Change toolkit for digital building permit

Deliverable number	D4.3
Deliverable name	CHEK process and data management platform
Work package number	WP4 Software development
Deliverable leader	CYPE
Dissemination Level	SEN

Status	Final
Version Number	V1.0
Due date	M31
Submission date	30/04/2025

Project no.	101058559
Start date of project:	1 October 2022
Duration:	36 months
File name:	CHEK_101058559_D4.3_CHEK_process_and_data_management_platform_v1.0_Final

Funded by the European Union

This project has received funding from the European Union under the Horizon Europe Research & Innovation Programme 2021-2027 (grant agreement no. 101058559).

Authors and contributors

Author	Organisation	E-mail
Ane Ferreiro	CYPE	ane.ferreiro@cype.com
Vicente Mediano	CYPE	vicente.mediano@cype.com

Quality control

Name	Organisation	Role	Date
Francesca Noardo	OGC	WP leader	30/04/2025
Luiggi Alfaro	DIR	Internal reviewer	24/04/2025
Jantien Stoter	TUD	Coordinator	29/04/2025

Document history

Release	Description	Date	Author
V0.1	Index and first draft	15/09/2024	Ane Ferreiro
V0.2	Main content and structure	04/10/2024	Vicente Mediano
V0.3	Additional sections and revision	14/04/2025	Ane Ferreiro
V0.4	First Final draft	16/04/2025	Vicente Mediano
V1.0	Final version	30/04/2025	Francesca Noardo

1. Contents

2. Executive Summary

This deliverable, focused on Task 4.3 of the CHEK project, presents the development of the Digital Building Permit (DBP) platform, which is built within BIMserver.center (https://bimserver.center/) and designed to digitalise the building permit process and improve collaboration among municipalities, designers, and software developers. This document serves as a report outlining the proceedings and development of the task's main output, the DBP platform. The platform aims to optimise workflows, improve compliance with regulations, and foster more efficient communication between all stakeholders involved in the building permit process.

The platform's "Corporate" accounts provide project teams with tools for managing contributions, assigning responsibilities, and tracking project progress. These accounts promote transparency and coordination by allowing users to control permissions, manage roles, and monitor project status in real time. The platform's intuitive interface simplifies project management, while incorporating new features like contribution uploads, issue tracking, and messaging systems to facilitate effective communication and workflow management.

For regulatory bodies, Validation accounts were created to support municipalities in reviewing and validating project submissions. These accounts are integrated with certified checking software that automates compliance checks, ensuring that projects meet necessary standards before approval. Validation accounts offer tools to assign reviewers, track review status, and provide accountability for each step of the approval process. The platform also allows municipalities to efficiently manage multiple projects through an interface that centralises project tracking and review.

The Open API, accessible through developer accounts, allows software developers to integrate external tools with the platform. Developers can use the Swagger UI (https://apis.bimserver.center/swagger/swagger.html) and API REST documentation to build and test applications that improve the platform's capabilities. This flexibility ensures the platform's adaptability and encourages ongoing innovation through external tool development.

The platform's integration of features such as map and model viewers, location search tools, and 3D visualisation enables a more detailed understanding of project data. These tools help designers and municipalities evaluate projects within their spatial and urban planning contexts, ensuring that projects align with local regulations. Additionally, the platform's notification system keeps all stakeholders informed of project developments, approvals, and pending actions.

In conclusion, the DBP platform meets the key user requirements of the CHEK project by providing a unified, digital environment for building permit management. It enhances collaboration, transparency, and efficiency for municipalities, designers, and software developers. The implementation of this platform marks a significant step in the digital transformation of the building permit process, laying a solid foundation for future development phases within the CHEK project.

3. Introduction

This deliverable presents the development and implementation of the Digital Building Permit (DBP) platform as a part of the CHEK project. This document details the various features of the platform, specifically developed for the main stakeholders that participate in the DBP process. This platform, built on the BIMserver.center (https://bimserver.center/) infrastructure, has been improved to meet unique requirements of the CHEK project, supporting the digitalisation of building permit processes. The aim is to provide a clear understanding of the platform's functionalities, its integration into the projects' validation workflow, and its role in optimising the DBP process.

3.1 Purpose of the deliverable

The purpose of this deliverable is to thoroughly document and communicate the development, improvement, and implementation of the Digital Building Permit (DBP) platform within the CHEK project. Specifically, it is needed to outline the newly developed features that address the needs of different user groups –designers, municipalities, and software developers- highlighting how these improvements support a more efficient and effective digital building process. Additionally, this deliverable serves as a resource for understanding how these platform functionalities are integrated into the overall workflow for the CHEK project, which also provides a foundation for potential continuous improvement and possible future developments.

3.2 Deliverable structure

The remaining of this deliverable is organised into the following sections:

- **Section 3, "DBP platform overview"**, introduces the BIMserver.center platform, including a summary of its existing features, the workflow for digital permits, and the specific platform adaptations made for the CHEK project.
- **Section 4, "DBP platform features for designers"**, explores the functionalities available to project designers, focusing on both existing "Corporate account" features, and the new functionalities such as issue management, messaging systems, and contributions upload.
- **Section 5, "DBP platform features for municipalities"**, details the "Validation accounts" designed for regulatory bodies, which in the context of CHEK project, are municipalities. This section includes an introduction to these accounts, their key features, and how they integrate with corporate accounts and other tools.
- **Section 6, "DBP platform features for software developers"**, covers the tools available for developers, including an overview of "Developers accounts", their integration with the platforms and other software, and their interaction with validation accounts.
- **Section 7, "Conclusions"**, summarizes the key points discussed in the deliverables and reflects on the impact of the DBP platform on the CHEK project

3.3 Relation with other project tasks

The development of the Digital Building Permit (DBP) platform described in this deliverable is closely interconnected with several tasks within the CHEK project, as shown in Figure 1. Mainly, the platform's design is informed by the to-be process map (D1.1) and the user requirements collected in D4.1, ensuring that it meets the specific needs of municipalities and designers in the DBP process.

The platform's implementation is highly interconnected with most of the tasks developed under the project including the data integration layer developed in WP2, covering Open BIM standards and GIS/BIM data.

Task of the same WP4 Task 4.4 focuses on the development of the Open API, enabling external software integration with the DBP platform. Additionally, Tasks 4.5 and 4.6 provide desktop and web-based tools for urbanism and accessibility compliance checks, as well as 3D city model visualisation for regulatory validation. Task 4.7 complements the platform's development with software documentation and workshops, while Task 4.8 builds the business case for the platform's further development.

Beyond these technical developments, WP5 supports upskilling and reskilling the construction value chain, ensuring that users can effectively adopt the DBP platform. WP6 facilitates pilot actions for real-world testing and validation by using the DBP tools and environment, and WP7 focuses on dissemination and exploitation, ensuring that the platform's innovations are widely shared and adopted across the industry.

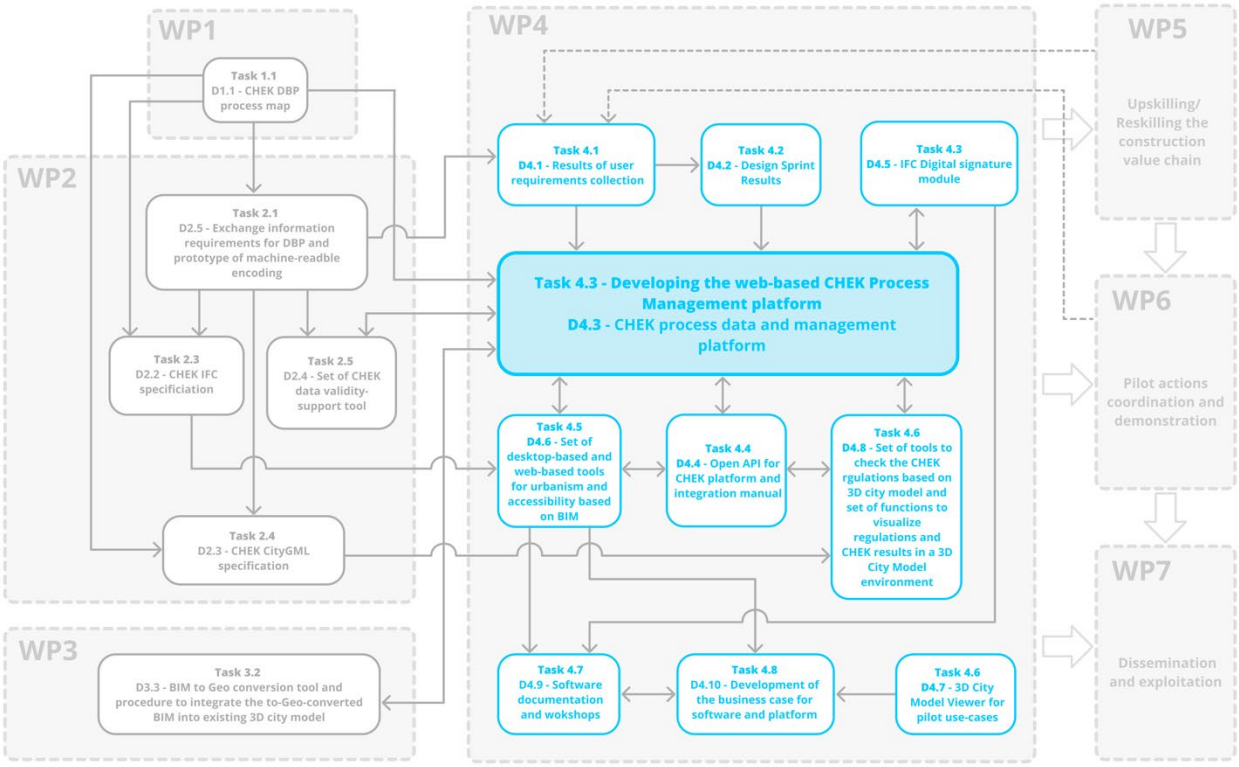

Figure 1: Relation with other tasks and outputs

4. DBP platform review

The Digital Building Permit (DBP) platform serves as the foundation for the CHEK project's goals of optimising and digitalising the building permit process. The DBP platform has been built up onto existing CYPE's platform BIMserver.center. This section provides an overview of the platform and summarises the existing features of BIMserver.center and the new features specifically designed for the CHEK project and the DBP process.

4.1 Introduction to BIMserver.center

BIMserver.center is a digital platform, or a Common Data Environment (CDE), designed to support the management and development of BIM projects within an OpenBIM environment. The platform integrates several functionalities that cover the needs of various stakeholders involved in the building and construction industry.

The platform is structured around a variety of features, including project management, and 3D visualization of models and data (Figure 2). Additionally, BIMserver.center works as a repository of BIM programs and applications (providing users access to a wide range of tools, essential for projects execution and management) and a social network for BIM professionals (facilitating communication, networking and knowledge sharing among industry experts).

BIMserver.center is a platform which is structured by projects. Each project is composed by a series of contributions that are uploaded by the users that belong to the project. A contribution is a list of files. This structure of the platform is in the core of its functioning and also structures the calls of the API REST.

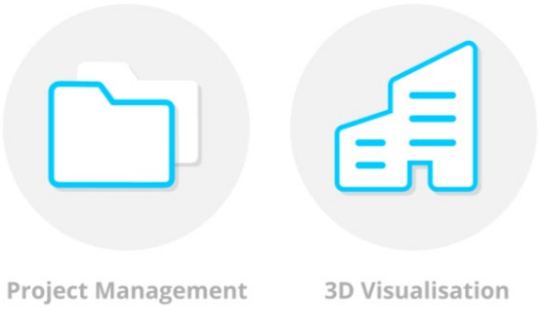

Figure 2: BIMserver.center main features as a CDE

BIMserver.center is a platform that strongly focuses on interoperability as the exchange of information in the platform in open formats. The platform supports and promotes the use of open information exchange formats, ensuring that data can be optimally shared and integrated across different software and tools.

