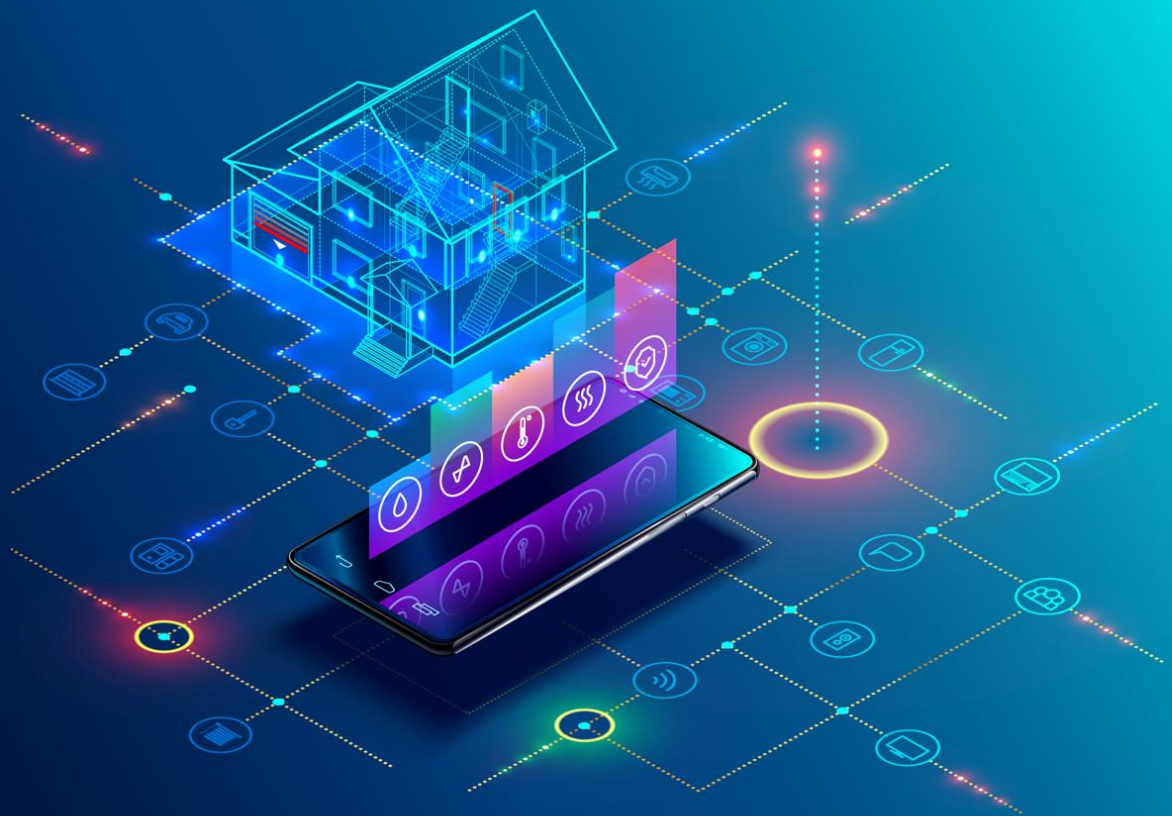


Launch version of the BIM-SPEED cloud platform, services and interfaces

Deliverable Report D6.1



Deliverable Report D6.1: Final version, issue date on 30 April 2019

BIM-SPEED
Harmonised Building Information Speedway for Energy-Efficient Renovation

This research project has received funding from the European Union's Programme H2020-NMBP-EEB-2018 under Grant Agreement no 820553.

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Launch version of the BIM-SPEED cloud platform, services and interfaces

Issue Date 30 April 2019
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Publishable executive summary

Deliverable D6.1 describes the launch version of the BIM-SPEED cloud platform, the main architectural component of the BIM-SPEED solution to speed up and increase the effectiveness and efficiency of BIM for renovation projects.

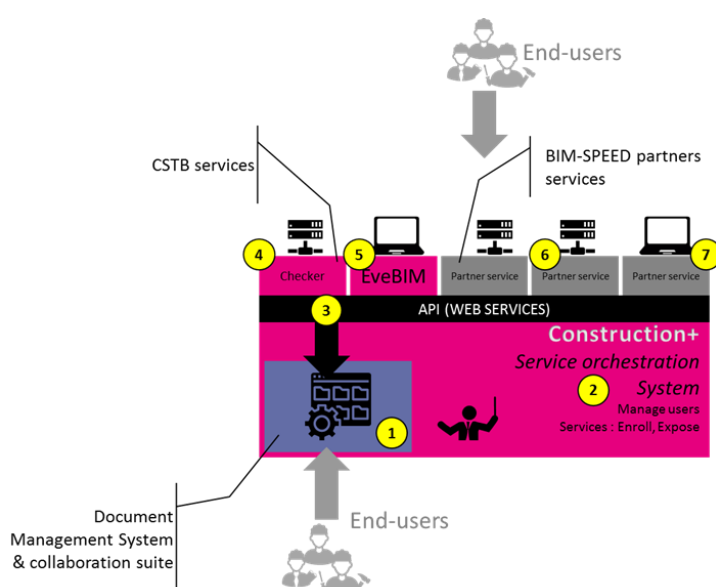
The BIM-SPEED cloud platform relies on the KROQI platform, a BIM collaborative cloud platform developed by CSTB at the request of the French public authorities in order to provide stakeholders, especially small entities (SMEs, VSEs), with tools allowing them to participate in the digital transition of the construction sector.

The BIM-SPEED platform relies on the KROQI platform in the way that it is using its infrastructure and pre-existing technical assets. Since KROQI is in exploitation phase, at M6, BIM-SPEED users will then be able to use a configured stable platform soon in the project, in order to understand its features and conscientiously propose evolutions that will be designed during the project. The BIM-SPEED project will extend the KROQI platform by providing new technical features like “advanced services profiles” (to segregate BIM-SPEED services from KROQI default services see §3.2) and “workflows” (to coordinate BIM-SPEED services).

The KROQI platform had to be adapted to the specific needs of the BIM-SPEED project: it has been fully translated in English, and a profiling feature has been added to personalize the KROQI workspace dedicated to projects created in BIM-SPEED. This feature allows administrators of the platform to specify the services that can be used in a given workspace, e.g. the BIM-SPEED workspace. Thus, BIM-SPEED users will only have access to the services integrated into the platform during the BIM-SPEED project and, conversely, these services will not be visible by non-BIM-SPEED users.

The KROQI workspace dedicated to BIM-SPEED can be accessed at: BIM-SPEED.kroqi.fr

The architecture of the platform is shown below.



The central components of the platform are a document management system and a collaboration suite. Integrated into the user interface of the document management system, BIM-SPEED services for renovation will be made available. Construction+ is the middleware platform aimed to manage the third-party services enrollment and their integration into the collaboration suite interface. A RESTful API allows external



services to interact with the collaboration suite features, for example to upload or retrieve documents, or add tags and comments. During the project, BIM-SPEED third-party online services will be integrated into the platform and be able to consume platform web services to access and process documents. Similarly, desktop applications will take advantage of these web services to get integrated into the BIM-SPEED platform. CSTB is currently working on an online model checking service. This service will be exposed as an available service to third-party applications during the BIM-SPEED project. CSTB also provides as integrated services a file naming service and a free desktop application named eveBIM which is a multi-scale model viewer (IFC, CityGML etc.).

The BIM-SPEED workspace is shared between the following projects:

- An **integration sandbox project** to exchange technical information and make tests with services developers;
- A **user support project** gathering all documents related to the "user experience" of the platform and providing user support;
- A **sample project** where any BIM-SPEED user can test and experiment BIM-SPEED collaboration and services;
- **BIM-SPEED pilot site projects** where any partner in a renovation project can use the platform to carry out the project.

User accounts have been created for BIM-SPEED partners with specific privileges depending on the role they will play in the project. For instance, developers can access the integration sandbox project, and BIM-SPEED pilot site leaders can manage one (or several) pilot project(s) and invite anyone of their choice to this project space.

In terms of infrastructure, the data storage of the document management system and the collaborative suite is distributed on two datacenters located in France. A RAID 10 architecture, combining redundancy and data distribution, ensures optimal resilience of this infrastructure and prevents data corruption. In terms of privacy and integrity of data exchanges. As for the Construction + middleware, it is hosted on Google Cloud servers in Western Europe, and benefits from the security procedures specific to these cloud services. Besides, KROQI uses digital certificates based on SSL technology. These certificates make it possible to encrypt data during exchanges.



List of acronyms and abbreviations

ACL: Access Control List
API: Application Programming Interface
BCF: BIM Collaboration Format
BIM: Building Information Model
CityGML: City Geography Mark-up Language
EDMS: Electronic Document Management System
EEB: Energy-Efficient Building
IFC: Industry Foundation Classes
MVD: Model View Definition
MvdXML: Model view definition XML
ORM: Object-Relational Mapping
RAID: Redundant Array of Independent Disks
RDF: Resource Description Framework
REST: Representational State Transfer
SDK: Software Development Kit
SME: Small and Medium-size Enterprise
SPARQL: SPARQL Protocol and RDF Query Language
SSL: Secure Socket Layer
SSO: Single Sign-On
VSE: Very Small Enterprise
XML: Extensible Markup Language

Definitions

KROQI

Name of the collaborative cloud platform developed by CSTB for the French construction stakeholders

eveBIM

Free multi-scale BIM viewer developed by CSTB, integrated in the KROQI platform

Triple store (or RDF store)

Database for the storage and retrieval of RDF triples through semantic queries

Docker

Virtualization technology allowing applications to be easily launched in software containers



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1. Introduction

A key aspect to speed up and increase the effectiveness and efficiency of BIM for renovation projects is to take advantage of a BIM Cloud Platform. The BIM-SPEED project uses the analogy of a Speedway. In contrast with the most available BIM solutions today, the development of the Information Speedway will be based on a decentralised/cloud-based database structure and focus on developing interfaces that describe how data can be provided and obtained for and from various BIM tools. Such a cloud-based interface solution allows for a quick integration of different data available in different formats and databases while an interface layer ensures the consistency of the data provided at every 'Service Station' according to harmonisation standards that will be used or developed in the project (open APIs and common data models). Such a micro-service strategy allows for the development of eco-systems of specialised applications to support different tasks for different stakeholders at the different 'Service Stations'. The R&D work within BIM-SPEED provides standards of how to exchange data between each of the 'Service Stations' to support the overall EEB deep renovation process.

The BIM-SPEED Information Speedway consists of 3 main elements (see figure 1):

1. **The BIM Cloud Platform** serves as an Information Speedway. It is not the 'final destination', but it is the holistic infrastructure that facilitates BIM-based processes, tools and data to achieve the short-term and long-term EEB deep renovation impacts. The 'Speedway' also contains 'traffic rules', which means: full compatibility standards, information exchange conventions, and agreements to regulate the workflows. The platform also manages the Data Storages.
2. The **10D BIM Toolset** can be considered as the 'Service Stations' along the Information Speedway. Each tool (each "Dimension of BIM") provides one or more functions to support EEB deep renovation, for example: As-Built Mapping, Modelling, Clash Detection, Scheduling, Cost estimation, Energy simulation, Comfort. The connections between the various BIM Tools and the BIM Cloud Platform are based on Open Interoperability principles.
3. The **BIM Projects and their Data** are like the vehicles and their content (passengers/goods) driving on the Information Speedway. Along the way, the vehicles and passengers receive the fulfilment of their needs at the 'Service Stations' (e.g. repair, refueling, restaurant). The BIM renovation project data is enhanced and enriched by the BIM Tools.

This deliverable presents the solution chosen for the implementation of the BIM-SPEED cloud platform. It introduces the KROQI platform developed by CSTB in the context of the French market, details the adaptations necessary to make it usable for BIM-SPEED, and summarizes the main features of the platform. A complete user manual is attached as an appendix.



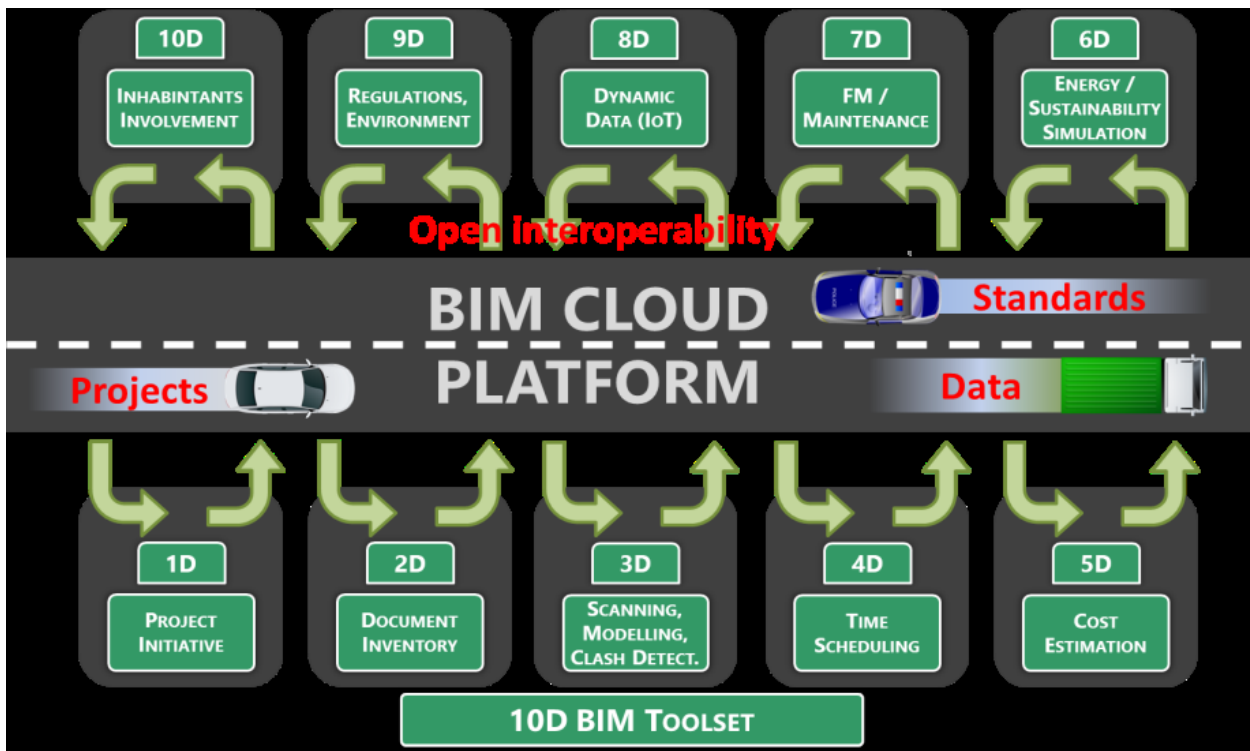
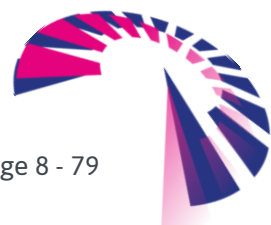


Figure 1. BIM-SPEED Information Speedway



2. Background: the KROQI platform

As a response to a demand from the French public authorities to provide stakeholders, especially small entities (SMEs, VSEs) with tools allowing them to participate in the digital transition of the construction sector, CSTB has started the development of an easy-to-use collaborative web platform open to everybody in 2017. This development was supported under the French Digital Transition Plan for the Building Sector (called PTNB¹), in consultation with professional organisations and construction stakeholders.

The project was structured around several key stages:

- June 2016: launch of the public digital collaborative platform project
- March 2017: start of the experimentation of the tool
- November 2017:
 - *Launch of the large-scale experimentation phase, in public beta version (at the BATIMAT exhibition in Paris)*
 - *1st Call for Expression of Interest aimed at developing high value-added technical solutions and services for VSEs/SMEs*
- March 2018: launch of the Digital Building Platform, named KROQI, operational and enhanced with interconnected third-party services, identified as part of the Call for Expression of Interest.

The functional foundation of KROQI, accessible free of charge to all stakeholders, provides document management functionalities, collaborative services, and a set of core services like a BIM model checker (see figure 2 below). This base is associated with an ecosystem of complementary and interconnected business services, which will be enriched over time. The platform, with its integrated services, allows all the actors concerned with a building project to manage and share the technical documentation, collaborate around BIM models, set up validation processes, check BIM models, and use innovative tools such as the production of digital models from scanned 2D drawings. Core services and third-party services are accessible through a web platform using SaaS-technology and ensuring data security to an unlimited number of users.

The collaborative suite of the KROQI platform relies on a commercial tool (WIMI), which is hosted on servers rented by the provider² of this solution. More technical details on the KROQI platform will be given in the next sections.

At the end of 2018, the platform had around 15,000 registered users (VSE/SMEs, craftsmen, architects, design offices, planners, etc.), including about 4,500 active users. Approximately 4,900 workspaces had been created, of which 800 were used frequently.

¹ Plan Transition Numérique dans le Bâtiment

² Cloud Solutions SAS



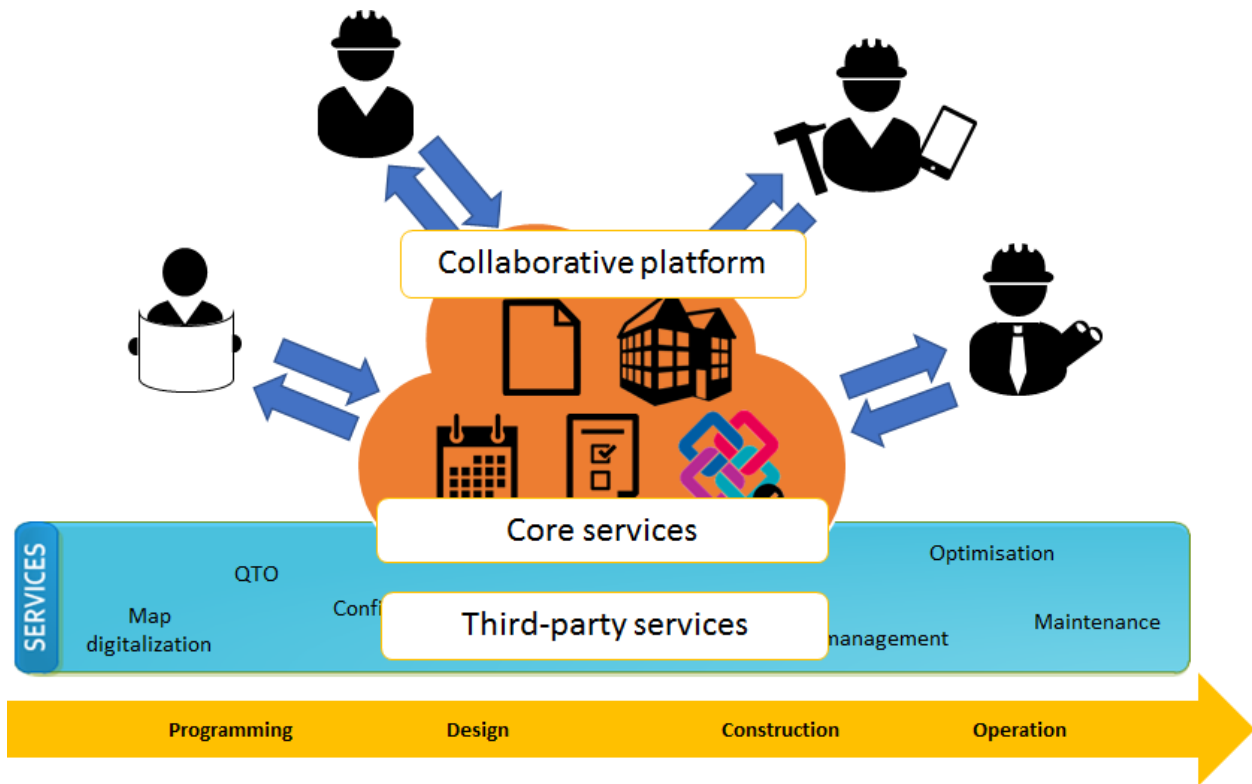


Figure 2. Functional principles of the KROQI platform



3. Adaptations of KROQI to BIM-SPEED

This paragraph initially details technical adaptations and support actions which have been engaged at M6 so that BIM-SPEED end-users and BIM-SPEED consortium partners could early get connected to the platform to understand it, use it, and later request “informed” technical evolutions according to BIM-SPEED-defined use cases.

This document has been updated at M24 after receiving remarks from the European Commission reviewers: The **Appendix 3** summarizes the differences between the KROQI platform and the BIM-SPEED platform to make this point clearer.

NB: at M24 the BIM-SPEED platform is still branded “KROQI” which will change in 2021 before it is used by consortium-outsiders for the BIM-SPEED competition.

3.1 Localization

Since the platform was developed in a purely French context, there was no English version available at the beginning of the BIM-SPEED project. The localization work in English consisted of:

- Translating the user interface of the collaborative suite
- Translating the user interface of the KROQI Drive (see this module in section 4)
- Internationalizing the user interface of the Construction+ platform
- Extending its data model layer with provision for handling multi-lingual data (e.g. displayed name and description of registered services)
- Addressing writing conventions (like date and time format)

By accessing the KROQI web application for the first time from your computer, the interface language is automatically chosen and corresponds to the language of the web browser installed on the machine. If desired, the user can nevertheless change the language of the interface.

3.2 Profiling

A new feature was added to personalize the KROQI workspace dedicated to projects created in BIM-SPEED. Indeed, a set of third-party services, which have been integrated for use by French stakeholders, do not need to be visible in the context of the BIM-SPEED project. Therefore, a profiling functionality has been developed that allows KROQI administrators to specify the services that can be used in a given workspace.

Thus, BIM-SPEED users will only have access to the services integrated into the platform during the BIM-SPEED project, without being polluted by the other services that will remain available in French.

Profile management offers fine-grained settings, profiles can be assigned to workspaces, projects within workspaces, individual users or individual users in a given project.



3.3 Sample third-party service

A sample service has been developed and integrated to illustrate how the platform interacts with third-party services. A sample BIM-SPEED-integrated program has been created to help the consortium partners to understand the philosophy and the APIs to integrate external BIM-SPEED services to the platform. The code is provided in Python and is made available in a developers-dedicated project³ on the BIM-SPEED platform.

The program can be executed on the BIM-SPEED platform to demonstrate how to process IFC documents. More details are available at page 20.

