D2.3 Social Platform Design and Specification

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EXECUTIVE SUMMARY

The Description of Action states a base architecture for the development of PLUGGY, which includes three main modules: A Social Platform, a Curatorial Tool and a Content Management System. D2.3 "Social Platform Design & Specifications" is intended to be the reference document for the development of the Social Platform modules. It centralises the requirements that this module will satisfy and the decision processes that have led to these requirements. To remain useful for the developers in the project, it is meant to be a live document,which is released early in the project as a draft, at MS3, and updated over the duration of WP2 until its official delivery in M18. The deliverable uses a combination of text, UML diagrams, and graphics to illustrate user interface design decisions.

In exactly the same fashion, D2.4 is intended to be the reference document for the development of the Curatorial Platform module. Both modules constitute the front end of the PLUGGY website, which will appear to the novice user as a single application. For this reason, initial release of deliverables D2.3 and D2.4 was done in an aggregated single draft, which is now split into both deliverables for their official submission.

1   Introduction

1.1   PURPOSE OF THE DOCUMENT

The Deliverable 2.3 "Social Platform Design & Specifications" is intended to contain the specifications of the Social Platform. The deliverable is organised in four sections:

- Section 1 is the introduction.
- Section 2 reviews the processes followed to elicit the requirements and create the design.
- Section 3 presents the requirements and their analysis, to which all the partners have contributed, from different perspectives.
- Section 4 illustrates the design of the user interfaces via conceptual, low-fidelity prototypes.

Requirement analysis (Section 3) and prototype design (Sections 2 and 4) have been iterative processes that span activities performed mainly within WP2, but also in other Work Packages, as described later in Section 1.3 *Relation with other PLUGGY deliverables*.

1.2   INTENDED READERSHIP

This deliverable is flagged as public, and, as such, will be distributed beyond the boundaries of the PLUGGY consortium. At the same time, this deliverable must contain technical information to support the development of the PLUGGY modules. We have thus tried to reach a balance between the language and formalisms used in technical specifications and a communication style suitable for a non-specialist audience.

1.3   RELATION WITH OTHER PLUGGY DELIVERABLES

All deliverables in WP2 are interrelated as they specify what can be seen as one system, that will be developed by the PLUGGY project. In particular:

- **D2.1** "Faro Research and ICT implementation" establishes Guidelines for PLUGGY, a set of high-level, stakeholder requirements and rationales for the system requirements to be satisfied in PLUGGY.
- **D2.2** "Users Engagement" produced a set of recommendations, which are taken into account in the design and implementation of the Social Platform.
- **D2.3** and **D2.4** specify two strongly interlinked subsystems, the Social Platform and the Curatorial Tool. As specified by the System Architecture, both constitute the front-end of a single website and thus the frontiers between them are initially blurred. Both deliverables were drafted initially in a joint document.
- **D2.5** "IPR Report" researched the possible licenses to be used by the Social Platform.

The specifications and design contained in these deliverables inform the development of the PLUGGY modules which are delivered in WP3:

- **D3.1** "Architecture Specification" establishes the System Architecture, which includes the organisation in logical components of the system to be developed in PLUGGY. The D3.1 deliverable contains specifications for the main modules of the system including the Social Platform and the Curatorial Tool.
- **D3.2** and **D3.3** are the implementation of the Social Platform and Curatorial Tool and thus are based on these deliverables. Section 5 illustrates the Conceptual Prototypes of these implementations.

WP2 has used the concept of Personas to analyse scenarios which result into use cases and eventually, requirements for the modules of the system. These same personas are used by WP6 Evaluation for evaluation tasks and overall goals tasks and overall goals, reported in D6.1 Evaluation and validation plan.

1.4   ACRONYMS AND ABBREVIATIONS

Abbreviation	Description
DoA	Description of Action document.
SP	Social Platform.
WP2	Work Package 2, Social Interaction design and specifications.
WP3	Work Package 3, Social Platform and Curatorial Tool Implementation.
WP6	Work Package 6, Evaluation and Validation of Usability and Utility.
WP7	Work Package 7, Communication and dissemination.
DoA	Description of Action document.
SP	Social Platform.

2   Methodology overview

Two of the main products of this Work Package are the set of **requirements** for the components of the PLUGGY system and the **user interface prototypes**. The requirements describe the features of PLUGGY in terms of what PLUGGY must do and how it must do it. The set of requirements was bootstrapped using information from the Description of Action and the literature review followed by an iterative loop between requirements and architecture:
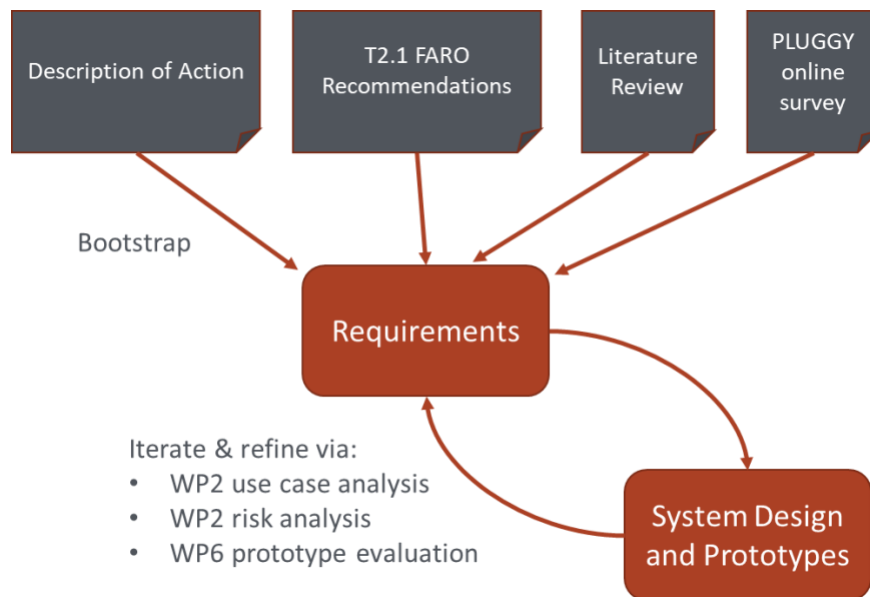
Figure 1. Requirements Process Overview

The **Description of Action** document (DoA) provides an initial design or Base Architecture, which organises the PLUGGY system into a set of logical components. Task T2.1 **Faro Research and ICT Recommendations** also identifies key stakeholder requirements. Literature review on current expectations from social platforms helps creating an initial set of high level user requirements, which is completed with the analysis of existing implementations and reusable components, and the **PLUGGY online survey**, distributed by WP7.

Within WP2, all the partners in the consortium have assessed this initial list of requirements, from the points of view of end user needs, exploitation impact and implementation effort. Use case analysis has allowed to identify further system requirements, which have been refined via the construction of conceptual prototypes, evaluated in WP6. These analyses together refine the requirements into lower level, smaller requirements useful for planning development, verification and validation tasks.

Within WP3, Requirements are used to track the progress of development. Requirements are not frozen, but continuously updated via assessment, testing and reflection of partners, coordinated within WP3 and WP6, via the early creation of functioning mock-ups of the PLUGGY website.

Requirement elicitation does not start from scratch, but from the concepts included in the **Base Architecture.** This includes the technical decisions taken prior to starting the requirement process. The main reference for the base architecture the Description of Action, and the details on how this architecture has evolved can be consulted in **Deliverable D3.1 Architecture Specification**.

The Base Architecture states that the PLUGGY has two central modules: Social Platform and Curatorial Tool. They organise into an architecture to which Pluggable Apps can connect themselves to allow users to experience the content shared in the Social Platform and curated through the Curatorial Tool.
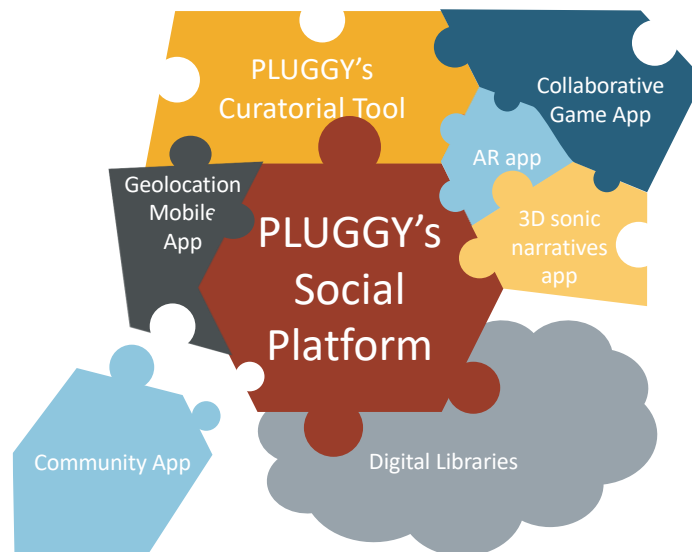
Figure 2. PLUGGY Base Architecture

The Social Platform, Curatorial Tool, and Pluggable Apps are thus present in all the subsequent analyses performed in the Work Package. For example, these concepts are already present in the first Online Questionnaire of PLUGGY performed within WP7, and in the wording of the first System Requirements. The scenarios associated with the different Personas (see next section) are also allocated to these modules, when we imagine that a certain persona first uses the Social Platform to perform a task, then the Curatorial Tool or one of the Pluggable Apps to perform another.

2.1   PERSONAS

WP2 work package has identified basic user types that would use our future PLUGGY platform, in the form of Personas. Personas are a powerful mechanism for participatory design (Grudin & Pruitt, 2002). In Plenary Meetings 1 and 2 the consortium dedicated two workshops to imagine how these typical users would interact with PLUGGY. We created our representation of these different user types or user groups and call them **PLUGGY Personas.**

Our Personas are Aurora**, the collector** and an individual with general interests; Adam, **the cultural traveller**; Jarmila, **the museum curator**; José, **the teacher**; George, **the travel agent**; and Mr. Troll, **the internet troll**[3].

Appendix 1. Personas, Scenarios and Use Cases documents our Personas and their stories while using PLUGGY. This in turn helps identifying use cases and platform requirements for different users in the future and also help to create evaluation scenarios for the platform.

For each Persona, detailed scenarios were created and generalised into **Use Cases.** Use cases describe the way in which PLUGGY will be used. They are small but complete tasks that PLUGGY users will require to perform. They involve a short number of smaller steps to complete, may require initial conditions or states in the system and may leave the system in a different state. Examples of use cases are *"Add an Image to a Collection"*, or *"Create a Collection"*. This analysis can then be generalised into a set of main content management and social interaction use cases of the whole PLUGGY Front-End, useful in the understanding of the overall use of PLUGGY and of placing the Social Platform Front-End in context.
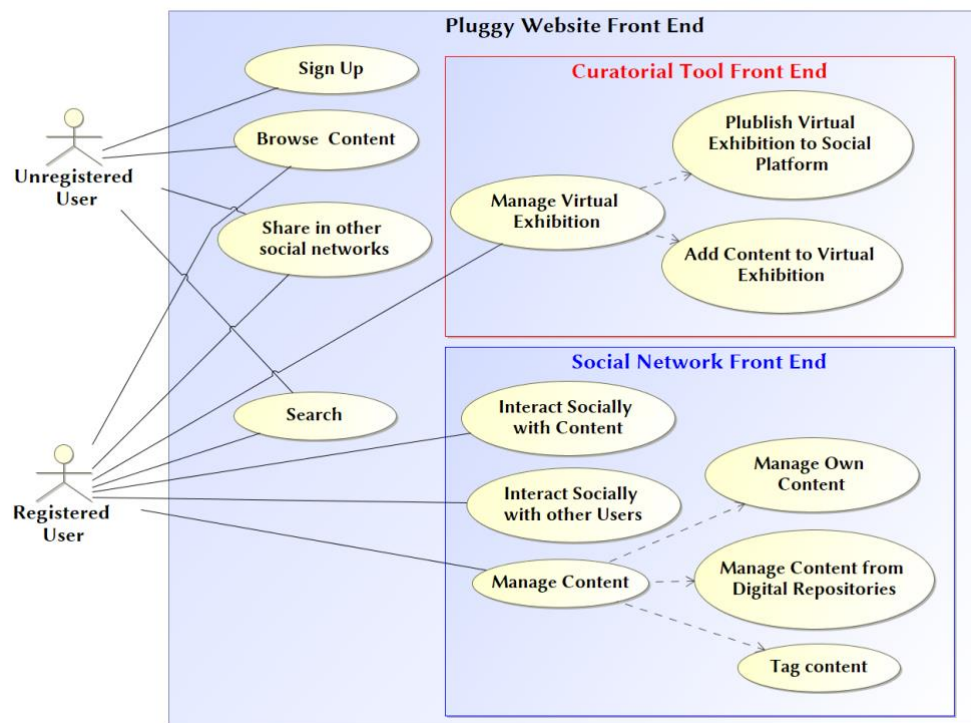
Figure 3. PLUGGY Main Front-end Use Cases

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3 https://en.wikipedia.org/wiki/Internet_troll

2.2   USER INTERFACE PROTOTYPES

Use case analysis allows designing of user interfaces for the Social Platform and Curatorial Tool. This design allows to elicit and identify even more detailed requirements, as well as defining secondary use cases for the system. The **user interface mock-ups** allow creating low fidelity (Pernice, 2016), **conceptual prototypes** in the form of wireframes that illustrate possible user flows, allowing also for early user evaluation of the system, as required by WP6 Evaluation Plan. The conceptual prototypes of the Social Platform are presented in Section

Conceptual prototype of the social platform of this document.

2.3   REQUIREMENTS

The process summarised in this Section allows for the construction of a list of **requirements**, that, together with the conceptual prototypes, can help in planning and tracking development, testing and validation tasks in WP3 and WP6.

The following section overviews the requirement elicitation process, a live process that continues to evolve during the project so as to remain useful and relevant, and a process in which all partners in the consortium have been involved.

3 Requirements

According to the SysML standard, (Object Management Group, 2013) a requirement specifies a capability or condition that must (or should) be satisfied. A requirement may specify a function that a system must perform or a performance condition that a system must satisfy. Requirements are used to establish a contract between the customer (or other stakeholder) and those responsible for designing and implementing the system.

The list of requirements is alive at the writing of this document and evolves during the project to remain useful. The first version of requirements included different types of requirements, which came from different sources. They were analysed in terms of subdivision, priority and feasibility, and mapped from high level, abstract stakeholder needs, into more concrete system requirements that can be verified when the system is implemented. Thus, during the first phase of user requirements gathering, a useful distinction was established between stakeholder needs and requirements on one hand, and system requirements on the other.