BIMserver.center offers a specialised system for managing different types of users and entities, by using collaborative accounts under "BIMserver.center Teams". These accounts are designed to comply with the requirements of different types of user groups, including "Corporate" accounts for project management teams and "Developer" accounts for software development teams. Additionally, in the context of the CHEK project a new type of account was created, "Validation accounts" for regulatory entities responsible to perform project review and compliance checking (further detailed in section 5 of this deliverable). Each account type is designed to optimize the workflow and collaboration

within its specific domain, ensuring that all users (Figure 3) can effectively contribute to the DBP process within an Open BIM framework.

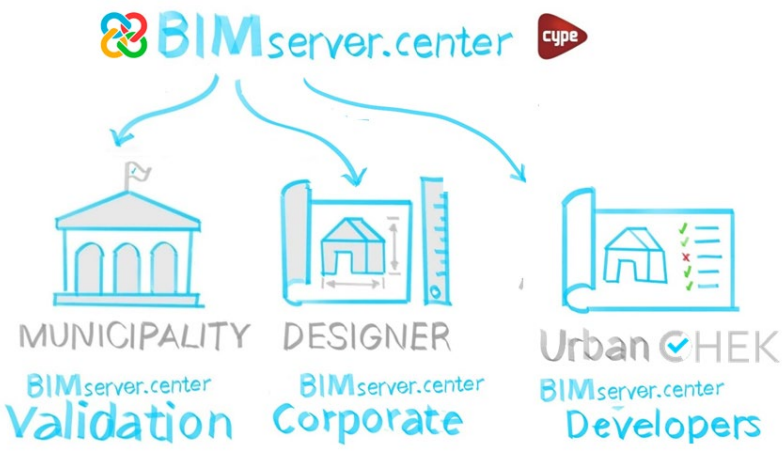

Figure 3: BIMserver.center account types for CHEK project

4.2 Workflow for Digital Building Permits

The DBP workflow within the CHEK project integrates various stakeholders and tools to optimise the building permit through collaborative digital platform. The workflow, illustrated in Figure 4, aims to ensure that designers, municipalities, and developers can efficiently contribute to and validate building projects within a geospatial and BIM-integrated environment under open standards.

Firstly, designers manage and develop their building projects through BIMserver.center Corporate accounts; before submitting their projects, they perform the first validation iteration by using the use of checking tools. This software such as Verify3D, VC Map CHEK, and CYPEURBAN assist with specific aspects of project validation, providing automated checks, and ensuring that projects meet the required standards before they are submitted for final approval.

On the other hand, Municipalities, through the “Validation” accounts (further detailed in section 5), are responsible for reviewing and validating building projects submitted by designers. This process is crucial in ensuring that projects comply with relevant regulations and standards before approval is granted. The interaction between designers and municipalities is facilitated by the platform, where designers submit their checked models and municipalities conduct official reviews. Feedback or approval is then provided through the same platform, creating an interaction between design and validation.

The whole workflow is supported by Open API developed under the scope of this project (Task 4.4), which allows for the integration of external software tools and ensures that data can be easily exchanged between them and the DBP platform. This flexibility enables developers to create custom solutions that can be integrated into the DBP platform, improving its functionality and adaptability to different project and stakeholder needs.

Once all validations and checks are complete, and the municipality has approved the project, the Digital Building Permit is issued. This final output reflects the successful integration of design, validation, and regulatory compliance within the DBP workflow, demonstrating the platform’s capability to optimise the building permit process through digitalisation and collaboration.

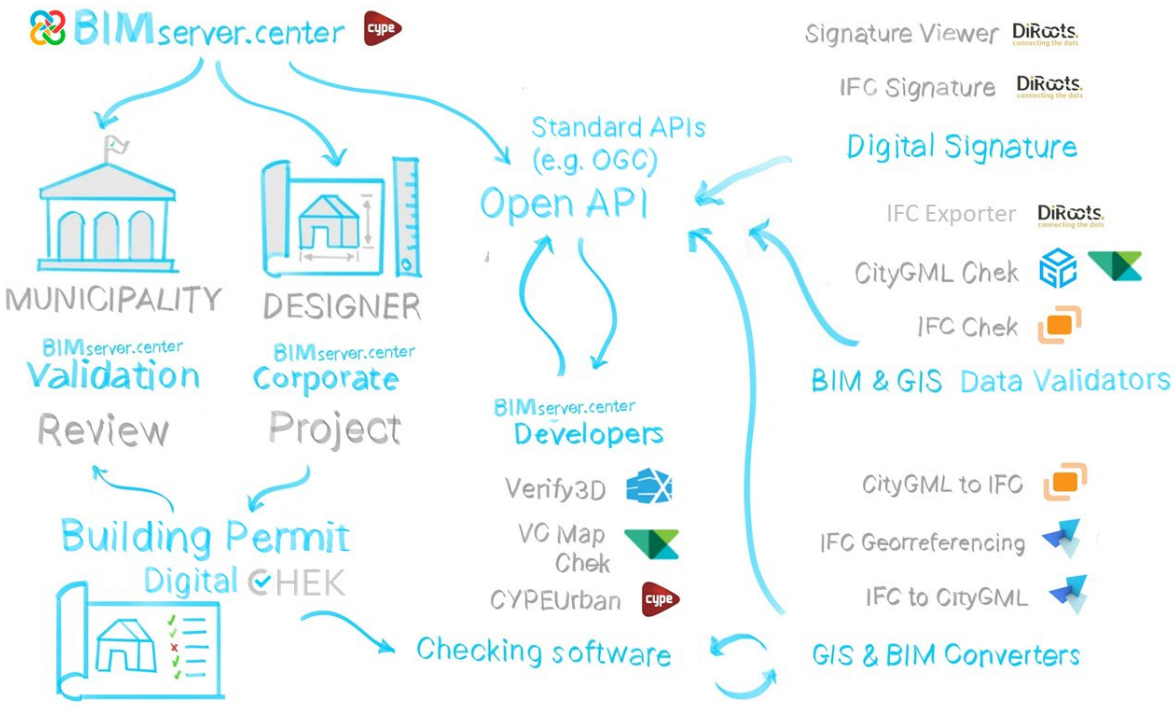

Figure 4: Workflow for Digital Building Permits

4.3 Compliance with user requirements

As part of the development of the Digital Building Permit (DBP) platform, the developments during this task focused in meeting the user requirements gathered in Deliverable 4.1 "Results of User Requirements.", Appendix 01: List of features. The platform now includes several features designed to optimise the digital building permit process, specifically addressing the needs of municipalities, designers, and other stakeholders.

As seen in Table 1, user requirements fulfilled at submission of the DBP platform include: the development of BIMserver.center Validation, a Teams space specifically design for Municipalities carrying out the DBP process. This section of the platform includes specific features to support the DBP process such as management of roles and permits inside the municipality including the ability to assign responsible reviewers, along with a notification system for real-time updates, and account and project history system for traceability. The platform provides a dashboard for municipalities to track projects and processes (to be assigned to a reviewer, to be reviewed, reviewed). Inside each project review results are displayed, as well as 3D visualization of the BIM models and results. The projects also have an issue system based upon BCF exchange format.

For designers (BIMserver.center Corporate) the platform includes additional features such as ability of uploading the model directly in the platform, the view of IFC information and entities, the issues system, an integrated chat platform facilitates communication, the revision of checks among others.

Table 1: Fulfilled user requirements from D4.1 Appendix 01

#	Feature	Description
8	Assign the responsible for the process review	Automatically assigns the reviewer responsible by selecting from a list of users in the municipality
10	Notification system	Get notification when there is some change in the process by another user. Possibility to manage the type of notification.
13	User management	Possibility to change viewing permissions and editing of the different users. Control the data privacy of the models by the municipality responsible
16	Check status of the process including time	Possibility to check the status of the process and the responsible reviewing it. Dashboard visualisation
17	Intuitive user experience and interface	User friendly interface. Possibility to change language. Minimise number of software's to install, concentrate maximum features in the platform.
22	Start process and share with Municipality	Initiates the process and shares it with the municipality platform. Streamlines the process start-up and collaboration.
29	Documents and file versioning track	Tracks versions of uploaded documents, allowing users to see changes over time. Ensures document management and traceability.
34	Project approval authority	Manages user permissions for project approval within the platform. Controls authority levels to streamline the approval process.
36	Give access to other users (external parties)	Chance to carry on a steering committee to release a unique authorisation (in one step)
38	Municipality dashboard for each process assigned to them	The administrative within CHEK - identifies in the CHEK Dashboard: 1. Arrival of models/processes; 2. (ID); 3. Notifies the responsible department according to the (ID); 4. Responsible department accesses CHEK - and assigns technician for process analysis
40	Review submission before sending	Possibility to review all extracted data from the model and filled information before official submission.
41	Show results with rules and entity	Table in the project "overview", on click it opens corresponding platform
60	Chat platform	Chat between involved parties of the process. Possibility to export report
67	Map viewer and navigation	Navigation in the city map. Possibility to change from 2D and 3D view
68	Model viewer and navigation	Offers an IFC model viewer for detailed inspection and navigation. Facilitates comprehensive model review and analysis.
69	Possible extensions store	Provides a platform for potential extensions to the software. Enables customization and additional feature integration.
70	Upload model	Allows users to upload models to the platform for processing and review. Streamlines model submission and integration.

These features ensure that the DBP platform is on track to meet the core user requirements identified in the initial stages of the CHEK project. Below you can see an overview of the total numbers for implementations.

Table 2: Number of requirements fulfilled from D4.1 Appendix 01

Application	Developer	Number of requirements	Implemented	Partially implemented	Not implemented	Out of scope	Overall percentage of implementation
BIMserver.center	CYPE	21	15	2	2	2	84%

The platform followed an initial design released in 07/10/24, the developments and updates of the platform have followed an iterative process in which the platform have been updated, bugs corrected, and new features added in the

following dates 19/11/2024, 11/12/2024, 24/01/2025, and 20/03/2025. The platform and the features have received feedback from users in Task 4.1 which have detected bugs as well as suggested improvements for existing features and new features.

5. DBP platform features for designers

The DBP platform has been designed to meet specific needs of project designers, who play a crucial role in the development of building projects and building permit's processes. In this context, this section focuses on the platform features available to designers, beginning, with an overview of existing collaborative accounts (called "Corporate" accounts) that provide the foundational tools for collaboration and project management. It then details the new functionalities introduced for the CHEK project, such as issue management, messaging system, contributions upload and checks review. These features are designed to optimise the efficiency and effectiveness of design and validation workflows, enabling designs to collaborate optimally and manage their project with precision.

5.1 Overview of Corporate accounts

BIMserver.center Corporate accounts are specifically designed for the management and coordination of work teams within an organisation, in CHEK project BIMserver.center Corporate accounts will be use by the Designers (stand alone, studios or real estate developers). These accounts are intended to facilitate collaboration, coordination, and BIM workflows within an entity, providing a common environment for managing complex projects with various stakeholders in an Open BIM environment. These accounts allow creation and management of groups within the organisation, that can be assigned to specific projects. This ensures that all team members have the necessary access to information and resources, thereby improving internal coordination and communication.

Corporate accounts function as virtual entities that represent an organisation or project team, bringing together multiple personal accounts under a unified structure, as seen in Figure 5. While all associated personal accounts can access and collaborate within the Corporate account, each user's actions are individually accountable. This ensures that while collaboration is centralised and optimised, responsibility and traceability of each contribution remain with the individual users, fostering a transparent and secure working environment.