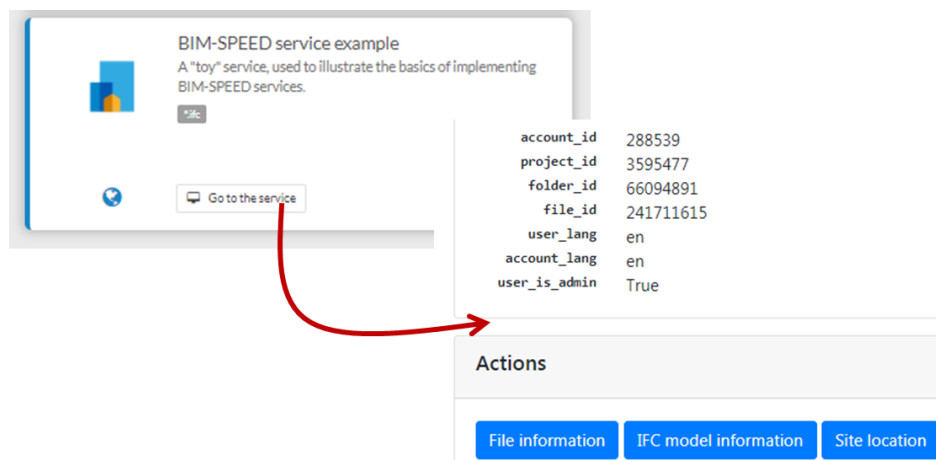


Figure 3. Sample BIM-SPEED-integrated service execution on the BIM-SPEED platform

3.4 BIM checker

CSTB has started to redesign the IFC model checker included in the French KROQI platform to integrate semantic features. It is not yet part of this launch version but will be integrated by the end of the first year of the project (M12). Its code design and triple store management will be improved in the context of BIM-SPEED. Specific model checking rules will be designed according to the BIM-SPEED partners' requirements for the BIM-SPEED use cases.

³ <https://bimspeed.kroqi.fr/#/integration-sandbox/documents/?directory=58856847>



4. Main features of the launch version

The KROQI workspace dedicated to BIM-SPEED can be accessed at: BIM-SPEED.kroqi.fr

4.1 Platform architecture

Figure below shows the architecture of the BIM-SPEED collaborative cloud platform.

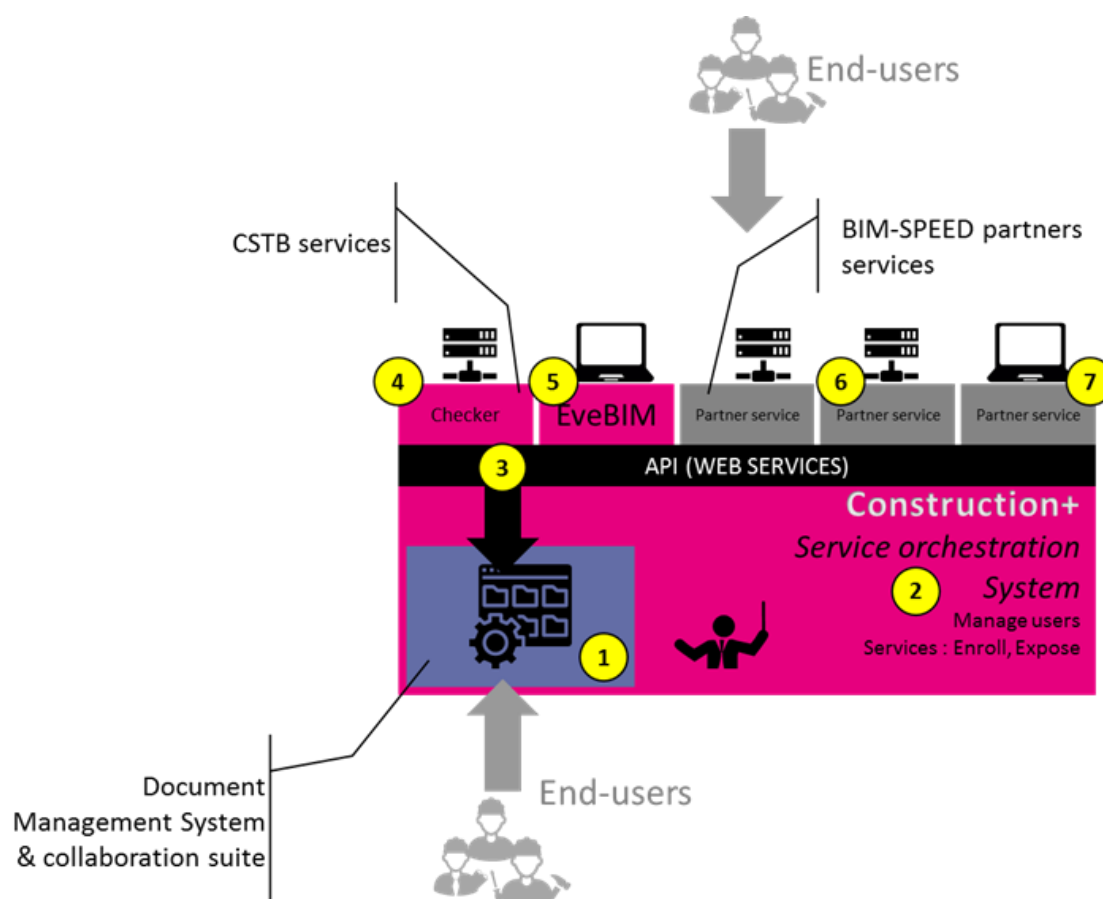


Figure 4. BIM-SPEED cloud platform architecture

1. At the center of the platform stands the document management system and collaboration suite. This is the platform and web interface that end-users are using when they connect to the platform. Integrated into the document management system interface some BIM-SPEED services for renovation will be made available.
2. The BIM-SPEED services for renovation added to the collaboration suite are managed by a platform which is named Construction+. The goal of this platform is to be the technical link between the third-party construction-and-renovation services and the collaboration suite. The purpose of this middleware platform is to manage the third-party services enrolment and their integration into the collaboration suite interface (like a market place).
3. This layer exposes API via web services so that external applications are able to interact with the collaboration suite features like: retrieving documents, uploading documents, adding some comments on documents, etc. In the future this platform may expose other core services created during the BIM-SPEED project. One of the key features of the Construction+ layer is to abstract the concrete documentation management system, and to provide an agnostic API to external services. This gives the freedom to replace it by a different solution, the only



- work being to develop the adapter plugin that bridges the functions of the public API to equivalent proprietary entry points or a combination of them.
4. CSTB is working on a model (IFC) online checker service. This service will be exposed as an available service to third-party applications during the BIM-SPEED project. It supports IFC 2x3 and may implement IFC 4 specifications during BIM-SPEED project depending on partners requirements (to be defined). This service uses the Construction+ API to retrieve documents stored in the collaboration suite.
 5. CSTB also provides a free desktop application named eveBIM which is a multi-scale model viewer (IFC, CityGML etc.). EveBIM is a sample desktop application that uses the KROQI API to retrieve documents and services from the KROQI platform. There is not yet an integrated online viewer.
 6. BIM-SPEED third-party online services will be able to be integrated into the KROQI platform by:
 - a. being registered and providing their end-point URL to KROQI administrators to get displayed on the platform;
 - b. and then consuming platform web services to access and process end-user documents in order to create added-value services.
 7. Desktop applications can as well take advantage of KROQI web services to get integrated into the KROQI BIM-SPEED platform.

The Construction+ platform uses an architecture based on micro-services, with highly decoupled components. Although this architecture does not impose any specific technology or language on the implementation of services, the underlying components (core model, orchestration, base services...) are written in Python. Data-centric ones use the Django framework to take advantage of its ORM and thus remain decoupled from the database technology. This is the case, among others, of the central registry that manages service descriptors and associated data for ACL and profile management, index filtering, etc.

Other components use lighter web server frameworks, such as Falcon for instance. This is the case of the EDMS, which abstracts the collaborative suite from the point of view of external services and provides a fully stateless REST API.

All the micro-services are packaged and deployed as Docker containers, their orchestration relying on Kubernetes. This provides valuable features such as automatic scaling, service health management and self-healing, hot upgrade of component images, ...

To date, the platform is deployed on Google Cloud Platform, and is physically hosted on data centres in Western Europe.

The following pages give an overview of the functionalities of the BIM-SPEED platform. For more details, the reader is invited to refer to the User Manual in Appendix 1 and available online in the 'User Support' project of the BIM-SPEED workspace (see below).

4.2 BIM-SPEED workspace structure: platform organization setup for BIM-SPEED partners

When using the KROQI platform, any user can create workspaces of which he becomes the manager. That said, CSTB has created a workspace dedicated to BIM-SPEED where all the demonstrators of the project will be managed. The features and services specific to BIM-SPEED will be integrated into this workspace and will not be visible to users in other spaces. On the contrary, third-party services



offered to French users of the platform have been excluded from the BIM-SPEED space, at least in this launch version.

As detailed in Appendix 1, a workspace is composed of projects that can be grouped into categories (e.g. to group all projects of the same country).

A project is composed of files (documents, models...) that can be grouped into directories (folders).

The following figure shows the initial structure of the BIM-SPEED workspace.

BIM-SPEED user access organization

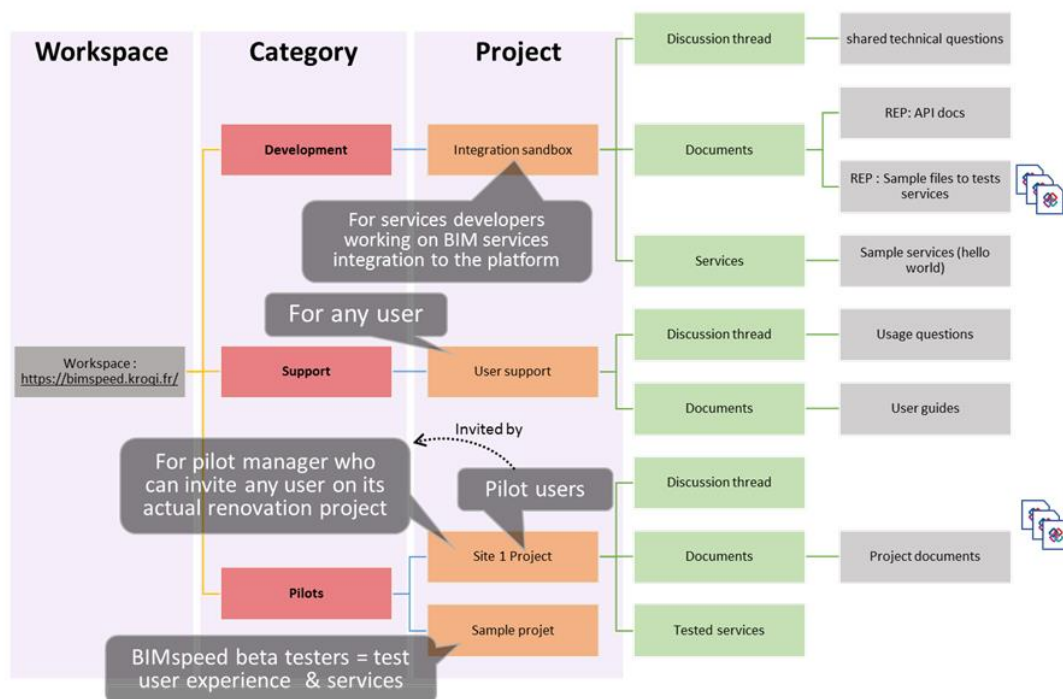


Figure 5. BIM-SPEED workspace structure

Within the BIM-SPEED workspace the following projects have been created:

- An **integration sandbox project** which is meant to exchange technical information and make tests with services developers (DEV zone only ...);
- A **user support project** where all documents related to the "user experience" of the platform will be accessible. This project is about end-user support;
- As projects:
 - a **sample project** where any BIM-SPEED user can test and experiment BIM-SPEED collaboration & services (when integrated), like a demo project.
 - **actual BIM-SPEED pilot sites projects** where any partner in a renovation project can use the platform to carry out his/her projects.



4.3 Accounts and roles

User accounts are created at the workspace level. A user account is associated with a role (or rank) giving different rights: administrator, project manager, user. Users can be created by managers or administrators. The various roles are synthesized below.

Table 1: Roles and associated rights

Roles/Ranks	Rights
Workspace Manager	He/she is the creator of the workspace. Only one person has this rank in a workspace. He/she is the master of all access and management rights on all projects of his/her workspace. In particular, the workspace manager can create projects in this workspace.
Administrator	He/she has the same privileges as the Workspace Manager. In particular, only the workspace manager and an administrator can create another administrator.
Project Manager	He/she has privileges limited to the projects for which he/she has been invited. In particular, he/she can invite users to participate in his/her project and define their access rights to the various project folders. He/she can also create new projects.
User	He/she has no privilege, either on the workspace or on the project. He/she can only participate in projects for which he/she has been invited.

To create a user account, the following data is requested: first name, last name and email address.

All users accounts created in a workspace are registered in the workspace address book. Only privileged users (workspace manager and administrators) have access to it.

For the launch version of the platform, members of the BIM-SPEED consortium have been asked to mention the role they will play in the project to assign them rights and give them access to the folders corresponding to their activities.

- **Dev:** to get access to the Dev Sandbox project
- **Tester:** to get access to the Sample project
- **BIM-SPEED pilot site leader:** to manage one (or several) Pilot project(s) and be able to invite anyone of your choice to this project space.

4.4 Document management

Successive versions of a given file are stored by the platform. By default, the latest version is accessed when accessing a file, but it is possible to select a former version by choosing it among the list displayed on demand.



The platform ensures the traceability of all downloaded documents.

A document can be the subject of a validation workflow.

Keywords can be added to a document to facilitate searching.

It should be noted that folders (or directories) can be shared with people outside the project to allow them to access documents in this folder without having to create new accounts on the workspace. It is also possible to allow third parties to upload documents to the platform.

4.5 KROQI Drive

KROQI Drive allows users to create a space on their personal computer (MAC or PC) where a copy of the content of all or part of the projects in a workspace is stored. This software ensures file synchronization:

- You can upload files to your Drive and the online workspace is automatically updated;
- If someone deposits or modifies a document, on the platform or from their own Drive, a message warns you of the change.

It should be noted that a maximum of 3 synchronized workspaces can be managed on KROQI Drive.

4.6 Teamwork functionalities

Several tools are available for teamwork.

4.6.1 Agenda and events

The agenda includes the tasks, meetings and other events of the project. It comes in the form of a classic electronic agenda.

When planning a meeting, it is possible to invite external participants to the project.

4.6.2 Tasks

The platform allows the creation of project-specific tasks. Tasks allow you to request a document or service from one or more users of the project. It is possible to break down a task into elementary subtasks. This function is very useful to trace the progress of solving the task. It is also possible to associate a manager with a subtask.

4.6.3 Chat

Chat is an instant chat tool. This is the best way to have a private chat with another project participant without overloading your mailbox. A chat can be initiated with a group of users (i.e. a discussion group).

When you have new messages in the chat, you receive a notification on the platform as well as in your working environment with the KROQI Drive installed.

4.6.4 Messages

The messaging functionality allows you to simply send an email from the platform to one or more project participants.

4.6.5 AirTime

The AirTime tool makes it easy to organize audio and video conferences. You can invite up to 4 participants whether they are part of your project or not. If they are not part of your project, you must send them an email to tell them the conference link.



It should be noted that AirTime is not yet supported by all browsers (incl. Internet Explorer), and that some functionalities (like screen sharing or notifications) are not yet implemented for some browsers (see Appendix 1 for more details).

4.7 BIM services

4.7.1 Integration of BIM services in the context of BIM-SPEED

As described in section 4.1, KROQI is a platform whose central design principle is **to integrate different services**. In the context of the French launch of the platform, the first required service to be integrated was a collaboration suite service that could be extended with business services. Here is a more detailed vision of the platform architecture for BIM-SPEED:

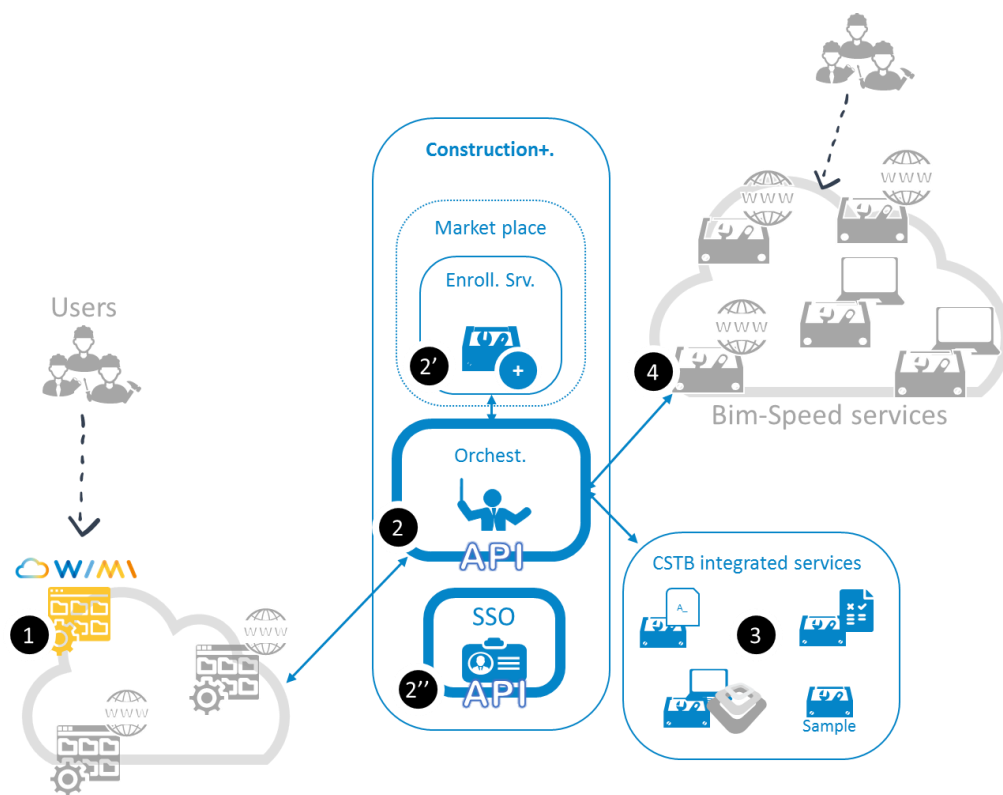


Figure 6. More detailed vision of the BIM-SPEED platform architecture

1. The first service integrated within KROQI was the collaboration suite **1** from Cloud Solutions named WIMI⁴. This collaboration suite enables the exchange of files and it offers different tools to end-users to communicate.
2. At the centre of the platform is Construction+, containing the orchestrator **2** which makes it possible for different services to communicate together and be integrated. This central system has an enrolment service **2'** used by platform administrators to enrol external services (at the right side of the figure). External services use web services over https to

⁴ <https://www.wimi-teamwork.com/>



integrate with the platform via APIs. The main role of the platform is to expose abstract APIs to interconnect services and make them appear in the user interface of the collaboration suite. For instance, the platform provides, via a dedicated API, generic access to user-managed documents in the collaboration suite. Thus, integrated services can use this document management API to interact with users' documents. In 2019, a Single Sign-on (SSO) system ² will be integrated into the KROQI platform used by the BIM-SPEED consortium. Any integrated services will be able to use this SSO central authentication system to identify users and share information about them.

3. CSTB provides services ³ in the context of the BIM-SPEED platform. These services will be described in the following chapter. At the time of writing this document, there are four services: a file naming service, a BIM checking service, a model viewer application (eveBIM), and a sample service for BIM-SPEED developers to allow them to experiment the use of the central platform API.
4. Finally, BIM-SPEED partners' services ⁴ will be able to be integrated via the Construction+ platform. They will be registered via the enrolment system and then they will appear in the user interface of the integrated collaboration suite. A RESTful API (see appendix 2) is available to services developers to integrate their services into the KROQI platform. A video⁵, targeted to BIM-SPEED developers, describes the process of integrating third-party services into the KROQI platform. It aims to better understand how the service integration process can take place in BIM-SPEED. All technical documentation is available at: <https://BIM-SPEED.kroqi.fr/#/integration-sandbox/documents/?directory=58856847>. The overall integration process is shown below. The potential services will be identified in a second step after the platform is launched. They will be identified from the list of tools compiled by BIM-SPEED partners for deliverable D10.3 (Data Management Plan - M6)⁶.

⁵ Available at <https://www.useloom.com/share/0ee360b1a05f42f7a8cdce54bcb0c50e> with the password 'bimspeed'

⁶ Refer to https://www.bim-speed.org/_layouts/15/start.aspx#/Lists/Data%20Management%20Plan%20%20Tools



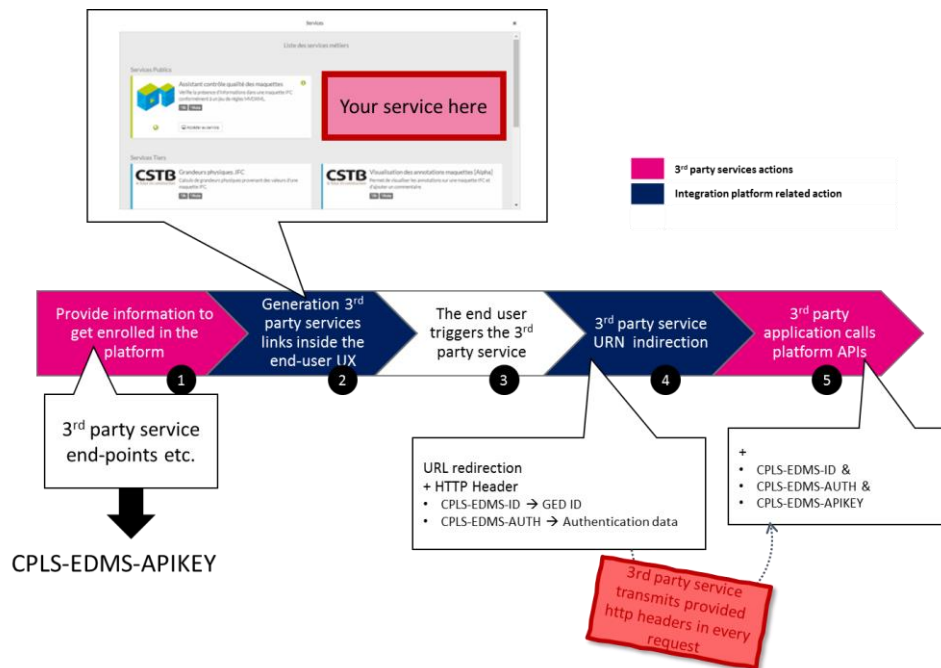


Figure 7. Service enrolment process

Figure below, composed from several screenshots, shows how an integrated service can be triggered on a folder or on a file of a collaboration suite.

