



**Virtual Production
Studio Networks**

Virtual Production Knowledge Base



Funded by
the European Union



**Breda
University**
OF APPLIED SCIENCES

VP Knowledge Base

Goal

The purpose of this manual is to give a solid foundation in the creation of video and film projects using virtual production-assisted technology.

The goal is for the readers to gain an understanding and knowledge of the various stages involved in the development of a video or film production in all stages of the process, including pre-production, production, and post-production.

Due to being a new field, the concepts tied to Virtual Productions are scattered. We aim to provide an extensive introduction to the topic and consolidate its definitions. This guide, though not exhaustive, serves as an initiation to pivotal concepts. It strives to establish connections between fundamental principles and more intricate content, offering readers a pathway to delve deeper.

The readers will gain a comprehensive grasp of the intricate process entailed in producing videos or films through the utilisation of computer-assisted technology. This knowledge will help them to start the development of their own creative projects in the realm of video and film production, harnessing the potential of modern technological advancements.

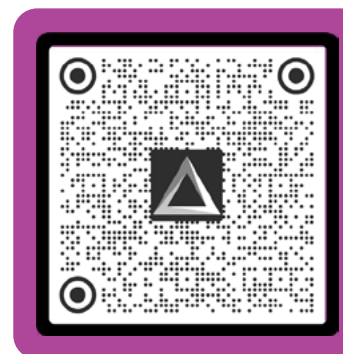
How to use

The fundamental concepts introduced within this knowledge base are expected to remain mostly consistent. However, the landscape of digital resources is always evolving, with better online materials and updated software frequently emerging. This might make linked content outdated quickly. Moreover, we are currently in the process of crafting a tangible hard-copy edition of this book to facilitate widespread distribution.

To address this evolving landscape and ensure the longevity of the learning experience, we have established a dedicated online support page. We are committed to providing you with relevant and current learning resources by updating these links regularly.



Online Resources



[VP Knowledge Base - Online Resources](#)

Collection of resources like guides, tools and tutorials.

Join our expert network to access the latest in Virtual Productions news, engage in discussions, and contribute to this evolving Knowledge Base.

Virtual Productions Knowledge Base Community



[Discord Server](#)

Join us

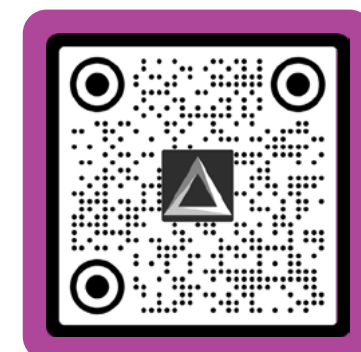


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**“Filmmaking is a
chance to live
many lifetimes.”**

Robert Altman

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Virtual Production

Definition

Virtual production is a film and video production process that involves the use of computer-generated imagery (CGI) and real-time computer graphics to create and capture filmed content.

This technique allows filmmakers to visualise and control the visual effects in real-time as they are shooting the live-action elements of the film, rather than adding them in post-production.

Virtual production enables real-time creation and capture of visual effects, streamlining film and TV production by shifting work from post- to pre-production.

In a virtual production, filmmakers can use digital graphics tools to pre-visualise and design shots, set up and block out scenes, and even rehearse with actors before actual filming begins. This allows for greater flexibility and control in the production process, as filmmakers can make changes and adjustments to the virtual environment on the fly.



With this production process, filmmakers can manipulate visual effects in real-time while shooting live-action elements for the film. This means that filmmakers can make changes and adjustments to the visual effects immediately, rather than having to wait until post-production to see how they will look. By doing this, filmmakers can better understand how the final film will look and make any necessary adjustments before the shoot is finished.

Virtual production allows filmmakers to create and manipulate digital assets in real-time, using a process that is similar to traditional animation techniques. This means that they can experiment with different visual effects and see how they look in the final film without having to spend time and resources creating and rendering the effects in post-production.

During filming, virtual production techniques can also be used to capture live-action footage and integrate it with CGI elements in real-time. This can be done using specialised cameras and VR headsets, allowing the filmmakers to see the final composite image as they shoot.

Virtual production offers a wide range of benefits to filmmakers, including increased efficiency and cost-effectiveness, greater creative control, and the ability to create complex and visually stunning content that might not be possible using traditional film and video production techniques alone.

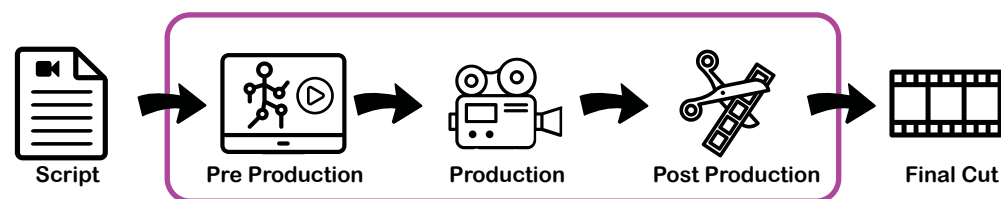
Production allows filmmakers to create more complex and realistic visuals while also streamlining the production process and reducing costs. It is a powerful tool that is becoming increasingly popular in the film and television industry.



Knowledge Base Content

This knowledge base delves into the process of designing and developing cinematic experiences. It comprehensively addresses the modern production pipeline, which is divided into three phases: pre, production, and post. The knowledge base follows this same three-part structure, with each section bearing the corresponding name.

Two critical points merit attention. Firstly, our coverage encompasses an updated pipeline, which anticipates the development of various elements during pre-production.

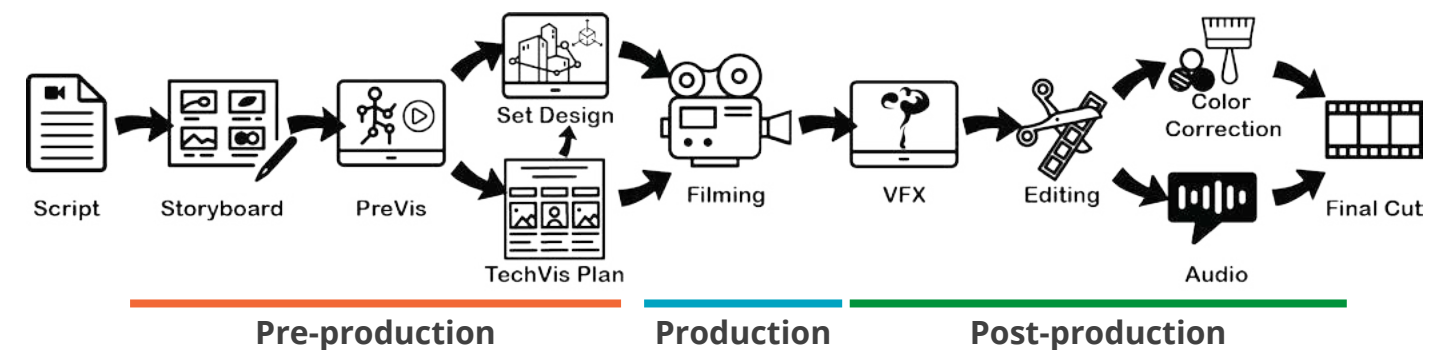


- **Script:** This is the initial stage where the idea for the film is developed and the script is written.
- **Pre-production:** Laying the groundwork for the actual filming process. This includes assembling the cast, scouting locations, and develop in-camera visual effects.
- **Production:** This is the stage where the film is actually shot. This can take place on location or on a soundstage, depending on the needs of the project.
- **Post-production:** After the film has been shot, it enters the post-production phase, where the footage is edited, special effects are added, and the final soundtrack is mixed and mastered.
- **Distribution:** Once the film has been completed, it is released to the public through distribution channels.

“
A film is
never really
finished, only
abandoned.”

George Lucas

Production Pipeline Overview



The production pipeline refers to the step-by-step process through which a project moves from initial concept to final output, and it is often divided into various stages and presented into a set of tasks that flow manage the complex tasks involved. Each project is different, and typically is not a straight forward recipe, specially because it is a creative process.

Due to the advance of virtual productions technologies, there has been a shift of a significant amount of work from the post-production phase to the pre-production phase. In traditional film production, many elements of a film, such as sets, props, and visual effects, are created and captured separately and then combined in post-production. With virtual production, these elements can be created and captured in real-time, which means that they can be fine-tuned and adjusted during the shoot, rather than having to be fixed in post.

This shift in the workload can help to streamline the production process, allowing filmmakers to save time and money by reducing the need for costly reshoots and post-production work, and be more sustainable.

It can also allow filmmakers to be more creative and flexible, as they can make changes and try out different ideas in real-time, rather than having to wait until post-production to see how everything will look. By putting in the work upfront, the team can streamline the production process and ensure that the final product meets the desired vision and standards.

An additional positive point of virtual productions is the possibility of offering a safer work environment as for dangerous shots, e.g., a burning warehouse or a ship in a storm, the stage can be used instead of recreating the shots in real life.



Tech Tools

Throughout the film production pipeline, there are many different tools supporting the project lifecycle.

This knowledge base it will be focusing on two essential tools that are crucial for multiple phases of the project pipeline.

While there are other important tools that also play a vital role in the production process, these two tools have been chosen for their versatility and ability to cover multiple aspects of the project pipeline. By mastering these tools, participants will have a better understanding of the project pipeline and the ability to handle different stages of production with more efficiency.

They will serve as valuable assets in every stage of the project, from planning, execution, and assessment. By the end of the workshop, you will have a solid understanding of how to use these tools.



Unreal Engine

The world's most advanced real-time 3D creation tool for photoreal visuals and immersive experiences.

Unreal offers a framework for creating high-fidelity digital realistic real-time immersive 3D content for Game Dev, Automotive, Architecture and Film & TV.



DaVinci Resolve

DaVinci Resolve is the only solution that combines editing, color correction, visual effects, motion graphics and audio post production all in one software tool.

That means you can work with camera original quality images throughout the entire process. It is like having your own post production studio in a single app!



Roles & Responsibilities

Film Productions

Director

The director is the person responsible for the overall creative vision and execution of a film or television show.

They work closely with the writer to develop the concept and script, and with the rest of the production team to bring the project to fruition.

The director is responsible for interpreting the script and communicating the desired look, feel, and mood of the film or television show to the rest of the production team. They work with the cast and crew to block out and rehearse scenes, and give instructions on camera placements, lighting, and other technical aspects of the production.

During filming, the director works closely with the director of photography (DP) to create the desired visual style and mood, and with the editor to ensure that the final cut of the film or show reflects their vision.

Overall, the director plays a crucial role in the film and television production process, working to carry out the creative vision of the project and ensuring that all the various elements of the production come together seamlessly.

Each person on the film production crew plays a vital role in bringing the project to life. There are many different roles and responsibilities that must be fulfilled, including producers, directors, writers, actors, cinematographers, editors.

A film crew is a team of professionals hired by a production company to create a movie or a motion picture. This group is different from the cast, which refers to the individuals who act in front of the camera or provide voices for characters in the film.



Producer

A producer is a person who is responsible for overseeing the development and production of a film, television show, stage play, or other form of entertainment. The producer is responsible for bringing together all the various elements of the project, including the script, the cast, the crew, and the budget, and ensuring that everything runs smoothly and efficiently.

The producer is usually involved in the project from the very beginning and is responsible for managing the budget and making sure that everything stays on schedule. They may also be involved in core decisions and coordinating with other departments. Overall, the role of the producer is to ensure that all the various elements of the production come together seamlessly and that the finished product is of high quality.



Director of Photography

The director of photography (sometimes shortened to DP or DoP) is a key member of the film and television production team, responsible for the visual look of the production. The DP works closely with the director to create the desired visual style and mood of the film or show and is responsible for the selection and operation of the camera and lighting equipment. The DP is responsible for the overall look of the film or show, including the composition, lighting, and camera movement. They work with the gaffer (the chief lighting technician) to design and execute the lighting plan, and with the camera crew to operate the camera and choose the appropriate lenses and other camera equipment.

The DP is also responsible for managing the camera and lighting crew and coordinating their work with the rest of the production team. They may also be involved in the color correction process, working with the colorist to ensure that the final image looks as intended.

Overall, the DP plays a crucial role in the film and television production process, working to create the desired visual style and mood of the production and ensuring that the technical aspects of the camera and lighting work seamlessly together.



Production Designer

A production designer is a key member of the film production team who is responsible for creating the visual style and overall look of a film. The production designer works closely with the director and the cinematographer to conceptualize and design the sets, locations, and costumes that will be used in the film. They are responsible for creating a coherent visual style that supports the story and the themes of the film, and that is consistent with the director's vision.

The production designer's role needs to research and develop the visual style of the film, taking into account the time period, location, and themes of the story. They are responsible for designing and creating detailed sketches and concept art of the sets, locations, and costumes. Furthermore, they work closely with the art department to oversee the construction and dressing of sets, and the sourcing and acquisition of props and costumes.

The production designer is responsible for bringing the script to life and creating the visual world of the film. They are the ones who are responsible for the overall look and feel of the film, and their work is essential to creating an immersive and believable environment for the audience. They are responsible for creating a visually rich and consistent story-world, that supports and enhances the script and the themes of the film.



Alone we can do so little, together we can do so much.

Helen Keller



Gaffer

In the film and television industry, the gaffer is the chief lighting technician on a production. They are responsible for the design and execution of the lighting plan for a film or television show, working closely with the director of photography (DP) to create the desired lighting look and mood for the production.

The gaffer is responsible for selecting and positioning the lighting equipment, including lights, reflectors, and filters, and for setting up and operating the lighting control systems. They may also be responsible for managing and coordinating the work of the lighting crew, including electricians and grips.

In addition to managing the lighting setup, the gaffer may also be responsible for ensuring that the lighting equipment is properly maintained and troubleshooting any technical issues that may arise during the production process.

Overall, the gaffer plays a crucial role in the film and television industry, as they are responsible for creating and executing the lighting plan for a production and ensuring that the lighting looks and functions as intended.

Pre-Production



Part 1

Pre-production is the initial stage of the production pipeline, where the project's concept is developed, and matures, storyboards are created, and schedules are set. The aim is to outline all the critical elements to ensure that the production process runs smoothly and effectively.

This section of the Knowledge Base delves into establishing a cohesive project vision and explains the process of crafting a storyboard from a script. It also explores the utilization of Virtual Productions to create a preview, and how this aids in making informed decisions about shot choices and determining the practical elements through a technical shot planning. Also, Unreal Engine tutorials are suggested as well as explanation of various filmmaking techniques such as shot framing and composition.

Creative Vision

Creative Vision refers to the overall aesthetic and thematic. The creative vision of filmmaking of a film can be shaped by the director and other key members of the creative team. It encompasses elements such as the film's:

- Mood
- Tone
- Style

Mood

The mood of a film refers to the emotional atmosphere or feeling that it evokes in its audience, such as suspense, fear, joy, or nostalgia. Mood can be established through the use of various visual and auditory elements, such as lighting, color, music, and sound design.

For example, a dark and moody film might use a lot of shadows, low-key lighting, and a subdued color palette to create a sense of unease and foreboding. This is often seen in horror films or films that have a psychological thriller genre, where the tension and sense of being on the edge is the main focus.

On the other hand, a film that is meant to evoke feelings of joy and nostalgia might use bright colors, upbeat music, and a warm and inviting visual style to create a sense of nostalgia and comfort.

Sound design and music composition also play a crucial role in creating the mood of a film. A tense scene, for example, might be accompanied by a fast-paced and dissonant score, while a peaceful scene might be accompanied by a slower, more melodic, and harmonious score.

The mood of a film can change and evolve throughout the story, often reflecting the emotional arc of the characters. For example, a film might start off with a light and comedic mood, but as the story progresses and the

characters go through difficult experiences, the mood may shift to become more serious and somber.

The tone and style of a film serve as powerful tools for creating an emotional connection between the audience and the story. These elements can help to immerse the audience in the world of the film, making the story more relatable, memorable, and impactful.

It is important to note that the audience's perception of the mood is just as important as how the creative team intended it to be.

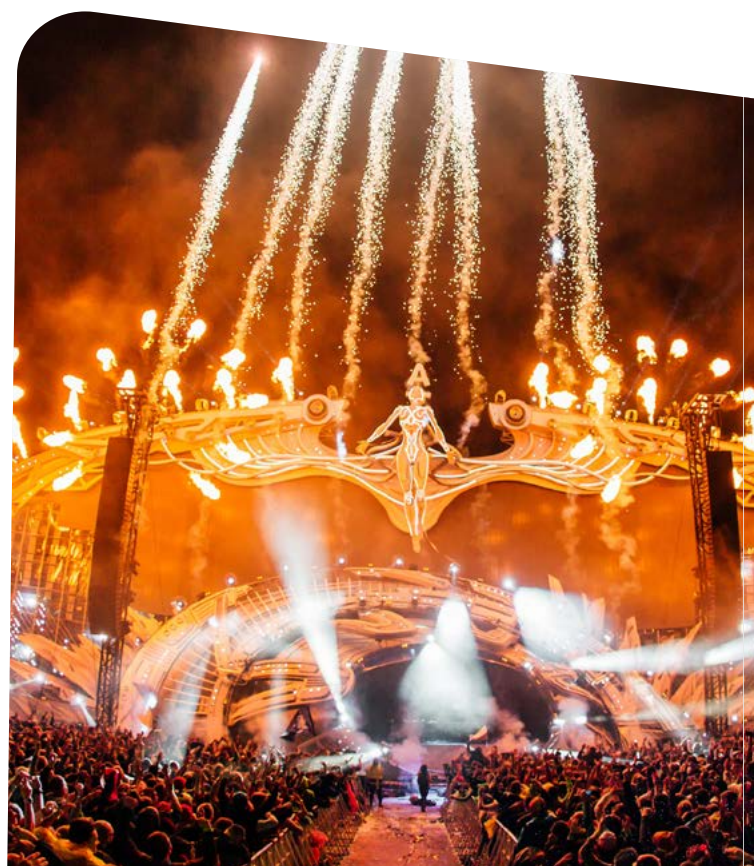


Image credit: Jessey Bijl on Unsplash

Tone

Tone refers to the overall atmosphere or feeling that a movie conveys to its audience. This can include elements such as the cinematography, music, and performances of the actors.

Tone can be used to create a specific emotional response in the audience and can vary greatly from one film to another. For example, a horror movie will generally have a different tone than a romantic comedy. In a horror movie, the tone might be suspenseful, dark, and eerie, while in a romantic comedy, the tone might be light-hearted and joyful.

