BIM4REN

context-aware image acquisition

User Guidance

BIM4REN: Building Information Modelling based tools & technologies for fast and efficient RENovation of residential buildings, has received funding from the European Commission H2020 Programme under Grant Agreement No. 820773.

Table of Content

Introduction

This document showcases the functionality of the CAIA workflow. It was developed by members of the chair of Design Computation at the RWTH Aachen as a part of the BIM4Ren project. This workflow can be used to take pictures on site and locate them on top of a 2D plan. Later, the 2D plan can be superimposed with an IFC model, thereby connecting the process of image documentation to the BIM methodology. Furthermore, we can use the CAIA workflow with the Nobateks Renovation Manager to generate and locate tasks in the digital building and make them available on site. Construction site workers can then complete these tasks. In addition, a photo of the finished task can be taken on-site to prove its execution. The following pages serve as a step-by-step guide to familiarize users with the handling of the workflow.

Feel free to contact us (schulz@dc.rwth-aachen.de) if you have questions about the workflow or its applications.

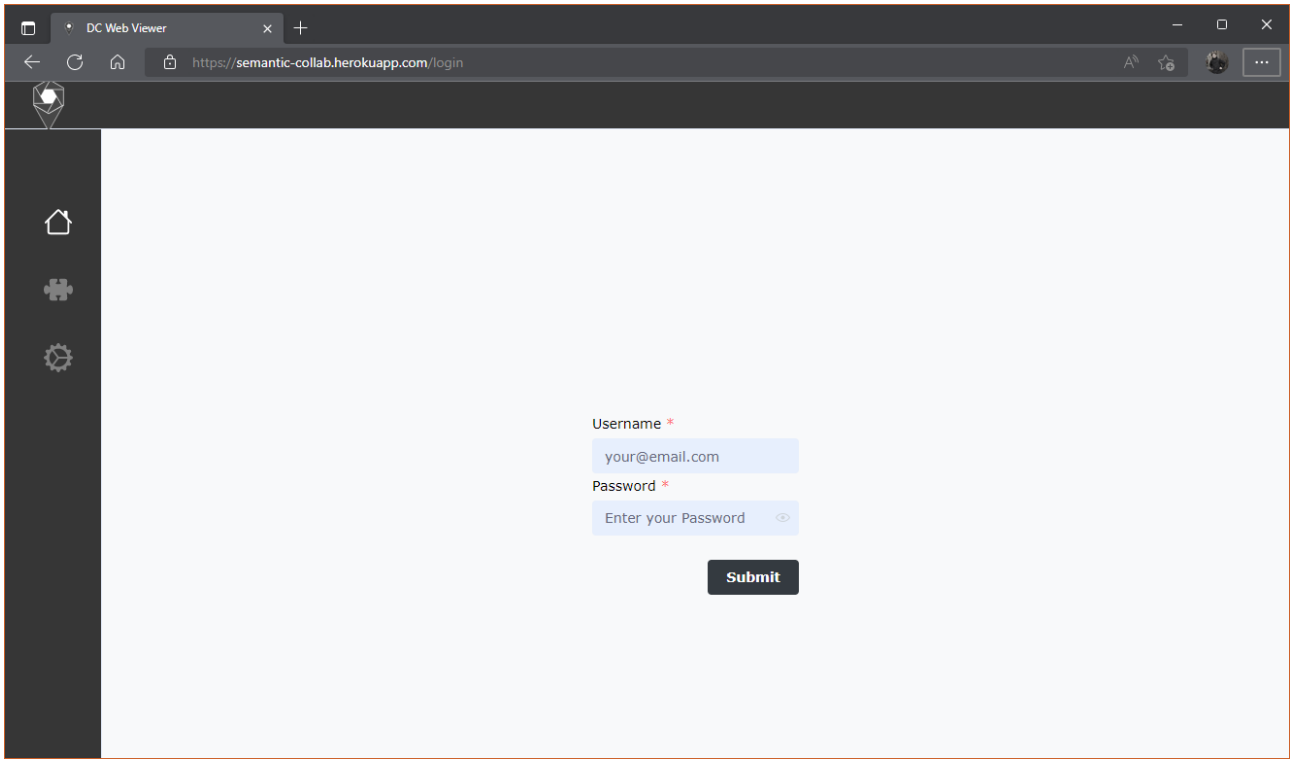
Important note:

The applications developed for this workflow are all prototypes intended to demonstrate the functionality of the workflow. They should not be compared to finished products and are therefore not free of bugs and errors.

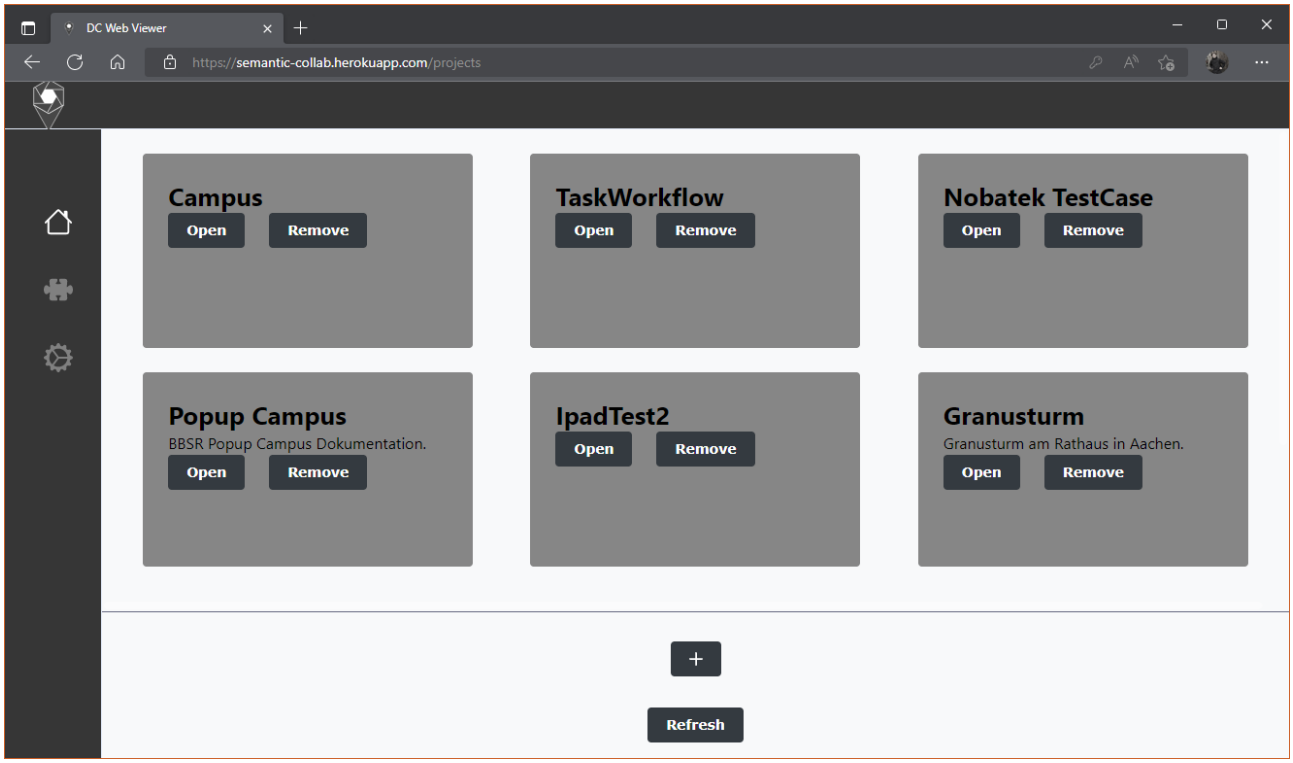
CAIA web application

The web application can be accessed via: https://semantic-collab.herokuapp.com/

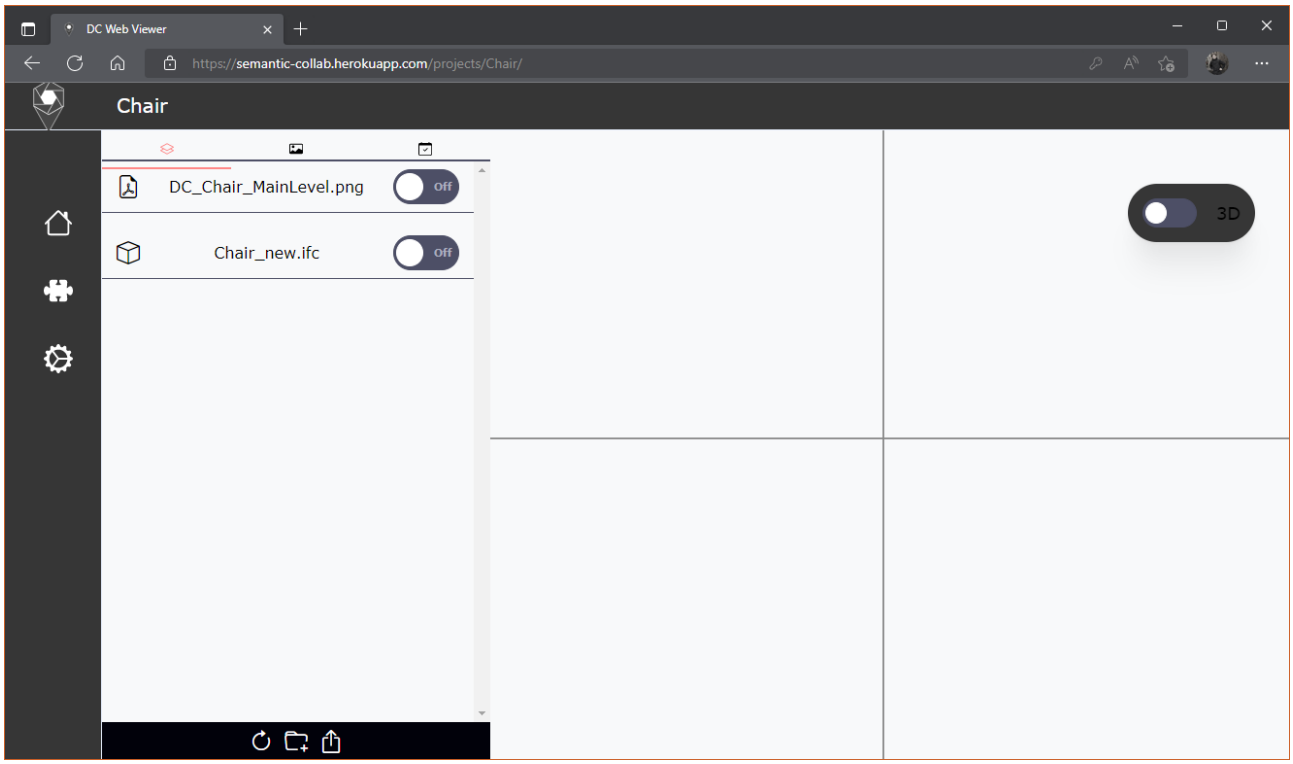
STEP 1 – Login to the application with the username and password that we provided.



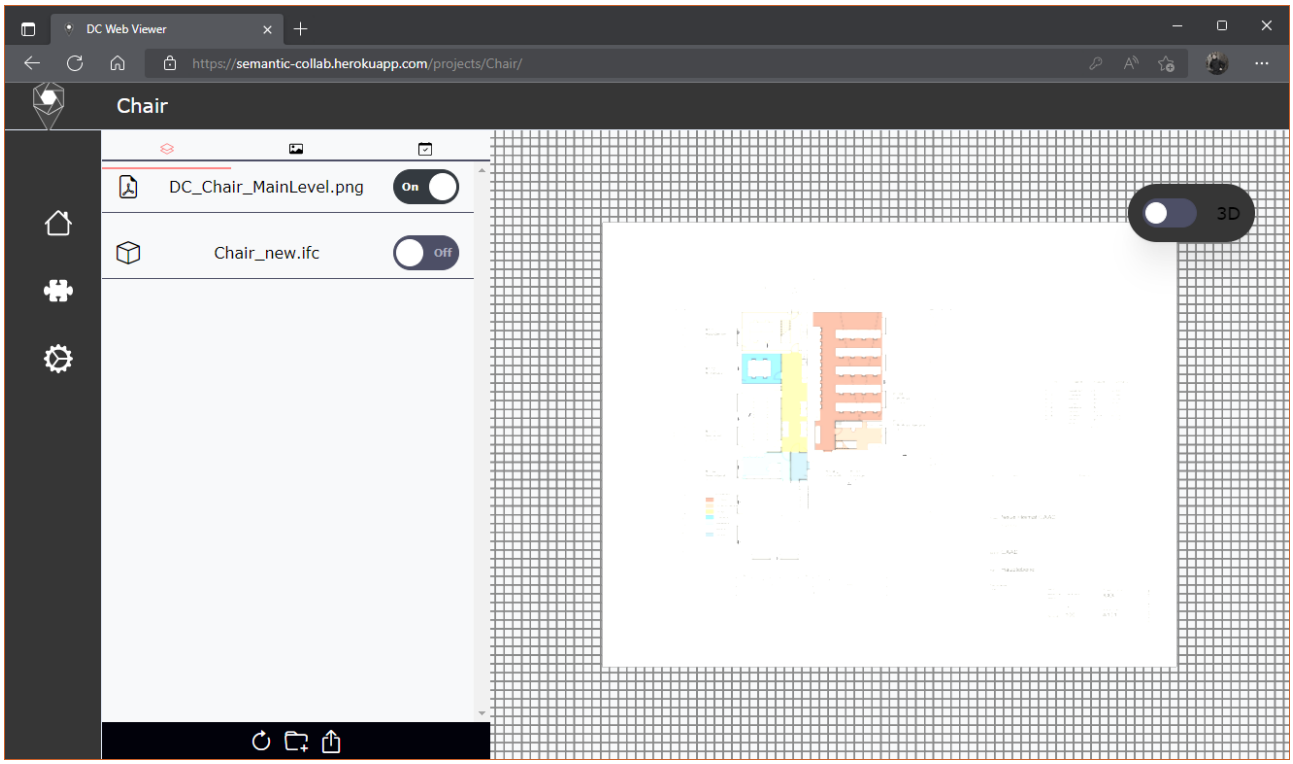
STEP 2 – Select a project from the list. You can also remove yourself from projects here by clicking « Remove ». Keep in mind that the project is not deleted by using this method! Just your access to it is revoked.



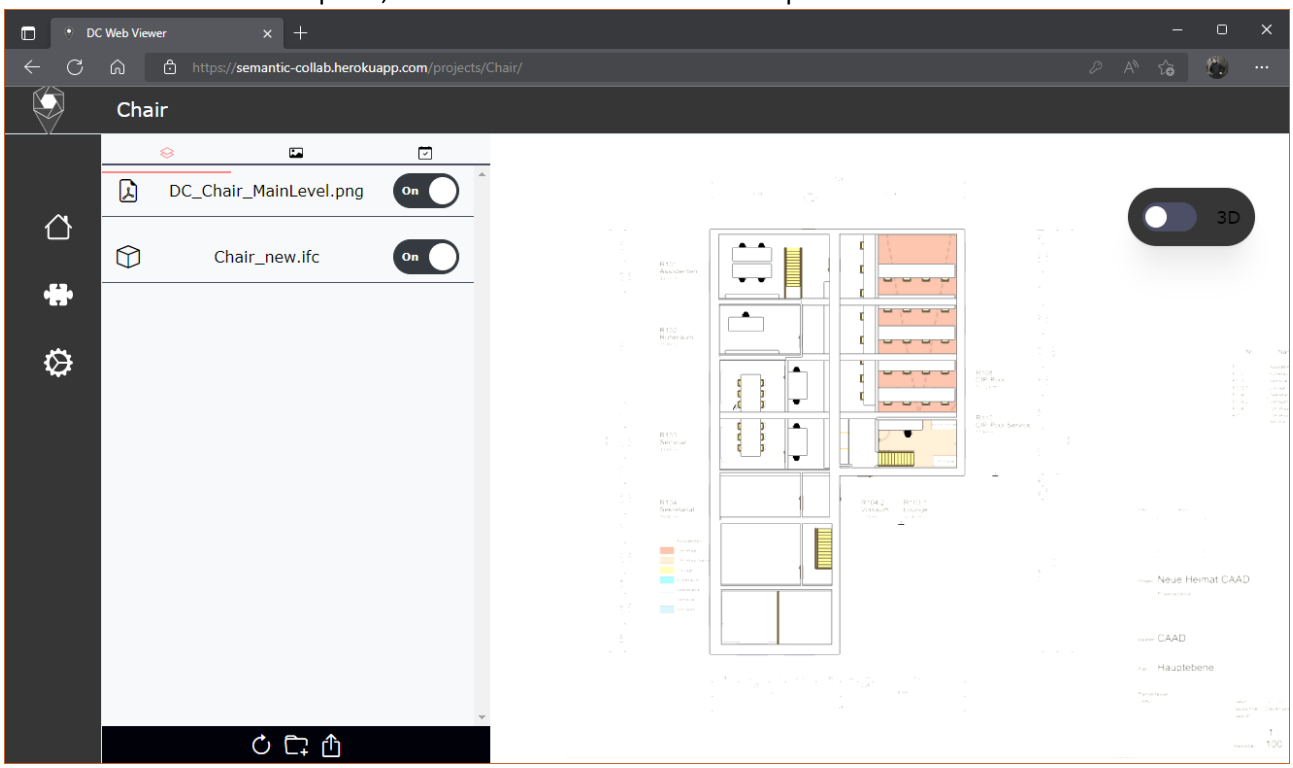
STEP 3 – Review current (spatial) documents in the project.



