

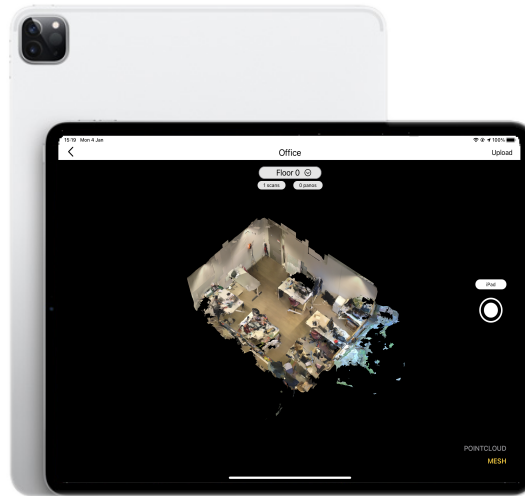


Manual

v1.1.25

1 About

The *WeScan* app allows anyone to scan houses in 3D using just an iPad Pro Lidar. The scan can be used to generate a NEN-2580 report or a dollhouse-model for a virtual tour (where the latter will require 360-panorama images). A more detailed guide on how to capture 360-panorama images is included in this manual.



2 Installation

The WeScan app can be installed from the Apple appstore after joining our beta test group. When you are invited you can install it through Apple's testflight by following this link <https://testflight.apple.com/join/5VhPT8du>

Each build is available to test for up to 90 days, starting from the day the developer uploads their build. You can see how many days you have left for testing under the app name in TestFlight.

TestFlight will notify you each time a new build is available and will include instructions on what you need to test. Alternatively, with TestFlight 3 or later, you can turn on automatic updates to have the latest beta builds install automatically.

To get started, install TestFlight on the device you'll use for testing. Then, accept your email invitation or follow the public link invitation to install the beta app. You can install the beta app on up to 30 devices.

1. [Install TestFlight](#) on the iOS device that you'll use for testing.
2. Open your invitation email or tap on the public link on your iOS device.
3. Tap View in TestFlight or Start Testing; or tap Install or Update for the app you want to test.

3 Scanning

3.1 Before scanning checklist

We've compiled a number of points that should be followed when scanning a house. Before starting to scan please consider the following checklist:

- The battery of the iPad is fully charged to avoid running out of battery during a scan
- The sensors are clean, it is advised to wipe them regularly with a cloth to remove any fingerprints or dust.
- Ask others that are present to move to a different floor if possible, or to a different room such that no one else is captured in the scan.
- Plan the scanning route before scanning. Check and clean the scene from bags laying around or cluttered small objects (such as cables) or moving objects (such as cooling fan, pets or robots). If the room has curtains, use about half of it to maintain the indoor light while keeping the window frame visible.
- Open all the connected doors if possible so it can be merged with other scans. If it is not possible to open all doors, you can scan these rooms separately by creating a new scan on the same floor and align them later on. Doors should be either open or closed, not half-opened.
- Start the scan in the center of the biggest room of the floor, and make sure that you hold the device in the upright position (e.g. not pointing at the floor). This is to allow the device to familiarise itself with the environment.

3.2 Usage

Once the app has started, you can see a list of previously scanned environments. For scanning a new house, add a new environment (see fig 1).