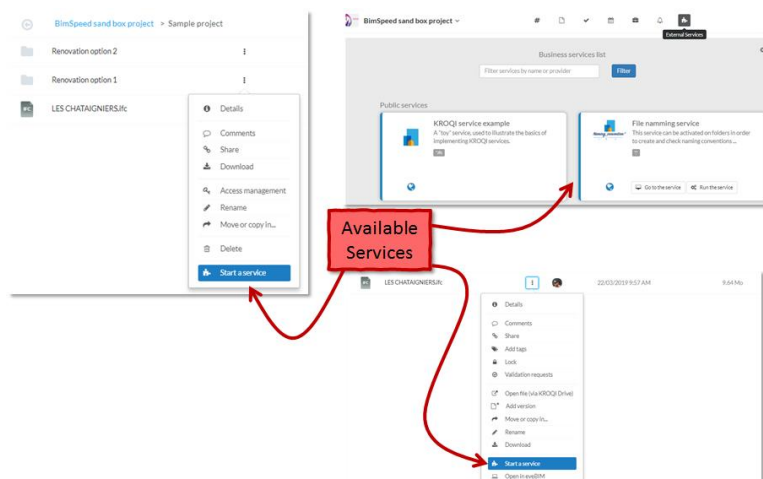


Figure 8. Third party services integration options in the EDMS

4.7.2 BIM services provided by CSTB

BIM-SPEED sample integrated service

In order to allow third-party service developers to start using the Construction+ API, CSTB has provided and deployed especially for BIM-SPEED partners a sample service coded in Python. This service demonstrates how to get connected to the document management API, how to retrieve a file



from the collaboration suite and then how to parse and display information about an IFC file. The service has been enrolled in the service list under the name 'KROQI service example', and can be started on any IFC file, e.g. the 'LES CHATAIGNIERS.ifc' sample file stored in the Sample project folder of the platform (accessible to any BIM-SPEED user).

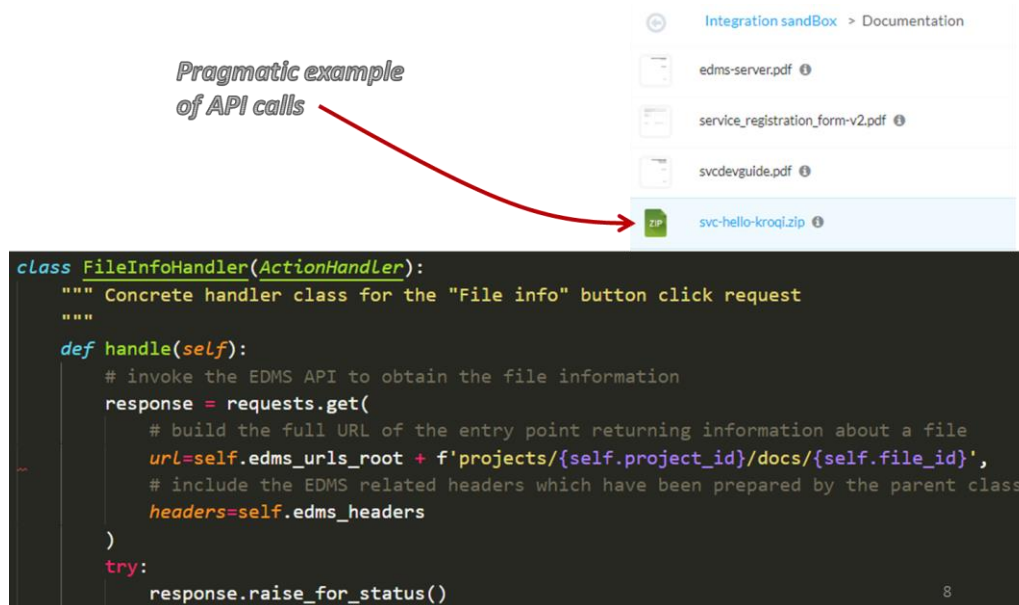


Figure 9. Python code demonstrating how to integrate a third-party service

File naming service

The collaboration suite used in KROQI doesn't work as an electronic document system where users drop well-named files when files are final deliverables; it is rather a file synchronization and sharing application like Dropbox or Google Drive that lets users freely name their files. It is very permissive for users in terms of file creation and naming, but in some construction projects, managers must share files by naming them in a certain way according to a naming convention. For this purpose, the file naming service has been created, it makes it possible to create and assign a naming convention to a folder. When users synchronize files that are misnamed according to the assigned naming convention, a warning is issued via a tag associated with the file. Users can then trigger the file naming service on the misnamed file to open a wizard that helps them rename the file according to the appropriate local naming convention.



Here is how the file naming service works:

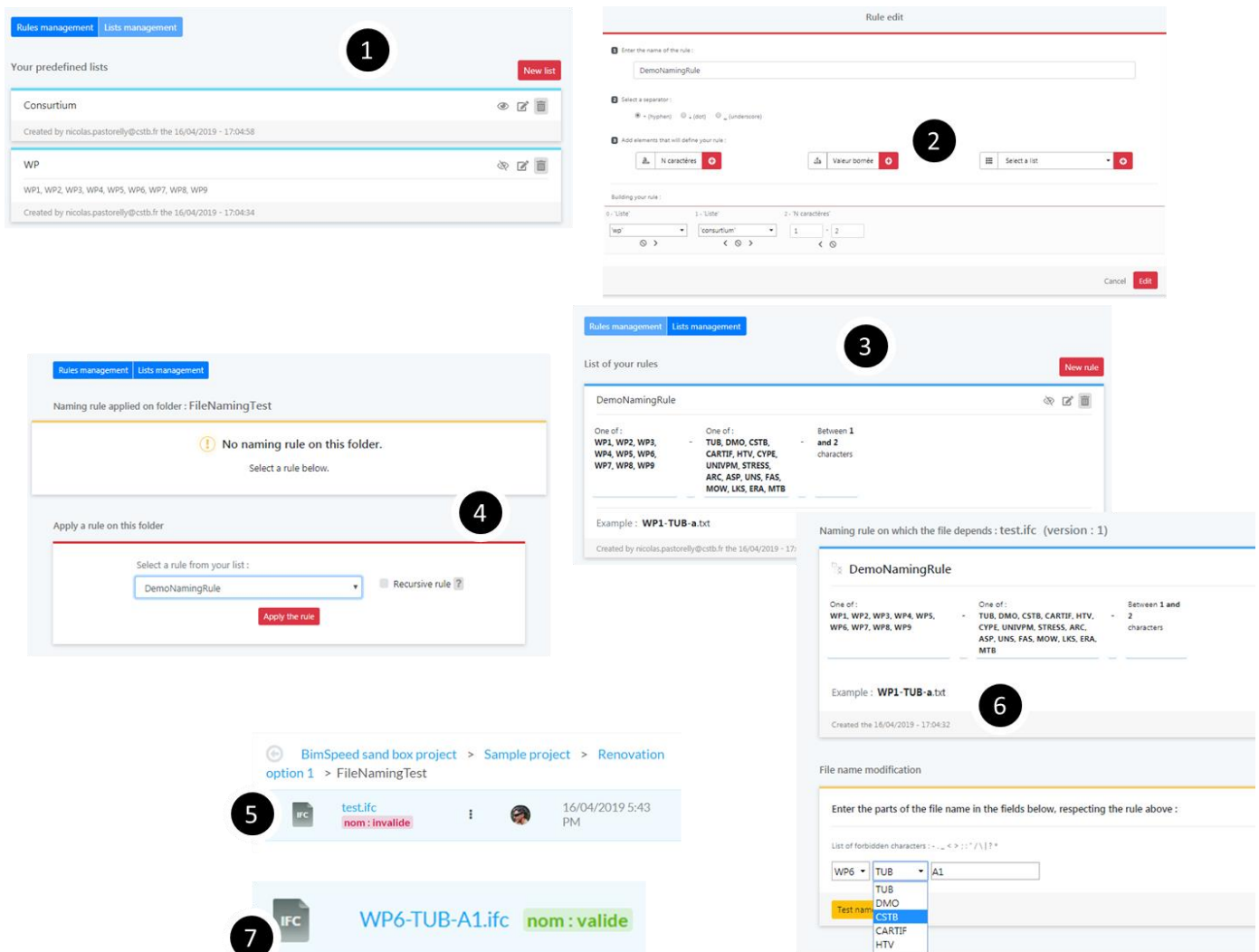


Figure 10. : Process of the file naming service

1. The project manager can create naming conventions. To do this, he/she can define predefined lists of names that will be reused in parts of file names later.
2. A naming convention gets created. A naming convention has a name, specifies a main separator, and has a list of constituent elements that can be: a predefined list of names, a range of alphanumeric characters or a range of numbers. A naming convention is a set of several of these elements configured by the manager.
3. A new naming convention has been created.
4. By triggering the naming service on a folder, the project manager can assign a naming convention to it.
5. A file gets synchronized in the folder holding the naming convention. It is misnamed and then it is tagged as “invalid”.



6. The user triggers the file naming service on the misnamed file. The wizard helps him to find a right name for the file.
7. The user validates the renaming, the file gets properly renamed.

IFC model checker

NB: At the time of writing this deliverable, this service is being redesigned in order to integrate semantic features that are outlined below.

The objective of this service is to verify whether a BIM model contains all the information required to be processed by an application or service at a given time in the renovation process. This validation, which is part of the quality control of the digital models uploaded on the platform, can concern the existence of certain properties, property values, or more complex relationships between the values of several properties.

Initially, the main target of this module was to validate an IFC file against rules expressed in mvdXML⁷ format. The output of this service is a PDF file report and BCFzip file containing comments on the digital model related to failed mvdXML rules.

The figure below shows what the workflow is for this initial version.

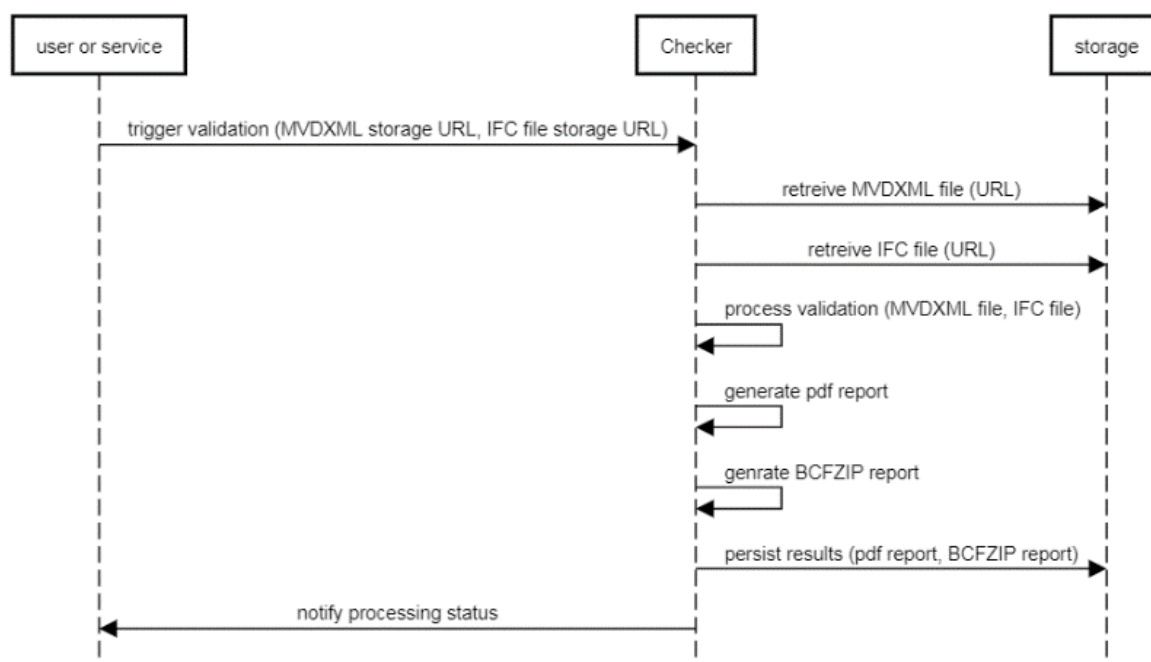


Figure 11. Workflow of the MvdXML checker developed by CSTB

Using MvdXML is the traditional approach to check the quality of IFC models. MvdXML is the XML format used to publish the concepts and associated rules of a Model View Definition (MVD), a subset of the IFC schema needed to satisfy exchange requirements. The MvdXML checker developed by CSTB is an

⁷ <http://www.buildingsmart-tech.org/specifications/mvd-overview/mvdxml-releases/mvdxml-1.1>



extension of the IfcDoc tool developed by buildingSMART International to create Model View Definitions, and to validate an IFC file against a particular model view. This extension was motivated by the need to address certain conditions and constraints, for some use scenarios, that cannot be supported by the IfcDoc tool. In addition, the checker was encapsulated in a web service.

However, there are many drawbacks of MvdXML for extracting building views such as: lack of logical formalisms, solely consideration of IFC schema, and MVD-based view constructors are not very flexible and dynamic. Verification by MvdXML rules are also very limited. Major limitations are identified such as restricted scope of applying conditions and constraints on several branches of an IFC model, poor geometric analysis of an IFC model (e.g. adjacency), lack of mathematical calculations, support of only static verification of a model, etc. On the other hand, Semantic Web technologies allow for the semantic verification of IFC models to enable compliance checking of IFC construction models with fast querying performance.

Therefore, a new approach is being developed that relies on Semantic Web technologies. Roughly speaking, this approach requires converting the IFC file (on the fly) into an RDF Triple Store database, then applying SPARQL queries to these triples to check rules. This tool will be detailed in a next deliverable.

eveBIM

eveBIM is a free openBIM and multi-scale BIM viewer. It allows the integration, in the same environment, of different data sets (BIM IFC, TOPO IGN, CityGML, 3D Photogrammetry, etc.). It provides quality display and rendering, textured BIM, measurements, viewpoints, selection baskets, etc., as well as data and quantitative extraction tools. It also provides collaborative work tools (annotations in BCF2 format). Many plugins are available or to come. In addition, the eveBIM SDK is a software environment to develop plugins in eveBIM (e.g. for connecting to applications, services or databases).

eveBIM is a desktop viewer that can be freely downloaded from the KROQI/BIM-SPEED platform by choosing 'Get Apps' in the 'Option' module (left bar of the user interface).



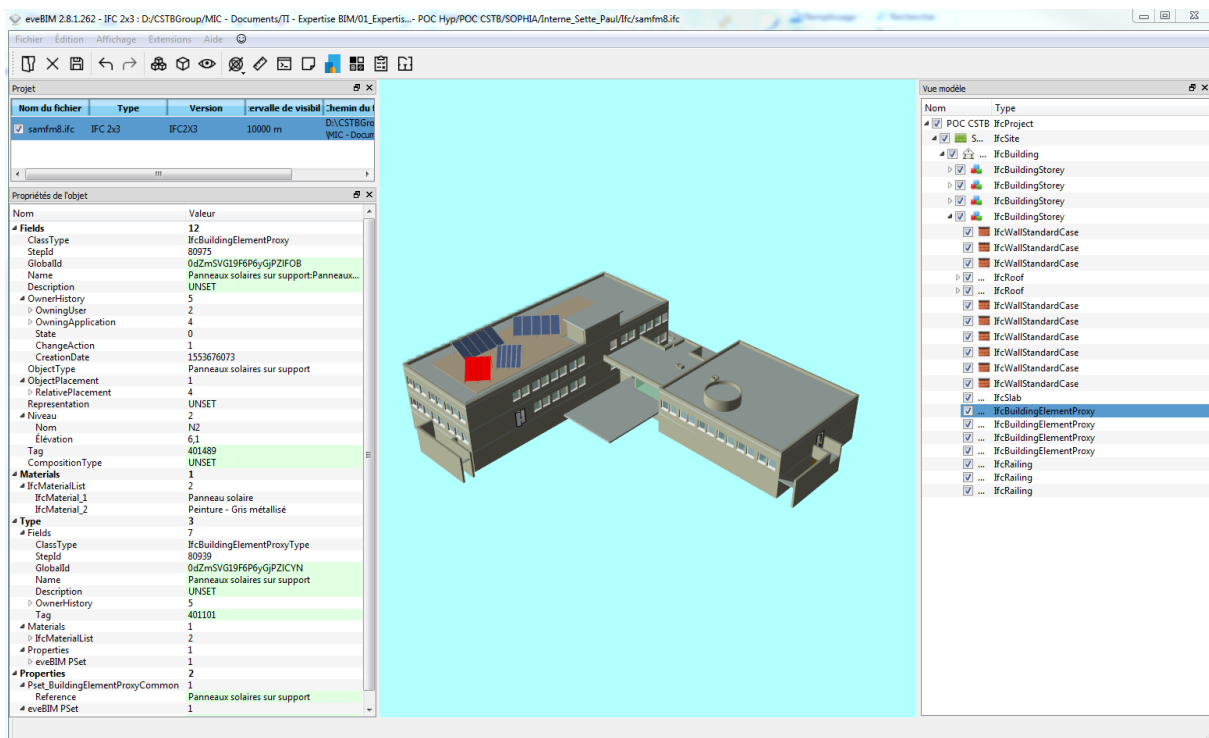


Figure 12. Navigating within a building with eveBIM

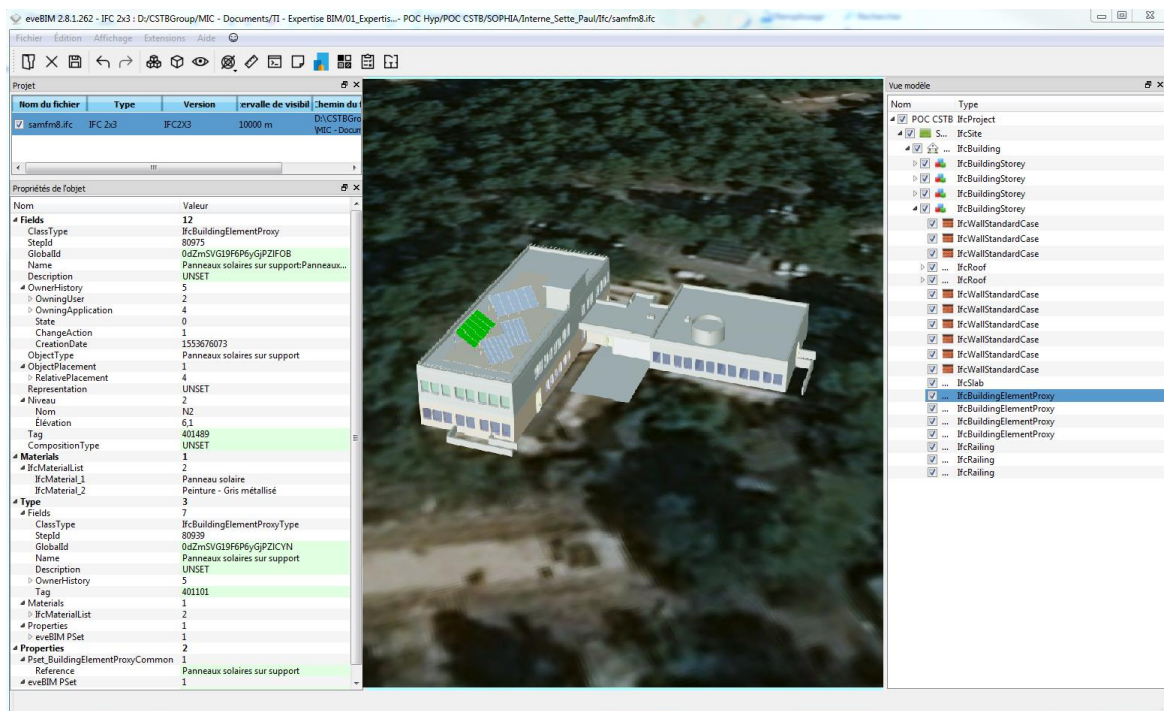


Figure 13. Visualizing a project in its environment with eveBIM



4.8 Data privacy and security

4.8.1 Resilient infrastructure

Data storage of the document management and collaboration suite is distributed on two datacenters located in France (Roubaix and Strasbourg) managed by the hosting provider Online by Scaleway⁸. A RAID 10 architecture, combining redundancy and data distribution, ensures optimal resilience of this infrastructure and prevents data corruption. Without disturbing the user, defective disks are replaced immediately. Depending on their nature, in real time, every 3 hours or daily, the data is replicated to the second data center.

As for the Construction + middleware, it is hosted on Google Cloud servers in Western Europe, and benefits from the security procedures provided by this host.

4.8.2 Maximum accessibility

Aiming to offer its users maximum accessibility, KROQI's document management and collaboration suite offers the flexibility of cloud computing. Thus, variations in use are supported without any slowdown. In case of a major incident on the primary server, connections are switched to the secondary server to ensure data accessibility without any interruption.

Construction+ is based on a micro-services architecture. All its components are deployed as Docker containers which are hosted on Google Cloud platform (geographical sites in Western Europe). Thanks to Kubernetes orchestrator, load balancing and resilience are guaranteed by replicating the micro-service instances over the 3 nodes of the physical cluster.

4.8.3 Privacy

To ensure privacy and integrity of exchanges and data within the workspaces, KROQI uses digital certificates based on SSL (Secure Socket Layer) technology. These certificates make it possible to encrypt data during exchanges (encrypted connection in AES on 256 bits). The distribution of resources on several servers has no impact on the security of exchanges.

⁸ See: <https://www.online.net/en>



5. Conclusion and future work

The launch version of the BIM-SPEED cloud platform provides document management and teamwork functionalities that are at the heart of collaborative activities. Some other services provided by CSTB are also integrated, like a BIM viewer and a file naming service.

Renovation services and external applications supplied by BIM-SPEED partners will be progressively integrated into the platform in the next months in order to ensure service interoperability consistent with the work developed in WP5.

Besides, CSTB will finalize the model checking service, and develop workflow mechanisms to be able to provide complex renovation services linking several basic services.

The ambition of the platform is to ultimately become a market place where construction stakeholders can collaborate and choose the renovation services that are useful for their work. The soon-to-be-incorporated Single Sign-On service will contribute to this objective of providing a single entry point to end-users in their business activities.

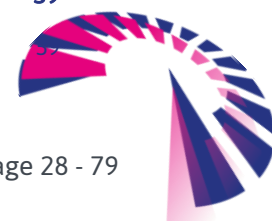
M24 : View platform development updated status in appendix 3



APPENDIX 1 – User Manual (collaborative services)

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A.1. Overview

KROQI is a collaborative work platform for all construction professionals. It proposes a set of services aimed at making the use of BIM more accessible, especially for SMEs.

A.1.1. KROQI

KROQI is a tool for exchange and collaboration between companies in the construction sector that allows:

- Share and manage BIM digital files and mockups in a secure way.
- Visualize and verify digital models without resorting to complex or paid tools.
- Access to various business services that optimize business activity, integrated into BIM design and collaboration processes.
- Collaborate easily with collaborators, partners or customers (threads of discussion, videoconference, shared management of agendas, follow-up of the activities, ...).

A.1.2. A business services platform

In order to meet the many expectations of the actors in the sector, the KROQI ecosystem is designed to accommodate and promote digital services to offer new functionalities complementary to core services made available in the basic version. Without upsetting the commercial ecosystem of already-marketed BIM and collaborative solutions, KROQI wants to support many construction stakeholders who are still reluctant to use new technologies to optimize their business process.

A.1.3. The KROQI ecosystem

- A set of collaborative features: documents, tasks, diary, etc.
- Core services, enabling the digitization of business uses related to the digital transition of the sector. The first core service implemented is a quality control wizard for digital mockups ('model check service'). Other core services are under study.
- Third-party services, complementing the ecosystem by offering services and features tailored to the various expectations of the construction industry. Third-party services are subject to their own business model.