The tone of a film can also change during the course of the movie. For example, a drama may start off with a tone of hopelessness and despair, but then shift to one of hope and triumph as the story unfolds.

Some other examples of different tones that a movie can have:

- Suspenseful, tense
- Nostalgic, sentimental
- Dark, gritty
- Lighthearted, comedic
- Romantic
- Action-packed



Image credit: Shutterstock

It is worth noting that tone is not the same thing as genre, as a film can have multiple tones within the same genre. A horror film can have suspenseful, scary tone, but it also can have a comedic tone as well.

The tone of a film is set by the director and is an crucial tool in creating a specific emotional experience for the audience. The tone can be used to make the audience feel a certain way about the characters, the story, and the themes of the film, and can be a key element in the overall impact that a film has on its audience.



Tone is everything in a film. The tone of Goodfellas, for example, is completely different from that of Raging Bull. Goodfellas is a comedy, in a sense, a dark comedy about very violent people. Raging Bull is very serious, a tragic film. It is the tone that makes the difference.

Martin Scorsese

Style

Style refers to the distinct visual and technical choices that a filmmaker makes to create a certain aesthetic or visual look for their movie. This can include elements such as the use of color, lighting, camera angles, editing, and special effects.

The style of a film is often closely tied to the mood and tone, as the visual choices made by the filmmaker can be used to reinforce and enhance the mood or feeling that the film is trying to convey. For example, a film with a dark and gritty tone might use a lot of shadows and low lighting to create a sense of unease, while a film with a lighthearted and comedic tone might use bright colors and fast-paced editing to create a playful and energetic feel.

Film style is also often associated with specific directors and their unique visual signatures. For example, the style of Stanley Kubrick is known for meticulous control over every aspect of the film, emphasizes symmetrical framing, use of long takes and meticulous use of music, while Quentin Tarantino's is associated with frantic camera movement, overlapping dialogue and an eclectic choice of music.

Overall, film style is an important tool that filmmakers use to create a specific visual aesthetic for their movie, which can help to reinforce the tone and themes of the film and ultimately enhance the overall viewing experience for the audience.



Breakdown Creative Vision

A film's creative vision is the overall artistic direction that the filmmaker wants to take the film in, in terms of the emotions and feelings they want to convey to the audience, the aesthetic they want to create, and the themes they want to explore. This vision can be achieved through the use of mood, tone, and style.

A good creative vision can be complemented by a concept board, which is a collection of visual elements used to convey a specific style. It is typically a collage of images, colors, text that gives a general idea of the aesthetic, tone, and feel of a project.



Mood

Mood refers to the overall atmosphere, feeling, or emotion that a film conveys to its audience. It is about the emotional impact the film has on its audience and the emotions it evokes in them.



Tone

Often associated with the filmmakers, general attitude, or approach of a piece of literature or film, such as serious, comedic, satirical, etc. For example, a film can have a serious tone or a comedic tone.



Style

Distinct visual and technical choices that a filmmaker makes to create a certain aesthetic or visual look for their movie. Style is often associated with the filmmaker's personal vision and it is how they translate their ideas into images on the screen.

Film Creative Vision

The difference between film tone and style



Film “style” and “tone” are closely related, but they refer to different aspects of the film.

Style refers to the distinct visual and technical choices that a filmmaker makes to create a certain aesthetic or visual look for their movie. This can include elements such as the use of color, lighting, camera angles, editing, and special effects. Style is often associated with the filmmaker’s personal vision and it is how they translate their ideas into images on the screen.

To give an example: A film with a dark and gritty tone might use a lot of shadows and low lighting to create a sense of unease(mood), while also having a hand-held camera movement and non-linear storytelling(style). Both the style and the mood can be used to create a sense of realism in the film, and to immerse the audience in the story.

Storyboard

A storyboard is a visual representation of a film or animation, created in a sequence of illustrations or images displayed in a specific order. It is used by filmmakers, animators, and other creative professionals to plan and communicate the different elements of a project, such as camera angles, shot compositions, and the flow of the story.

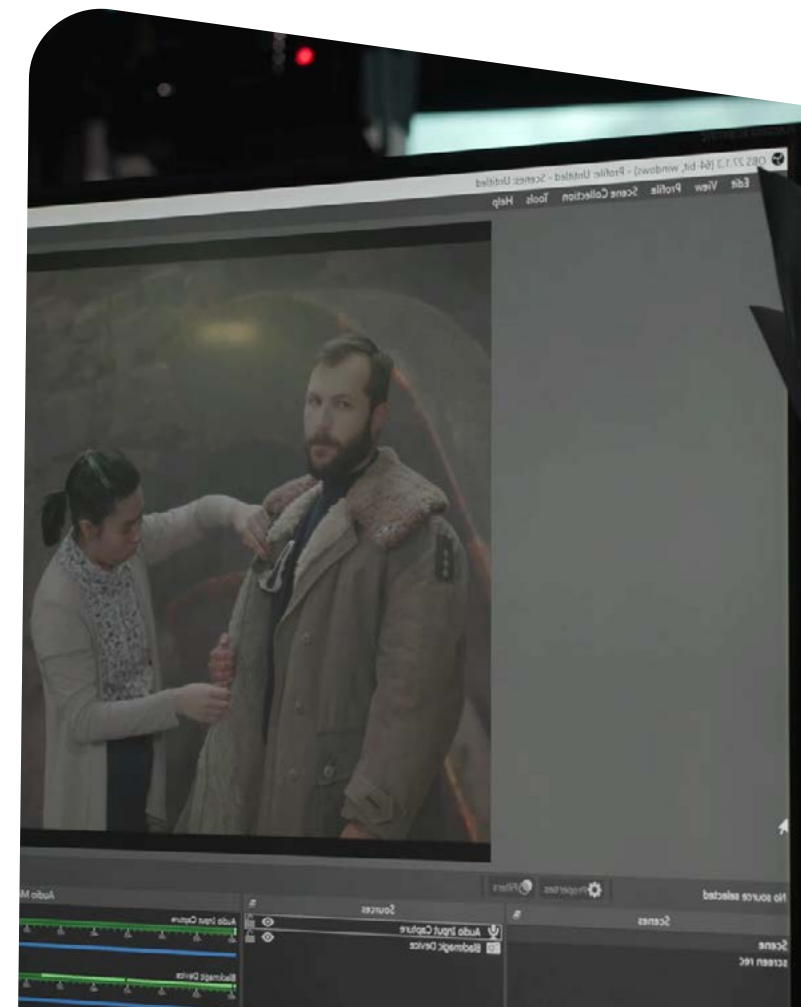
A typical storyboard is created using a series of illustrations or images arranged in chronological order, along with notes and other annotations to indicate things like dialogue, sound effects, and other valuable information. These illustrations or images can be hand-drawn, created using animation software or any other medium that effectively communicates the creative vision of the storyboard artist.

Storyboards are commonly used in the pre-production stage of a film or animation project, and are essential for helping the director, producer, and other key members of the production team to plan out and visualize the overall structure and pacing of the project, as well as the individual shots and scenes that make it up. They also help in communicating the idea and vision to the other members of the crew and department heads as well as the clients.

Additionally, storyboards can also be used during production to plan the logistics of filming and animating a scene, such as camera positions, movement, and special effects, and can also be used in post-production to plan the editing and visual effects of the film.

In animation, storyboarding is a key process of planning out the animation sequence, the timing, the action, and the dialogue of the animation. It is the backbone of the animation process and it is used to visualize how the final animation will look like before actual production starts.

Overall, storyboards play a critical role in the planning and execution of a film or animation project, by allowing the filmmakers and animators to clearly communicate their creative vision, plan out the logistics of production, and ensure that the final product is as close to their original vision as possible.



How to Storyboard

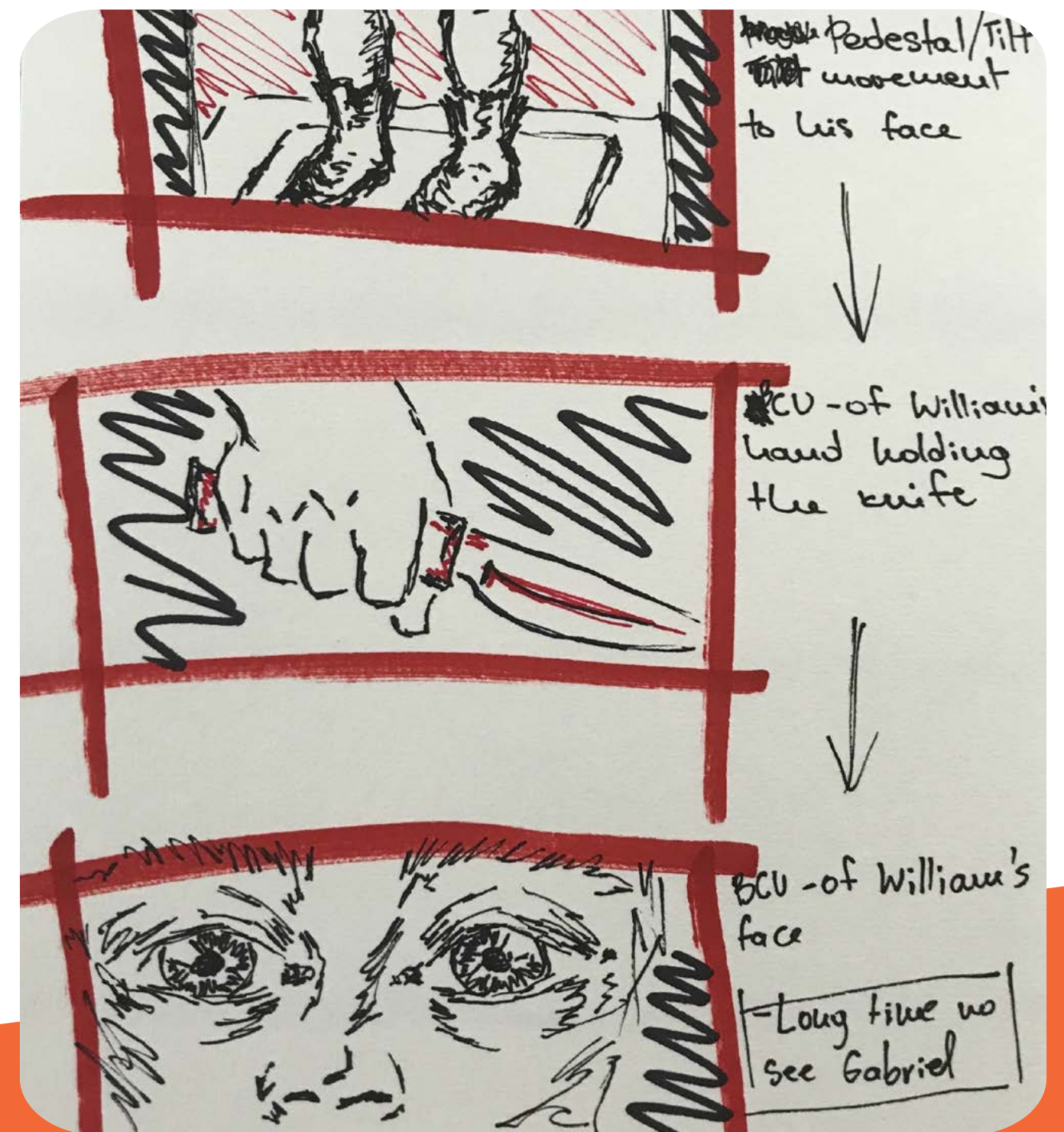
The process of developing a storyboard can vary depending on the specific project and the preferences of the filmmaker or animator, but there are some general steps that are typically followed:

- Script breakdown:** The first step in developing a storyboard is to read and analyze the script for the film or animation. This will involve breaking down the script into individual scenes and shots, and identifying key elements such as dialogue, character actions, and special effects.
- Planning:** After the script breakdown, the storyboard artist will start planning out the visual composition of each shot and scene. This will involve deciding on things like camera angles, shot lengths, and the movement of characters and objects within the frame.
- Sketching:** Once the planning stage is complete, the storyboard artist will begin sketching out the individual shots and scenes, using illustrations or images to represent the different elements of each one. They may also include notes and annotations to indicate things like camera movements, dialogue, and sound effects.
- Revisions:** After the initial storyboard is complete, it will be reviewed by the director and other key members of the production team, who may suggest revisions or changes to the storyboard. The storyboard artist will then make the necessary adjustments and revisions to the storyboard.

- Finalizing:** After revisions are made, the storyboard is finalized and it will be used as a reference for the entire production process, including pre-production, production, and post-production stages. The storyboard will be used to plan out the logistics of filming or animating a scene, as well as to plan the editing and visual effects of the final product.

For animation the process is slightly different, the storyboard will be used as a reference for the entire animation pipeline. Animation storyboards is broken down into panels, called key frames. Each panel represent a specific moment in the animation and it is the animator's reference for the action and the timing of the animation. Key frames will be then passed to other departments such as layout, animation, and compositing to be brought to life.

It is worth noting that the process of storyboarding can be quite time-consuming and can require a lot of attention to detail, but it is a crucial step in the filmmaking or animation process, it helps ensure that the final product is as close as possible to the original creative vision of the filmmaker or animator.



A film storyboard is a visual representation of a film, using illustrations or images to represent each shot and panel that will be in the final film.

Cinematic Shots

Cinematic shots refer to the way in which a scene is captured by the camera. Different shots have different effects on the audience, and they are used to create a particular visual style or to convey a certain mood or emotion.

Some examples of cinematic shots include close-ups, which show the subject in great detail, and wide shots, which show the subject in relation to their surroundings. There are also medium shots, which show the subject from the waist up, and extreme close-ups, which show only a small part of the subject in detail.

The director and the director of photography (DP) work together to create the cinematic shots that will be used in a film or video production. The director is responsible for the overall vision and direction of the film, and they work with the DP to decide on the types of shots, camera angles, and movements that will best convey the themes and emotions of the story.

The DP is responsible for capturing the director's vision on camera. They use their technical knowledge of lighting, lenses, and camera equipment to create the desired visual effects. They also work with the camera crew to set up and execute the shots.

The director and DP will collaborate on the shot list, which is a plan that outlines all the shots that will be needed for the film. This plan will consider how the shots will be used to tell the story and create a certain visual style or convey a certain mood or emotion. They may also use storyboards to visualize the different shots, angles, and movements before shooting.

During the filming, the director and DP will work together to make sure that each shot is executed according to the shot list and to the director's vision. They will also make any necessary adjustments to the lighting, camera angles, and movements to ensure that the shots are visually compelling and effectively convey the story.

In summary, the director and the DP play a key role in creating cinematic shots, by deciding on the types of shots, camera angles, and movements that will be used to tell the story, and capturing the director's vision on camera.

Framing Shots

Framing shots are camera shots that use visual elements to frame the subject and convey meaning.

Long shot

A long shot is a type of cinematic shot that captures the entire subject and their surroundings, usually used to establish a location or to show the subject in relation to their environment.



Medium shot

A medium shot is a type of cinematic shot that captures the subject from the waist up, often used to show the subject in relation to their surroundings and to focus on their gestures and facial expressions.



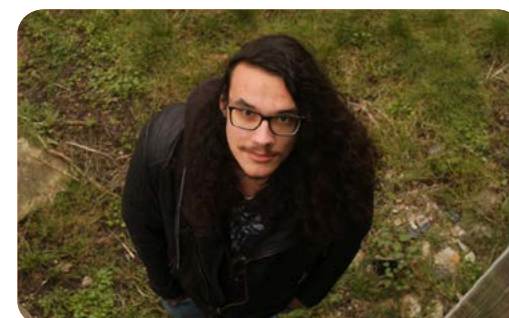
Close up

A close-up shot is a type of cinematic shot that captures a person or an object in great detail, often used to focus on the subject's face, emotions, or a particular object in the scene.



Bird's eye

A bird's-eye shot is a type of cinematic shot that is taken from an overhead angle, giving the audience a view of the scene as if they were looking down on it from above, often used to provide a sense of the overall layout or to show the relative positions of characters or objects in a scene.



Moving Shots

Moving shots are camera shots that are captured while the camera is in motion.



Tracking shot

A tracking shot is a camera movement where the camera follows a moving subject by moving along with it, it can create a sense of motion and immersion and reveal more of the environment. It is often used to follow a character and to create smooth transitions between different shots.



Tilt shot

Tilting is when the camera stays in a fixed position but rotates up/down in a vertical plane. Not moving the camera up or down on a vertical axis (That is called Pedestal, or Boom up/down)



Panning shot

A panning shot is a type of camera movement where you move your camera horizontally; either left to right or right to left, while its base is fixated on a certain point.

Zoom shot

A zoom shot is a type of camera movement where the lens of the camera is adjusted to change the focal length, it can be used to create the illusion of moving towards or away from the subject or to change the perspective of the scene.



View Shots

View shots are camera shots that provide a specific stylized point of view, often to convey a particular atmosphere, and emotional visual effect.

Dutch angle

A Dutch angle or Dutch tilt, also known as a canted angle, is a type of shot in which the camera is deliberately tilted to one side. It creates a sense of disorientation or unease and is often used to convey a character's emotional state, to show a character's point of view or to create a dramatic effect.



Over the shoulder

An over-the-shoulder shot is a type of shot where the camera films a subject from behind another's shoulder, it is used to show interaction and facial expressions of both characters, and to show a character's point of view.

Point of view

A point-of-view shot (POV) is a type of shot that is filmed from the perspective of a particular character, allowing the audience to see the scene from their point of view. It can be used to create a sense of immersion and to show a character's perspective or mental state. It can also be used to create suspense or to reveal information to the audience.



Want to know more?

Here are some online resources which show cinematic shots in more detail:



[14 Basic Cinematography & Film Techniques for Better Cinematic Shots](#)

Quick reference guide of different cinematic shots with video references.



[Cinematography Manual: The Ultimate Guide to Becoming a DOP](#)

Extensive information about the role of DOP, lenses, cameras, shot & lighting.

