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## *Executive Summary*

***Aim of the Deliverable.*** This deliverable was set up to define the functional requirements in regard of first.stage (software) within the relevant field of “animation production”.

***Brief Description of the Sections of the Document.*** Section 2 introduces the reader to the application area in which the requirements are outlined within this document. Section 3 describes scenarios in which the future use of previsualisation with the first.stage software is in regard of the specific application area. These scenarios are mainly inferred from the outcome of the interviews and in respect of the special application knowledge by the authors. Section 4 describes individual use cases of the first.stage software specific to the application area. Finally, section 5 derives the functional requirements for the first.stage software from the previously described scenarios and use cases.

***Mayor Achievements.*** Definition of the functional requirements for the application area “animation production”

***Summary of the Conclusions Obtained.*** The functional requirements for application area “animation production” have been documented. These requirements will be needed to define the core functionalities in the deliverable D1.5.

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# 1 Introduction

In this document the functional requirements for previsualisation (hereinafter referred to as “previs”) in the application area “animation production” are developed.

## 1.1 Methodology

The process of defining the requirements for the animation application area consists of four consecutive steps, including interviews, scenarios, use cases and deriving the functional requirements. This is an informed process based on relevant literature [1, 2, 3].

First, semi-structured interviews with professionals from the application context were conducted. The objective of the interviews was to obtain information on procedures adopted by users and on their expectations of the system and gather information based on the user's experience. The interview targeted current and envisioned previs practices, experience with previs and workflow, areas of improvement, current disadvantages of previs and limitations in everyday work, as well as preferences in the application area, ideas for the integration of previs in the future using 3D tools, and possible impact on the production. Individual questions based on the person being interviewed as well as follow up questions were allowed in order to spark idea generation and the exploration of alternatives.

Based on the interviews we derived use case scenarios which generalize the answers from the interviews. For this, key statements were extracted from the interviews concerning tasks, workflow, benefits and drawbacks of used software, input / output hardware, natural interaction techniques as well as preferences for a new software. From these statements, scenarios were derived that summarize all statements from the different interviews and generalize from the concrete answers given in the interviews. Furthermore, we developed individual use cases describing each of the tasks from the scenarios in more detail. Pre- and postconditions as well as a detailed description of the tasks were made.

Scenarios have been outlined and confronted with the technical artists interviews. Analysis of the scenarios revised with the technical details have been conducted by a CG supervisor / UX expert in order to define the level of complexity of the output and input / output capabilities of first.stage software. Technical details and potential bottlenecks have been further proposed in subsequent brainstorming sessions including directors, technical artists and CG supervisors / UX experts have been performed with a fictional approach in order to mimic the behaviours of the scenarios and review the process and feasibility of the actions to perform. Final versions of the scenarios have been created.

From the scenarios and detailed use cases the final functional requirements for the animation application area were extracted. The requirements for each use case were initially derived based on their content as well as the pre- and postconditions of the specific use case.

Since different use cases can derive into the same substantial requirements, the requirements were grouped and combined when possible. Driving actors and roles for the requirement were also considered in the process of grouping the requirements. Each use case has its own scenario, actors and flow.

## 1.2 Interviews

Interviews with the following key people have been conducted:

**Rene Weinberger**, Editing Supervisor, Talking Tom and Friends

The Editing supervisor is responsible of assembling shots into coherent sequence which create the finished show. Starting with the raw footage produced by the storyboard team working closely with the director he incorporates the storyline and personality of the characters through the definition of the angle of the shots, their length and order in the sequence.

**Nenad Mitrovic**, Layout Supervisor, Talking Tom and Friends

The Layout supervisor is responsible for the breakdown of 2D storyboards into 3D shots. He ensures that the digital asset designed and produced in the previous stages of preproduction are properly used to build locations, to block in the position of characters, to select camera angles and to plot camera moves. He is responsible for staging every shot and plotting the action that will take place within each scene.

**Dejan Brujic**, Animation supervisor, Talking Tom and Friends

The Animation supervisor is responsible for the quality of the animation, he interprets the brief from the Director and other relevant departments that are defined in the layout phase of a show. He then guides, supervises and reviews the work produced by the Animation team. He guarantees that the requirements in terms of performance, style, quality and continuity are met.

