



## What will ATLANTIS look like?

ATLANTIS Public Report Nr. 4	
Project:	ATLANTIS – AuThoring toolL for indoor Augmented and dimiNished realiTy experienceS
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Abstract:	This report describes the initial design work that has been conducted in the project and key design ideas/principles. A series of wireframe prototype illustrations are also included.

## Introduction

Ensuring the highest level of User Experience (UX) in ATLANTIS user interfaces has been identified as a key success factor for the project. It is of the utmost importance to have a design process that is highly user-centric and, furthermore, adapted to suit the nature of the target users and the manner in which it is possible for them to participate.

The ATLANTIS user-centred design process is based on ISO 9241-210 (“Human-centred design for interactive systems”) and includes four types of activities that are carried out in an iterative fashion, with the cycle being repeated until usability objectives have been attained. This is illustrated in the figure below.

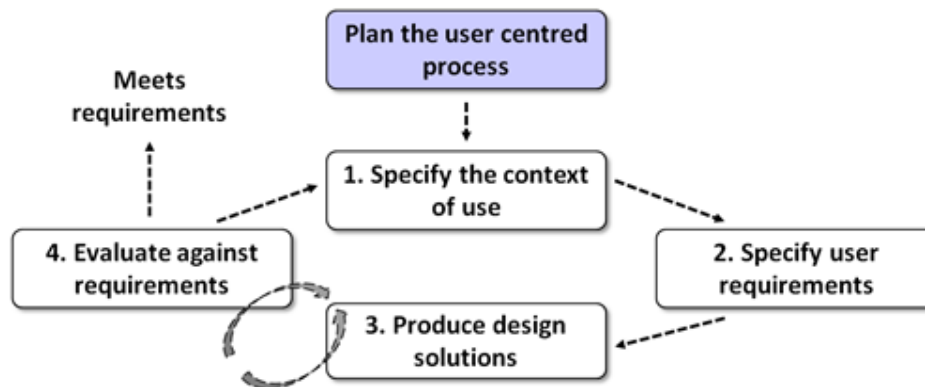


Figure 1: The ATLANTIS user-centred design process in accordance with ISO 9241-210.

The whole process is iterative, especially so during design work where user testing will be used extensively to gather feedback on the design and provide objective data for design implementation decisions.

## Key design ideas/principles

Based on earlier work with identifying users and their needs (see earlier public reports from the project), a number of key design ideas/principles were identified in the ATLANTIS UX design.

### Simple and intuitive – “install and use”

The solution to be developed will be based on a mobile app (a desktop variant may also be developed later but not within the scope of the project). It almost goes without saying that, at least from the perspective of home users, the solution must be simple to get started with and highly intuitive in use.

One important consequence of this is that any complex operations that users need to perform (e.g. the scanning of a room, which inevitably will have to be done in a certain way) will require simple step-by-step guidance as the operations are performed. Another consequence is that the interface will need to be kept ‘clean’ – given both the nature of the users and the platform (potentially a small mobile screen) then functionality must be discoverable but at the same time not visually cluttering up the interface.

Also in the case of many of the professional users it is unlikely that they are going to be prepared to devote significant time to learning to use the mobile app. At least in the first instance this will be a complement to the other tools that they use in their work.

## Combined AR authoring and AR experience

Earlier user requirements work has highlighted the need for an integrated/combined AR authoring and AR experience – in user interface work these need to be tackled together, not as separate interfaces. This is likely to be one of the most demanding aspects in achieving a simple yet powerful user interface design.

The scene capture process, whilst somewhat separate in nature, will also need to integrate with this and consideration given to eventual ‘re-scanning’ of rooms (if things change) and combining scans from different viewpoints. Indeed, one of the central parts of the design concept will be how it deals with the different views on rooms that may be required for room/scene capture vs authoring vs viewing/experiencing (as at least in some cases these are unlikely to be the same).