The consortium in the project assessed Version 1 of requirements. Each requirement has been patiently assessed by every partner, from three different points of view. Industrial partners in the consortium have chosen, both for every stakeholder and system requirement, whether they expect it to have *low*, *medium* or *high* **exploitation impact** if PLUGGY would satisfy it. As PLUGGY is meant to be for every citizen, all partners have also assessed, from the **end user point of view**, whether they *won't have*, *could have*, *should have* or *must have* every stakeholder or system requirement. Finally, developer partners have estimated whether each system requirement requires *low*, medium or high **implementation effort**. The aggregation of this information allows prioritising and planning development effort in WP3. The process is summarised in Figure 4.
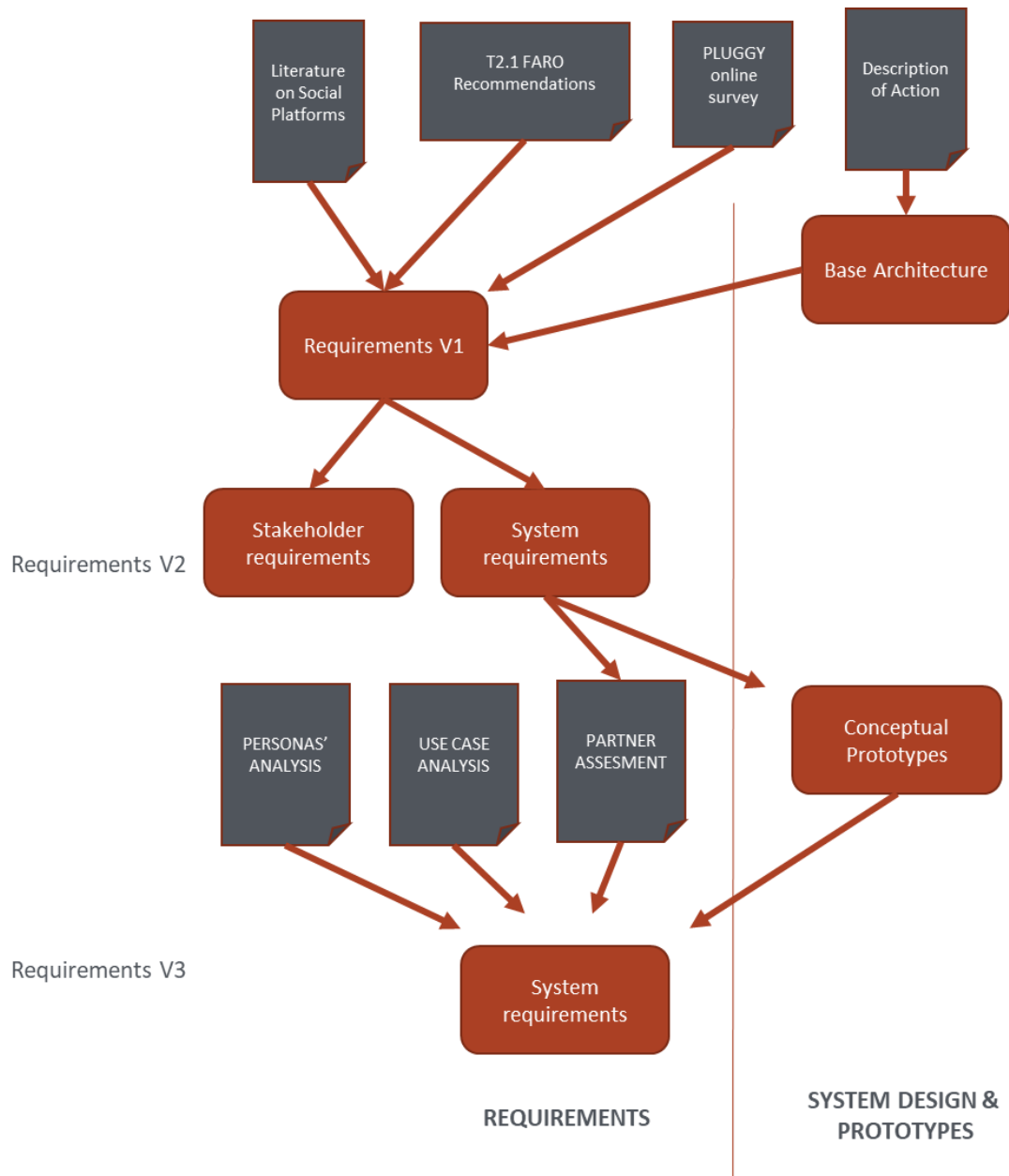
Figure 4. Detail of the first iterations of the Requirements Process

3.1   STAKEHOLDER REQUIREMENTS AND NEEDS

Stakeholder needs may begin with desires or expectations that may contain ambitious or ambiguous statements that are difficult to use in system design and implementation activities. They need to be transformed into **stakeholder requirements** that use more engineering-oriented language and help architecture definition and subsequent requirement activities (SEBoK Authors, 2017). Stakeholder needs, and requirements came from the extensive research conducted within WP2 (T2.1 Faro Research and ICT Recommendations), and the initial surveys conducted in WP7.
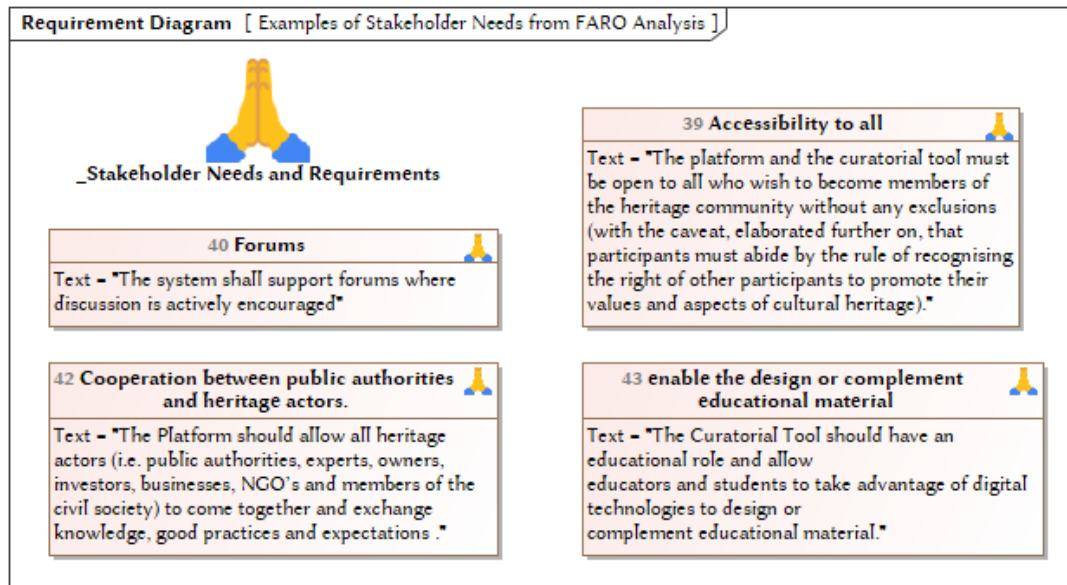
Figure 5. Examples of Stakeholder Needs from FARO Analysis performed in WP2.
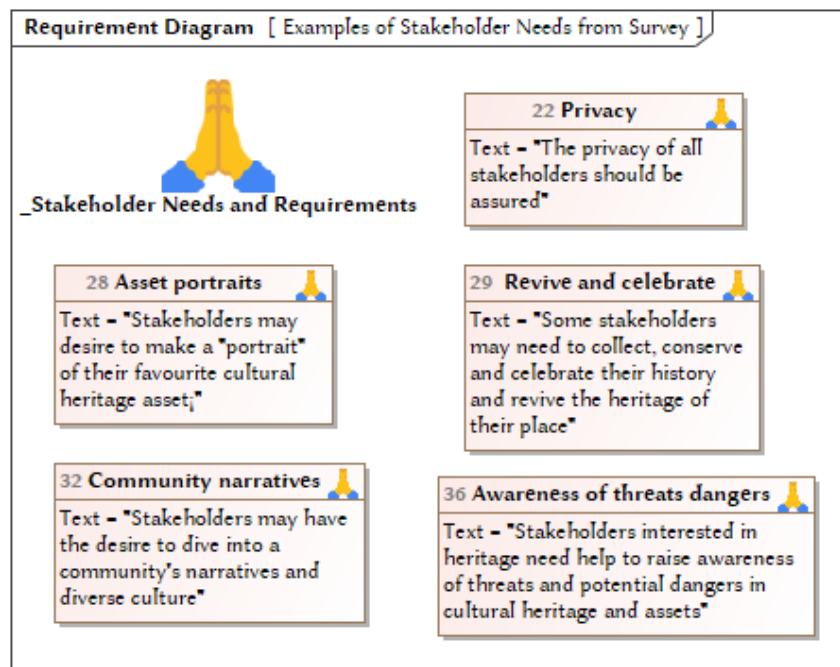
Figure 6. Examples of Stakeholder Needs from Initial Survey realised in WP7.

3.2   SYSTEM REQUIREMENTS

System requirements describe functions which the system as a whole should fulfil to satisfy the stakeholder needs and requirements.

Requirement elicitation starts with large, complex requirements some as the examples show in Figure 7. For example, Req 1. Social Interaction: *"The system shall implement*

features to promote social contacts/relations between users, and interaction between user and content, such as friendship, user groups, recommendations, notifications, favourites and item rating". This is a very complex requirement which contains many **simpler, individual sub-requirements**.
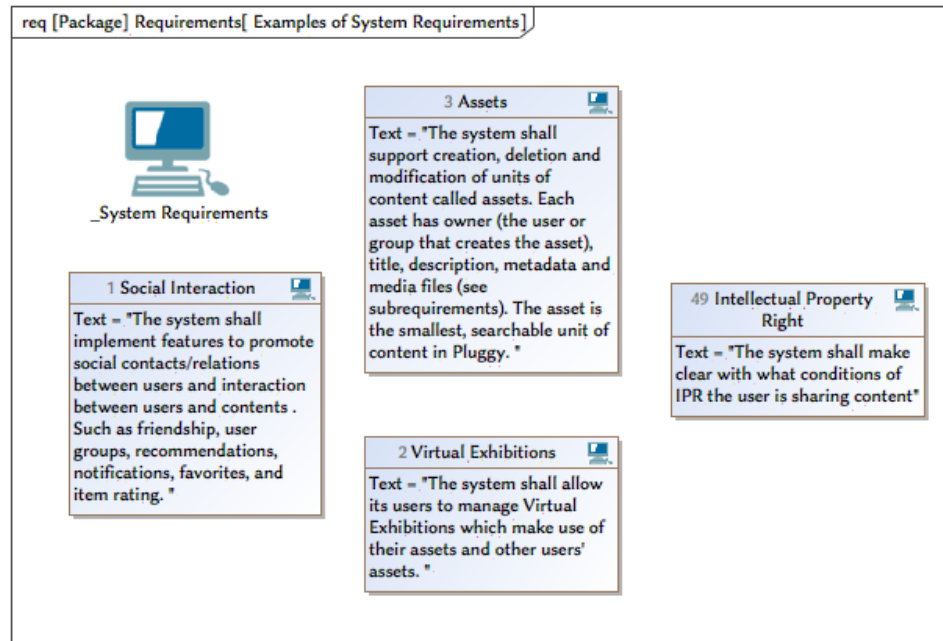
Figure 7. System Requirement Examples

Work within WP2 was devoted to analysing and subdividing the complex system requirements. Continuing with the example, Req. 1 Social Interaction was subdivided into 1.1 User Relations, 1.2 User Interaction, 1.3 Content Interaction, etc (see Figure 8).
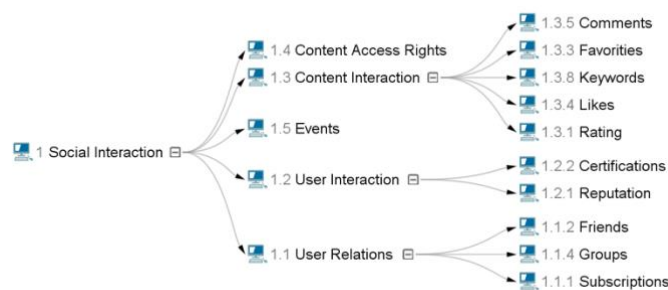
Figure 8. Example of subdivision of System Requirements into simpler, individual requirements.

Subdivision continues until requirements can no longer be subdivided, or it is not practical to do so. The result of this analysis is a **hierarchical tree of requirements**. The deepest nodes of the tree allow for finer tracking of development progress and simpler testing of implementation.

Two main entities emerge from analysis which will organise content into simple Virtual - Assets, and curated Virtual Exhibitions:

3.2.1   Virtual Assets

Virtual Assets (or simply assets) are the main unit of cultural heritage content in the PLUGGY System. An asset offers the user a perspective on a cultural artefact, tangible or intangible. The asset is realised by a media file, or a tightly related set of media files, which share a common set attributes, such as **Title**, **Description**, **Owner** (if any) of the related artefact, **Licence** via which the media content is shared on the PLUGGY System, Keywords to facilitate search, and **Geolocation** of the related artefact.

A number of media file types will be supported by PLUGGY, including: **image** files, **audio** files, **video** files, **3D** (mesh + texture) files and **text** files.

The PLUGGY System shall allow the import of existing assets from **External Asset Repositories**. The main implementation effort shall be devoted to the integration of the **Europeana**[4] Collection. Secondary to Europeana, other available repositories.

Within WP3, Deliverable **D3.1 Architecture Specification** will offer a complete specification of the Asset attribute metadata, and how they map to existing **standardisation** efforts in cultural heritage data exchange. Deliverable **D2.5 IPR Report** specifies the recommendations of the PLUGGY Consortium regarding the type of Licences that PLUGGY will allow users to use. Further below, section Social Platform System Requirements specifies how users interact socially with the assets that other users have uploaded to the platform.

3.2.2   Virtual Exhibitions

In PLUGGY, the users will curate crowdsourced Virtual Exhibitions, which make use of their assets and other users' assets, including assets uploaded by cultural heritage experts and institutions, and assets imported from external asset repositories. Exhibitions can be created collectively by Teams (See Section Social Platform System Requirements). When using an asset, the user curating the exhibition will be able to create an **exhibition point**, which gathers an asset or set of assets around a **narrative story**, a geolocation, and a date.