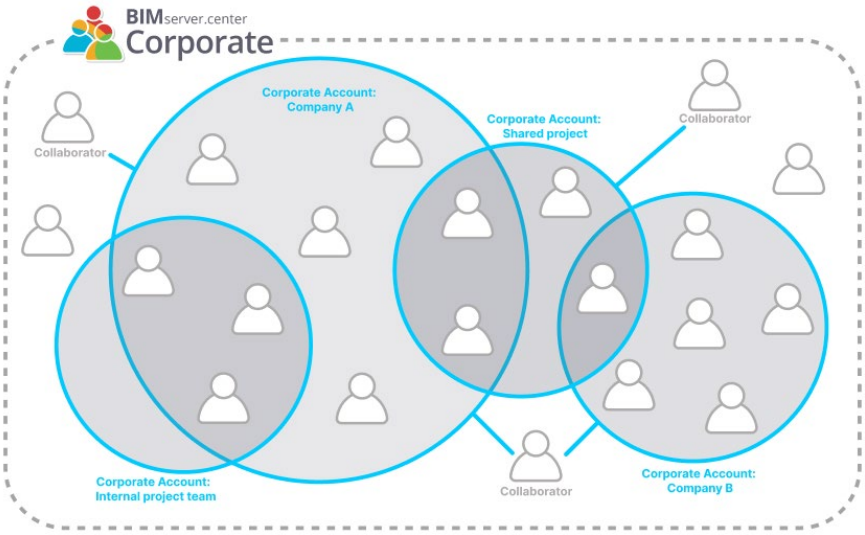

Figure 5: Corporate account and personal accounts

One of the features of Corporate accounts is the ability to assign permissions to team members. Administrators within a Corporate account have full access to the account management and can delegate specific responsibilities to other users, such as user management or project management (Figure 6). This feature ensures that each team member has the appropriate level of access and responsibility, maintaining both control and security over project information.

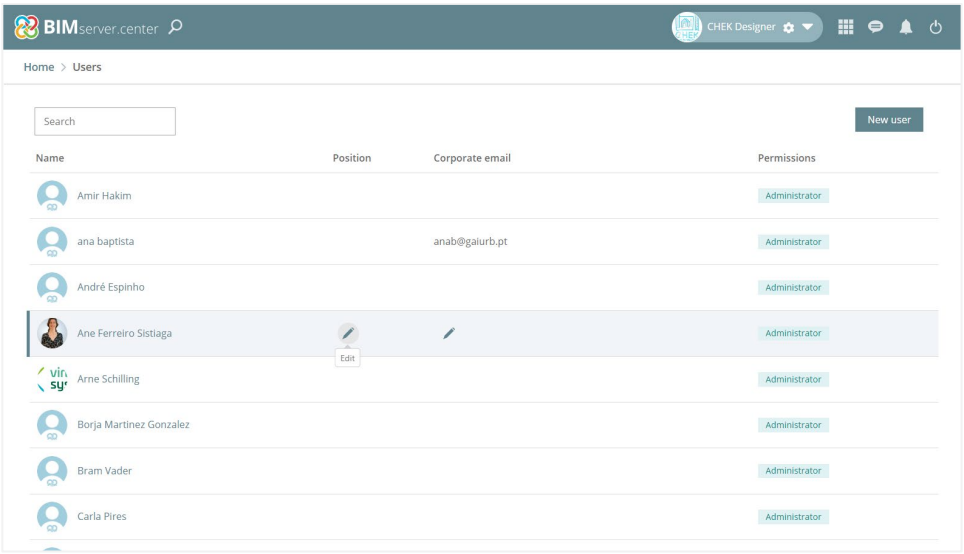

Figure 6: Corporate account users' management interface "CHEK Designers"

Moreover, Corporate accounts offer additional functionalities that enhance the collaborative environment. By centralising project management, these accounts enable organisations to maintain a high level of control while ensuring that all users can work effectively. Projects are hosted in one single interface, as seen in Figure 7, where the accessibility and visibility of each of them can be easily configured. This structured approach supports more efficient project execution and safeguards the integrity of the information being shared and utilised.

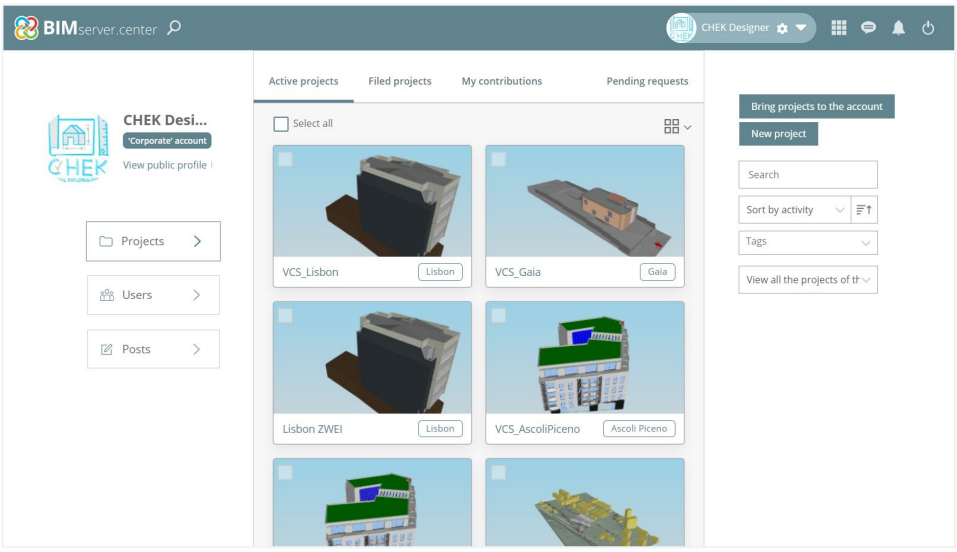

Figure 7: Corporate account projects interface "CHEK Designers"

Each project in BIMserver.center is provided with its own dedicated page, where a general overview of the project is displayed and where it can be fully configured and managed. Users can control various aspects of the project, including general data, privacy settings, contributions, 3D views, and accessibility options. This central hub also allows all project contributions to be accessed, reviewed, and managed in an organised and intuitive manner, under the "Contributions" tab, ensuring smooth project coordination (Figure 8).

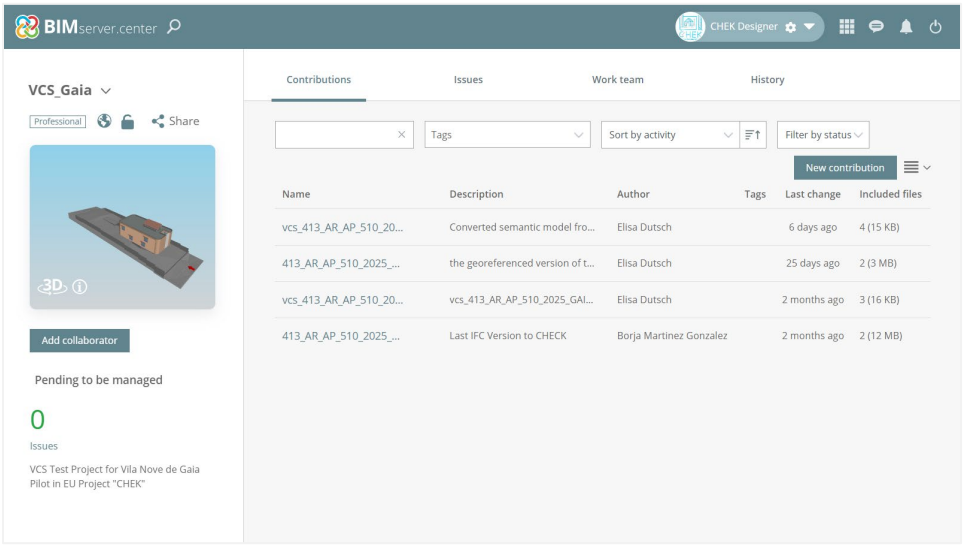

Figure 8: Corporate account specific project interface for "Gaia DEMO"

The project's 3D view (Figure 9) can also be accessed from here. Users can interact with models and contributions through configuring layers, shadows, and section planes to gain insights into different aspects of the design. Navigation

tools allow for exploration of the 3D environment, while visibility settings enable control over the display of specific elements and categories. Additionally, element information can be accessed, and various configuration options provide further customisation of the 3D view, offering a flexible way to review and manage project details.

Figure 9: Project 3D view for “Gaia DEMO”

Additionally, work teams can be managed and reviewed under the "Work team" tab. This section allows team members to control who is part of the project team and provides the option to add external collaborators through the "Add collaborator" button. By integrating external partners, the platform promotes flexibility and collaboration while keeping all team management centralised in one location, as seen in Figure 10.

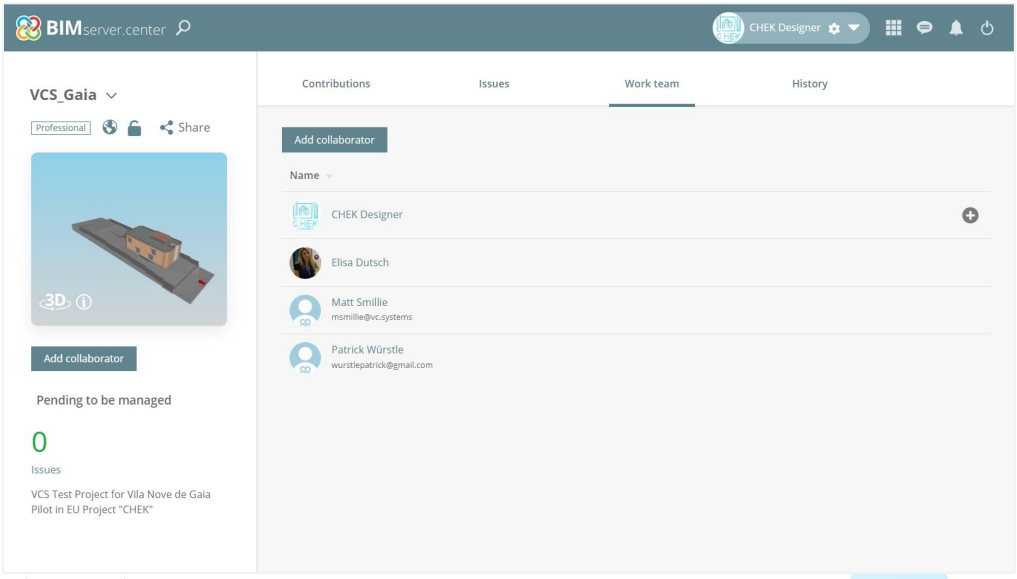

Figure 10: Corporate account work team for “Gaia DEMO”

5.2 New functionalities

In the context of the CHEK project, several new functionalities were developed to improve collaboration and optimise workflows on the BIMserver.center platform. These features, described below, are designed to promote more efficient communication, organisation, and project management within an Open BIM environment, allowing users to manage contributions, track issues, and communicate with team members and track history of the project.

The Contribution Upload feature (Figure 11) enables users to add and organise project files directly within the platform. By allowing unlimited BIM and GIS file types, such as IFC models, CityGML models, GLTF, JSON, images, PDFs, among others, to be uploaded and grouped under a single contribution, this feature ensures that all project-related documents are easily accessible and stored securely in the cloud. The flexibility offered by the Contribution Upload functionality improves collaboration by ensuring that all team members have access to the most up-to-date project information, which is crucial for the coordination of complex projects.