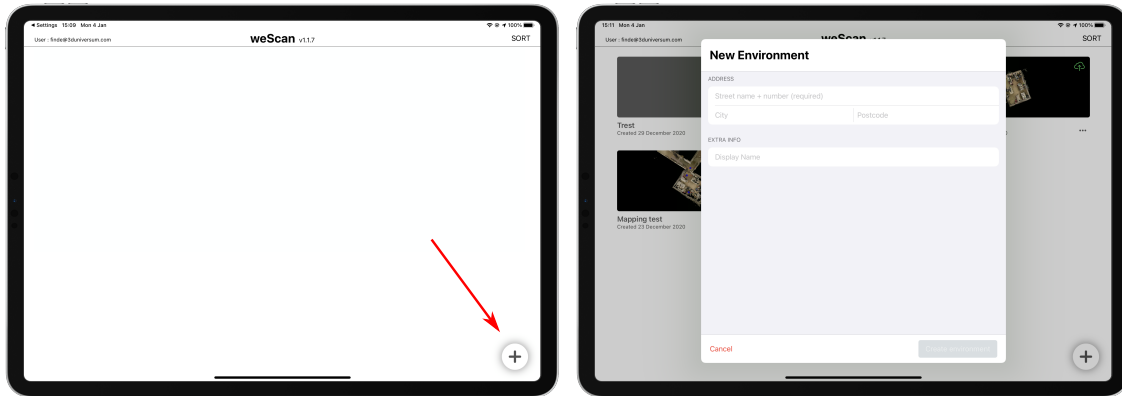


Figure 1: Create a new environment

When opening the environment you just created, you should see something like in figure 2. You can start a new scan by pressing on the round button on the right.

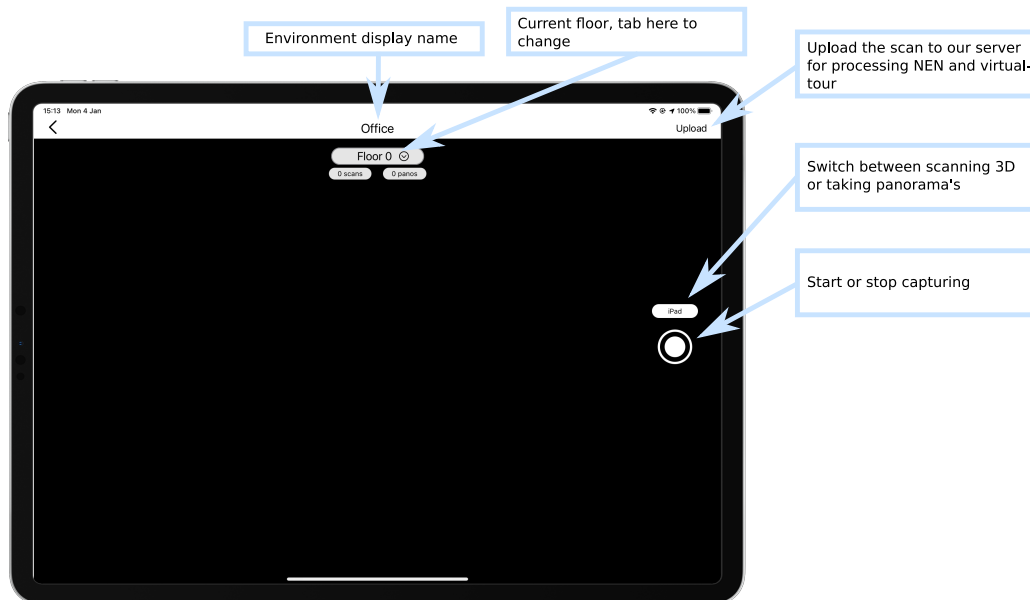


Figure 2: Scan overview

While scanning you can see the mesh being generated, and the top-view on the bottom right indicates your position on the floor. If something goes wrong while scanning, such as somebody

walking in front of the camera, or the iPad is losing track, you can press the cancel button to restart the scan.

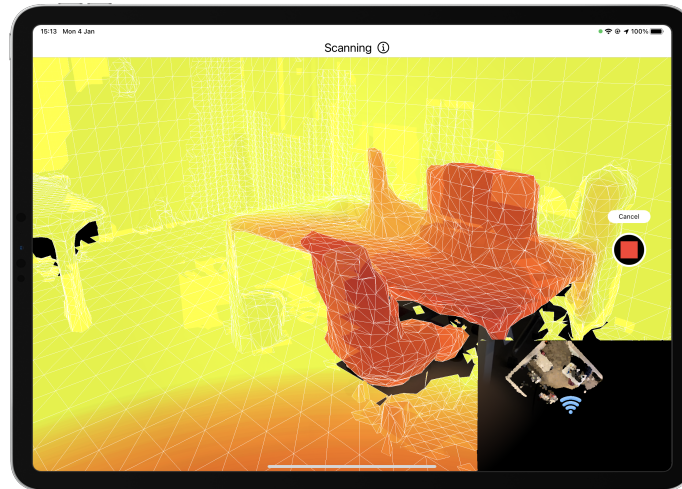


Figure 3: Scanning

3.3 During the scan

One of the advantages of WeScan is that it allows you to create multiple scans, and merge them together. This allows for larger areas to be scanned without causing a large drift in tracking. We found best practise is to create several scans per floor, multiple small rooms can be combined into one scan, or one scan for a big room.