### 1.3 Key Statements

The following **key statements** were collected from the interviews:

- Animation projects are possible only with a great plurality of skills spread over many artists, technicians and coordinators working together.
- The workflow is highly iterative and involves many pipeline steps.
- Efficient tools to keep track of the iterations and their status throughout the whole pipeline are a mandatory requirement.
- The storyboard phase is the key moment where a director defines the visual requirements of the animated production. This is the most effective stage in which all the choices must be locked down.
- Layout stage is a crucial step where all the actual 3D assets needed, the staging of the characters and the framing of the camera are locked down.
- An efficient and solid previs can ensure the smooth process of production, also guaranteeing that the costs do not exceed the budget and that the artistic needs are met.
- Previs data should be reusable and ready to be implemented in the next production processes in order to speed up the transition between the two phases.
- Verbal / face to face communication is mandatory to clarify the grey areas of the artistic requirements.
- VR tools and performance capture could be extremely helpful to speed up the process of layout and the creation of the 3D animatic.

- A consistent, well-structured metadata layer that enforces the 3D assets' definition is crucial to allow the iteration process required in a large-scale production.

## 2 Scenarios

In this section, scenarios are developed that describe the future process of previs within the first.stage software. Typical animation production staff that will use the software is described in a fictional setting where the first.stage software will aid the application area.

We will explore four use cases:

1. **Zero data previs:** An art director starts a new project from scratch
2. **Transition from “Zero data” to a 2D animatic:** The previous project is moved to the next level of the pre-production phase.
3. **Move to 3D animatic:** In a more complex process a CG team is involved in the project to create all the assets needed in the layout phase of the 3D animation.
4. **Creation of a library:** To speed up the process of the 3D layout a library of predefined animation is built using a performance capture system.

### 2.1 Zero Data Previs

Eric, a well-known art director specialized in CG production, is hired by the animation company to work on an animated commercial. The intent of the client is to get a “full CG 360 degree” commercial for a new product.

After the client provides the brief, Eric starts to work on the first tasks. His first goal is to find the most effective story to advertise the product.

He then starts sketching out some ideas on paper, writing a few scripts in order to outline the storytelling.

Satisfied with the result, Eric wants to prototype these ideas quickly with a very basic storyboard in order to be assured that everything is as effective as he imagined.

Eric loves to start and setting the mood of the project based on a sound reference, a song that can clearly define the strength of the story.

Surfing on the internet with his tablet he finds exactly what he is looking for, copies the link from YouTube and opens the first.stage software (hereinafter referred to as f.s).

Eric types in the basic information of the project he wants to start:

- project name
- client name
- “show name”

Then he creates a new asset, pastes in the link of the song he found, opens a simple timeline tool provided by the software and is able to define the starting and ending point of the song.

He lets the software replay the music to listen to the clip and get inspired.

Eric then starts imagining where to locate the action. He goes back on the web and searches for pictures as a reference.

He finds ten pictures of environments that he likes and sends them to the f.s library. Now he looks for some other visual references for the characters he has in mind.

Going through Pinterest he recognizes three out of four characters that he really likes and again sends them to f.s, he still misses the fourth one, which has to be a robot with specific elements on top of it.

Eric grabs a piece of paper and starts drawing something that fits his requirements, he takes a picture with his phone of that drawing and pushes it into his f.s library.

Eric is now ready to create his first prototype of the commercial. He opens the library, selects a picture that represents the first environment and associates it to the music. He starts playing the music, listens to it a few times, then stops the music at certain points and drags another image to express “from now on use this as new background”. As soon as he adds a new background he defines a new shot. He iterates this process until he reaches a reasonable result for him. Now that the environments are there, he drags pictures on top of the characters, unfortunately they have no transparent edges. Eric opens a simple tool to cut out the border simply creating a shape with his finger around the character and defining what has to be kept.

Using simple manipulators (scale, translate and rotate) he frames each shot, then iterates this process until he is satisfied.

Playing again with the timeline he now has the chance to edit the length of the shots, speaking on top of the video playing he also finds the proper speech he wants to record, using the microphone he plays the video and records a voice over.