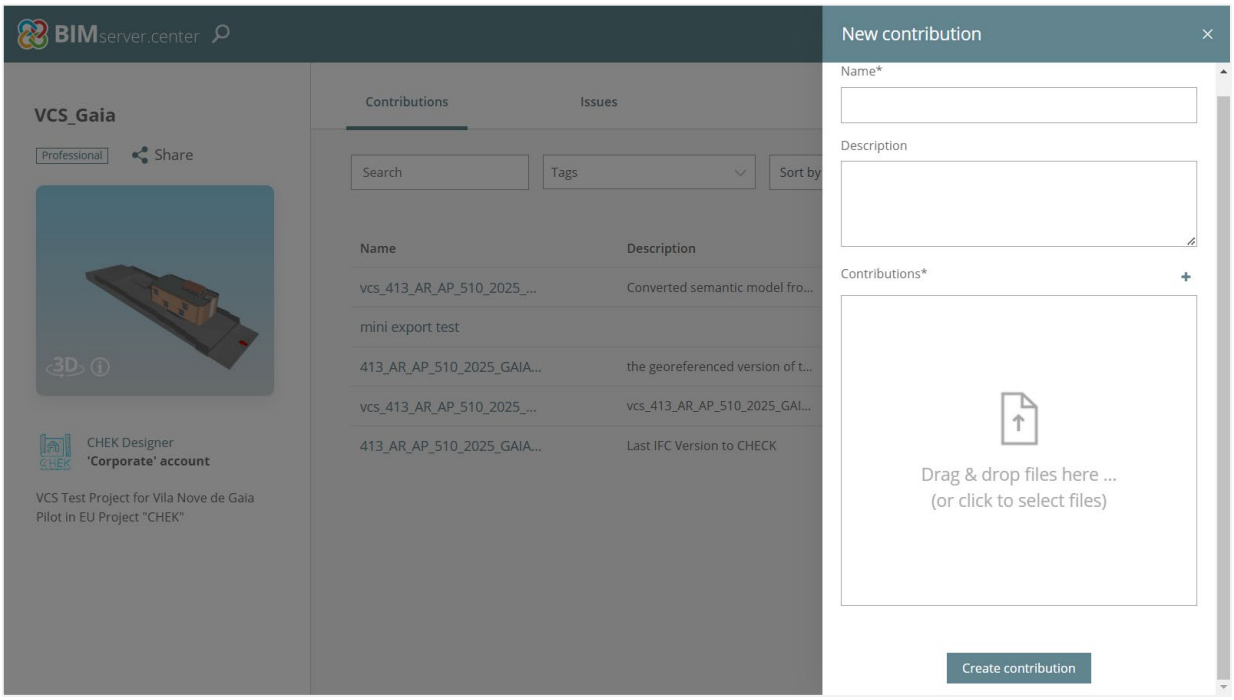

Figure 11: Contribution upload interface for "Gaia DEMO"

The Issues functionality in BIMserver.center significantly improves collaboration and coordination among project members by providing a centralised space to manage and track project-related issues. All issues are stored in one place within the project, ensuring they are easily accessible to the entire team. They must include a title, description, priority, and be assigned to the specific user -associated to a contribution- ensuring clearness and accountability for identifying and resolving the issue (Figure 12). Issues are related to contribution and users can attach images to provide visual context, helping team members better understand and address the issue. Once an issue is created, it can be edited as needed, allowing users to update details as the project evolves. Additionally, each issue includes a built-in messaging feature, enabling team members to communicate directly within the issue itself, keeping all relevant discussions in one place. Furthermore, the Issues feature is fully compatible with the BIM Collaboration Format (BCF), allowing for integration with other BIM tools and ensuring that the information can be shared and managed across different platforms in a standardised way. This functionality improves transparency, communication, and overall efficiency in addressing project challenges.

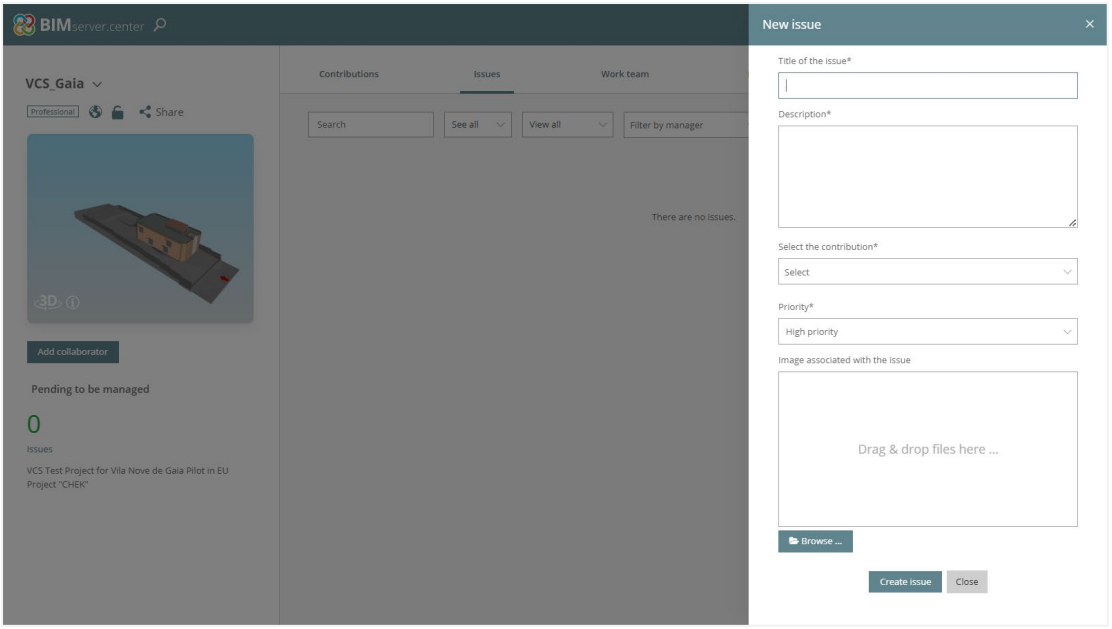

Figure 12: Issue creation interface

The "History" feature offers a complete record of the accounts and the project's activity, documenting all changes in the account and projects within it. This feature is available in two tabs; one general tab inside the account, tracking general activity of the account, this feature is also available at project level tracking changes in contributions and project management actions. This history feature ensures that every update, modification, or interaction within the account and the project is registered, providing a thorough audit trail that allows for easy tracking of progress and accountability (Figure 13).

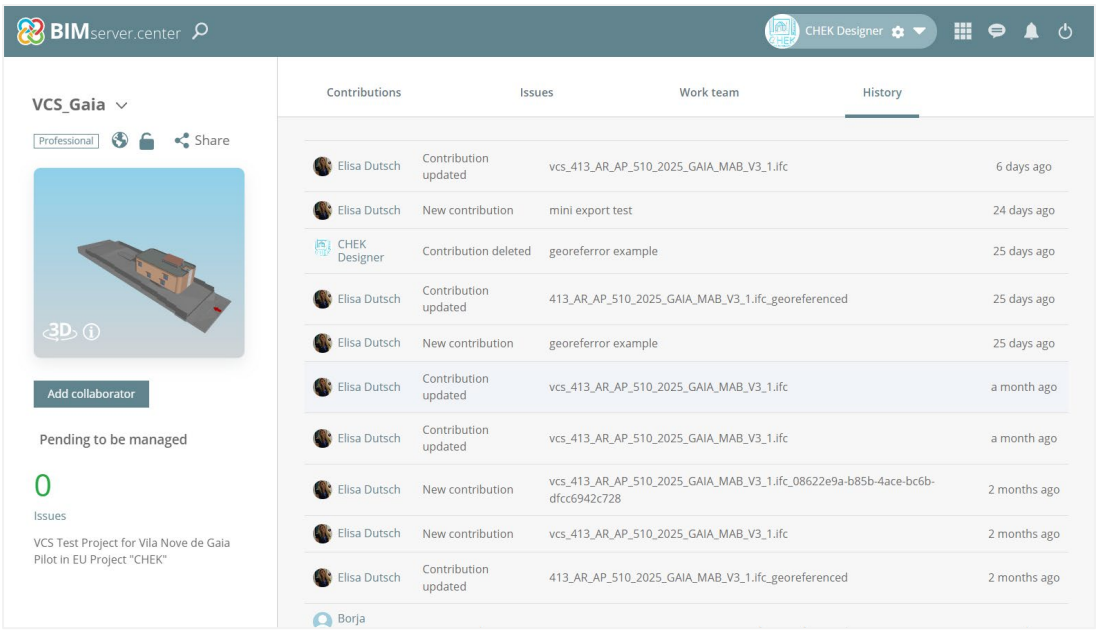

Figure 13: Project history for "Gaia DEMO"

The Messages feature was added as a functionality meant to promote communication between users and team members, allowing them to chat in real-time through the platform. This functionality helps to optimise collaboration, enabling users to quickly address questions, share updates, or resolve problems without needing to switch to external communication tools, like emails or other messaging platforms. Messages are synchronised across devices, including the BIMserver.center app, ensuring that communication can take place anytime, anywhere, improving responsiveness and overall team coordination within the project (Figure 14).

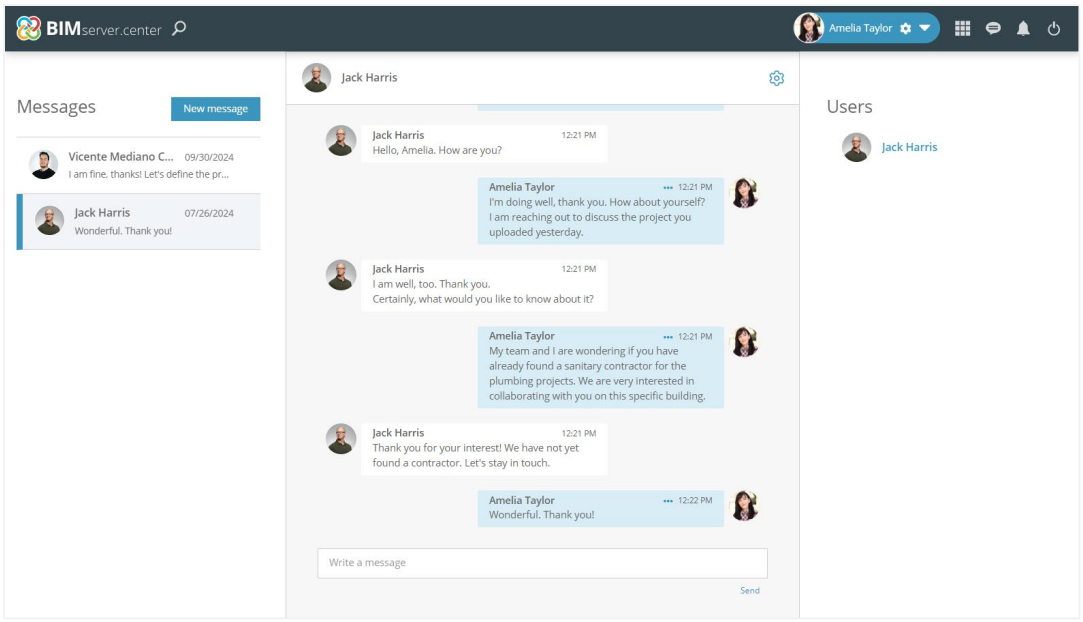

Figure 14: Messages feature interface

6. DBP platform features for municipalities

To ensure the digital building permit process within CHEK project a new branch of Teams had been developed, BIMserver.center Validation, this specialised account and features had been designed for municipalities -acting as regulatory entities- involved in the validation and approval of building permits, this account also has tailor-madecalls from the API REST to manage its workflow efficiently. This section of the document introduces the concept of "*Validation"* accounts, which are custom-made to the needs of these types of entities. It also provides an overview of the key features and functionalities available within these accounts, including tools for reviewing, validating, and approving project submissions. Additionally, this section explores how validation accounts integrate with "*Corporate"* accounts, allowing for an efficient process for regulatory review and collaboration between designers and municipalities.

6.1 Introduction to validation accounts

Validation accounts in the DBP platform were developed as part of the CHEK project to specifically address the needs of municipalities and other regulatory bodies responsible for emitting building permits. These accounts are designed to serve as a central hub for the validation process, providing the necessary tools for reviewing and approving building designs submitted by designers. Validation accounts are distinct from other types of accounts, as they are focused solely on regulatory validation, ensuring that projects meet all applicable standards and regulations before approval is granted.