Several notes to consider while scanning:

- Make sure you selected the correct floor (see 3.6)
- When scanning, imagine you are doing a room painting with an air-brush. Move at a steady pace in continuous motion, not too fast or too slow.
- Avoid scanning the same location twice. This will not only slow down the scanning routine, but also degrading the end result. The best way to do this is to plan a route through the house that minimizes scanning the same location multiple times. From experience it is best to end the scan of a floor in the hallway. For floors where you have to walk through the hallway multiple times while scanning, you can either create separate scans for each section. Or if the floor is small enough, you can avoid scanning the hallway (while just passing through to get to another room) by aiming the iPad slightly to the ground to avoid it making an unwanted scan of the wall of the hallway. But be sure to still include the hallway at a later point in your scan.
- For areas that have a lot of overlapping doors that cannot be all opened at the same time; First create a scan where half of the doors are fully opened and the others fully closed, and then create a second scan of the same area with the other doors opened.

- For large floors, the best results are obtained by making several smaller scans instead of 1 large one. Scans should not last more than 10 minutes. If it is getting close to the 10 minute mark, consider creating a new scan
- Make sure that every room is fully scanned by 1 (or more) scan. Otherwise, when a room is scanned in multiple parts, it will degrade the accuracy of the NEN-report.
- Make sure to include all corners and walls in the scan. Sometimes walls or corners are blocked by curtains, cabinets or other objects, in these cases try to find at least 1 spot on wall that can be scanned by opening or moving the curtains or other objects before starting the scan.
- Make sure to include the staircase for each floor, including the area above the staircase. If you start a new scan on a new floor, rescan the staircase leading to lower level as well (just a few staircases to create an overlap between the 2 floors). It is important to have an overlap between scans of 2 floors, such that they can be aligned later on.
- Do not rotate 360 degree in single spot, this may cause the tracker to loose track. If the location is too narrow, you can walk backward instead of doing a full rotation
- Do not get too close to objects or walls especially when it is textureless or surfaceless, we suggest to keep at least 0.5m distance between the device and the object or wall.
- Reflective objects can be a bit more challenging to capture. Try from different angles or sides to ensure these areas can be sufficiently captured
- Thin objects like fences can be challenging to capture, so it is best to avoid them when possible.
- Make sure all surfaces of the wall are visible in the scan. For example, when scanning a kitchen, make sure the wall area below the hanging cupboard is clearly visible.
- Please check the screen from time to time (also with the top view) to ensure all parts are well recorded.
- Check the mesh for potential holes in the scan, if there are holes in the scan, it reduces the quality of the scan

3.4 Multiple scans per floor

It is advised to create multiple scans per floor for floors bigger than $40m^2$, best practise is to create a separate scan for large rooms (e.g. living room), and combine multiple smaller ones into a single scan. These scans can then be merged into a single 3D model. When creating a new scan on the same floor, it will first try to orientate itself with the existing scans. It is best to stand on the same location as where the previous scan stopped, if that is not possible, aim the camera at a well-lit location with a lot of different objects which were present in the previous scans.

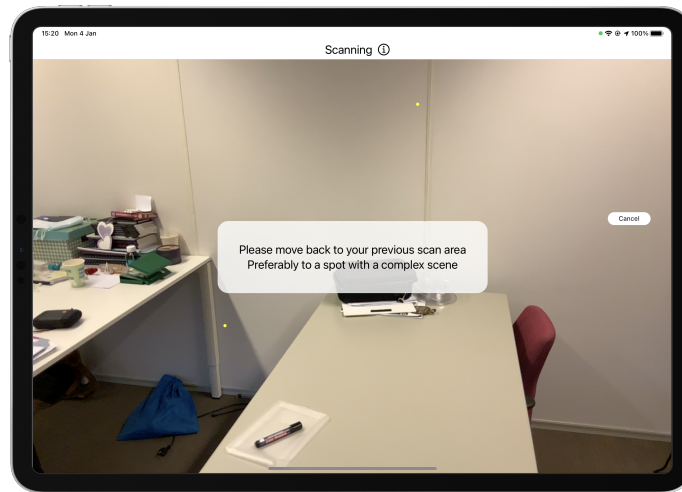


Figure 4: Scanning interface

3.5 The iPad is losing track

While scanning it may happen that suddenly the model appears to be moving while you are standing still. When this happens, stop the scan and try to scan the same room again. The most common reason for the iPad to lose track is when scanning too close to a textureless wall. To prevent it from losing track try to move a bit back.