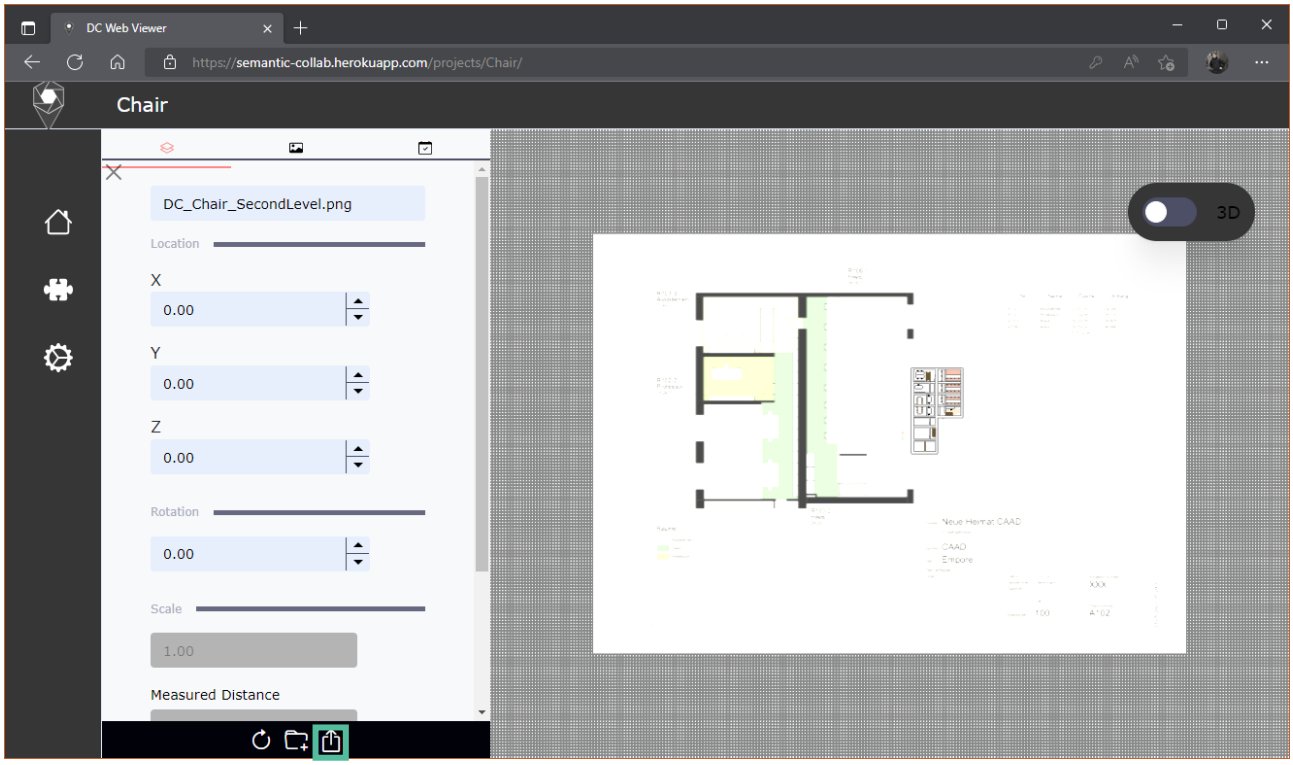
STEP 4 – By selecting one, it will be displayed in the viewport. In this example, we selected the 2D plan.



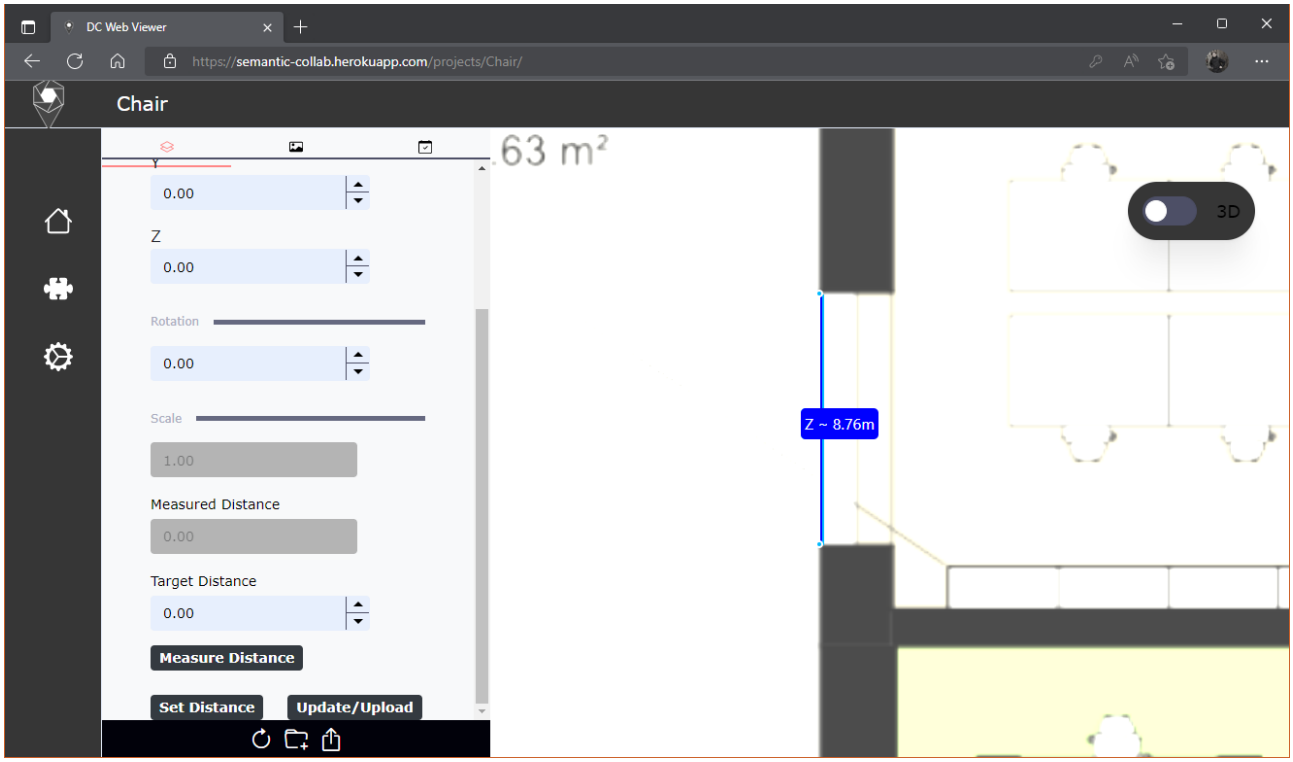
STEP 5 – In addition to 2D plans, we can show IFC files in the viewport.



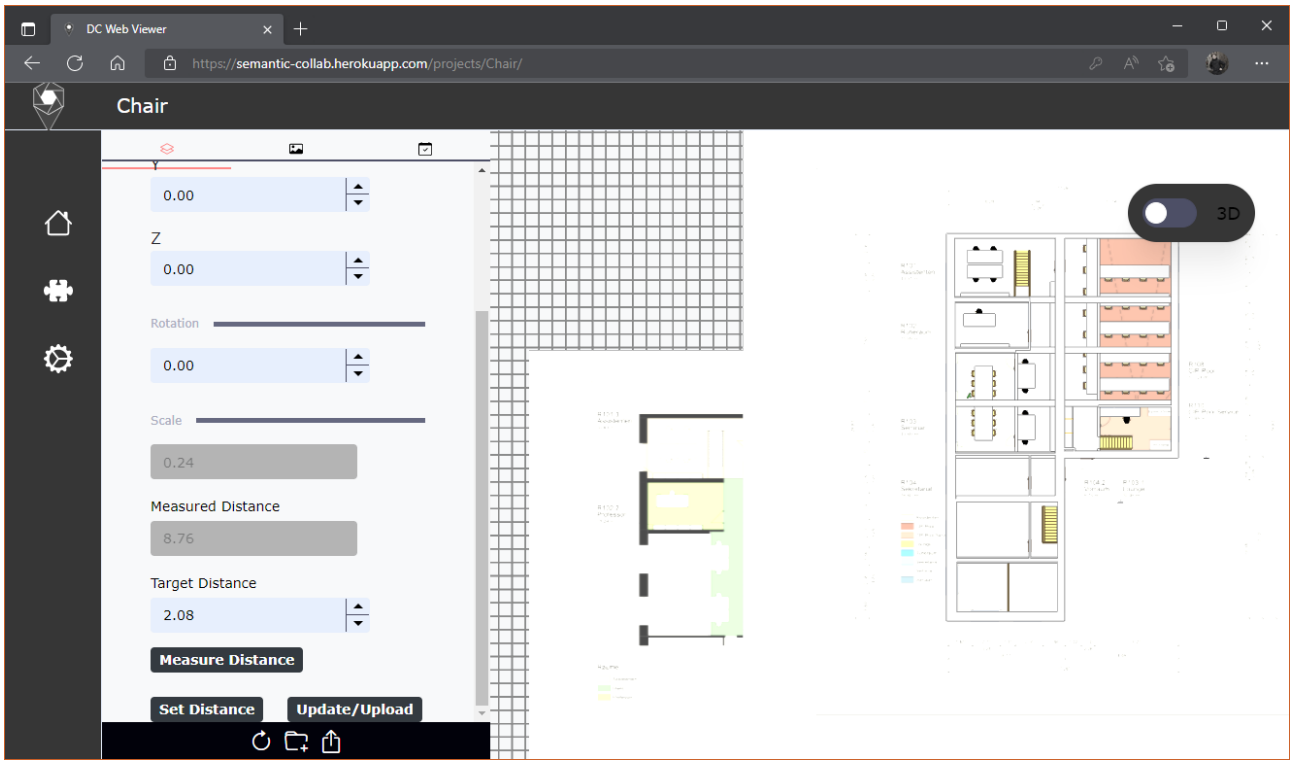
STEP 6 – By selecting the right icon in the documents list, you can add a new file to the documents. Only PNG- (PDF plans can easily be exported to PNG) and IFC files are supported. When importing a PNG, we must set up the file, so it is scaled and located correctly.



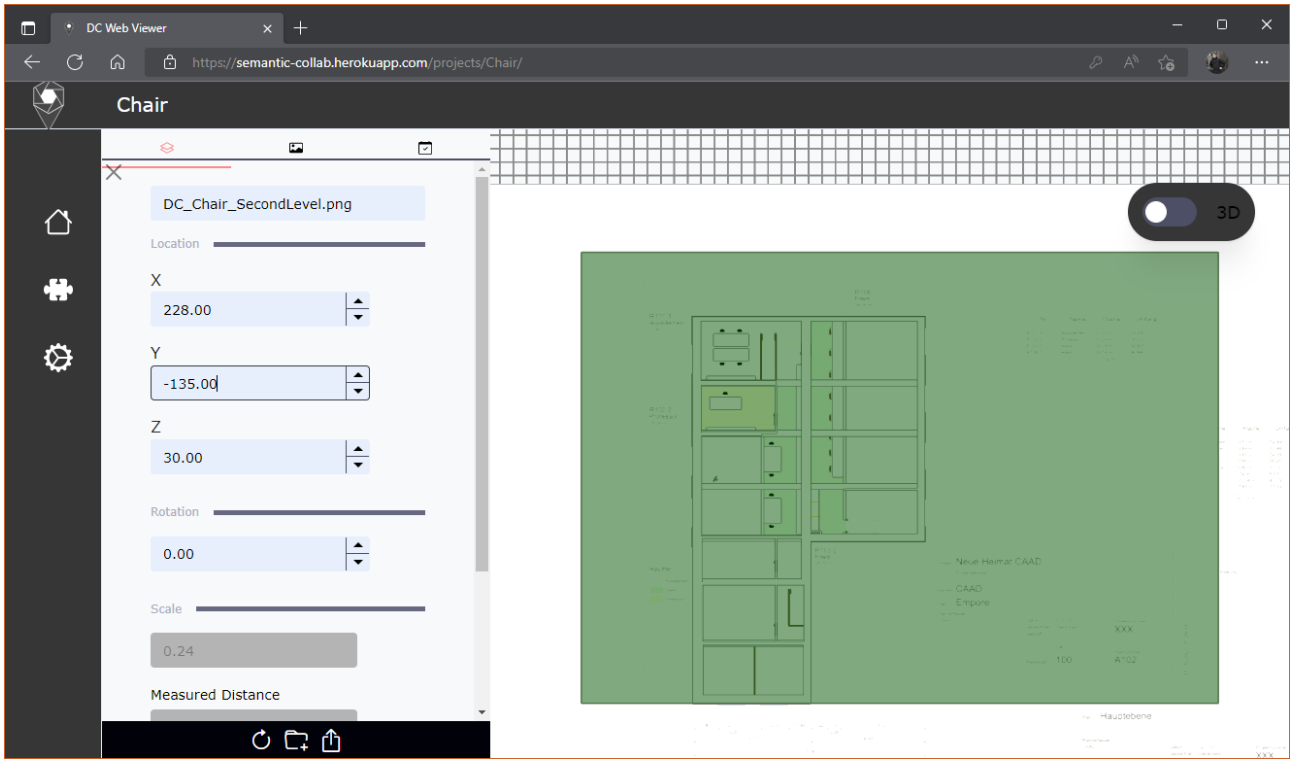
STEP 7 – Therefore, we first have to measure a known distance in the plan by using the “Measure Distance” button.



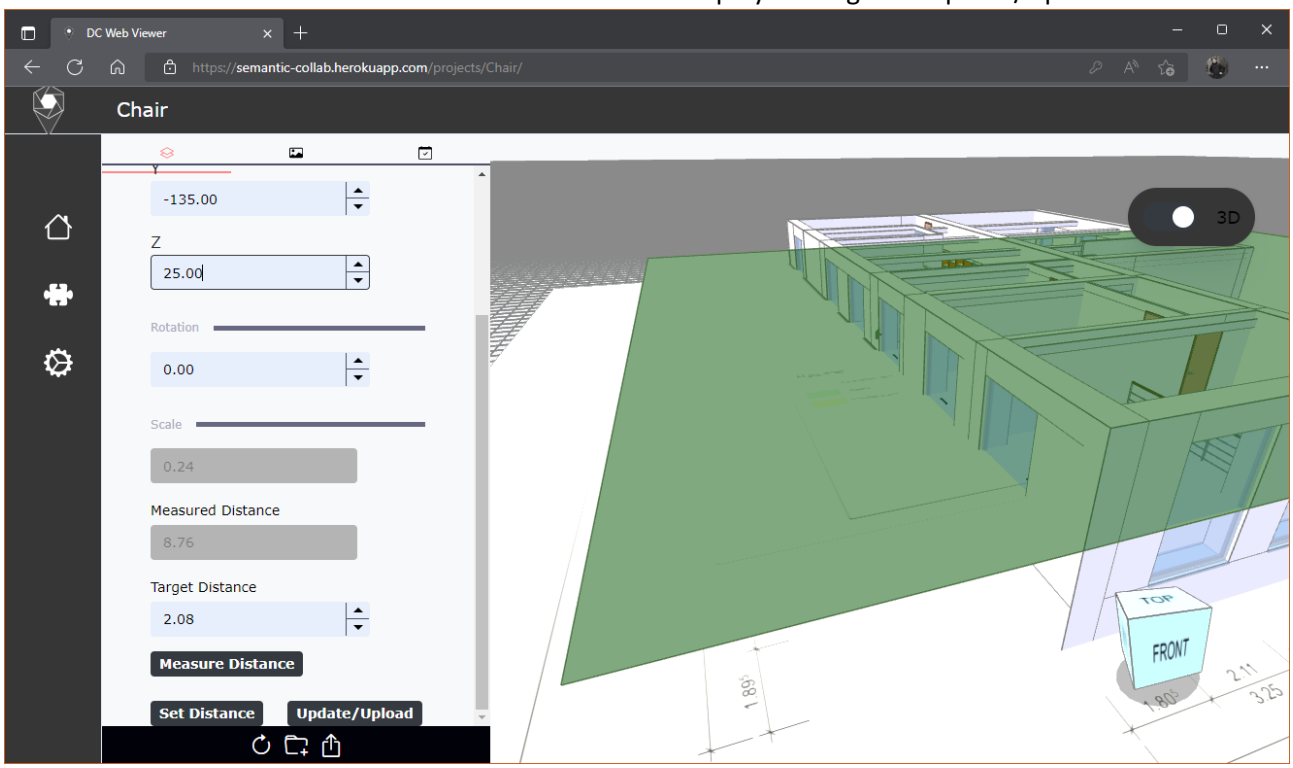
STEP 8 - In the next step, we have to enter the “Target Distance” – the actual length in the building. Confirm this step by clicking “Set Distance”.