## Handle the whole home

The design concept needs to consider the whole home and not only individual rooms. This has several consequences for the user interface:

- Different rooms have different characteristics and users will want to work with them in different ways. Living rooms, which are the most common room type worked with in Roomle’s existing tool, can for the most part be designed with a few centimetres of accuracy. Kitchens often require a much higher degree of accuracy due to the nature of fitted cupboards, pipework, etc.
- Users want to see how the rooms relate – i.e. the floorplan (or multiple floorplans, where a home is over multiple floors). In larger interior design and/or renovation projects then several rooms may be worked with at the same time and users may want to coordinate design and furnishing between the rooms as well as easily navigate between them.



## **Aid re-use as well as starting from scratch**

Home re-design and furnishing projects vary greatly, as demonstrated by the user requirements work and resulting personas. Small projects may involve adding or changing one item of furniture and larger projects may involve complete re-decoration and a complete change of furniture. The design concept will address this complete range – i.e. it should be simple to make small changes (possibly only making small complements to existing furniture), whilst also not being cumbersome when emptying the whole room of all furniture and adding in groups of new furniture.

## **Support exploration of alternatives**

One of the main reasons for having an interior design/planning tool is to explore different options before committing to a particular design and/or set of furniture. The design concept will address this through automatically providing a range of different suggestions based on characteristics of the room and eventual preferences of the user. It will be possible for users to work with multiple designs/layouts for a room and to directly change between them when viewing them.

## **Support collaboration**

This can be both about professional-consumer collaboration (where an interior designer shares designs with a customer and they interact with them and provide feedback), collaboration between members of a household (working on designs together), as well as informal collaboration (e.g. where a user shares ideas with a friend or colleague to get their opinions). The design concept will address how this collaboration can be facilitated and managed.

## **Recognise and build on key advantages for users**

The main goal of ATLANTIS is to enable the authoring of AR experiences within real-world scenes which in itself will provide a number of important benefits to how users will be able to interact with, and experience, interior designs.

The importance of the DR functionality used in conjunction with AR is not to be underestimated as one of the key enablers in AR interior planning. In most solutions today then AR, at best, can be used to see how one or a few individual items of furniture look when placed in a free area of floor space in a room. For users to see how these will look where they actually would place them (e.g. where other furniture is currently located) can require physically re-organising the room. Consequently, larger scale planning with AR isn't possible (or certainly not realistic). This means that AR as it is used in mobile apps today is of somewhat limited value to home users and rarely used by interior designers. Interior designers may employ VR solutions today – something that to some extent should be possible to replace with the ATLANTIS AR/DR solution (with the time and cost savings this can entail).

However, it is important to recognise that there are other user benefits that result from the application of this technology in the way that is envisaged in ATLANTIS. These include:

- The accuracy of room scans will save time and allow use of the tool in a broader range of situations than existing planning tools. Room scanning will enable whole rooms to be rendered automatically, complete with floorplans, without users needing to take many (or any) measurements.
- Capturing accurate real room scenes in combination with AR/DR and VR views will support other valuable uses than strictly interior design/planning. Two examples of this are communication with workmen (decorators, equipment installers, etc,) and creating virtual home tours.

## Design concept

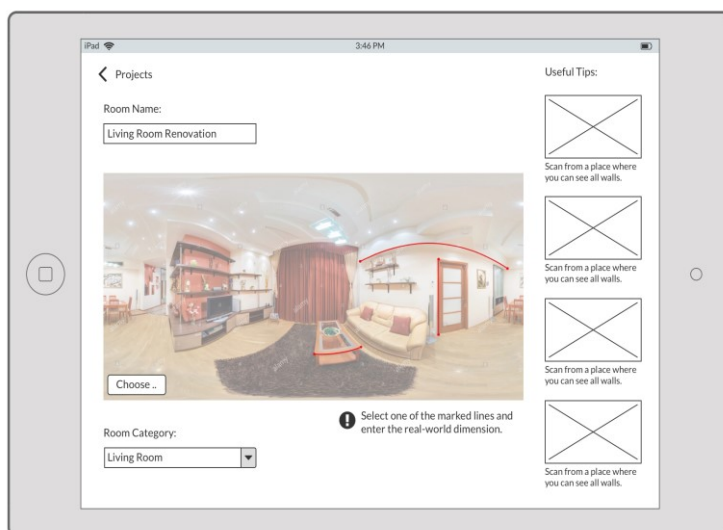
A series of co-design workshops with users were held during November and early December 2020 to ensure an end-user perspective in the initial creative design phases of idea generation, and to explore the potential with different design ideas/directions with users. These were also used to gather more detailed input from users with regard to how certain requirements should be practically addressed in the design. Outputs from these workshops in combination with findings and insights gathered from earlier user requirements gathering work were used to guide the initial design prototyping work.