3.6 Moving to a different floor

Once you've completed the scan on one floor, and ensured that the staircase is included. Create a new floor by pressing on the Floor-number on the top. You can add new floors here and select the correct one to continue.

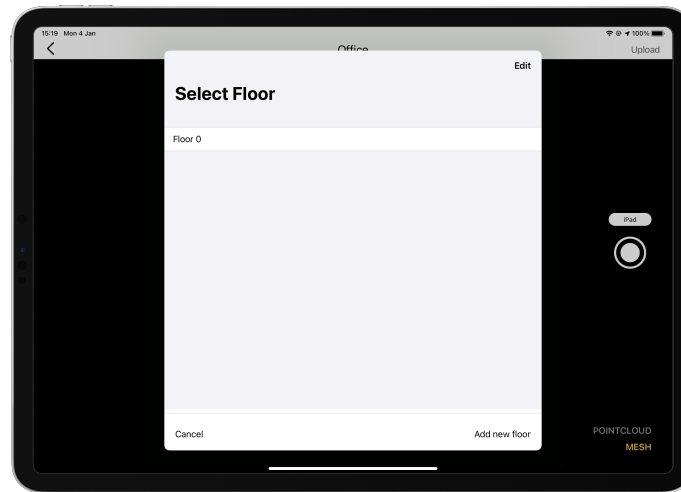


Figure 5: Adding new floors

3.7 Scanning for dollhouse-model

While for the NEN-report the focus of the scan should be the walls, for creating a dollhouse model it is important to also include other objects like tables, chairs, sofas etc... . To scan these sufficiently it is best to make a full rotation around the object and make sure to scan it in 1 go. Make sure there are no gaps visible in the objects on the scan. After scanning it is best to check the mesh for any holes or issues. And try again if there appear to be issues with the mesh.

3.8 Validating the model

Once you have finished scanning a floor, view the mesh to spot any holes or issues with the model. Tab on *Mesh* in the bottom right to view the mesh. In addition to viewing the raw mesh, you can tab on the *texture* button to start texturing the model. This may take some time (up to 2 minutes for larger scans).

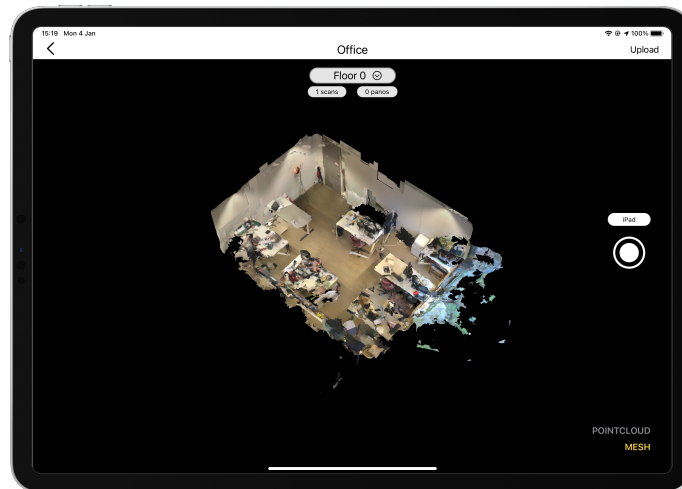


Figure 6: Textured model

4 Adding panoramas

For generating a virtual tour, it is required to take panoramas. Our scanner works with the insta-360 ONE X camera. For the first time, the 360-camera requires to be configured, to do so install the insta-360 app for IOS (<https://apps.apple.com/app/id1491299654>). After opening the Insta-360 app and connecting to the ONE X it is configured. You can now directly connect to the insta-360 ONE X camera by connecting to it in the wifi settings. Follow the following steps to start capturing panorama's:

1. Swipe down in the top-right, and long-press wifi (see figure 7a)
2. Long press wifi -again (see figure 7b)
3. Select One X (see figure 7c)
4. In the WeScan app, select Insta360 for capturing (see figure 7d)