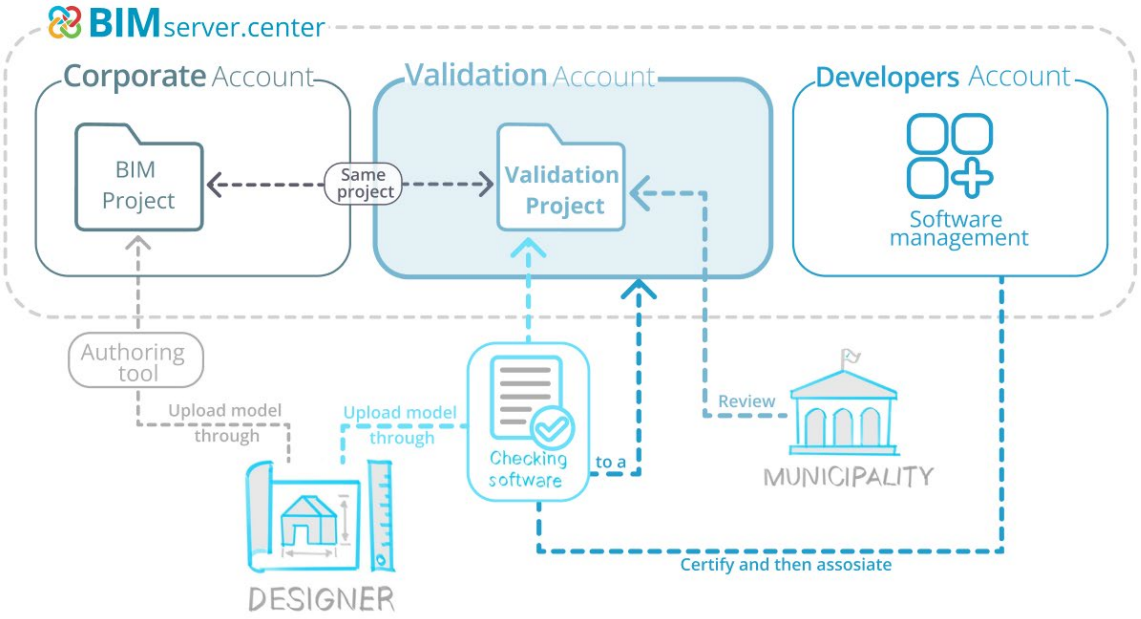

Figure 15: Validation accounts workflow

In the DBP platform, validation accounts collaborate with developer accounts and certified checking software to automate compliance checks. Developers create and certify this software, which designers use to test their projects

for regulatory compliance. Once the project is deemed compliant, it is submitted through the checking software to the validation account hosted in the DBP platform for final review and approval by Municipalities (Figure 15).

As mentioned above, validation accounts rely on specialised checking software. These types of software perform automated compliance checks based on the rules and standards embedded in the project's design. An example of one of these software interface, Verify 3D, can be seen in Figure 16.

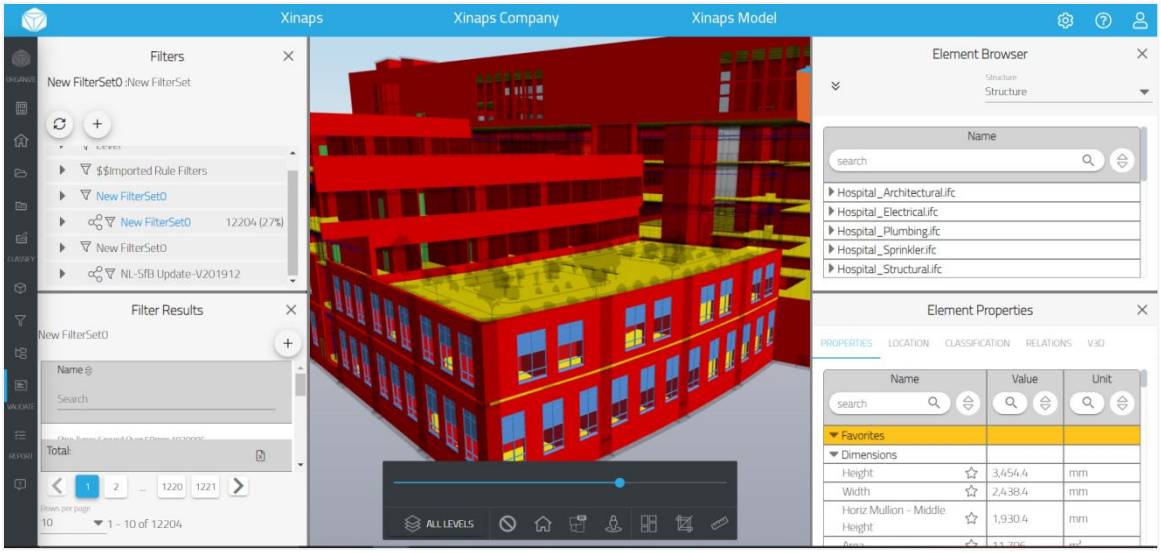

Figure 16: Verify 3D checking software

Before a project can be submitted to a validation account, the checking software must be certified as viable validation software by the platform and a specific municipality through a Developer account, ensuring that it can **conduct** the necessary regulatory checks and have compatibility with the DBP platform. Then, the software needs to be associated to a validation account for designers to upload the projects to the validation accounts (see section 6 for further detail).

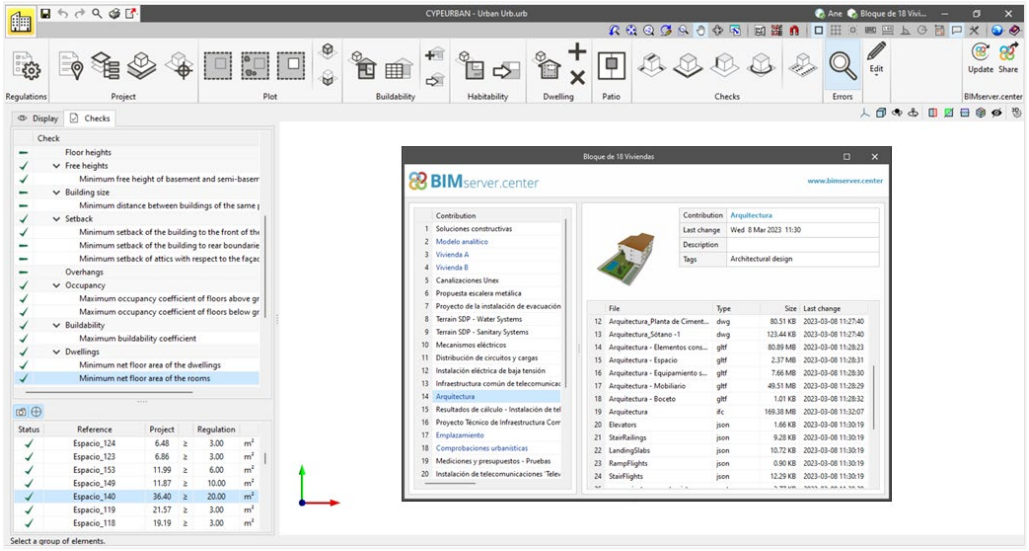

Figure 17: CYPEUrban connection with the DBP platform

Afterwards, once the designers have estimated that their project is fully compliant with the applicable rules and is ready for municipal review, a submitted contribution is created in the Municipalities validation account through the approved checking software, triggering the review process. Examples of some of this software connection with the DBP platform interfaces are shown in Figure 17 and Figure 18.

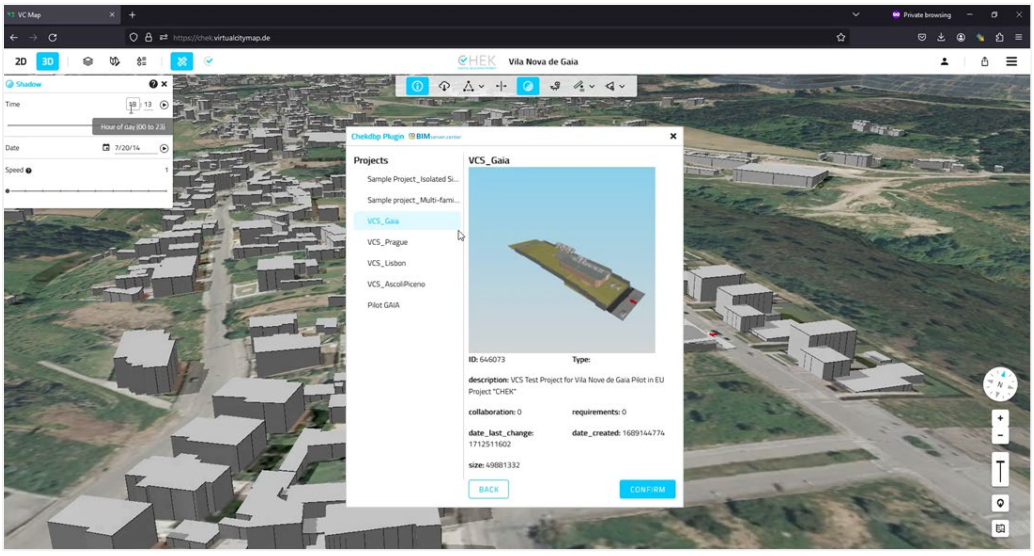

Figure 18: VC Map CHEK connection with the DBP platform

Finally, once the validation projects are uploaded, Municipalities can review them through Validation accounts and use specific features and functionalities.

6.2 Features and functionalities

Validation accounts are equipped with a range of features designed to facilitate the review and approval of building projects. One of the primary functionalities is the ability to manage users and permissions within the validation account. There are three main types of users in validation accounts, each with specific roles and access levels.

Administrators and Project Managers in Validation accounts have full control over both user and project management. Regarding **user management**, they are allowed to add new users to the account (see Figure 19), which can be reviewers or other administrators; depending on the granted permissions at the moment the invitation is sent. Modifications to their permissions may be done at any time afterwards.

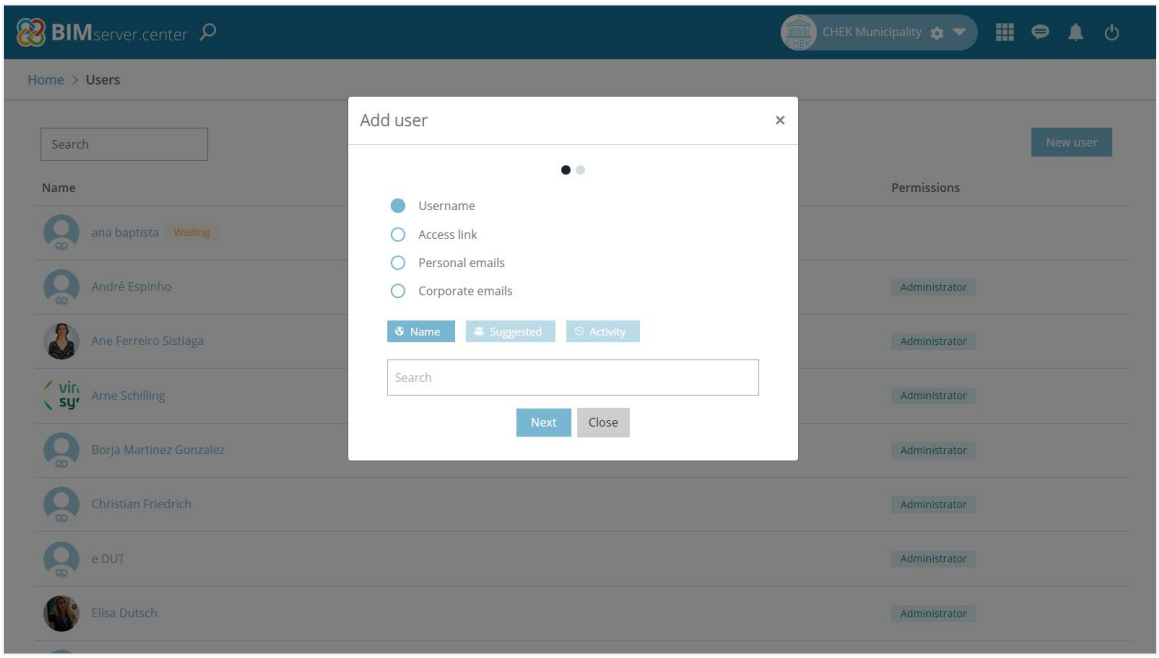

Figure 19: Validation account new user configuration

Administrators are also responsible for assigning reviewers to specific projects, as seen in Figure 20 and Figure 21, ensuring that the appropriate professionals are tasked with reviewing each aspect of the project, assessing compliance in different regulatory disciplines. More than one reviewer can be assigned to the same project. This was a specific request by the municipalities after testing the platform. The platform also allows to filter projects by reviewer which was another request after the testing.