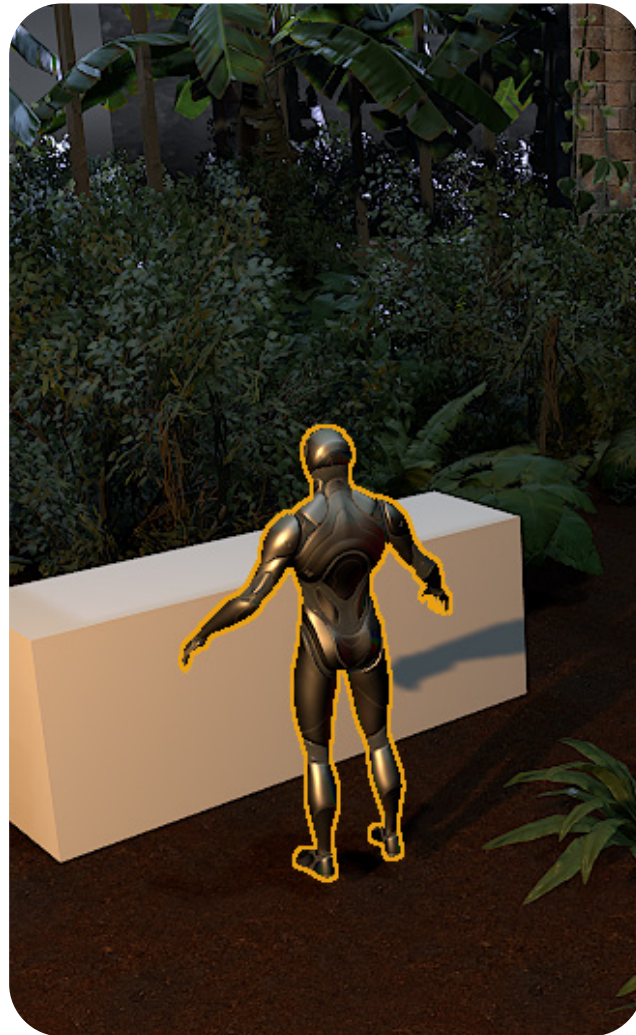


<https://www.studiobinder.com/blog/ultimate-guide-to-camera-shots/#camera-movement>

Example guide for Camera Movement.

Pre-vis

Previs, short for “previsualization,” is the process of creating a rough animation or 3D visualization of a film or video game scene before it is shot or produced. The goal of previs is to plan and communicate the visual elements of a scene, such as camera angles, character movements, and special effects, in a way that is easy to understand and change.



Previs is a critical tool for filmmaking, it allows us to plan and communicate the visual elements of a scene in a way that is easy to understand and change.

David Dozoretz, The Third Floor

Explained Pre-vis

This process allows the director, cinematographer, and other members of the production team to make decisions and adjustments to the scene before it is filmed or produced, which can save time and money in the long run.

Previs is typically done using specialized software and can include a wide range of techniques such as 3D animation, motion capture, and virtual camera work. It can be used for different stages of production, from pre-production to post-production and special effects integration.

The process of previs can vary depending on the project and the production company, but the main idea is to have a visual representation of the scene and use it as a reference for planning the filming or production.



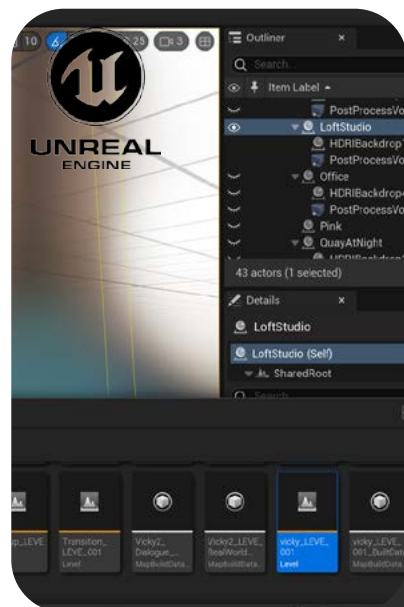
Unreal Engine

Pre-vis

To quickly create a previs (previsualization), you can use the built-in assets of Unreal Engine, such as characters and environments, or import your own models and textures. Furthermore, you can also use the Unreal Engine's lighting and visual effects tools to enhance the look of your previs.

Once you have your scene set up, you can use the Sequencer tool to create a cinematic previs by creating a timeline and adding cameras and animation to it.

It is a good idea to have some experience in Unreal Engine before diving into previs creation. Here are some helpful tutorials and documentation, to start with.



Unreal Engine 5 Beginner Tutorial

You will learn how to install Unreal Engine, navigate the 3D viewport, create materials and worlds, sculpt landscapes, paint foliage, program in Unreal using Blueprints, and end with creating a photorealistic world in real time.



Create Cinematics in Sequencer

Learn how to use the sequencer to create cinematics. Includes Camera & Object workflows, setting up animations, and edit them with the curve editor.



Virtual Production in UE5

Learn how to animate a virtual camera for Virtual Production. Learn the basics of the user interface, create an environment, and animate a virtual camera for Virtual Productions.

 **Advised Unreal Engine 5 tutorials**

Unreal Engine Extra

Here are some additional recommended tutorials for Unreal Engine. These are not mandatory but provide more insights on setting up Virtual Productions environments.



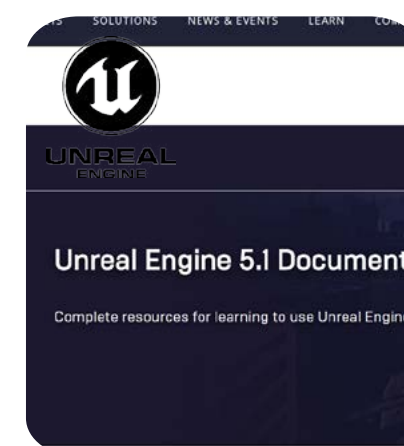
Quickly Create 3D Environments

Learn how to quickly block out the camera angle, environment, and lighting.



Tutorial | Nordic Cave Environment

In this UE5 tutorial you will learn to create a Realistic Cave Environment using UE5.



Unreal Engine 5.1 Documentation

Complete resources for learning to use Unreal Engine 5

Unreal Engine Advanced

Here are some additional recommended tutorials for Unreal Engine. These are not mandatory but they are recommended for improving some specific skills related to Virtual Productions.



[Unreal Engine 5 - Optimizing Lumen, Lumen Reflections and Troubleshooting Virtual Shadow Maps](#)

Advanced settings for lumen, lumen reflections, and virtual shadow maps.



[Capturing Lofoten in Unreal Engine 5](#)

A workflow and process video on how to set up a realistic scene in UE5.



[Lumen Explained](#)

How to set up an UE5 scene using Lumen.

Shot Composition

Shot composition also known as blocking refers to the arrangement of characters and objects within a scene. This is where the director's vision for the scene translates into physical reality. Proper blocking ensures that actors are positioned and move in a way that serves the story, maintains continuity, and utilizes the space in an aesthetically pleasing manner. It can also contribute to the rhythm and pacing of a scene, working in tandem with editing to create a cohesive and compelling narrative.

The Rule of Thirds is a fundamental principle in visual arts. The concept is a guide to composing visual images in a way that is aesthetically pleasing and well-balanced. It suggests dividing the frame into a grid of nine equal rectangles, created by two equally spaced horizontal lines intersecting with two equally-spaced vertical lines, for example:

- **Placement:** When framing a character or object, directors often place them along one of the vertical lines to create a balanced but dynamic shot.
- **Dialogue Scenes:** In dialogue, one character might be placed along one vertical line while the other is along the opposite line, creating a balanced yet dynamic conversational scene.
- **Landscapes:** The lower or upper horizontal line is often used to align the horizon, depending on where the emphasis needs to be.

Overall, the Rule of Thirds is a versatile tool for visual composition and storytelling. Like any artistic guideline, it can be bent or broken when needed, but understanding it provides a useful foundation for creating visually compelling images, alternative you can follow other rules like golden triangle, or the golden ratio.



Why It Works:

The Rule of Thirds works on the principle that our eyes are naturally drawn to these off-center points. The technique engages the viewer's gaze in a more natural way, encouraging them to explore more of the image rather than fixating on a central point.

Negative Space refers to the void areas surrounding the primary subjects which create a powerful contrast. Filmmakers can manipulate these to create a balanced composition or to focus attention on key elements. For example, more negative space might suggest loneliness or isolation.

Shot Composition Analysis

This shot exhibits a strong composition, adhering to the rule of thirds with a well-considered balance of negative space at the bottom and ample headroom. The lines and perspective lead naturally towards the subject, creating a visually engaging flow. However, hair merges with the green edge resulting in a lack of contrast, and the orange box region draws attention away from the subject, potentially benefiting from a change in camera angle to 30% angle, hiding the orange area and the double doors.



Headroom is the space between the top of a subject's head and the upper edge of the frame in a visual composition. Proper headroom helps balance the frame, avoids making the shot look cramped, and guides the viewer's attention. Too much headroom can make the subject appear small or lost, while too little can make the composition feel awkward or incomplete. Adjusting headroom is essential for maintaining visual harmony and effectively conveying the scene's intended mood or message.

Lines

Lines play a crucial role in shot composition by guiding the viewer's eye and creating a sense of movement, depth, and structure. They can lead the audience toward important elements, frame subjects, and add dynamism or tension to a scene and lines are powerful compositional tool for effective visual storytelling.

Perspective lines converge toward a single point, often called the "vanishing point", and create a sense of depth and three-dimensionality.

Horizontal lines suggest stability, calm, and rest. For instance, a flat horizon often gives a sense of balance and tranquility.

Vertical lines evoke feelings of strength, height, and grandiosity. Tall buildings, trees, or standing figures can create a sense of formality or rigidity.

Diagonal lines imply action, tension, or change. They create dynamic energy and can suggest instability or imbalance and create a sense of disorientation or urgency.

Curved lines can suggest softness, elegance, and fluidity. They guide the viewer's eye in a more gentle, natural manner.

Want to know more?

Here are some online resources which show cinematic shots in more detail:



[Rules of Shot Composition in Film: A Definitive Guide](#)

Tech-vis Plan

A technical visual plan is a document that outlines the technical and visual aspects of a film or video production, including the use of cameras, lenses, lighting, and special effects.



It is a useful tool that helps the director of photography (DP) and the director to communicate their vision to the rest of the production team and to ensure that the final product meets their creative and technical specifications.

The DP and the director, in collaboration with other production team members, such as the gaffer, the key grip, and the special effects supervisor, usually create the tech-vis plan. It is often an iterative document that includes information about the types of shots, camera angles, and movements that will be used, as well as details about the lighting, lenses, and camera equipment that will be required. It also includes information about how the visual effects will be achieved and how the visual style will be developed.

The tech-vis plan is used to plan the shooting schedule, it will specify the necessary equipment, crew and time required to shoot each scene. It also helps to identify any potential technical or logistical challenges that may arise during the production. This plan will give the team an idea of the number of cameras and lenses they would need, the kind of lighting equipment and the number of crew members required on set.

The tech-vis plan is also useful for managing the budget, it will help to identify the resources and costs required for each shot and to make sure that the production stays within budget. It is also a useful tool for communicating with other departments, for example, the costume and production design teams can use it to ensure that the visual style aligns with the director's vision.



Breakdown Tech-Vis Plan

The development of a tech-vis plan based on a pre-vis is a collaborative process that involves the director, the DP, and other members of the production team, it is important to have clear communication and coordination.

01 Review the pre-vis

The first step is to review the pre-vis, which is a rough animation or 3D mockup of the film or video production. This will give you an idea of the overall visual style and the types of shots, camera angles, and movements that will be used.

02 Shot Breakdown

Based on the pre-vis, you will need to identify the technical requirements for each shot, such as the type of camera and lenses used, the lighting equipment, and any special effects required, and revise the Pre-vis whenever necessary.

03 Shot list

Create a shot list, which is a plan that outlines all the shots that will be needed for the film. This plan will consider how the shots will be used to tell the story and create a certain visual style or convey a certain mood or emotion.

04 Call Sheet

Plan the shooting schedule. Using the shot list, you can plan the shooting schedule and the daily call sheet to identify any potential technical or logistical challenges that may arise during the production.

05 Coordinate departments

Coordinate with other departments such as costume, production design, and special effects to ensure that the visual style aligns with the pre-vis and the director's vision.



We changed and adapted the Techvis daily, there was a constant back and forth of ideas and solutions between multiple departments to come up with the most efficient way to shoot VFX heavy sequences.

Joanne Smithies (Visualization Supervisor for Shadow and Bone)

Shot List

A shot list is a document that outlines all the shots that are planned for a particular film or video production.

It is a detailed and organized list of each shot that the director and the cinematographer have planned to capture on set for the movie, including the type of shot, the camera angle, the lens to be used, and the movement of the camera, if any. It also includes information about the location, the actors involved, and the props and equipment needed for each shot.

The shot list is used as a guide for the production team, including the director, the camera operator, and the lighting and sound crews, to ensure that all necessary shots are captured during filming and that the final product meets the director's vision.

Additionally, the shot list is also used as a reference during the editing process, to make sure that all the necessary shots are included in the final cut and that they are used in the correct order to tell the story effectively.

Shot	Camera movement	Camera angle	Camera	Lens	Description
MEDIUM	Dolly	Slight High Angle	Dolly tracks	50mm	WORKER 1 is sleeping with his head on the table
MEDIUM CLOSE UP	Handheld	Eye level	Shouder rig	85mm	Worker 2 walks in the room and wakes up worker 1
MEDIUM	Handheld or Static	Shoulder level	Shoulder rig or Tripod	50mm	Worker 1 gets up and they both leave the room
COWBOY or MEDIUM FULL SHOT	Static	Shoulder level	Tripod	35mm	Both Workers walk through the hallway one after each other
MEDIUM	Handheld or Static	Low Angle	Shouder rig or Tripod	85mm	Worker 2 walks in frame and looks for the wreck
MEDIUM FULL SHOT	Handheld or Static	Shoulder level	Shoulder rig or Tripod	24mm	Worker 2 is looking at the wreck, emergency lights turn off, Worker 1 walks in frame and stands next to Worker 2
MEDIUM	Handheld or Static	Eye level or Low angle	Shoulder rig or Tripod	85	Both workers stand in front of the wreck

Call Sheet

A call sheet is an essential tool for keeping the production running smoothly and on schedule, by providing everyone involved with the necessary information to be at the right place, at the right time, with the right equipment.

A call sheet is a document that is distributed to the cast and crew of a film or video production, typically on a daily basis, which provides important information about the schedule for the upcoming day of filming.

A typical call sheet includes:

- The call time (when cast and crew should arrive).
- Key member contact information.
- Shooting schedule for the day including the scenes, order, and expected timeline.
- Equipment, props and other film and set needs.
- Information about transportation for cast and crew.
- Emergency Contact information.
- Meal and break times.
- Special requests or instructions for the day.

Name of Talent	Role	Phone number	E-mail	Call Time
Aiden	Aiden	012 345 6789	aiden@breda.nl	10:00
Marion	Marion	012 345 6789	marion@breda.nl	10:00
Director	director	012 345 6789	director@breda.nl	9:00
producer	producer	012 345 6789	producer@breda.nl	9:00
DoP	DoP	012 345 6789	dop@breda.nl	9:00
artist / UE operator	artist / UE operator	012 345 6789	artist@breda.nl	9:00
artist / UE operator	artist / UE operator	012 345 6789	artist@breda.nl	9:00
colorist	colorist	012 345 6789	colorist@breda.nl	9:00
audio recordist	audio recordist	012 345 6789	audio@breda.nl	9:00

Time	Tasks	Cast/Crew	Location
9:00	set up	crew	XR stage
9:30 – 10:00	actors call time / costume / stand up	Cast	XR stage
10:00 – 12:00	shot 31 + 34 / Make A Wish	cast + crew	XR stage
12:00 – 13:00	lunch	cast + crew	-
12:50 – 13:00	set up	crew	XR stage
13:00 – 15:00	shot 33 + 36	cast + crew	XR stage
15:00 – 15:15	break	cast + crew	-
15:15 – 17:00	shot 35	cast + crew	XR stage
17:00	wrap / back up footage	crew	XR stage

Production Bible

The production bible is a document that contains essential information about a film production. This can include things like the film's concept and story, characters, settings, and production schedule, as well as information about the cast and crew.

A production bible is typically created during the development phase of a film, before filming begins, and is used by the various members of the production team to ensure that everyone is on the same page and working towards the same goals.

It is important to note that the content of a production bible can vary depending on the project and the production company.

Examples of information that might be included in a production bible are:

- Script
- Creative Vision
- Storyboards
- Location information and scouting photos
- Prop and costume design
- Makeup and special effects notes
- Music and sound design notes
- Marketing and promotional materials.
- Character descriptions and backgrounds
- Episode synopses and outlines
- Production schedules and budgets



Advice

Production Bible

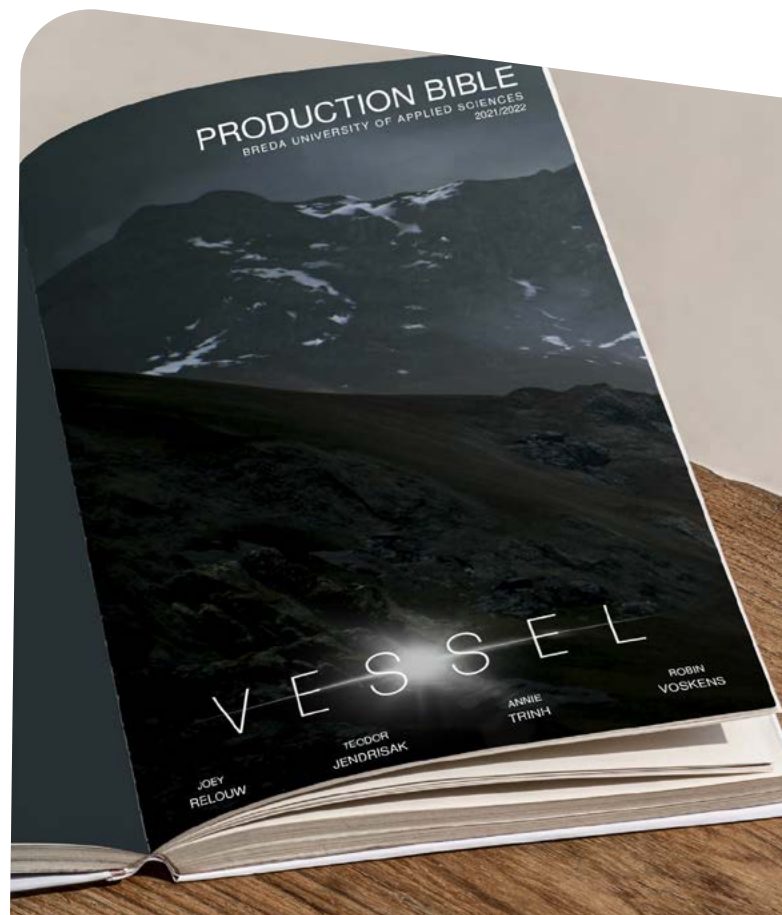
A production bible is a “live” document in the sense that it is not a static document, but one that is constantly updated and revised as the production progresses. During the development phase of a film, the production bible is used to capture all the important information about the project, such as the concept, story, characters, and production schedule. But as the production moves into pre-production, production, and post-production, new information is generated, and the production bible should be updated to reflect this new information.