Below are some example illustrations of the first design, taken from a wireframe prototype (several views have been complemented with examples of real-world images of captured living rooms in or to convey a more realistic understanding of the design concept).

The illustrations below are based on a tablet layout. Design work for small mobile devices (i.e. phones) has not properly started yet - button/control positions should be consistently located with the tablet version although sub-dialogues/menus will need to be rendered somewhat differently.

## Initial wireframe prototype illustrations (examples)

### Scanning and Calibrating a scan

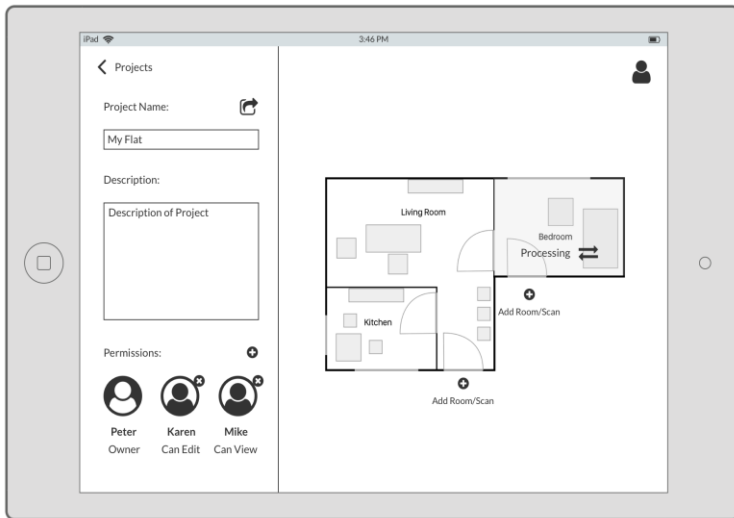


In the first version this dialogue step will be to add/import a scan (e.g. from a 360 degree camera) as an image file. Later, assuming the mobile device's camera is adequate for scanning, direct scanning in the app will be supported.

Tips are provided for how and where to conduct scans, and typical mistakes to avoid.

The user is asked to categorise the room (e.g. living room, bedroom, hallway, kitchen, bathroom,...) so that in later planning work the tool is already aware of the nature of the furnishings likely to be in the room.