In a very short amount of time Eric has conceptualized the scripts he wanted to prototype.

## **2.2 Transition of the “Zero Data” Output to the Creation of a 2D Animatic with a Multi User Cooperation**

The input of this scenario is the output of the previous one. This time Eric works as a director that has to prove the effectiveness of his concept. The output of the first scenario would have been enough but Eric works in a very collaborative environment and he can use the work he has already done to iterate with other artists.

First of all, Eric starts to attach vocal notes to each single element he created and used in the chosen timeline.

Selecting each background and defining what he would really see in that environment, he applies the same to each character.

Eric invites Jens, an artist, to collaborate on the project and to have a look at the reference he created. After Jens joins the project he starts to draw pictures of the environments and of the characters based on Eric’s notes.

Assets created from Eric were defined in f.s as “sketch-step”, Jens using the bridge between f.s and Adobe Photoshop, takes each asset and while he updates the content, marks his work as the next step of the iteration called “art-step”.

Meanwhile, Eric gets in touch with a sound studio, which gets the audio assets as reference and starts looking for the voices to be chosen for the voice content and to design the sound and music based on the proposal of the director.

Since the pre-production is in progress it’s time to start thinking about a detailed outline of the project to give to the client a final estimation before the actual production start.

Kristian, project manager of the agency, shares all the projects Eric is involved in, synchronizes the current one on his tablet and analyses the number of environments, characters and props that needs to be created in 3D. He can then easily review these information based on the automatic report that f.s provides for each timeline of the project.

Since Jens is already providing some designs approved by Eric, Kristian can contact his CG supervisor to get a quick overview of the time that he will have to spend creating a list of assets for the project, determining the size of the team that will conduct the project and get an estimate of the length and cost of the production.

Meanwhile, a radio play is ready from the sound studio. They upload the mix down version ready for preview for Eric and the project file embedded in the exchange data format (OMF/AAF) to be used in a future editorial session directly into f.s. Eric reviews the radio play and adds some comments to the timeline which is received by the sound studio. The sound studio can now go back to do the adjustments.

While Jens is also preparing the storyboard for the commercial, he looks at the shots and creates poses on purpose using Photoshop or another professional grade storyboard tool such as Toon Boom. He defines a new asset step called “storyboard-step” in which he loads the poses into f.s.

Eric can then review the work done by Jens and the sound studio and is ready to present the 2D animatic generated in f.s to the client together with Kristian.

### 2.3 Move to 3D Animatic the CG Pipeline Starts

Lee is the Director of an animated series, he has already used f.s to develop the 2D Animatic of the first episode of the new series. His next step is to move everything into the 3D environment following all the aspect of a full 3D preproduction.

Lee already has a good overview and a lot of information thanks to the extensive use of f.s for his episode.

In brief:

CG pipeline step to reproduce	First stage info provided as input
Asset generation	Asset description / comments / art design
Layout	Shot definition (amount, length, contents)
Staging	Storyboard camera framing



Animation	Storyboard key poses
FX / dynamics / particles	Storyboard FX notes
Lighting & Rendering	Storyboard lighting condition notes
Post process / edit / compositing	Timeline synchronized with an editorial suite

Before getting back into f.s the asset teams have to build all the elements needed to populate the scene based on the design provided by the art director.

They constantly update the assets starting with the creation of the new “3D asset-step”.

Since the library grows very fast the asset department is creating an organized structure of metadata that will easily allow the display of these assets into f.s.

Each asset is also created in at least two different polycounts to allow the usage on hardware of different computational power

Nenad, layout supervisor, starts f.s and verifies the list of the environments that have to be built. Looking at the report sheet of the approved timeline; he listens to the comments of the director while looking at the art-step of the environments. He then puts the VR headset on (e.g. HTC Vive, etc.) and starts working.

In VR mode his first objective is to manage in which environment-assembly he has to work on; a list of environments sorted by priority of production, sequence name and asset completeness shows up. He picks the first “ready to start” one and enters the (first.)stage.