A.1.4. Security policy and data storage

A.1.4.1 Resilient Infrastructure

Data storage is distributed on two datacenters located in France (Roubaix and Strasbourg) managed by the French hosting provider ONLINE. A RAID 10 architecture, combining redundancy and data distribution, ensures optimal resilience of this infrastructure and prevents data corruption. Without disturbing the user, defective disks are replaced immediately. Depending on their nature, in real time, every 3 hours or daily, the data is replicated to the second data center. As for the Construction + middleware, it is hosted on Google Cloud servers in Western Europe, and benefits from the security procedures provided by this host



A.1.4.2 Maximum accessibility

Aiming at offering its users maximum accessibility, KROQI offers the flexibility of cloud computing. Thus, the variations of use are supported without any slowing down. In the event of a major incident on the primary server, we switch the connections to the secondary server so as to ensure data accessibility without any disruption.

A.1.4.3 Privacy

To ensure privacy and integrity of exchanges and data within the workspaces, KROQI uses digital certificates based on SSL (Secure Socket Layer) technology. These certificates make it possible to encrypt data during exchanges (encrypted connection in AES on 256 bits).

The following chapters describe the use of the modules of the KROQI platform.

A.2. Main principles for a clear understanding of how KROQI works

- A workspace is composed of projects that can be grouped into categories
- A project is composed of documents that can be grouped into directories (folders).
- A project is composed of the following modules: documents, tasks, agenda, meetings, activities.
- A workspace is created by a workspace manager
- User accounts are created at the workspace level. A user account is associated with a role giving different rights: administrator, manager, user. Users can be created by the manager or by the administrators.
- A user account can be invited to one or more projects with different access rights depending on the module and the directories that make up the folder.

A.3. Workspace management

A.3.1. User ranks

The roles (or user ranks) define the main user privileges on the workspace.

There are 4 user ranks:

1. The **Workspace Manager** is the creator of the workspace. Only one person has this rank in a workspace. He is the master of all rights of access and management on all the projects of his workspace as well as all the users of the address book.
2. The **Administrator** has the same privileges as the Workspace Manager. He has access to all the projects in the workspace. We advise the Workspace Manager to only give this rank to users belonging to its own structure or under a confidentiality agreement. Only Administrators can create another Administrator.



3. The **Project Manager** has privileges limited to the projects for which he or she has been invited. We recommend that you give the rank of Project Manager to the people responsible for managing a project. For example, it can be the BIM Manager, whether internal or external to the structure responsible for the workspace. A project Manager can also create new projects.
4. The **user** has no privilege, either on the workspace or on the project. He/she can only see, access and participate in the projects for which he has been invited within the limits of the access rights assigned to him. He/she may later be appointed administrator by a preferred rank user.

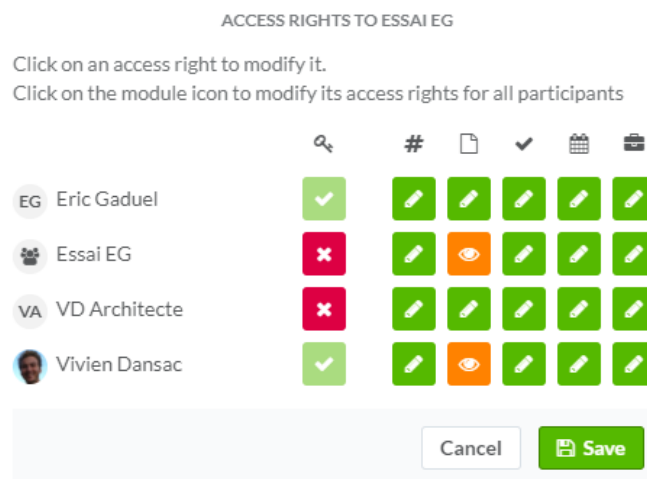
A.3.2. Managing user ranks

User ranks can be assigned by an Administrator or by the Workspace Manager, through the workspace address book, in the "role" category.



The privileges given by the administrator rank are initially valid on all projects in the workspace to which the user was invited.

It is possible to restrict the extent of these privileges on a case by case and project basis. To disable privileges of an administrator on a project, go to the interface to manage access rights to the modules of the project. Note that it is also possible to give the administration rights of a project punctually to a simple user.



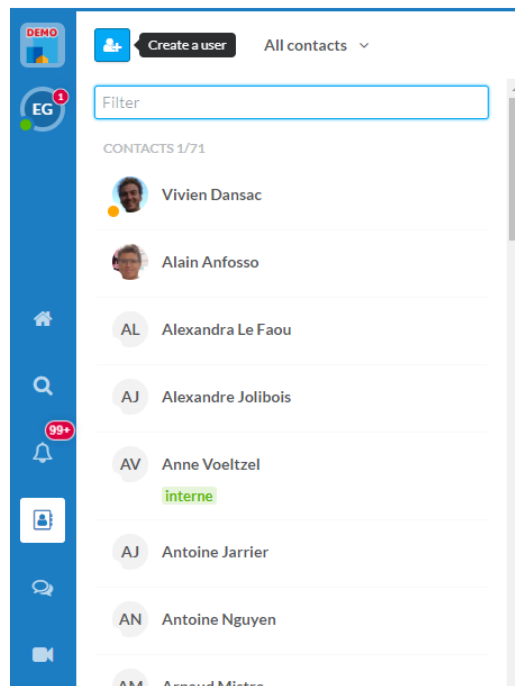
A.3.3. Create a user

Only workspace managers and administrators can create a user within the workspace.

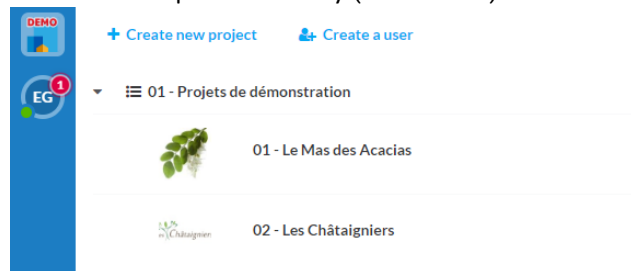
This action can be done:

- From the "Address Book" (Contacts) side tab and then "Create user" located in the upper banner.

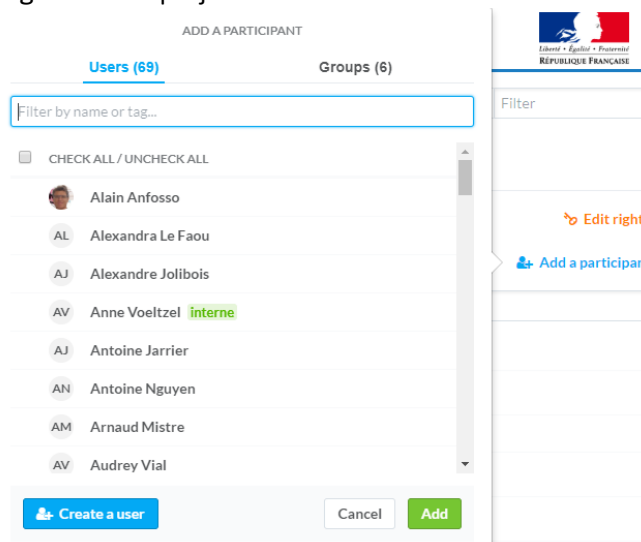




- From "Create a user" link in the workspace summary (Dashboard)



- From interface for adding users to a project.



Information to be filled in:

Then you need to fill in the first name, surname and email of the user to be created, to assign a role and click on Add:

CREATE USER

Create from existing user

First name

Last name

Email

Language

Notify this user by email

Invitation

I just invited you on my KROQI workspace to facilitate our collaboration.
See you soon on KROQI !

Role User Manager Administrator

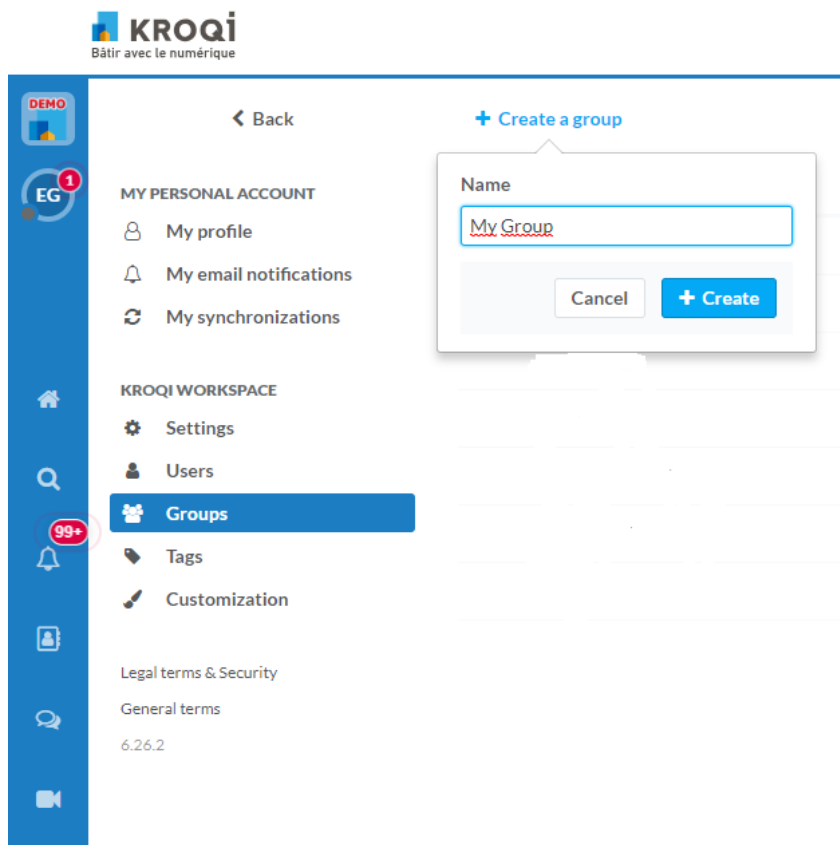
Groups

A.3.4. User groups

A.3.4.1 Creating a group

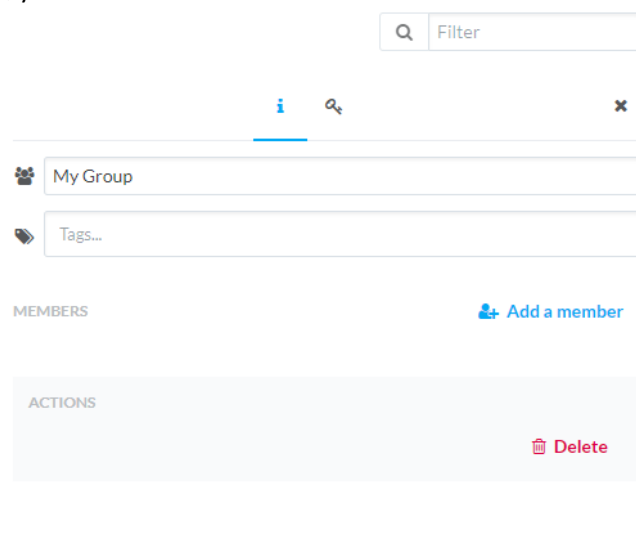
Only administrators and workspace managers can create a group within the workspace. This action is done from the side tab "Workspace settings" (first tab at the top of the left sidebar). Select the menu "Users" then the menu "Groups" and click on "+ Create a group". Enter the name of the group and click on "+ Create".





A.3.4.2 Add members to a group

Once the group is created, you can add members to it:



When you create a new user, you have the option of associating him/her directly with a group.



CREATE USER

Create from existing user

First name

Last name

Email

Language

Notify this user by email

Invitation

I just invited you on my KROQJ workspace to facilitate our collaboration.
See you soon on KROQJ !!

Role

User

Manager

Administrator

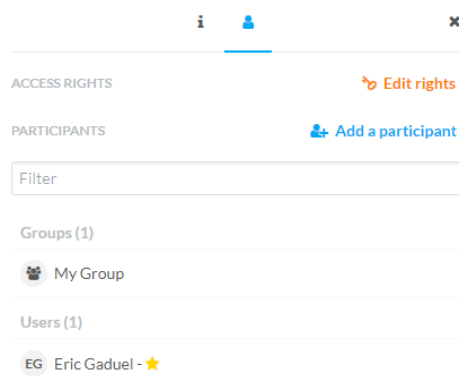
Groups

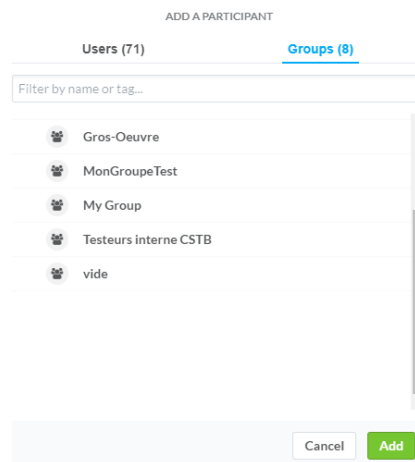
A.3.4.3 Add a group to a project

Groups are used to simplify the management of user access and rights within the workspace and its projects. From the "Groups" page (workspace settings), adding a group to the projects / access rights to the modules:



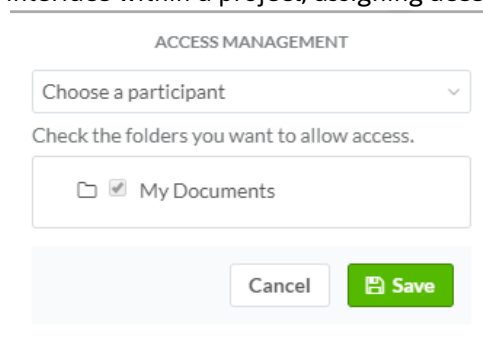
From the interface "Add a participant" to a project (Summary page):



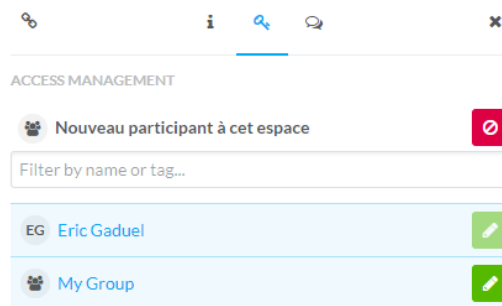


A.3.4.4 Access rights to documents

From the "Access Management" interface within a project, assigning access to folders to a group:



On the folder-specific access management interface:



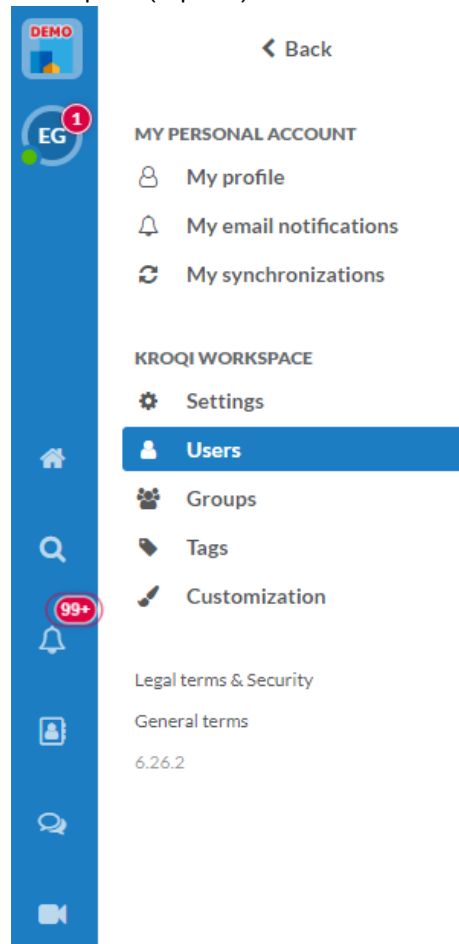
Important:

- If a group of users is associated with a project, it is not necessary to associate each user of the group individually with the project.
- If a group of users is associated with a project and if users of this group are associated individually with the group, it is the user rights that prevail over those of the group.

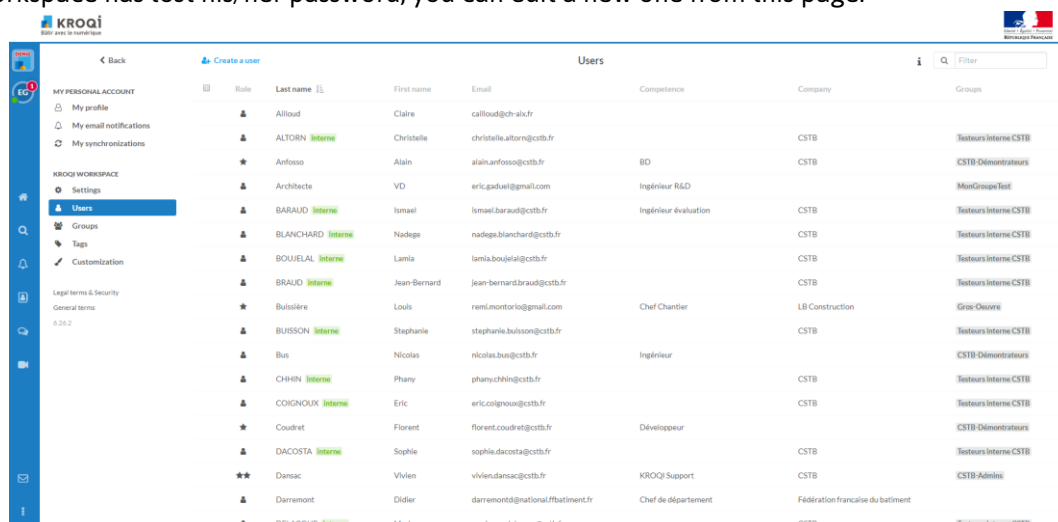


A.3.5. Address Book/Users (Contacts)

The **address book (contacts)** of a workspace more commonly called "User page", groups users of all projects in the workspace. Only privileged users (workspace manager and administrators) have access to it, through the main menu of the workspace (top left), and then the "Users" function.



From this page you can manage the ranks and rights of each user in the workspace. If a user in your workspace has lost his/her password, you can edit a new one from this page.



Role	Last name	First name	Email	Competence	Company	Groups
	Alloud	Claire	calloud@chr-als.fr			
	ALTON <i>Interne</i>	Christelle	christelle.alton@cstb.fr		CSTB	Testeurs Interne CSTB
	Anfoso	Alain	alain.anfoso@cstb.fr	BD	CSTB	CSTB-Demonstrateurs
	Architecte	VD	eric.gaduel@gmail.com	Ingénieur R&D		MonGroupeTest
	BARAUD <i>Interne</i>	Ismael	ismael.barraud@cstb.fr	Ingénieur évaluation	CSTB	Testeurs Interne CSTB
	BLANCHARD <i>Interne</i>	Nadège	nadège.blanchard@cstb.fr		CSTB	Testeurs Interne CSTB
	BOUJELAL <i>Interne</i>	Lamia	lamia.boujelal@cstb.fr		CSTB	Testeurs Interne CSTB
	BRAUD <i>Interne</i>	Jean-Bernard	jean-bernard.braud@cstb.fr		CSTB	Testeurs Interne CSTB
	Bullière	Louis	remi.montorio@gmail.com	Chef Chantier	LB Construction	Gros-Ouvrage
	BUSSION <i>Interne</i>	Stephanie	stephanie.bussion@cstb.fr		CSTB	Testeurs Interne CSTB
	Bus	Nicolas	nicolas.bus@cstb.fr	Ingénieur		CSTB-Demonstrateurs
	CHHIN <i>Interne</i>	Phany	phany.chhin@cstb.fr		CSTB	Testeurs Interne CSTB
	COIGNOUX <i>Interne</i>	Eric	eric.coignoux@cstb.fr		CSTB	Testeurs Interne CSTB
	Coudret	Florent	florent.coudret@cstb.fr	Développeur		CSTB-Demonstrateurs
	DACOSTA <i>Interne</i>	Sophie	sophie.dacosta@cstb.fr		CSTB	Testeurs Interne CSTB
	Dansac	Vivien	vivien.dansac@cstb.fr	KROQI Support	CSTB	CSTB-Admins
	Darremont	Didier	darremont@nationalffbatiment.fr	Chef de département	Fédération française du bâtiment	
	DELACOUR <i>Interne</i>	Marianne	marianne.delacour@cstb.fr		CSTB	Testeurs Interne CSTB



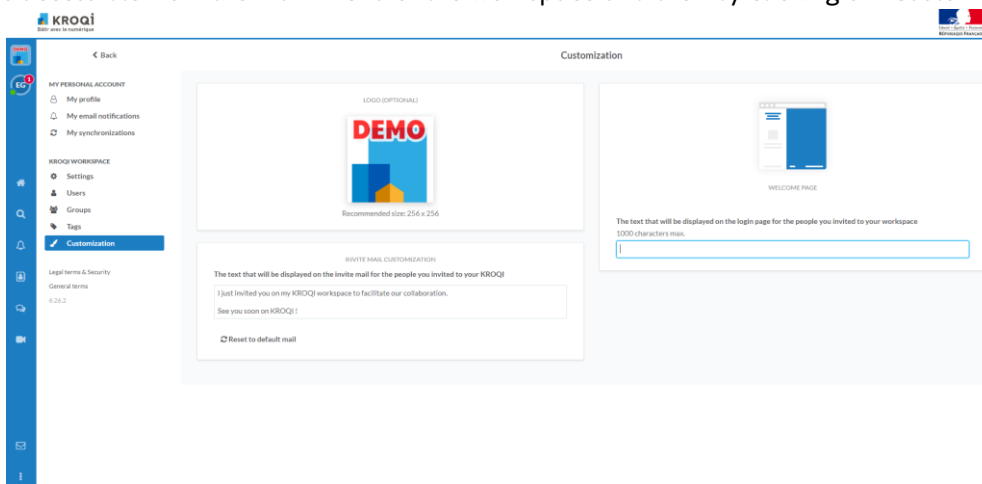
This interface can also be used to return an invitation, in the case where this person would not have received the email or would have accidentally deleted it.

Finally, you have the option of disabling a user: he/she will no longer have access to the workspace, but his/her account still exists, and you will have the possibility to reactivate it.

Once a user is disabled, you have the option to permanently delete his/her account by clicking on "Permanently delete".

A.3.6. Customizing the workspace

The workspace manager and the administrators have access to the option to customize the workspace. This page is accessible from the main menu of the workspace and then by clicking on "Customization".

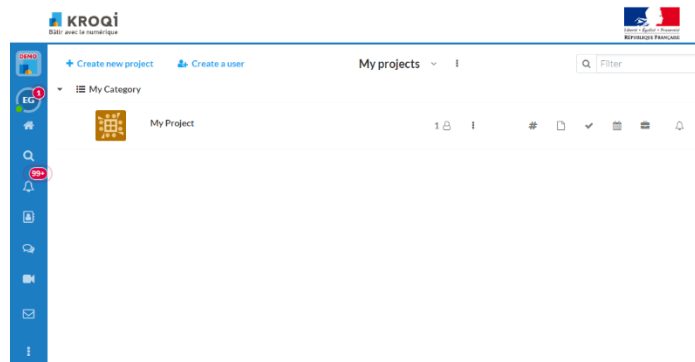


This page gives you the ability to edit the public text that appears on the workspace login page and change the workspace logo.


