilitator and the CoP members). The CoP facilitator defines on the privileges given within the folder for the member of the CoP as well as on the sharing possibilities.
- **Step 4:** A specific calendar is created within list of calendars within NextCloud and it is assigned to a specific CoP. Similarly, the CoP facilitator is responsible for defining the privileges of how calendar entries are being handled by the members of the CoP group. These calendars can be fully edited and managed by the CoP group (e.g., the CoP Facilitator and the CoP members), and viewable by other CoPs and the INSPIRE consortium members.
- **Step 5:** During this step, the Super Administrators, handle configurations and customizations on external systems and platforms such as the [INSPIRE Web Site](#) for the dedicated dissemination section of each CoP and the [Discourse platform](#) for building the community forum of each CoP group. It could be the case that each of the above-mentioned platforms will require the creation of a group in their own environment

similarly to Step 1 above for each CoP, as well as potential solutions for Authentication and Authorization with the accounts of the NextCloud users.

We have to always take into consideration that Super Administrators of the platform have full access at all levels of the INSPIRE Community Platform and can revoke privileges and apply restriction in all elements of the platform at any given time.

A more comprehensive guide on the functionality provided by NextCloud aligned with the user scenarios of INSPIRE is presented in section 5.3 below.

5.2.1 User and Group Management

According to the Usage Scenarios described in section 3 above, the INSPIRE Community Platform has a complicated structure of different groups (e.g., INSPIRE Consortium Group, 4 KSH Groups and 12 CoP Groups) each with different privileges as well as different levels of administrators (e.g., simple users / members of a group, KSH support manager, CoP facilitator, etc.).

For this reason it is imperative to utilise the features provided by the [User Management](#) of NextCloud in order to implement the above requirements. All of the groups operate under the same environment (since there are not separate instances of the installation for each group), but different privileges are assigned to each Group, including its own Administrator(s).

The following groups will be created within the INSPIRE NextCloud Installation:

NextCloud Groups	Type
INSPIRE Consortium	Consortium Members
Sustaining and deepening change	KSH
Widening participation	KSH
Intersectionality	KSH
Innovation	KSH
CoP [1-12]	CoP

Groups provide a way to manage multiple NextCloud users by assigning them specific authorizations once, instead of individual grants. This makes it easy to update permissions or add new users quickly, making it a much more efficient method of managing NextCloud accounts.

NextCloud has two types of administrators: **Super Administrators** and **Group Administrators**. Group administrators have the rights to create, edit and delete users in their assigned groups. Group administrators cannot access system settings or add or modify users in the groups that they are not **Group Administrators** for.

The administrators of the INSPIRE Community Platform (i.e., Super Administrators of the platform) can create the above new groups in NextCloud and then add a new or an existing user as the Administrator of Group (e.g., KSH Support Manager or CoP Facilitator respectively). Following this, the KSH Support Manager or CoP Facilitator can further add users or assign new users within their respective Groups accordingly. More specifically, group admins are granted administrative privileges on specific groups, and can add, modify, and remove users from their groups. New group members will immediately have access to file shares that belong to their new groups. Group admins can also create 2-factor one-time login codes and do other administrative tasks like manage ACLs on Group Folders.

5.2.2 Sharing of files within Groups

Each one of the above groups can have their own dedicated root folder within the overall INSPIRE Community Platform directory and all files within this group folder can be available to all group members or shared explicitly from the administrator(s) of the group.

NextCloud users can share files with their NextCloud groups and other users on the same NextCloud server, with NextCloud users on other NextCloud servers, and create public shares for people who are not NextCloud users. Therefore, users have control of a number of user permissions on file shares.

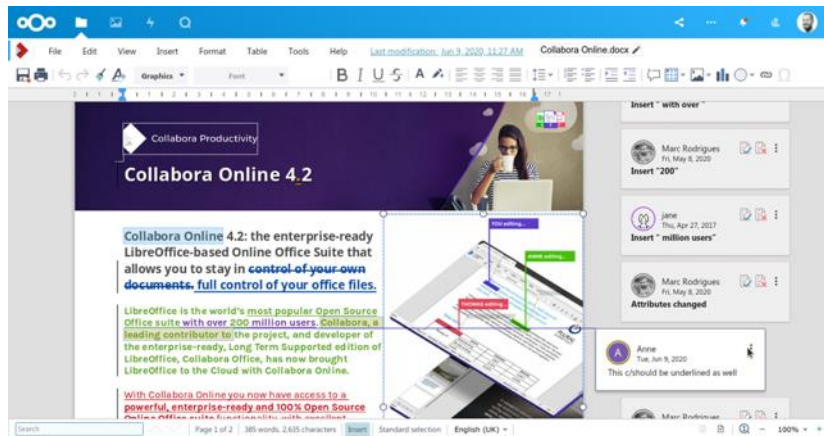
Apart from the existing functionality, the [Group Folders](#) module can be deployed offering features that allows administrators to create folders where different groups of people can store and view files, thus offering admin configured folders shared with everyone in a group. In this way CoPs can collaborate without everyone having access to everyone else's documents (apart from the Super Administrators of course). After a folder is created, the Super Administrators can give access to the folder to one or more groups, control their write/sharing permissions and assign a quota for the folder.