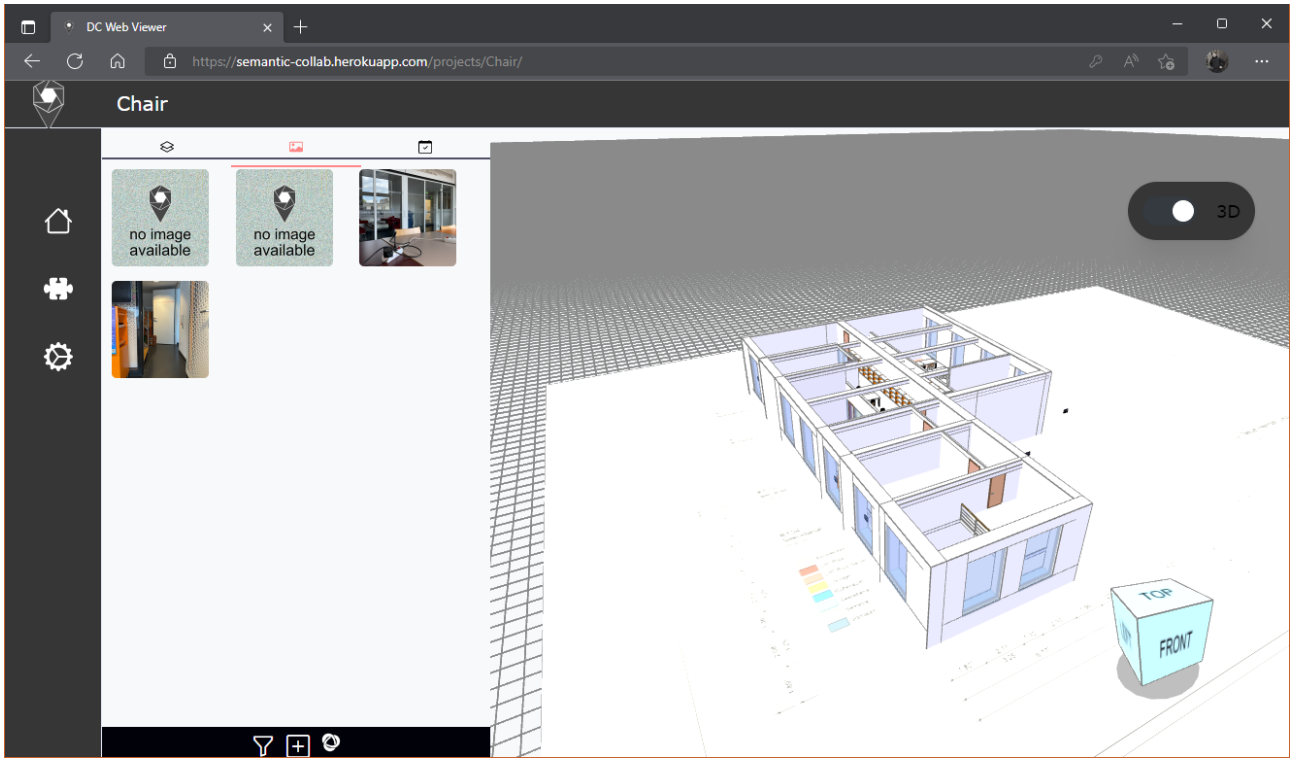
STEP 9 – In addition to scaling the plan, we can adjust its position. This is specifically important if an IFC representation of the buildings exists. Then we want to superimpose the plan with the model. Therefore we can change the plan's X, Y, and Z locations. If you forgot to set up the location at the moment of creation, you could still do this process later on.



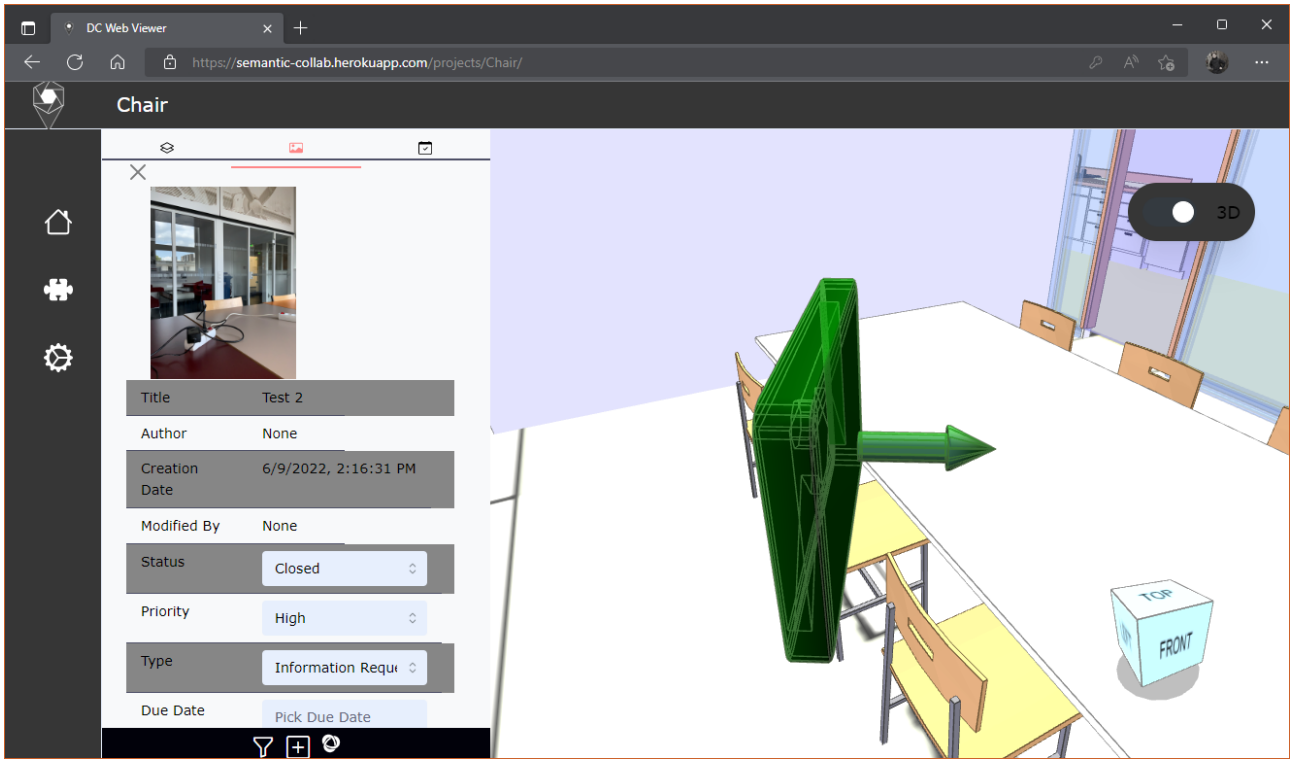
STEP 10 - You can review the superimposition by clicking the toggle button at the upper right corner and switch from the 2D mode to the 3D mode. Confirm the setup by clicking the "Update/Upload" Button.



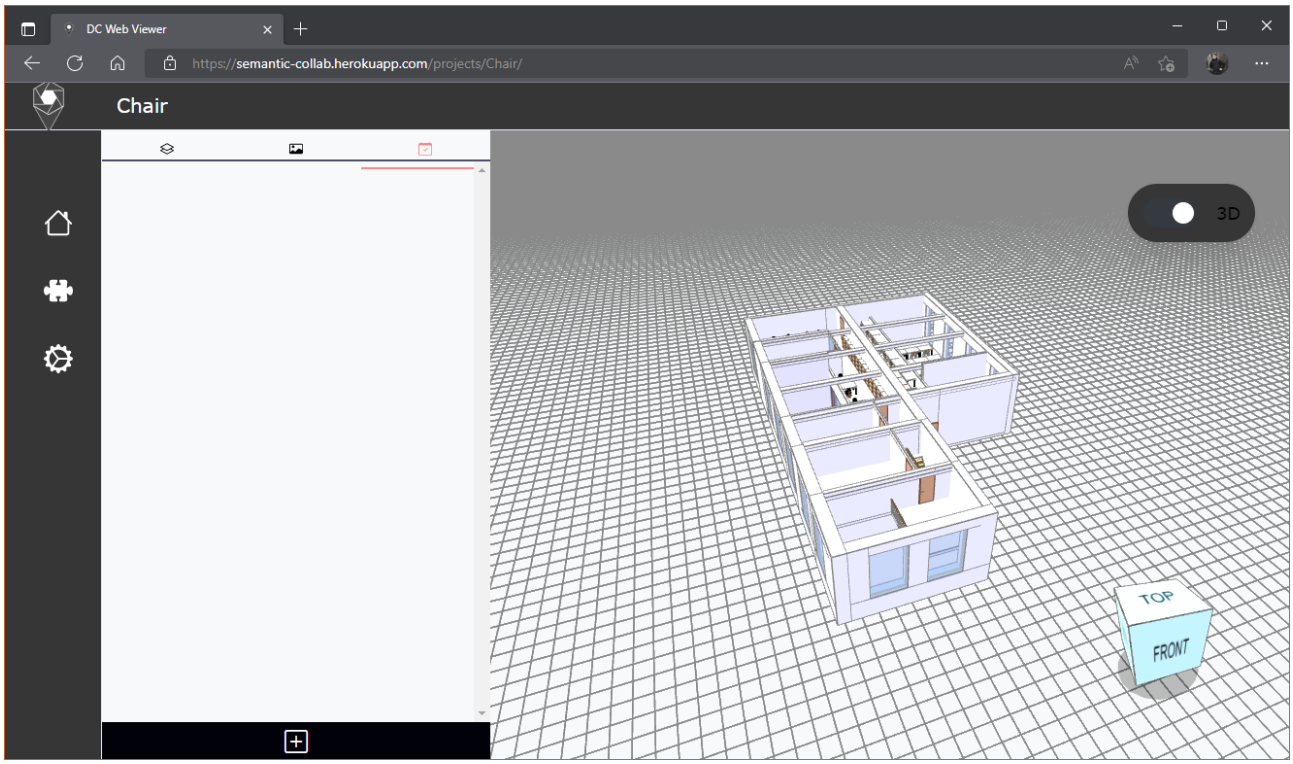
STEP 11 – We can switch to the gallery by clicking the image icon in the upper tab bar. Here we can review and filter all images created in the project.



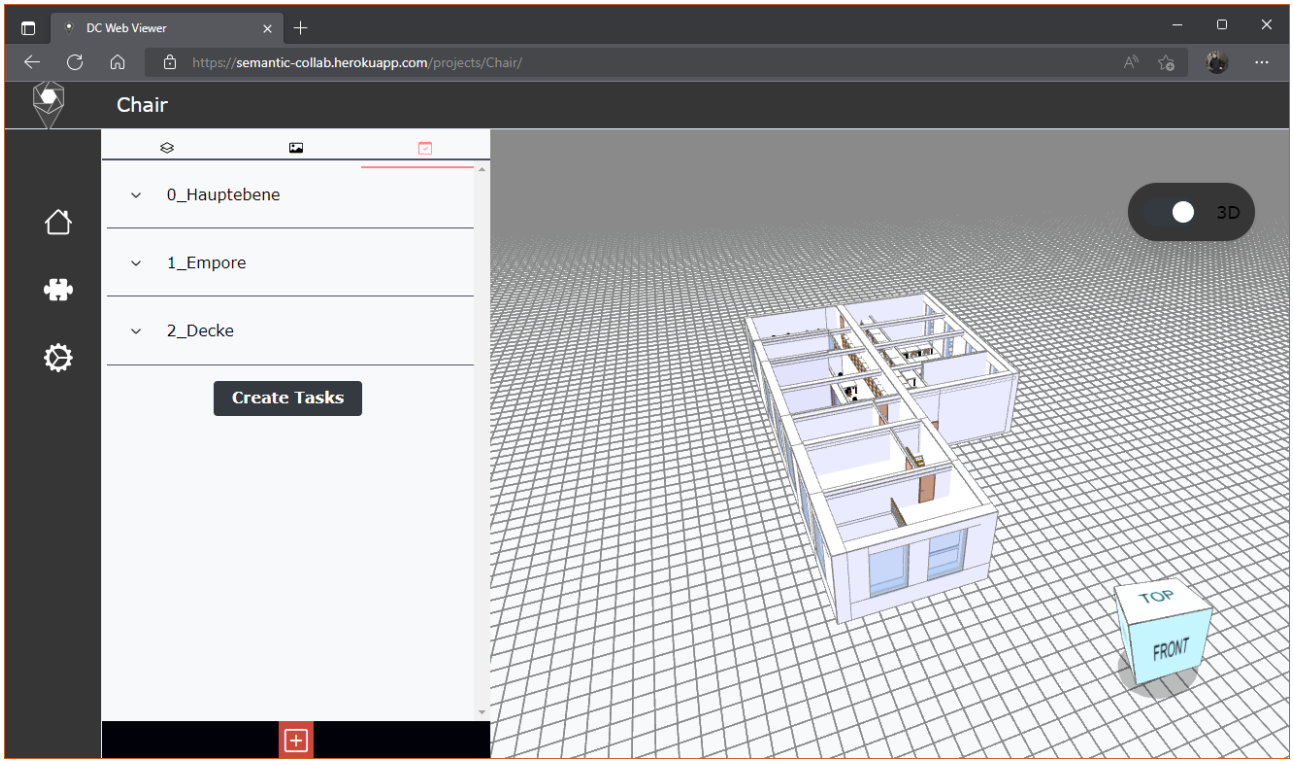
STEP 12 – When we click on one of the images, the camera focuses on the picture and shows us the location in the viewport. On the left side, we can see and edit some of the parameters of the picture.



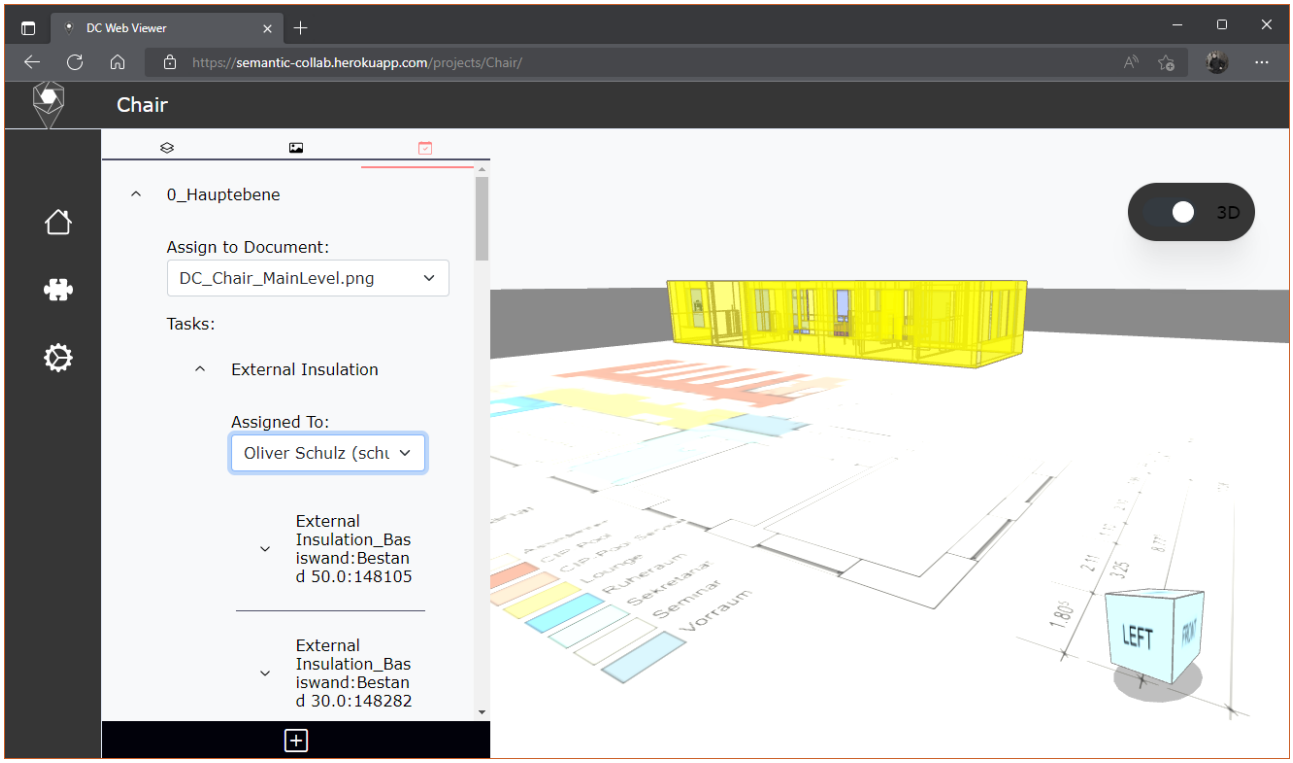
STEP 13 – The last tab is used for creating and managing tasks in the building.



