Escola Universitària
Politècnica de Mataró

Centre adscrit a:

UNIVERSITAT POLITÈCNICA
DE CATALUNYA

Bachelor's Degree in Audiovisual Media

VISUAL EFFECTS COMPOSITING DEMO REEL

Report

Ramón Rosa Esparrach
Ponent: David Minguillón Planell

SPRING 2014

TecnoCampus
Mataró-Maresme

Acknowledgements

Thanks to all the directors and producers who let me work on their projects. Also to my colleagues and family for their invaluable feedback and support.

Resum

L'objectiu d'aquest projecte és la creació d'una bobina de composició d'efectes visuals per a cinema i una pàgina web professional a través de la participació en tres curtmetratges: 'Carne de Gaviota', 'Hope' i 'Nostalgia'. S'han obtingut més de 40 plànols amb un alt nivell de qualitat tècnica i visual utilitzant fluxos de treball i software estàndards a l'industria dels efectes visuals.

Resumen

El objetivo de éste proyecto es la creación de una bobina de composición de efectos visuales para cine y una página web profesional a través de la participación en tres cortometrajes: 'Carne de Gaviota', 'Hope' y 'Nostalgia'. Se han obtenido más de 40 planos con un alto nivel de calidad técnica y visual utilizando flujos de trabajo y software estándar en la industria de los efectos visuales.

Abstract

The main goal of this project is to create a visual effects compositing demo-reel and a professional website trough the participation on three short films: 'Carne de Gaviota', 'Hope' and 'Nostalgia'. The final outcome has been more than 40 high technical and visual quality shots, following visual effects industry standard workflow, procedures and software.

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Glossary of Terms.

RED	RED Professional Digital Cinema
BMC	BlackMagic Cinema Camera
vfx	Visual effects
fps	Frames per second
DCI	Digital Cinema Initiative
DPX	Digital Picture Exchange
XML	eXtensible mark-up language
CC	Adobe Creative Cloud
H264	High compression vídeo codec

1. Objectives

1.1. Objective

To create a visual effects compositing demo reel to show the skills and abilities learnt after supervising the post-production and creating the visual effects of three short films.

1.2. Aim

To learn and improve new compositing techniques such as wire removal, sky replacement or camera tracking and gather all them in a video that will be sent to visual effects companies when applying for a job.

1.3. Object

The final result of this project is a 3 minutes length video that shows the best work done on three short films where the author has worked as a visual effects compositor. It also includes the creation of a professional website with contact information and an extended portfolio.

1.4. Scope

To supervise the whole post-production process (from the editing to the final export) of ‘Carne de Gaviota’ and ‘Hope’, to create the visual effects of ‘Nostalgia’ and to edit a demo reel gathering the best work done on this three short films.

2. Information about the project

This project consists in the supervision of the entire post-production process and the compositing of the visual effects of three fiction short films. It also includes the editing of a demo reel gathering the best work and a professional website that will be used when applying for a job.

2.1. The short films

The first one is 'Carne de Gaviota' (2014), directed by Felipe Espinosa and starring Christian Stamm, Toni Climent and Bianca Palmisano. It relates the history of a shipwreck on a desert beach and the relationship between the characters, their emotions and their fight to survive. With a budget of 2,000 € it was shot on RED Scarlet in 2013 at Cala Sa Boadella, Lloret de Mar.

This project has involved nine visual effects shots, including clean-up of undesired elements, mechanical rigs stabilization (jib and dolly) and a big panoramic moving shot.

The second one is 'Hope' (2014), directed by Aleix Buch and starring Júlia Molins and Josep Maria Alejandre. It tells the history of a girl kidnapping and her appearance on TV. With a budget of 1,200 € it was shot on BMC 4K in 2014 at TecnoCampus Mataró and Sant Vicenç de Montalt.

'Hope' has involved twelve visual effects shots, including clean-up of undesired elements, reframing, mechanical rigs stabilization (dolly and steadicam) and digital blood.