The PLUGGY System will allow the creation of several types of exhibitions, including **Multimedia** exhibitions, **Timeline** exhibitions, **Map** exhibitions, **VR/AR** exhibitions, **Game** exhibitions and **Soundscape** (spatialised audio) exhibitions. The Curatorial Tool, specified in Deliverable **D2.4 Curatorial Tool Design Specifications**, will allow the creation of these exhibitions, complemented by the Curatorial Apps and Plugins developed in Work Package **WP4 Application Design and Implementation**.

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4 http://www.europeana.eu. Secondary to Europeana, other repositories such as the Wikipedia and Flickr Commons , History Pin, or the Databases of the Instituto Andaluz del Patrimonio Histórico should also be integrated .

3.3   SOCIAL PLATFORM SYSTEM REQUIREMENTS

This section overviews the Social Interaction requirements, which are more relevant to the Social Platform (SP) component of the PLUGGY System, reported in this document.

The main requirement for the Social Platform is **Social Interaction**: The PLUGGY System shall implement features to promote social contacts between users, as well as interaction between users and content, using mechanisms such as friendship, user groups, recommendations, notifications, favourites, and item rating. This requirement is subdivided and analysed in the remaining of this section.

The **focus of PLUGGY is on content** (assets and exhibitions), rather than on the user, which is the focus of many existing popular Social Platforms. This has guided decisions regarding social interactions towards the simpler functionality (e.g. one-way versus two-way friendships) that can support the essential goals of PLUGGY.

3.3.1   User Relations

The SP shall allow the creation and management of relations between users and group of users. This includes:

- **Friends**: The SP shall allow users to make virtual relation of friendship with other users. This will be a **one-way relationship (follow)**, as users while not have private contents to be shared with friends
- **Teams**: The SP shall allow user to create and participate in groups with common interest and content. Teams will be useful for **institutions** or **associations**, whose members or employees will be able to upload content collectively. Every user will be able to be part of multiple teams. Every team will have administrative users, that can manage team members. Every member will be able to create content on behalf of the team, and content created on behalf of the team will be owned by the team.

3.3.2   Content Interaction

The SP shall implement mechanisms to allow and promote interaction between users and the content (assets and exhibitions). This includes all the requirements associated with the management and socialisation of content, such as 'liking', rating or tagging.

- **Rating**: The SP shall allow users to assign a rate to a content, according to a predefined scale of values.
- **Favourites:** The SP shall allow user to mark pieces of content as preferred, so as to see them highlighted or in a special section.
- **Likes:** The SP shall allow users to indicate that they like specific content from other users.
- **Comments**: The system shall allow users to add comments related to a specific content.

- **Report**: The system shall allow user to report inappropriate content (IPR or other) to a PLUGGY authority.
- **Tags:** The system shall allow user to assign various tags or keywords to a content, either from a predefined set or as a free text.
- **Been there**: The system should allow users to indicate that they have been near a specific asset or done an activity closely related to that asset.

3.3.3   User Interaction

The SP shall implement mechanisms to allow and promote interaction between users with the same or different profiles (e.g. citizens and cultural heritage experts). PLUGGY will provide a mechanism to assess the relevance of the content uploaded by users via user interaction. Additionally, to avoid misuse of PLUGGY, a mechanism shall be put in place to report abuse of other users to a PLUGGY authority. In summary:

- **User certification**: The SP shall implement mechanism to allow users to certify and validate other users' content.
- **User reputation**: The SP shall implement a mechanism to measure and show the user overall image in terms of visibility, loyalty and reliability.

3.3.4   Events

The system shall allow users to publish events, and other users to subscribe to them. Subscriptions shall have a "type" attribute that can be "interested" and "will go". When a user subscribes to an event, they are notified of changes to the event.

4 Conceptual prototype of the social platform

In an iterative process between requirement analysis and prototype design, conceptual prototypes for the Social Platform component of the PLUGGY System have been designed and are reported in this document. The prototypes have the form of **wireframe, low-fidelity drawings** of the different screens of the Social Platform front-end (Pernice, 2016).

Appendix 2. Social Platform Conceptual Prototype: Wireframes presents the full design.

This section presents examples of how the prototypes will be navigated by the users, in the form of User Flows. **User flows** are simple diagrams that illustrate the steps involved in achieving a use case by the user. User flows put the front-end prototypes in context; they help experience a process or product without building it.

In this section, we show example user flows for the logged and non-logged user. This wireframe flows are a simple way to visualize the entire user experience and are developed at a high level.

Figure 9 shows the user flow among the main pages for a non-registered user. In the figure, only the main links are explicitly represented for the sake of clarity.
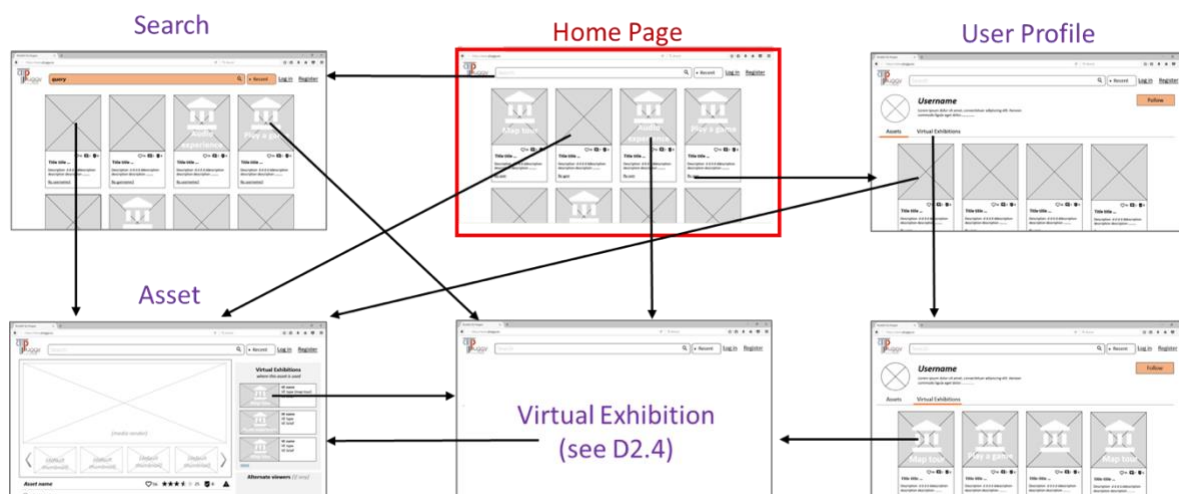
Figure 9. Non-logged user flow diagram. Only some of the possible paths are shown.

The Home page is accessible from all the pages in the platform by just clicking in the upper left logo. The Search screen functions similarly: there is a search box in the upper banner available from every page in the platform through which the user can access the search page by introducing a search string in it.

Assets, and **Exhibitions** are the main entities of the PLUGGY Data Model (See Deliverable D3.1 for the details of the PLUGGY Data Model). Every time an exhibition or asset is presented, its owner is shown as a link which will lead to that user profile, whether it is an individual or a group. User profile content is organised by assets and virtual exhibitions.

Besides these implicit links, Figure 9 shows how assets and virtual exhibitions are linked from the home page or the search results. In addition, assets are linked from exhibitions and the asset page gives also access to the exhibitions to which it belongs.

Figure 10 shows a specific area of the user flow possibilities, once they are logged in. In every page (Home Page in the example of Figure 10), there is a menu with all the available

options for the use. One of them is My Assets. This link leads to the page where the user can administer their assets, editing them or creating a new one.
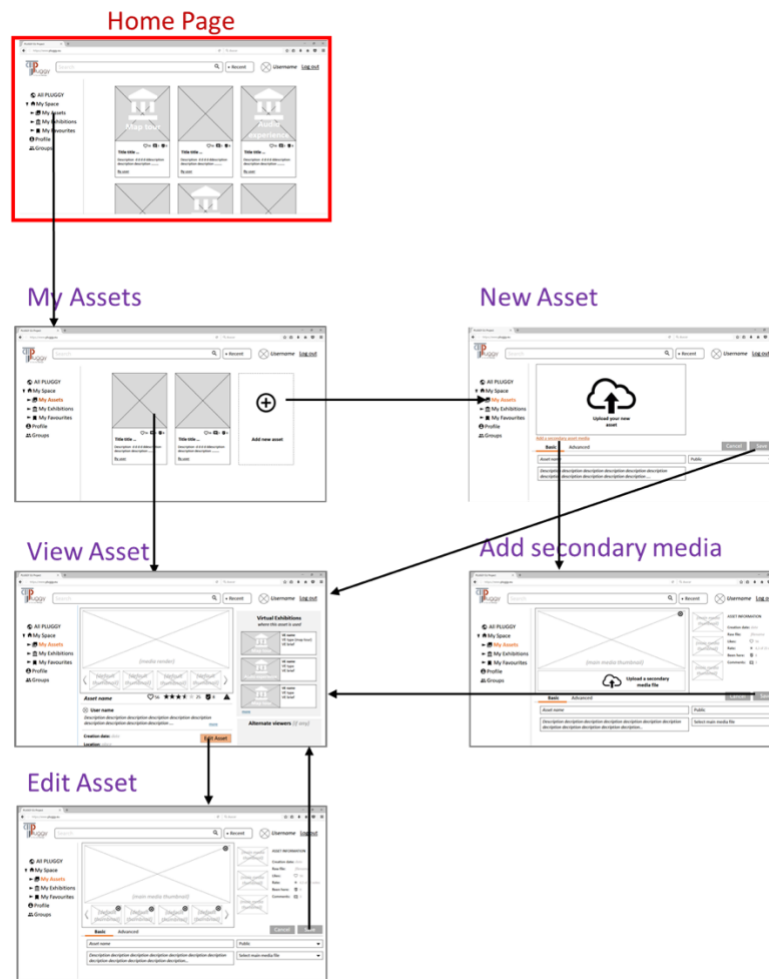

Figure 10. Logged user flow diagram. Only some of the possible paths are shown.

5 Conclusions

WP2 has delivered the specifications of the Social Platform and the Curatorial tool, two highly coupled components of the PLUGGY System. This deliverable reports on the methodology, which from the Stakeholder Needs stemming from the Faro Convention, has collectively created a set of **Scenarios** built around the **PLUGGY Personas**, resulting on the specifications of the PLUGGY System. This deliverable describes in detail one of the components: the Social Platform. See Deliverable D2.4 for the details of the Curatorial Tool.

The two main products reported here are the **requirements** and the **conceptual prototypes**.

- The list of **requirements** specifies the details of what will be developed within WP3. Requirements are described in terms of what the user can do with the system, with enough detail to start development in WP3 of the front-end modules and the back-end services. See Deliverable D3.1 Architecture Specification to understand how the requirements are being used to implement the PLUGGY System.
- The **conceptual prototypes** have allowed for early understanding, evaluation and feedback of the whole consortium to the partners in charge of developing the Social Platform. The implementation progresses in WP3 and the first working prototypes are being delivered as this deliverable is written.

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Appendix 1. Personas, Scenarios and Use Cases

WP2 work package has identified basic user types that would use our future PLUGGY platform, in the form of Personas. Personas are a powerful mechanism for participatory design (Grudin & Pruitt, 2002). In Plenary Meetings 1 and 2 the consortium dedicated two workshops to imagine how these typical users would interact with PLUGGY. We created our representation of these different user types or user groups and call them **PLUGGY Personas.**

In the following sections we describe the activities that different PLUGGY Personas are able to perform thanks to the PLUGGY system. The tables in each section present the activities realised by the Personas allocated to the main modules of the Base Architecture: The Social Platform, the Curatorial Tool and the Pluggable Apps. We stress here what is achieved by the Social Platform Only.

- ## Aurora, the collector

Aurora is a collector of ancient dolls and she is using internet to support her passion. She is 69 years old and she already owns a lot of ancient dolls. She spends between 1-3 hours on the internet daily. She buys broken ancient dolls from sellers all over the world and she repairs and reconditions them. She loves PLUGGY and she wants to make a Virtual exhibition of the 30 dolls she owns. She already has half of a room full of dolls. She already has digital photos of the dolls.

		Scenario for Aurora, the Collector
1	Social Platform	Aurora visits the PLUGGY website and she hits the "new collection" button and creates a new collection, which is called "Muñecas del siglo XX en Europa". She uploads the digital photos of the dolls into this collection. Use cases (SP): 1. Sign In to PLUGGY 2. Create Collection 3. Add Image to Collection
2	Social Platform / Curatorial Tool	When the upload finishes PLUGGY asks her if she wants to tell a story about this collection. She writes a short text describing how many years has taken her to gather all the dolls and from how many countries are these dolls. Use cases (SP/CT): 4. Suggest Writing of Story 5. Add Story 6. Link Collection to Story
3	Social Platform	When she saves the story, PLUGGY asks her if she wants to keep the collection private or share the collection and the story with only her friends of the whole world. She selects the whole world and PLUGGY post the story on the "new story" board. Use cases (SP) 7. Share collection 8. Share story

Aurora now wants to tell a story that she knows from her own experience, that the Spanish dolls of a particular period are prettier than the German dolls.

Scenario for Aurora, the Collector (cont.)

4	Curatorial Tool	She hits the "new story" button and a textbox for a title appears and an area to write a story. She starts to write "I know for a fact that the Spanish dolls are…" PLUGGY detects the word dolls and displays the content of her dolls collection on the side of screen with a subtle message than she can drag and drop her pictures in the text area. She drags and drops on of her pictures in the text, she continues the text and subsequently adds another picture. When she finishes she saves the story. PLUGGY detects that her story is composed of text and images. PLUGGY asks her if she would like to create a Virtual Exhibition of her story. She says Yes and then PLUGGY opens a new window for her to place her pictures and text on a large wall. She does it and press the "Publish Exhibition" button. Use cases (CT) 1. Suggest Asset Linking 2. Suggest Virtual Exhibition 3. Create Virtual Exhibition 4. Get Virtual Exhibition Template 5. Publish Virtual Exhibition
5	Social Platform	PLUGGY asks her if she would like to share her exhibition with her friends. She presses 'yes' and PLUGGY presents her with the options to share in PLUGGY, to share through email or a personal message. She selects the personal message and she gets a link and sends the link to her son, Eduardo. Use cases (SP) 6. Get shareable Virtual Exhibition Link

Finally Eduardo, Aurora's son, receives an instant message from his mother with a link.

		### Scenario for Aurora, the Collector (cont.)
6	Pluggable Apps	He clicks the link and the PLUGGY Augmented Reality App opens. He holds his phone up and looks around and he sees the 2 dolls and the text composing the virtual exhibition that his mother created using PLUGGY. 7. Visualise virtual exhibition 8. Interact with virtual exhibition using augmented reality.