Nenad loads all objects that create the scene from the library as he needs them. Thanks to a tool-editor easily accessible from his arm he can have a look at all the drawings that refer to the environment and can now complete his work. As soon as the assembly is reasonably done he sets the cameras corresponding to each point of view described by the storyboard.

The VR solution allows him to have a great ease of manipulation of the objects as well as an easy management of the scale of the whole world. He can look at a city block as if it was on a tabletop in front of him, and with simple gestures, he can enlarge it and stand in the middle of the street from a natural / human point of view.

When he is finished he invites Lee (the Director) into a voice call on f.s to review the assembly together, Nenad is still in VR mode while the director looks at the scene through the cameras from his computer or tablet. Nenad is able to adjust Lee’s requests on the fly.

Optionally, Nenad and Lee can control the stage at the same time and manipulate different elements of the scene, e.g. while Lee moves the camera Nenad can readjust the stage.

Lee has requested some extra assets that have not been defined yet, Nenad sketches these assets quickly in a 3D Software creating a rough representation of what Lee has asked for. Together they adjust position and scale and Nenad defines the 3D sketch as a new asset ready to be sent over to the proper department for production.

Both Nenad and Lee can leave comments of any form at the environment level (the asset to be edited / redressed) or at shot level (each camera references a shot).

Once the environments for the episode are ready, Nenad assigns them to the layout artists taking care of the sequences of shots that share the same environment to prepare the previs of the animation with poses or fully animated recorded performance.

The Layout artist loads the characters into the scene and using the freedom of movement in VR space, he places and moves them around to get a feeling of the space and the positions that need to be assumed within the sequence.

Using the tool-editor to switch to animation mode the artist is then able to record how the scene roughly plays out. He works with mixed solution depending on the goal he wants to achieve:

- key frame set on purpose,
- pick poses from a library,
- select a pre-recorded animation, and
- start recording performance capture on the fly with an accurate motion capture system.

Switching back to camera mode from the tool-editor the artist can set up / tweak the camera movement until they are ready for the review with Lee.

Just like real life cameras, CG instances have a window that represent the viewfinder. This can be freely resized and positioned around the scene parented to the camera object or to world. Focal length can be easily accessed and controlled via gesture or Vive Joypad.

As soon as the scenes are approved by Lee and Nenad, an output, in the form of a video file, is rendered from each camera. Using the metadata of the f.s timeline, Rene, Editing supervisor, is able to produce the final cut into the editorial suite, provide final audio track in order to proceed with the next step of the production. All of this can be imported back into f.s for further potential adjustment.

## **2.4 Creation of a Library, an Extensive Use of Performance Capture System**

Making the process of the staging and layout of an animated series is extremely time consuming mostly on posing and animating the characters. To reduce the effort of the work and improve the quality of the output, it is mandatory to have a great library that provides as many performances as possible for each character.

Nenad, layout supervisor, and Santiago, animation supervisor of the animated series directed by Lee investigate together the 2D animatic of the upcoming episodes and they observe that the production is quite demanding: there are 10 main characters used in almost all the episodes plus 40 secondary character used to populate the scene as crowd.

Santiago verifies that each main character has at least:

- ~30 facial expression
- ~40 body poses

Secondary characters need the following animation takes:

- 50 cheering
- 20 standing

- 20 chatting seated
- 20 eating food
- 20 walking loop
- 200 reactions on various action of the main characters

To achieve these results, Santiago is planning on using a performance capture system that allows him to record all the animations that can be further cleaned and improved by his animation team.

The library will be built within f.s as “poses-step” or “animation-step” of each character asset.

As soon as the library is ready, Nenad’s team opens f.s and starts working with it to create the 3D animatic. Artists wearing Vive systems scrub the animation and set poses picking them from the library, from time to time they see that the pose used is not enough effective for their purpose, so they decide to edit it. Entering in edit mode they quickly adjust the pose and record the new setup in the “poses-step” database.

While working on the main character poses, the Layout artists need to add the secondary characters to populate the scene, they quickly paint over the environment areas where the secondary character have to be spread. f.s allows them to quickly assign random animation picked from the “animation-step” library grouped in categories. Accessing sub selection of the crowd the artist can also define path for the walking characters.