In both projects the whole post-production process has been supervised, from the editing and dailies transcoding to the colour grading and final export.

The last one is 'Nostalgia' (2014), directed by Daniel Tolleson and produced by Sturm und Drang, and it relates the history of a man who suffers "Mal du Suisse" disease. It was shot in 2014 at Begur using a RED Epic and ARRI Alexa cameras.

'Nostalgia' has been the biggest one, with twenty-one visual effects shots including wire removal shots, matte-painting, sky replacement and stabilization.

2.2. Methodology

All the procedures and workflows involved in the creation of the visual effects are industry standard and based on the main books consulted for this project:

[1] S. Wright, *Digital Compositing for Film and Video*. Focal Press, 2010.

[2] J.A. Okun and S. Zwerman, *The VES Handbook of Visual Effects: Industry Standard VFX Practices and Procedures*. Focal Press, 2010.

The software used for this project are the following ones:

- The Foundry NUKE-X (compositing)
- Adobe After Effects CC (compositing and motion graphics)
- Adobe Photoshop CC (matte-painting)
- Adobe Media Encoder CC (transcodification)
- Adobe Premiere Pro CC (editing)
- DaVinci Resolve Lite (conform and colour grading)

3. 'Carne de Gaviota'

3.1. Shooting supervision

'Carne de Gaviota' was shot during 3 days back in April of 2013 at Cala Sa Boadella, Lloret de Mar. To make things easier in post-production all the shots that involved any kind of visual effect were supervised. The main supervision work were the following points:

- To check tracking markers position and scale
- To check camera settings: resolution, shutter speed, compression ratio, format and frames per second.
- Write down all the shot information that could be relevant in post-production: focal distance, focal length, white balance, pan and tilt degrees, camera height, shutter speed, sensibility, resolution, distance to the actors and shot length.

A customised camera report like this was used to write down all the shot information:

CARNE DE GAVIOTA

Recolección datos VFX

Fecha	Hora	Localización	Clima	Claqueta	
Cámara	Lente	Formato	Resolución	Filtro	
Diafragma	Foco	Altura cámara	Tilt	Obturador	Técnico

Descripción del plano
Trabajo de VFX necesario
Notas

Toma	Focal	FPS	Tarjeta	Comentarios

Fig. 3.1 – VFX camera report

3.2. Post-production

The first step of the post-production process was the editing. It was done by the director, Felipe Espinosa, following the provided technical advice.

'Carne de Gaviota' editing was done using the raw footage, without any transcodification process. Almost everything was recorded using a cinema RED Scarlet Mysterium-X camera, in .R3D format at 5K (5120x2700 25fps shots) and 3K (3072x1620 48fps shots) resolution. The .R3D format allows the user to playback the footage at a lower resolution (1/4 or 1/8), so it can be edited using a consumer computer.

The final delivery resolution chosen for this project was 2048x858, known as DCI 2K Scope, a standard cinema resolution set by the Digital Cinema Initiative in 2005. The reason to choose this resolution was to ensure the maximum compatibility with all the cinemas where the short film is going to be projected.

Once the editing was finished, all the visual effects shots were exported as DPX frame sequences at 2048x858 using Adobe Media Encoder CC. Visual effects software like Nuke or After Effects works with frame sequences not compressed videos, and DPX is the standard format for visual effects shots. Before closing the editing process, the finished visual effects shots were introduced back into the timeline.

The last step in the post-production process was to export a XML file from Premiere CC to be able to send the complete timeline to the colour grading software DaVinci Resolve. Then, the whole project was sent to the colour grading artist.

The final export was done using Apple ProRes 4444 lossless codec at DCI 2K Scope resolution and this is the master that will be used for film festivals and distribution.

3.3. Visual effects

3.3.1. Panoramic shot

The most challenging shot of 'Carne de Gaviota' has been a panoramic shot of Cala Boadella composed by 17 images, 15 of them statics and 2 with moving water. The idea

behind this panoramic shot is to create the illusion of an island because there's water on both sides of the frame.