The use cases identified in this user story can be summarised graphically using UML notation. Use cases are allocated to components of the logical architecture of the PLUGGY System, including the PLUGGY Website Front End, which contains the Social Network Front End, Curatorial Tool Front End, as well as a Pluggable App Front End.

An interesting classification emerges that there are things that **registered users** can do, and others that any user, registered or unregistered, can do. The following use cases for the Social Platform Front End can be identified:
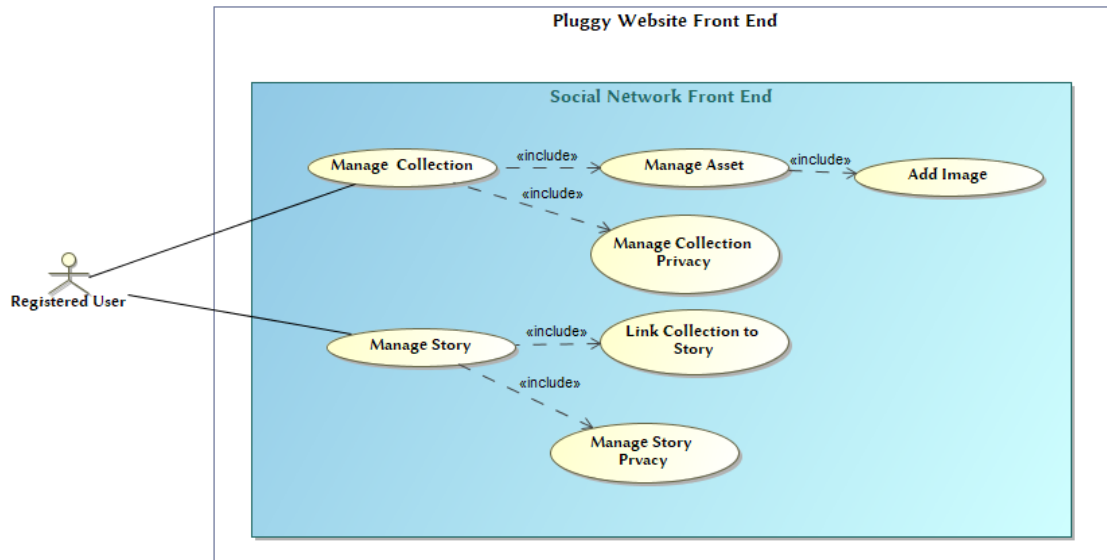

Figure 11. Use cases required by the Collector scenario, allocated to the Social Platform

- Adam, the cultural traveller.

Adam has decided to plan a trip to Athens. He is interested to visit some monuments and archaeological sites in Athens and Delphi perhaps doing one day excursions. In order to prepare his trip and decide which places of cultural interest he is going to visit, he wants to gather as much cultural info as he can get. Adam has some friends living in Athens. He asks them for their proposals.

		Scenario for Adam, the Cultural Traveller
1	Social Platform	Adam is a registered user of PLUGGY's social platform. He searches through the social platform for existing/recommended virtual exhibitions around Athens. Moreover, Adam gathers information through filtered search regarding his friends' recommendations. Adam also takes a look into the destination's contemporary art exhibitions - cultural events taking place during his visit. Adam start planning his travel by adding gathered information and events to his favourites and his calendar. Social platform keeps advertising Adam newly added content related to his favourites. Use Cases (SP): 1. Search exhibitions by keyword "Athens" 2. Add more keywords to previous search 3. Search for events in given Location and Dates 4. Bookmark/Favourite Existing Events from other Users 5. Add events to his calendar

		6. Get notifications about new content related to his bookmarked/favourite content.
		7. Aggregate/Favourite/Save Assets from other Users which have come up from searches.

Adam, having arrived to his destination, takes a free bike tour in order to get a feel of the city and visit places he finds interesting. He takes many photos of those places and asks locals for historical/cultural information.

		Scenario for Adam, the Cultural Traveller (cont.)
2	Pluggable App.	Adam uses the sound app to record some of the stories told by locals. In addition he records some of his own thoughts. He also uses the geolocation app to mark those places as places of cultural interest. Use Cases (App): 　8. Record audio 　9. Create Points of Interest

Adam visits virtual exhibitions and places found from the social platform. Throughout these visits he gathers information (video, photo, notes, sound) he finds fit to enhance the visitor's experience.

		Scenario for Adam, the Cultural Traveller (cont.)
3	Social Platform	After his trip Adam uploads gathered assets to social platform adding the story learned regarding each of them. Use Cases (SP): 　10. Share exhibitions/assets/posts through PLUGGY
4	Curatorial Tool	Adam uses the PLUGGY curatorial tool to create his own new virtual exhibitions and to enhance existing ones with stories and assets gathered from his travel. Use Cases (CT): 　11. Create exhibition with other users' previously bookmarked assets. 　12. Edit existing exhibitions (other users' ?) with new assets and stories.
	Social Platform	Adam shares his newly added virtual exhibitions/assets/thoughts through PLUGGY's social platform and other social platforms (Facebook, Twitter, WhatsApp). Use Cases (CT): 　13. Share exhibitions/assets/posts created in PLUGGY through other Social Platforms.

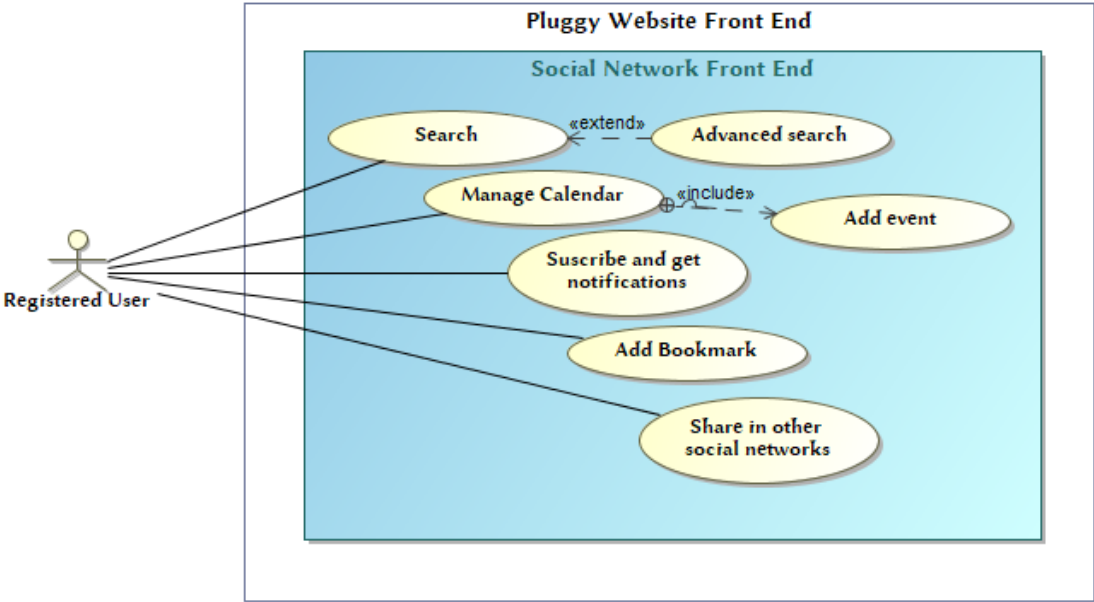For the Social Platform Front End, these are the required use cases:

Figure 12. Use cases for the Traveller, allocated to the Social Platform.

- ## Jarmila, the Museum Curator (and Zuzana, the student)

Jarmila works at the Eastern Slovak Museum of Košice. Jarmila wants to attract young, local students to the museum. She believes that the museum has the duty to educate local children and she believes that playful events are the best to attract young students and make them want to come back to the museum.

Her museum features a unique medal made from gold. On its front side, it depicts a soldier on a horse. On the rear side, it is engraved with a coat of arms. It was a gift made by an emperor from an artist to an anonymous nobleman from the region that saved the Emperor's life in a battle. The museum has high quality digital images of the artefact.

Those images have been combined into an interactive photorealistic representation of the artefact so that the Museum visitors can look at both sides of the object in high resolution and choose the magnification and the level of detail they desire.

Jarmila decides to use the gold medal as the centre of a game that students from local schools will play during their next visit.

		Scenario for Jarmila, the Museum Curator
1	Social Platform	Jarmila wants to use the social platform to create a collection dedicated to the artefact. She uploads the images to the social platform giving annotation and all the metadata necessary to accurately describe both the artefact and the digital images. Use Cases (SP) 1. Create Collection 2. Add assets to Collection 3. Add metadata to asset about asset itself 4. Add metadata to asset about related artefact.

		Scenario for Jarmila, the Museum Curator (cont.)
2	Curatorial Tool	At the end of this process, Jarmila can use both the digital representations of the artefact and the annotations as input, and through the curatorial tool create a gamified exhibition that describes the history of the artefact. Use Cases (CT): 5. Create Game-type Exhibition.

3	Pluggable App (authoring)	The game that Jarmila will prepare is a 'treasure hunt'. In the museum, WiFi is accessible in the whole exhibition, and all the exhibited artefacts are labelled with QR codes.
		Jarmila makes up a story about the gold medal: "In the medieval period there was a medal that was broken into 3 pieces and all of them are lost. Please help us to get medal back." All teams will have this same task.
		Jarmila prepares three thematic paths; each leading towards the one piece of the medal. Each path will tell a story of a medal from different point of view (king, farmer, burglar). The path is ordered list of exhibited artefacts identified by QR code.
		Jarmila prepares clues that navigate players between exhibited artefacts.
		Some artefacts have attached a mini game (puzzle, mini quiz) that the students have to complete to earn score points or to get next navigation clue.
		Jarmila creates a task that will be solved by groups
		Jarmila exports the prepared game onto mobile platform.
		Use Cases (App Authoring Part):
		    6. Choose QR-based Quiz among Game-Type Exhibitions.
		    7. Generate QR Code for asset in Social Platform
		    8. Create Path between QR Codes for Game-Type Exhibition
		    9. Associate mini-games with points in Path.
		    10. Associate scores to points in path of Game-Type exhibition.
		    11. Create task for players.
		    12. Create installable application (e.g. apk) from Game-Type exhibition.
		    13. Save Game onto Social Platform for download.

Zuzana and her schoolmates are visiting the museum for the first time. At the museum, they are handed tablets with the ESM PLUGGY Game preinstalled.

		Scenario for Zuzana, the Student

4	Pluggable App (experience)	Jarmila and her schoolmates are divided into groups by game automatically. Every member of a group plays different role in a team. Zuzana is in a role of a farmer and received first clue which helps her to find next exhibited artefact that tells her next piece of a story.
		Zuzana scans the QR code of an artefact that she found based on the clue. The Mobile App will notify her if she is on the right path. Zuzana is faced with mini quiz related to artefact. Then she continues through whole exhibition towards her piece of golden medal.
		The game is finished when all three pieces of the medal are found. Every team receives their final game score and get prize.
		Use Cases (CT):
		    14. User sign-up to social platform
		    15. Automatic creation of groups

	16. Assign roles to teams
	17. Create new game /new match
	18. Retrieve asset associated to QR
	19. Increase score associated to QR
	20. Finish game informing all teams.

For the Social Platform, the Museum Curator requires adding detailed metadata to the Asset to relate this to a real Artefact of the Museum.
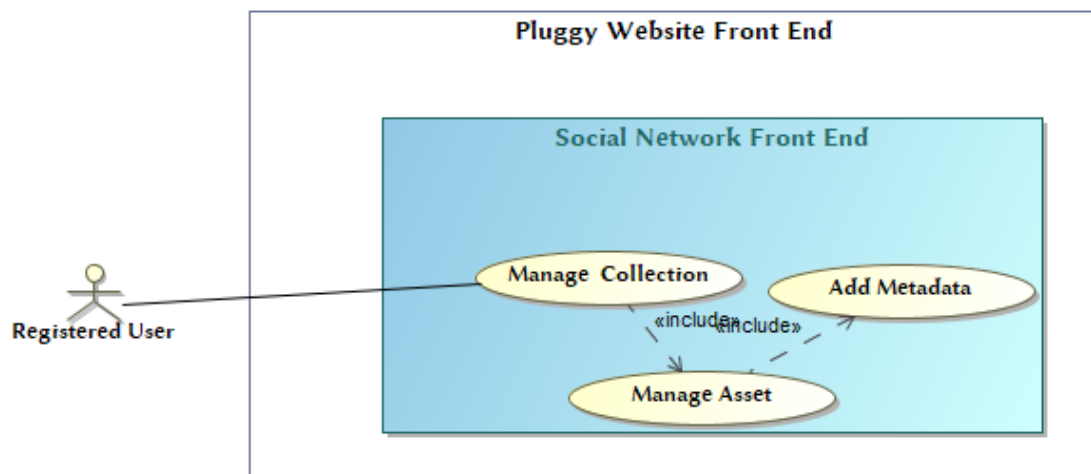

Figure 13. Use cases allocated to the Social Platform for the Curator Scenario

- ## George, the Travel Agent

		Scenario for George, the Travel Agent
1	Social Platform	George creates his business profile in PLUGGY social platform and uploads the logo of his business as an avatar. He sends friend requests to other PLUGGY users through the social platform in order to attract new clients. He uploads pictures, videos or songs from the places he visits or travels to, so that users can vote, like or keep in lists what they liked most. This way George's best stories are highlighted, and he discovers new trends in his business. He also uses PLUGGY to communicate with potential clients and organise new upcoming tours and activities. However, as a frequent traveller himself, he shares his experiences from the places he travels and uses them as a way to promote - advertise his travel packages and attract more clients. George, also uses the social platform to keep in contact with institutional sites (municipalities, museums, etc.) in order to post event and activities' updates to his followers.
		Use Cases (SP):

		1. Register in to PLUGGY as a professional user. 2. Send friend request to other users. 3. Create Collection. 4. Add assets to Collection (image/video/song). 5. Get statistics about other users likes/saves/rates 6. Send private messages to other users. 7. Post events. 8. Update information to followers about activities.
2	Curatorial Tool	George uses PLUGGY authoring tool to aggregate cultural content from other online platforms in a more user-friendly way. He loves to give texts a creative look (colours, templates, designs) as well as use effects in his images/videos and create picture collages. He gives hashtags to his stories through PLUGGY reference tools and suggested hashtags. George also uses an autocorrecting tool when he creates stories for the trips he creates in the authoring tool. He likes to recommend places and destinations to visit or to avoid for others. The best thing in PLUGGY is that he gives his trips a "fairy tale" tone that helps engage more with their travellers. Use Cases (CT): 9. Create Virtual Exhibition 10. Get Virtual Exhibition Template 11. Aggregate content to the Virtual Exhibition from Europeana/Wikipedia 12. Add tags to virtual exhibitions 13. Add textual stories to the virtual exhibition 14. Publish Virtual Exhibition
4	Pluggable App.	George loves to improve his audience's experience through the PLUGGY AR app, as this is how he brings in reality the "fairy tale" scenario that he creates in his collection of stories. Through the GEO app he pins his stories in maps and designs creative destination maps or even thematic maps (gastronomical, mythological, literature, etc.). He also has the opportunity to find other users' map pins and pinned creative cultural stories. Through the 3D audio app, George dresses his stories with real time audio and 3D sounds. Especially through the GAME app, he easily creates language interactive games like SCRABBLE, QUIZDOM, TRIVIAL PURSUIT and calls other users to be players. He encourages his clients to earn discounts by playing the games he creates. To engage his younger clients, he also creates educational games that presents in school teachers. Use cases (Pluggable App): 15. Use Geolocalisation App to physically pin exhibitions/assets/collections to specific locations. Edit existing exhibition to do this. 16. Use Geolocalisation App to create Map/Tour type exhibition. 17. Use Geolocalisation App to search for other Maps that other users have created. 18. Use Sonic App to add Sounds to exhibition. 19. Use gaming App to create language interactive game 20. Use gaming App to create educational game
	Social Platform	21. Get notification that someone you follow have created an exhibition.