### 3 Use Cases

In this section use cases are developed that describe typical tasks performed with the first.stage previs software.

Scenario	UC #	UC Name	UC description	Actors	Flow
<b>3.1 – Zero data previs</b>	UC1	Director develops the animated project	Creates the project in f.s, pushes references he finds through the web, loads hand drawn images, edits a timeline, defines shots and the assets into the shots, records his voice as a temporary speech asset	Director, f.s tablet interface plugin with camera and web browser	Director uses the browser, performs actions over a tablet, communicates with other actors
<b>3.2 – Transition from zero data previs to 2D animatic</b>	UC2	Director supervises other actor’s work	Create comments in different forms, review designer and sound studio work	Director, f.s tablet interface	Director uses a style sheet like interface to add information / notes on each asset that

					requires further development
	UC3	Designer develops arts	Read and hear in f.s for desktop notes and reference from director. Push the asset to work on to Photoshop and send back to f.s for review	Designer, f.s desktop interface, plug in in/out data for Adobe Photoshop	Designer uses f.s for desktop to retrieve the information, work with an external package to create the new version of the assets, push back on f.s database finished work
	UC4	Sound studio creates professional grade sound	Read and hear Director's comment, push to audio suite f.s timeline work on it send back to f.s for review	Sound studio, f.s desktop interface, plug in in / out data for sound edit tool	Sound studio uses f.s for desktop to retrieve the information, work with an external package to create the new version of the assets, push back on f.s DB finished work
	UC5	Project manager (PM) defines the Project's costs	PM uses f.s for tablet or desktop to list all the needs of the production and ask for bids to CG supervisor	PM, CG supervisor, f.s interface for desktop or tablet	PM lists all the assets, sets a time estimation for each element, verifies the workload
	UC6	Designer creates storyboard	Jumping back and forth between f.s and Photoshop, he creates the storyboard	Designer, f.s interface for desktop	Prepare sketch poses in Photoshop, define key frames to display the poses in f.s, iterate as much as needed
<b>3.3 - 3D animatic</b>	UC7	Director supervises other actor's work	Create comments in different form, interact live or offline with the other actors	Director, f.s tablet interface / f.s desktop interface	Director uses all the allowed interface of f.s to review the work, set new notes on task that have to be performed
	UC8	Asset department creates 3D assets	Read and hear in f.s for desktop notes and	Asset department, f.s desktop interface,	Asset department uses f.s for desktop

			references from director, Push the asset to work on to Maya and send back to f.s for review	plug in in / out data for Maya	to retrieve the information, work with an external package to create the new version of the assets, push back on f.s DB finished work
	UC9	Layout department creates the set dressing	In a VR environment, each layout environment is edited and the 3D animatic is prepared	Layout dep., f.s for desktop with VR extension, VR hardware	For each environment enter the layout mode, dress the stage, put the camera, review the job in a voice call with the director, pose the character iterate the animation until it's ready for approval
	UC10	Editorial department works on the edit	Read and hear Director's comments, push to editing suite f.s timeline work on it send back to f.s for review	Editorial dep., f.s desktop interface, plug in in / out data for editing tool	Editorial dep. uses f.s for desktop to retrieve the information, work with an external package to create the new version of the timeline, push back on f.s DB finished work
<b>3.4 Creation of a library</b>	UC11	Animation supervisor defines animation requirements	Define the kind of animation that have to be provided	Animation supervisor, f.s desktop / tablet interface	Start f.s on a style sheet like interface, list all the assets that have to have animation, define the list of the "animation takes" send to MoCap team to start recording, wait for recorded animation and poses to be approved, send approved animation to be used by layout

	UC12	MoCap / animation department creates the animation takes	Prepare the animation to be imported in f.s	MoCap / animation department, performance capture tools, f.s for desktop	Record the animation per character, clean them up, push them to f.s DB
	UC13	Layout department finalizes the 3D animatic	Uses the poses and animation to complete the animatic	Layout dep., f.s for desktop with VR extension, VR hardware	Start f.s in VR mode, apply the poses to the character according to the proper frame in the time, edit poses to generate new ones, spread secondary character to define background animation

### 3.1 UC1: Director Develops the Animated Project

#### Short Description:

The director wants to express his first ideas by putting them on a virtual stage using an ordered timeline with each reference he needs: hyperlinks from the web, picture, photos, videos, and songs.