Fig. 3.2 – Panoramic shot base plates

After stitching the panorama manually using Photoshop, the next step was to import the panorama in Nuke-X, merge over the moving water shots and do some clean-up work of people, trash cans and small buildings.

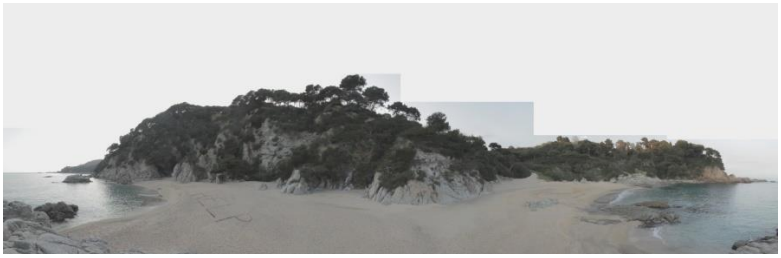

Fig. 3.3 – Stitched panorama

The day this panoramic was shot the sun was above the trees and the sky was really bright without any clouds, so the director wanted to change it and we shot another panoramic plate to be used as the new sky. After masking the island, compositing the new sky and some colour grading this is the final result:

Fig. 3.4 – Final panorama shot

3.3.2. ‘Help’ shot clean-up

Another difficult shot of ‘Carne de Gaviota’ has been this big clean-up work. Sa Boadella is a public beach and even with shooting permissions people didn’t want to go out of the sand and they had to be removed from the shot. This is the original shot:

Fig. 3.5 – Original ‘Help’ shot

After stabilizing the shot and the clean-up work (more than 600 clone brush strokes) this is the final result, a desert beach on an island:

Fig. 3.6 – Final ‘Help’ shot

3.3.3. Buoys clean-up

There are 3 shots with visible sea buoys. The procedure to clean them up is always the same: the first step is to track the buoy using a 2D tracker, remove the buoy using a clone brush in the first frame and then link the tracker movement to the clone brush.

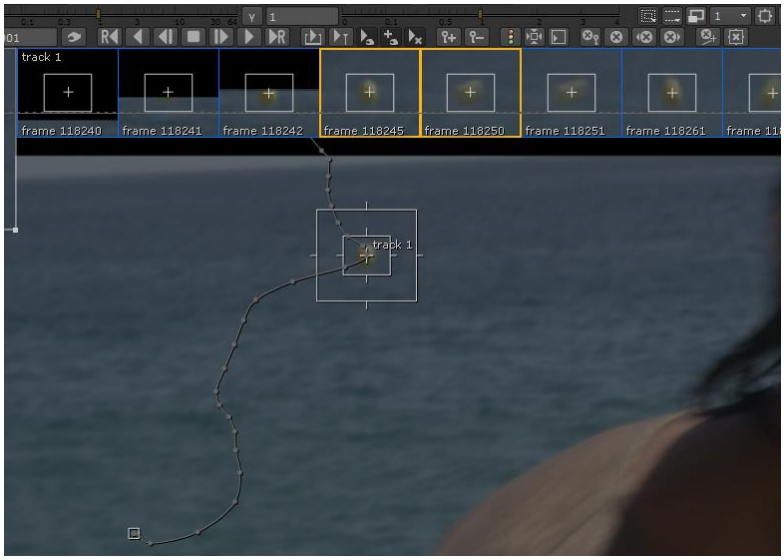

Fig. 3.7 – Tracking a buoy in Nuke

3.3.4. Dolly zoom shot

The opening shot of 'Carne de Gaviota' is an extremely smooth dolly zoom out shot, achieved thanks to the stabilization work done in post-production using After Effects CC warp stabilizer.

Fig. 3.8 – Dolly zoom shot

The setup for this shot was an actor in front of the sea and a 6 meters dolly behind him with a 50mm lens mounted on the camera. The focus puller also installed a wireless follow focus on the lens zoom ring to perform a zoom out while the camera was moving.