There will be one dedicated folder for each one of the Groups presented above. The root folders (directories) are administrated by the respective group administrator and sharing features within these directories and following the custom properties and features provided by NextCloud installation and general settings defines by the Super Administrators.

5.2.3 Co-Authoring of Standard Office Documents

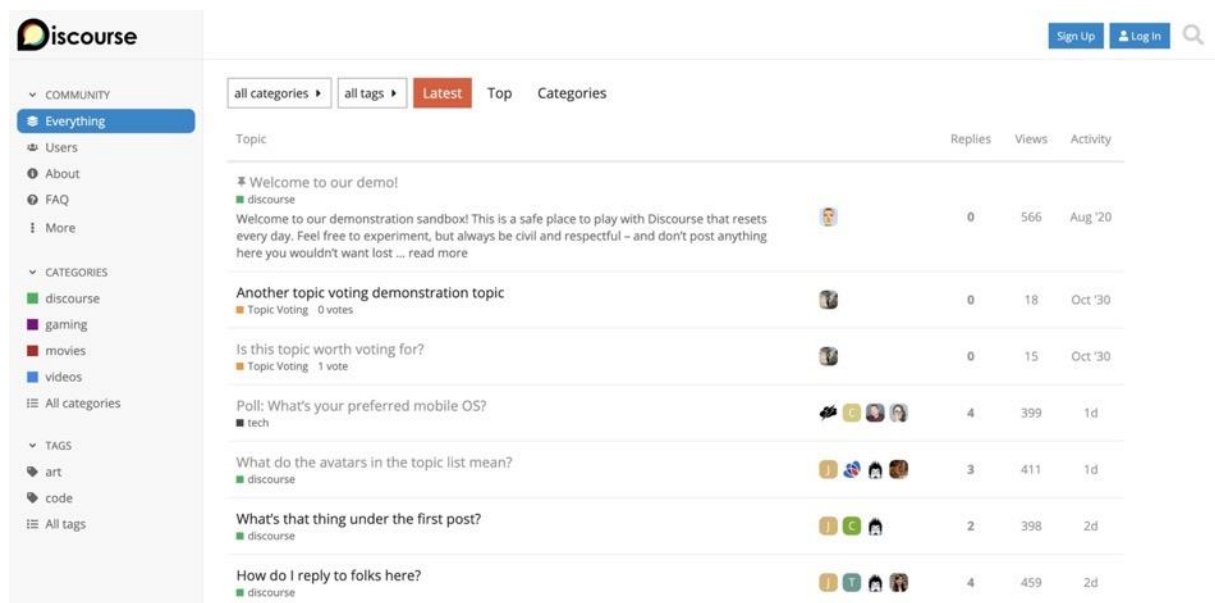
The users that have access to edit, and modify files according to the privileges mentioned above, can utilize the installed solution of [Nextcloud Office](#), which is an online office suite with collaborative editing. It supports all major document, spreadsheet and presentation file formats and works in all modern browsers.

This works side by side with the [Collabora Online Server](#). Collabora Online is a powerful LibreOffice-based online office suite with collaborative editing, which supports all major documents, spreadsheet and presentation file formats and works together with all modern browsers. This app provides a built-in server with all of the document editing features of Collabora Online.



5.2.4 Discussion Forums

Unfortunately, NextCloud so far does not offer a discussion forum application, and therefore we must look for alternative options. The main approach revolving around the notion that the discussion forum of each CoP will be built upon the open-source platform of [Discourse](#) which is the 100% open-source discussion platform built for the next decade of the Internet. It can be used as a: (a) mailing list, (b) discussion forum, and (c) long-form chat room. We primarily focus on the discussion forum.



Within Discourse, the same structure and user management of the various CoP groups must be replicated similarly to NextCloud. The CoP Facilitator is responsible keeping the groups in both platforms up to date to allow same privileges across platforms.

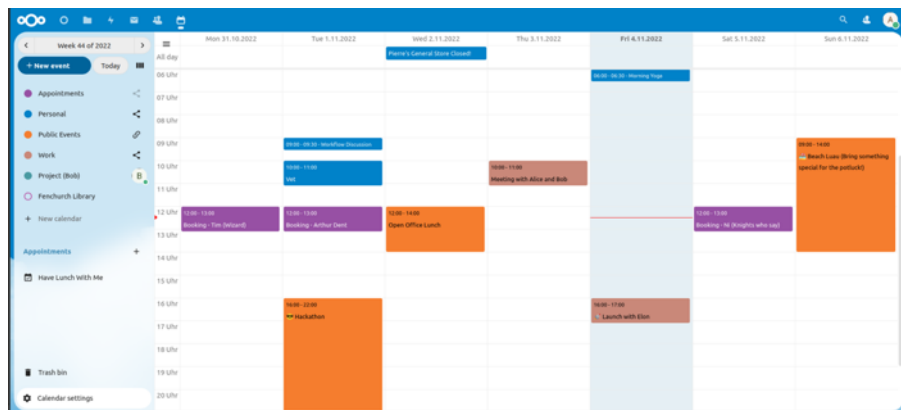
Through Discourse there can be a numerous of basic functionality provided for discussion forums such as management of topics and posts, manage categories, tags, notifications, etc.