The Travel Agent makes extensive use of Event Management, as well as the social networking functionality of the Social Platform. Users that follow him get notifications when he creates new Virtual Exhibitions:
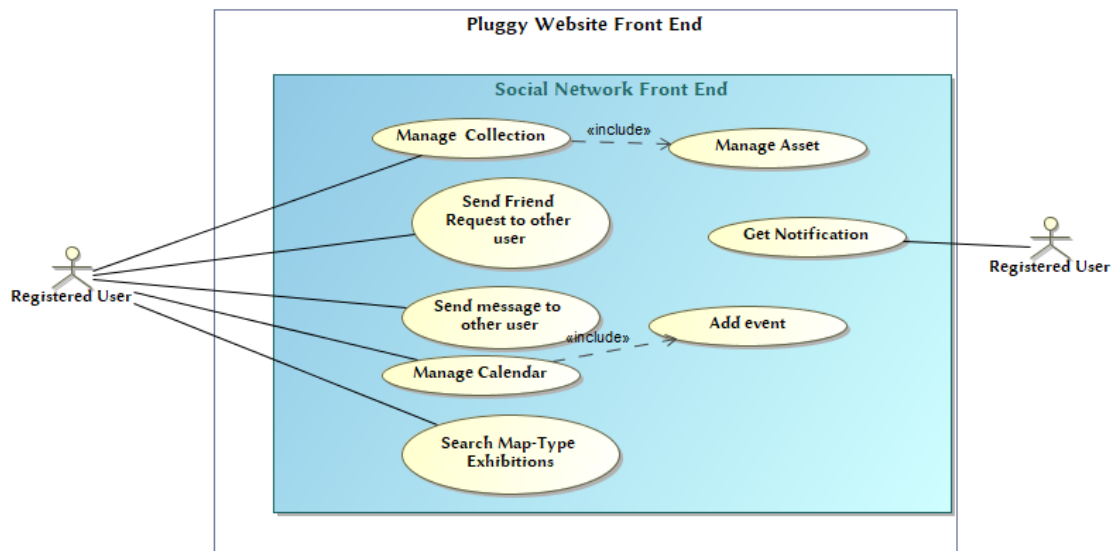

Figure 14. Travel Agent use cases for the Social Platform

- José, the Teacher.

The Association in Defence of Chimneys and Industrial Heritage of Málaga is composed of retired workers of the ancient factories located in the western coast of the city of Málaga, teachers of history, local experts in industrial heritage, neighbours of the area, and other citizens interested in the history of Málaga. The mission of the association is the preservation of the industrial heritage of Málaga. Before the invention of PLUGGY, their activities ranged from small events for dissemination of the industrial history of the city, to campaigning to construct a local industrial heritage museum. They have a special interest in the preservation of the chimneys of the ancient factories which are still standing along the western beach of the city. Some have basic 3D modelling skills and have built 3D models of the chimneys, and even one of a complete factory, as it used to stand at the end of the 19th century. In their campaign for the construction of a local museum, which they believe would foster sustainable business opportunities based on the cultural heritage of the area, members of this association have recently joined the PLUGGY Social Platform to create the first Malaga Industrial Heritage Virtual Museum.

		Scenario for José, the Teacher
1	Social Platform	Members of the association sing up in PLUGGY. Use cases (SP): 1. Sign up a new user 2. Create a profile

Some of the historians, members of the association-built 3D models of all the chimneys still standing in the city and located them in the map of the city, based on Google Earth images. They built 3D models of some of the old factories as well and linked those models with the images and other documents they had collected.

They have also geolocalised the 3D models of all the chimneys still standing in the city and add photographs of the area and fragments of scanned documents of the time that members of the Association are preserving.

		Scenario for José, the Teacher (cont.)
2	Social Platform	Members of the association use PLUGGY to share all their information and multimedia content of the chimneys. Use cases (SP): 3. Create a new collection 4. Add 3D models in OBJ format to the collection 5. Add pictures in JPG format to the collection 6. Add documents in PDF format to the collection 7. Create Stories, linking 3D Models, pictures and documents

The association propose to a high school in the neighbourhood to carry out some activities with the students about the industrial past of the area. One of the teachers of technology in the school accepted the challenge and worked with his students in a research project about the factories which worked in the area during XIX century and first half of XX century.

		Scenario for José, the Teacher (cont.)
3	Social Platform	Students collaborate with the association's experts in industrial heritage and collected more pictures and documents about the ancient factories. They use and contribute to enlarge information available in the PLUGGY platform and study the urban structure of the current neighbourhood which was built in 1870 for the factory workers, following the British idea of giving individual houses for each worker family instead of the traditional barracks used in the area at that time. The students also contribute with a 3D model of the workers neighbourhood. They also interview retired workers of the last period of the industrial activity who are still alive, adding these interviews to the platform for making them public. The teacher supervises all this work reviewing the students' contributions. Use cases (SP): 8. Make a collection collaborative, allowing other users to contribute 9. Find another user's collections 10. Accept invitation to collaborate in a collection 11. Add video in MPEG4 to the collection 12. Make Stories collaborative, allowing other users to edit and link new assets 13. Accept invitation to collaborate in a story 14. Browse a story history to see different author's contributions?
	Curatorial Tool	The students collect information about the industrial activities of each of the factories and create a route through the neighbourhood with stops at each of the chimneys, producing a video for documenting each of them and some marks for adding 3D models to the real places using the augmented reality functionality that the platform provides. Use cases (CT):

	15. Create a route as a virtual exhibition 16. Add points of interests to the route selecting geolocalisation in a map 17. Link stories to the points of interest 18. Link story to the route 19. Add AR information to 3D models
Pluggable App.	Some travellers visiting Malaga, interested in the industrial heritage, discovered the PLUGGY app for geolocalisation and follow the route, visualising the pictures, documents, videos and 3D models using the PLUGGY app for AR to visualize the models, or the Geolocalisation APP to follow the route. Use cases (AR/Geo APP): 20. Follow a route with a geolocalised mobile device 21. Display stories in the mobile device 22. Display pictures in the mobile device 23. Display videos in the mobile device 24. Display 3D models in the mobile device using AR for interacting 25. Add comments to stories and assets (Pictures, videos and 3D models) 26. Give likes to stories and assets (Pictures, videos and 3D models)

The teacher and the students make extensive use of the asset management functionality in the Social Platform. Initially, students will not be registered to PLUGGY.
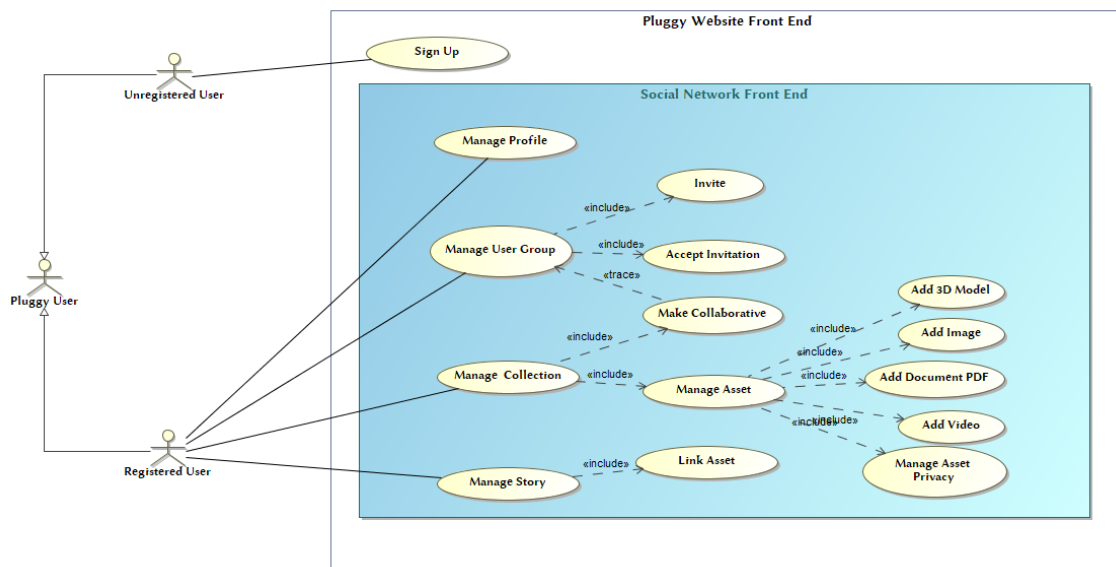
Figure 15. Use cases of the Social Platform required by the teacher and the students in the Teacher scenario.

- Mr. Troll.

The case of Mr. Troll represents that of a user who misuses the systems provided by PLUGGY, either through ignorance or malicious intent. It also includes the case of automatic programs, "bots", that pretend to create problems in the PLUGGY network. The following list shows some of the cases of malicious use of which Mr. troll could make use.

- Mr. Troll wants to gain commercial benefits from PLUGGY. So, he creates a fake collection of e.g. dolls that he tries to sell.

- Mr. Troll intentionally creates a wrong route that misleads followers, e.g. a route about historic landmarks of World War I that are not true.
- Mr. Troll is member of a nudist community and tries to use PLUGGY and the Faro Convention acceptance of all communities to promote the values of nudity through art. So, he:
  - uploads a collection of paintings containing nudity from well-known artists.
  - uploads personal / amateur or professional photos containing nudity.
  - uploads pornographic material on purpose.
- Mr. Troll is a "bot" who reports uploaded content as "inappropriate" through PLUGGY reporting mechanism.
- Mr. Troll uses PLUGGY to spread racism and hate to a criminal level
- Mr. Troll spams using comments on others' uploads or private messages.

To neutralise a malicious user, the system will provide a series of mechanisms that will allow well-intentioned users to report abuse by these users and block unwanted content. The system will also implement automatic mechanisms to deal with these problems.

		Scenario to neutralise Mr. Troll
1	Social Platform	A well-intentioned user reports Mr. Troll content, through a reporting button with allow different sub-categories: not true / valid sexual content / nudity illicit / illegal Commercial Criminal inappropriate language Use cases (SP): 1. Report content as inappropriate
2	Social Platform	A well-intentioned user blocks / hides, from their profile , Mr. Troll content. Use cases (SP): 2. Block unwanted content
3	Social Platform	An automatic mechanism, for spam controlling, catches Mr. Troll trying to abuse of the commenting feature. This mechanism blocks Mr. Troll account comments functionality.
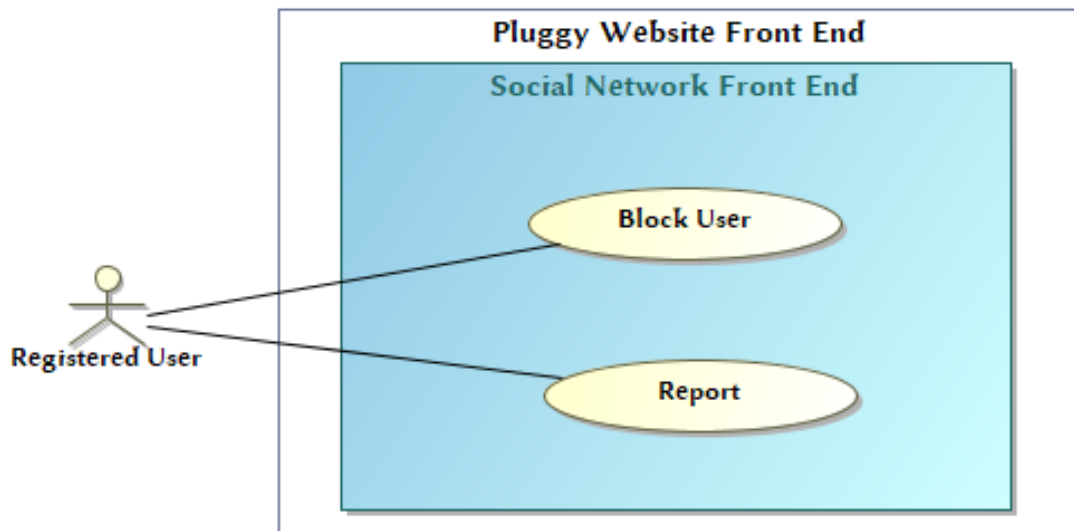
Figure 16. Use cases of the Social Platform for registered users to manage Mr. Troll.