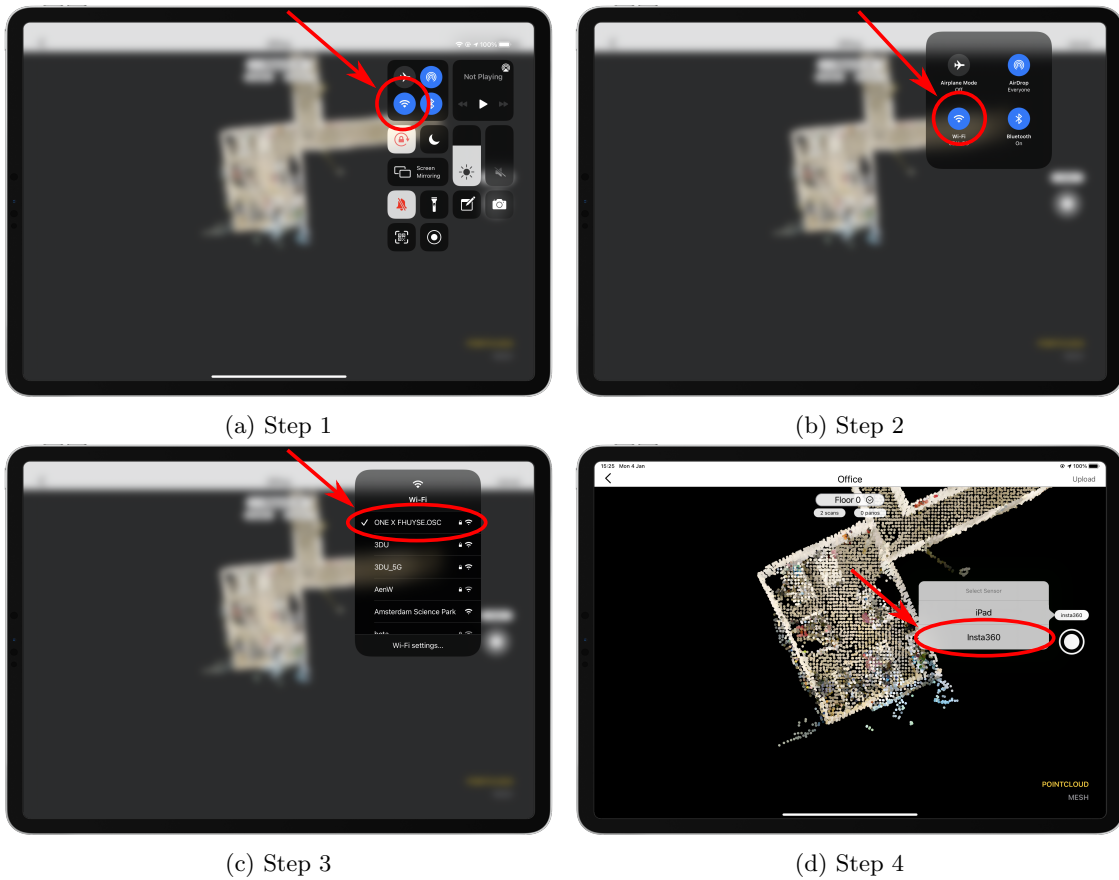


Figure 7: Configuring insta-360 camera

Once Insta360 is selected, you can press the capture button, and wait a few seconds for the panorama to be sent to the iPad. Then drag the blue dot to the correct location on the screen to annotate the panorama-location and press *Save annotations* (see figure 8). The annotation should be accurate within 1.5m, it is important that the annotation matches the room it is taken in, in addition make sure not to annotate too close to the wall (at least 1m from the wall).