Finally, there is a [module](#) for providing integration with Discourse and NextCloud, which provides a dashboard widget displaying your important notifications and the ability to find topics and posts with NextCloud's unified search.

Alternative solutions could also include the Forum Module provided already by Drupal which is the core platform of the INSPIRE Web Site, utilized as the dissemination area of all CoP groups as described below.

5.2.5 Shared Calendars and Events

NextCloud is offering a very advanced calendar solution that fits the needs of the INSPIRE Community Platform. As already mentioned above, a specific calendar is created by the Super Administrator



featured in the list of calendars within NextCloud and it is assigned to a specific CoP. Similarly, the CoP facilitator is responsible for defining the privileges of how calendar entries are being handled by the members of the CoP group. These calendars can be fully edited and managed by the CoP group (e.g., the CoP Facilitator and the CoP members), and viewable by other CoPs and the INSPIRE consortium members.

More specifically, the functionality offered by the Calendar app is associated with the management of events, invite attendees to an event, add attachments to events, setting up reminders, add recurring options, etc. It gives the ability to respond to invitations, manage appointments, etc. The most important aspect is that each user is able to create and manage their own calendars, but most importantly all the CoP members can see the common CoP calendar that has been created by the Super Administrator and managed by the CoP Facilitator. Other CoPs and INSPIRE project members can subscribe to a shared calendar of another CoP.

The CoP calendar can be shared with other users or groups. Calendars may be shared with write access or read-only. When sharing a calendar with write access, users with whom the calendar is shared will be able to create new events into the calendar as well as edit and delete existing ones. Users outside a specific CoP should only be allowed read-only access to the calendar of that CoP and therefore we can achieve sharing among CoP calendars within the INSPIRE Community Platform.

5.2.6 Task Planning and Progress Tracking (OpenProject)

Task planning and Progress Tracking is provided only to members of the INSPIRE consortium and only through the OpenProject platform which is integrated with the NextCloud platform (see section 5.5 below), through the LDAP server of the overall INSPIRE Community Platform.

OpenProject offers advanced Task Management features alongside progress tracking for all tasks.

A more comprehensive guide on the functionality provided by OpenProject aligned with the user scenarios of INSPIRE and the task planning and progress tracking features, is presented in section 5.4 below.

5.2.7 Single-Sign on and LDAP (Integration with NextCloud, OpenProject, Discourse, and Drupal)

For the provision of Single Sign On between NextCloud and OpenProject for INSPIRE Consortium members, as well as the rest of the platforms within the INSPIRE Community Platform (e.g., Discourse, access to INSPIRE Web Site and Blog section / Drupal Backend, etc.) for CoP members we utilize an LDAP Server and LDAP Account Manager. LDAP Account Manager (LAM) is a webfrontend for managing entries (e.g., users, groups, DHCP settings) stored in an LDAP directory. LAM was designed to make LDAP management as easy as possible for the user. It abstracts from the technical details of LDAP and allows persons without technical background to manage LDAP entries. If needed, power users may still directly edit LDAP entries via the integrated LDAP browser. This part of the platform is handled only by the Super Administrators of INSPIRE Community Platform.

The LDAP infrastructure will be provided to INSPIRE consortium members, utilized to primarily integrating users and providing a more seamless authentication and authorization among NextCloud and OpenProject platforms, but also to CoP members for allowing single-sign on between their NextCloud CoP group community, their Discourse dedicated forum area, and their public dissemination blog space in the INSPIRE web site.

NextCloud ships with an LDAP application to allow LDAP users (including Active Directory) to appear in INSPIRE NextCloud user listings. These users will authenticate to NextCloud with their LDAP credentials, so we don't have to create separate NextCloud user accounts for them. Super Administrators will manage the INSPIRE NextCloud group memberships, quotas, and sharing permissions just like any other NextCloud user.

At the same time, OpenProject offers an LDAP Authentication. Super Administrators can specify the LDAP configuration. This can be any directory service compatible with the LDAPv3 standard, such as Microsoft Active Directory or openLDAP. The configuration depends on the specific database/applications, through which the authentication with OpenProject is intended.

A more detailed description of the integration aspects between NextCloud and OpenProject platform is provided in section 5.5 below.

Furthermore, Discourse provides a plugin to enable LDAP/Active Directory authentication with the INSPIRE LDAP Server for CoP Facilitators and CoP members, and so does Drupal CMS through the Drupal LDAP Login module which allows LDAP / Active Directory users to login to Drupal using their LDAP / Active Directory (AD) credentials. The latter will allow CoP Facilitators to seamlessly login into the INSPIRE Community Platform and manage their CoP dissemination public space through the blog area of INSPIRE Web Site. Finally, the LDAP

Server will also allow access to GenPORT for uploading and sharing resources, which would be yet another site to authenticate against the LDAP.

5.2.8 Dissemination of Information for CoP

As mentioned in the requirements specifications of the usage scenarios, CoPs need to communicate about their activities in general to the “outside” world.