#### Precondition:

f.s for tablet has a connection with external hardware (microphone and Cameras) and software (web browser and 2D image editor). The f.s software is launched.

#### Postcondition:

A 2D mock-up including environments, characters and sounds is playable through a timeline of defined shots.

### 3.2 UC2 / 7: Director Supervises Other Actor's Work

#### Short Description:

The director needs to supervise the process of the creation of the animated media, using the timeline as a reference base he can always iterate and insert notes in in each stage of the process.

#### Precondition:

f.s for tablet has a connection with external hardware (microphone and Cameras) and software (web browser and 2D image editor). The f.s software is launched.

#### Postcondition:

Any other actor involved in the process can retrieve and use the notes created by the director.

### 3.3 UC3: Designer Develops Arts

#### Short Description:

The art director has to have access to the preliminary version of the assets defined by the director to start iterating on top of them to create actual art that will be further used by other departments.

**Precondition:**

f.s for desktop has a connection with an external software (Adobe Photoshop). The f.s software is launched.

**Postcondition:**

The action performed in Adobe Photoshop can be directly read in f.s to be used in the following step of the process.

### **3.4 UC4: Sound Studio Creates Professional Grade Sound**

**Short Description:**

The sound studio has to have access to the timeline defined by the director to provide professional grade audio mix and voice recording

**Precondition:**

f.s for desktop has a connection with an external software (pro-tools). The f.s software is launched.

**Postcondition:**

The audio file can be directly read into f.s to be used in the following step of the process and the OMF output from pro-tools can be stored in f.s database to be used on an editing suite.

### **3.5 UC5: Project Manager Defines the Projects Costs**

**Short Description:**

The project manager has to have access to the contents created in a spreadsheet form in order to define the effort needed to create the asset and build the budget of the CG production.

**Precondition:**

f.s for desktop has a spreadsheet form to add extra metadata for management purpose. The f.s software is launched.

**Postcondition:**

No post condition required.

### **3.6 UC6: Designer Creates Storyboard**

**Short Description:**

Storyboard artists have to create poses for the character and environment sketches to quickly prototype the story. He iterates between f.s and Adobe Photoshop or another storyboard tool.

**Precondition:**

f.s for desktop has a connection with an external software (Adobe Photoshop, Toon Boom). The first.stage software is launched.

**Postcondition:**

The action performed in Adobe Photoshop can be directly read into f.s. to be used as poses in the “storyboard step” to enable the director to navigate through them and send request to the storyboard artist.

### **3.7 UC8: Asset Department Creates 3D Assets**

#### **Short Description:**

Asset department outside of f.s creates with 3D modelling tools the rigged geometry ready to be imported into f.s.

#### **Precondition:**

f.s for desktop has a connection with an external software (Maya, Autodesk 3ds Max, Blender, Side Effects Houdini). The f.s software is launched.

#### **Postcondition:**

The assets created are ready to be tested and reviewed in f.s.

### **3.8 UC9: Layout Department Creates the Set Dressing**

#### **Short Description:**

Within f.s, Layout artists in VR mode can easily assembly full CG environment, set cameras and pose characters. They can also sketch in 3D new potential assets not previously defined during director’s reviews.

#### **Precondition:**

f.s is able to work in a VR environment, allowing basic 3D manipulation of the assets. The f.s software is launched.

#### **Postcondition:**

The dressed environments are ready to be tested and reviewed in f.s. The information collected in f.s are easily exported to the production animation software (Maya).

### **3.9 UC10: Editorial Department Works on the Edit**

#### **Short Description:**

Using the timeline exported from f.s, editorial is able to finalize the editing of the shots in a professional grade editing suite.

#### **Precondition:**

f.s is able to export the data to the editing suite. The f.s database is in use to bridge the timelines.

#### **Postcondition:**

The timeline is synchronized back to f.s ready for a review with the director.

