FURNIT-SAVER

Smart Augmented and Virtual Reality Marketplace for Furniture Customisation

D1.2 Application Scenarios Deliverable

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1 FurnIT-SAVER project introduction

The traditional nature of the furniture industry and the limited incorporation of ICT tools have reduced the ability of SMEs in the sector to innovate and respond to the competition coming from larger companies. These specialised furniture shops and small furniture manufacturers have been unable to compete with the economies of scale advantages that larger furniture retailers can offer.

On the other hand, smaller furniture companies can offer higher levels of personalization and quality of customized goods that truly meet customers' preferences and needs which represents a potential competitive advantage over larger furniture providers. Nevertheless, as it is impossible to envisage how the furniture will look and fit into the customers home, customised furniture also bears an expensive risk if the final piece of furniture does not meet the customer's needs or does not complement other furniture. Furthermore, these customised services are predominantly provided on a face-to-face basis in local and fragmented markets which prevents small manufacturers to benefit from ecommerce growth and limit their international reach.

The FURNIT-SAVER project makes use of innovative ICT solutions based on a combination of Virtual and Augmented Reality (VR/AR) technologies, recommendation engines and ecommerce solutions, to produce a smart marketplace for furniture customisation. Customers will be able to select among an extensive furniture catalogue and properties and virtually try the selected pieces in their rooms with three very simple steps: (1) Creating an accurate 3D virtual representation of their place, (2) Trying furniture of different manufacturers in this virtual scenario and get recommendations according to their preferences of a wide range of properties and pieces, and (3) Visualizing the fit of the chosen products in their place using augmented reality.

2 Scope of the document

This document details the application scenarios or use cases representing the different stakeholders, interfaces, tools and environments involved in the usage of the FurnIT-SAVER platform. The deliverable offers a general description of the role of the actors and expected functionalities that will be used in the validation workpackage (WP4). The application scenarios defined in this document will set the basis to identify and describe the business cases behind FurnIT-SAVER platform in WP5.

The document is structured as follows:

- Section 3 presents the different possible roles of the users
- Section 4 defines the range of actions that can be performed with the platform
- Section 5 names the different devices and interfaces that can be used to access the platform and perform the different actions
- Section 6 describes the places where the actions can take place
- Section 7 defines the four different application scenarios that cover the main relevant relations among the previous items (users, actions, devices, interfaces and places) for the project

3 Roles – Type of users

The project has several roles or type of users described below:

- **Purchaser**: The purchaser wants to buy furniture. This type of user could be divided into:
    - **Personal purchaser**: individuals, usually buying home furniture pieces, that can use the marketplace to visualize and make easier the buying process. These personal purchasers can use the FurnIT-SAVER marketplace tools at home until finalising the buying process and/or use the marketplace tools at home and go to the furniture shop to see and touch the real furniture pieces and finish the buying process there, and/or come back at home after touching the real furniture pieces at the furniture shop and finish the buying process at home, once they visualize how the furniture fits in the real place using the augmented reality environment
    - **Professional purchaser**: expert (architect, interior designer, etc.) that helps enterprises and/or personal purchasers furnishing spaces. They can do the same activities as the personal purchasers, but from a professional point of view
- **Furniture salesperson** (furniture retailers): salespersons who sell furniture in furniture shops. They should help the furniture purchasers to define the room layout where to place the furniture using some marketplace tools and/or explaining the "final user" how to use the platform and mobile applications and virtual and augmented reality environments
- **Furniture Manufacturer**: manufacturers managing their furniture pieces and attributes catalogue to be used by the purchasers in the marketplace platform

4 Actions

This section shows an overview of the main actions that can take place in the different scenarios with the FurnIT-SAVER marketplace. The following actions are independent of the type of user and room to be furnished and define the main workflow for each scenario.

4.1 Purchaser registration

The potential customer introduces some data such as username, password and email to become a registered user in the platform and generate a user personal area. This activity should be quick and simple in order to make this step easy for the purchaser

4.2 Profile definition and preferences

This action consists on the introduction of complementary personal data by the user in order to define its profile. The type of information can include demographic information, family status, academic background and more specific about furniture: colours, styles, finishes, etc.

4.3 Mapping Room Layout

In this action the user maps the layout of the room to be furnished. This layout can be obtained using a mobile app which requires the user to be physically in the targeted space or through a web-based drawing tool which only requires specific knowledge about the floorplan measurements of the room.