4. 'Hope'

4.1. Shoot supervision

'Hope' was shot during two weekends back in March of 2014 at TecnoCampus Mataró and Sant Vicenç de Montalt. All the visual effects shots were also supervised, always with the aim of avoiding problems in post-production.

The main visual effects work involved clean-up of undesired elements, so the supervision was really important. Sometimes it was just a matter of moving the camera or the actors, or even with some help of the art department.

4.2. Post-production

The editing of 'Hope' was done by Aleix Buch, the director, following the provided technical advice.

The main difference between 'Hope' and 'Carne de Gaviota' has been the use of proxy files. Proxy files are essentially the same clips but with much lower resolution and bitrate, and that's why it's much easier to work with them than with the original footage.

The camera used for 'Hope' was a BlackMagic Production Cinema Camera 4K, recording at 4K resolution in Apple ProRes format and 10bit colour depth. ProRes files need much more bandwidth than .R3D files, and it's really difficult to edit using the raw footage on a consumer computer.

Proxy files were created using Adobe Media Encoder CC, at 1920x1080 resolution and using a compressed video codec (H264). Proxy files don't keep the same level of quality of the raw footage, but it's really easy to edit using them.

After closing the edit, the next step was to do the on-line edit, to swap the proxy files for the raw footage. The procedure is to hide the proxy files, and point to the raw footage when the editing software asks for the original media.

The resolution chosen for this project was also DCI 2K Scope (2048x858), trying to ensure the maximum compatibility with all the cinemas where the short film is going to be projected. The next step was to export the visual effects shots in DPX format and do all the work that they needed.

After the visual effects process, a XML file was exported from Premiere to conform the project into DaVinci Resolve and send it to the colour grading artist. The final export was a ProRes 4444 master at DCI 2K Scope for film festivals and distribution.

4.3. Visual effects

4.3.1. TV News green screen

The first visual effects shot done for ‘Hope’ was a green screen TV news because it was going to be used during the main shooting. It was shot on Mataró local television green screen studio, using three bounced lights and a Canon 5D Mark III.

Fig. 4.1 – Original green screen shot

Visual effects work has included green screen keying, background design and weather chyron animation. The background has been designed using references provided by the director, always looking for orange as the main colour.

Fig. 4.2 – Finished green screen composition

4.3.2. Character death

The last shot of 'Hope' has been the most challenging one but also the most rewarding. Visual effects work has included clean plate creation, blood splashes compositing and rotoscoping.

The first step has been to create a clean plate of the girl lying on the floor from the original footage. This clean plate has been used to composite over several blood splashes over the girl and the wall, matching defocus, noise and brightness.

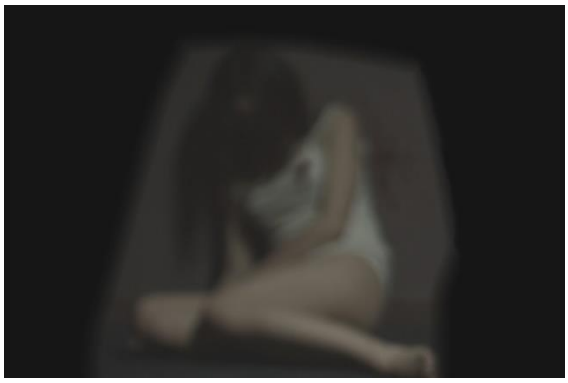

Fig. 4.3 – Blood splashes composited over the clean plate

After compositing the blood splashes, the actor's body has been rotoscoped and composited over the original footage to restore the original scene depth.