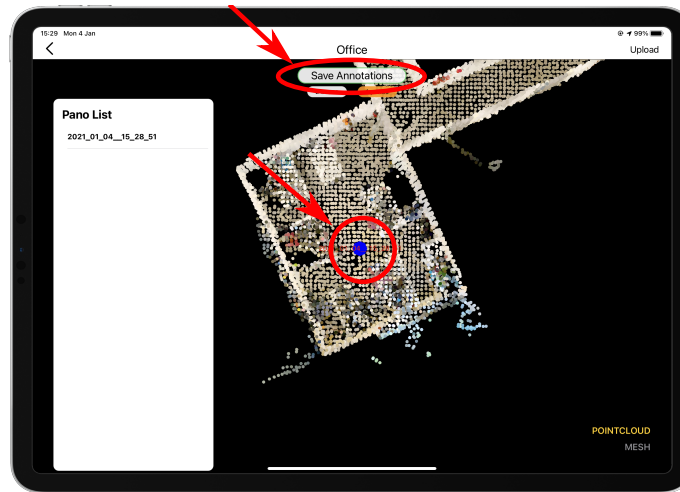


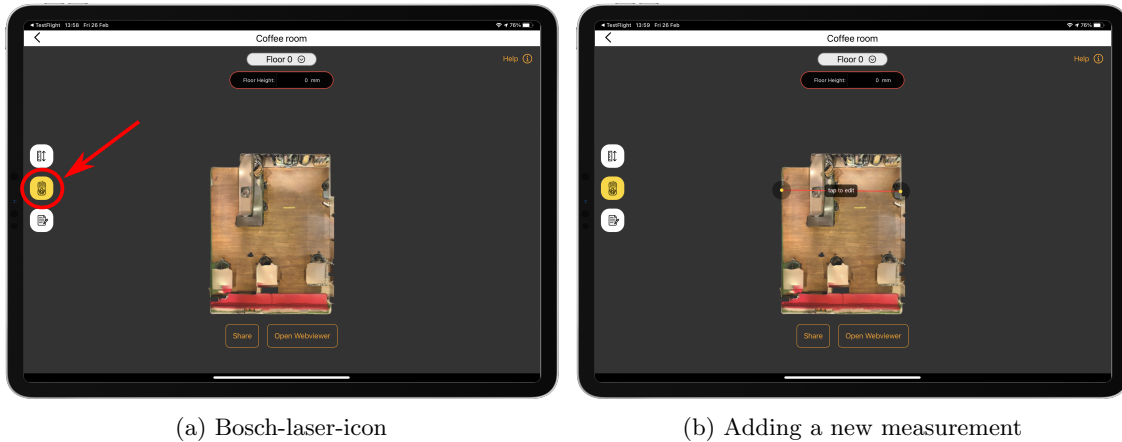
Figure 8: Adding panorama's

When capturing panorama's, there are a few things to consider

- Create a panorama for every room, and hallway.
- Make sure you are not captured in the panorama
- For the virtual tour it is best to create panorama's in a natural walking path. E.g. that for every panorama you take there is at least 1 other panorama location that can be seen from that location. This is to prevent panorama's being behind walls in the virtual tour.

4.1 Adding laser measurements

To improve the quality of the model, we recommend adding a few laser measurements. These measurements will be used to calibrate the 3D model accordingly. Adding these can be done through the app by pressing on the bosch-laser-icon on the left (see figure 9a). Afterwards simply drag on the screen to add the measurement between 2 walls. The best results can be achieved by performing about 2-3 measurements on every floor, in addition to having 2 extra measurements for challenging rooms such as a bathroom. In general it is best to simply take the length and the width of a floor if possible, or otherwise the largest 2 distances on that floor.