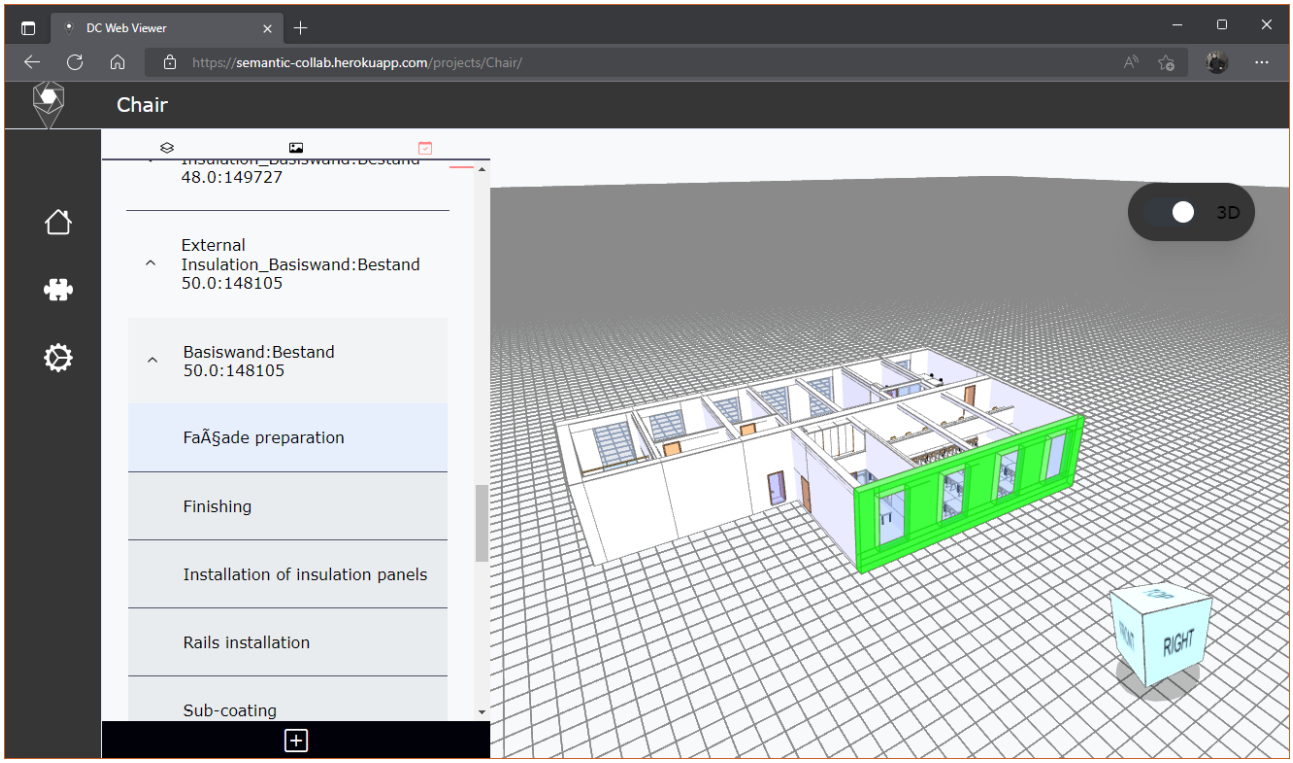
STEP 14 – When we click on the "Plus" button, we can import a JSON file from the Renovation Manager application and generate and locate the tasks in our project. **Keep in mind that this step is just working if an IFC file is currently visible!**



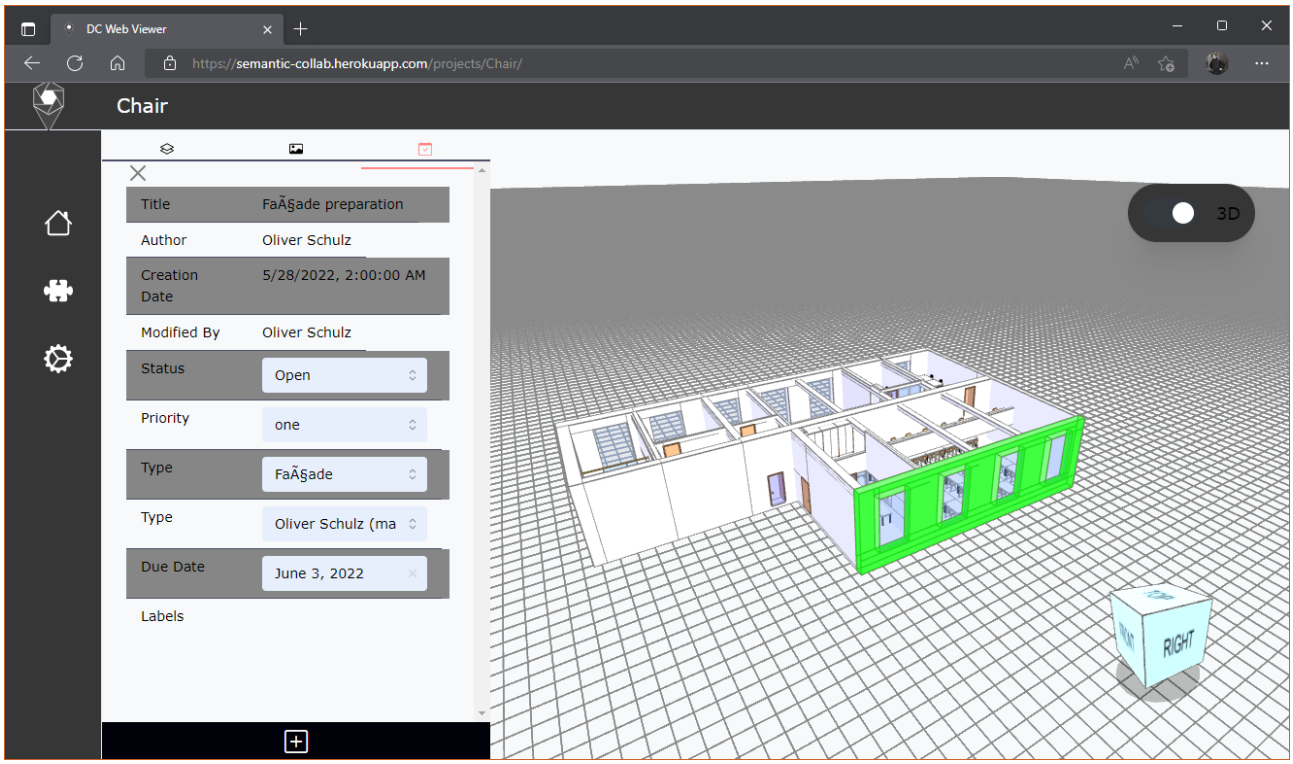
STEP 15 – The application creates the tasks per building storey. Each storey must be assigned to a document so that we can use the tasks in the mobile application. Furthermore, every task needs a responsibility. Assign them to a person that is part of the project and click the “Create Tasks” button at the bottom of the list.



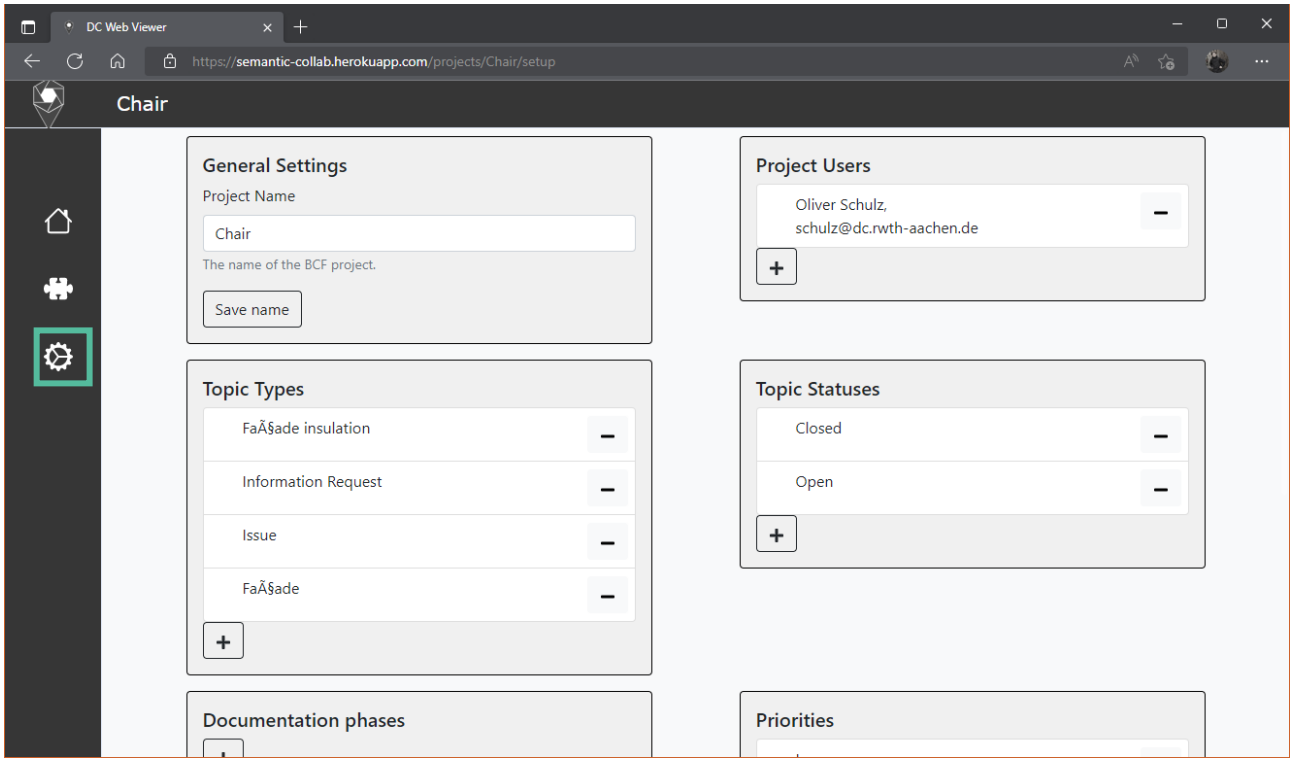
STEP 16 – We can now review all the generated tasks in the task tab.



STEP 17 – When we select a task, we can review and change its parameters.



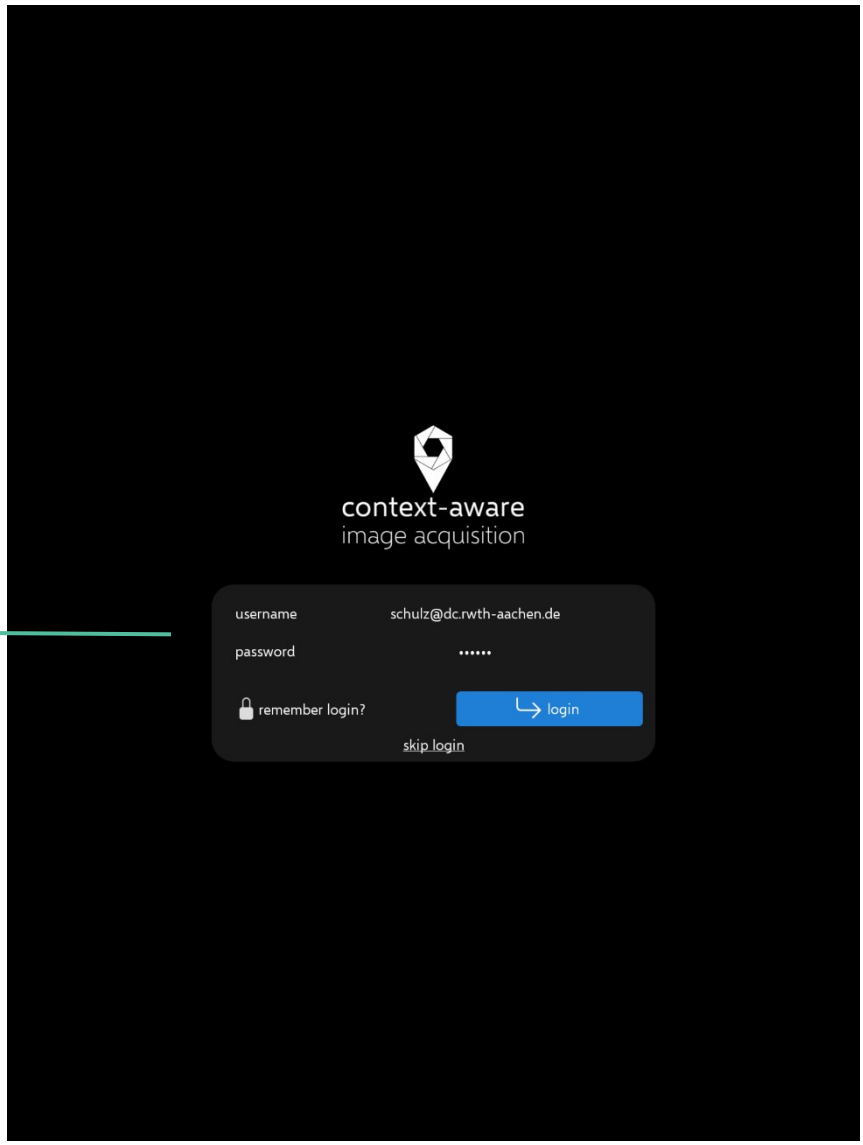
STEP 18 – We can adjust our project's settings by clicking the "Gear" icon on the left side. For example, new users can be added to the project here.



CAIA mobile application

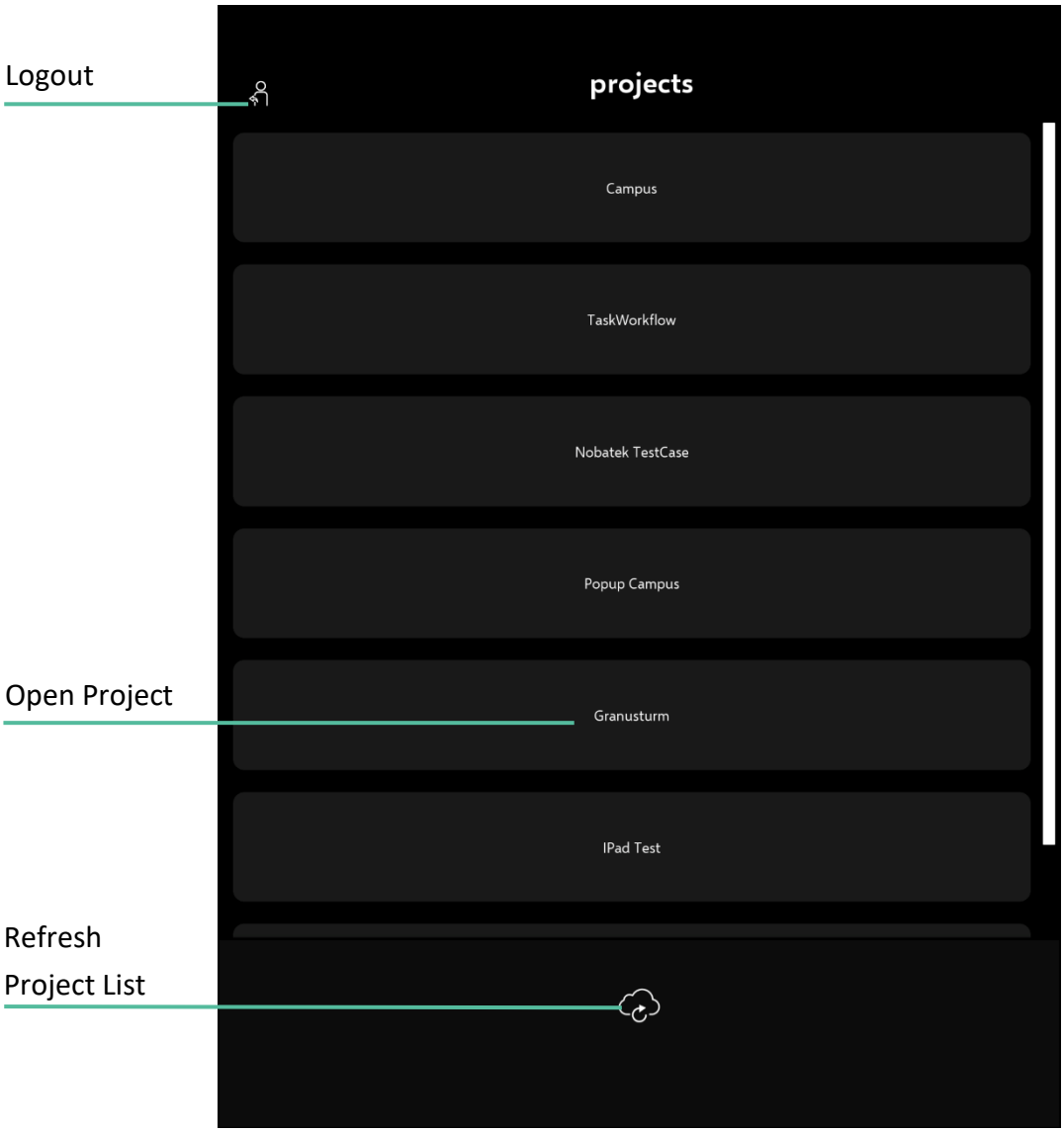
The mobile application is targeted at iOS devices. Please get in touch with us if you want access to it.