Fig. 4.4 – Final shot

4.3.3. Clean-up work

'Hope' has also included a lot of clean-up work, mainly house furniture that couldn't be removed physically and it had to be done in post-production. This shot is an example, where a wall switch has been removed to avoid distracting the audience:

Fig. 4.5 – Wall plug

After choosing a patch from another part of the wall, compositing it over the wall switch and adjusting the texture and light this is the final result:

Fig. 4.6 – Wall plug removed

5. 'Nostalgia'

Back in May 2014 Miguel Pacheco, the visual effects supervisor of 'Nostalgia', sent an e-mail because they were looking for a digital compositor for their project.

On May 27th a meeting between Miguel, Jorge Sales (the producer) and me took place in Barcelona, to talk about the visual effects: the number of shots to do and the deadline. All the post-production process before visual effects was already done, so they sent all the DPX files after the meeting.

'Nostalgia' didn't have any visual effects supervisor, and it was a problem because some shots needed a lot of work for small things. The short film was shot using a RED Epic and an ARRI Alexa, and the resolution chosen for the final delivery was DCI 2K 16:9 (2048x1152).

5.1. Visual effects

5.1.1. Sunset window

The biggest visual effects shot of 'Nostalgia' is this one, an actor in front of a hotel window watching the sunset. It includes matte painting work, edge refining, flare restore and windows dirt.

Fig. 5.1 – Original shot

The first step to remove the hotel background is to create a matte that's used as a mask to separate the foreground and the background. It has been created adjusting the luminance of

the shot, bringing up the exposure on the highlights and down on the shadows. Then the pixel values of the matte are multiplied by the pixel values of original shot, what means that the area covered by white pixels will remain after the multiply operation. To accomplish the desired result and keep the actor on the shot the final matte has been inverted.

Fig. 5.2 – Inverted matte

The next step is to composite the background plate behind the foreground, some dirt over the windows, restore the original flare and do a quick colour grading to improve the final shot.

Fig. 5.3 – Final shot

5.1.2. Sky replacement

During the short film this shot is located before a big storm scene. Because it's difficult and dangerous to shot a scene near the beach during a storm the director and producer decided to do it using visual effects.

Fig. 5.4 – Sky replacement original shot

The original footage was recorded without tripod but the director liked the shaky movement. To be able to create the new sky and paint over a static frame the shot was stabilized. Then the new sky was painted using Photoshop CC and composited over the footage with Nuke creating a luminance matte (the same technique used in the previous shot) for the girl. The last step was to reapply the original movement because the director wanted to keep it.

Fig. 5.5 - Sky replacement finished shot

5.1.3. Hotel replacement

In this shot the visual effects work has been to replace a small building located at the top of the mountain for an old hotel and another sky replacement because this shot it's also located before the big storm scene.

Fig. 5.6 – Hotel original shot

The hotel replacement has been done using Photoshop, and the matte and final compositing in Nuke. After creating the luminance matte the shot was split in two parts: the foreground with the mountain and the hotel and the background with the new cloudy sky.