### **3.10 UC11: Animation Supervisor Defines Animation Requirements**

#### **Short Description:**



Using the spreadsheet to see the list of the assets, the animation supervisor defines the poses as well as the animations required to complete the 3D animatic phase.

**Precondition:**

f.s is able to display in a spreadsheet format the assets to add metadata to be filled with other contents (animation takes). The f.s software is launched.

**Postcondition:**

The MoCap team receives the list of takes to record and all the notes to fulfil the requests.

### **3.11 UC12: MoCap Department Creates the Animation Takes**

**Short Description:**

Using performance capture hardware and software, the MoCap team is able to record the animation takes defined by the animation supervisors and load them directly into f.s database. Those animation takes are assets linked to their associated characters ready to be used by the layout team in order to complete the task.

**Precondition:**

f.s is able to import live data as well as prerecorded data to the defined assets. First.stage database is in use to bridge the software. f.s software is launched.

**Postcondition:**

The animation takes are ready to be used.

### **3.12 UC13: Layout Department Finalizes the 3D Animatic**

**Short Description:**

Using the takes recorded and the poses library, the layout artists complete the 3D animatic within f.s, wearing VR technology.

**Precondition:**

f.s is able to quickly access live data as well as pre-recorded data to use / edit poses and spread secondary characters to define background animation. f.s software is launched.

**Postcondition:**

The shots are ready to be reviewed by the director.

## **4 Functional Requirements**

### **4.1 Ability to Manage a Project**

**Driven by:** Managerial User

**Related Use Case:** UC1

**Description:** Any user that owns a project in f.s must be able to create the project, define all the general parameters that describe it and, in the case of a shared project, set the rules in terms of user

management. The interaction should be a collection of data entries in a form page. Entries can be supported by software suggestions especially in terms of user assignment.

## 4.2 Ability to Import Media Sources

**Driven by:** Creative User

**Related Use Case:** UC1

**Description:** Creative staff must have the ability to import any kind of digital media as source of their work. Video, audio, images, 3D elements, hypertext are owned by him (as actual files), and links from online media, physical objects that can be loaded from a photo camera, video camera or sound recording device can be imported. The interaction should be as simple as a system command provided in a contextual menu.

## 4.3 Ability to Create and Edit a Timeline

**Driven by:** Creative User

**Related Use Case:** UC1

**Description:** Creative staff must be able to create relationships between images, sounds and time. In order to perform this action, a timeline with basic editorial tools is provided. The user must be able to assemble audio track, scroll the timeline with a perfect sound sync. The interaction should mimic pro grade editing tools with a simplified interface and a very effective user experience.

## 4.4 Ability to Create and Edit the Building Blocks of Scenes Contained Into Shots

**Driven by:** Creative User, Tech User

**Related Use Case:** UC1, UC9

**Description:** Every shot in a timeline contains a corresponding scene in a 3D world. The same scene is referenced in the timeline as many times as there are cameras the creative user has set. The creative user uses the timeline as an entry point to access the scene in a contextual way in order to perform action relevant to the story telling like: create the layout, frame the cameras, animate the asset added in the layout. The interaction has different levels of complexity driven by the assets loaded in the scene and the use case scenario. Every action must be equally performed via a tablet or in a fully immersive VR experience. In both cases, basic interactions are allowed: selection of assets, simple transformations, selection of poses, editing along the time of each keyframeable parameter.

## 4.5 Ability to Create and Edit Notes

**Driven by:** Any User

**Related Use Case:** UC2

**Description:** Every user must be able to keep track of his thoughts about further development of each element present in f.s and should be able to share it with all the other users involved in a project. In order to achieve this result, the user must be able to set a note on each relevant element. Notes can be text, image, video, voice recording (automatically transcribed into text for an easy access to the information). The interaction should be as simple as identifying the relevant element and perform a single action to start taking the note. f.s behaviour should prioritize the technique used to do the entry

based on the current user experience: typing text is the main choice when using tablet or desktop computer, voice is the primary solution in VR.