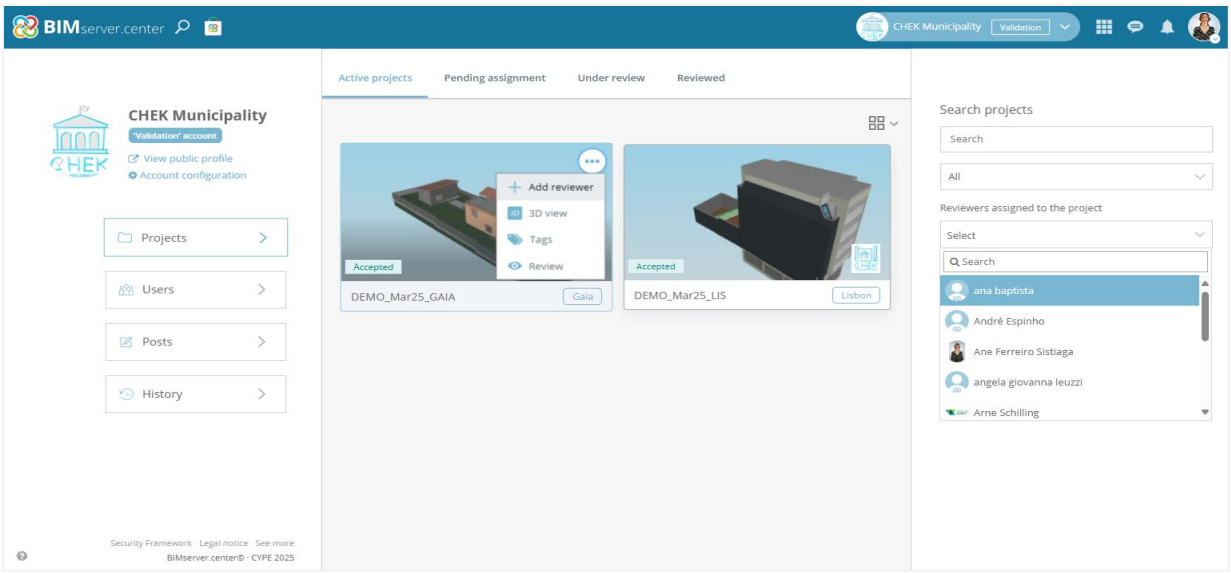

Figure 20: Validation account reviewer addition "CHEK Municipality"

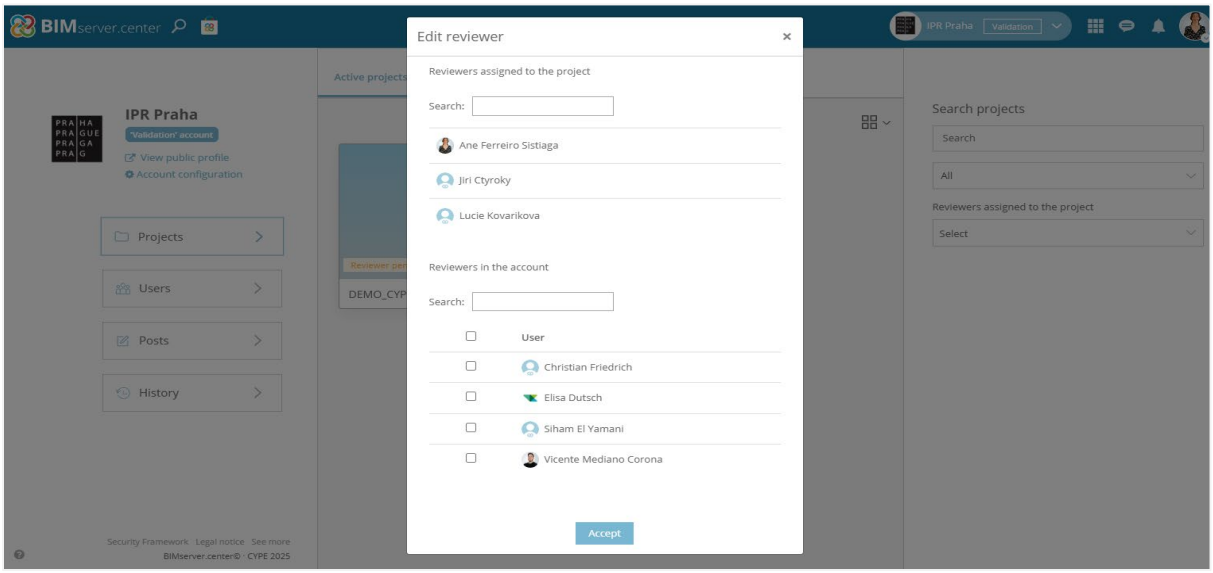

Figure 21: Validation account reviewer selection for "IPR Praha"

Projects hosted in validation accounts are assigned a **"revision state"** that evolves as the review process progresses, as seen in Figure 22. A project will initially be in a "Reviewer to be assigned" state, indicating that a reviewer has yet to be assigned by an administrator. Once a reviewer has been assigned, the project moves to "Pending review" signifying that it is currently under review. Following the review process, the project will either be marked as "Accepted" or "Rejected," depending on whether it meets the required regulations. This state-based workflow ensures transparency and enables all stakeholders to track the progress of a project through the validation process. Within the validation accounts project menu, users may search projects by name or may filter them according to their revision state.

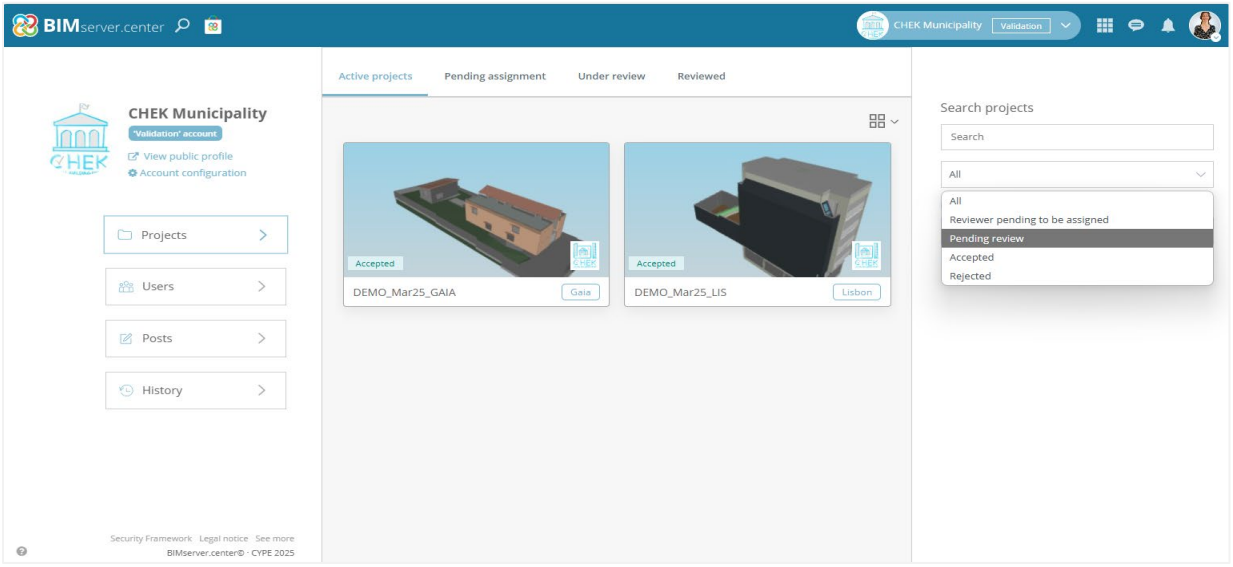

Figure 22: Validation projects' revision states

On the other hand, reviewers, which are regular user members of the validation account (this, meaning they have no advanced permissions), are in charge of reviewing and approving projects. Once they are assigned to a specific project, they can access the Review tool.

The projects menu contains five main features for its review: project contributions, where documents can be viewed and accessed (ifc, pdf, gltf, json...), issues, where technicians can communicate issues to the designers; review tab, where the list of rules is provided together with the limit values for its compliance; history, to follow up the changes in the project; and the 3D viewer, where checks can be seen in the 3D model.

The first critical aspect of validation accounts is the ability to **manage contributions** within a project, as seen in Figure 23. Each contribution may encompass different regulatory disciplines, such as urban planning, accessibility, and energy efficiency, among others. Different reviewers, each with their own expertise in these specific areas, can be assigned to validate the respective contributions. This flexibility allows validation accounts to handle complex, multi-disciplinary projects in an efficient and organised manner. Reviewers have the ability to access all project contributions and documents associated with the disciplines they are reviewing, ensuring that they have all the information they need to make their evaluation.

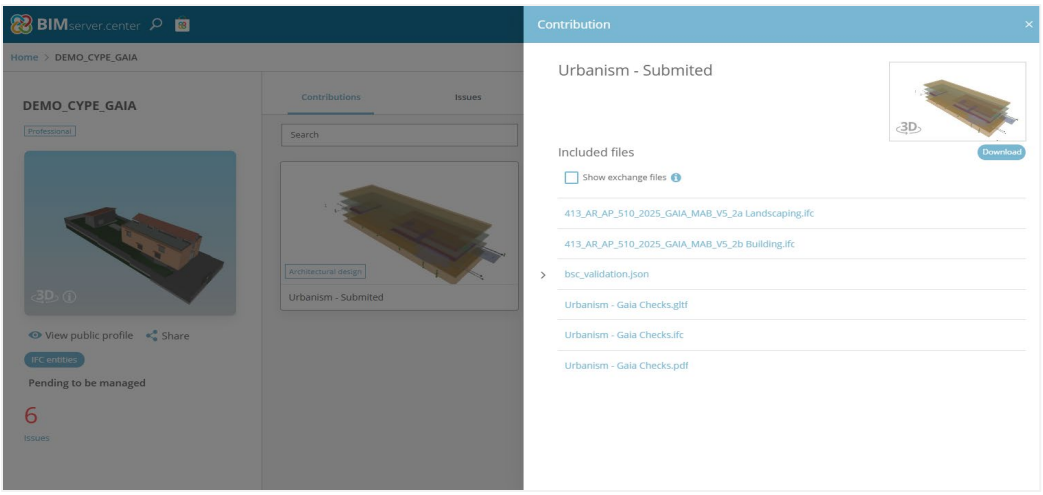

Figure 23: Validation account contribution management

In validation accounts, the **Issues functionality** plays a critical role in managing and resolving compliance-related concerns during the project review process. Once a project is submitted for validation, regulatory reviewers can create and assign issues to highlight specific aspects of the design.