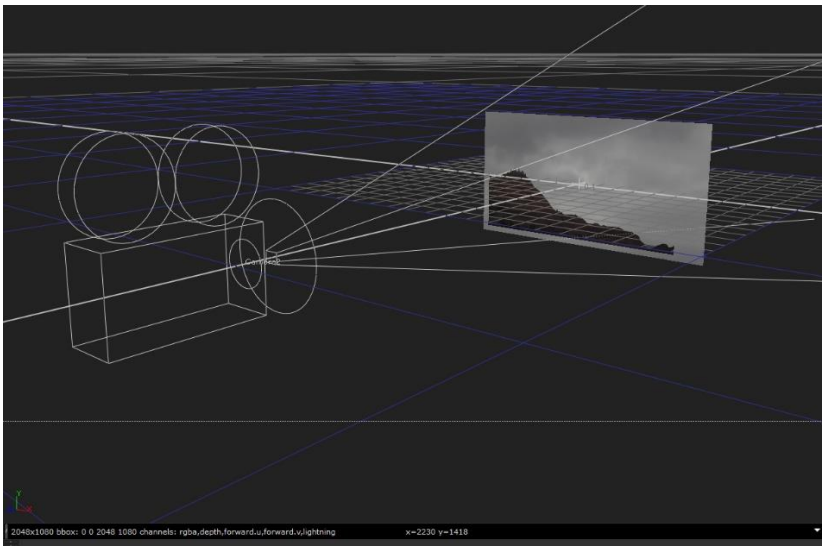

Fig. 5.7 – Nuke 3D scene

Each part was projected on a Nuke 2D card with an animated camera that performs a dolly out movement to enhance the scene depth. The last step was to create a lightning animation using a greyscale map of the sky and animating the exposure of the highlights.

Fig. 5.8 – Final composition

5.1.3. Wire removal

At the end of 'Nostalgia' there is a sequence of four shots where one the characters is being shot by another. To trigger the blood squib the actor had a wire around him that has been removed using wire removal techniques, commonly used to remove the wires used to hang actors. To remove the wire a clean frame was used as a mask composited over the area covered by the wire:

Fig. 5.9 – Wire removal comparison

6. Reel editing and website development

6.1 Reel editing

The main goal of this project is to create a high quality demo reel that could be used as an example of the author's skills. The most important elements of this reel are the following ones:

- Contact information (website, e-mail and phone number) at the beginning and at the end of the video.
- Show a variety of different compositing techniques
- Show the name of the project and the work done on each shot
- Maximum length around three minutes

The reel was edited using Adobe Premiere and motion graphics video was created with After Effects to be used as an introduction and conclusion of the reel:

Fig. 6.1 – Reel motion graphics introduction video

6.1.1. Shot list

Shot Nº	Project	Techniques
1	Nostalgia	Sky matte-painting, colour correction and girl rotoscoping.
2	Carne de Gaviota	People clean-up and colour grading

3	Hope	Background design and animation, green screen keying
4	Hope	Wall plug clean-up
5	Hope	Wardrobe clean-up and reframing
6	Carne de Gaviota	Panoramic stitching, people clean-up, rotoscoping, background grading and water restore
7	Hope	Gun tracking and rotoscoping, muzzle flash integration
8	The Squad	Cell-shading compositing, depth-of-field, motion blur, lens distortion and colour grading
9	Nostalgia	Hotel removal, matte-painting, sky replacement and sky lightning animation
10	Personal work	Plate clean-up, rig removal, match-move and girl rotoscoping
11	Nostalgia	Buoy removal and kid rotoscoping
12	Tears of Steel	Green screen keying, background grading, lens redistort and flares compositing
13	Nostalgia	Buoy line removal and kid rotoscoping
14	Nostalgia	Foreground keying, background integration, windows dirt and flare restore
15	The Squad	Cell-shading compositing, windows dirt, depth-of-field, motion blur, lens distortion and colour grading
16	Hope	Clean plate creation, blood splashes and girl rotoscoping
17	Nostalgia	Wire removal
18	Nostalgia	Plate stabilization and ship removal
19	Hope	Right wall light switch removal
20	Hope	Plate stabilization

Chart 6.1 – Reel shot list

6.2 Website development

In addition to the reel, a professional website has been created. The purpose of this website is to gather all the author's contact information, skills, a portfolio and as a place to watch

the reel. The goal is to have an own identity on the Internet and not rely on any other website or social network as the main information point.

The website has been created using WordPress content management system and the Ego Parallax Responsive theme, modified to suit the website style. The hosting service is provided by BlueHost, a recommended partner of Wordpress. It is located under the domain www.ramonrosavfx.com.