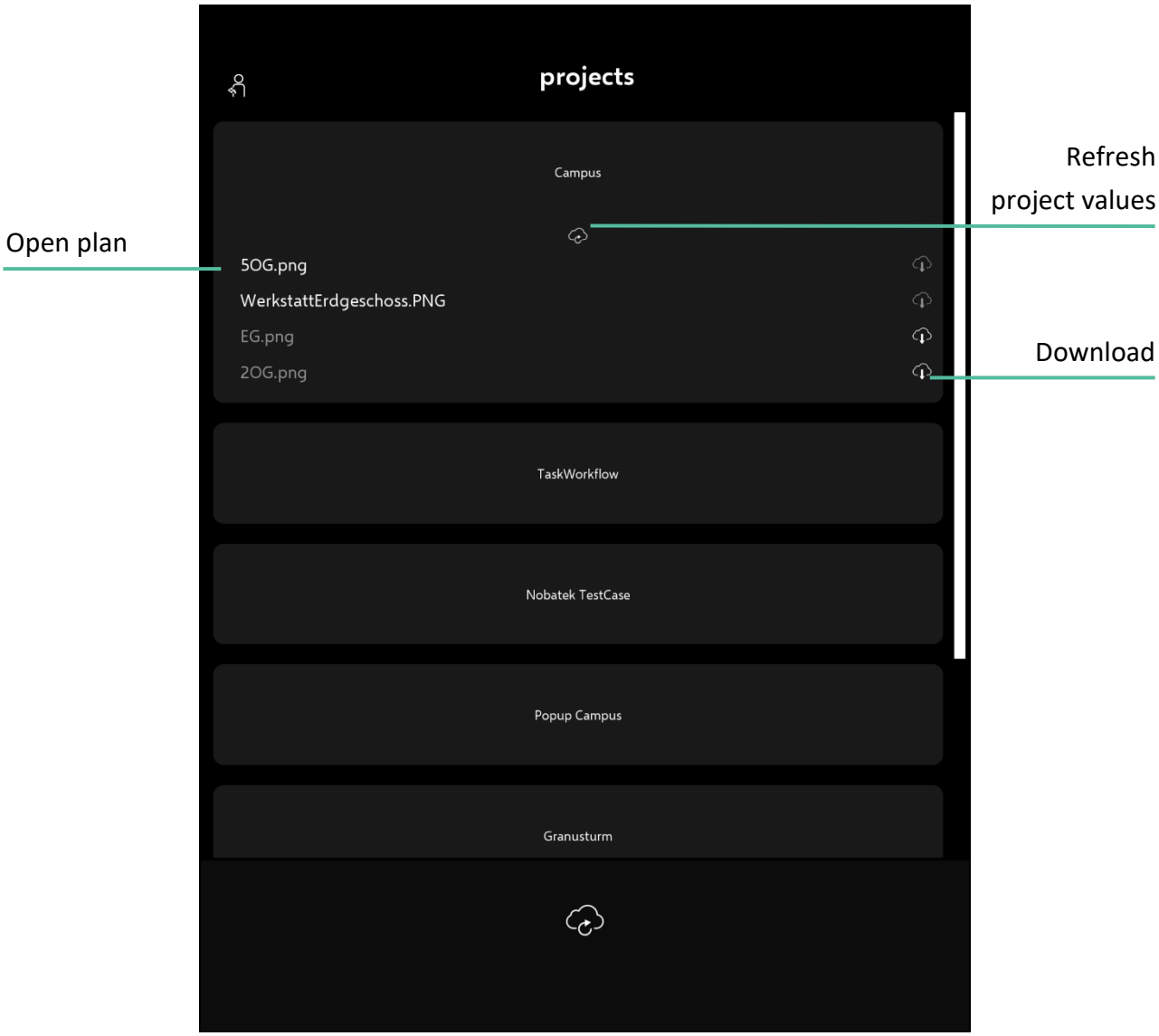
3.1. Project Overview



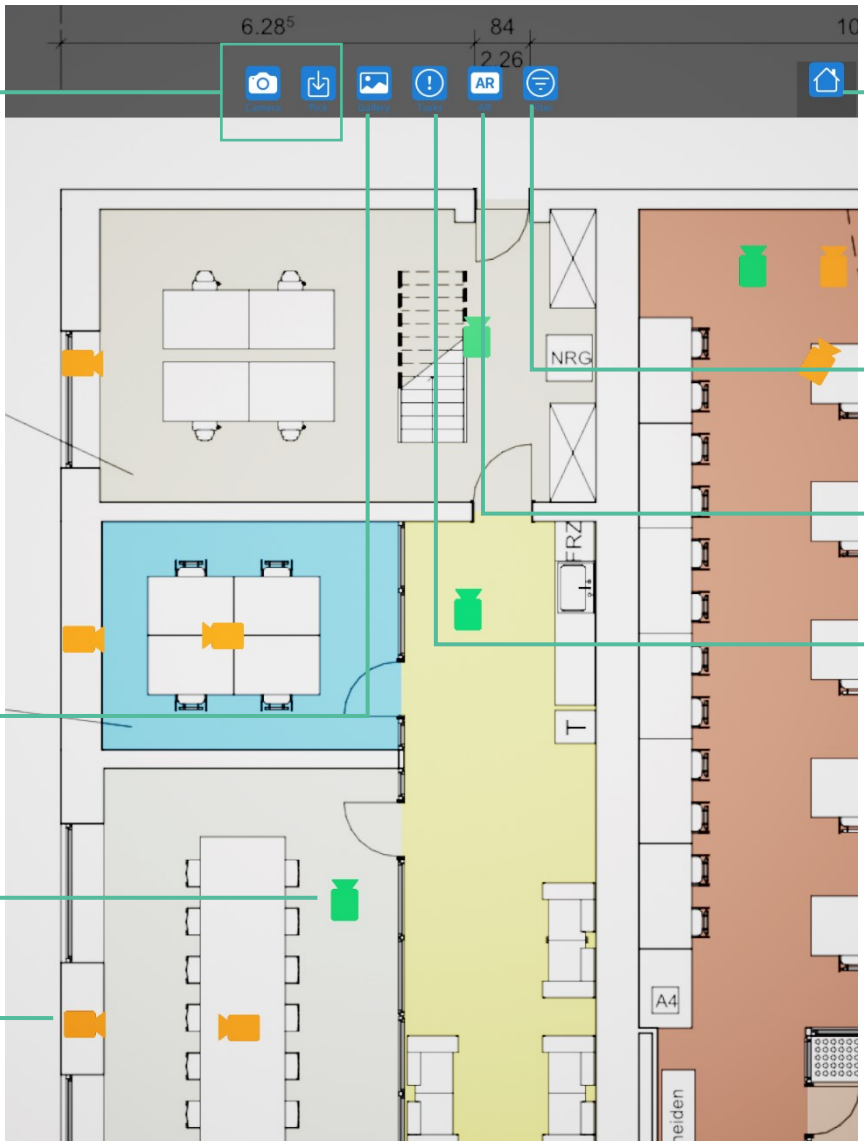
Login

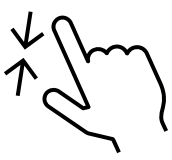
Is provided by us. Currently you cannot create your own account. If you want to test the application, please get in touch with us.


Logout
projects
Campus
TaskWorkflow
Nobatek TestCase
Popup Campus
Open Project
Granusturm
IPad Test
Refresh
Project List


projects
Campus
5OG.png
WerkstattErdgeschoss.PNG
EG.png
2OG.png
TaskWorkflow
Nobatek TestCase
Popup Campus
Granusturm
Refresh
project values
Open plan
Download

3.2. Taking and selecting photos



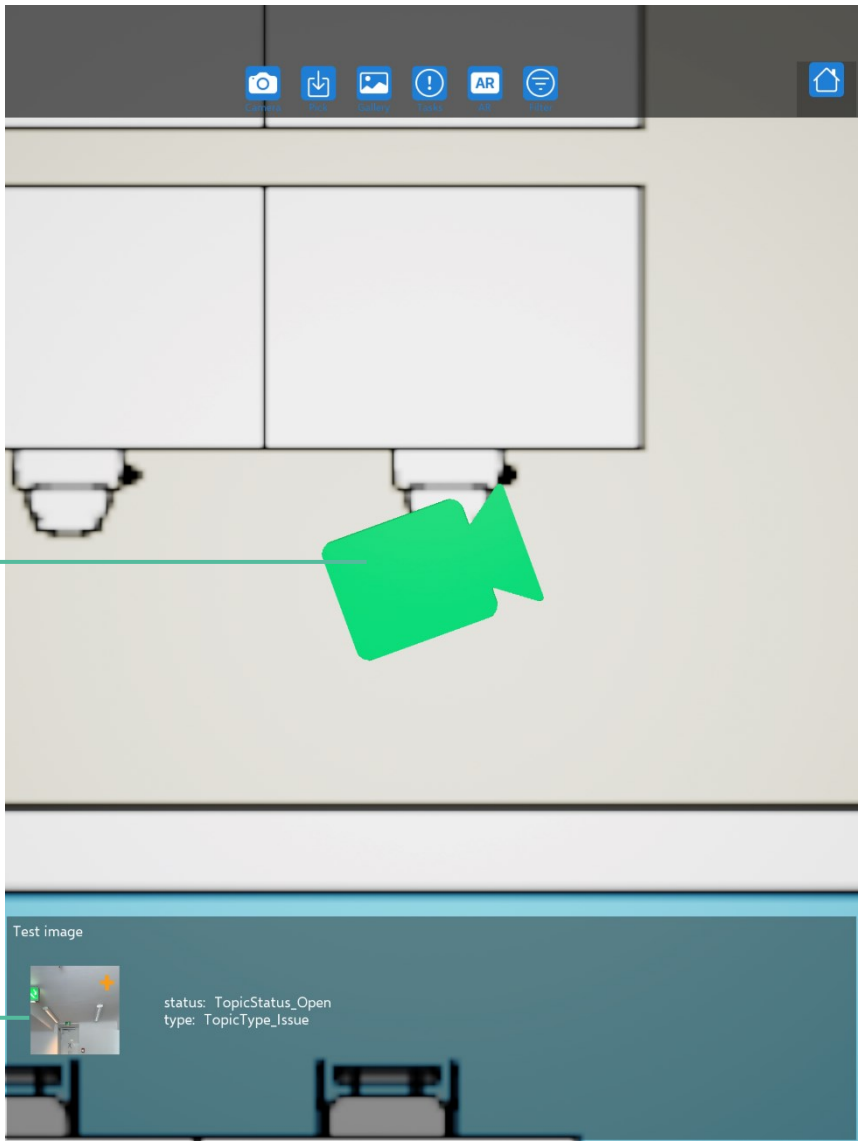


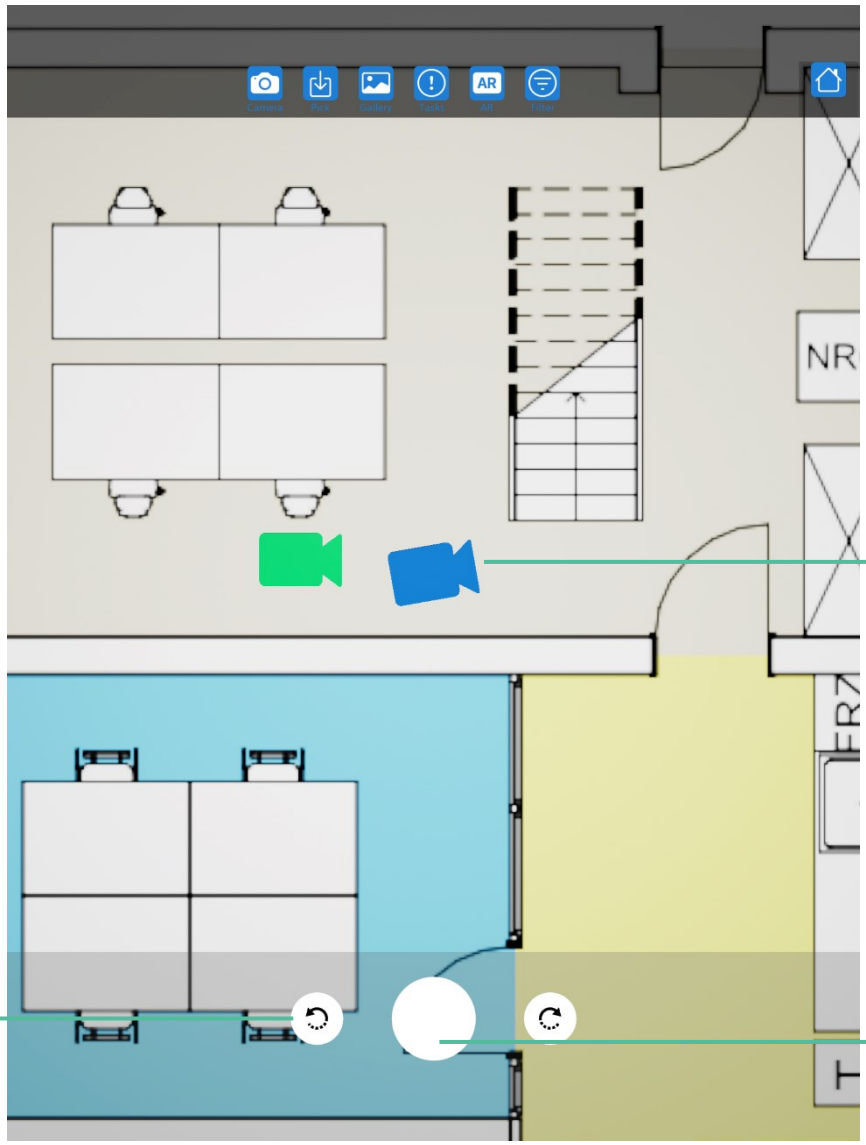
Zoom

By pinching the plan, you can zoom in and out of it.

Move

By swiping with one finger you can move forward, backward, left and right.