Appendix 2. Social Platform Conceptual Prototype: Wireframes

In the following figures we present the conceptual prototypes for the social platform (for both non-register and register user) as a schematic for each page. A first version of the prototypes was evaluated within WP6 and is reported in Deliverable D6.1. Taking into account the outcome of these evaluations and the evolution of project requirements, a second version of the prototypes was developed and is reported here.
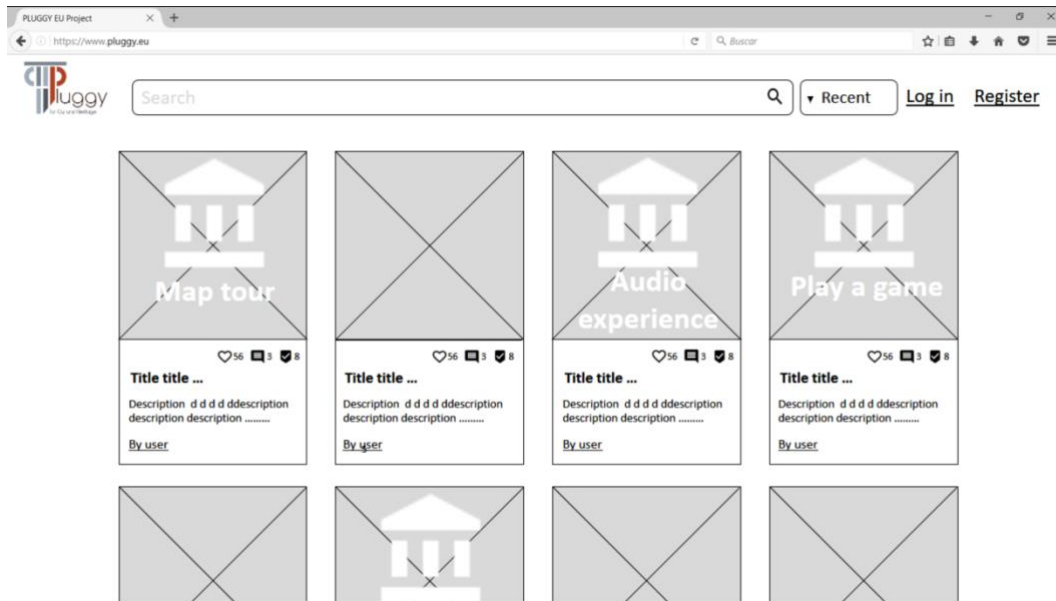
Figure 17. Non registered User – 'All PLUGGY ' Home page
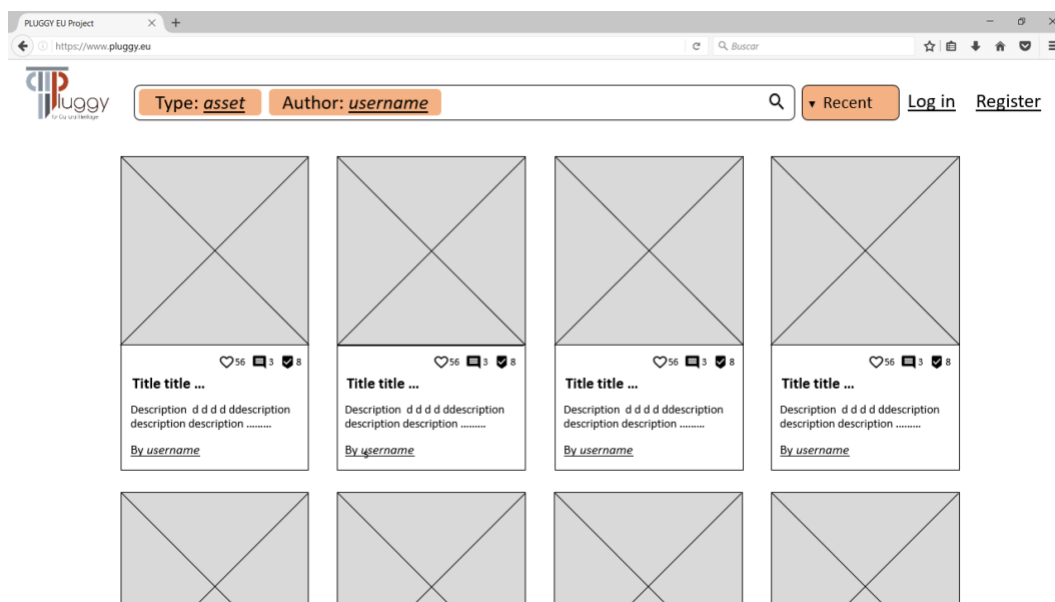
Figure 18. Non-registered User – 'Search' page
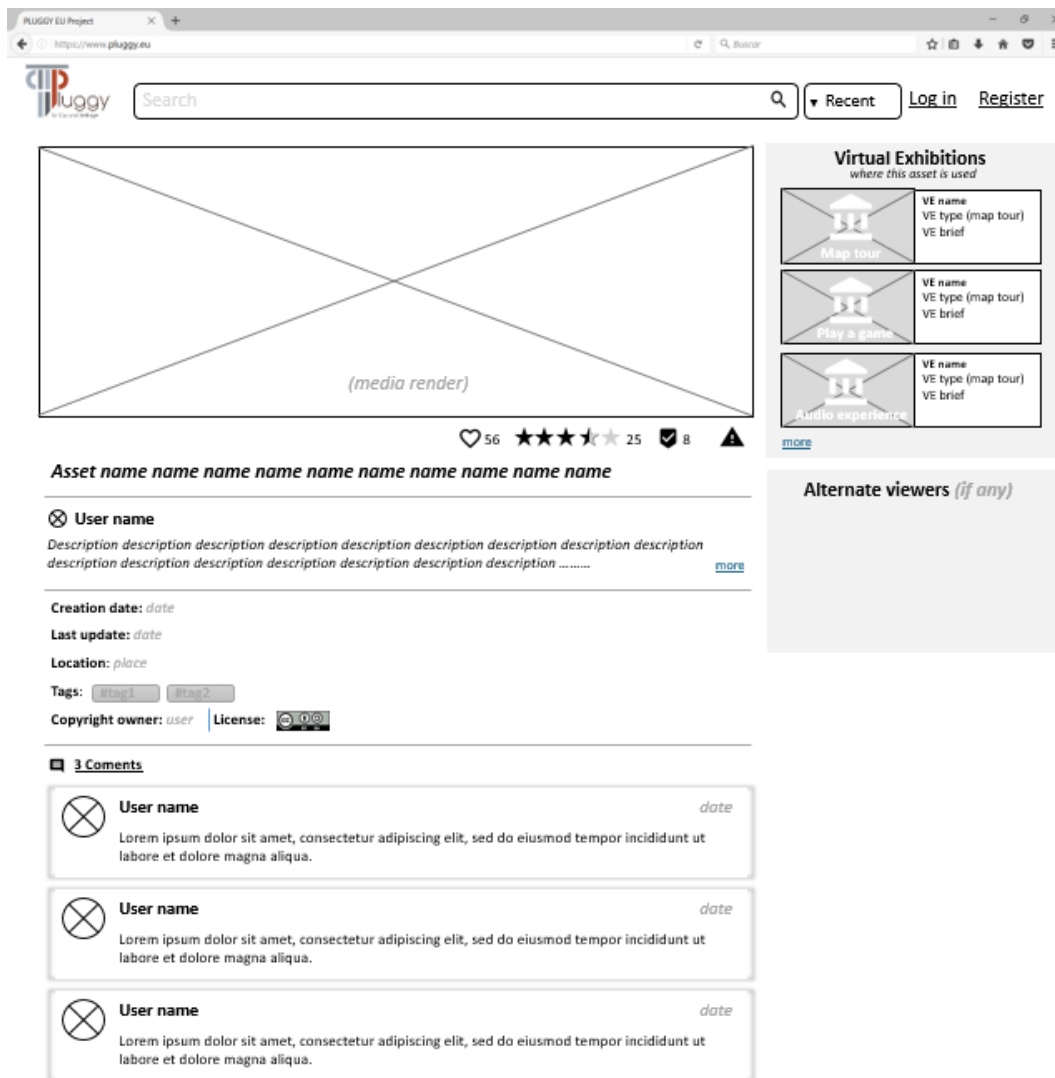
Figure 19. Non-registered user – 'View Asset' with one media
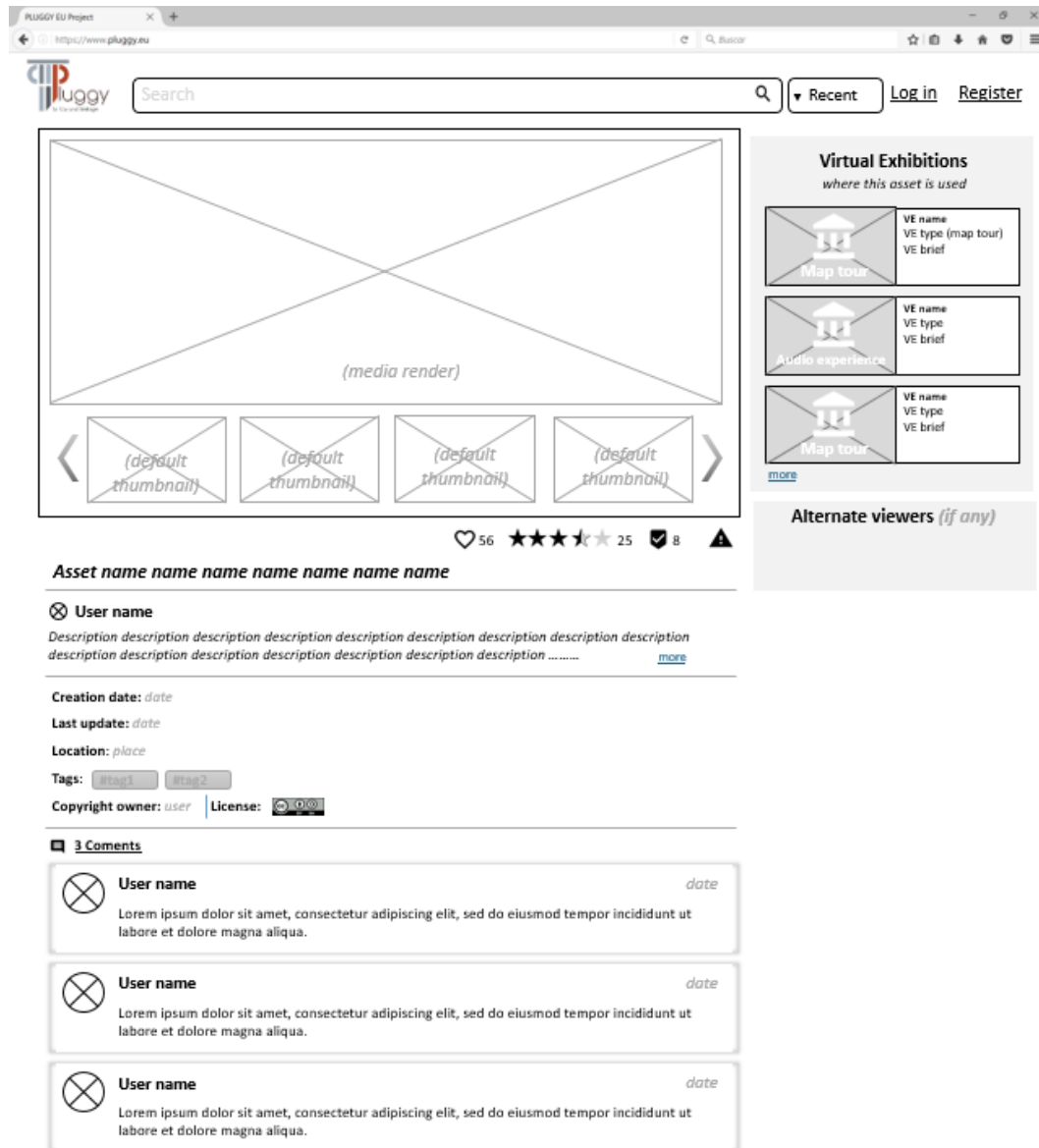
Figure 20. Non-registered user – 'View Asset' with a set of media
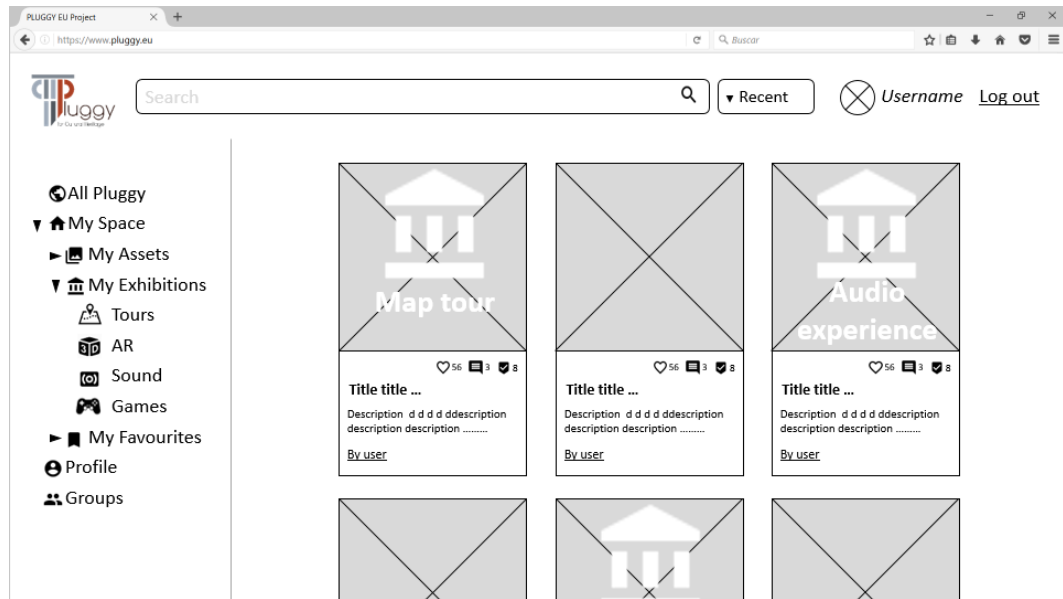
Figure 21. Registered User – 'All PLUGGY ' Home page
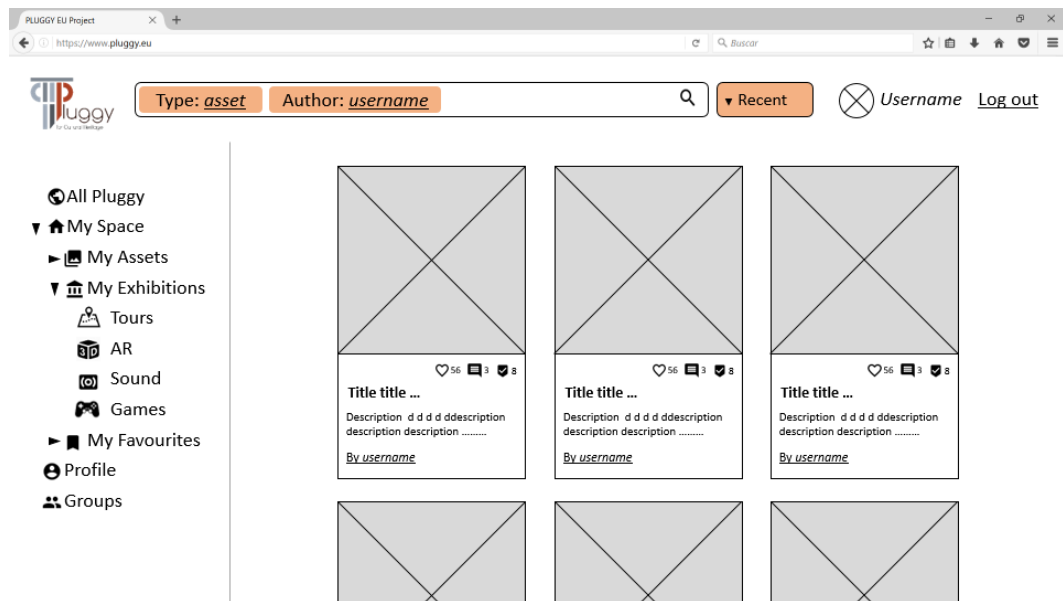
Figure 22. Registered user – 'Search' page
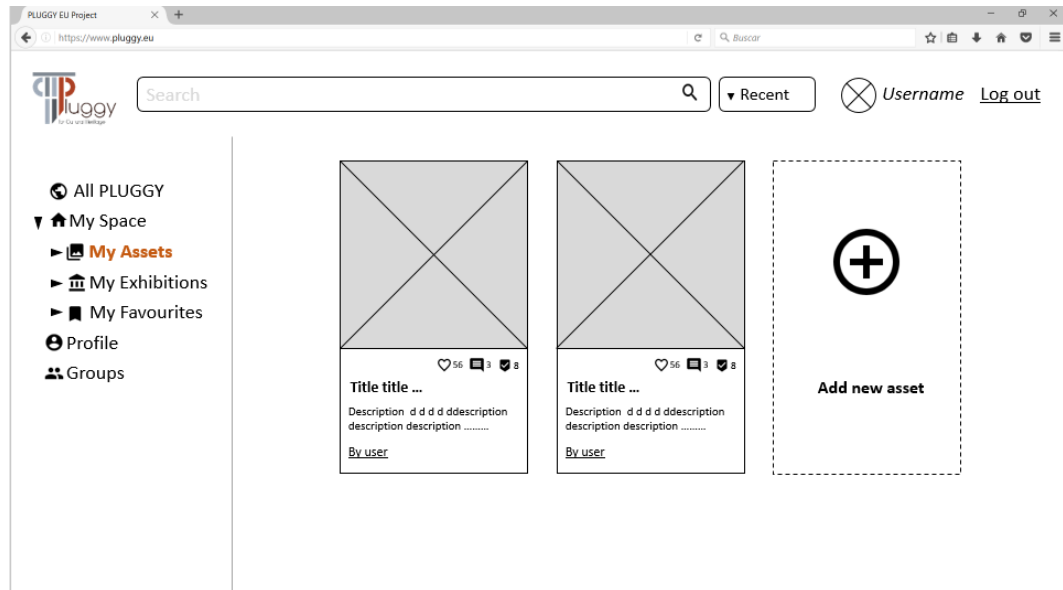
Figure 23. Registered user – 'My Assets' page
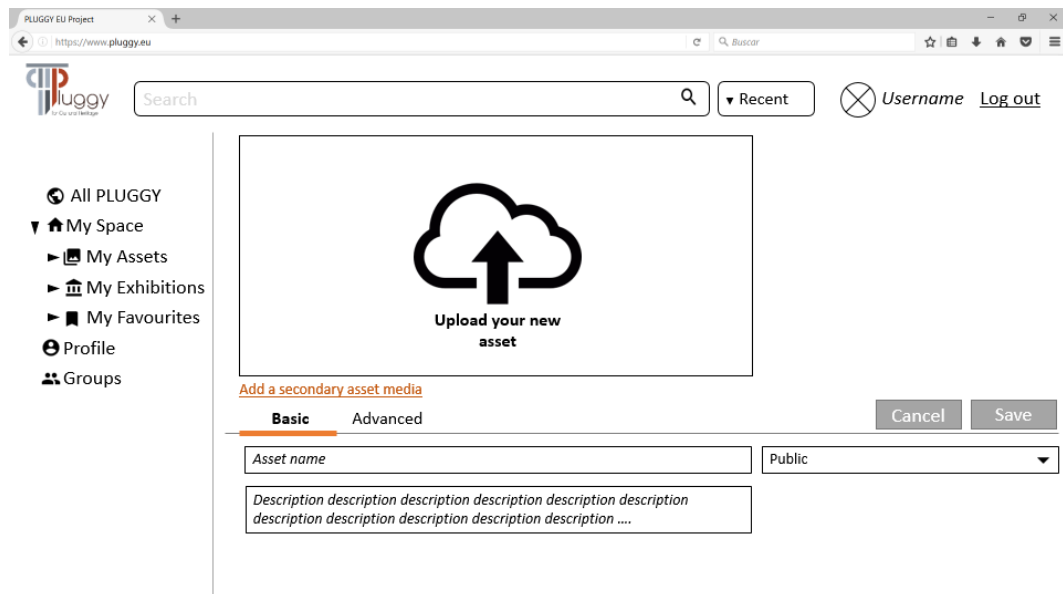
Figure 24. Registered user – 'Add new Asset' with one media file - Basic settings
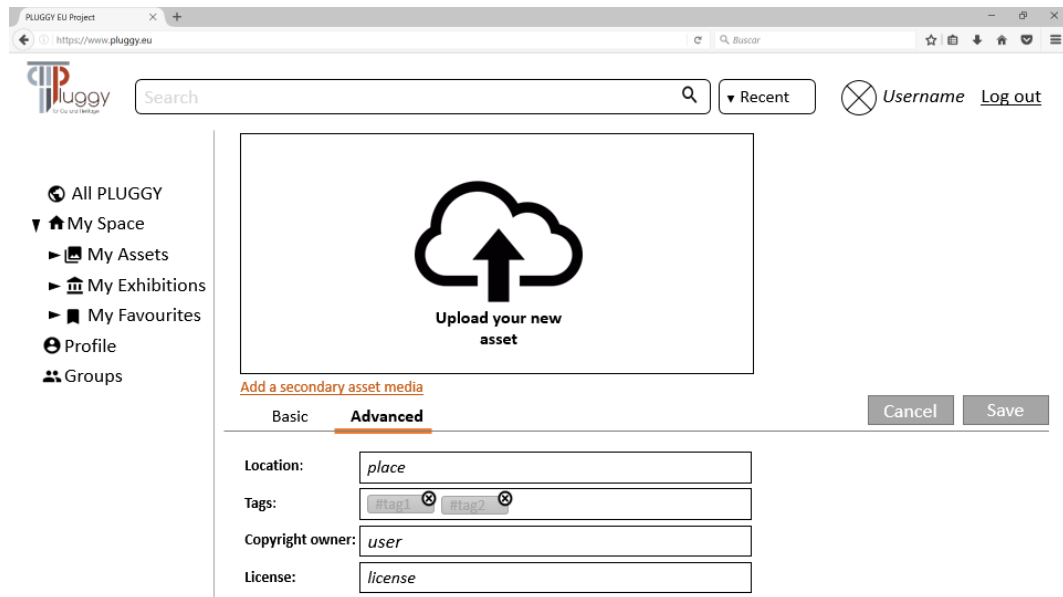
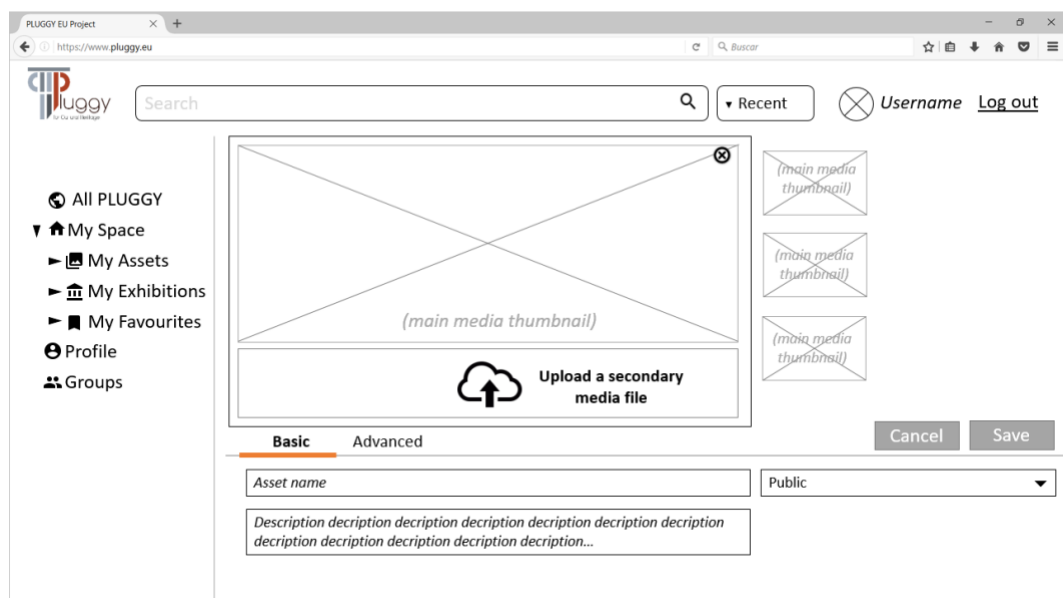*Figure 25. Registered user – 'Add new Asset' with one media file - Advanced settings*