#### **4.6 Ability to Interact with Pro Grade Tools**

**Driven by:** Tech User

**Related Use Case:** UC3, UC4, UC6, UC8, UC10

**Description:** In order to further expand the possibilities of the creative user, an artist with technical skills must be able to have a bridge with pro grade tools in order to implement f.s in a professional environment. Tech users should be able to import to and export from f.s seamlessly. The interaction should be as simple as performing push / pull commands and being able to add comments and stack versions of the updated results together with reference thumbnail and basic comments to keep track of their action.

#### **4.7 Ability to Analyse the Complexity of the Project**

**Driven by:** Project Management User

**Related Use Case:** UC5

**Description:** The project manager (PM) should be able to inspect the content of a project with a full analysis of all the assets available to create a schedule, organize manpower bidding and forecast costs. The interaction should be very simple, they should be able to filter, sort and group contents in order to get clean data to extract and use it in their own pipeline.

#### **4.8 Ability to Interact with Other Users Online**

**Driven by:** All users

**Related Use Case:** UC7

**Description:** Creative Users, PM and tech users could be geographically located in different areas of the world. f.s must be able to allow online real-time communication between the parties at least via voice / text chat providing a visual feedback on the changes discussed and performed during the call session. Interaction should be as easy as joining a call via any other instant communication tool.

#### **4.9 Ability to Record and Import MoCap Data**

**Driven by:** Tech user

**Related Use Case:** UC9, UC11, UC12, UC13

**Description:** While in the process of defining animation the tech team dedicated to the animation and the layout phase must quickly dress MoCap suits, gloves and face recognition tools to do their performance on the fly. While performers act, other technicians should be able to start recording the action together with cameras and load other prerecorded files on other characters present in the scene. The interaction with f.s must be smooth and solid allowing the control of concurrent action with an effective control panel presented as a virtual console UI displayed on a tablet.

## 5 Assessment of Output Quality

In order to assess the quality of the requirements gathered in this document and to ensure that these are valid requirements, two steps were performed based on common user experience guidelines and practises [1]. First, after gathering all requirements for all four application areas of the first.stage project, the requirements were reviewed and prioritized by each application partner. Prioritisation included all requirements, sorting them in either of the three categories low, medium, and high priority. It is important to get the full understanding of the extent to which a requirement is critical or not. A low priority requirement may not be met but will not jeopardize the end quality of the product whilst a high priority requirement that is not met may be mandatory to have a useful product. That way, important requirements can be identified to focus on core and most important functions of the future system whilst incorporating a control loop that allows dismissal of certain requirements. However, the order of implementation is highly dependent on the priority of the requirements. The prioritized requirements can be found in Deliverable 1.5. This step ensures that only valid and important requirements result from the requirement analysis.

The fictional scenarios are there to assess the necessity of usage of the requirements. With the pre-conditions (what is needed to properly test out the requirements) and post conditions (what should we be able to do after the requirement has been tested out), we are able to set the requirements into a plausible environment.

As a second step, the requirements are subject to constant validation, change and rework in the process of testing the prototypes developed based on these requirements. These efforts are rooted in Work Package 6. Based on the iterative approach of software development practices [1], on the basis of the initial requirements and their priorities, first prototypes are developed. These prototypes are tested iteratively in the application context with professionals. Based on the results of these tests, the requirements are adapted and new ones are added if necessary. In addition, non-functional requirements regarding the interaction with the system are gathered based on first user tests of prototypes, as interaction requirements are often hard to obtain from users without much technical knowledge. The results of the new and reworked requirements can also be found in Deliverable 1.5.

## 6 References

- [1] Rex Hartson and Pardha S. Pyla. *The UX Book: Process and Guidelines for Ensuring a Quality User Experience*. Elsevier, 2012.
- [2] John M. Carroll. *Making Use: Scenario-based Design of Human-Computer Interactions*. MIT Press, 2000.
- [3] Klaus Pohl. *Requirements Engineering: Fundamentals, Principles, and Techniques*. Springer Publishing, 2010.

## 7 Document History

Ver.	Date	Changes	Author
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V0.9	07.11.2016	First version	Kai Erenli, Francesco Paglia
V1.0	30.11.2016	Final editing and proofreading	Brigitte Fass
V1.1	13.12.2016	Proofreading	Thomas Friedrichs
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V1.4	07.05.2018	Refinements	Francesco Paglia
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