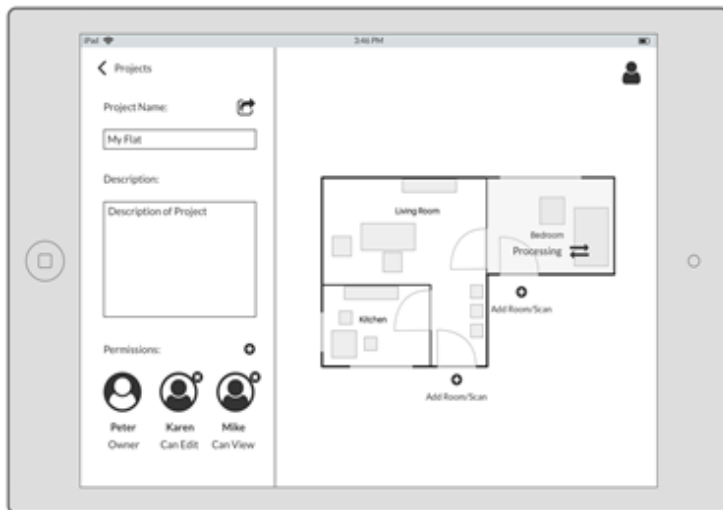
## Project overview



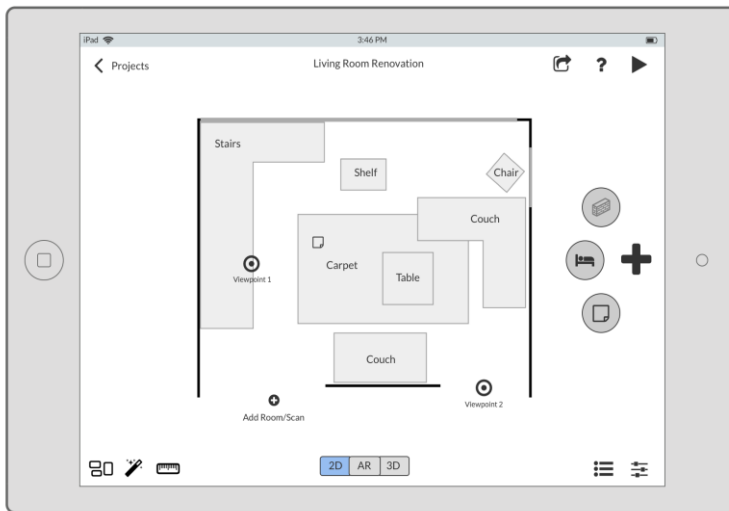
Floorplan (or multiple floorplans if more than one floor) showing relative position of rooms and the connections between them.

Possibility to rearrange the floorplan by dragging rooms around the plan.  
Handling of permissions (when sharing with other users).

Field(s) for metadata which can be important for some users but that doesn't have a bearing on functionality/authoring tasks (e.g. notes about the customer, general style and colour preferences, times of meetings, etc.)



### Authoring view - "Add" menu (+)



The large '+' is used to reduce screen space whilst maintaining a feeling of direct interaction.

All different types of additions to the plan will be handled through this menu, most likely divided up into three categories - items of furniture, notes, and room infrastructure (e.g. walls, doors)

### Authoring view – Main AR[VR] mode



When not on location or when the system is not able to recognise the room, the user is asked to switch to the VR environment to continue authoring (see illustration to the right)

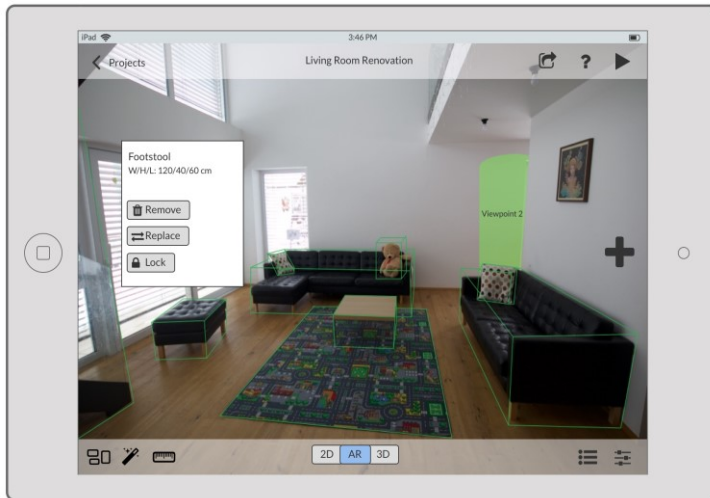
The AR mode will support most authoring tasks though it isn't believed that large amounts of authoring will be done in the AR mode (as the user will need to constantly have the device in front of the scene they are authoring). This view will therefore mainly be used to experience the result of authoring in other views and for smaller changes and detailed adjustments.

The means of interaction with the AR and VR modes will be the same (i.e. different to the 3D mode, which will have virtual controls (discussed later).

Alternative viewpoints that exist will be shown and users will be able to move directly to them by tapping them.