Figure 26. Registered user – Add a secondary media file to a new Asset
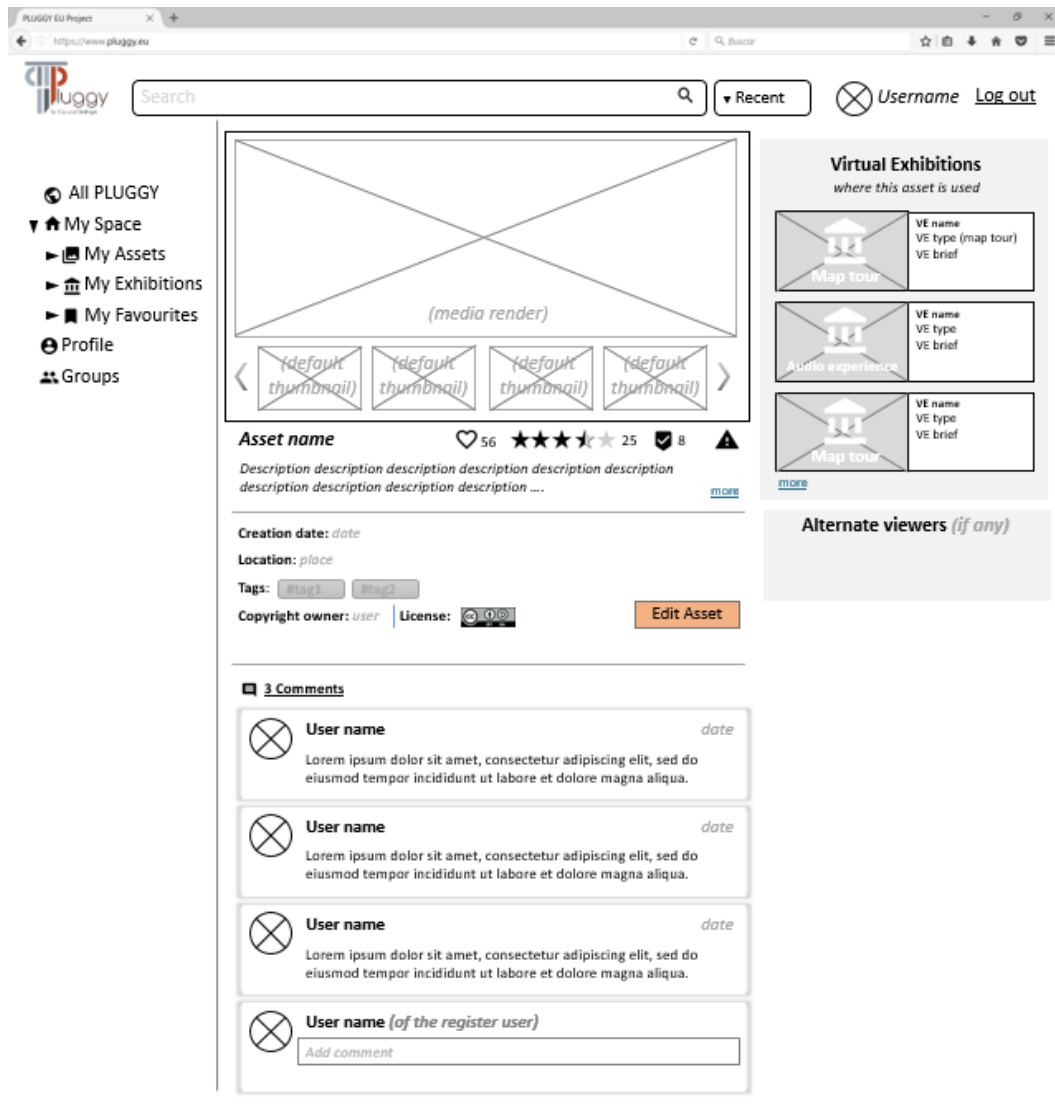
Figure 27. Registered user – 'View Asset' with a set of media
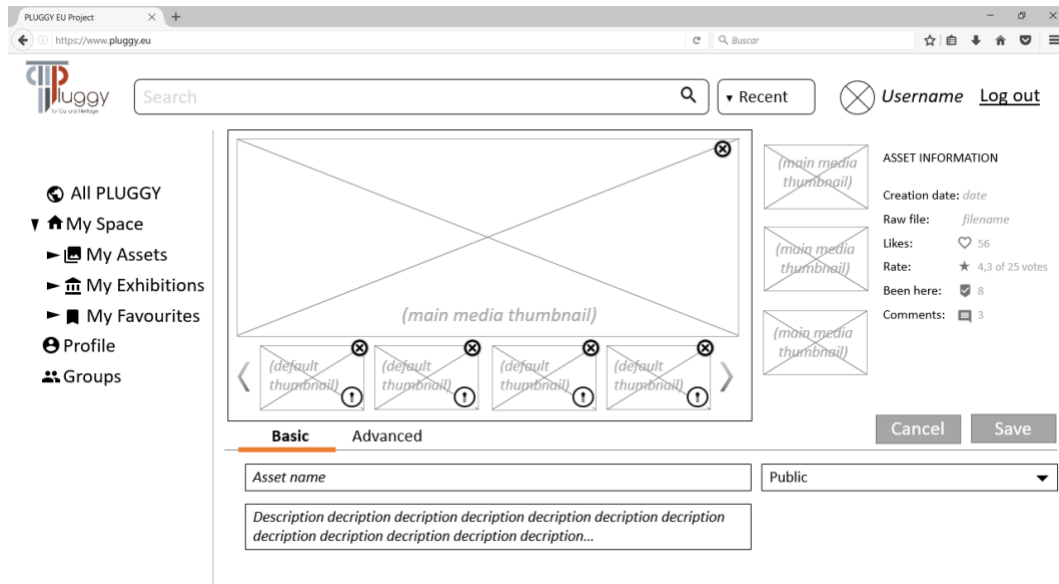
Figure 28. Registered user – 'Edit Asset' page
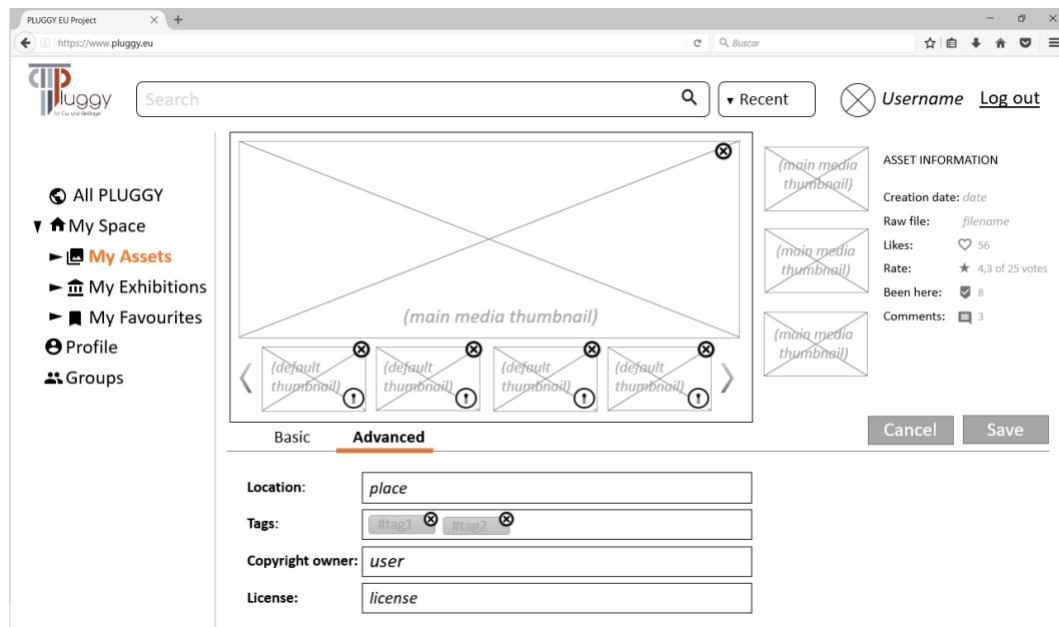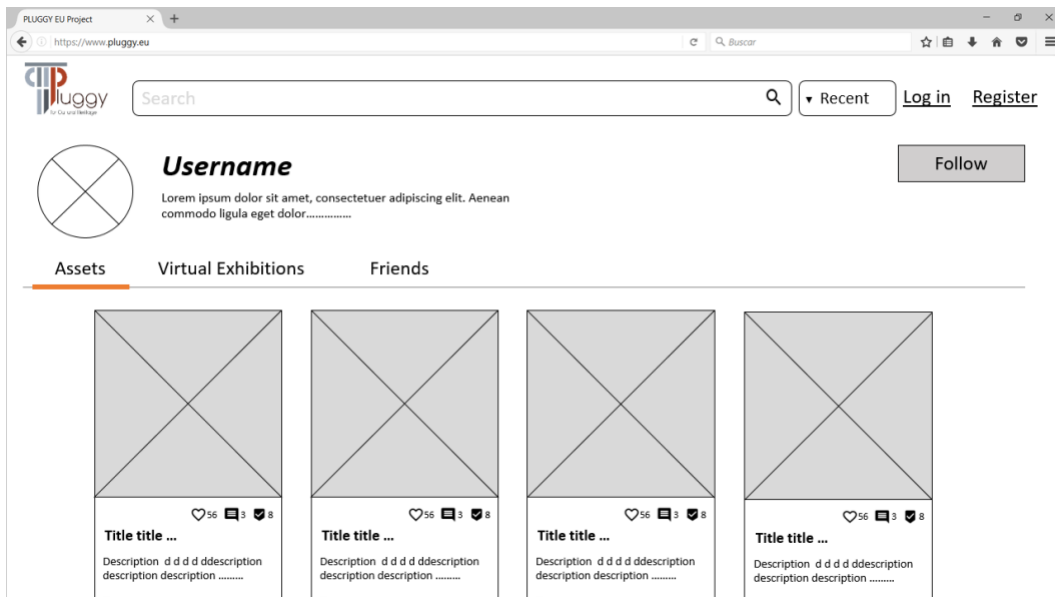