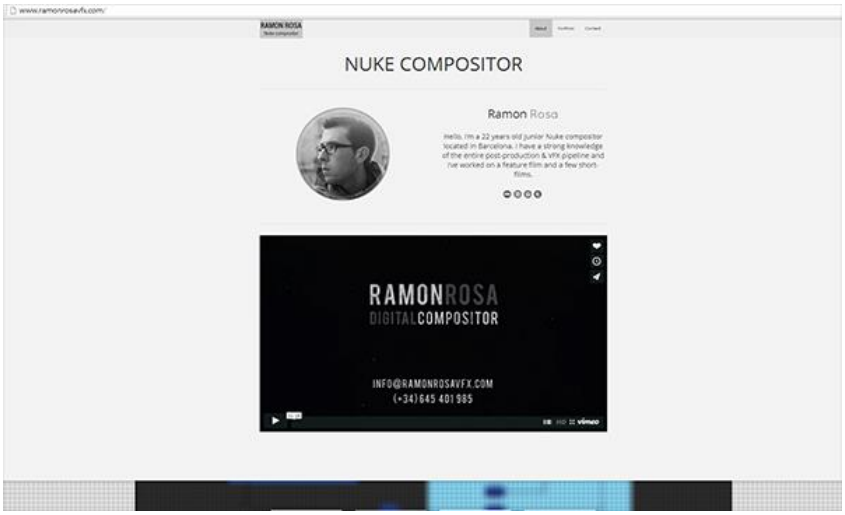

Fig. 6.2 – Website layout

The website design is responsive and it's split in two different depth layers to create a parallax effect when the visitor scrolls down. It also includes an upper menu to surf between sections. Using "Yoast WordPress SEO plugin" the website is now well positioned on Google.

7. Conclusions

This project has been really challenging, it has forced me to learn new techniques and workflows but I don't have any doubt that it has been worth the effort. It has encouraged me to continue improving my skills and make a career in the visual effects industry.

And I've also learnt something impossible to learn from books or tutorials, the experience of dealing with clients, directors, producers and tight deadlines, what makes you work faster without decreasing the quality.

8. References

[1] S. Wright, *Digital Compositing for Film and Video*. Focal Press, 2010.

[2] J.A. Okun and S. Zwerman, *The VES Handbook of Visual Effects: Industry Standard VFX Practices and Procedures*. Focal Press, 2010.

[3] C. Finance and S. Zwerman, *The Visual Effects Producer*. Focal Press, 2010.

[4] E. Hornung, *The Art and Technique of Matchmoving: Solutions for the VFX Artist*. Focal Press, 2010.

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Economic Study

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Index.

1. Project cost

1.1. Hardware

Description	Hours	Price	Total
Laptop Dell XPS L702X (i7, 12GB, GT555M, SSD 240GB)	*550*	*935,76*	*935,76*
Dell U2312HM 23”	*350*	*194,95*	*194,95*
Apple Cinema Display 23”	*350*	*289,95*	*289,95*
Lacie 2Big Quadra RAID 4TB	*350*	*320,01*	*320,01*
Seagate Expansion 2TB	*350*	*66,95*	*66,95*
Seagate Expansion 2’5” 1TB (2 units)	*550*	*59,95*	*119,90*
TOTAL HARDWARE COST		**1927,52 €**	

1.2. Software

Description	Hours	Price	Total
The Foundry Production COLLECTIVE (Nuke-X, MARI, MODO and Hiero) – Student License	*400*	*190*	*190*
Adobe Creative Cloud	*250*	*36,89 / month*	*221,34*
DaVinci Resolve Lite	*40*	*0*	*0*

Microsoft Office 2013	*60*	*120*	*120*
TOTAL SOFTWARE COST		**531,34 €**	

1.3. Human resources

Description	Hours	Price/hour	Total
Visual effects supervisor	*120*	*46,15*	*5538*
Visual effects junior compositor	*500*	*23,54*	*11.770*
Report writing	*60*	*8,36*	*501,6*
TOTAL HUMAN RESOURCES COST		**17.809,6 €**	

1.4. Final project cost

Description	Total
Total Hardware Cost	*1927,52*
Total Software Cost	*531,34*
Total Human Resources Cost	*17.809,6*
Subtotal	*20.268,46*
Indirect Expenses (11%)	*2229,53*
TOTAL	**22.497,99 €**