As the production progresses, new details will emerge, and the production bible should be updated to include this information. It serves as a reference for all members of the production team, including the director, producer, casting director, and crew members. Keeping it updated ensures that everyone has access to the most current information, which can help to avoid confusion and delays. It is also very useful as a historical reference, after the production is finished, it can be used to look back on the journey of the film, and as a reference for future productions.

Here are a few suggestions for how to keep and maintain a production bible:

- ▣ Assign a dedicated team member to be responsible for updating the production bible. This person should be familiar with the project and have access to all the relevant information.
- ▣ Use a digital format for the production bible. This will make it easier to update and share with the production team. Cloud-based document-sharing platforms like Google Drive, Dropbox, and others can be useful in this regard.
- ▣ Schedule regular updates to the production bible.
- ▣ Use version control, in case of digital format, this will be helpful in case of any discrepancy or to refer back to any previous version.
- ▣ Finally, encourage feedback from the team, this will help identify any missing information and ensure that it meets the production team’s needs.

Please develop your Production Bible and share with us, so we can support the development of your film.



Production



Part 2

The production phase is when the script and creative vision become visual and auditory content for the final film, i.e., when actual filming takes place. It involves capturing scenes, directing actors, technical elements, and adhering to the schedule.

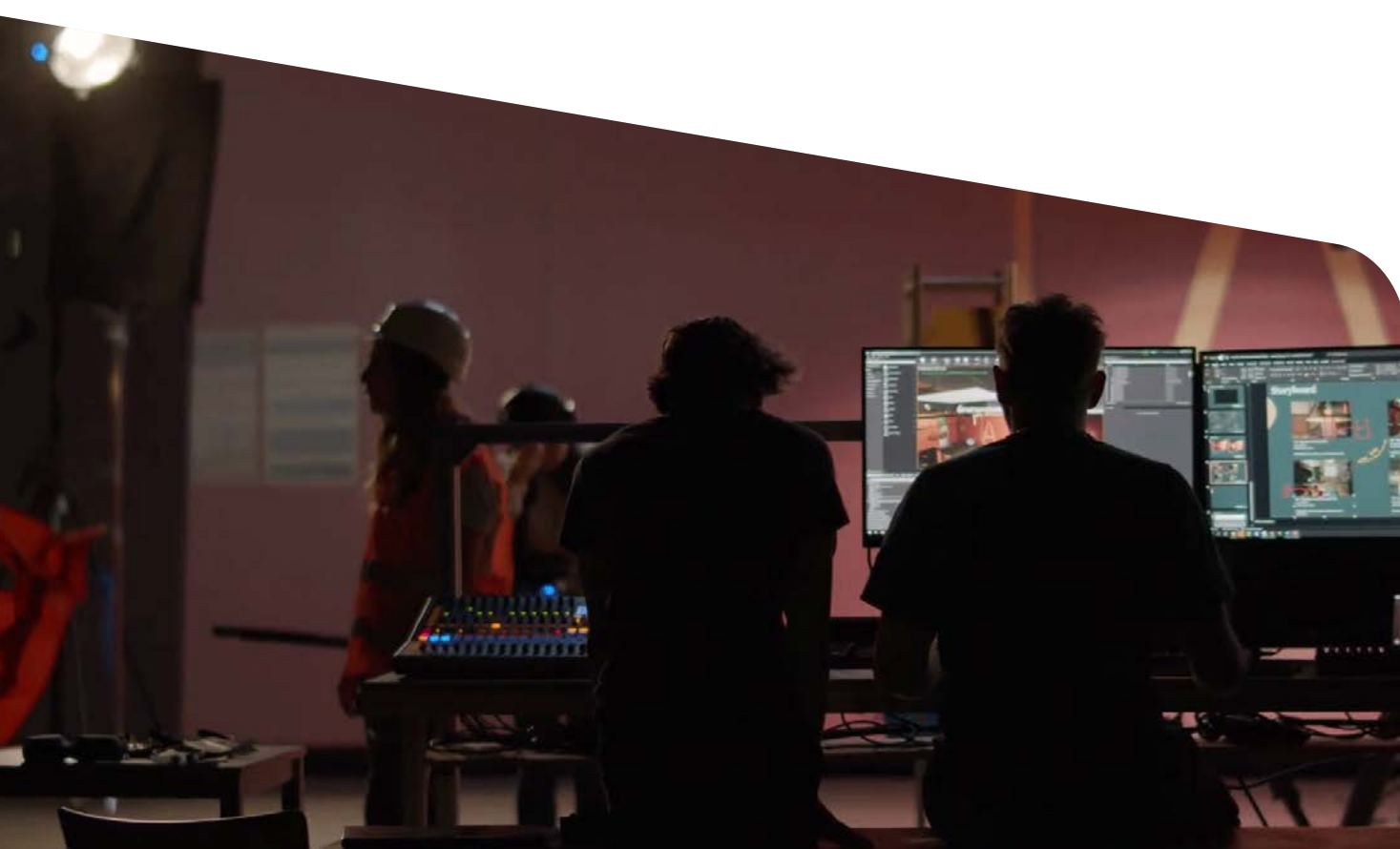
In this section, it provides an overview of colour theory, which is important for creating a visually pleasing film. Second, it discusses lighting, focusing on the three-point lighting technique, which is a popular technique for illuminating subjects on camera. Finally, it includes information on cameras, lenses, or Look-Up Tables (LUTs), which are used to adjust the colour and contrast of footage during post-production, and creates base understanding of some key concepts and techniques that are essential for creating high-quality cinematics.

Walls

LED & Chroma

A typical Virtual Production (VP) studio setup often includes a combination of advanced hardware and software technologies to create a seamless blend of physical and digital environments. The core of this setup is usually an LED volume or green screen stage, surrounded by high-resolution cameras and motion-tracking systems. These cameras capture real-time actions and sync them with computer-generated backgrounds or virtual sets.

A high-powered computing system runs software that integrates live footage with digital elements, often employing game engine technology like Unreal Engine for real-time rendering. The setup also usually features lighting rigs that can match lighting conditions in the virtual environment, making the integration between real and virtual elements more convincing. The studio is often divided into zones like capture areas, control rooms, and review stations, allowing specialized teams to focus on different aspects of the production.



Brain Bar

The Brain Bar is a centralized workstation in virtual production that serves as the control hub for managing cameras, lighting, and real-time rendering. It enables instant decision-making and adjustments to various production elements, typically allows for real-time decision-making, providing the team with the ability to make instant changes to virtual environments, camera angles, lighting, and other aspects of the production.



Chroma Wall

Commonly known as a green screen or blue screen, it is a uniformly colored backdrop to isolate the subject so that the background. It uses software that identifies the chroma color and composites it with a different background during the editing process. Chroma process can be tricky, due to chroma spill, i.e., scenes that has practical objects or props with reflective or translucent material, and may bleed the chroma color into the video.



LED Wall

An LED wall is a flat surface made up of LED panels, often used for displaying images or videos in real time. They are typically powered by a game engine which would allow in real-time display realistic digital worlds and using camera tracking provide perceived depth.



LED Volume

The main difference between an LED Wall and a LED volume is the usage of extra panels to support correct lighting in the shot, for example for accurate lighting, dynamic lighting/movement and or reflection, enabling a seamless blend of physical and digital elements for filmmakers.

There are several possible configurations, like side, or ceiling panels up to 180 or even 270 degree configurations.

Nutshell

Colour Theory

Colour theory is a set of guidelines and principles used to determine which colours will look harmonious and appealing when used together. It explains how colours interact with each other and how they can be combined to create visually captivating compositions.

In the 19th century, James Maxwell demonstrated the nature of colour vision by showing that all colours could be additively created based on the primary red, green, and blue using spinning disks at high speeds, producing a visual blend of colours. In contemporary times, Maxwell's disc concept has been expanded and integrated into various colourimeters and spectrophotometers, employed to measure and quantify the properties of light and colour in diverse settings, including the CIE 1931 colour space.



Image credit: Maxine Bhm on Unsplash

The CIE 1931 colour space, also known as the CIE XYZ colour space, is an international standard for representing and defining colours. It was created by the International Commission on Illumination (CIE) in 1931 and is based on the human visual system and considers the sensitivity of the average observer to different wavelengths of light. It defines a colour as a set of three numerical values, X, Y, and Z, which represent the amount of red, green, and blue light that is needed to match the colour being measured. In practice, the CIE 1931 colour space is often used in colour management, quality control, and colour matching because it is device-independent, meaning it can be used to accurately describe colours across different displays, printers, and lighting conditions.



Image credit: Shutterstock

It is important to understand the colour gamut of the cameras and lights that are being used and to ensure that they are matched to the intended colour representation, to ensure accurate colour reproduction and to prevent colour discrepancies.

If the camera or light has a limited colour gamut, some of the colours in the scene may not be accurately represented in the image or output. This can result in a loss of colour accuracy and may require colour correction or adjustments to be made to achieve a more accurate representation of colour.

Harmony

Colour Composition

In colour theory, colour harmony is achieved by using colour combinations that are aesthetically pleasing and that create a sense of balance, unity, and order in a design. There are several principles of colour harmony that can be used to create visually appealing colour combinations:

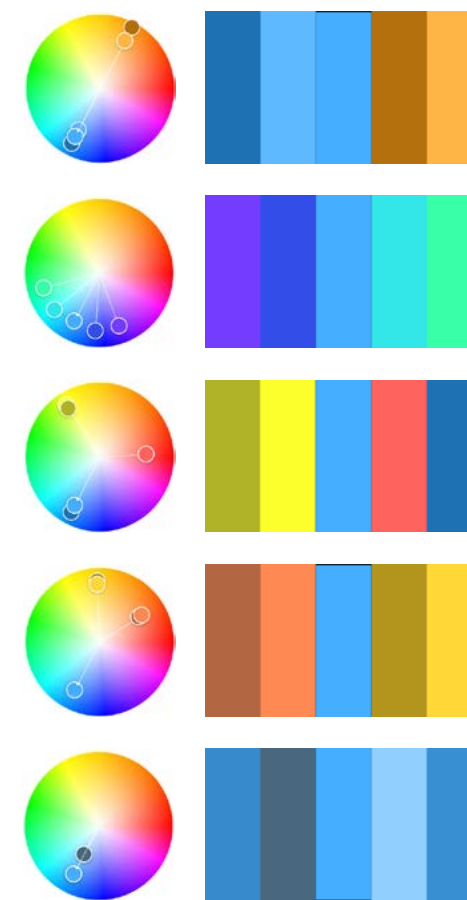


image source: colour.adobe.com

- **Complementary colours:** Complementary colours are pairs of colours opposite each other on the colour wheel. When used together, they create high contrast and can be used to create a bold, dynamic look.
- **Analogous colours:** Analogous colours are colours that are adjacent to each other on the colour wheel. When used together, they create a harmonious and unified look, and are often used to create a calming and soothing atmosphere.
- **Triadic colours:** Triadic colours are colours that are evenly spaced around the colour wheel. When used together, they create a balanced and harmonious look, and are often used to create a vibrant and energetic atmosphere.
- **Split-complementary colours:** Split-complementary colours are a combination of a colour and the two colours that are adjacent to its complementary colour on the colour wheel. This creates a harmonious colour combination that is less intense than a complementary colour combination.
- **Monochromatic colours:** Monochromatic colours are different shades and tints of the same colour. When used together, they create a cohesive and harmonious look, and are often used to create a calming and soothing atmosphere.

Warm versus Cold Colours

In colour theory, warm, and cold colours are used to create contrast and evoke certain emotions in design and art. For example, a warm colour like red can be used as an accent to draw attention to a specific area, while a cool colour like blue can be used as a background to create a sense of calmness.

It is worth noting that the perception of warm and cold colours can vary based on culture, personal preference, and the context in which they are used. Nevertheless, warm and cold colour associations are widely recognized and used in various forms of visual arts and design.

Device Calibration

Colour Balance

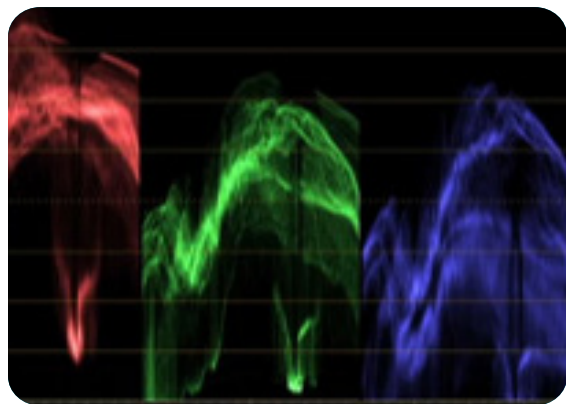
A colour histogram is a graphical representation that displays the distribution of colours in an image or video. It depicts the frequency of pixels associated with specific colour values, thereby facilitating colour adjustments to enhance visual appearance and accuracy.



Image credit: Vincent Guth on Unsplash

Colour histograms are used to analyse the colour content of an image or video and to understand the distribution of colours in a scene. They are commonly used in image and video processing, colour correction, and image analysis applications.

By analysing the colour histogram, it is possible to determine the dominant colours in an image or video, to identify any colour imbalances, and to make colour adjustments to correct these imbalances. For example, if the colour histogram shows that an image has a dominant blue colour cast, colour correction can be applied to reduce the blue cast and to achieve a more neutral colour balance.



In addition, colour histograms are also used in computer vision and image recognition applications to help identify and classify objects and scenes. By analysing the colour histogram of an image, it is possible to extract features that can be used to train machine learning algorithms to recognize specific objects or scenes.

The exact correction will depend on the desired tone and style. A Macbeth chart, also known as a Macbeth Colour Checker, is a colour calibration target used in photography, cinematography, and other imaging applications. It is a standardized colour chart that consists of twenty-four square patches of an assortment of colours, including neutral greys, skin tones, and primary and secondary colours.

The purpose of the Macbeth chart is to provide a reference for colour accuracy and consistency. By photographing or scanning the chart, you can analyse the colours captured by a camera or scanner and determine if they are accurate and consistent. This information can then be used to make adjustments to the camera or scanner settings to ensure that the colours are captured correctly. In addition to colour calibration, the Macbeth chart is also used in colour grading, which is the process of adjusting the colours and tones in an image or video to achieve a specific visual style or look.



By comparing the colours in the image or video to the reference colours on the Macbeth chart, you can determine if the colours are accurate and adjust to the colour grading settings as needed.

The Macbeth chart is widely used in professional imaging applications, such as photography, cinematography, and printing, due to its standardized and well-regarded colour reference. It is a useful tool for ensuring colour accuracy and consistency across different devices and applications.



Colour Correction & Filming in RAW



Image credits: Davinci Resolve 18, Blackmagic Design Pty. Ltd 2023.

Colour correction is the process of adjusting the colours and tones to achieve a specific visual style or look, or to correct any colour inaccuracies or inconsistencies. It is an crucial step in the post-production process and it is often performed using specialized software.

Filming in RAW refers to the process of capturing digital images or videos in a raw, unprocessed format, instead of a compressed or processed format such as JPEG or H.264. Raw formats capture a much larger amount of information about the image or video, including colour, luminance, and other data, which provides more flexibility and control during post-production.

As the raw data provides more information about the colours and tones, it allows for more precise adjustments to be made to the colours, including adjustments to the hue, saturation, and luminance, as well as the use of Look-Up Tables (LUTs) to apply pre-determined colour adjustments.

Using LUTs Look Up Tables

A LUT is a mathematical formula used in image processing and video production to map one set of colours to another. A LUT is used to correct a video's colours and ensure that the colours are accurate and consistent.

LUTs are used to perform colour grading, which is the process of adjusting the colours and tones in an image or video to achieve a specific visual style or look. By using a LUT, you can apply a set of pre-determined colour adjustments to an image or video in a single step, making the colour grading process quicker and more consistent.



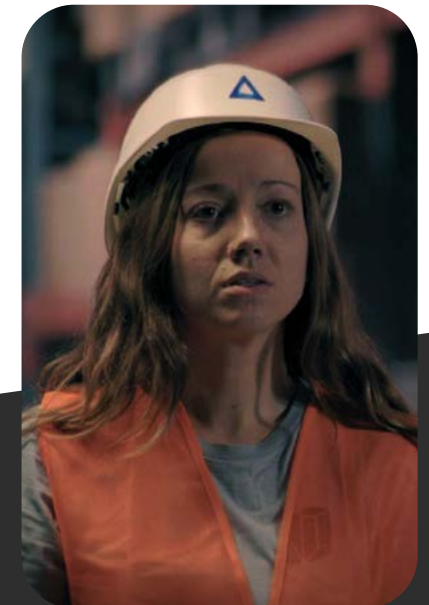
Orange/Teal

The Orange and Teal look enhances the depth of the shot by pushing the blues/teals into the shadows and oranges/yellows into the highlights making skin tones stand out against blue shadows.



Muted Yellow

The muted yellow look is a distinct look created by lowering the saturation of the shot, reducing the blue tones in the highlights, mid-tones, and shadows, leaving a predominantly yellow image.



Cross Processing

The cross-processing look is achieved by opposite adjustments to colours, most commonly with red/blues, increasing the red highlights and lowering shadows while increasing the blue shadows and lowering highlights.

Physics & Optics

Light

Light is a form of energy that travels through space as electromagnetic waves and is perceived by the human eye as visible light. Light can also be described as a stream of photons. It has both wave-like and particle-like properties and its behaviour are described by both classical physics and quantum mechanics.