Figure 29. Registered user – 'Edit Asset' page
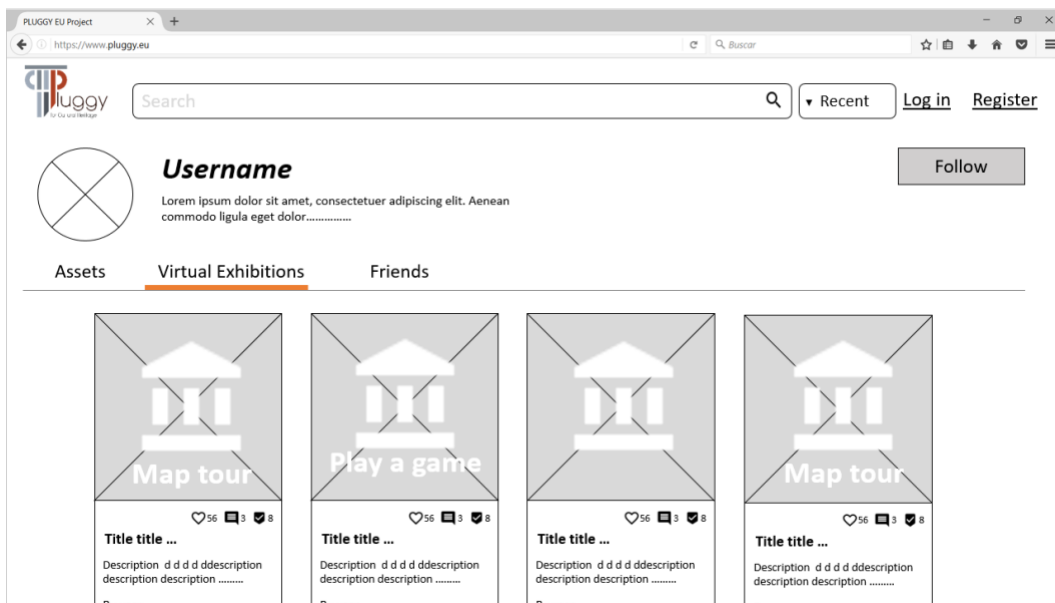
Figure 30. User profile - Asset list

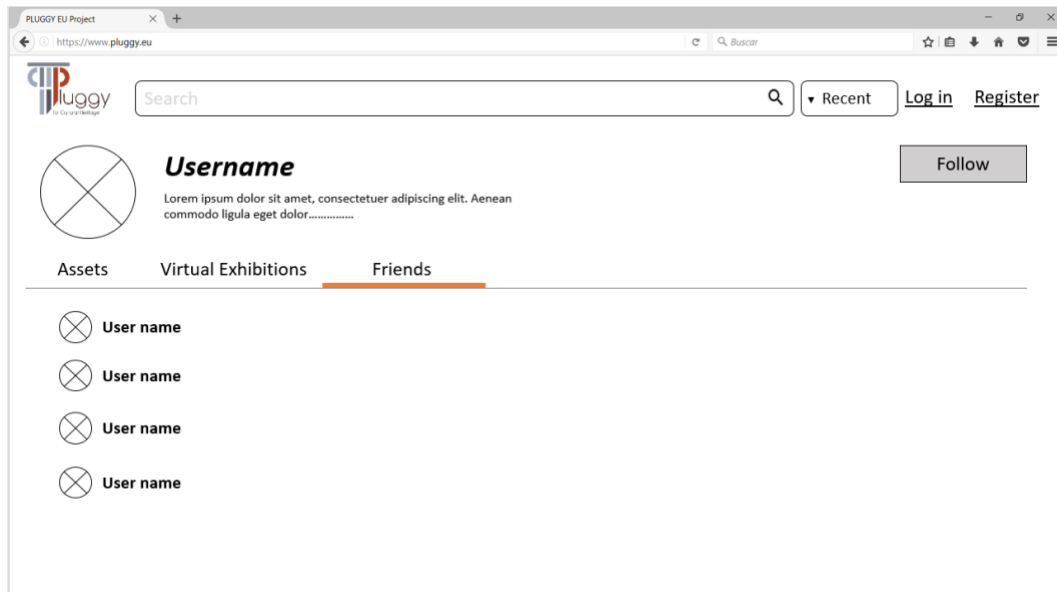*Figure 31. User profile - Virtual Exhibitions list*

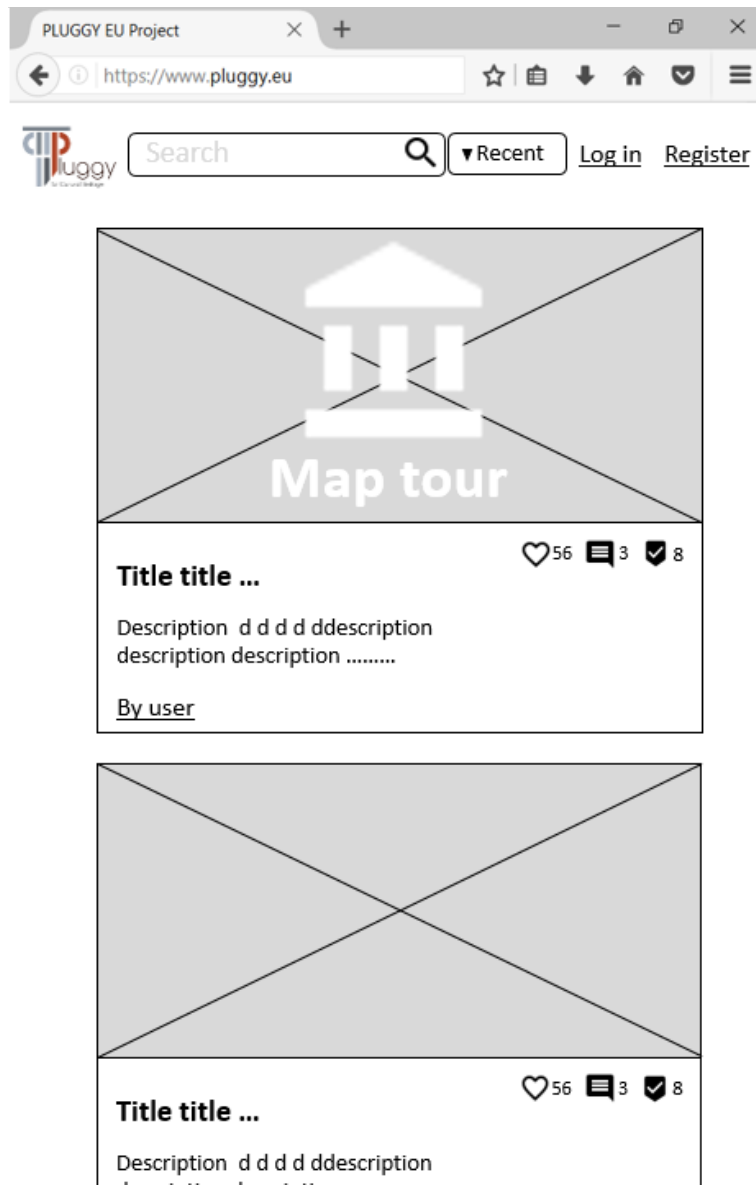*Figure 32. User profile - User Friends list*

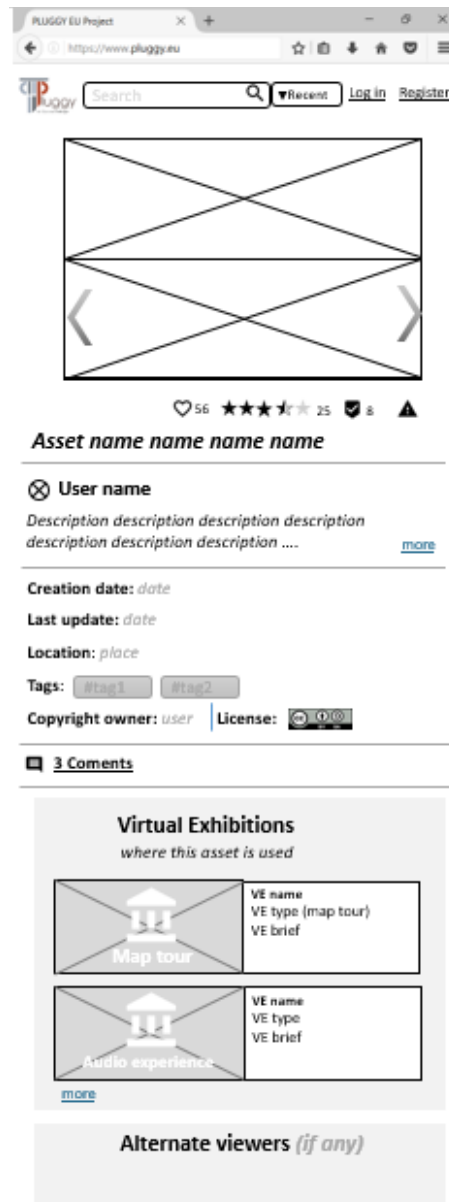*Figure 33. Non Register - PLUGGY home - Mobile version*

Figure 34. Register user – View Asset with a set of medias - Mobile View

Appendix 3. Requirement Tables

The requirement tables are a live document which can be consulted in the following address: https://goo.gl/JfFjaq. It is realised as a shared spreadsheet. Different tabs show the evolution of the Requirements, according to the process summarised in Section Requirements.