A.3.7. Summary Page

The summary page, or home page, allows each user to have a general overview of the projects he has access to in this space. Wherever you are in the workspace, this page is always accessible by clicking on the module "Dashboard" (Home page) In the left side menu.

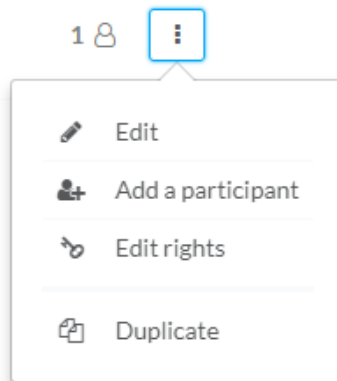
A workspace is a subdomain of the KROQI platform. The workspaces are completely independent of each other. It is imperative to have been invited to have access to it.



Available information and possible actions from the summary page:

- Add an image project
- See the number of new activities 
- See the number of users on a project and have a preview of the list

From the context menu on a project:



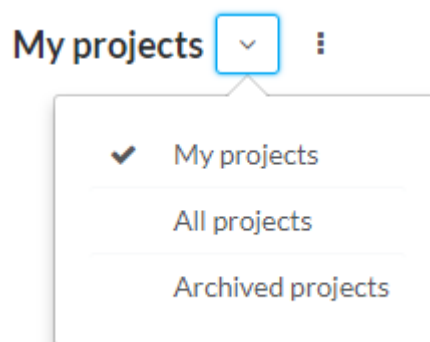
- Add a participant to a project
- Edit access rights to modules
- Duplicate project
- Edit project information (name, category, logo, tags, description, available modules, archiving)

A.3.7.1 Categories of projects

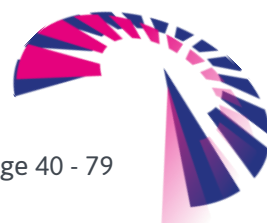
Within the same workspace, the project manager must organize his/her projects into categories. At least one category is required to create and classify projects. It is the responsibility of the project manager to determine the type of classification he/she wants to use, for example according to the geographical location of the projects. The category name is visible to all users participating in one of the projects it contains.

A.3.7.2 Visible Projects

The workspace users do not all see the same list of projects in function of their ranks and their access rights. The administrators and the workspace manager have the option of choosing if they want to display:



"My Projects" corresponds to all the projects that you are part of.



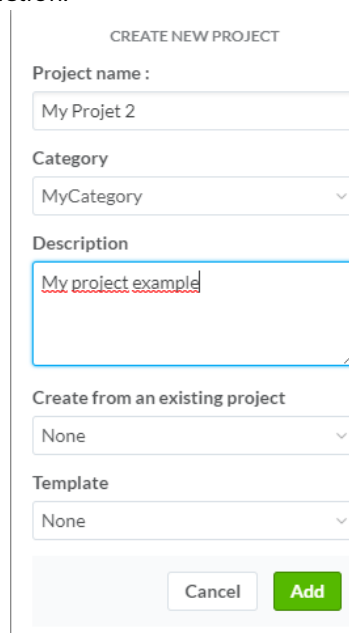
"All Projects" allows you to view all non-archived projects in the workspace, even those you are not part of.

"Archived Projects" contains only archived projects not removed from the workspace

A.4. Manage a project

A.4.1. Create a project

Administrators and workspace managers can create a new project through the workspace summary page by using the "Create new project" function.



A.4.1.1 Categories

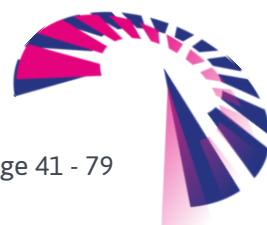
Within the same workspace, projects must be organized into categories. At least one category is required to create and classify projects.

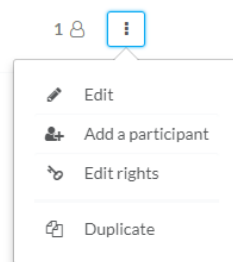
It is the responsibility of the workspace manager to determine the type of classification he/she wants to use, for example according to the geographical location of the projects. The workspace manager and the administrators can, if they wish, remove the ability of administrators to create new categories by unticking the corresponding option in the workspace settings.

The category name is visible to all users participating in one of the projects it contains.

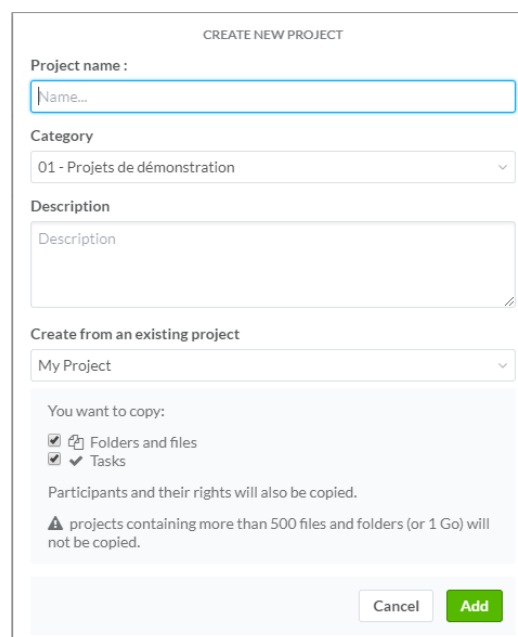
A.4.1.2 Creating from existing project

It is possible to create a new project by duplicating an existing project by clicking on "Creating from existing project" in "Create a project" interface or by clicking on "Duplicate" from the workspace summary page.





The feature gives the opportunity to duplicate a project with all of its participants and their rights. As an option, it is possible to recover the structuring of the folders and the files they contain, as well as the tasks.



This feature allows for example to create templates of projects by creating the folder structuring that fits your needs and then simply duplicating this project. This way you will not have to manually recreate this structure.

A.4.1.3 Template

When creating a new project, the user can choose a template structuring of the document module folders. **This structure is specific to the French construction sector. It will not be used in the BIM-SPEED project. You can leave the choice "None".**

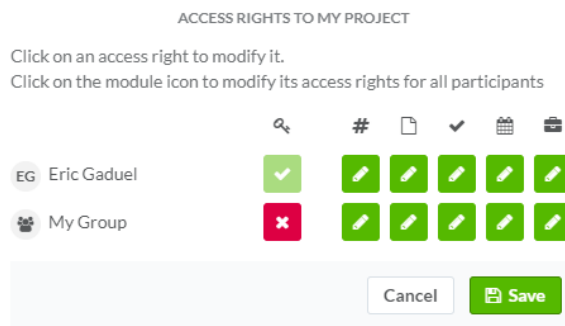
A.4.2. Access rights to Modules

Users of privileged ranks (workspace managers and administrators) can manage the access rights of participants to different modules in a project. The Rights Management interface is accessible:

- Via the summary page in the context menu of each project
- Via the summary page, in the Users tab of each project
- In any tab of a project, via the button "Edit The rights "in the header of the list of participants

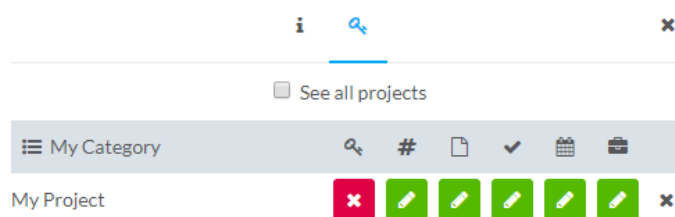
These rights are managed by user and tab:





- Documents: Read/Write – Access Denied – Read only
- Tasks: All Tasks – Access Denied – Only own tasks
- Diary: Read/Write – Access Denied – Read only
- Meetings: Read/Write - Access Denied
- Channel: Read /Write - Access Denied

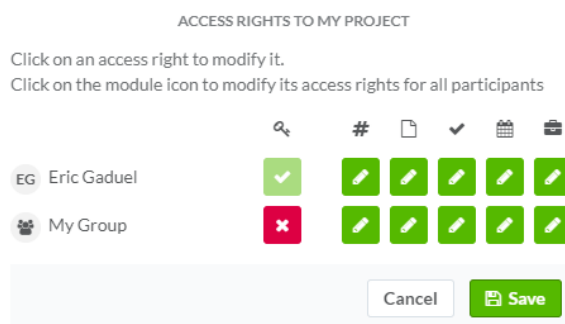
The workspace manager and the administrators have access to a similar interface through the address book for quickly manage a user's access rights for different projects.



Administrative rights

To complement the possibilities offered by the ranks of users, it is possible from this interface:

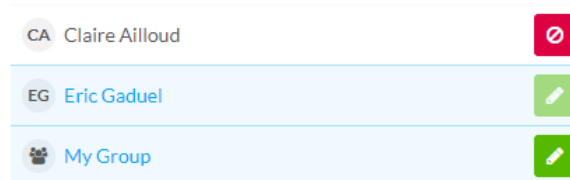
- To assign administrative rights to a single user for a specific project.
- To remove administrative rights to an administrator for a specific project: it then becomes simple user on this project.



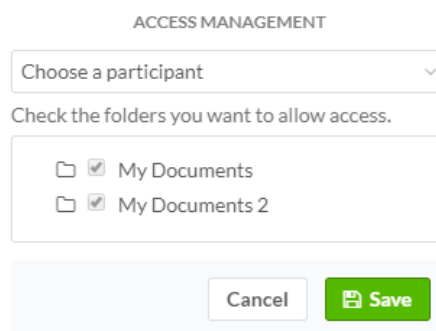
A.4.3. Access rights to documents

The project manager and administrators have the option of restricting participants' access to the documents module folders on a case-by-case basis. These rights can be managed from:

The Contextual menu of each folder



The "Manage access" function in the Documents module header



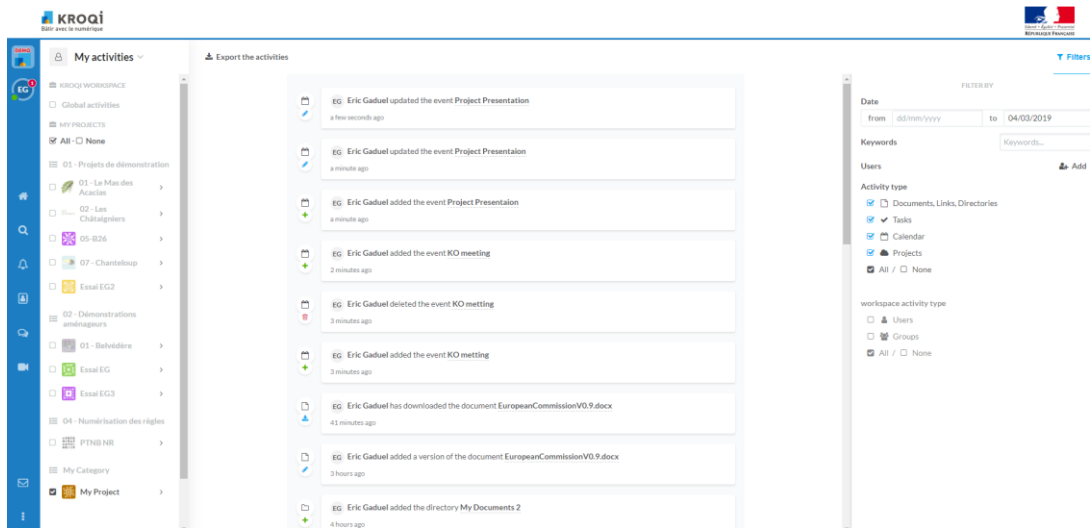
A.4.4. Activities Module

The Activities module allows you to view the history of the actions carried out on the project. All participants have access to this module. On the other hand, they see only the activities of the modules and folders to which they have access. The module offers an interface for filtering activities:

- By Date
- By Keyword
- By User
- By Type of activity

It is also possible to export the activities in CSV format using the function "Exporting Activities". The activities module considers user access rights, in order to improve confidentiality. For example, if a user does not have access to a folder, he/she will not see the activity notifying the deposit of a document in that folder.

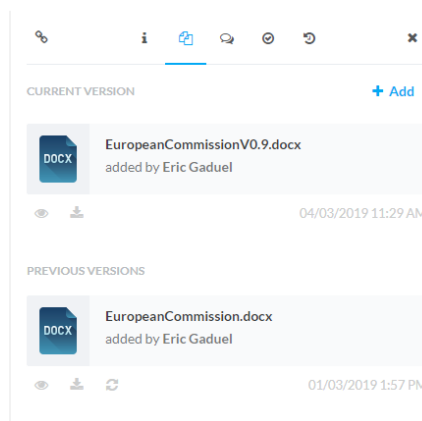




A.5. Documents

A.5.1. Versions of documents

All the documents uploaded on the platform can evolve thanks to the versioning functionality. The document displayed in the directory is the current version of the document. To add a version to a document, use the "Add" feature and select the file of your choice on your computer. To view and manage versions, go to the "Versions" tab of the side interface.

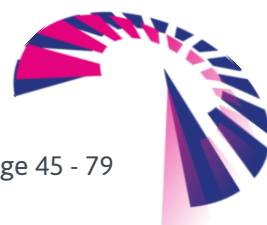


Use the "Restore" function to define an earlier version as the current version of the document. The evolution of a document is subject to traceability. Any person who decides to add, delete or restore a version must take responsibility for it. We advise users to explain each of these actions via file comments.

A.5.2. Requests for validation


- **Initiate a validation request**

To request a document to be validated, click the function of the shortcut menu, and then click "Request validation".



VALIDATION REQUESTS

Validate before

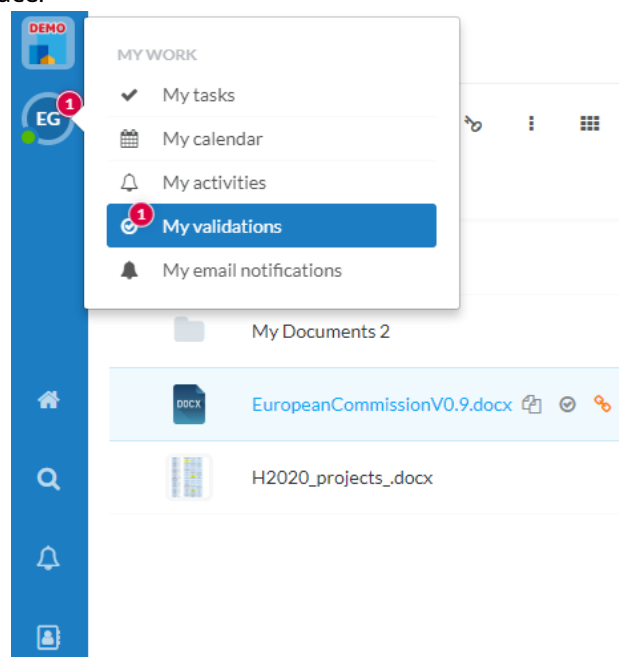
Validate by 

Description

ACTIONS Delete this request

Put on hold Close request




Respond to a validation request: when a user has validations to perform, a notification appears on the main menu of the workspace.



Click on "My Validations" to show the interface.

VALIDATION REQUESTS

My validations (1) **My requests (2)**

 01_CR_RevueProcessus_R4_2016_04-06.docx	In progress		
---	-------------	---	---

Show completed requests

Close

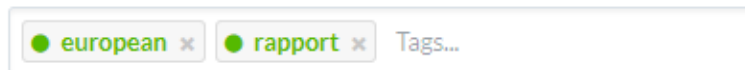


Navigate to the document (Go to the item), and then respond with one of the following three buttons: "Validate" – "Questions" - "Reject".

A.5.3. Use tags

Tags allow you to add keywords to a document. This makes it possible to increase the classification capabilities of the platform and thus facilitate searching.

TAGS



A.5.3.1 Add/Remove tags

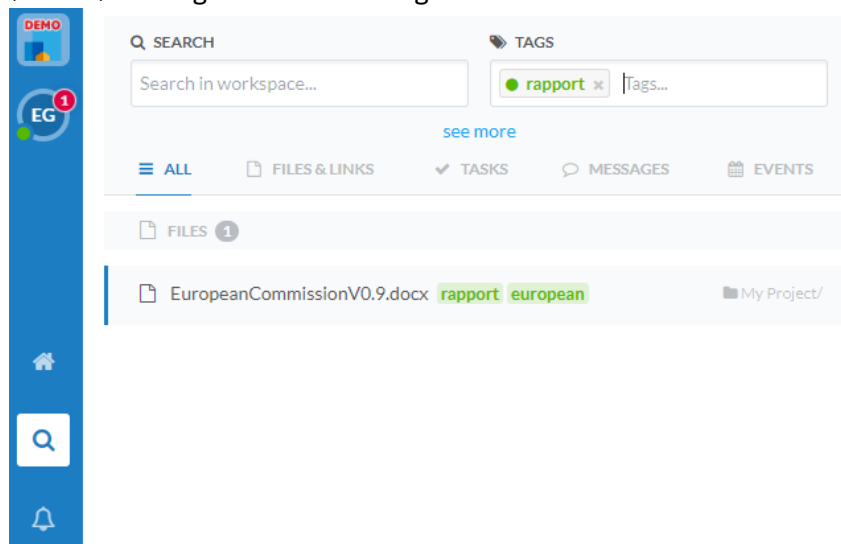
To add a tag to a document, click the "Add Tags" feature in the shortcut menu. A tag can contain a multi-word character. To validate, press the ENTER key on your keyboard. To delete a tag, click on the cross.

A.5.3.2 Use tags

When a document is tagged, the tags appear next to its name.



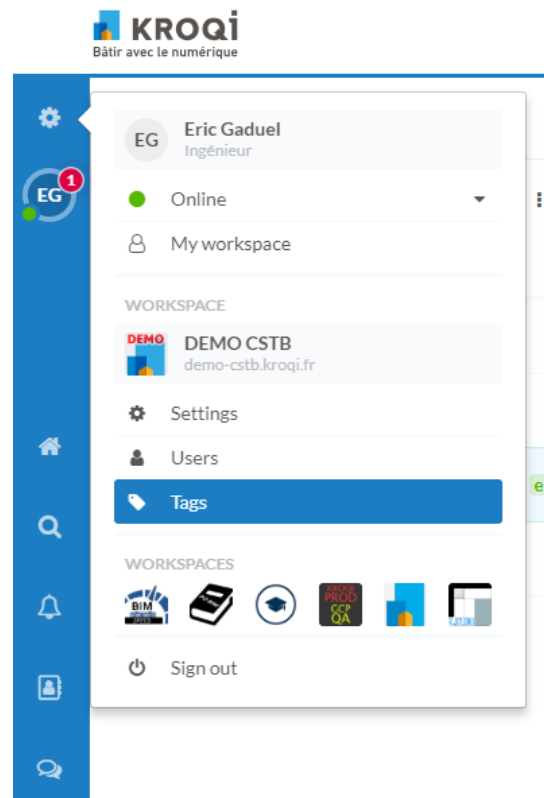
When you enter a tag in the search bar, you will quickly get a list of all the documents/tasks/events/meetings that have this tag.



A.5.3.3 Manage tags

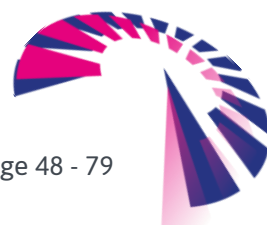
Main administrators have access to a tag management page through the main menu.





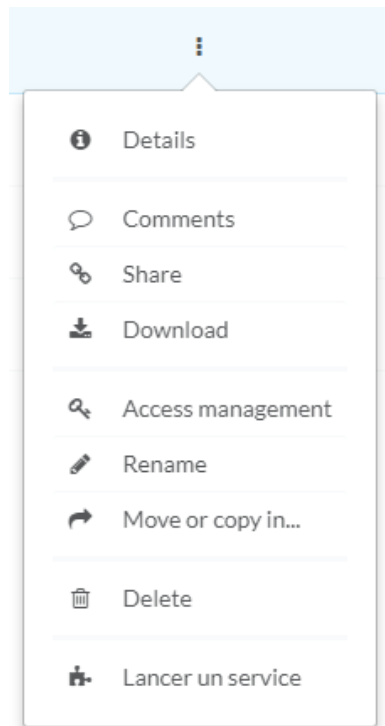
This page allows you to view and manage all the tags used in the workspace:

- View the use of each tag (documents, tasks, meetings, users)
- Import a list of tags
- Renaming a tag
- Merge multiple tags
- Delete a tag
- Change the color of a tag



A.5.4. Manage Directories


A.5.4.1 Folder Shortcut Menu



A.5.4.2 Details

Opens the side interface in order to view and manage folder-related information. This action is also possible by clicking anywhere on the line representing the folder.

A.5.4.3 Fast Sharing

The button  available at the top left of the side interface allows you to obtain the direct URL of the folder, to be exchanged with project participants only.

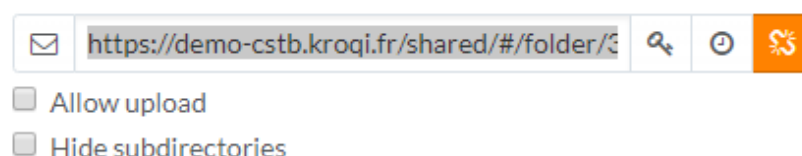
A.5.4.4 Comments

General comment interface on a folder. For example, we recommend using this function to describe the usefulness of this file and what documents are expected.


A.5.4.5 Share function

The share function allows you to create a share link for the document.

FOLDER SHARING



The share link can be shared with one or more people outside the project, allowing them, without creating new accounts on the workspace, to access the documents in that folder.

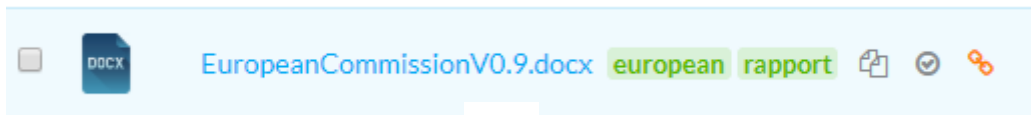
It is possible to protect the sharing by password by clicking on the key .



By ticking "Allow the upload", you give the opportunity to third parties to upload documents on the platform. The directory then becomes a real exchange file.

You can also prevent third parties from accessing the subfolders of this directory by ticking "Hide subdirectories".

It can be noticed at a glance that a share link is active on a document by the presence of a string near the folder name.