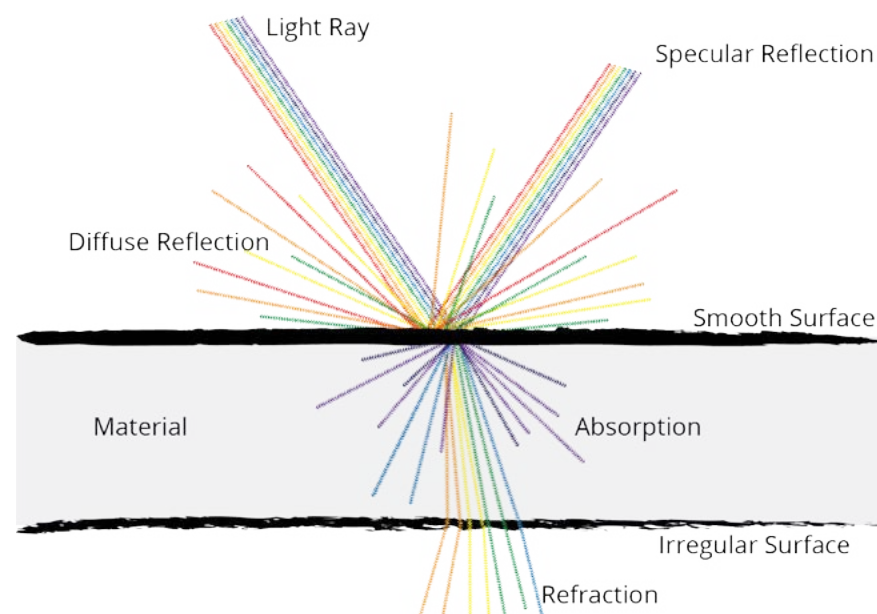
Light can have varying effects as it interacts with different materials and surfaces.

Specular reflection

Specular reflection is the reflection of light from a smooth, shiny surface in a single, well-defined direction, and the inability from the material to intake light. This results in the creation of sharp, clear reflections that can be used to create highlights and define the shape of an object.

Diffuse

Diffuse reflection refers to the scattering of light in all directions after it strikes a rough or irregular surface. This causes light to be reflected in many different directions, creating a soft, uniform illumination that lacks distinct shadows. Diffuse reflection is what gives objects their overall brightness and appearance of texture.



Absorption

Absorption refers to the process by which light is absorbed by a material. This happens when the photons in the light are absorbed by the electrons in the material. The amount of absorption depends on the properties of the material and the frequency of the light and is typically transformed in heat.

Refraction

Refraction is the bending of light as it passes from one material to another with a different refractive index. This can cause light to change direction and is what makes objects appear distorted or like they have moved when viewed through a lens or a curved surface.

Design Process

Lighting

'Lighting' refers to the use of artificial light sources to illuminate a subject or scene in a controlled environment. Studio lighting is often used to create specific lighting effects, such as highlighting, shading, or creating contrast, or to simulate natural or ambient lighting conditions.

The individual responsible for orchestrating and configuring the lighting for a shoot is commonly referred to as a gaffer. Their responsibilities include devising a comprehensive lighting plan that encompasses the selection of appropriate lighting equipment, determining optimal placement and angles, and adjusting the power levels to achieve the desired effect.

The light design process typically involves several steps:

- Determine the desired look and feel for the shoot, and to plan the lighting setup accordingly.
- Select the lights and other equipment required for the shoot, such as stands, gels, and reflectors, based on the lighting plan.
- Set up and test the lights and make any necessary adjustments to ensure they illuminate the scene correctly.
- Adjusting the lights during the shoot, in coordination with the director's or cinematographer's instructions and the subject or scene.
- Tearing down the lights, after the shoot and return the equipment to storage.



**"And where do we get those big portable lights?
Borrow them from Batman?"**

**Art Evans - Barnes
Martin Scorsese**

Three Point Lighting

Three-point lighting is a traditional method for illuminating a subject in a scene with light sources from three distinct positions. The three types of lights are key light, fill light, and backlight.



Key light

The key light is the main source of illumination for the subject and provides the primary lighting effect. The position and intensity of the key light determines the overall mood and feel of the scene and can be adjusted to create a range of different lighting effects.

In general, the key light is placed to one side of the subject, at a 30-45-degree angle, to create a dramatic and interesting lighting effect. The position of the key light should be chosen based on the desired lighting effect and can be adjusted to create a range of different lighting styles, from dramatic and moody to soft and natural.

The intensity of the key light is also important and can be adjusted to control the exposure and balance of the scene. A higher intensity key light will result in a brighter and more dramatic lighting effect, while a lower intensity key light will result in a softer and more natural lighting effect.

By adjusting the position and intensity of the key light, the lighting technician can control the overall exposure and balance of the scene and create a range of different lighting effects. Whether creating a dramatic, moody look or a soft, natural look, the key light is a critical element of the three-point lighting process and plays a central role in determining the final look of the scene.

Fill light

The fill light is a key component in the three-point lighting process. It serves to "fill in" or soften the shadows created by the key light and provides a secondary source of illumination to balance the lighting in the scene.

In general, the fill light is placed on the opposite side of the key light and is aimed at the subject from a lower angle. The fill light should be positioned and adjusted in intensity to balance the lighting in the scene, and to reduce or eliminate the shadows created by the key light. The intensity of the fill light is generally lower than that of the key light and can be adjusted to control the overall lighting balance in the scene.

A lower intensity fill light will result in a softer, more natural lighting effect, while a higher intensity fill light will result in a brighter, more dramatic lighting effect.

The fill light is a critical component of the three-point lighting process, as it helps to balance the lighting in the scene, and to create a more natural and appealing look. Whether creating a dramatic, moody look or a soft, natural look, the fill light is an important part of the lighting setup and helps to achieve a well-balanced and professional lighting effect.



Backlight light

The backlight, also known as the rim light, is the third and final component of the three-point lighting setup. Its role is to add depth and separation to the subject, by illuminating the edges and creating a subtle "halo" effect around the subject.

The backlight is placed behind the subject and aimed at the back of the head or shoulders and should be positioned so that it creates a gentle separation between the subject and the background. The intensity of the backlight can be adjusted to control the degree of separation between the subject and the background, and to create a range of different lighting effects.

In general, a lower intensity backlight will result in a subtle, natural separation effect, while a higher intensity backlight will result in a more pronounced separation effect. The backlight can also be adjusted in colour temperature to create different lighting effects, and to match the overall lighting style of the scene.

The backlight is a critical component of the three-point lighting process, as it adds depth and separation to the subject, and helps to create a more visually interesting and appealing lighting effect.



Four-point Method

Background light

The four-point lighting method is a lighting setup used in photography and videography, which involves adding a fourth light source to the traditional three-point lighting setup.

This fourth light source is an additional light, which is positioned behind the subject and used to separate the subject from the background. Therefore, creating a more visually interesting and appealing image.

The background light, unlike the backlight, is used to shed light on the background elements such as walls or outdoor landscapes rather than creating a halo or an outline around the subject. Both light options are used for separation and enhance each other.

Tips and Tricks

- **Plan** your lighting scheme before the shoot begins. Sketch out the set, the subject, and the lighting positions so you can visualize how the final image will look.
- Start with a basic **three-point lighting** system, it is a good foundation for your lighting scheme, and you can add additional lights as needed.
- **Balance** the key and fill lights. If the key light is too bright, the subject will look flat and one-dimensional. If the fill light is too bright, the subject will look washed out.
- The **background** can have a substantial impact on the overall look of your production. Make sure the background is properly lit so it does not distract from the subject.
- Different **colour temperatures** can evoke different emotions and moods.
- **Shadows** can add depth and dimension to your images, but they can also be distracting if not properly controlled. Use flags and gobos to control the shadows and make sure they fall in the right places.
- Take the time to **test** your lights and make adjustments as needed.



Four-point illumination composition



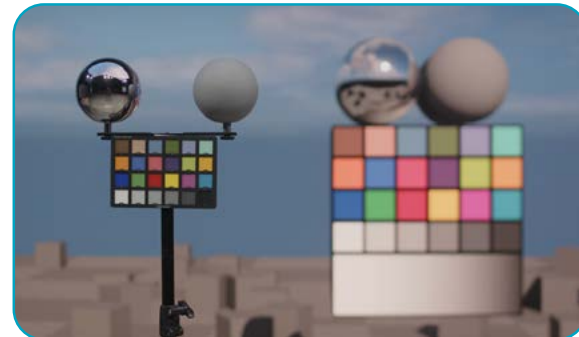
**In film, we sculpt time,
we sculpt behaviour,
and we sculpt light.**

David Fincher

Light Checker Spheres

The fill reflector balls are two reflective spherical objects, usually made of chrome-plated metal that is used in visual effects and cinematography to visualize light references.

By placing the balls in the scene, the gaffer or cinematographer can see how light and reflections interact with the environment by being used as reference for reflections in the scene and adjust accordingly. They provide a simple way to visualise and record the lighting conditions in a scene, which can then be replicated in digital scenes, like the LED Volume or post VFX. The diffuse and specular chrome balls are used together



to provide a complete picture of the lighting conditions in a scene. By using both types of chrome balls, filmmakers can ensure that the lighting in their final shots will be consistent, even if various shots were captured at separate times or in different locations.

Specular ball

The specular chrome ball is designed to capture the highlights and reflections in a scene. The ball is made of a highly reflective, shiny material, such as chrome-plated metal. The specular chrome ball is used to record the reflections in a scene, such as those from windows, mirrors, or other reflective surfaces.

Diffuse Ball

The diffuse chrome ball is designed to record the overall light level and colour temperature in a scene, without capturing any direct reflections or highlights. The ball is covered in a diffuse, matte material that scatters light in all directions, which allows it to record the ambient lighting in the environment.



[The Grey, the Chrome, and the Macbeth Chart](#)

A breakdown of reflection spheres and Macbeth chart for look development and lighting.

General workflow:

- ❑ Set up the set and digital scenes.
- ❑ Place the diffuse & specular reflection balls in the set and place the diffuse & specular reflection balls in the digital scene.
- ❑ Analyse the chrome ball, looking into diffuse and specular light reflection, direction of the light, and the intensity of the light, colour temperature, and match it.
- ❑ Capture the scene using the camera(s), to make sure you create reference footage for VFX.
- ❑ The Digital VFX team will use the information from the chrome balls to replicate the lighting conditions in the scene in post-production. This could involve colour grading the footage, adding light sources and reflections and shadows.

Post Processing Volumes

Post processing volumes are virtual 3D spaces that are used to control various aspects of the final image. These volumes are used to apply different effects and have precise localized control over the look and feel of their scenes.

A post processing volume can be created for a specific portion of a scene, such as over a particular object or a set piece. Within the volume, the artist can adjust parameters such as light intensity, shadow density, and colour grading, to create the desired look. This way, several parts of the scene can have different lighting conditions and can be treated differently.

For example, a filmmaker might use a post processing volume to adjust the lighting and colour grading of a set to make them stand out in a scene. Or control the blend between the

props in the studio and the digital assets in the LED Volume.

To use post-processing volumes effectively for in-camera VFX, filmmakers must have a strong understanding of the technical aspects of visual effects, as well as experience working with cameras, lighting equipment, and visual effects software.

Particular care should be taken when using special visual effects and lighting equipment. For example, smoke or fog can be added to the physical scene with a fog machine, and this might require modification of the digital assets to create a matching look and feel.



[Unreal Engine 5 - Post Processing Volume Tutorial](#)

Looking into Post Process Volumes and an introduction to global illumination for cinematic lighting.

Parameters Explained

Cameras

Digital cameras capture images by converting light into an electrical signal using a light-sensitive sensor. Light enters the camera through the lens and falls onto the sensor, where it is converted into a digital signal. Cameras have a set of important controls which allow us to regulate the image.



Image credit: KAL VISUALS on Unsplash

Shutter speed

Shutter speed refers to the amount of time that a camera's shutter remains open to allow light to enter and hit the camera's sensor. It is measured in seconds or fractions of a second, such as 1/60th or 1/250th of a second. The shutter speed has a significant impact on the final image and can affect the sharpness, motion blur, and amount of light captured in the photo.

In low light situations, a slower shutter speed may be required to allow more light to enter the camera, which can result in a well-exposed image. However, if the subject is moving, a slower shutter speed may result in motion blur.

ISO

ISO is a camera setting that adjusts the sensitivity of the camera's image sensor to light. It influences the image by adjusting the amplification of the camera's image sensor signal.

A higher ISO value results in a brighter image, but also increases the amount of noise in the image. A lower ISO value results in a darker image but with less noise. The ISO setting can be used to control the exposure of the image and is often adjusted along with the shutter speed and aperture to produce an image with the desired brightness and depth of field.

Aperture

Aperture refers to the size of the opening in a camera lens that allows light to pass through and reach the camera sensor. It influences the amount of light that enters the camera, and as a result, affects the exposure of the image.

Aperture also plays a significant role in determining the depth of field, which is the amount of the image that is in focus. A larger aperture (i.e., a smaller f-number) will result in a shallower depth of field, causing the background to be blurred while keeping the subject in focus.

Conversely, a smaller aperture (i.e., a larger f-number) will result in a deeper depth of field, keeping both the foreground and background in focus. Aperture settings can be used creatively to control the focus and separation of elements in an image.

Focus

Focus refers to the state of the lens in which an image is sharp and clear. In photography and videography, adjusting the focus allows the camera to determine what part of the scene will be in sharp focus and what will be blurry. This is a crucial tool for controlling the perception of depth, creating visual interest, and guiding the viewer's attention.

The focus can be adjusted manually or automatically, and different focusing methods, such as single-point, continuous, or face detection, can be used depending on the scene and desired effect. How the focus influences an image determines what elements in the frame will draw the viewer's eye and can be used to guide the viewer's attention and emphasize certain elements of the composition.



DOF with 24mm lens

Depth of field

Depth of Field (DOF) is cinematography term that refers to the portion of a scene that appears in focus and sharp in a photograph or movie. It is determined by the aperture size, distance between the lens and the subject, and the focal length of the lens. Aperture size, which can be adjusted, has the most significant impact on the DOF.

A shallow DOF refers to having a small portion of the image in focus while having the foreground and background out of focus and blurry. This effect is often used to create a sense of depth and to draw attention to a particular subject. On the other hand, a deep DOF refers to having most of the image in focus, which is often used to capture landscapes, architectural details, and other scenes with more elements that need to be in focus.

In summary, the aperture size controls the amount of light entering the camera, which in turn determines the DOF, affecting the sharpness of the image and how much of the scene appears in focus.



Camera Lenses

The role of lenses is to capture and focus light onto the image sensor, and determine the field of view, perspective, and control various optical aberrations and distortions. They also play a significant role in determining the depth of field, bokeh, and overall image quality.



Image credit: Lucas Favre on Unsplash

Filmmakers can control the style and mood of their images by using lenses with different zooming and focusing capabilities. In film making, some of the most commonly used lenses include:

- Prime lenses: offer a fixed focal length and provide a sharp, high-quality image.
- Zoom lenses: provide a range of focal lengths in one lens, allowing for greater versatility.
- Anamorphic lenses: provide a distinctive look for wide shots and produce a distinctive widescreen format.
- Macro lenses: designed for close-up photography and provide high magnification.
- Tilt-shift lenses: provide the ability to control perspective and perspective distortion.

Macro and Tilt-shift lenses are included so you will be familiar with them, but they are not typically seen in Virtual Production settings.

"A good idea is like a lens. It keeps you focused!"

Abhijit Kar Gupta

Bokeh

The term bokeh comes from the Japanese word "boke," which means "blur" or "haze." Bokeh is a term used to describe the quality of the out-of-focus blur in a photograph. The bokeh effect can be used to create a shallow depth of field, making the subject stand out by separating it from the background, which appears blurred and out of focus. Bokeh is determined by several factors, including the size and shape of the lens aperture, the focal length of the lens, and the distance between the camera and the subject.

Prime lenses

A prime lens is a camera lens with a fixed focal length. This means that the lens cannot zoom in or out and has a single, fixed field of view. Prime lenses are typically faster than zoom lenses and offer wider apertures, which allows for shallower depth of field and better low-light performance. They also tend to be more compact and lighter than zoom lenses, making them a popular choice for photographers and videographers looking for high image quality and creative control. Additionally, prime lenses often produce sharper and more detailed images than zoom lenses due to their simpler construction.



Image credit: Jakob Owens on Unsplash

Zoom lenses



Image credit: Christian Wiediger on Unsplash

Zoom lenses are lenses that allow the user to change the focal range, and this makes them very versatile for filming. However, they tend to be larger and heavier than prime lenses. Additionally, zoom lenses tend to have less control over aperture parameters which can make the footage look "flat" or lacklustre, as the range of focal lengths can make it more difficult to create a shallow depth of field or achieve a cinematic look. This is because zoom lenses tend to have a smaller maximum aperture than prime lenses, which means that they allow less light to reach the camera's sensor and create less of a shallow depth of field effect.

Anamorphic lenses

Anamorphic lenses are a type of lens used in filmmaking that horizontally compress the image. This results in a wider aspect ratio compared to standard lenses. When the anamorphic footage is played back on a screen with the correct aspect ratio, the image is stretched horizontally to fill the screen, resulting in a widescreen look. Anamorphic lenses can create unique and desirable visual effects such as horizontal lens flares, oval-shaped bokeh, and a distinctive, cinematic look. They can also create a shallow depth of field, which can be useful for isolating a subject from the background.



Image credit: Sharegrid on Unsplash

Focal Length

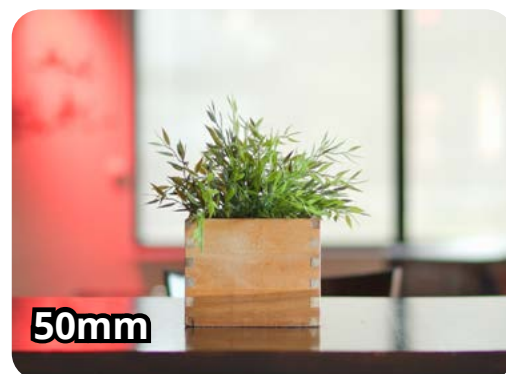
The focal length of a lens determines its angle of view, which in turn affects how much of the scene is captured in a single frame and how the subject is presented in the photo or video.

A lens with a shorter focal length (e.g., 18mm) has a wider angle of view, meaning it can capture more of the scene in a single frame. This is ideal for landscape, architecture, and interior photography where you want to capture a lot of the scene.

On the other hand, a lens with a longer focal length (e.g., 50mm) has a narrower angle of view, meaning it can capture less of the scene in a single frame. This is ideal for portrait, wildlife, and sports photography where you want to isolate the subject from the background and create a shallow depth of field.

In summary, the focal length of a lens determines its angle of view, which in turn affects how much of the scene is captured in a single frame and how the subject is presented in the photo or video.

The choice of lens mm will depend on the desired composition and effect for the shot. A wider angle can create a sense of expansiveness, while a longer lens can compress the scene and isolate the subject from the background.