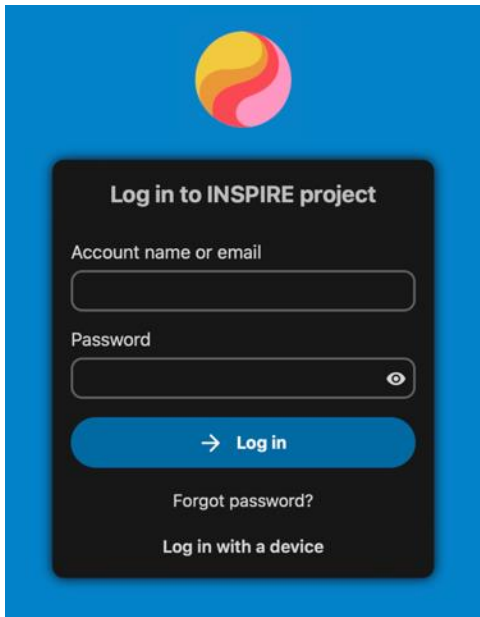
In order for this to be achieved Super Administrators will create a dedicated Blog Page within the [INSPIRE Web Site](#), which will be editable by the CoP Facilitator in order to publish online a general description about their CoP/Members in combination with periodic updates.

The INSPIRE Web Site is based upon the Drupal Content Management System. Within this CMS, all the CoP Facilitators will be entered within the User Management System and will be given access and write-edit privileges to their dedicated page of their CoP.

All CoP dedicated pages will have the same layout based on the theme of INSPIRE, on a “blog-type” format. The CoP Facilitator should provide the Title, Image, Short description, and Long description of a Blog post through the Drupal CMS backend system,

5.3 NextCloud

Based on the SoTa of online collaboration tools presented above, NextCloud is the respective popular platform that is employed as the main collaboration environment of INSPIRE to support the online collaboration space for partners, Knowledge Sharing Hubs (KSH) and the 12 Communities of Practice (CoPs). NextCloud is a suite of client-server software for creating and using file hosting services as well as other collaboration services. NextCloud is free and open-source, which means that anyone is allowed to install and operate it on their own private server devices. In contrast to proprietary services like Dropbox, Office 365 or Google Drive, the open architecture enables users to have full control of their data.



The INSPIRE file sharing as part of the INSPIRE Community Platform, under the sub-site <https://colab.inspirequality.eu>, permits user and group administration and authenticates users through the respective login page where credentials are entered (username & password). The administrator can fully manage the users and groups of the platform. Apart from creating or de-activating users, the administrator can set quota limit for each user to manage optimally the storage capacity of the file sharing. For each user of the INSPIRE file sharing the quota limit is set to 1GB while the admin has a quota limit of 5GB. Of course, if needed, these limits can be updated upon request. The view for user and group management is presented in *Figure 3. File sharing users and groups*. Following the same approach of OpenProject groups for each partner are created along with auxiliary groups. Each user belongs to at least one group, which is either: (a) the INSPIRE project (name member), (b) one or more of the four Knowledge Sharing groups, and/or (c) one or more of the 12 Communities of Practice groups.

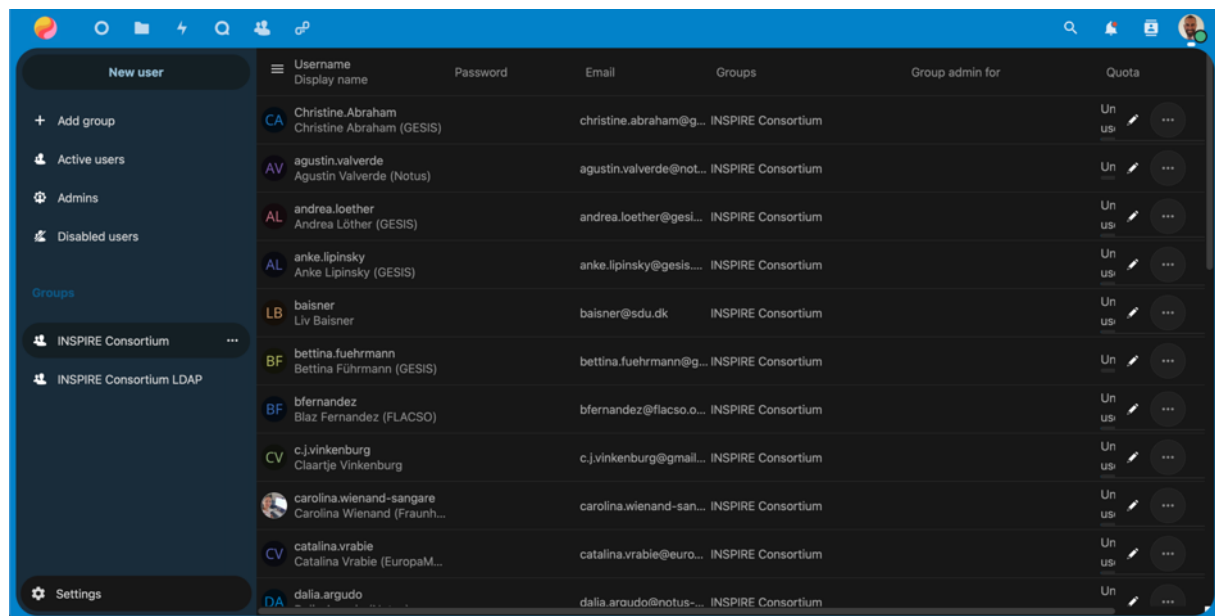


Figure 3. File sharing users and groups

NextCloud files are stored in conventional directory structure and are encrypted during transit and storage. The INSPIRE administrator created the required file structure of the project as presented in *Figure 4. File sharing structure*.