4.4 Virtual Reality Environment (VRE)

Users can see their room with the selected furniture inside in a virtual reality environment. This virtual environment allows moving and changing some furniture attributes, add/delete furniture pieces and/or use the recommender engine for adding new furniture pieces. Both the room and the furniture are 3D virtual models.

4.5 Augmented Reality Environment (ARE)

In this action the users can see the selected furniture inside the real room using the augmented reality environment by placing a printed mark in the targeted space. This environment allows moving and changing the selected furniture into the real room. In this environment the room is real and the furniture virtual.

5 Devices and interfaces

This section names the different devices and interfaces that can be used to access the platform and perform the different actions:

- **Mobile devices (Smartphone, Tablet, Phablet**)
- **Desktop computer or laptop (PC)**

The following table shows the possibilities between the activities and the devices.

	Registration	*Profile*	*Layout - Mobile App*	*Layout - Drawing Tool*	*Virtual Reality*	*Augmented Reality*
Mobile Device (Phone, Tablet, …)	O	O	M			M
PC	O	O		M	M	

M: Mandatory // O: Optional

The **registration** action can be done using any mobile device such as a table and/or a mobile phone, but can be done in a PC environment as well. The **profile definition and preferences specification** can also be done independently through the PC of the mobile devices as long as the platoform is responsive and offers a good portable device experience. The **layout mapping** depends on the device: in case the users use the mobile application to define the layout, the mandatory device to do that is the mobile device. On the other hand, the alternative/complementary possibility of using the drawing tool must be performed in a PC environment with no alternative. The **virtual reality environment** and the recommender must be managed using a PC where to see the virtual place and virtual furniture. Finally, the **augmented reality environment** action must be performed in the final room with a mobile device in order to see the virtual furniture in the real place.

6 Places

The following table shows the real places where to carry out the different scenarios:

	Registration	*Profile*	*Layout - Mobile App*	*Layout - Drawing Tool*	*Virtual Reality*	*Augmented Reality*
Home	O	O	M	O	O	M
Furniture Shop	O	O		O	O	

M: Mandatory // O: Optional

- **Home (meaning where the final furniture will be located):** All the activities can be done at home, but it is mandatory to do the following activities:
    - Mapping the layout of the room to be furnished using the mobile device application
    - Using the Augmented Reality Application to see the virtual furniture in the real room to be located
- **Funiture Shop:** The layout definition using the mobile application and the use of the augmented reality in the final place to be furnished do not apply in this place (this makes sense only in case that the salesperson explains the purchaser how to use them). All the other actions are optional in this place, but the added value is that the purchaser could be helped by the furniture salesperson.

Obviously, the same actions that can be done at the furniture shop could be done in any other place, as well.

7 Application scenarios

The following are the four application scenarios relevant for the validation and exploitation of FurnIT-SAVER platform capabilities.

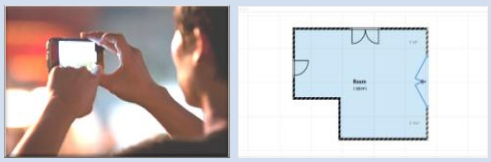
7.1 Scenario 1: Furnishing online a domestic space

Description of the scenario and actors involved: In this scenario a domestic user furnishes the living room of an accommodation using only the online capabilities of the FurnIT-SAVER marketplace, i.e. without attending a physical furniture retailer. The stakeholders involved are a domestic user, a furniture ecommerce company and furniture manufacturers.

Scenario workflow

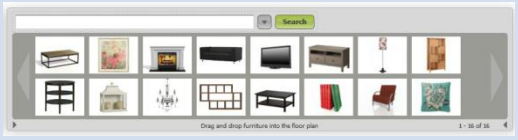
The domestic user or personal purchaser accesses to the marketplace and registers introducing basic data such as email and password

The user will be asked about their preferences with a short user-friendly survey



The user maps the room layout through the mobile app or the web-based application at home and upload it to the marketplace

The user runs the virtual reality environment and places 3D models of the desired furniture into the 3D room layout



The system learns about the user's preferences and provides recommendations of similar or complementary furniture pieces

The user exports the list of selected furniture and visualize it at home by placing a printed mark in the desired space

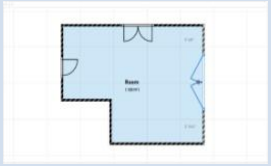
7.2 Scenario 2: Furnishing a domestic space with the support of a retail shop

Description of the scenario and actors involved: In this scenario a domestic user furnishes the living room of an accommodation attending to a furniture retailer and using the online capabilities of the FurnIT-SAVER marketplace to visualize the chosen furniture and add or modify new furniture pieces to the purchasing list. The stakeholders involved are a domestic user, a furniture ecommerce company, and furniture manufacturers.