In summary, the director and the DP play a key role in creating cinematic shots, by deciding on the types of shots, camera angles, and movements that will be used to tell the story, and capturing the director's vision on camera.

Moiré Effect

The moiré effect is an undesirable pattern that can occur in digital images or video when a repetitive pattern or texture in the subject being photographed interacts with the sampling pattern of the camera's sensor.



The moiré effect is a common artifact in digital imaging that occurs when two patterns with different frequencies are overlaid or superimposed on one another. This results in an interference pattern that can cause unwanted visual distortion, particularly in areas of fine detail or patterns, such as fabrics or architectural elements.

In digital cameras, the moiré effect can occur when a subject contains fine details or patterns that do not align with the camera's sensor resolution or the pattern of the camera's anti-aliasing filter. The anti-aliasing filter is designed to blur the image slightly, reducing the likelihood of moiré, but it can also soften the image slightly.

To minimize the moiré effect, some high-end digital cameras and cinema cameras use a sensor with a high resolution and no anti-aliasing filter, while others use specialized software to reduce the effect in post-production. Filmmakers may also avoid certain patterns or fabrics that are more likely to produce moiré or use anamorphic lenses that can reduce the likelihood of the effect.

Ways to reduce moiré for Virtual Productions:

- ❑ Avoid focusing on the screen's pixels. Instead, direct the focus on the actors and foreground elements, rather than the horizon.
- ❑ Shoot at a shallow depth of field - the more depth you have in your shot the less the moiré will translate to your camera's sensors.
- ❑ Adjust camera angle and distance: Changing the camera angle and distance can reduce the chance of Moire by altering the perspective and changing the pattern of the subject.
- ❑ Use a low-pass filter: A low-pass filter can be applied to the camera lens to help reduce the interference between the sensor and subject pattern.



Recording sound

Audio

Capturing high-quality audio on set is important, however, on-set conditions like ambient noise, and equipment hum can pose significant challenges to achieving clear sound. Dialogue can also be compromised by actors moving, changing direction, or speaking at varying volumes. Additionally, coordinating between the sound crew and other departments like lighting and camera operation requires precision to avoid capturing equipment in the frame.



Selection of an appropriate microphone:

- **Shotgun microphones:** These are highly directional microphones that can pick up sound from a narrow angle, are highly directional mics with hyper or supercardioid capsules and interference tubes. They are commonly used for capturing dialogue and other sounds in a specific direction, and are often used on a boom pole.
- **Lavalier microphones:** Also known as lapel microphones, these are small microphones that can be attached to a person's clothing. They are often used for recording dialogue in situations where a boom or shotgun microphone would be too visible.
- **Condenser microphones:** These are sensitive microphones that can capture high-quality sound, but also pick up a lot of background noise. They are often used in controlled recording environments.
- **Dynamic microphones:** These are more rugged microphones that can handle high sound pressure levels and are often used for live sound applications but can also be used for recording sound for film.

Set the Levels

It is important to set the levels of recording, which refers to the process of adjusting the recording levels of audio equipment, such as microphones or audio mixers, to ensure that the sound being captured or mixed is at an appropriate volume, as audio that is too quiet may not be audible or may be drowned out by other sounds, while audio that is too loud may be distorted and unpleasant to listen to. By setting the levels correctly, the audio can be captured or mixed in a way that is clear, balanced, and pleasant to listen to, we recommend typically to -10 to -12db when rehearsing in the normal sound range.



Record the room tone

Recording room tone is important in film sound design because it provides a consistent and neutral background noise for a particular location or setting. It captures the ambient sound in the room, including any echoes, reverberations, or subtle noises that are present when no other sounds are being produced intentionally. By recording room tone, sound designers and editors can use it to blend different audio clips together seamlessly and create a more natural and cohesive soundtrack for the scene. Additionally, it can be used as a reference point for removing unwanted noises or adding in sound effects to match the existing audio environment.

Clapboard to sync

When filming, use a clapboard to create a visual and audio cue for syncing the audio and video tracks later in post-production. At the start of each take, the slate is held in front of the camera, and the clapper is closed while the camera and audio recorder are rolling. This creates a sharp spike in the audio waveform that can be used as a reference point for syncing the audio and video tracks.

In post-production, the video and audio tracks are imported into an editing software, and the editor uses the visual and audio cue of the clap to match the audio track to the corresponding video track. The spike in the audio waveform created by the clap allows the editor to align the two tracks accurately.

Once the tracks are synced, the editor can then adjust the levels, remove unwanted sounds, or background noise, and mix in any additional audio elements, such as music or sound effects, to create the final soundtrack for the film.



Production Preparation

Assuming all the pre-production phase was complete successfully, make sure you plan appropriate time for testing before filming with LED walls. Unlike traditional filmmaking or even green screen techniques, LED walls involve real-time rendering and complex lighting scenarios, among other features. Here's why pre-filming testing is particularly essential with LED walls:

- **Real-Time Rendering:** Because LED walls often use game engine technology for real-time visual effects, it's important to test the load and performance of the system. Any lag or glitch can not only disrupt filming but also impact the actors' performances.
- **Camera Tracking:** LED walls often work in conjunction with camera tracking systems to ensure that the perspective in the virtual environment shifts appropriately with camera movement. Testing ensures this interaction is seamless.
- **Synchronization:** LED walls are part of a complex ecosystem that includes cameras, tracking systems, lighting, and often even sound. All these elements need to be tested together to ensure they are synchronized.
- **Color Accuracy:** The color representation on LED panels must be precisely calibrated and tested to ensure it matches what the camera captures and what eventually appears in post-production.
- **Lighting Consistency:** One of the advantages of LED walls is their ability to provide naturalistic lighting that matches the virtual environment. However, this must be tested in advance to ensure that the lighting on the subjects seamlessly integrates with the virtual background.
- **Visual Cohesion:** LED walls display backgrounds in real-time, making it critical to test how these virtual environments interact visually with live-action elements. This can help avoid discrepancies that might be jarring in the final product.
- **User Familiarity:** Crew members may need time to familiarize themselves with the nuances of operating an LED wall setup. Pre-production testing allows for a better understanding of workflows, troubleshooting, and best practices.

Given the complexity, skipping the testing phase when using LED walls can lead to time-consuming and costly errors. Rigorous testing is critical for productions using this advanced technology.

Post-Production



Part 3

Post-production is the stage after filming where editing, sound mixing, visual effects, and color grading occur to assemble the final product. It's where the raw footage and elements are refined and combined to create the finished work.

This section will cover the organisation of scenes, cuts, and editing, as well as different ways to transition between scene cuts and how to organise the DaVinci Resolve project. Additionally, it covers VFX and how can captured information during production can be used, and Colour Correction, which is critical for achieving a uniform mood and tone and will reference the colour theory discussed in the second part. Lastly, sound and the extensive setup required for sound design.

Editing

Editing plays a crucial role in the filmmaking process by shaping the story, pacing, and the emotional impact of the film. It involves selecting and arranging the shots captured during production, adding visual effects, sound effects, music, and dialogue to create a cohesive and engaging final product. The editor works closely with the director to bring their vision to life and often has a significant impact on the final version of the film. Besides technical skills, an editor must also have a strong understanding of storytelling and be able to make creative decisions that enhance the film's narrative and emotional impact.

Director & Editor Communication

Effective communication between the director and editor is critical to ensuring that the film meets the director's creative vision and goals. The director must be involved in the editing phase and work closely with the editor to make sure that the film reflects the intended creative vision in terms of style, tone, and pacing.

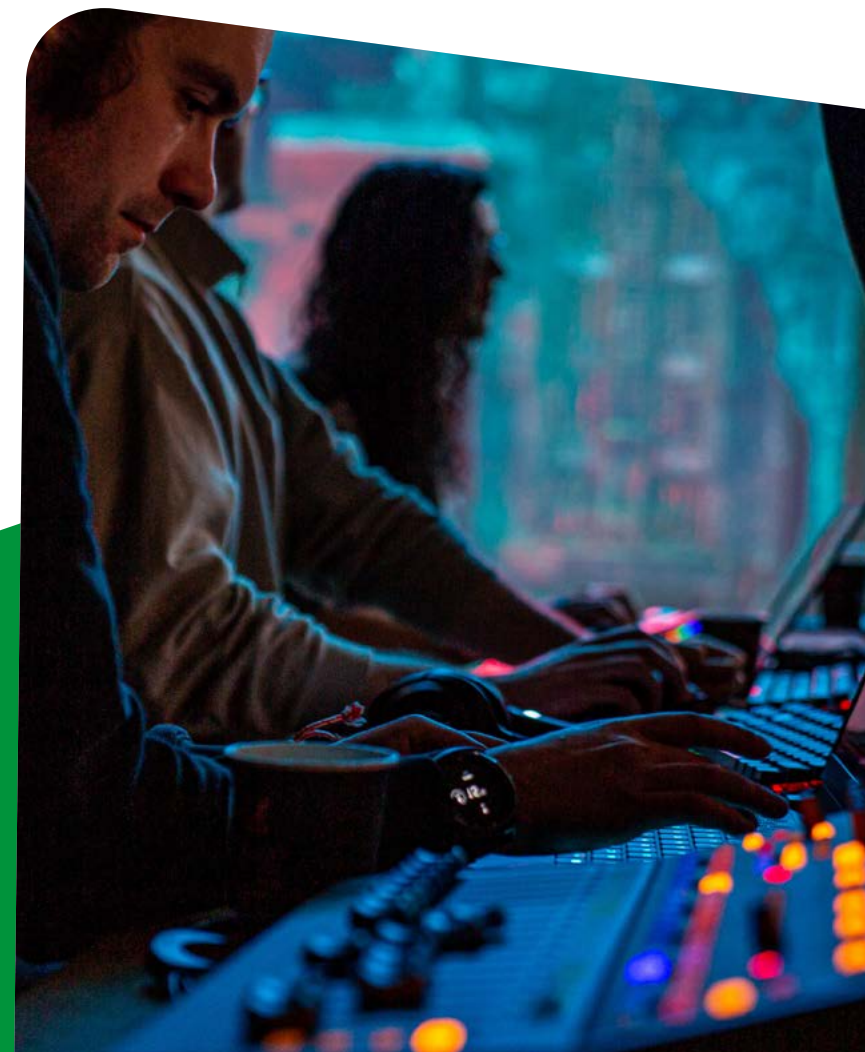
Some challenges that can arise in director and editor communication include:

- **Differences in creative vision:** The director may have a specific vision for the film, while the editor may have a different interpretation. This can lead to disagreements and conflicts during the editing process.
- **Time constraints:** Both the director and editor may work under tight deadlines, which can create pressure and stress that can affect their communication.
- **Communication breakdowns:** Misunderstandings or lack of clear communication can occur when discussing creative choices, making it difficult to move forward.
- **Ego clashes:** Both the director and editor may have strong personalities and egos, which can cause power struggles and conflicts.

The director and editor must prioritise establishing open communication and collaborating to achieve a cohesive vision for the film and overcome these challenges. It is also essential to have mutual respect and understanding of each other's creative perspectives. Effective communication and collaboration between the director and editor can result in a stronger and more impactful production. Some specific ways that the director can communicate effectively with the editor include:

- **Providing a clear vision and guidelines for the film:** The director should communicate their vision for the film and provide guidelines for the style, tone, and pacing of the film.
- **Regular check-ins and discussions:** The director and editor should have regular meetings to discuss the progress of the editing process and any changes that need to be made.
- **Collaborative problem-solving:** When challenges arise, the director and editor should work together to find solutions that meet the director's creative vision.
- **Mutual respect and understanding:** The director and editor should approach their collaboration with mutual respect and understanding, recognising that they both bring valuable skills and perspectives to the project.

By fostering effective communication and collaboration, the director and editor can create a stronger and more impactful film.



Editing

Organise Before You Start

Organising footage files is an essential aspect of the post-production process, as it guarantees a smooth and efficient editing process. Organised footage files assist editors in locating the footage they need, distinguishing between various takes and angles, and monitoring other relevant information such as camera settings and location. This simplifies the editing process, minimising the time spent searching for specific footage, and streamlining the workflow.

Here are some tips on how to organise your footage files:

- **Create a folder structure:** Create a folder structure that makes sense for your project. For example, you could have a main folder for the project and then sub-folders for each shooting day, scene, or camera angle.
- **Use descriptive file names:** Include the scene number, take number, and camera angle in your file names. Standardise this naming convention and ensure they are easily searchable: for example, if you begin your file name with the scene information, the files are naturally ordered to reflect the film's structure.
- **Use metadata:** Most modern cameras allow you to add metadata to your footage files. This can include information such as the camera settings, location, and date.
- **Back up your files:** Make sure to back up your footage files regularly, either to an external hard drive or to the cloud. Filmmaking is often expensive and reshoots can be unaffordable!

By organising your footage files, you can save time and avoid frustration during the post-production process.

Davinci Resolve Media

The Media tab lets you reorganise video clips, rename them and organise them into separate “bins”, which function as folders. An important dataset is the Metadata information that can be linked to each file, containing information like scene, shot, and take.

The top right window is the media viewer. In this, the bottom panel shows your imported footage, and at the top left is where you can organise clips based on metadata or in bins.



[Organize Media in DaVinci Resolve](#)

Ingest & Organize Media in DaVinci Resolve - Workflow Tip for Beginners!



**“A place for everything,
and everything in its place.”**

Benjamin Franklin

Editing

The Storyboard Is Your Friend

Storyboard and previs footage can be useful tools in the editing process.

The storyboard provides a visual plan for the film and can help the editor understand the director's vision for the project.

When editing, the editor can refer to the storyboard and previs footage to ensure that the final edit is consistent. However, reviewing the earlier decisions based on the acquired footage might be necessary. Differing choices made during the production phase (i.e., filming) can support stronger performances, so some flexibility is necessary. We advise revising the storyboard, with the support of the director, showing the preferred shots (or even identifying specific takes) to help plan the editing.

Rough Cut

A rough cut is an early version of a video or film edit that provides a basic visual and audio structure of the final product. It is created by assembling raw footage and selecting the best takes, arranging them in a logical order, and trimming out unwanted footage. A rough cut generally lacks refined transitions, effects, colour correction, and audio mixing, but it should give a clear sense of the story and pacing of the final product. It serves as a starting point for further editing and refining. Rough cuts can be shared with clients or collaborators for feedback before proceeding to the fine cut stage.

B-roll footage is secondary footage used to complement the primary footage, which is typically the main subject of the scene. The role of the B-roll in editing is to provide context and variety to the visuals while also helping to break up the monotony of the main footage. B-roll can be used to establish the location or environment, provide additional detail or information about a subject, or simply add visual interest to the scene. B-roll can set a scene's mood, tone or setting while also providing visual interest during transitional moments.

Using B-roll in editing can enhance the overall production value and engage the audience by providing a more immersive viewing experience.

Placeholder shots can be used as temporary stand-ins for shots that will later be replaced with the final VFX shots. Using placeholders for VFX shots in a rough cut is common practice. This approach can be helpful for several reasons:

It allows the editor to create a rough cut with the intended timing and pacing, even if the final VFX shots are not yet available. It helps the VFX team understand the editor's intentions and the timing of the shots, which can be helpful when planning and executing the VFX work. It can be used as a tool for communication between the editor and the VFX team, allowing them to discuss and refine the visual effects before finalising the shots.

When using placeholders for VFX shots, it is important to label them clearly and to provide detailed notes to the VFX team on what is required for the final shot. This can help ensure that the VFX shots are created to the desired specifications and can be easily replaced in the final edit.

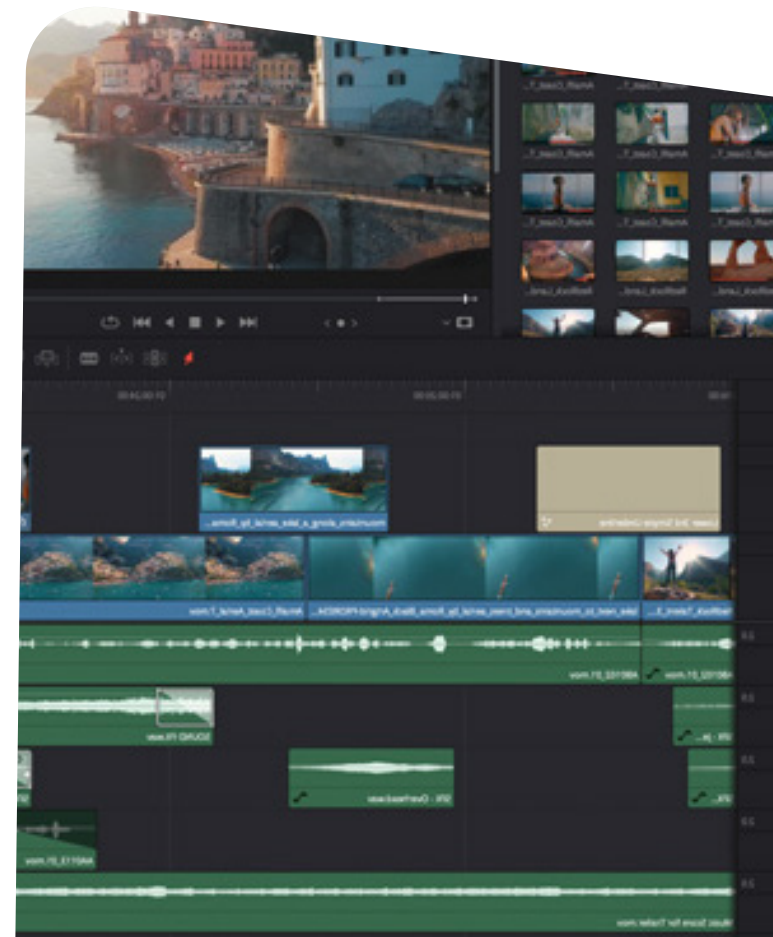
Editing

In the editing process, all footage and audio files are thoroughly reviewed, and notes are taken on which shots would work best for each part of the story. Afterwards, a rough cut is created by placing the shots in order and adding basic transitions. This is a solid foundation for the editor to refine and build upon. The editor can then add music, sound effects, and other layers to enhance the mood and tone of the piece. It is crucial to continuously review and make adjustments to ensure the story flows seamlessly.