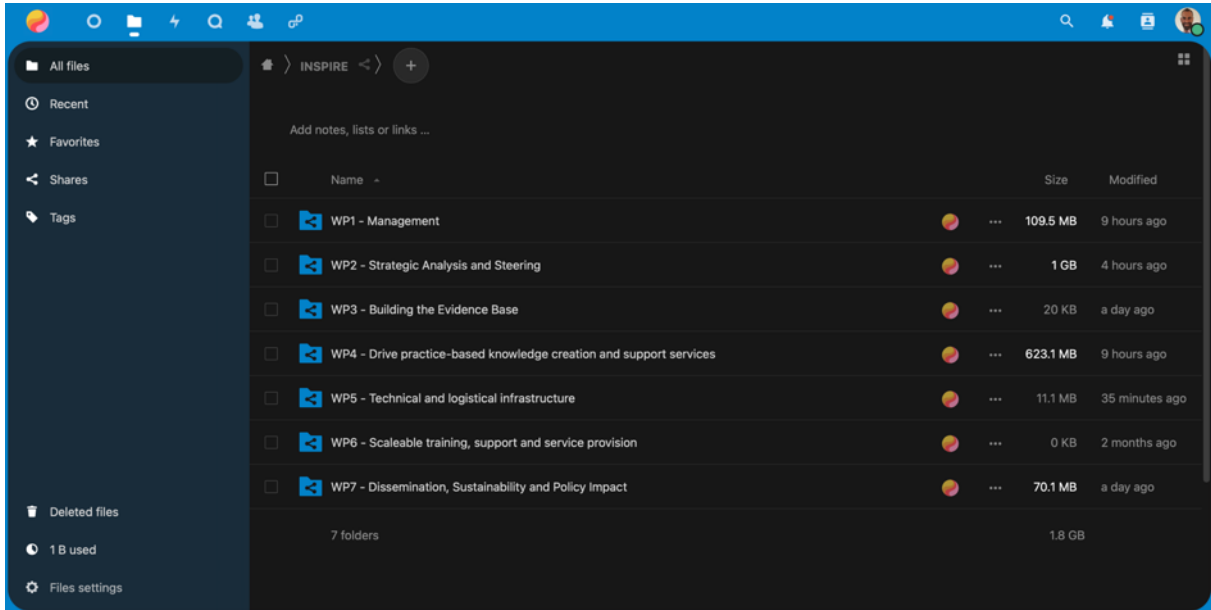


Figure 4. File sharing structure

Content can be shared by defining granular read/write permissions between users and groups (Figure 5. *File sharing capabilities*). Alternatively, NextCloud users can create public URLs when sharing files. Logging of file-related actions, as well as disallowing access based on file access rules is also available.