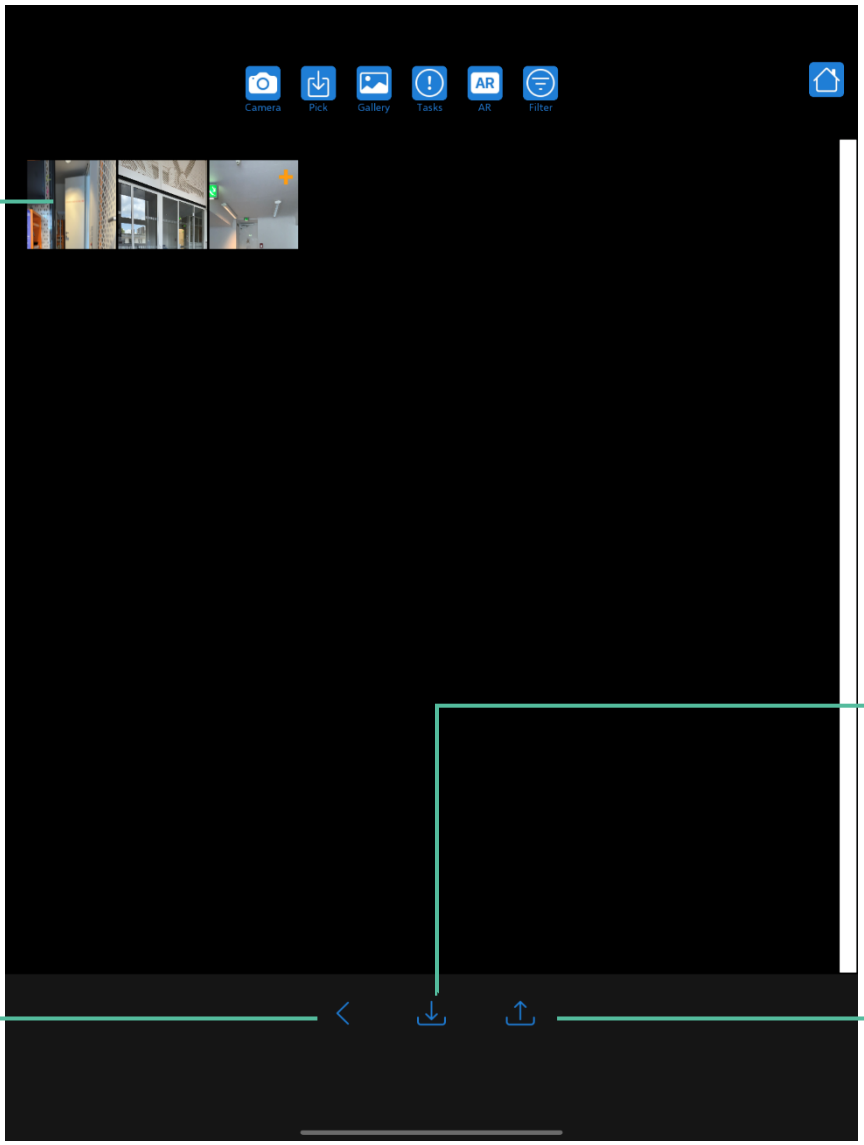

Preview Image
Open in gallery
Test image
status: TopicStatus_Open
type: TopicType_Issue



Set Location

By swiping you can set the location of the camera on top of the 2D plan.

3.3. Gallery & review images



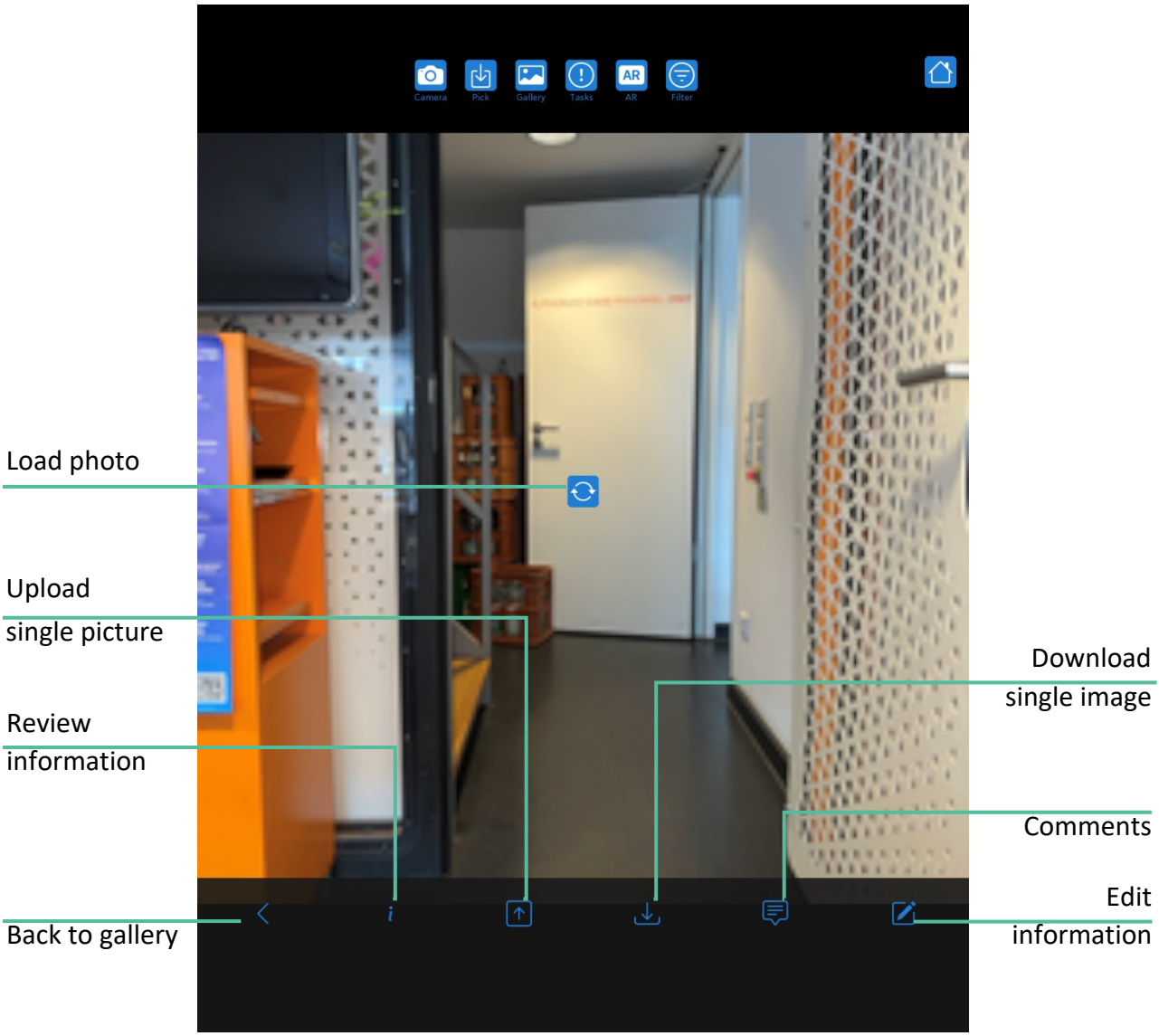
Select photo

Select an image to open the preview. On the upper right corner, a little icon displays if the image is either new (+), was edited (!), or is untouched (no symbol).

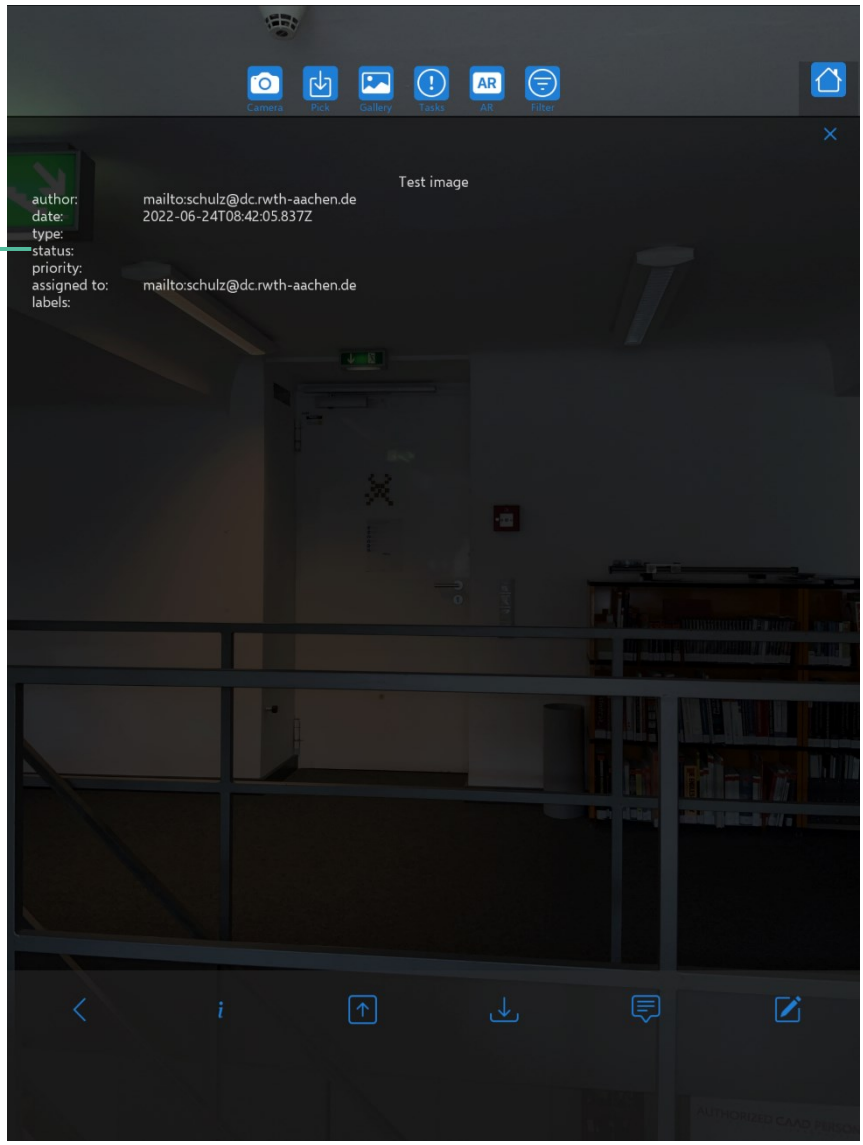
Download photos (and tasks)

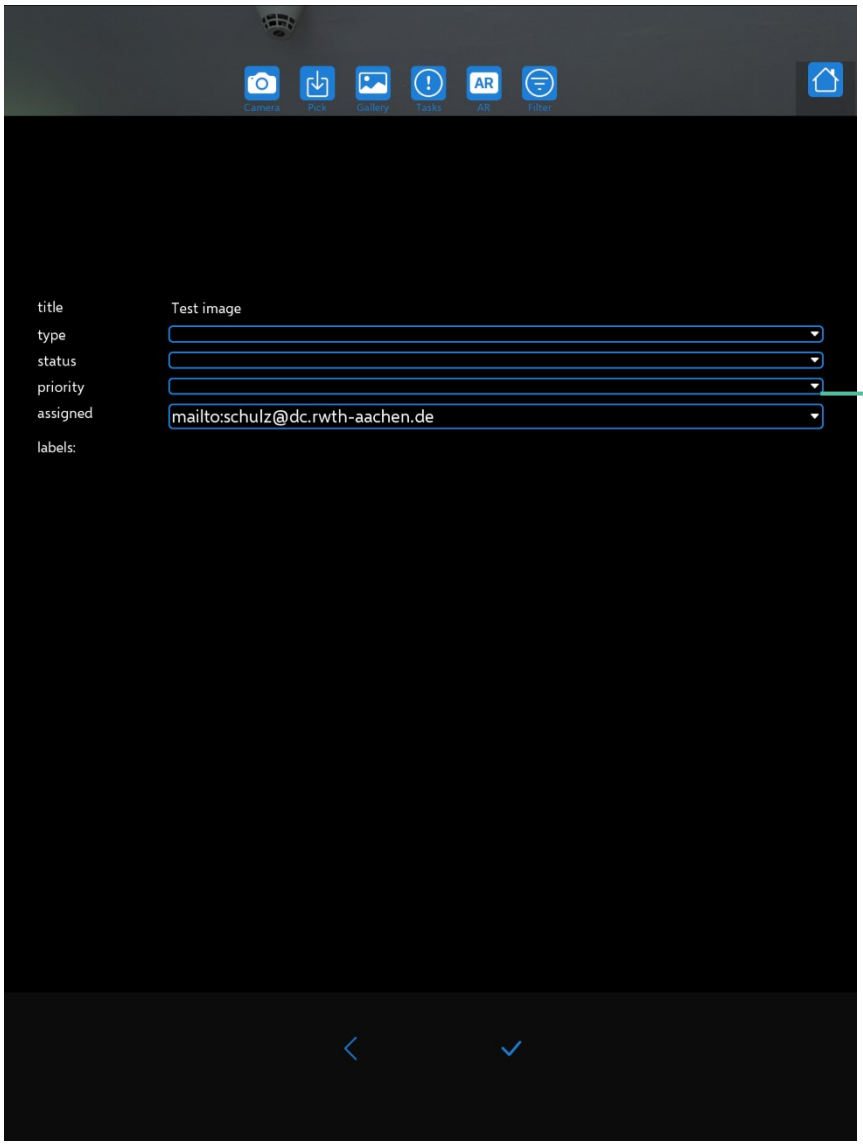
Upload photos (and tasks)

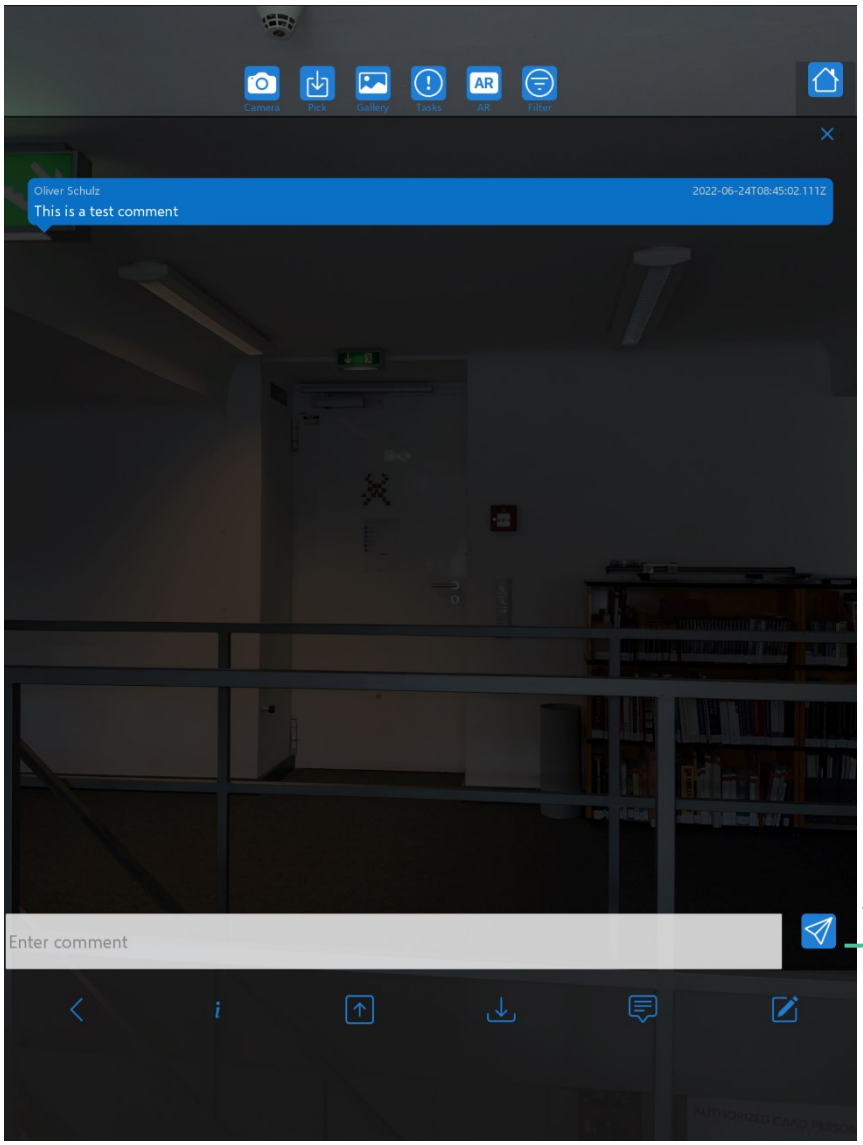
Back to plan


Camera
Pick
Gallery
Tasks
AR
Filter
Load photo
Upload
single picture
Review
information
Back to gallery
Download
single image
Comments
Edit
information