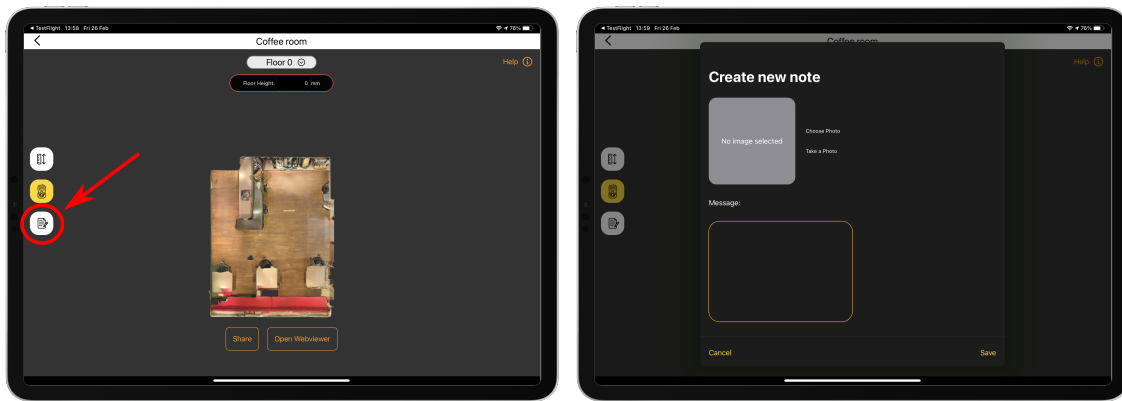
(a) Bosch-laser-icon

(b) Adding a new measurement

Figure 9: Adding manual laser measurements

4.2 Adding notes

For situations where you may want to add notes to the floor, you can do so within the app by pressing on the notes-button on the bottom left (see figure 10a). For houses with more than 1 floor that don't align well, it is best to take a picture from the outside of the house to show such differences between the floors. To add more than one note per floor, it is best to edit a previous note and add the messages there.



(a) Notes-icon

(b) Adding a new note

Figure 10: Adding notes to a floor

5 Improving model quality

Within the weScan app you can increase the quality of the model, select *"Improve Mesh Quality"* after you have finished a scan. Select one of the options for remeshing; *Low-*, *Medium-* or *High-*

quality. This make take several minutes time to finalise depending on the size of the model. After remeshing the model can be textured as well.

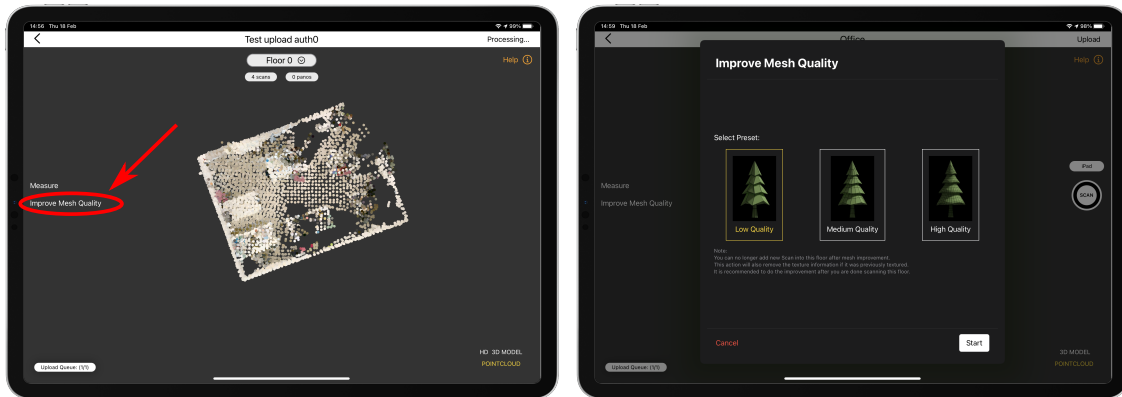


Figure 11: Improving mesh quality

6 Uploading

Once you have completed scanning the house, it is time to upload. Make sure you are connected to a wifi network, and press the upload button which can be found in the floor-view (see figure 12). When the model is fully uploaded, we will be able to process the scan within 3 working days. Once everything is finished processin you can see the *HD* version in the app. (see figure 13).

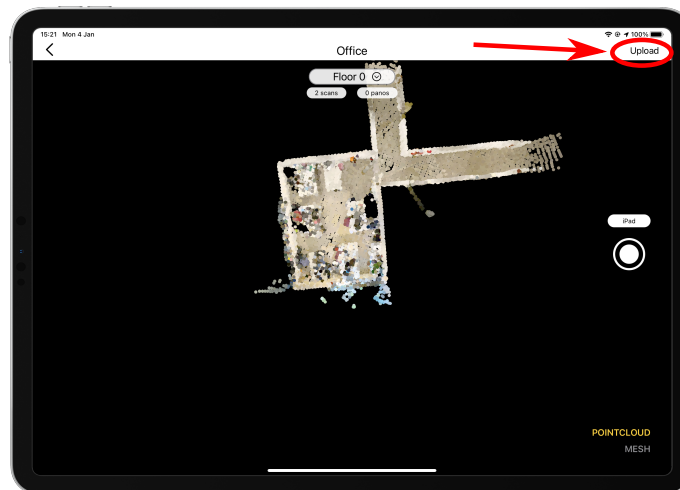


Figure 12: Uploading



Figure 13: weScan Webviewer