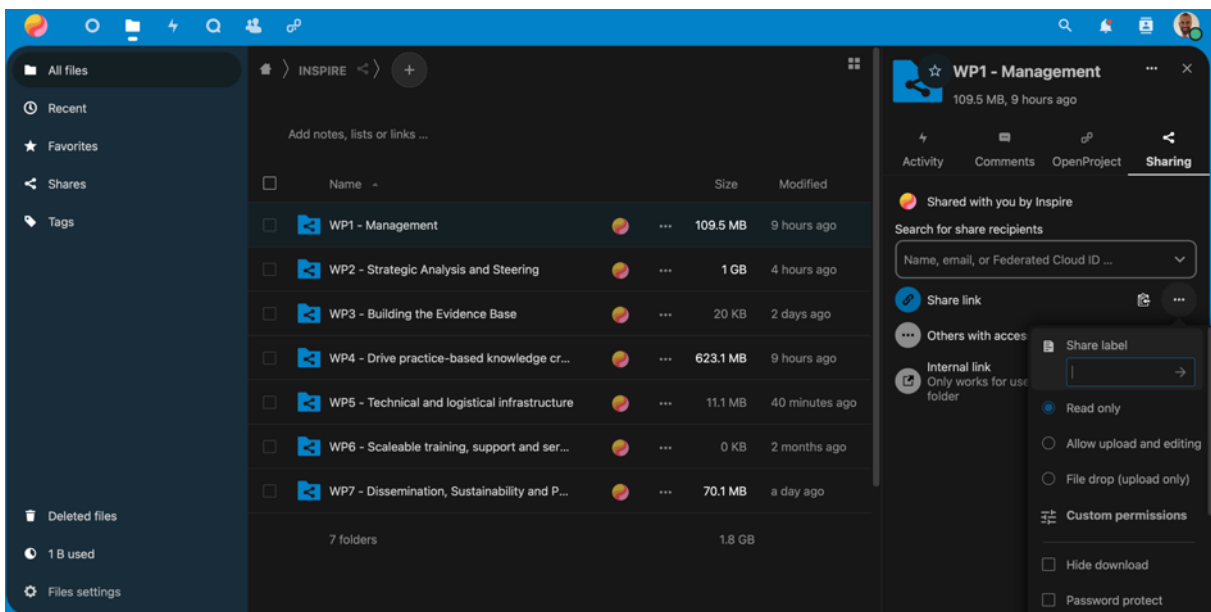


Figure 5. File sharing capabilities

NextCloud can synchronise with local clients running, MAC OS (10.6 or later), or various Linux distributions (Figure 6. INSPIRE File Sharing client). Client also supports notifications for new activities on the file sharing (creating files, editing, deleting, sharing, etc.). Of course, the client cannot override the permissions the user has on the platform.

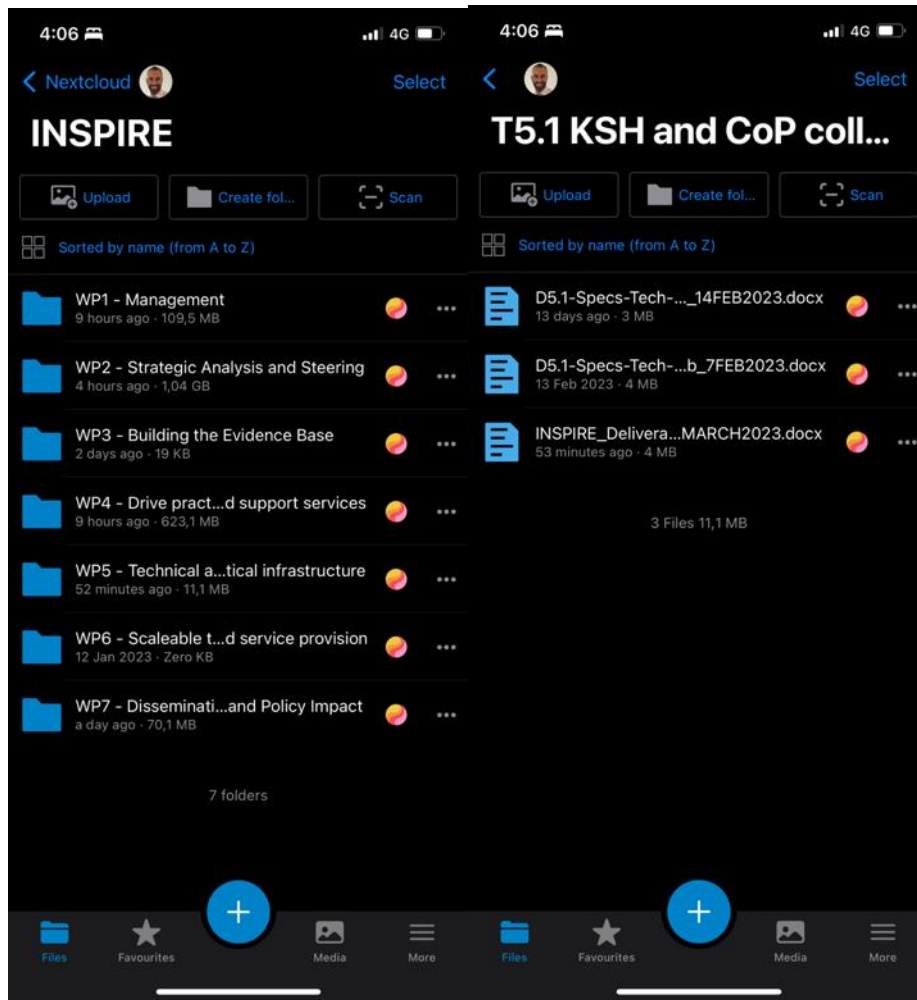


Figure 6. INSPIRE File Sharing client

Developers can offer their extensions to other users for installation via a manufacturer-operated platform. This platform communicates with the NextCloud instances via an open protocol and the App Store⁷ already contains over 200 extensions. With the help of these extensions, many functionalities can be added to improve collaboration among the INSPIRE consortium member including:

- browser-based text editor
- gallery
- document viewer tools from within NextCloud
- connection to Dropbox, Google Drive and Amazon S3

⁷ <https://apps.NextCloud.com>

5.4 OpenProject

The main tool used for project management is the OpenProject. OpenProject is a web-based project management system for location-independent team collaboration. This open-source application is released under the GNU General Public License Version 3 and available as a community edition and chargeable Enterprise Edition. INSPIRE is using the community edition of OpenProject.

The main features of OpenProject utilized by INSPIRE are listed below:

- Project management and milestones
- Issue management
- Project timelines
- Project news



OpenProject supports a quite flexible user management system with roles and permissions for each user group. The users of the OpenProject are all affiliated staff of the members of the consortium and each one of them are authenticated through their personal accounts.

In order to accomplish a more fine-grained authorization policy, each user belongs to the user group that reflects to the organization he or she represents. Additionally, auxiliary user groups are created such as the four Knowledge Sharing groups, and the 12 Communities

of Practice groups, similarly to the NextCloud infrastructure presented above.