Review information



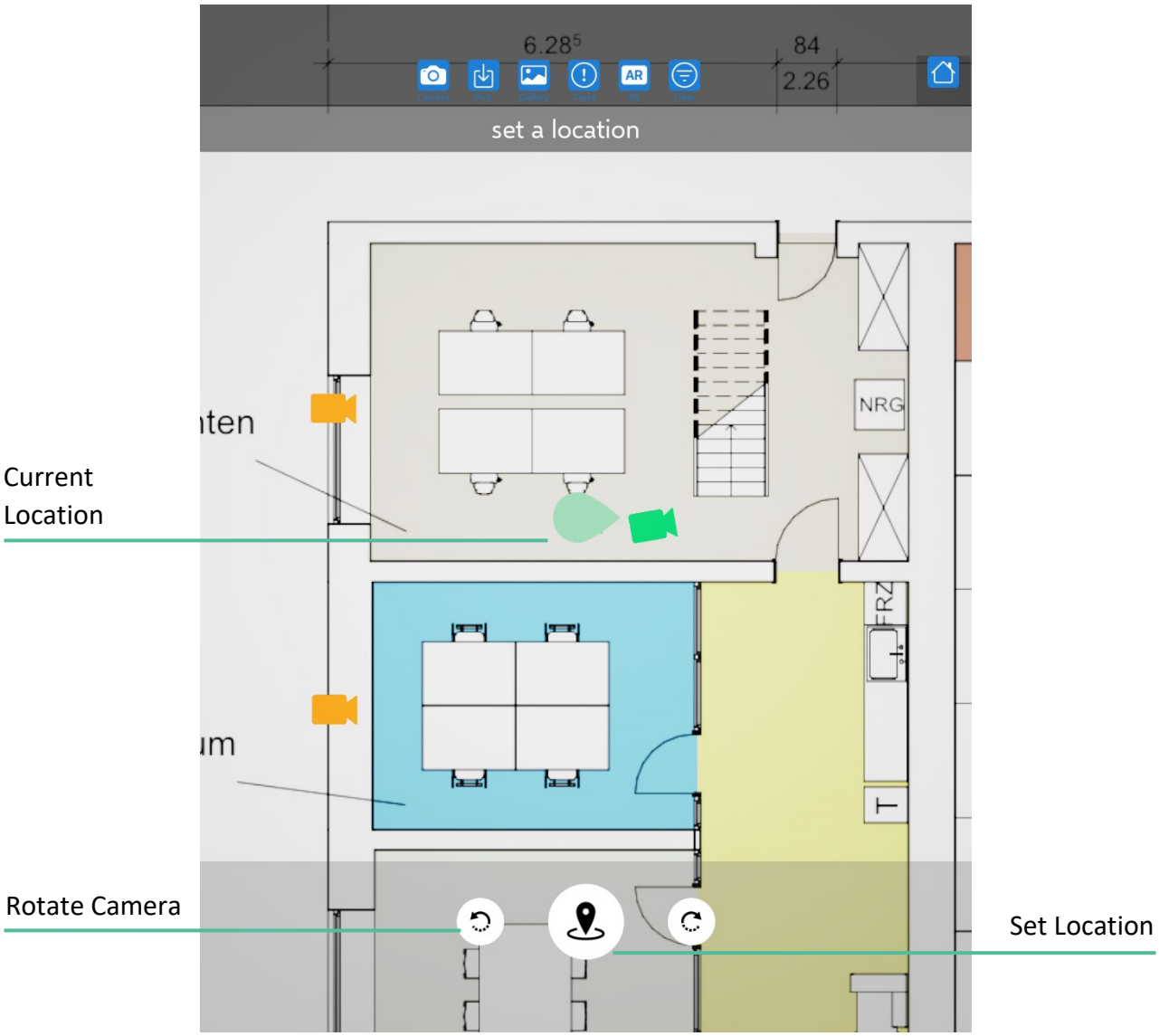

Camera
Pick
Gallery
Tasks
AR
Filter
title
Test image
type
status
priority
assigned
mailto:schulz@dc.rwth-aachen.de
labels:
Select options


Camera
Pick
Gallery
Tasks
AR
Filter
Oliver Schulz
2022-06-24T08:45:02.111Z
This is a test comment
Enter comment
Send Comment

3.4. Augmented Reality

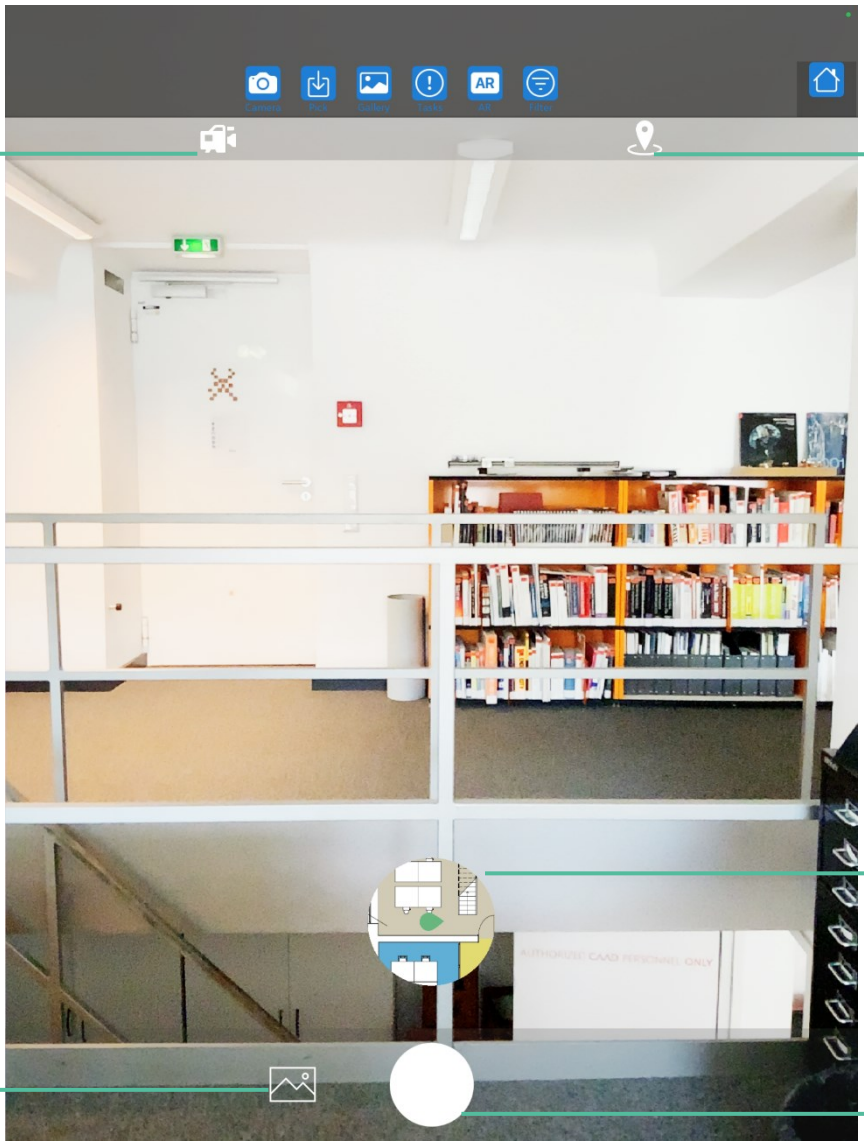
IMPORTANT:

If you want to use AR you have to select the location in the building where you are actually standing. Otherwise, the position is desynced and not valid. For locating yourself it is best to choose a door since these are easy to find. Do not try to locate yourself in the centre of the room, you will be most of the time way of the location you think you were standing. Before applying the location hold the camera in front of you so it is facing in your direction of view. Do not point it to the floor. The application currently assumes that the height of the camera is about 105 cm, the height of a doorknob.



Set Location

By swiping you can set the location of the camera on top of the 2D plan.


Display Cameras
Relocate
Minimap
Gallery
Take Picture

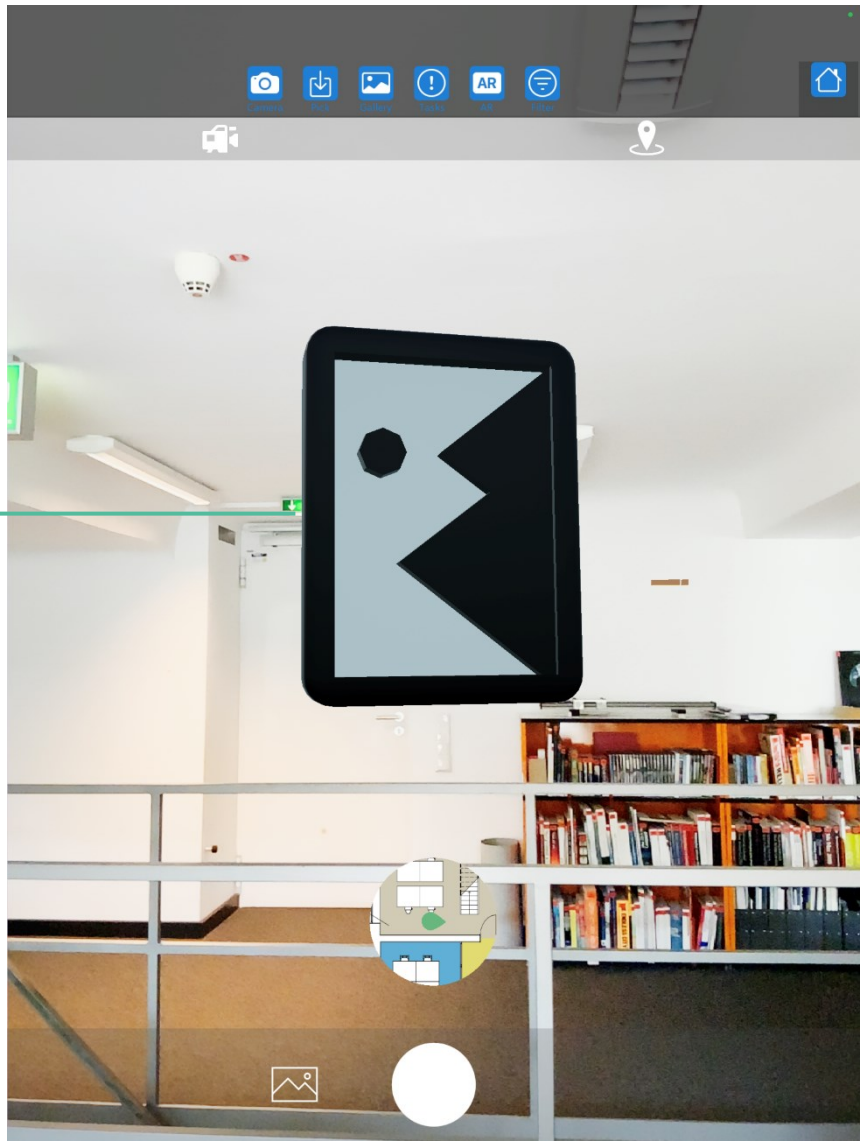
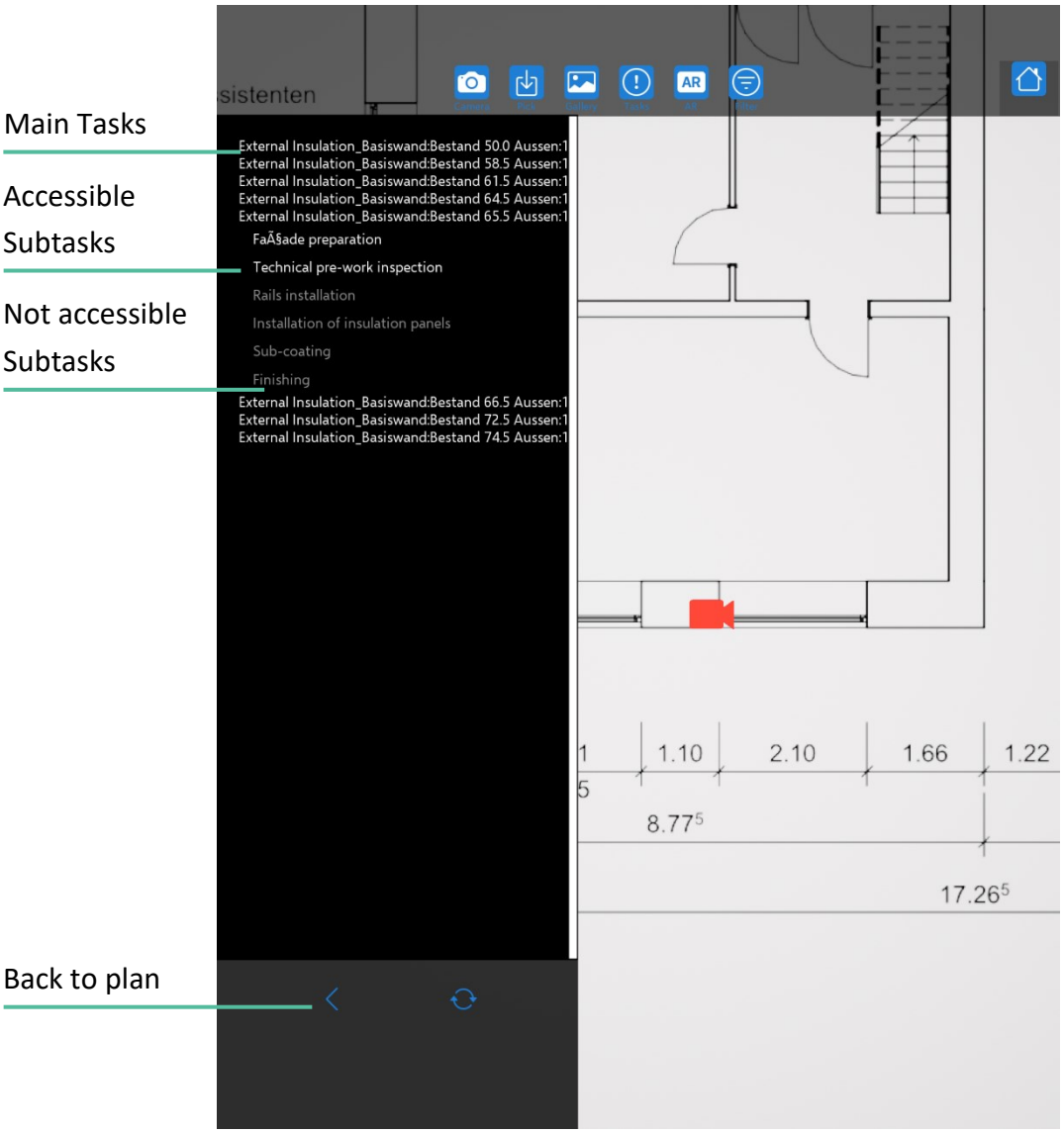