All objects are outlined, indicating that some form of interaction is possible with them.

## Authoring view – Real object interaction

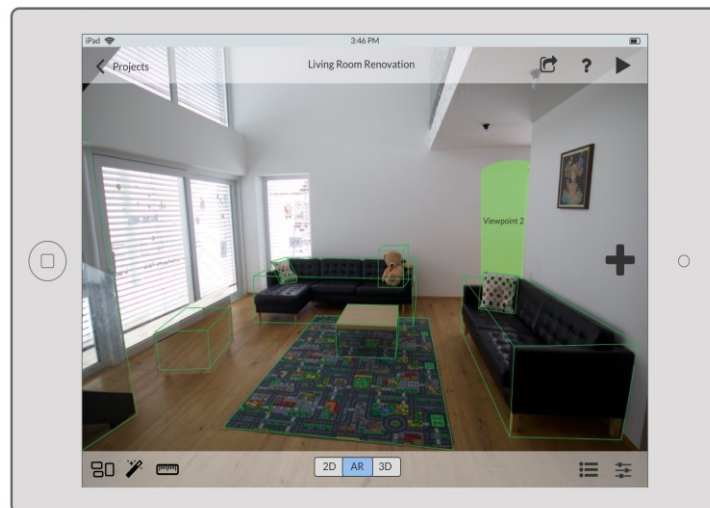


The means of interaction with objects will be the same in AR/VR and 3D modes (as well as 2D, with the exception of vertical positioning).

Selecting any element will display basic metadata, a link to details and action buttons.

Removing an object will result in its bounding box remaining visible (in order to enable it to be put back) but the object itself being diminished (see illustration to the right).

Real objects cannot be significantly moved or rotated without distortion and therefore won't be supported (at least in the first phase of development, and even later on if there is insufficient scene data to support movement).

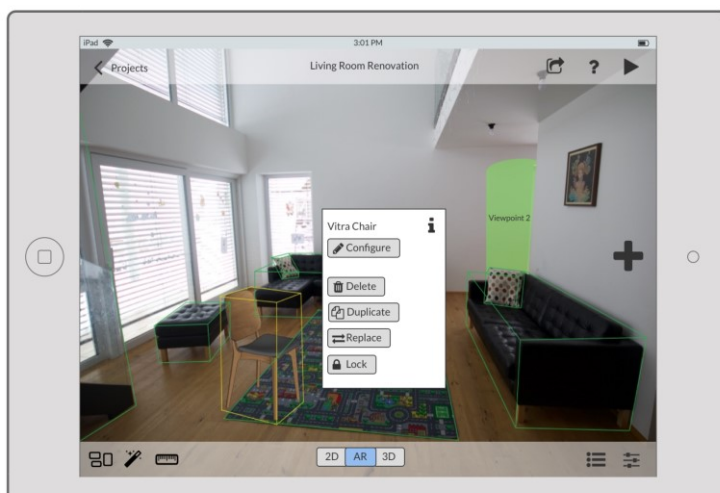


A 'replace' function is provided for convenience – for real objects this will enable removal and addition of a replacement virtual object as one operation (i.e. instead of first having to remove the object and then adding a new one, the user selects an alternative product from the catalogue and the selected real object is automatically diminished and the new augmented object put in its place).

Locking an object prevents it from being moved around – where the user wants to ensure they are not moved, e.g. for items of furniture that are fixed to a wall.

Long-touch will enable multi-select for grouping and operations on multiple objects at once.

## Authoring view – Virtual Objects



Greater interaction is possible with virtual objects – they can be moved and rotated freely and, depending on the object, configured in different ways (e.g. colour scheme, choice of fabric, leg material, etc).

Virtual objects can also be duplicated (to support the efficient addition of multiple items of the same type, such as dining chairs).

A different colour of bounding box is used to distinguish them from real objects.