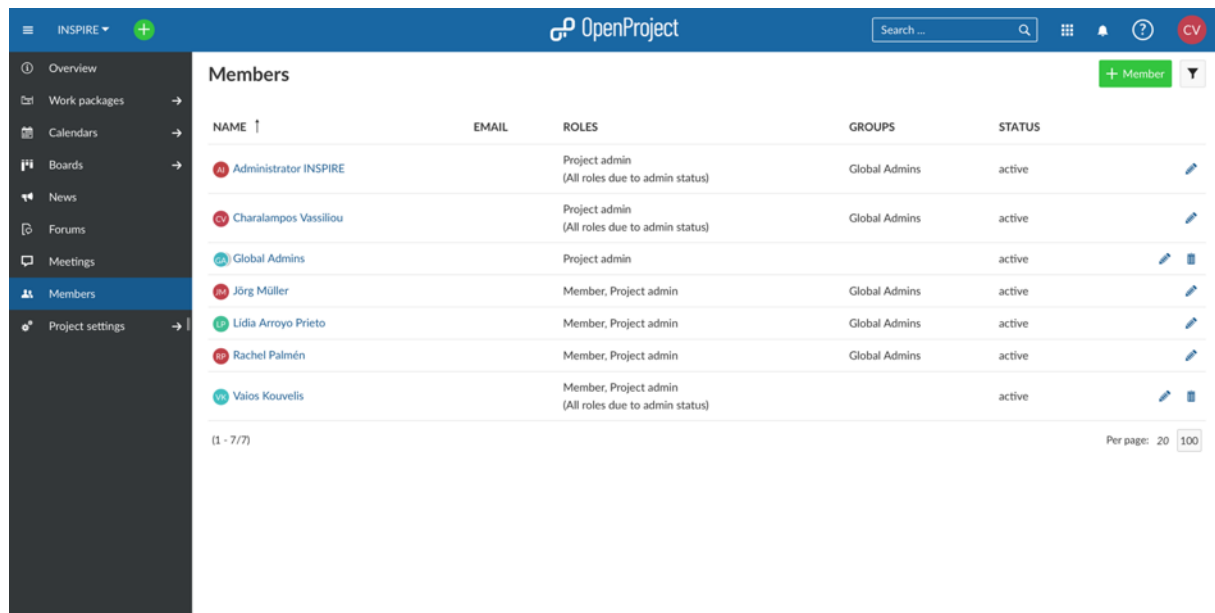


Figure 7. Users and groups

As long as the user authenticates through the authentication mechanism of the OpenProject (username and password) the landing page is loaded (Figure 8. Landing page after authentication). In landing page, basic information presented such as the latest registered users, latest published news and links for the user’s account page, change password page and of course a link to existing projects of the platform. In the context of INSPIRE only the respective project is present along with a couple demo projects used by the users to get familiar with the platform.

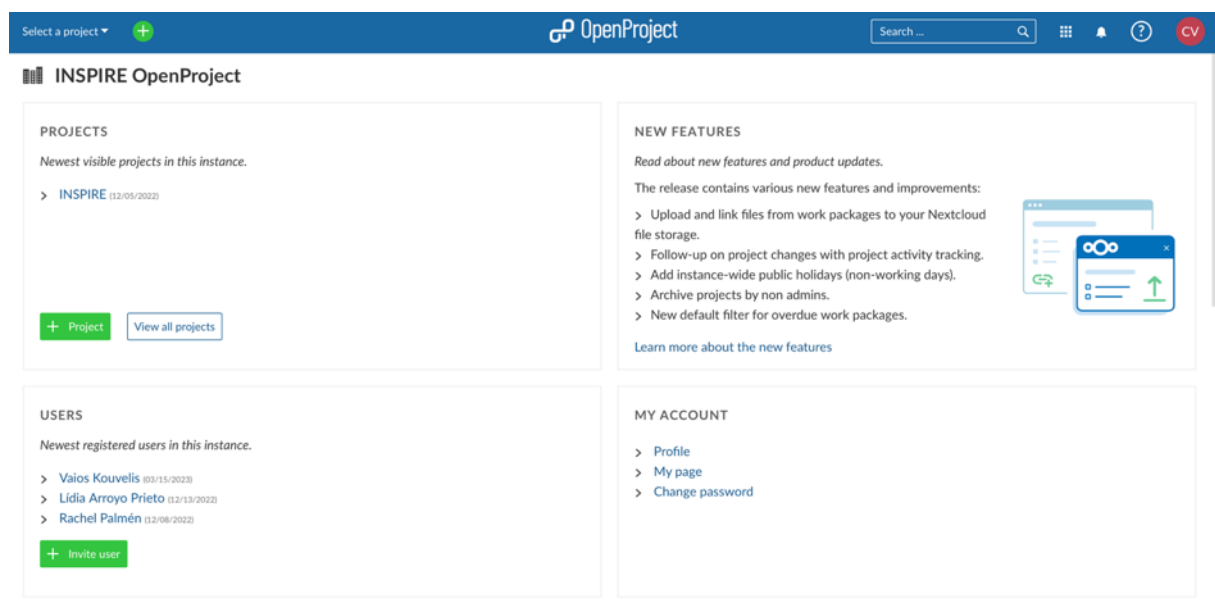


Figure 8. Landing page after authentication

By entering the project’s space, a front-page with useful information presented. This information regards project’s description, the users of the project, latest news as published by

the administrator of the project and finally an overview of the work packages and their statuses (Figure 9. Frontpage for INSPIRE at OpenProject).