Continuity

Continuity editing is a style of editing that seeks to establish a sense of spatial and temporal coherence between different shots in a film. This is achieved through various techniques, such as the use of establishing shots to orient the audience, matching on action to create a seamless transition between shots, and the use of eyeline matches to create a sense of visual continuity between different characters and their perspectives. Continuity editing is typically used in narrative films, where it is important to maintain a consistent sense of time and space throughout the story.

A typical sequence starts with an establishing shot. An establishing shot is commonly a wide-angle shot in a scene or sequence and is used to establish the location, time, and mood of the scene. The shot is typically taken from a distance, showing the surroundings, such as a cityscape or a landscape, to provide the audience with a context for the following action.

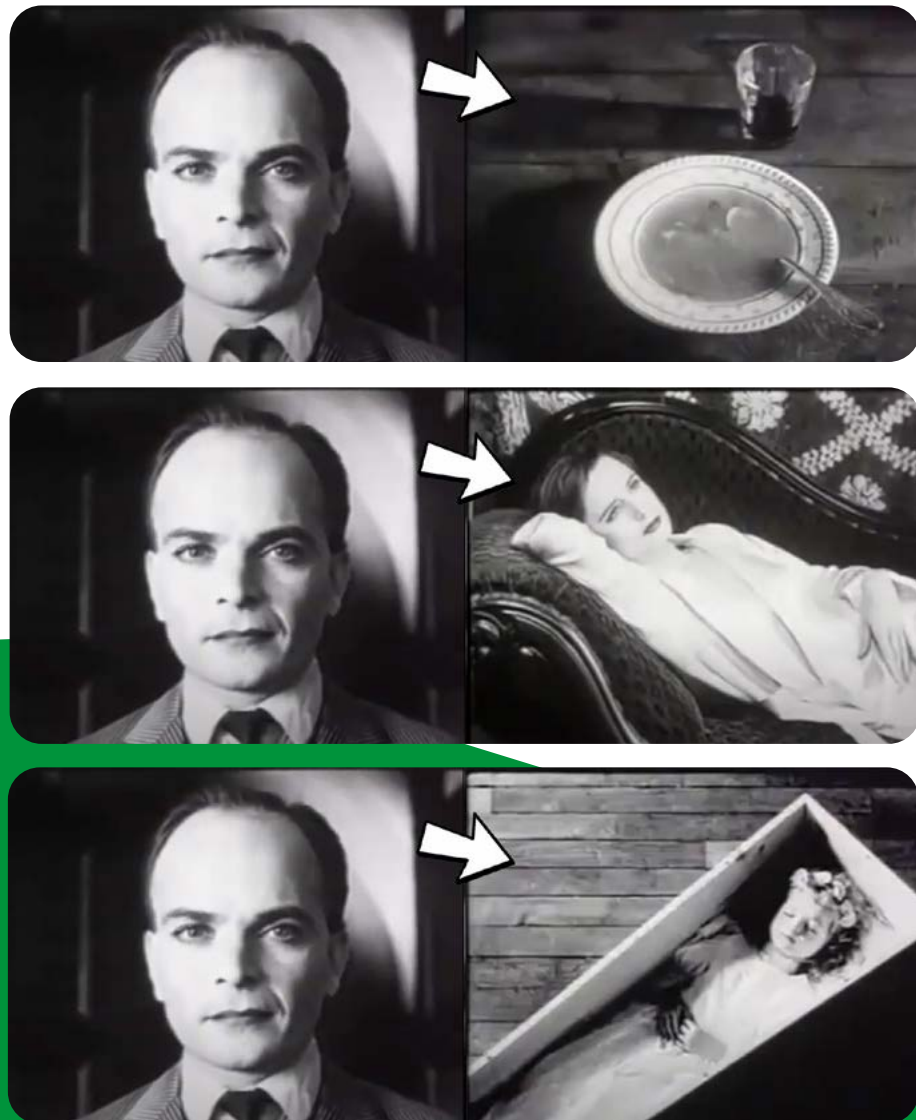


Kuleshov Effect

The Kuleshov effect is a film editing technique that Soviet filmmaker Lev Kuleshov developed in the early 20th century. The effect is created by editing together a series of shots to suggest a connection or relationship between them, even if no actual connection exists. This can create a specific emotional or intellectual response in the viewer based on the context and meaning that they assign to the shots.

Kuleshov demonstrated the power of film editing through an experiment. He showed the same shot of actor Ivan Mosjoukine's face, followed by various other shots: a plate of soup, a girl in a coffin, and a woman on a couch. Despite Mosjoukine's expression remaining unchanged, the audience interpreted it differently in each case: hunger when shown with the soup, grief when shown with the dead girl, and lust when shown with the reclining woman.

The Kuleshov effect is often used in film to create meaning using visual language and editing. It is a powerful tool for manipulating audience perception and emotion.



Continuous Editing Techniques

We can create a seamless and logical flow of time and space in a film by maintaining continuity in the visual and audio elements. It may involve using a series of editing rules, such as the 180-degree rule, shot-reverse-shot technique, match-on-action, and eyeline match to ensure that the audience can understand the relationships between the characters and the space they occupy.

This technique is commonly used in mainstream narrative films and television shows because it helps to maintain the coherence and clarity of the story being told.

180-degree rule: The 180-degree rule is a guideline in filmmaking that governs how shot composition and camera angles are arranged to maintain spatial continuity. The rule states that an imaginary line called the "axis of action" should be established between two characters or objects in a scene, and the camera should remain on one side of this line to preserve a consistent spatial relationship between them. Crossing the line can cause disorienting shifts in perspective that can confuse the viewer. Very rarely, some directors deliberately "cross the line" to exploit this sense of uneasiness and disorientation, but this is always done with great care and intentionality.

Shot-reverse-shot technique: The shot-reverse-shot technique is a common film-making practice used to show a conversation or interaction between two or more characters. The camera is positioned on one character during a shot and then switches to another character during a subsequent shot, with the dialogue and action being edited together in a way that creates a seamless and fluid conversation. This technique is used to establish the spatial and emotional relationship between the characters and to highlight the reactions and expressions of each.



[The Insider - Michael Mann](#)

Axis of Action - 180° rule



Till The Clouds Roll By (1946)

Match-on-action: Match-on-action is an editing technique that involves cutting between two shots of the same action or movement to create a seamless transition. The technique is often used to maintain the continuity of an action or movement across different camera angles or perspectives and can also create a sense of fluidity and momentum in the editing. For example, a shot of a person reaching for a door handle might be followed by a shot of the door opening, with the action of reaching and opening the door seamlessly blending together in the editing.

Discontinuity

Discontinuity editing is a style of film editing that deliberately breaks the rules of continuity to create a jarring, disjointed effect. Unlike continuity editing, which is designed to create a seamless and realistic flow between shots, discontinuity editing uses techniques such as jump cuts, time lapses, and non-linear narrative structures to disrupt the viewer's sense of time and space.

Jump cuts are perhaps the most common form of discontinuity editing, in which the same shot is repeated from slightly different angles or with minor changes in camera position. This creates a visual jump that can be disorienting for the viewer but can also be used to create a sense of tension or urgency.



Match Cut: This cut creates a connection between two shots by matching their visual or audio elements, such as movement, shape, colour, sound, or theme. It is used to create a seamless transition between two shots and establish a relationship between them.

Cross Cut: This cut shows two or more separate actions happening simultaneously in different locations. It is used to create tension, suspense, or parallelism between different storylines.



Match Cut
2001 A Space
Odyssey (1968)

Discontinuity editing can also involve non-linear narrative structures, such as flashbacks, dream sequences, and other unconventional storytelling techniques. By jumping back and forth in time or presenting events out of sequence, filmmakers can create a sense of disorientation or confusion that is not possible with traditional linear storytelling.

Overall, discontinuity editing is often used to convey a sense of emotional intensity or to create a particular mood or atmosphere in a film. It can be a powerful tool for filmmakers to experiment with and push the boundaries of traditional storytelling conventions.

Rhythm

The rhythm plays an essential role in film editing and refers to how cuts are arranged and timed to create a particular pace or tempo. By varying the rhythm of cuts, an editor can manipulate the pace of a scene and create tension or relaxation, depending on the desired effect.

The rhythm can be affected by several factors, including the duration of shots, the pace of camera movements, and the timing and placement of cuts. A fast rhythm may be achieved by using quick cuts with shorter durations and a higher frequency of camera movements, while a slower rhythm may be achieved by using longer shots and fewer camera movements with more extended durations.

The rhythm can also be influenced using sound, such as music or sound effects, which can create a sense of urgency, excitement, or relaxation. Visual effects, such as slow-motion or freeze frames, can also contribute to the rhythm of a scene.

Overall, the rhythm is an important tool for the editor to shape the emotional and dramatic impact of a film and engage the audience's attention throughout the story.



Editing

Other Versatile Cuts

Cut In: A “cut in” is an editing technique in which a shot is inserted into a sequence to show a closer view of an object or person in the scene. It is typically used to draw attention to a specific detail or to provide a more detailed view of a subject. A “cut in” is often used in combination with other editing techniques, such as a cutaway or a reaction shot, to create a more dynamic and engaging sequence. The timing and placement of a “cut in” are important to ensure that it enhances the narrative flow and visual impact of the scene.

Cutaways: A “cutaway” is an editing technique in which the camera cuts from the main action to a shot of something else, then back to the main action. The purpose of a cutaway is usually to provide additional context or to heighten the tension of a scene. For example, in a conversation between two characters, a cutaway to an object in the room or a reaction shot of a third character can help build tension or provide visual interest. Cutaways are often used to smooth over continuity errors, such as an actor flubbing a line, by providing a brief interruption in the action.



Goodfellas, Cut In... relevant to the action by showing a money delivery.



Goodfellas, Cutaway... not relevant to the action, secondary activity.



[Introduction to Film: Lesson 5.4 - Cuts and Transitions](#)

Introduction to Film: Lecture Videos

L-Cut & J-Cut

J and L cuts are editing techniques used in film and video production to blend the audio and video between two scenes. A J-cut is when the audio from the next scene begins before the visuals of the current scene end. This creates a smoother transition between scenes, allowing the audience to hear what is coming up next before seeing it. J-cuts are commonly used in dialogue-heavy scenes, where the audio from one character's speech may overlap with a shot of the other character reacting to what they're saying. An L-cut is the opposite of a J-cut. It's when the audio from the current scene carries over into the next scene while the visuals of the current scene end. L-cuts are commonly used in scenes with there is background music or ambient sound that continues into the next scene.

Invisible Cut

An invisible cut, also known as a seamless cut, is a type of cut that is designed to be as unnoticeable as possible to the viewer. It is a cut that occurs at a point where there is a visual or audio match between the shots on either side of the cut. This match can be based on a variety of elements, such as colour, motion, subject matter, or sound. The purpose of an invisible cut is to create a smooth and fluid transition between two shots without jarring the viewer out of the story or disrupting the flow of the scene.

Invisible cuts can be achieved through careful planning and editing and may involve using specialised techniques such as match framing or split editing. They can be a powerful tool for enhancing a film or video's storytelling and emotional impact and are a prominent element of the language of cinema.

Transitions

Dissolve: This cut involves one shot gradually fading out while the next shot gradually fades in. It creates a smooth transition between two shots and conveys a passage of time or a dreamlike effect.

Fade: This cut involves one shot gradually becoming darker or lighter until it fades to black or white, followed by the next shot becoming progressively brighter or darker from black or white. It is used to show the beginning or end of a scene or time passing.

Iris In/Iris Out: This cut involves one shot gradually shrinking to a small circle or oval in the centre of the screen (Iris In) or gradually expanding from a small circle or oval to fill the screen (Iris Out). It is used to indicate a flashback, a dream sequence, or a change in perspective.



Transition sequence, dissolve and then iris out, on Till the Clouds Roll By (1946).

Colour Grading

Colour grading is an essential part of the post-production process, and it can significantly impact a project's final look and feel. Simply put, colour grading is the process of adjusting the colours in the footage to achieve a desired look or mood. This can include adjusting the overall colour balance, exposure, contrast, saturation, and more.

Colour grading has a rich history that dates back to the early days of cinema. In the early 1900s, hand-colouring techniques were used to add colour to black and white films. Later, colour film stocks and colour grading techniques were developed, allowing filmmakers to achieve more nuanced and complex colour palettes.

Today, colour grading is an essential part of the filmmaking process, and it is used in everything from feature films and television shows to commercials and music videos. With the right colour grading tools and techniques, you can enhance the emotional impact of your footage, create a consistent look and feel across your project, and bring your creative vision to life.

In the following sections, we'll explore the fundamentals of colour grading, including the basics of colour spaces, the colour grading workflow, primary and secondary colour correction, creative colour grading techniques, and more.



Understanding Colour Spaces

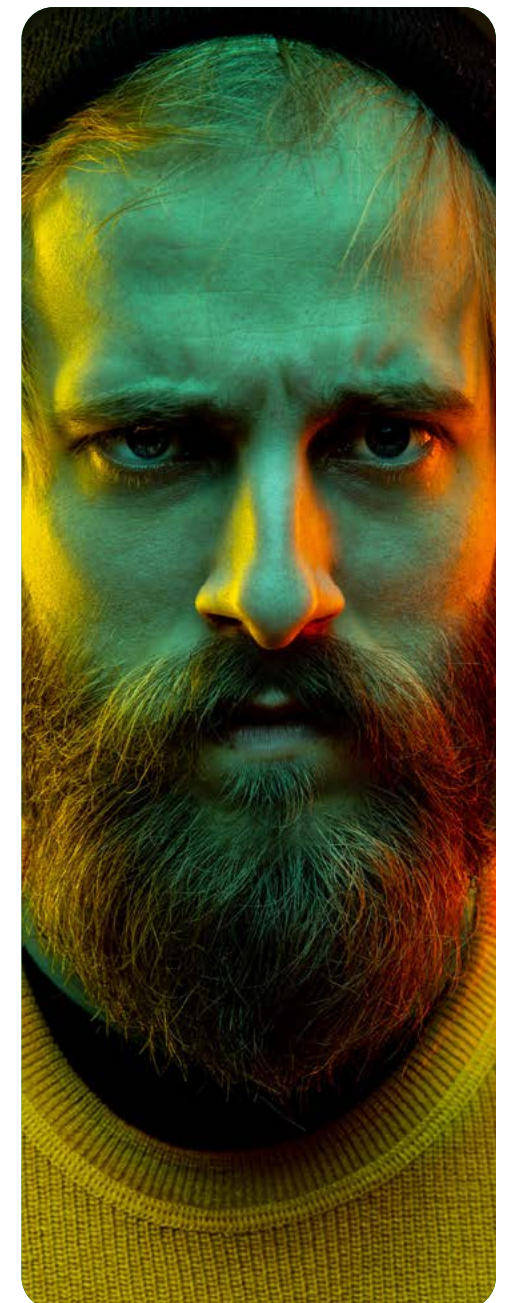
Colour spaces are an essential concept to understand when it comes to colour grading. A colour space is a specific way of representing colour using numerical values. Different colour spaces have different colour primaries, colour gamuts, and gamma curves, which affect how colours are represented and displayed.

There are many different colour spaces used in film and video production, but some of the most common ones include:

- **Rec. 709:** This is the colour space used for HD video, and it has a relatively narrow colour gamut compared to some other colour spaces.
- **DCI-P3:** This is a colour space used for digital cinema projection, and it has a wider colour gamut than Rec. 709.
- **Rec. 2020:** This is a newer colour space that is designed for ultra-high-definition (UHD) video, and it has an even wider colour gamut than DCI-P3.

In addition to these commonly used colour spaces, many other colour spaces are used in different parts of the production process, such as log-encoded colour spaces for capturing high-dynamic-range (HDR) footage.

Understanding colour spaces is important for colour grading because it affects how colours are displayed on different devices. For example, if you grade your footage using the Rec. 2020 colour space but your final output is in Rec. 709, the colours may appear different than you intended.



The Colour Grading Workflow

The colour grading workflow is a systematic approach that involves several stages, each with its own set of goals and techniques. The workflow typically includes the following stages:

- **Preparation:** Before starting the process of colour grading, the footage must be adequately prepared. This can include transcoding to a format compatible with the colour grading software, syncing audio and video and organising the footage files.
- **Primary Colour Correction:** The first stage of colour grading is primary colour correction, which involves adjusting the overall colour balance, exposure, contrast, and saturation of your footage. This is usually done using colour wheels, which allow for independently adjusting the shadows, mid-tones, and highlights.
- **Secondary Colour Correction:** The next stage is secondary colour correction, which involves making targeted adjustments to specific parts of the image. This can include things like adjusting skin tones, removing colour casts, or boosting the saturation of a specific colour. This is usually done using tools like masks, which allow you to isolate specific parts of the image.
- **Creative Colour Grading:** The final stage of the colour grading workflow is creative colour grading, which involves using creative looks to achieve a specific mood or style. An example of creative colour grading is desaturating the image to create a gritty, documentary-style look or using a teal and orange colour grade to create a cinematic look.

It's crucial to work in a non-destructive way throughout the colour grading workflow, making adjustments that can be easily undone or modified later on. This approach permits experimenting with different looks and making changes based on client feedback without starting from scratch.



"Colour grading is the secret weapon of storytelling."

Chris Do

Primary Colour Correction

The first stage of the colour grading workflow is primary colour correction, which involves adjusting the overall colour balance, exposure, contrast, and saturation of your footage. This stage is critical because it sets the foundation for the rest of the colour grading work.

The primary colour correction stage is usually done using colour wheels, allowing the shadows, mid-tones, and highlights to be adjusted independently. Three main colour wheels are used in primary colour correction: the lift, gamma, and gain wheels.

- **Lift Wheel:** The lift wheel adjusts the shadows in the image. Moving the lift wheel up adds more brightness to the shadows while moving it down adds more darkness.
- **Gamma Wheel:** The gamma wheel adjusts the midtones in the image. Moving the gamma wheel up adds more brightness to the midtones, while moving it down adds more darkness.
- **Gain Wheel:** The gain wheel adjusts the highlights in the image. Moving the gain wheel up adds more brightness to the highlights, while moving it down adds more darkness.

In addition to the colour wheels, there are other tools you can use for primary colour correction, such as exposure and contrast controls, saturation controls, and white balance controls.

It's noteworthy to remember that primary colour correction should be used to correct any colour imbalances or exposure issues in the footage rather than to create a creative look. Moving to the next stage of the colour grading workflow is preferable only once a balanced and natural-looking image has been achieved.



Secondary Colour Correction

The next stage of the colour grading workflow is secondary colour correction, which involves making targeted adjustments to specific parts of the image. This stage is where fine-tuning the colour grading can make the footage look its best.