To turn off this sharing link, click on the button

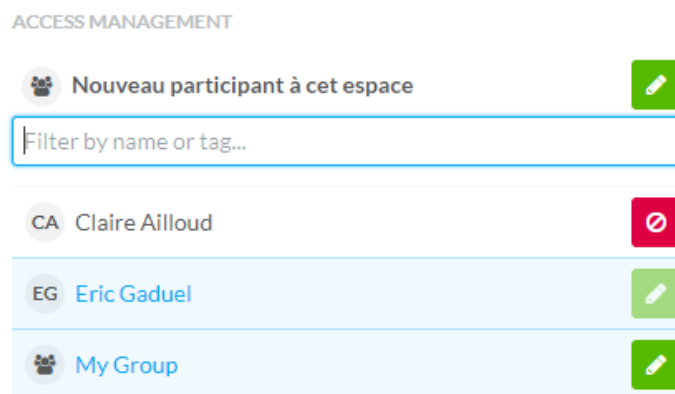


A.5.4.6 Download

Allows you to download all the documents in the folder, in the form of a compressed folder, into your download folder. Warning: the downloaded files are not synchronized by the KROQI Drive.

A.5.4.7 Access Management

Opens the interface to manage access to this folder. If you want to remove access to a user for this folder, untick the box before his/her name.

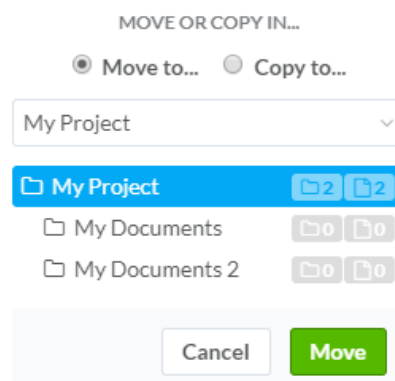


A.5.4.8 Rename

Opens an interface for renaming the folder.

A.5.4.9 Move or Copy in...

Opens an interface for selecting the directory of the project in which you want to move the folder.

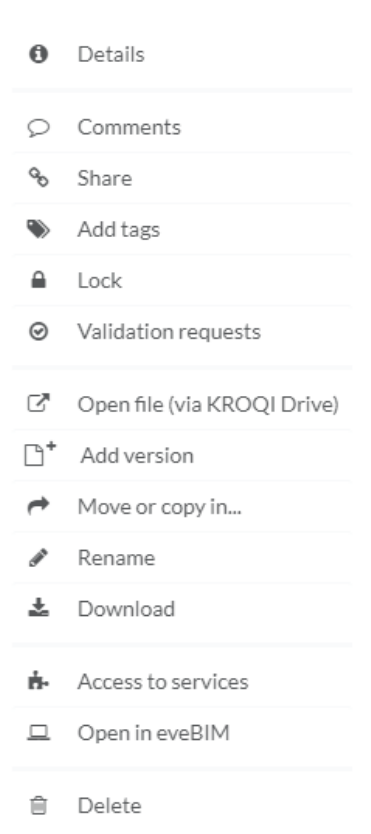


Remove

The function of deleting a folder.

A.5.5. Actions on a document

The actions allowed by the platform on a document are accessible through the context menu of the document.



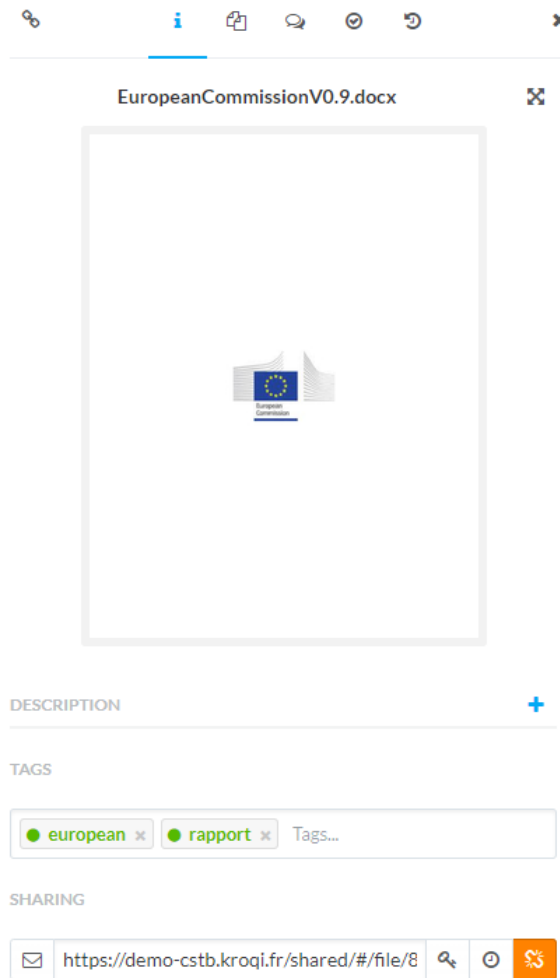
A.5.5.1 Description of actions

The following actions are available for all types of documents. Some documents, such as models in IFC format, have additional functions such as checking the model.

A.5.5.2 Details

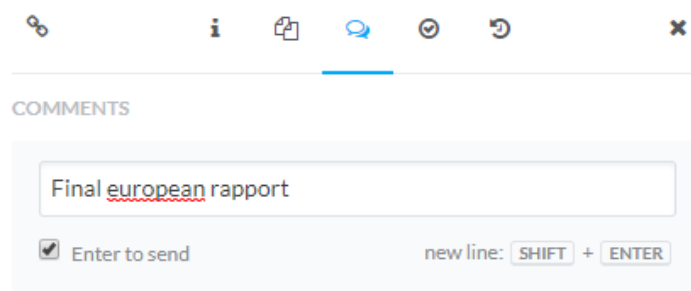
Opens the side interface in order to view and manage document-related information. For example, you can add a description to the document.





A.5.5.3 Comments

Interface to post general comments on a file. For example, we recommend using this feature to comment on adding a new version to a document.



For IFC files placed in folders subject to a protocol, the summary of the validation report is posted as a comment of the file.

A.5.5.4 Add tags

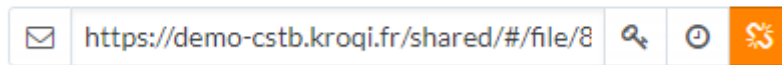
Allows you to add a tag to a document.

A.5.5.5 Share

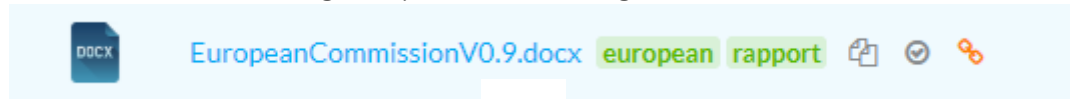


The share function allows you to create a share link for the document.

SHARING



The sharing link can be shared with one or more people outside the project, which allows them, without creating new accounts on the workspace, to receive a document. It can be noticed at a glance that a share link is active on a document through the presence of a string near the document name:



To turn off this sharing link, click on the button



A.5.5.6 Lock

Locks a file when you want to tell other participants that you intend to change it offline. To unlock it, press « Unlock ».

A.5.5.7 Requests for validations

See the topic dedicated to requests for validations.

A.5.5.8 Open the file (via KROQI Drive)

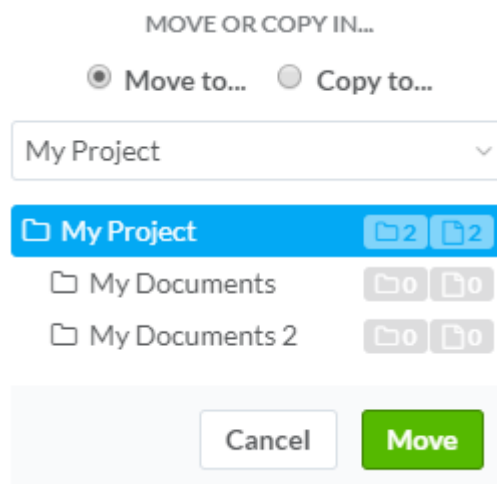
If the file is synchronized on your computer with the KROQI Drive, this function will open the document with the ideal application.

A.5.5.9 Add a version

See the dedicated topic: Document Versions

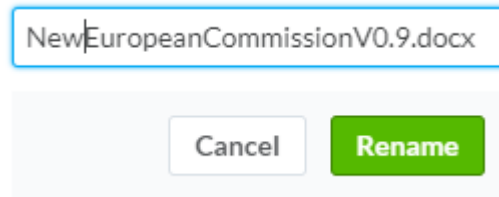
A.5.5.10 Move or copy in...

Opens an interface for selecting the directory of the project in which you want to move the document.



A.5.5.11 Rename

Opens an interface for renaming a document.



A.5.5.12 Download

Allows you to download the document in your download folder. Warning: the downloaded file is not synchronized by the KROQI Drive.

A.5.5.13 Remove

The function of deleting a document.

A.5.5.14 Stock history

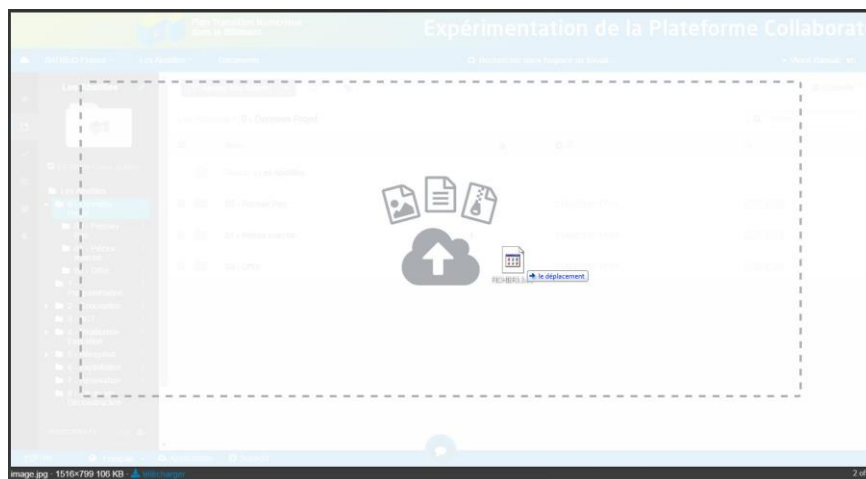
All actions performed on a document are viewable in the history tab of the side interface.

A.5.6. Add a document

The user has several ways to add a document to a folder in the “Documents” module.

Via the button "Add Files" in the header of the “Documents” module interface. The user can choose one or more files present on his computer and upload them in the current folder on the platform.

By performing a "drag and drop":



By dropping a file into its KROQI Drive directory.

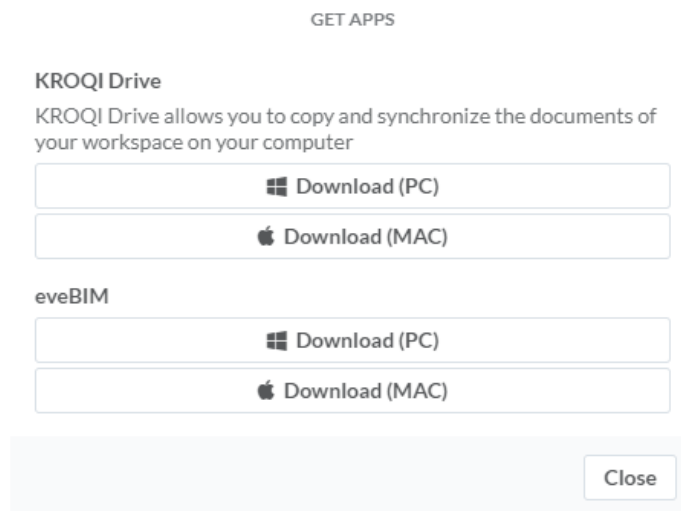


A.6. KROQI Drive

A.6.1. Download

If you did not download KROQI Drive when you created your account, you can do it later, from the platform.

In the lower interface bar, click "Get Apps" and choose the installer for your operating system (Mac or PC).

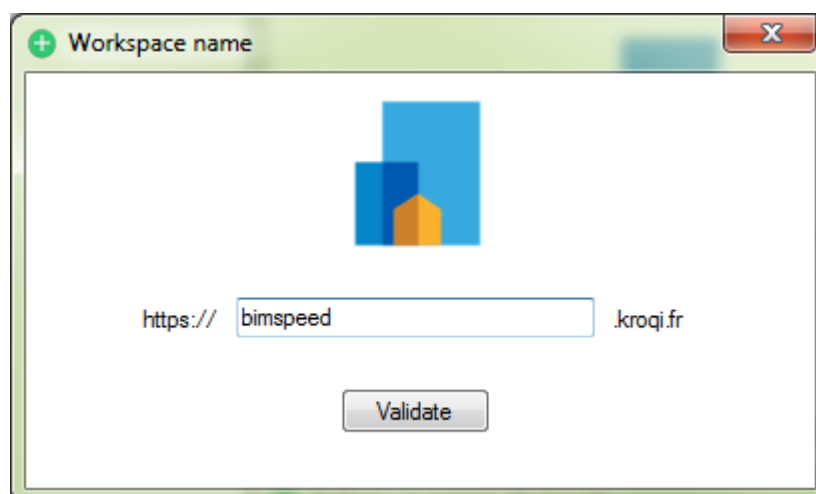


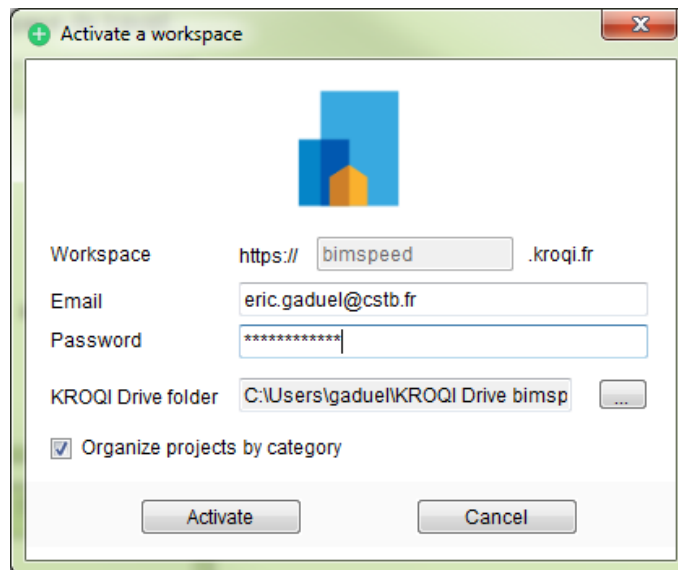
Depending on the antivirus installed on the computer, it may be possible to block and/or delete the KROQI Drive installation file. To remedy this, you can temporarily interrupt the antivirus in order to install KROQI Drive.

A.6.2. Install and configure the KROQI Drive

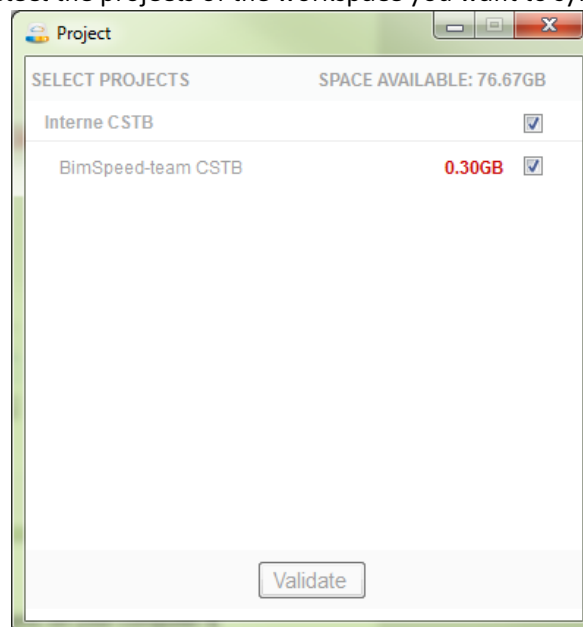
Open the previously downloaded executable, and then follow the installation Wizard.

After displaying a tutorial in 4 images, an interface opens automatically in order to enter your login information on a first workspace:





The interface asks you to select the projects of the workspace you want to sync on your computer:

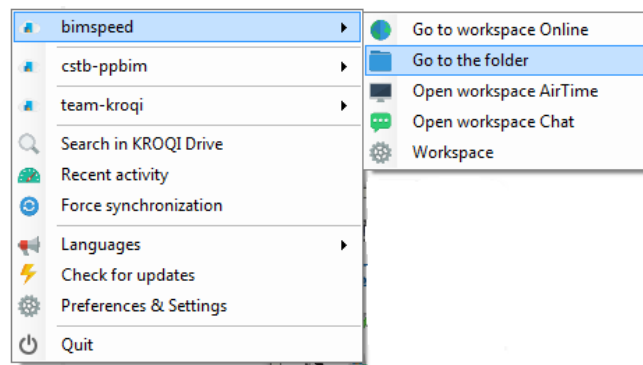


A.6.3. Open a file from the KROQI Drive

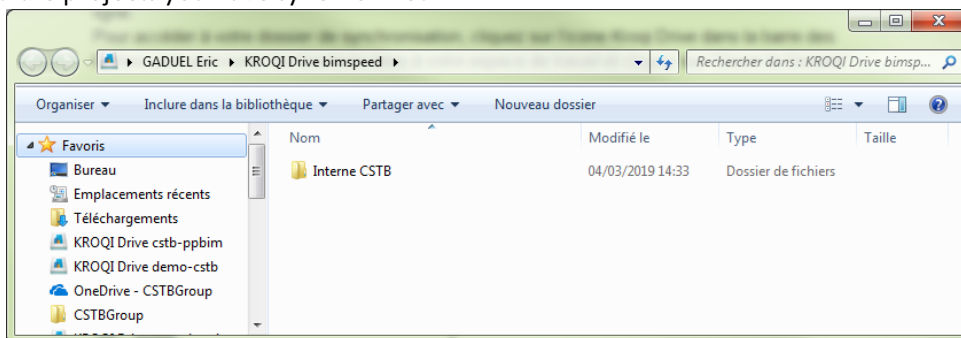
Once configured, the KROQI drive allows you to automatically synchronize files from a platform workspace to your hard disk. This is especially useful for working offline.

To access your Sync folder, click the KROQI Drive icon in the notification area of the taskbar, then browse through the functions related to your workspace and click "Open Folder":



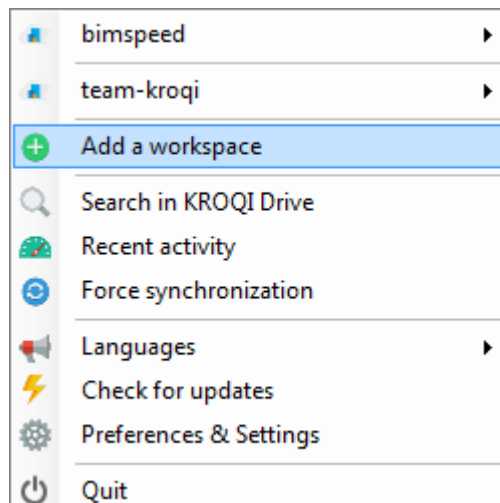


You can find the projects you have synchronized:



A.6.4. Synchronize a new workspace

The KROQI Drive allows you to synchronize multiple workspaces. To do this, use the "Add Workspace" function:



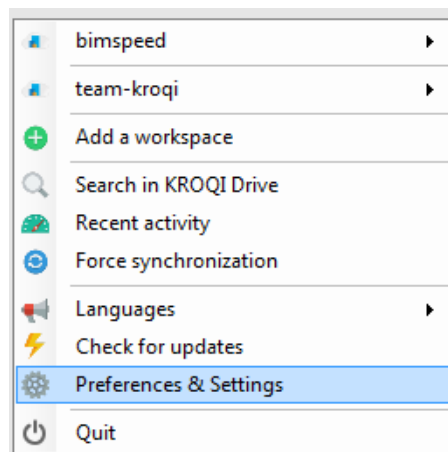
Then fill in your connection information for this workspace.

You can only have three synchronized workspaces on Kroqi Drive.

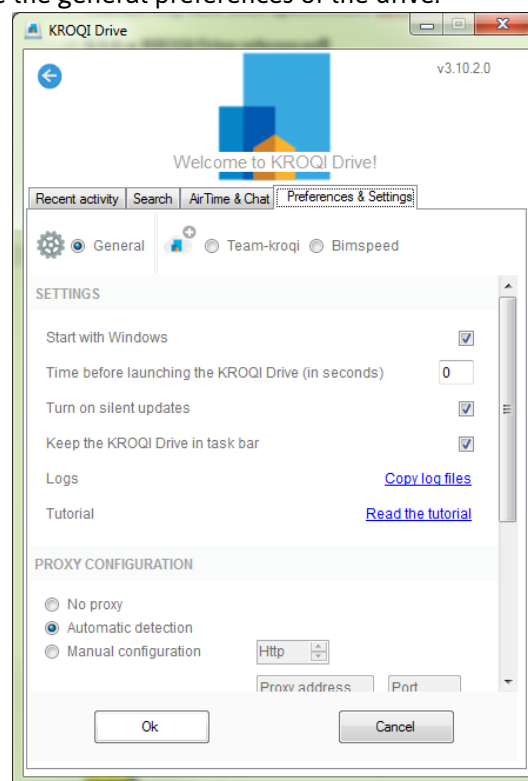
A.6.5. KROQI Drive preferences

To access the KROQI Drive preferences, click on "Preferences & Options":



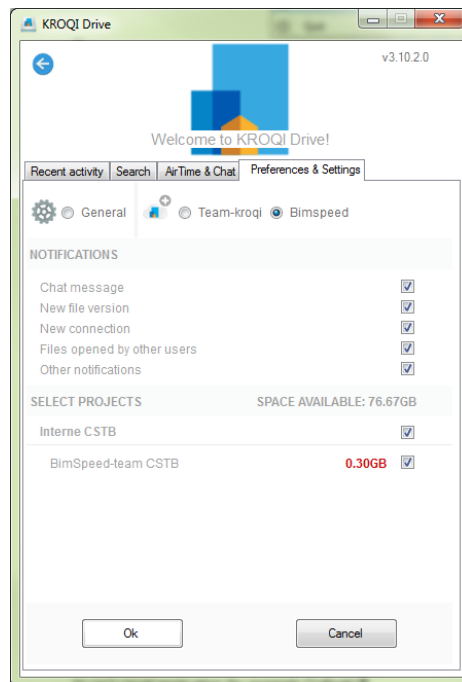


From this tab you can manage the general preferences of the drive:




You can also manage preferences more specifically for a workspace:

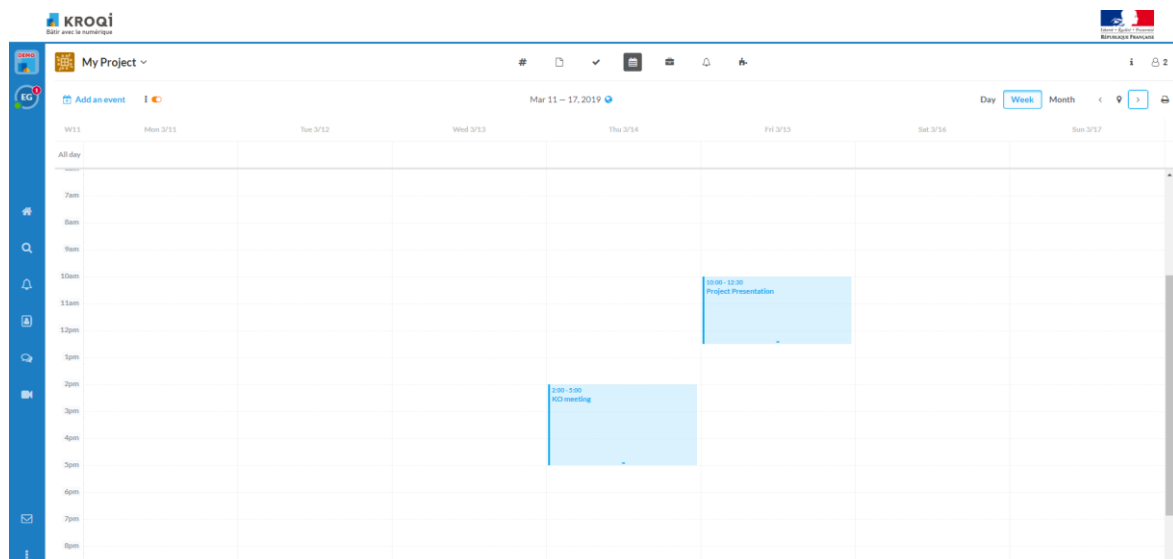




A.7. Agenda and meetings

A.7.1. Agenda and Events


The Calendar module is available through the icon  to all users who have access to it. The agenda includes the tasks, meetings and other events of the project. It comes in the form of a classic electronic agenda:






To create an event, click "Add an Event » to make the interface appear:



NEW EVENT





 




Date

All-day long event








 Start at :

 End at :


Participants [+ Invite participants](#)

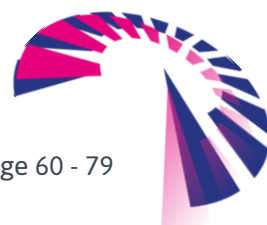
 Only added contributors will be notified. If no one is added, all the participants of this workspace will see this event.