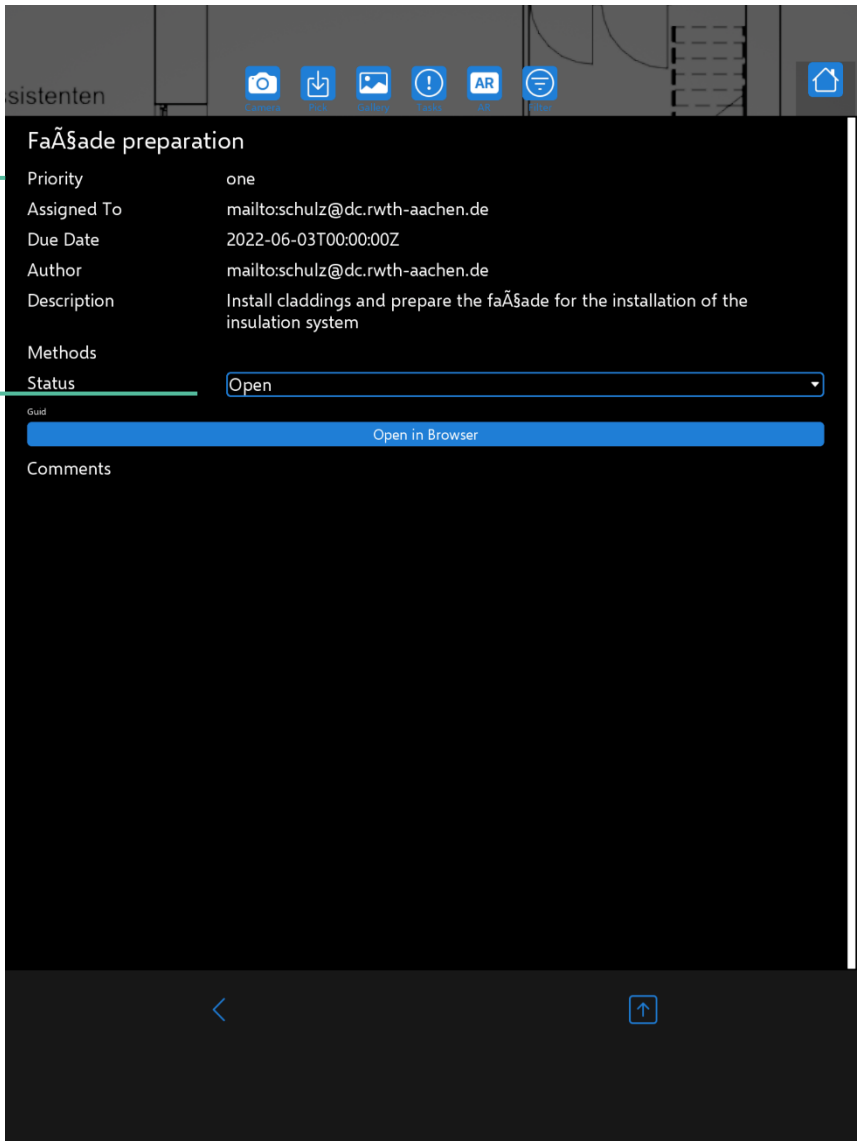
Photo Location

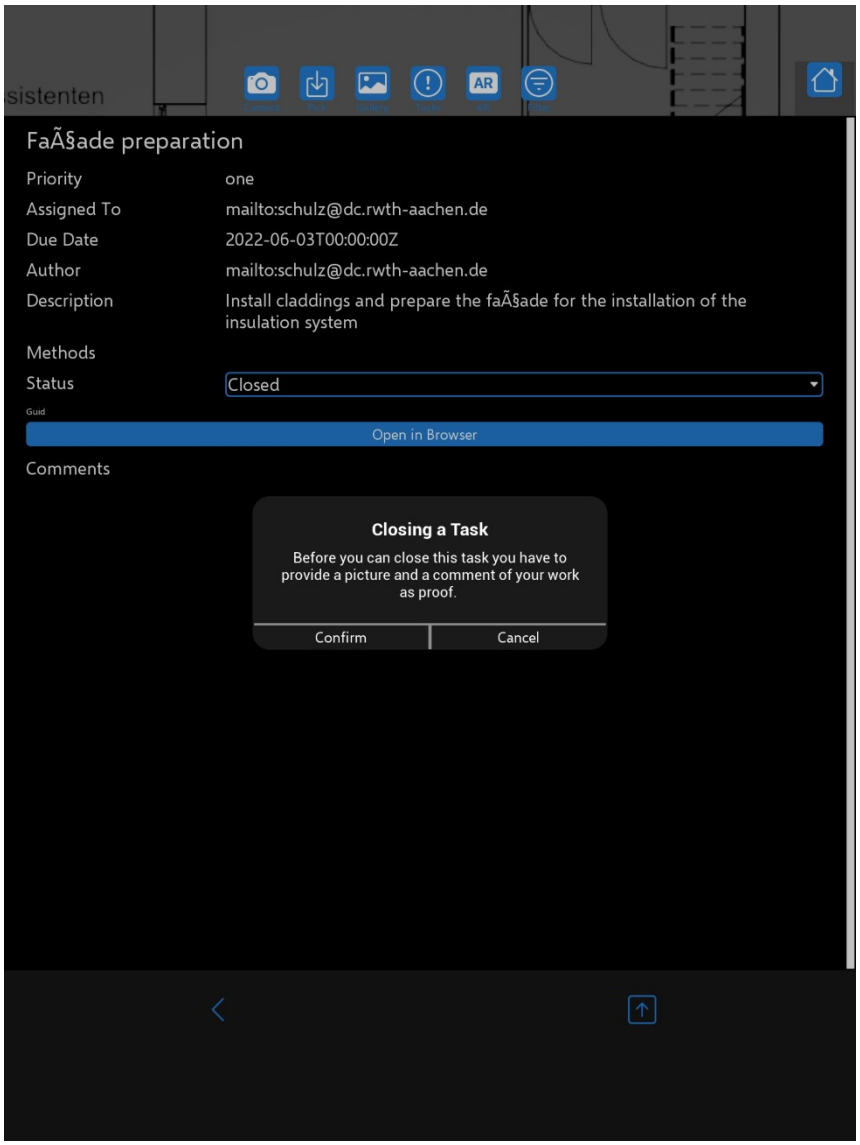
3.5. Task management

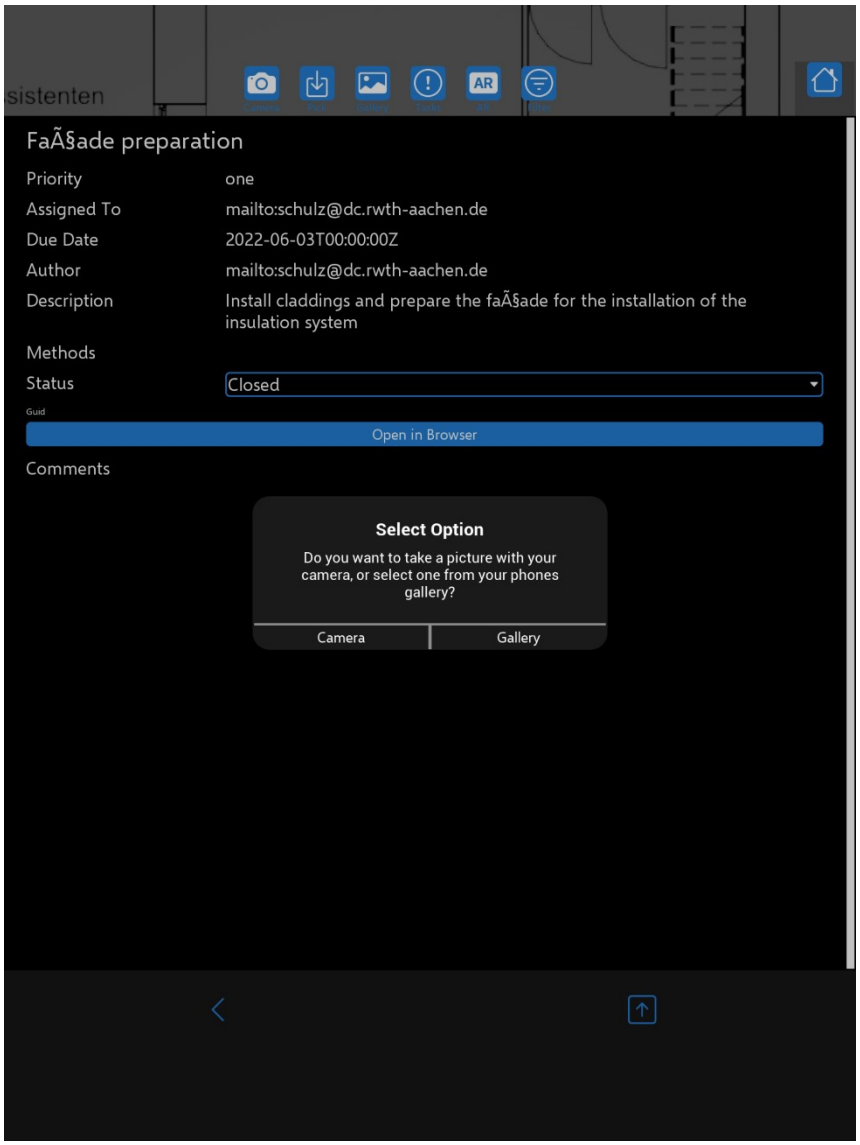
IMPORTANT:

The tasks are formed out of main- and subtasks. The main task is finished when all subtasks are completed. The subtasks must be performed in a specific order. The user cannot access Grey tasks as long as its previous task was not solved.



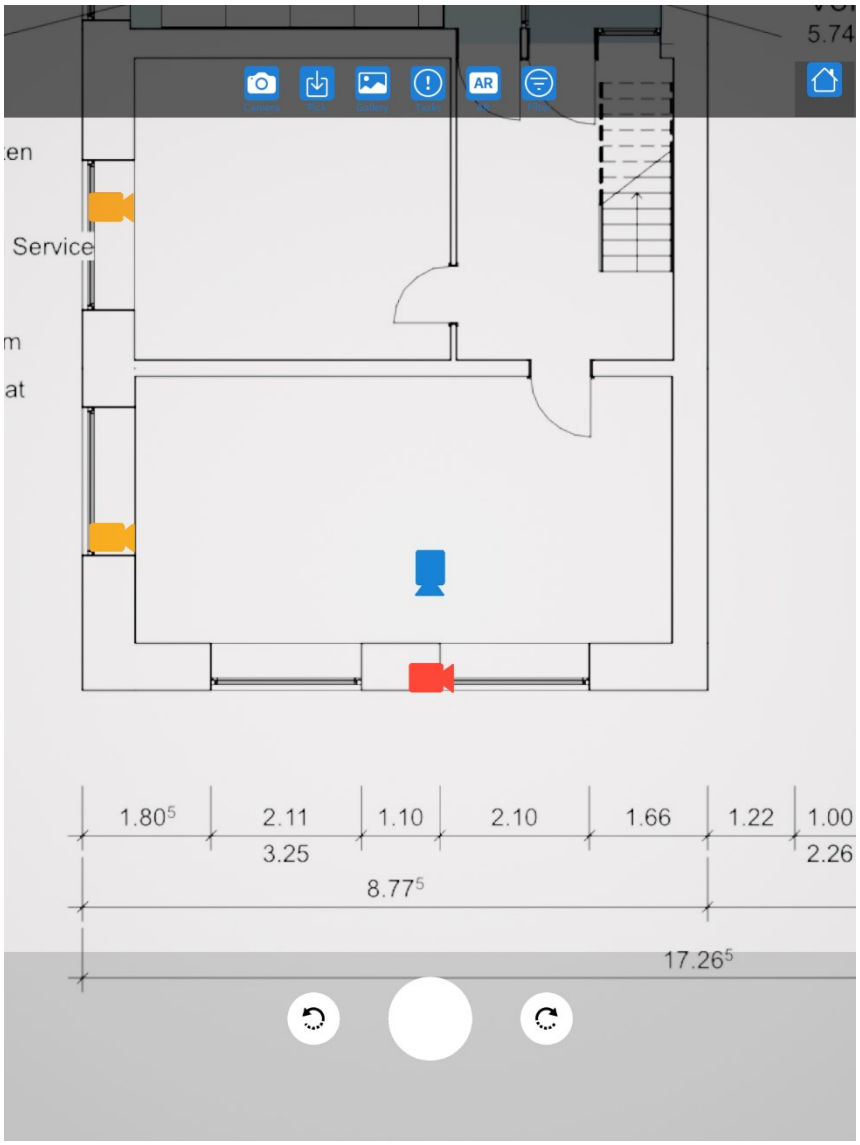

Task parameter
Changing status
sistenten
AR
FaÃ§ade preparation
Priority
one
Assigned To
mailto:schulz@dc.rwth-aachen.de
Due Date
2022-06-03T00:00:00Z
Author
mailto:schulz@dc.rwth-aachen.de
Description
Install claddings and prepare the faÃ§ade for the installation of the insulation system
Methods
Status
Open
Guid
Open in Browser
Comments

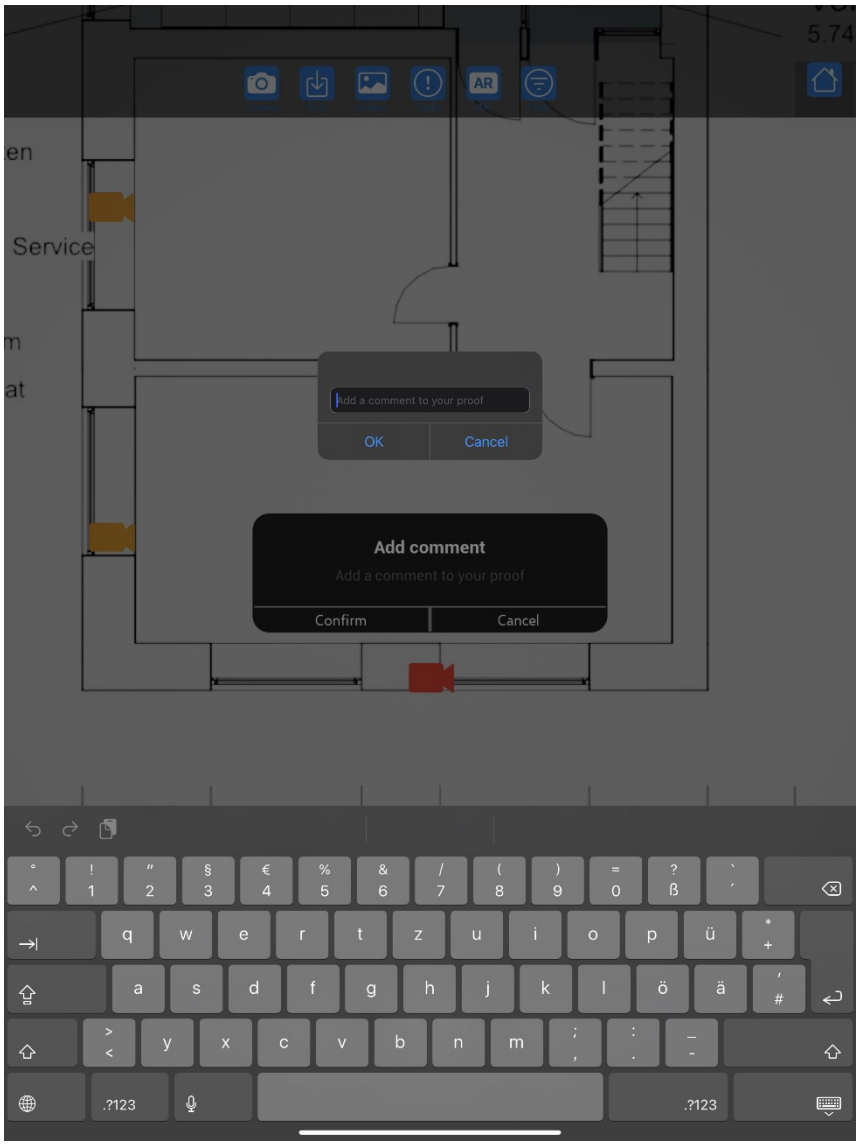

sistenten
AR
FaÃ§ade preparation
Priority
one
Assigned To
mailto:schulz@dc.rwth-aachen.de
Due Date
2022-06-03T00:00:00Z
Author
mailto:schulz@dc.rwth-aachen.de
Description
Install claddings and prepare the faÃ§ade for the installation of the insulation system
Methods
Status
Closed
Guid
Open in Browser
Comments
Closing a Task
Before you can close this task you have to provide a picture and a comment of your work as proof.
Confirm
Cancel


sistenten
AR
FaÃ§ade preparation
Priority
one
Assigned To
mailto:schulz@dc.rwth-aachen.de
Due Date
2022-06-03T00:00:00Z
Author
mailto:schulz@dc.rwth-aachen.de
Description
Install claddings and prepare the faÃ§ade for the installation of the insulation system
Methods
Status
Closed
Guid
Open in Browser
Comments
Select Option
Do you want to take a picture with your camera, or select one from your phones gallery?
Camera
Gallery

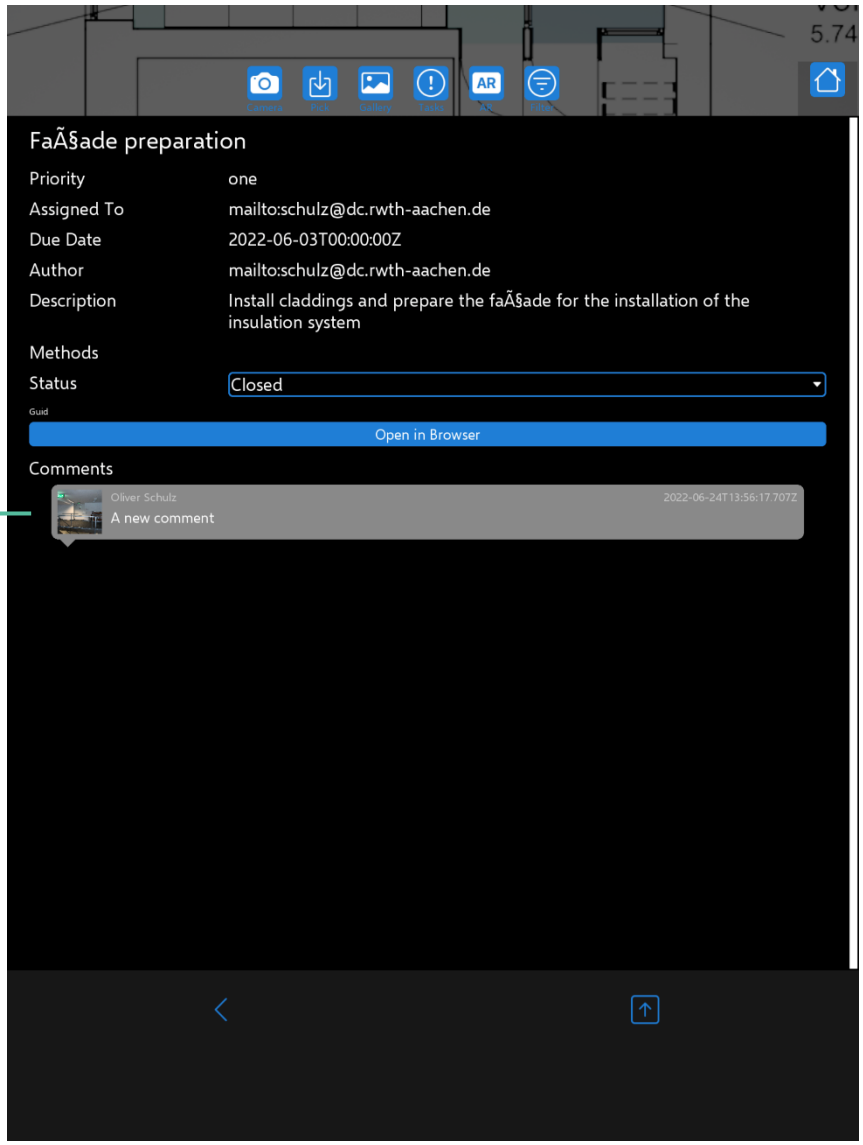
IMPORTANT:

This step is equal to the one for setting up a picture on page 18.




AR
Service
Add a comment to your proof
OK
Cancel
Add comment
Add a comment to your proof
Confirm
Cancel

Proof with comment and picture



Updated accessibility