Each issue is centrally logged within the project, ensuring that all parties can track its status (Figure 24). Reviewers can create new issues, with their respective descriptions, attach relevant images, assign responsibility for resolving the issue, and give them a priority, as seen in Figure 25. They can additionally communicate directly with the designers via the integrated messaging system within the issue itself or though the DBP platform's messaging system. This allows for efficient collaboration and ensures that issues are addressed systematically before a final decision on the project is made. Additionally, the Issues feature in Validation accounts supports the BIM Collaboration Format (BCF), ensuring that issues can be easily exchanged and managed across different BIM tools and platforms, further streamlining the resolution process.

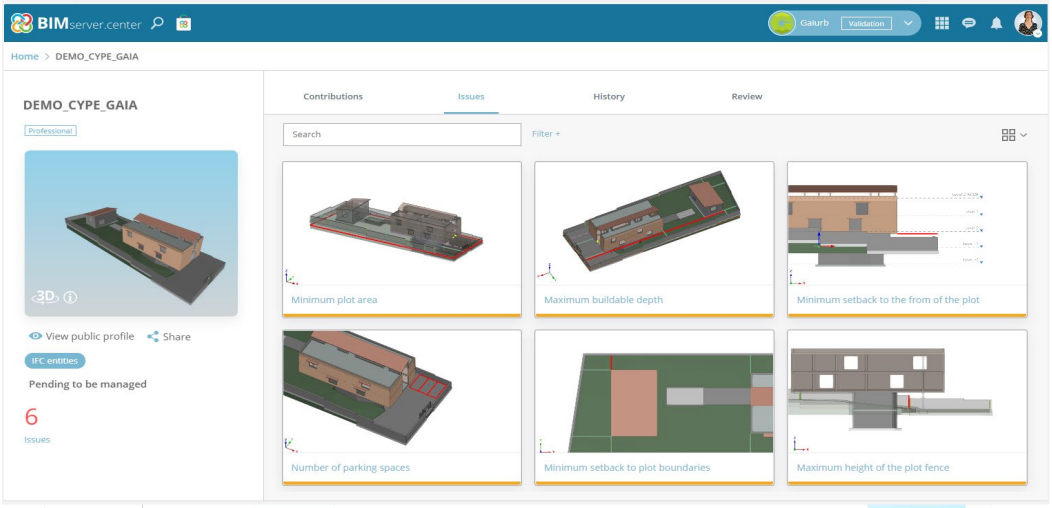

Figure 24: Validation account issue management for "Gaia DEMO"

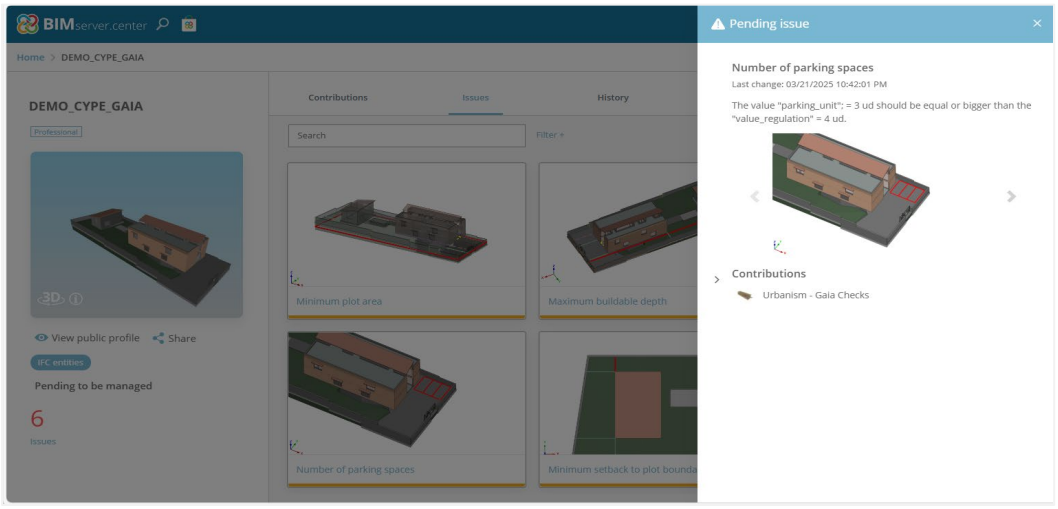

Figure 25: Validation account issue review for "Gaia DEMO"

The "history" tab allows tracking the actions and changes in the project, main actions are project submission, changes in the version of the files (changed, added, and deleted), reviewers assigned to a project, issues tracking, accept or reject of a project.

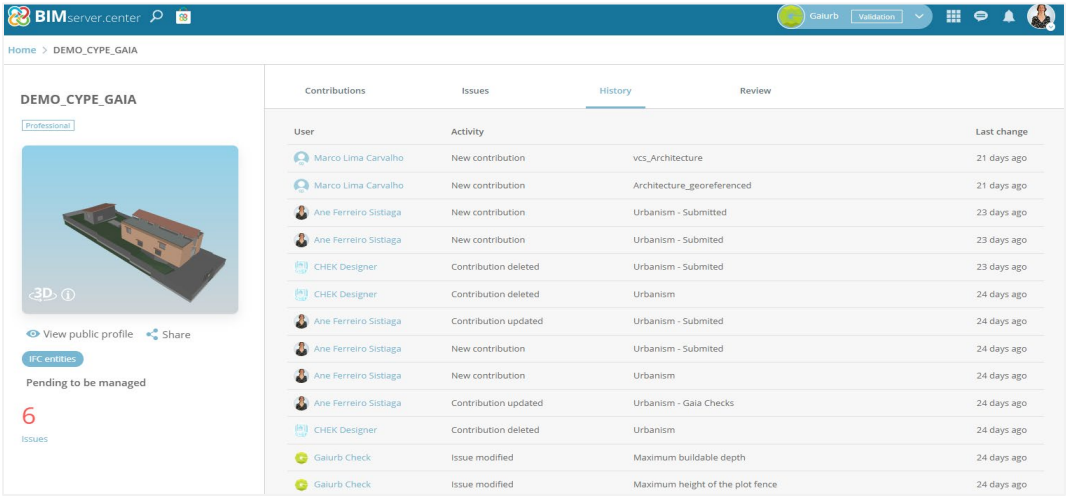

Figure 26: Validation account history tracking for "Gaia DEMO"

The **review Tab** contains all the information from the checks performed in the checking tools connected to the validation accounts. The review tab shows results of the checks with the limit value of the project and the limit value for the regulation. The check review tab can show comments written by the designer at the time of the justification of the check. At this moment the information between the checking tools and BIMserver.center Validation is exchanged in a JSON file format described in section 6.

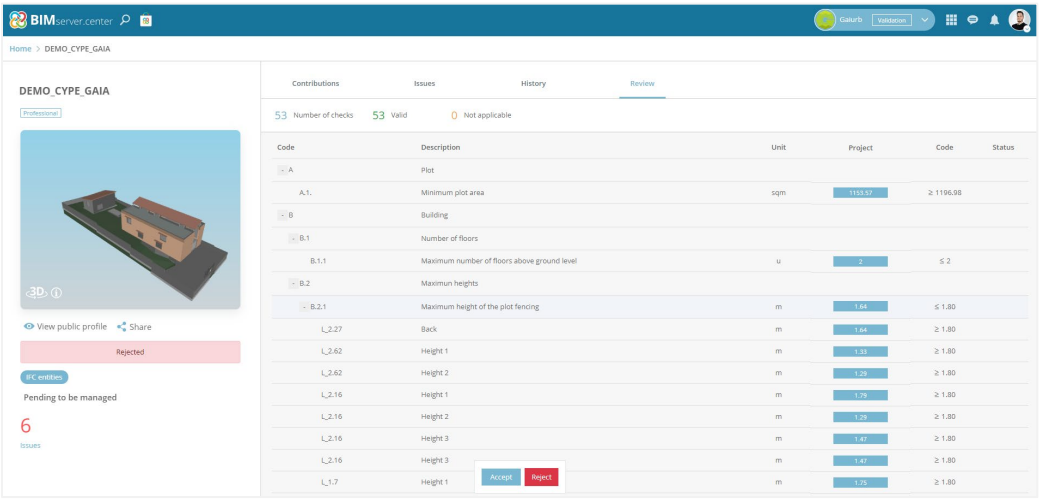

Figure 27: Validation account reviewers tab for "Gaia DEMO"

7. DBP platform features for Software Developers

Software developers play a crucial role in extending the capabilities of the DBP platform by creating and integrating tools that enhance the digital building permit process. Developer accounts provide access to the platform's core functionalities, enabling software developers to create, test, and certify external software that interacts with the platform via the Open API. This section outlines the features of developer accounts and their importance in connecting the DBP platform with external tools and highlights how they support the validation process through their integration with validation accounts.

7.1 Overview of developer accounts

Developer accounts offer a wide range of features to support software development and integration with the DBP platform. Upon registration, developers are provided with a BIMserver.center ID and Secret ID to authenticate their applications and access the platform's API REST. As illustrated in Figure 28, developer accounts enable software developers to access the API documentation and the management, visibility, and authorisation of their applications. These accounts are essential for connecting new software solutions to the platform, allowing developers to add, edit, and manage applications through a dedicated interface.

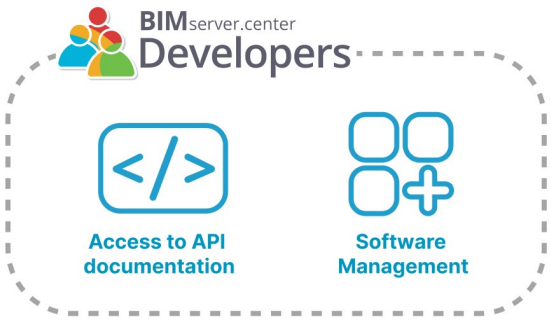

Figure 28: Developers account main features

Developers are also provided with specific documentation regarding the software development process for their integration with the DBP platform. The documentation available to developers includes complements, manuals, and other resources (shown in Figure 29). Under complements, developers have access to tools like Swagger UI (https://apis.bimserver.center/swagger/swagger.html), an open-source interface that allows users to visualise and interact with the API, simplifying the development process by enabling real-time testing and understanding of API functionalities. Manuals include the API REST documentation, which provides detailed guidelines on how to integrate external software with the DBP platform, outlining key components like projects, contributions, users, and applications. Lastly, other resources feature the Corporate Identity documentation, which contains guidelines for correctly applying the BIMserver.center brand in various software or services, ensuring consistent visual and communication standards. This interactive documentation makes it easier for developers to integrate their tools with the DBP platform, ensuring their software is fully compatible with the system's workflows.

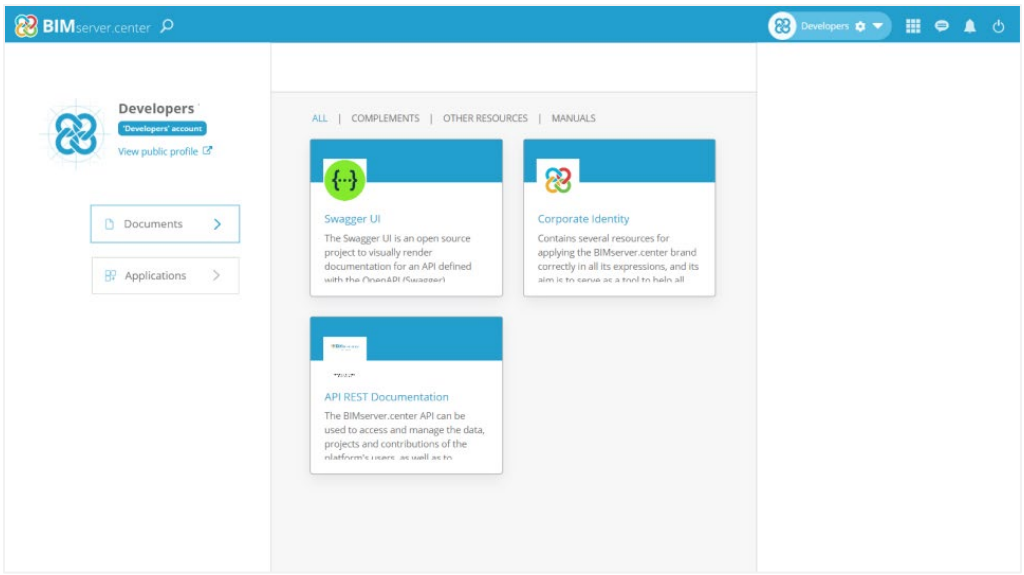

Figure 29: Developers account Documentation

Through their accounts, developers can manage applications in the BIMserver.center Store, control visibility, and associate their software with validation accounts (see Figure 30).