The options available on the right of the "Add an event" menu allow you to filter the events to be displayed, and to link the calendar to your usual application (by example Outlook):


-  My events
 -  My tasks
 -  Meetings
 -  Other events
 -  Other tasks
 -  Display participants' calendars
- 



A.7.2. Create a meeting


The meeting module is available through the icon  to all participants who have access to it. To create a meeting, press "Add meeting" to show the interface. Note that it is possible to invite both external participants to the project. The guests are all notified of the invitation to the meeting.



ADD MEETING





 




Notify me about the responses

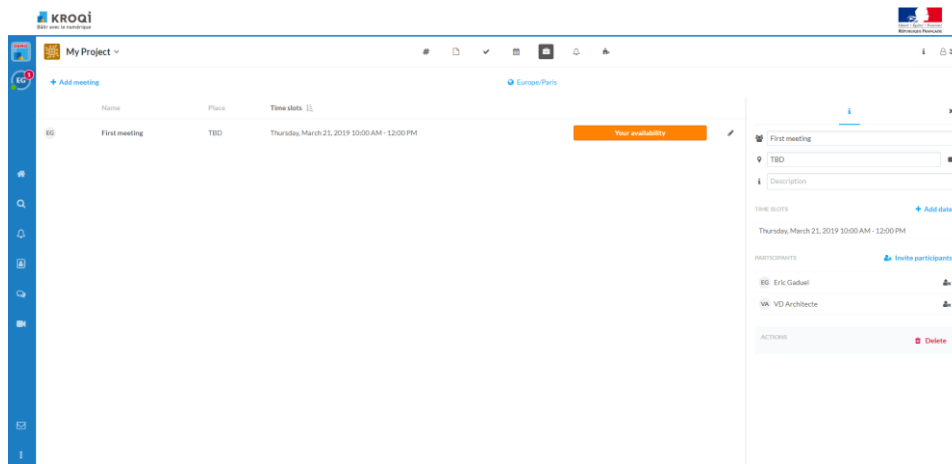
Notify participants by email

Time slots

 from : 

to :

Participants  [Invite participants](#)



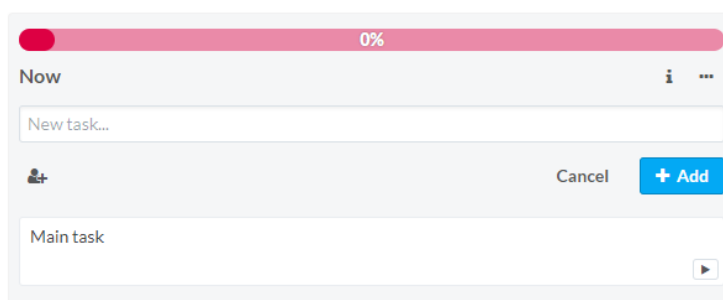
The screenshot shows the KROQI software interface. At the top, there's a navigation bar with 'My Project' and 'Europe/Paris'. Below it, there's a table with columns for Name, Place, and Time slots. A row is visible with 'First meeting', 'TBD', and 'Thursday, March 21, 2019 10:00 AM - 12:00 PM'. An orange button labeled 'Your availability' is next to the time slot. To the right, a detailed view of the meeting is shown, including fields for Name, Place, Description, Time slots, and Participants. The Participants list includes 'Eric Gaduel' and 'VD Architecte'. There is also a 'Delete' button in the Actions section.

Click on "Your availability" to check your and your guest's availability.

A.8. Tasks


A.8.1. Create a task

This topic deals with the creation of a new task and the advanced functions of this module. For more information about task management, see the dedicated topic. A task must belong to a task list. Each task list has a "New task" box.

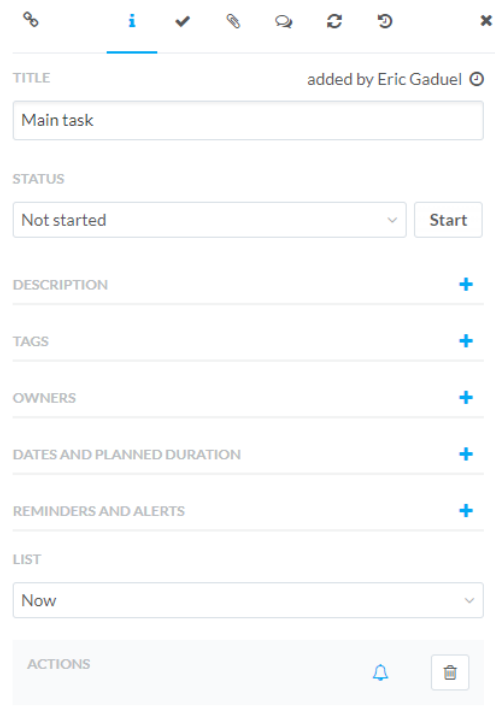


The screenshot shows a dialog box titled 'Now' with a progress bar at 0%. It contains a text input field labeled 'New task...'. Below the input field, there are two buttons: 'Cancel' and '+ Add'. At the bottom, there is a section labeled 'Main task' with a play button icon.



Enter the name of the task and then add a person in charge of it using the button . The task is created when you click "+ Add".

More fields are available in the side interface. It appears when you click on a task:



The screenshot shows a task management interface with the following fields and options:

- TITLE:** Main task (added by Eric Gaduel)
- STATUS:** Not started (dropdown menu) with a Start button
- DESCRIPTION:** + (expandable)
- TAGS:** + (expandable)
- OWNERS:** + (expandable)
- DATES AND PLANNED DURATION:** + (expandable)
- REMINDERS AND ALERTS:** + (expandable)
- LIST:** Now (dropdown menu)
- ACTIONS:** Includes a bell icon and a trash icon.

We advise the project managers to define a charter at the start of the project to govern the creation of tasks. Our recommendations are as follows:

A.8.1.1 Title

The title of a task must be easily understandable and correctly summarize the purpose of the request.

A.8.1.2 Status

The possible statuses for a task are:

- Not started: The task is scheduled, but no responsible person has been assigned.
- In progress: The task is started, in progress.
- Completed: When completed, the responsible person states that the task is completed.
- Refused: The task creator refuses the work done. We strongly recommend that you complete this status with an explicit comment and then restart the task.
- Validated: The task creator validates the work done.

A.8.1.3 Description

The description should allow the full understanding of the task by the concerned users. It may then be the subject of comments.

A.8.1.4 Tags

Tags allow you to filter tasks in a way that diverges from the structuring imposed by the lists. For example,



in a structuring of lists by phase, we can use the tags to insert the trades concerned. It is advisable to tag a task with the word "deliverable" if it is intended to order a deliverable file. For more information on tags, see the dedicated topic.

A.8.1.5 Responsible

Although this is not obligatory, we strongly recommend imposing the appointment of at least one responsible person per task.

A.8.1.6 Planned Dates and duration

We recommend at least to enter the end date of the task, which must match the deadline date for which the task is due.

DATES AND PLANNED DURATION

🕒 Start 06/03/2019 at 14 : 55 ✖

🕒 End 21/03/2019 at 15 : 55 ✖

🕒 Duration 15 day(s) ⌵

Automatically calculate the duration from planned dates

[✔ Confirm](#)

A.8.1.7 Reminders and Alerts

Allows you to add a reminder before the start or end date of the task.

ADD A REMINDER

🔔 15 minutes ⌵ before the ending date ⌵

[Cancel](#) [+ Add](#)

A.8.1.8 List

Allows you to classify the task in one of the predefined lists in the "Tasks" module. The lists created by default are: "Now", "After", "Later".

A.8.1.9 Actions

Allows you to start tracking the task or delete it.

A.8.2. Advanced actions on tasks



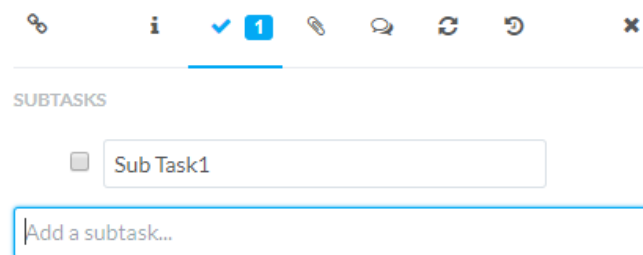
A.8.2.1 URL of a task

As with documents, it is possible to retrieve the direct URL of a task to share it with a project participant. This URL is accessible via the « # » of the side interface.

A.8.2.2 Subtasks



The platform allows you to detail a task into elementary subtasks. This function is very useful to have a trace of the progress in solving a task. It is also possible to associate a responsible person with a subtask.

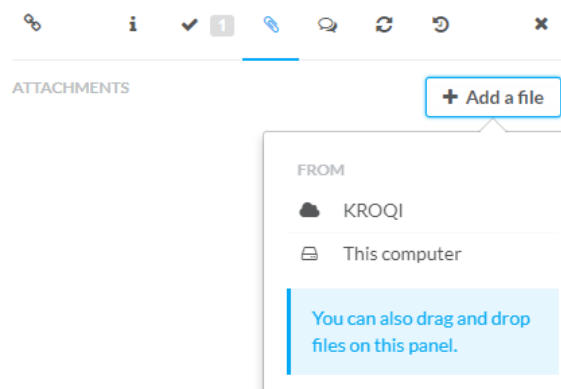


A.8.2.3 Attachments

It is possible to link documents to a task. These can be documents on the KROQI platform or documents imported from your computer. You can also drag files.

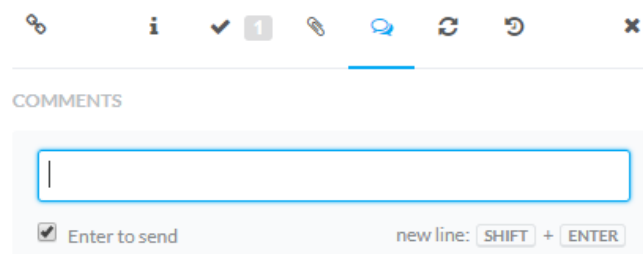
Linked files can be used in addition to the task description as well as in response to the task.

Binding a file to a task does not generate a notification. So, it is important to always leave a comment on the task in addition to this action.



A.8.2.4 Comments

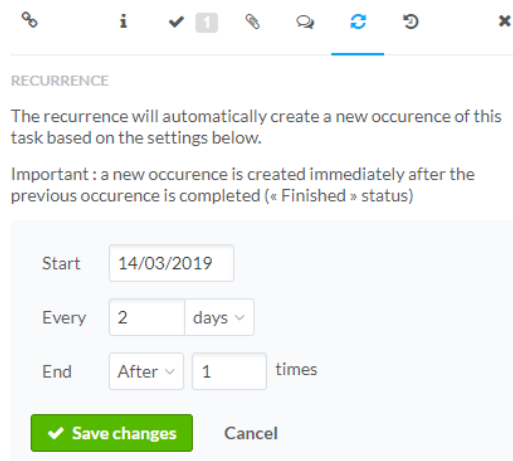
To avoid the use of emails, the task tool offers a specific interface to exchange on the subject concerned. The users tagged on a task always receive a notification when they comment on that task.



A.8.2.5 Recurrence

Allows you to automatically create a new occurrence of the task based on parameters (start of recurrence, frequency of recurrence, end of recurrence).






A.8.2.6 History of a task

All actions performed on a task are viewable in the task history.

A.8.3. Task management

The platform allows the creation of tasks, which are specific to a project. These allow you to request a document or a service from one or more users on the project. This topic focuses on the task management and task lists. To create a new task, see the dedicated topic.

A.8.3.1 Rights to access the Tasks module

The Tasks module is accessible by clicking on 


3 types of access are possible for this module:

- All tasks: the user has access to all the tasks of the project. It can create tasks in all available task lists.
- Only his/her tasks: the user has access only to his/her tasks. It can create a new task within a list that has at least one task assigned to him/her.
- Access denied: User does not have access to the Tasks module.

Any user who has access to a task can delete the task, or modify all the fields that define it, except for the list of responsible persons. Any changes to these fields will be notified in the task history and in the general tab of notifications. Nevertheless, it will be appropriate to define the conditions and tolerated limits of these possibilities from the very beginning of the use of the platform.

A.8.3.2 List of tasks

A task created on the platform takes place in a task list. All users who have access to "All Tasks" (access rights to modules) can create task lists. We advise the project managers to define a charter at the start of the project to govern the creation and nomenclature of the task lists.

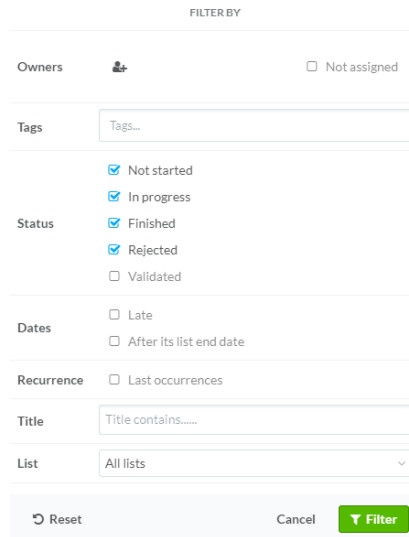
Natively, the platform offers 3 lists: Now, Next and Later. To rename or delete a task list, press 

A.8.3.3 Filter

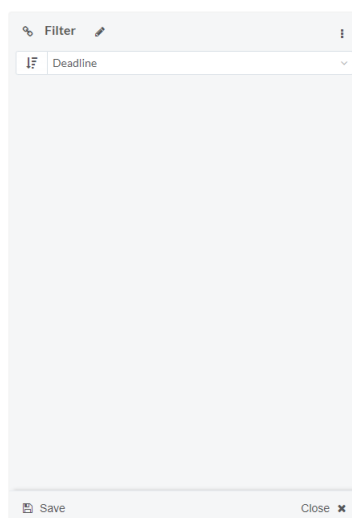
Task filters allow you to search for tasks according to several parameters. To create a filter, press the



"Filter" button in the top area of the module. The interface proposes to filter by considering the responsible persons, the tags, the status of the task, the list that contains it as well as the keywords contained in the title:



Once the filter is created, it appears as a task list:



By clicking on "Save", you keep this filter for future use: It appears in the left side interface, above the list of participants. To activate it, click on it.

Warning: unlike a task list, which is visible to at least all users concerned by the tasks it contains, filters are user-specific.

A.8.3.4 Import/Export

The function Export allows you to export project tasks and their attributes to a spreadsheet in CSV format. It is also possible to import a set of tasks in the project, provided that the format is respected. We recommend that you use the CSV file created by the export function as an example.

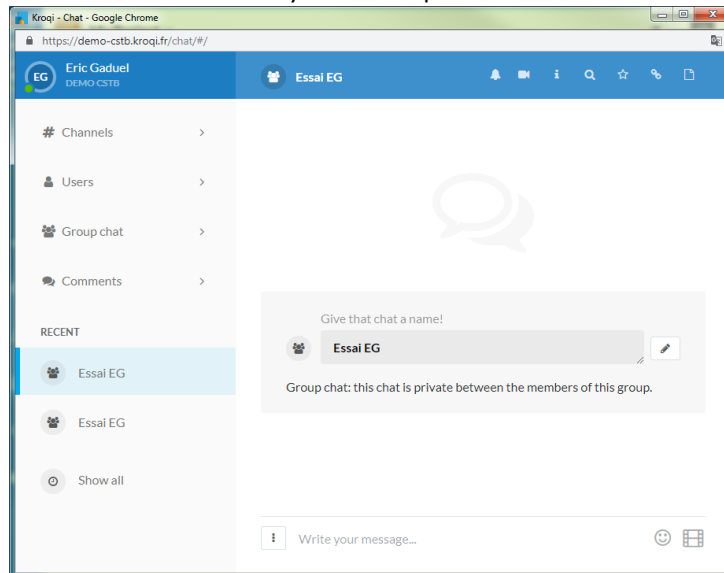


A.9. Communication

A.9.1. Chat & Channel & Messages

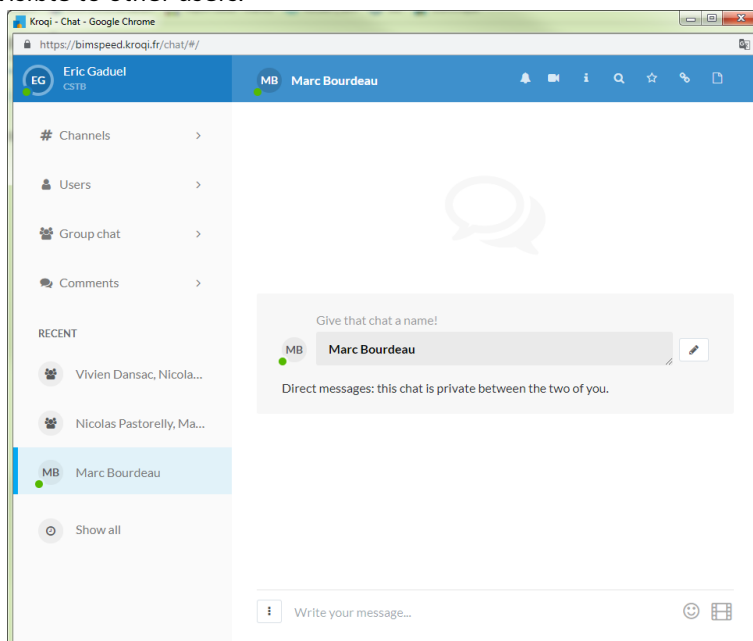
A.9.1.1 The Chat

Chat is an instant chat tool. This is the best way to have a private chat without overloading your mailbox.



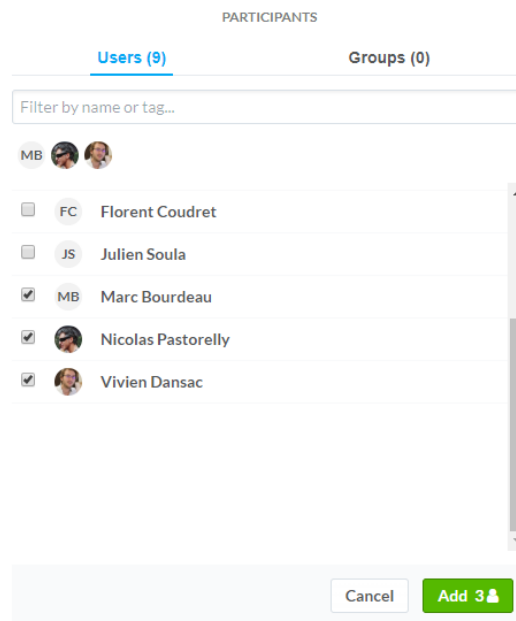
Engaging a conversation with a person


The left side of the interface allows you to select the participants in a conversation. The last contacts you have discussed with are available under "recent". If not, click on "Contact" and select the person of your choice. This conversation will be private between you two. The messages and items you exchange on this discussion will be invisible to other users.

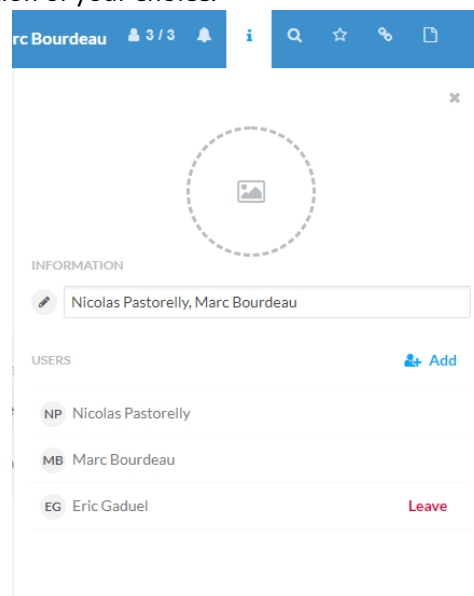


Initiate a conversation with a group of users

By clicking on "Contact" and then "Create a group", the chat allows you to select the people of your choice to create a group discussion. Then click on "It's gone!" to create this discussion group. Members outside this group will not be able to see these exchanges.



It is possible to name group conversations. Once the conversation is started, click on the icon  then enter the name of the conversation of your choice.



Chat related notifications

When you have new messages on the chat, you receive a notification on the platform as well as in your working environment with the KROQI Drive installed:

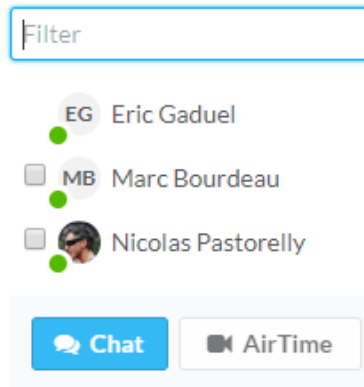
Chat features

5 major features of the chat are available in the upper right corner of the interface:

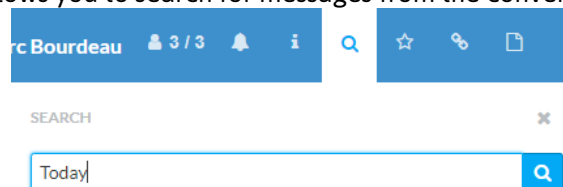




This button allows you to quickly know the number of participants in the group conversation that are online. By clicking on it, you can choose members to invite them to another chat or AirTime video-conference.