Scenario workflow

The domestic user or personal purchaser is introduced to the marketplace by a furniture salesperson and registers with basic personal data

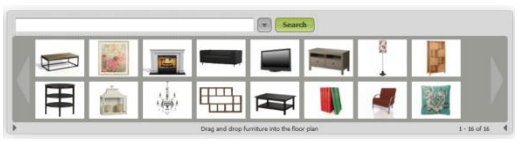
The user will be asked about their preferences with a short user-friendly survey



The user creates a room layout of his room through the web-based application at the shop and upload it to the marketplace

The user runs the virtual reality environment and places 3D models of the desired furniture into the 3D room layout while he can see the furniture in the shop

Once at home the user accesses the marketplace and runs its virtual reality session to modify or add new pieces to the list of selected furniture.



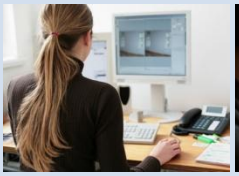
The system learns about the user's preferences and provides recommendations of similar or complementary furniture pieces

The user exports the list of selected furniture and visualize it at home by placing a printed mark in the desired space

7.3 Scenario 3: Furnishing online an office or a hotel by a professional user

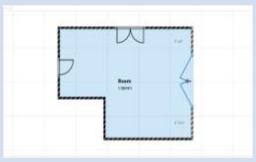
Description of the scenario and actors involved: In this scenario a professional user, namely an interior designer or architect uses the platform online to furnish one or several hotel rooms or an office space. The professional user will get recommendations based on their choices and will not make use of the augmented reality capabilities of the platform. A professional user, a furniture ecommerce company and furniture manufacturers should be part of this scenario.

Scenario workflow



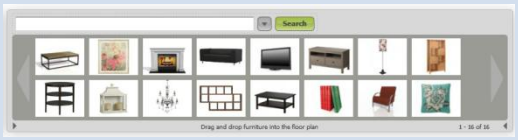

The professional user accesses to the marketplace and registers introducing basic data such as email and password

The user will be asked about their preferences with a short user-friendly survey




The user creates one or several room layouts through the web-based application or uploading 2D files into the marketplace

The user runs the virtual reality environment and places 3D models of the desired furniture into one of the 3D room layout and repeat it for the rest of layouts



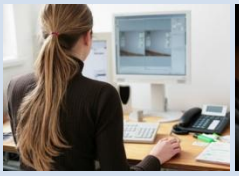
The system learns about the user's preferences and provides recommendations of similar or complementary furniture pieces


The user exports the 3D design and the list of selected furniture to present it to the clients

7.4 Scenario 4: Furnishing hotel rooms or office spaces by a professional users with the support of a retail shop

Description of the scenario and actors involved: In this scenario a professional user makes use of the platform to visualize and get recommendations of possible furniture. The user captures one or several room layouts using the mobile app or through the web-based application. Then the user can visit a manufacturer to see the furniture. Finally, the user shows the final results to the client. The involved stakeholders are the professional user, a furniture ecommerce company and the furniture manufacturers.

Scenario workflow

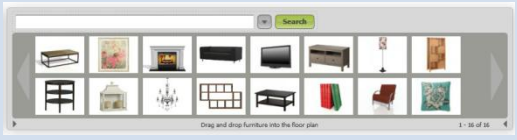



The professional user accesses to the marketplace and registers introducing basic data such as email and password

The user will be asked about their preferences with a short user-friendly survey


The user creates one or several room layouts through the mobile app or the web-based application or uploading 2D files into the marketplace

The user runs the virtual reality environment and places 3D models of the desired furniture into one of the 3D room layout and repeat it for the rest of layouts



The system learns about the user's preferences and provides recommendations of similar or complementary furniture pieces

The user runs the virtual reality environment and add or modify the list of selected 3D models while he can see the furniture in the shop

The user exports the list of selected furniture and visualize it at the client's hotel or offices by placing a printed mark in the desired space