This association ensures that municipalities and regulatory bodies can use certified software tools to check project compliance during the review process. By facilitating the integration of tools for automated compliance checks, developer accounts play a vital role in expanding the platform's functionality and ensuring seamless collaboration between designers, municipalities, and developers.

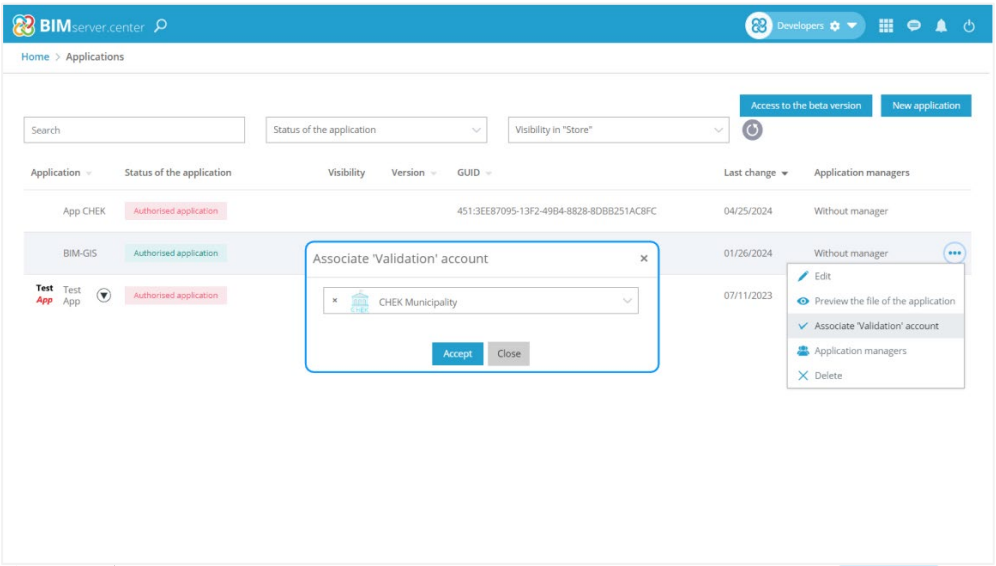

Figure 30: Validation account software association

7.2 Integration of external software with the platform.

The Open API allows external software to integrate with the DBP platform, enabling communication between any tool and service in the building permit process. Through this API, developers can connect their applications to manage projects, contributions, and compliance checks. These integrations are essential for automating validation and optimising workflows between developers, designers, and municipalities. The association of software with validation accounts, as shown in Figure 30, ensures that certified tools can be used in regulatory processes. To connect with BIMserver.center API REST is mandatory for developers to create a "Developers account" and an "Application" from which they will obtain the mandatory credentials, ID and Secret ID. Further details on the Open API can be found in Deliverable 4.4.

7.3 Sample specification of the communication JSON.

To communicate the results of the checking to the platform a JSON must be written down with the results. This JSON is a basic proposal for communicating results and further investigations after check project must be carried out in terms of communication of results. This was a proposed protocol that was set at the beginning of the project before the appearance of IDS. Currently other protocols are being studied for future implementations and long-term sustainability of the project. CYPE will continue working after the finalization of this task and project to fulfil requirements from municipalities in terms of standardized exchange of information between tools.


```
"concepts" : [
    {
        "code" : "A",
        "text" : "Plot",
         "not_excluded" : true,
         "subconcepts" : [
            {
                "code" : "A.1.",
                "text" : "Minimum plot area",
                "not_excluded" : true,
                  "project_value" : "1153.57",
                  "demanded" : "≥ 1196.98",
                "units" : "sqm",
                "status" : "ok"
            }
        ]
    }
  ]
}
```


8. Testing Environment Setup.

In preparation for the testing phase of the CHEK Digital Building Permit (DBP) platform, a structured and collaborative approach was adopted to ensure that all stakeholders, including designers, municipalities, and software developers, had access to fully functional accounts and environments suitable for testing the platform's core features.

To support early testing activities, two central accounts were set up within the BIMserver.center platform: CHEK Designers (Corporate account), CHEK Municipality (Validation account)

These accounts have been made accessible to all CHEK consortium partners and have served as the primary environment for internal testing by software developers, designers, and municipal representatives. They were used to simulate typical DBP workflows, including project submission, validation, issue tracking, and communication between stakeholders. To facilitate navigation and organization, the tagging functionality was implemented to label and categorize projects by municipality, testing scope, and final demonstration use. This allowed users to quickly locate relevant projects during platform evaluation.

After the initial testing and to prepare for the upcoming WP6 testing and validation activities, dedicated Validation accounts were created for the participating municipalities: Gaiurb, IPR Praha, Lisbon, Ascoli Piceno. The setup of these accounts was conducted during a live session at the CHEK meeting in Gaia, ensuring hands-on experience and immediate feedback from municipal users. This activity also functioned as a training opportunity for municipalities to become familiar with the account features, permission settings, reviewer assignment workflows, and platform navigation.

Individual municipality accounts will be used for final testing and demonstration phases, where municipalities will validate projects submitted by designers through connected checking tools. Each municipality will work within its own environment to test full DBP workflows. This two-tier preparation process ensures both a shared learning/testing space and municipality-specific environments for formal pilot actions, aligning with the broader goals of WP6 and supporting a smooth transition into the operational validation phase of the CHEK platform.

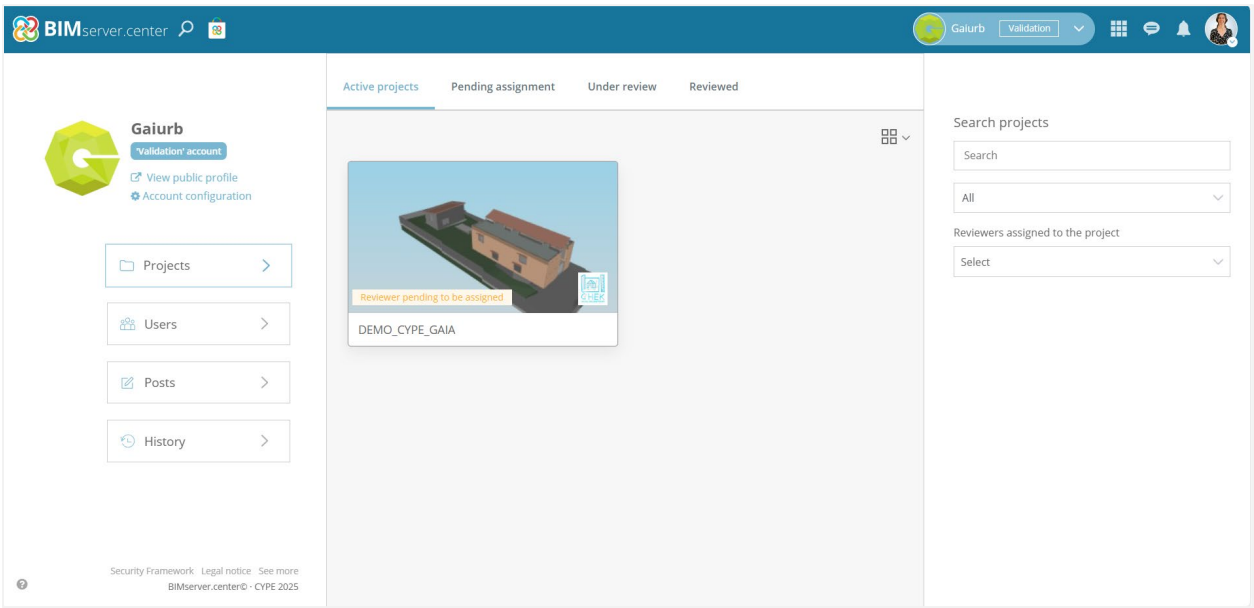

Figure 31: Validation account for "GAIURB"

9. Conclusions

This deliverable, focused on the development of the Digital Building Permit (DBP) platform, contributes significantly to the broader goals of the CHEK project, which aims to optimise and digitalise the building permit process for municipalities, designers, and other stakeholders. The premise sustaining this deliverable was that the implementation of a unified digital platform could improve collaboration, efficiency, and compliance throughout the building permit lifecycle. The outcomes presented in this document confirm the platform's ability to meet these goals by offering features such as Corporate accounts, Validation accounts, and integration with external tools through Developer accounts and the Open API.

Among the most important results is the success of Corporate accounts in facilitating collaboration among design teams. These accounts offer structured tools for project management, contribution tracking, and smooth communication, thereby promoting transparency and coordination in project development. On the other hand, the introduction of Validation accounts custom-made to regulatory bodies, particularly municipalities, has proven to be crucial in automating and simplifying the compliance review process. Validation accounts allow municipalities to manage submissions, assign reviewers, and track compliance using integrated checking interfaces, creating a more efficient workflow.

One of the limitations encountered during this phase of development is the reliance on third-party checking software and the need for continuous updates to ensure compatibility with evolving regulations. While the Open API offers flexibility for integrating new tools, further refinements and continuous support from software developers will be required to maintain the platform's effectiveness as regulatory standards evolve. Additionally, some stakeholders may require more extensive training to fully utilise the platform's advanced features, particularly within municipalities with limited experience in digital platforms.

The deliverable not only marks a cornerstone in the project but also lays the foundation for future phases of the CHEK initiative. The integration of developer accounts and Open API capabilities paves the way for ongoing innovations in tool development, ensuring that the platform can adapt to meet new challenges. Additionally, the features and feedback from this phase will directly inform further refinements, including improvements in user experience and system scalability, as the project continues. The foundations established in this deliverable will support the ongoing evolution of the platform, ensuring its relevance and utility in the long-term.

As part of the preparation for testing, shared CHEK Designer and Municipality accounts were created to enable all partners to explore and test the platform's features, using tags to organize projects by municipality and testing phase. Additionally, individual Validation accounts were set up for Gaiurb, IPR Praha, Lisbon, and Ascoli Piceno during a live session at the Gaia meeting, ensuring municipalities are equipped and trained for the upcoming testing phase under WP6.

In conclusion, Deliverable 4.3 successfully demonstrates that the DBP platform is a critical enabler for improving the efficiency and transparency of the building permit process. Its flexible structure, integration capabilities, and custom-made features for designers, municipalities, and developers position it as a vital component in the digital transformation of the permitting process. Future phases of the CHEK project will build on this platform, enhancing its functionalities and ensuring it continues to meet the evolving needs of the industry and its stakeholders.

10. References

10.1 List of Figures

10.2 List of Tables

10.3 List of used abbreviations

API	-	Application Programming Interface
BCF	-	BIM Collaboration Format
BIM	-	Building Information Modelling
CDE	-	Common Data Environment
D	-	Deliverable
DBP	-	Digital Building Permit
GIS	-	Geographic Information System
REST	-	Representational State Transfer
T	-	Task
UI	-	User Interface
WP	-	Work Package