The search function allows you to search for messages from the conversation using keywords.



Allows you to find all the messages in the conversation that you have declared as favourites



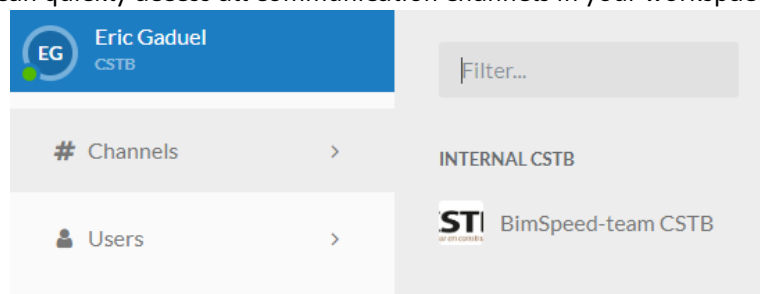
Makes it easy to find all the URL links that have been posted in the conversation



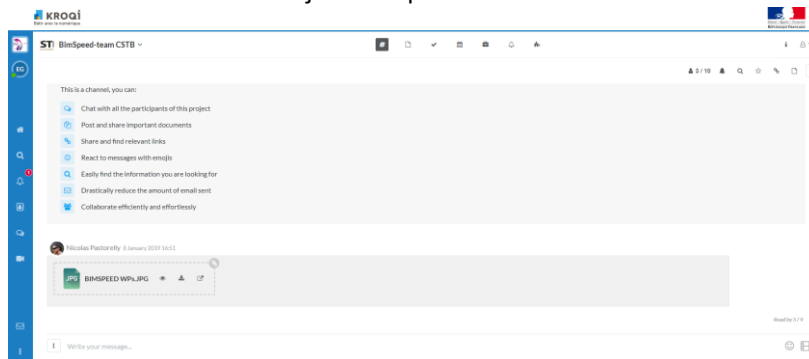
Allows you to find and add all the attachments in the conversation. These attachments are not present in the Document module.

A.9.1.2 The Channel Module

From the Chat, you can quickly access all communication channels in your workspace.




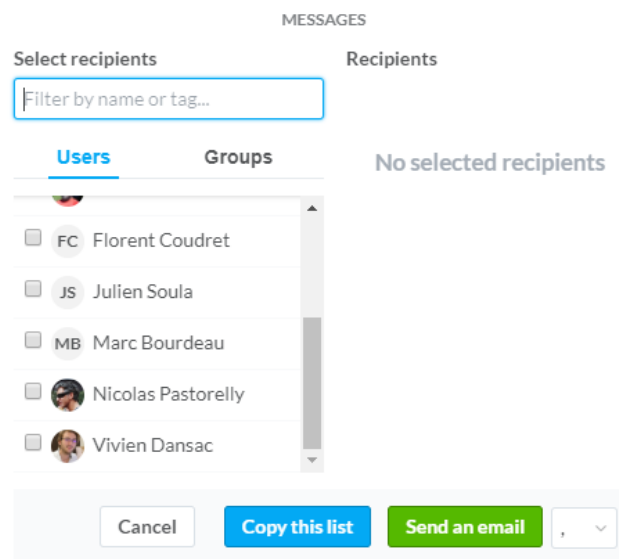
For each project, the channel is also the subject of a particular module:



You can use the chat to exchange documents or links with all the participants in an informal way. By default, all project participants have access to the channel and can post messages there. The workspace manager or administrators can, if they wish, restrict this access on a case-by-case basis.

A.9.1.3 Messages

The messages function  allows you to simply send an email from the platform to one or more project participants.



A.9.2. Use Airtime

Airtime makes it easy to organize audio and video conferences. You can invite up to 4 participants whether they are part of your project or not. If they are not part of your project, send them an email to indicate the link of the conference.

The interface of Airtime opens in a new window from the button



A.9.2.1 Supported Browsers

This table is subject to change. Eventually, AirTime will be fully supported by most web browsers.

AirTime Functionality	Firefox	Chrome	Opera	Safari	Internet Explorer
Audio (microphone)	X	X	X	NON	NON
Video (screen)	X	X	X		
Screen sharing	X (Native)	X (Plugin)	NON		
Browser notifications	X	NON	X		

A.9.2.2 Screen sharing

The screen sharing feature is currently available with Firefox and Chrome.

To use this feature in Chrome, it is necessary to add the extension KROQI Screen Sharing.

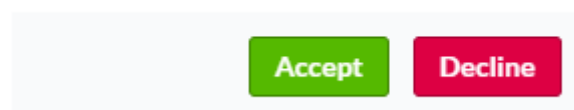
A.9.2.3 Notifications

During an Airtime call, your correspondents are alerted by notifications:

Via a browser

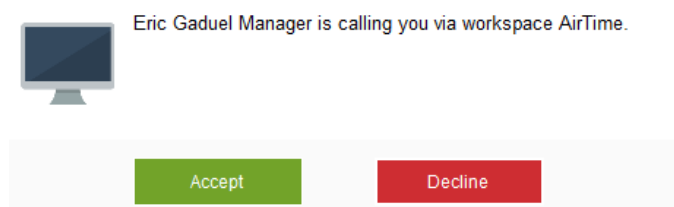
If your correspondents are browsing the web platform, they will receive an alert directly via their browser.

Eric Gaduel Manager is calling you via AirTime!



Via KROQI Drive

If the KROQI Drive is installed, synchronized and active on your correspondents' computers, they will receive an alert from your call:



Browser alerts are not currently functional under Chrome.

Your correspondents will still receive the alert via KROQI Drive if It is synchronized and enabled. If this is not the case, we recommend that you send the link to the AirTime conference (by email or chat for example).



APPENDIX 2 - EDMS REST API (routes summary)

This list is extracted from the document edms-server.pdf available in the 'Integration sandBox' project of the BIM-SPEED workspace at;

<https://BIM-SPEED.kroqi.fr/#/integration-sandbox/documents/?directory=58856847>

- /
- /about
- /api/1.0/edms/account
- /api/1.0/edms/account/user
- /api/1.0/edms/account/user/{user_id}
- /api/1.0/edms/account/users
- /api/1.0/edms/accounts
- /api/1.0/edms/auth
- /api/1.0/edms/login
- /api/1.0/edms/logout
- /api/1.0/edms/projects
- /api/1.0/edms/projects/{project_id}
- /api/1.0/edms/projects/{project_id}/docs
- /api/1.0/edms/projects/{project_id}/docs/{doc_id}
- /api/1.0/edms/projects/{project_id}/docs/{doc_id}/comments
- /api/1.0/edms/projects/{project_id}/docs/{doc_id}/comments/{comment_id}
- /api/1.0/edms/projects/{project_id}/docs/{doc_id}/content
- /api/1.0/edms/projects/{project_id}/docs/{doc_id}/path
- /api/1.0/edms/projects/{project_id}/docs/{doc_id}/protocols
- /api/1.0/edms/projects/{project_id}/docs/{doc_id}/protocols/{protocol_name}
- /api/1.0/edms/projects/{project_id}/docs/{doc_id}/protocols/{protocol_name}/validation
- /api/1.0/edms/projects/{project_id}/docs/{doc_id}/tags
- /api/1.0/edms/projects/{project_id}/docs/{doc_id}/updated
- /api/1.0/edms/projects/{project_id}/events
- /api/1.0/edms/projects/{project_id}/folders/{folder_id}
- /api/1.0/edms/projects/{project_id}/folders/{folder_id}/index
- /api/1.0/edms/projects/{project_id}/folders/{folder_id}/path
- /api/1.0/edms/projects/{project_id}/folders/{folder_id}/protocols
- /api/1.0/edms/projects/{project_id}/folders/{folder_id}/protocols/init
- /api/1.0/edms/projects/{project_id}/index
- /api/1.0/edms/projects/{project_id}/users
- /api/1.0/edms/toast
- /health
- /version





APPENDIX 3 - difference between the BIM-SPEED platform and the KROQI platform

This paragraph presents some of the differences between the BIM-SPEED platform and the KROQI platform reviewed at M24.

It provides an overview of the differences between the two platforms. At the time the document is written the platform is still under construction.

A full vision of the differences between both platforms will be accurately defined at the end of a project when BIM-SPEED use cases will be implemented.

NB: at M24 the BIM-SPEED platform is still branded “KROQI” which will change before it is used by consortium-outsiders for the BIM-SPEED competition in 2021.

Feature or service	Description	Pre-existing within KROQI	Improved, updated or created within BIM-SPEED project	Description of BIM-SPEED work	Provided to KROQI users	Provided to BIM-SPEED users
Sample third-party service	Sample integrated service to provide an example for BIM-SPEED consortium developers.	no	created	Creating & documentation of a structured sample service	Yes	yes



Profiling service	This service makes it possible for the BIM-SPEED administrator to create sets of services (profiles) which can be assigned to chosen accounts so that a set of services can be selectively made available to groups of users. This is useful in BIM-SPEED project to be able to expose BIM-SPEED integrated services only to BIM-SPEED projects users. Up to the exploitation phase decisions, BIM-SPEED services will not be exposed to KROQI users. See A.3.1 for details.	initiated	finalized	The concept of profile to group set of services was prototyped during the KROQI Project (initial basic prototype). Administration profile service was finalised and put in production during the BIM-SPEED project with the goal of segregating BIM-SPEED set of services from KROQI set of services. This work made it possible to expose BIM-SPEED services to BIM-SPEED users without mixing them with KROQI services.	Yes (outcome of BIM-SPEED effort)	yes
Semantic BIM checker	Semantic model checker is meant to check IFC models against a set of predefined checking rules. Ontology and linked data related research about rule checking were initiated by CSTB in research projects preceding the BIM-SPEED project. BIM-SPEED project effort focusses on improving the technical internals of the checking service and putting it in production for BIM-SPEED users.	yes	Improved software BIM-SPEED Dedicated checking rules	<ul style="list-style-type: none"> • Service core features improvement (IFC processing technique, SparQL rules management features etc.) • Modularisation of the service for BIM-SPEED workflow integration • Improved deployment process in production (GCP) • Specific BIM-SPEED checking rules created during the project (ex: Cype rules see A.3.2) 	yes	yes
BIM-SPEED workflow system	The BIM-SPEED workflow system has been created to allow folder-based automations: users can install predefined folder templates that help them to trigger renovation services while using the EDMS. When files are dropped in automated folders, BIM-SPEED services can be automatically triggered. See A.3.2 for details.	no	Created	<ul style="list-style-type: none"> • BIM-SPEED workflow use cases definition • BIM-SPEED workflow technical design and implementation • BIM-SPEED workflow deployment on development, qualification & production platforms • BIM-SPEED workflow support for BIM-SPEED partners 	To be seen on case per case basis	yes



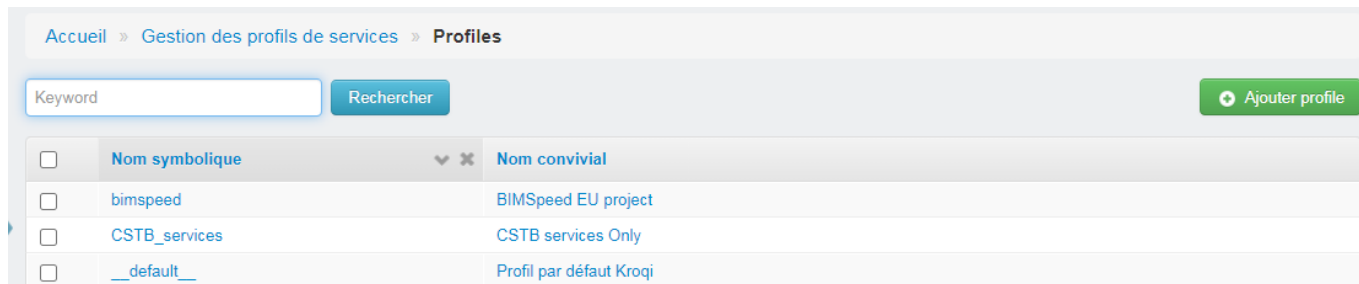
Integration of BIM-SPEED services	Integration of BIM-SPEED services in BIM-SPEED platform	No	Yes	<ul style="list-style-type: none"> BIM-SPEED support services integration use cases definition BIM-SPEED services technical integration support (for BIM-SPEED partners development teams) Integrated services (non exhaustive): GIS service, weather service, BACN2BIM (linking IoT data to BIM), "Material" service (enrichment of IFC4 files with material properties), BIM2BEPS (prediction of energy performance), Cype ecosystem's proxy application etc... 	To be seen on case per case basis	yes
Integration with sister projects activities	Integration in BIM-SPEED of existing services/features from other H2020 sister projects (ex: BIM4REN)	no	Yes	<ul style="list-style-type: none"> E.g.: integration of BIM4REN LODLifter application for BIM-SPEED users 	To be seen on case per case basis	yes

NB: This table will be updated along the project.

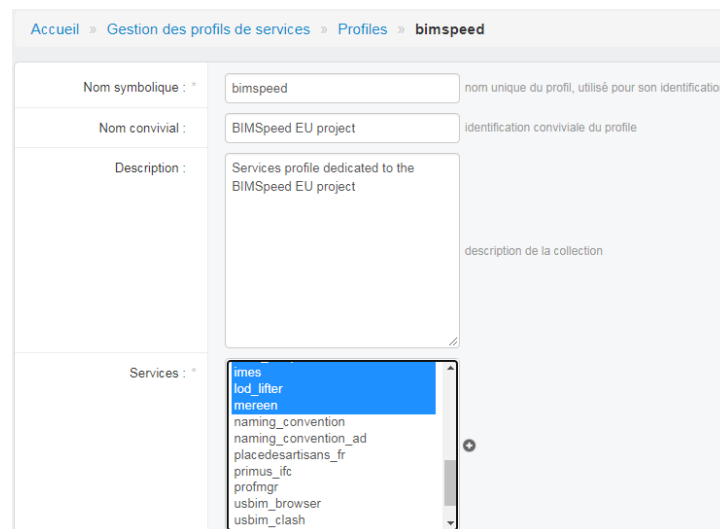


A3.1 Details of the BIM-SPEED profile system

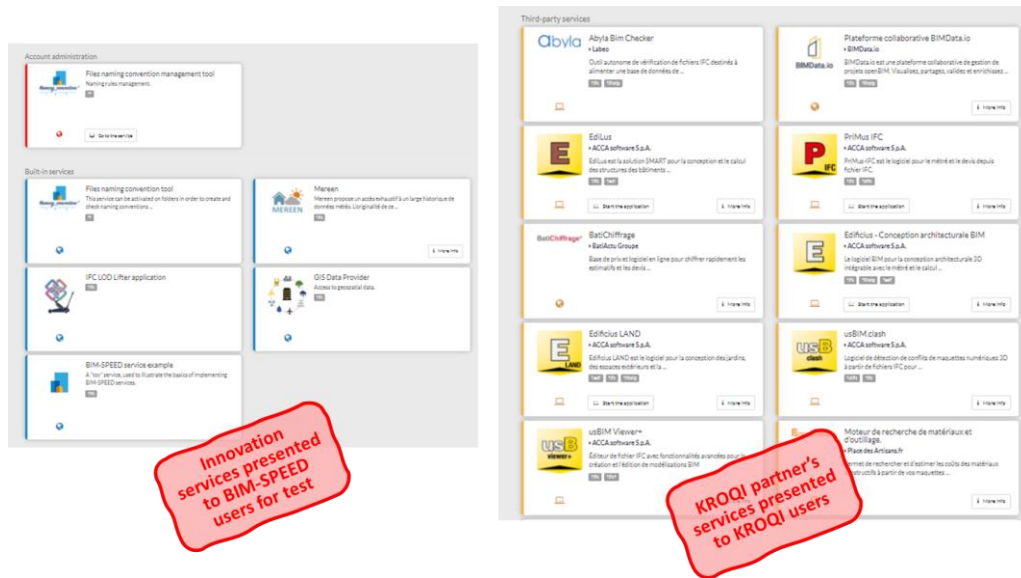
The profile system is dedicated to BIM-SPEED administrators. Administrators can create “profiles” that group services together.



Here is the definition of BIM-SPEED profile grouping BIM-SPEED R&D services together to be presented to BIM-SPEED users.

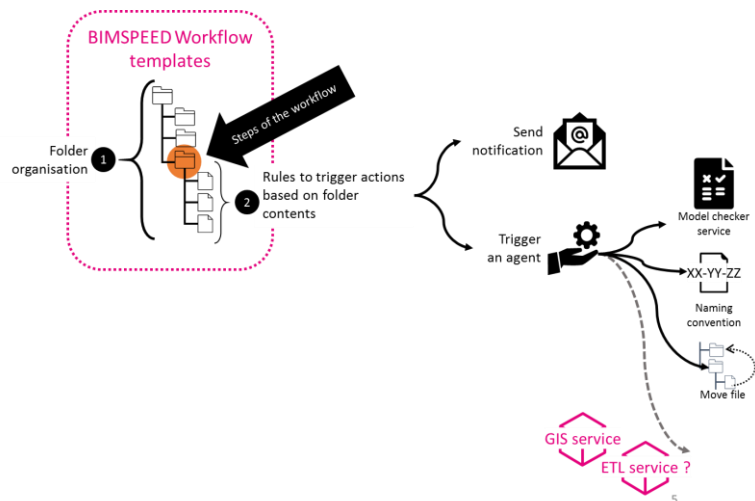


Consequently, here is the difference between the list of services presented to BIM-SPEED users via the BIM-SPEED profile (left) and services presented to KROQI users in the default profile (right)



A3.2 BIM-SPEED workflows management

The BIM-SPEED Workflows propose predefined folder organisations, also known as “templates” (see 1 in the figure), that the BIM-SPEED users can implement in the EDMS. Folders come along with services automations based on EDMS files events (see 2 in the figure). BIM-SPEED users can experience steps of a renovation workflow as a set of folders to work in.



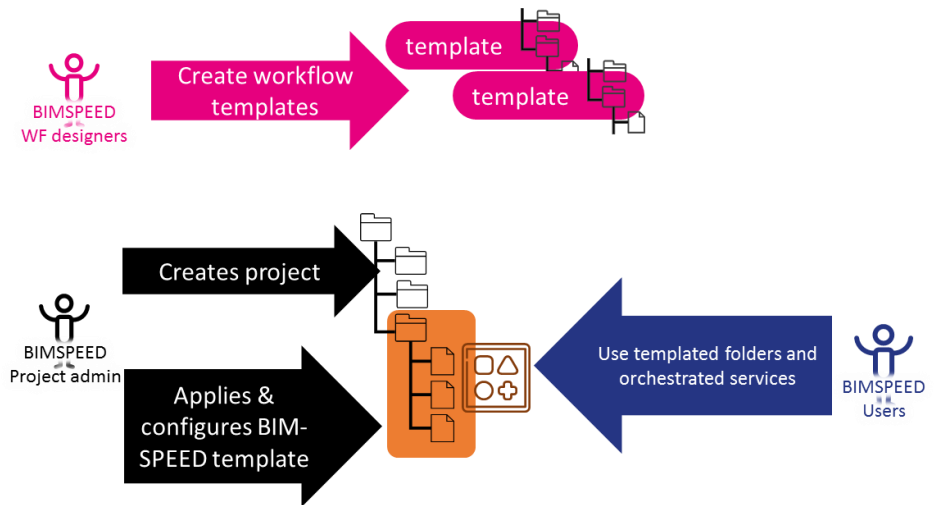
Each folder can be automated so that when a file is dropped into it, some internal or external services are triggered. Triggered services may be any types of BIM-SPEED platform internal services (like notification services, file moving service, checker service) or any cloud BIM-SPEED partner services.



BIM-SPEED designers (BIM-SPEED team) are **designing** BIM-SPEED workflows all along the BIM-SPEED project, based on renovation use cases and BIM-SPEED partner tools provided in BIM-SPEED.

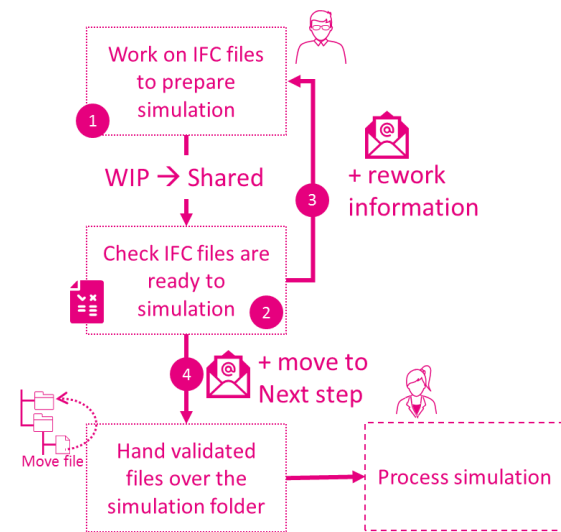
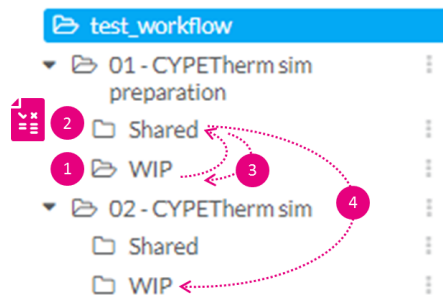
BIM-SPEED project administrators can then **install predefined workflow templates** in their BIM-SPEED platform created projects. **Projects users** can **use** the

predefined folder structures to store content and automatically trigger services on these folders contents.



Here is a concrete example to handle a CYPETHERM simulation scenario:

A BIM-SPEED workflow template creates a folder structure that is representing a renovation simulation process. In the first folder, at step one, an operator works on preparing the IFC file which will be the



base for CYPETHERM simulation. To that extend, he is working in the “work in progress” (WIP see 1 in the figure) folder. When the operator is done with preparing the IFC file which is the input of the simulation, he drops the file in the “shared” folder (see 2 in the figure). At that step, the model checker checks if the IFC file contains the relevant information to perform a CYPETHERM simulation (NB: The IFC model Checker has been provided with a set of rules targeted to BIM-SPEED simulation requirements). If the IFC file fails the checking process, the Notification Service is triggered to notify the operator that the prepared IFC file is missing important information : detailed failed-checking reports (PDF & BCFZIP files) are put in the work in progress folder, along with the IFC file which is moved back from shared folder as well (see 3 in the figure). Later, if the shared IFC file is checked to be compliant with simulation requirements, a notification is sent to the person responsible for the simulation so that he/she knows that he/she can perform the simulation task with a well calibrated file (see 4 in the figure). The validated IFC is then moved from the preparation/shared folder to the simulation/work in progress folder so that the simulation operator can use it in that dedicated folder.