## Authoring view – View options

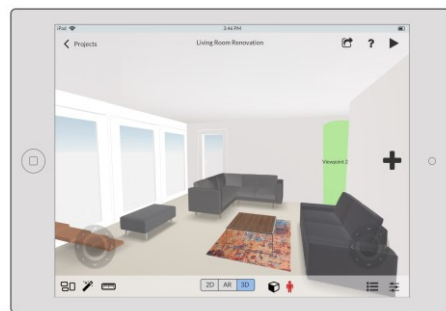


The view options menu (accessed via the icon in the bottom right corner) allows users to focus on particular types of authoring by removing bounding boxes for those not currently being worked with (these elements can then not be interacted with).

In the lower left illustration to the right only the walls, floors and ceiling are outlined and can be interacted with. Real & virtual products are hidden in view options, so the users can concentrate on only walls/floors.

The lower right illustration to the right shows how users could directly apply colour changes to a wall after having selected it in the view.

## Authoring view – 3D mode



Walls, floors, ceilings and virtual objects are all 3D constructed whereas real objects are shown either as generic boxes, or, when sufficient data is available, as 3D objects with mapped texture.

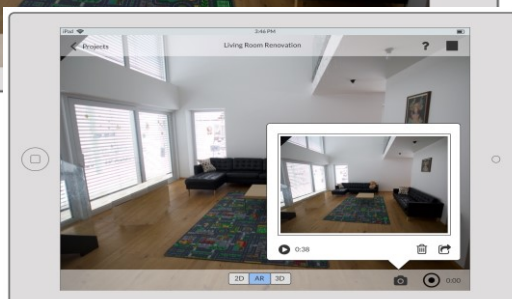
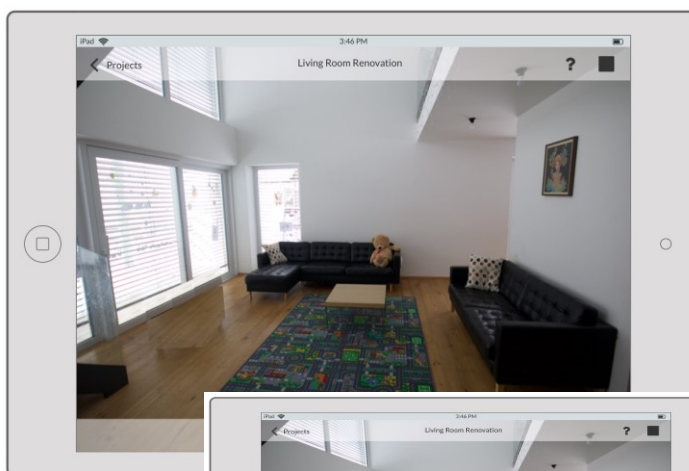
The initial 3D view is the 'dollhouse' view, an overview position. Movement around this view will be using gestures (e.g. swipe, two-finger zoom).

Viewpoints are visualised, and when touched, the view transitions to a first-person view of the selected viewpoint.

Manually switching to first-person view (pressing on the walking man icon) transitions to a view from the nearest viewpoint.

The first-person view (lower image) is primarily for exploring the space (rather than authoring) and it allows free navigation around the room. Virtual controls are used to navigate and it is primarily intended for use when not in the room (e.g. when sitting at a desk).

## Live AR or VR experience view



This mode is entered by tapping the top right 'play' icon and the intention is to provide a clean 'experience' of the room design/plan based on the authoring work that has been done.