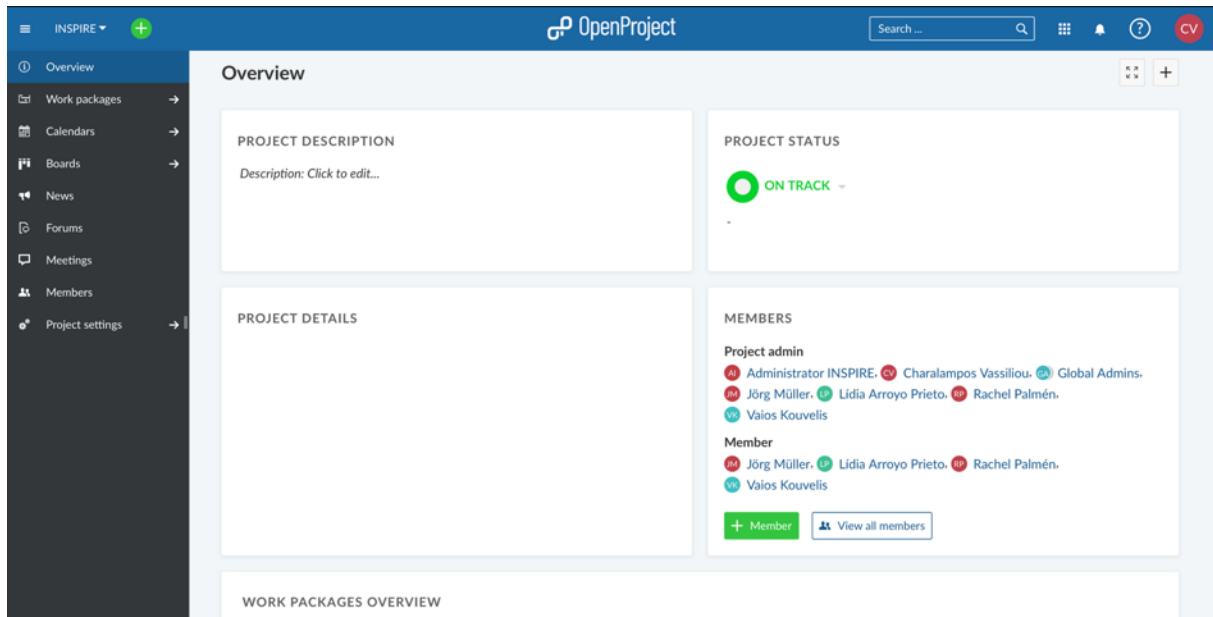


Figure 9. Frontpage for INSPIRE at OpenProject

The most important functionality for OpenProject in the context of INSPIRE is of course the task management. Task management is offered by OpenProject at the work packages page. The structure of the work package is already defined by the administrator of the platform and the respective tasks and deliverables are assigned to the responsible member of the consortium as described in the workplan of the project. OpenProject supports custom views of the tasks and work packages in order to serve the needs of the users. The administrator of the platform has defined and made available to the users and alternate view presenting the start date and the end date of each activity (work package, task, deliverable). Thus, users will facilitate the users to keep track of their activities and deliver their assignments within the project's deadlines. In the same context, the work packages page gives to the users the ability to present the tasks in a GANTT chart view.

ID	SUBJECT	TYPE	STATUS	ASSIGNEE	PRIORITY
37	WP1 - Management	TASK	New	-	Normal
38	WP2 - Strategic Analysis	TASK	New	-	Normal
39	T2.1 Strategic analysis: conceptual foundations, existing knowledge & gaps.	TASK	New	-	Normal
40	WP3 - Building the Evidence Base	TASK	New	-	Normal
42	T3.1 GEP Monitoring and Indicator Development	TASK	New	-	Normal
41	WP 4 - Drive practice-based knowledge creation and support services	TASK	New	-	Normal

Figure 10. Workpackages at OpenProject

Additional auxiliary functionalities are also supported by the OpenProject platform. Particularly, the users have access to the calendar of the project. In this calendar all the important events and deadline are presented. Such deadline and event may regard deliverables, project meetings, teleconferences or dissemination events.

5.5 Integration Aspects

OpenProject offers close integration with NextCloud. Starting with OpenProject 12.2, Nextcloud can be used as an integrated file storage in OpenProject. The integration application, which can be found in the NextCloud App store, enables seamless integration with open source project management and collaboration software OpenProject.

On the NextCloud end, it allows users to:

- Link files and folders stored in NextCloud with work packages in OpenProject
- View, open and download files and folder linked to a work package via the Files tab
- View OpenProject notifications via the NextCloud dashboard
- Search for work packages using NextCloud's search bar

On the OpenProject end, users are able to:

- View all NextCloud files and folders linked to a work package
- Download linked files or open them in NextCloud to edit them

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