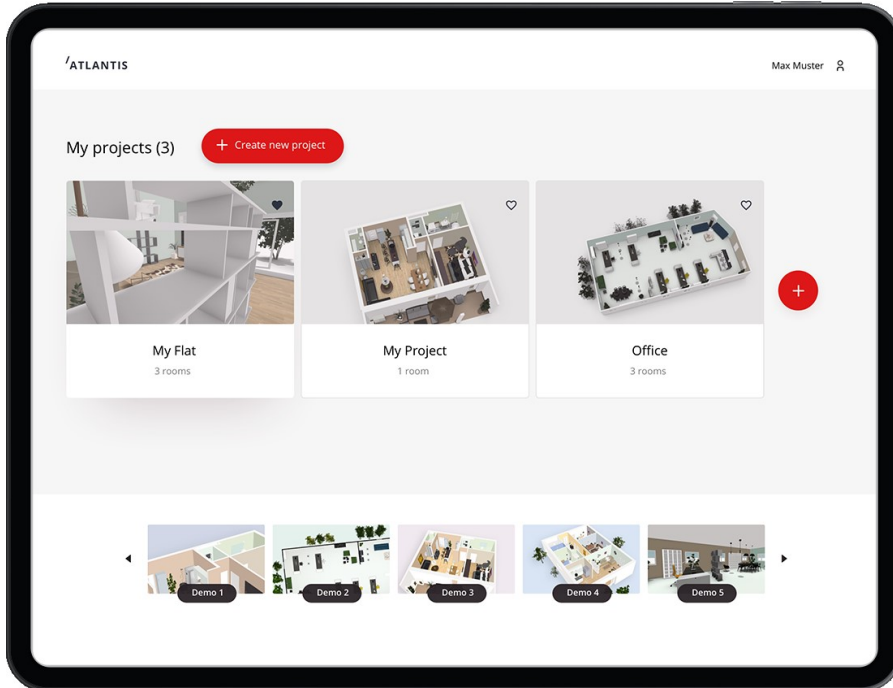
No bounding boxes are visible and no editing or configuration of objects is possible.

Switching to different views is still possible, and if this 'experience mode' is exited then the user is returned to an authoring view which matches the view they last had upon exiting the 'experience mode'.

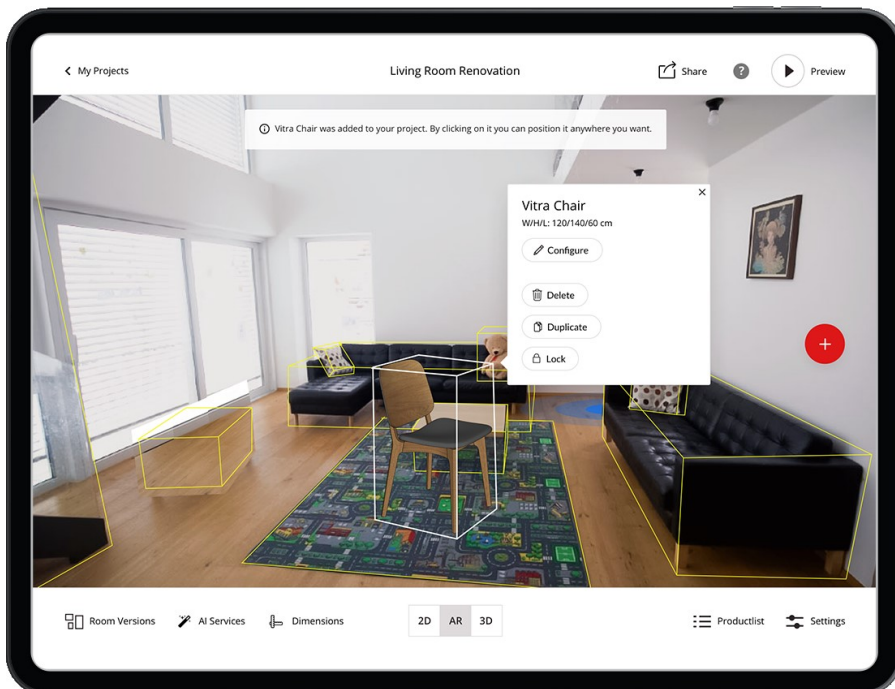
In this mode there are options to take snapshot pictures or record a video with optional microphone recording. This is illustrated in the prototype image shown to the right. (Pictures and videos can then be shared with others, e.g. via social media or email.)

## First Design Studies

**First designs** are currently being tested with users. Below is a sneak peak on what the design prototype will possibly look like:



Dashboard View of 'My projects'



VR View from a selected viewpoint showcasing selected objects as well as diminished objects.

## More information

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