Several tools can be used for secondary colour correction, including:

- **Masks:** This tool allows you to isolate specific parts of the image and apply colour corrections to those areas only. For example, you might want to adjust the skin tones in a person's face without affecting the rest of the image.
- **Power Windows:** Power Windows are a more advanced version of masks that allow you to create complex shapes for your colour corrections. This can be useful for correcting difficult areas, such as a brightly lit sky or a dark shadow.
- **Hue, Saturation, and Luminance (HSL) controls:** HSL controls allow you to adjust the hue, saturation, and luminance of specific colours in your image. This can be useful for things like adjusting the colour of someone's shirt or making the green foliage in a landscape shot look more vibrant.
- **Curves:** This tool allows you to adjust the brightness and contrast of specific parts of the image. This can be useful for things like brightening up the shadows in a dark scene or adding more contrast to an overexposed shot.

When using these tools for secondary colour correction, it's important to be subtle and make small adjustments. You don't want to overcorrect and end up with an unnatural-looking image. It's also important to work in a non-destructive way, so you can easily undo any changes if needed.



In Different Genres

Colour grading plays a vital role in establishing the tone and mood of a video project, and different genres require different approaches to achieve their desired look and feel. Here are some considerations to keep in mind when colour grading for different genres:



Image credit: Freepik

Narrative Film

Narrative film is perhaps the most well-known genre in which colour grading is used to create a specific look and feel. In this genre, colour grading can be used to establish the time of day, the mood of the scene, and even the emotions of the characters. For example, a warm colour palette might be used to create a cosy, comfortable feel for a romantic scene, while a desaturated, cool palette might be used to convey a sense of sadness or isolation.



Image credit: Boris Baldinger on Unsplash

Documentary

Documentaries often aim for a more natural look and feel, with colour grading used primarily for consistency and to enhance the footage rather than to create a specific mood. In this genre, colour grading might be used to ensure that footage shot in different locations or at different times looks consistent and flows seamlessly.



Image credit: Freepik

Music Videos

Music videos often feature highly stylised colour grading, with bold, saturated colours used to create a striking and memorable look. In this genre, colour grading might be used to complement the lyrics or themes of the song, or to create a specific atmosphere or vibe.



Image credit: Pixabay

Commercials

Commercials often aim for a highly polished and professional look, with colour grading used to make products and brands stand out. In this genre, colour grading might be used to emphasise certain colours or create a specific contrast between the product and the background.

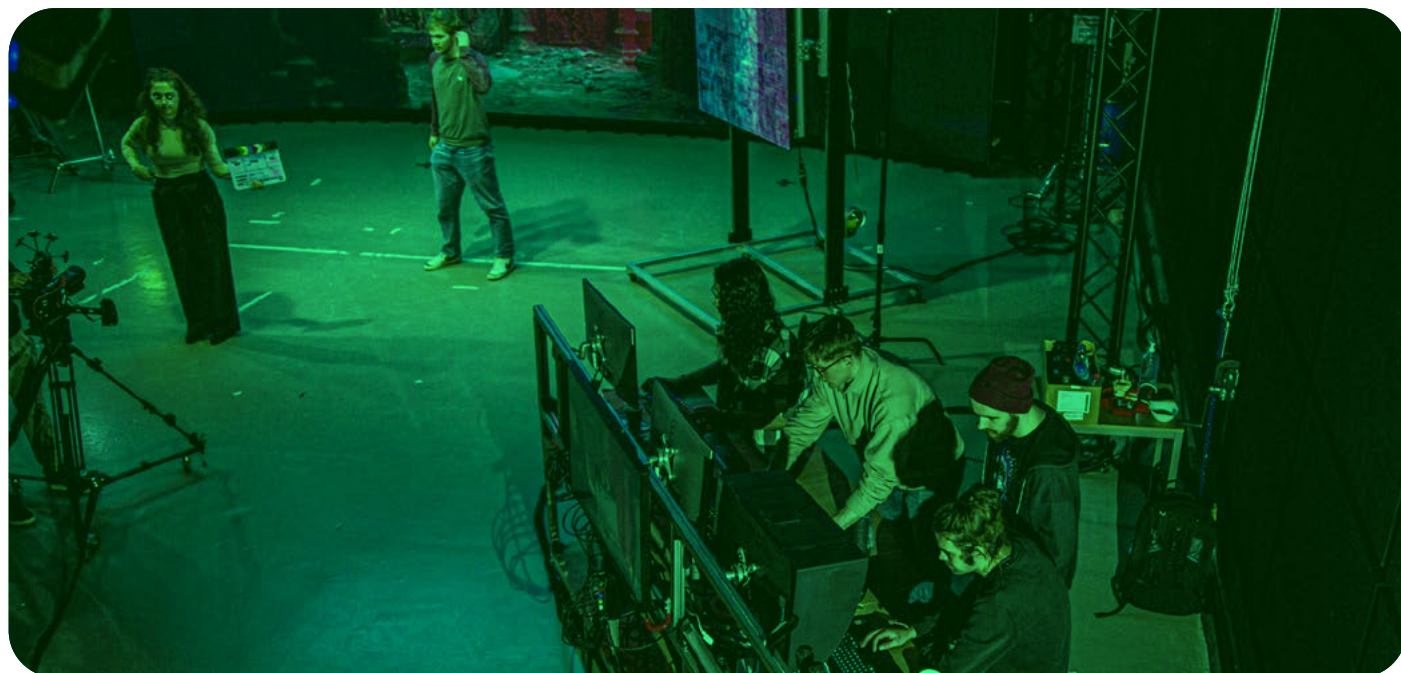


Image credit: Freepik

Animation

Animation allows for complete creative control over the colour palette, and colour grading is used to establish the look and feel of the entire project. In this genre, colour grading might be used to create a specific atmosphere, such as a fantastical world with bold and bright colours, or a sombre and melancholic environment with a muted colour palette.

Ultimately, the approach to colour grading will depend on the specific needs of the project and the genre. By understanding the nuances of different genres, you can create colour grades that enhance the storytelling and elevate the visual impact of the project.



Tools

Colour grading involves adjusting various aspects of an image, such as exposure, contrast, saturation, and colour balance. There are a variety of tools available to colour grade footage, ranging from basic tools found in most video editing software to specialised software designed specifically for colour grading.

1. Primary Colour Correction Tools

Primary colour correction tools allow you to adjust the overall colour balance and exposure of an image. These tools include:

- **Lift, Gamma, Gain (LGG):** Allows you to adjust the shadows (Lift), midtones (Gamma), and highlights (Gain) of an image.
- **Exposure:** Allows you to adjust the overall brightness of an image.
- **Colour Temperature:** Allows you to adjust the overall warmth or coolness of an image.
- **Saturation:** Allows you to adjust the intensity of the colours in an image.

2. Secondary Colour Correction Tools

Secondary colour correction tools allow you to make targeted adjustments to specific areas of an image. These tools include:

- **Hue, Saturation, and Lightness (HSL):** Allows you to adjust the hue, saturation, and brightness of individual colours.
- **Curves:** Allows you to adjust the brightness and contrast of specific areas of an image using a curve.
- **Colour Wheels:** Allows you to adjust the colour balance of an image by adjusting the shadows, midtones, and highlights of specific colour ranges.
- **Keying:** Allows you to select a specific colour range or area of an image and make targeted adjustments to that area.

3. Specialised Colour Grading Software

In addition to the basic colour correction tools found in most video editing software, there are also specialized colour grading software programs available. These programs offer more advanced tools and workflows designed specifically for colour grading. Some examples include:

- **DaVinci Resolve:** A professional-grade colour grading software with advanced tools for primary and secondary colour correction, as well as specialised features such as colour matching and tracking.
- **Adobe SpeedGrade:** A colour grading software that integrates with other Adobe Creative Cloud programs, offering advanced tools for primary and secondary colour correction and colour grading workflows.
- **FilmConvert:** A specialized plugin that allows you to apply film stock emulation and colour grading presets to your footage.

By understanding the various colour grading tools available, you can choose the right tools for your project and achieve the desired look and feel for your footage.



Image credit: Freepik

Virtual Productions

Colour grading for virtual productions presents some unique challenges and considerations. Here are some tips for achieving great colour grading results in virtual productions:

1. Start with a Good Base Image

When colour grading for virtual productions, it's important to start with a good base image. Ensure that the live action footage is properly exposed, and colour balanced, and that the virtual set or environment is lit to match the lighting in the live action footage. This will provide a solid foundation for your colour grading work.

2. Match the Lighting and Colour of the Virtual Set

One of the main challenges of colour grading for virtual productions is matching the lighting and colour of the virtual set or environment to the live action footage. Use reference images and footage to ensure that the virtual set matches the lighting and colour temperature of the live action footage. Make adjustments as necessary to achieve a consistent look across the entire image.

3. Use Scopes to Analyse the Image

When colour grading for virtual productions, it's important to use scopes to analyse the image and ensure that it is properly exposed, and colour balanced. Use waveform monitors and vectorscopes to analyse the colour and exposure of the image and make adjustments as necessary to achieve a consistent and balanced look.

4. Pay Attention to Reflections and Shadows

In virtual productions, reflections and shadows can present some unique challenges for colour grading. Ensure that reflections and shadows in the virtual set or environment match the lighting and colour temperature of the live action footage. Use masks and selective adjustments to adjust the colour and brightness of reflections and shadows as necessary.

5. Use 3D LUTs for Consistency

Using 3D LUTs (Look-Up Tables) can be a powerful tool for achieving consistency in colour grading for virtual productions. Create a custom 3D LUT for your project and apply it to each shot to ensure a consistent look and feel across the entire production.

6. Test Your Colour Grading in a Virtual Environment

When colour grading for virtual productions, it's important to test your colour grading in a virtual environment to ensure that it looks good in context. Use a virtual camera to preview your colour graded footage in the virtual environment and make adjustments as necessary to achieve a consistent and polished look.

Colour Grading Tips & Tricks

Colour grading is both an art and a science, and there are a variety of techniques and best practices that can help you achieve the desired look and feel for your footage. Here are some tips and tricks to keep in mind when colour grading:

1. Use Reference Images

Reference images can be a great tool for establishing the desired look and feel for your project. Before you begin colour grading, collect reference images that capture the mood and tone you want to achieve. Use these images as a guide for your colour grading and refer back to them frequently to ensure that you are staying on track.

2. Use Scopes

Scopes are a powerful tool for analysing and adjusting the colour balance and exposure of your footage. Use scopes to ensure that your footage is properly exposed, and colour balanced and make adjustments as necessary to achieve a consistent look across your footage.

3. Work in Stages

Colour grading is a complex process that involves making adjustments to multiple aspects of an image. To avoid getting overwhelmed, it's often helpful to work in stages. Start by making broad adjustments to the overall colour balance and exposure of your footage, and then move on to more targeted adjustments such as adjusting the colour of specific objects or areas of the image.

4. Be Consistent

Consistency is key when it comes to colour grading. Ensure that your footage is consistent in terms of colour balance, exposure, and overall look and feel. This will help your footage feel cohesive and polished.

5. Experiment with Different Looks

Don't be afraid to experiment with different colour grading techniques and looks. Sometimes the most interesting and creative results come from trying new things and stepping outside of your comfort zone.

6. Consider the Audience

When colour grading, it's important to keep in mind the intended audience for your project. The colour grading for a commercial aimed at teenagers might look very different from the colour grading for a documentary aimed at an older demographic. Consider the demographics and preferences of your target audience when making colour grading decisions.

7. Don't Overdo It

While it can be tempting to go all out with colour grading, it's important to exercise restraint and not overdo it. Over-saturating colours or pushing the contrast too far can result in an image that looks unnatural and jarring. Remember that subtlety and restraint can often be more effective than bold and dramatic colour grading.



**“Visual effects empower filmmakers
to bring their wildest imaginations to life.”**

- James Cameron

Visual Effects, VFX

Visual effects, or VFX, have revolutionized the world of video editing, enabling filmmakers and editors to bring their creative visions to life in ways that were once impossible. From creating lifelike explosions and massive battles to seamlessly integrating computer-generated characters into live-action footage, VFX have become an essential tool for modern video editors. In this chapter, we will explore the fundamentals of VFX and how they can be used to enhance your video editing projects.

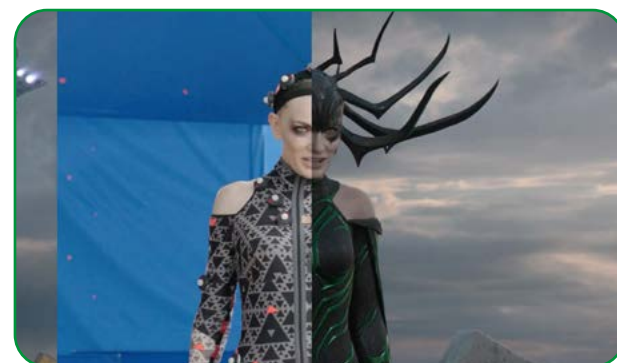
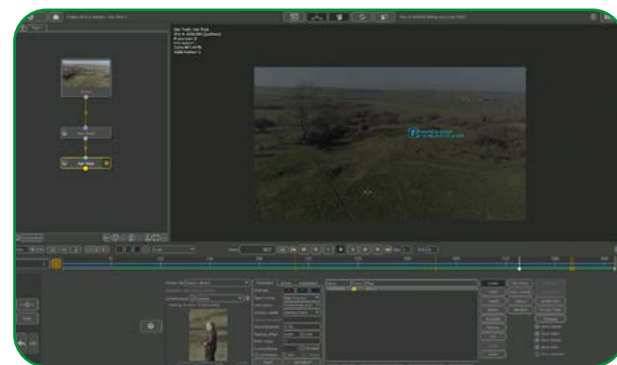
Matchmoving

The process of integrating 3D elements into live-action footage is known as matchmoving or camera tracking. There are different techniques used within this discipline, each with a different goal in mind. There are several software options available for matchmoving, including PFTrack, 3DEqualizer, and others. Additionally, compositing software packages also have basic matchmoving functionality built in, such as After Effects and Fusion. Dedicated matchmoving software packages use advanced algorithms and techniques to track camera movement and object motion in the live-action footage, and generate a 3D scene that aims to match the footage as close as possible.

The general workflow for matchmoving is:

- 1. Shot preparation:** The first step is to prepare the live-action footage for tracking. This process involves removing distortion, stabilising the footage, and editing the footage.
- 2. Tracking:** The next step is to track the camera's movement, and to add tracking markers to the footage using the matchmoving software's toolset. If done correctly, the software generates a 3D scene and a camera that matches the movement and perspective of the original footage.

There are a few different techniques used in order to integrate 3D-elements into live-action footage. The goal is to accurately replicate the camera's movements and the motion of physical objects, so that the user can composite digital 3D objects and/or animations together with the live-action footage.



Subtopics Matchmoving

Camera tracking: Camera tracking, also known as motion tracking, is an important aspect of matchmoving. It involves analysing the camera used to shoot the live footage and creating an accurate virtual camera that can be used to integrate 3D elements seamlessly with the live footage. During the camera tracking process, software analyses the movement of the camera in each shot. This is done by identifying specific points or markers in the footage, which are then tracked over time to calculate the camera's movement and position in 3D space. The software then creates a virtual camera that matches the movement and position of the real camera in the shot.

Object tracking: Object tracking is used to track real-world objects within the footage. Object tracks are used to either replace or enhance an object that is already present in the footage.

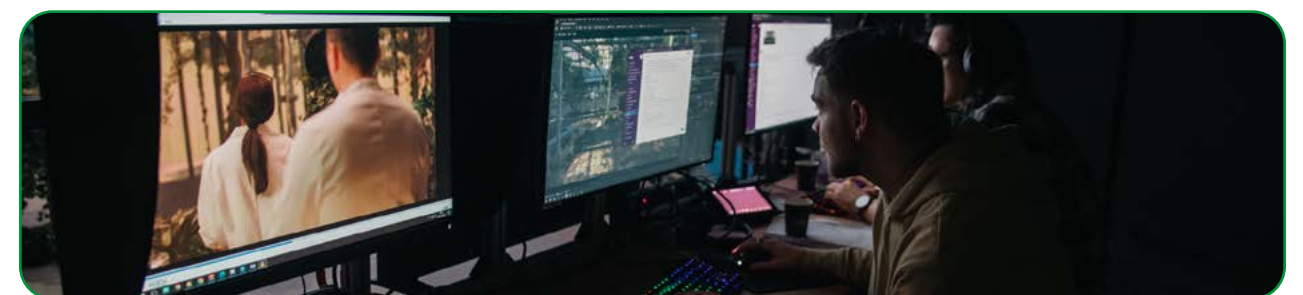
Roto animation: Roto animation, also known as rotoscope animation, is a technique used to match the precise movement of a subject's body parts, such as their head, hands, or even their entire body. To achieve this, often a (polygonal) representation of the actor's body is created, which is then animated to match their movements. This technique is used for several reasons, including the need for geometry to interact with other 3D elements in the scene for lighting and rendering purposes, and to create a matte that helps when adding different elements on top of the actor during compositing.

Automatic tracking vs. interactive tracking:

(Automatic tracking is when technology tracks something without human intervention. Interactive tracking involves real-time interaction and allows users to actively control the tracking process).

Automatic tracking Pros:

-  **Faster tracking:**
Automatic tracking and auto-solve features can create a large number of tracking points at much faster speeds than human-driven tracking.
-  **Reliable data:**
Filtering tools in the software can analyse the automatic solutions. These help to determine the most reliable points to use from a large number of tracking points.
-  **High accuracy:**
Automatic tracking can be very accurate in favourable circumstances with stable and distinct features, e.g. in shots with less camera movement, reduced motion blur, reliable tracking markers.



Automatic tracking Cons:

- **Easily confused:**
 Depending on the algorithm used, automatic tracking can easily be confused when tracking objects through the scene, particularly in shots involving fast camera motion and repetitive subject matter.
- **Motion blur:**
 Automatic tracking is less effective in shots with a large amount of motion blur, because small details are harder for the software to track.
- **Hard to control:**
 Given the vast amount of information an automatic solution requires, it becomes harder to control the result.

Interactive tracking Pros:

- **Accurate tracking:**
 In contrast to an automatic solution, a manual process allows the user to follow individual features and place markers interactively throughout the entire shot at will, while also being less obstructed by imperfections in the footage.
- **Flexible:**
 A manual workflow is less obstructed by imperfections in the footage such as motion blur, fast-moving camera motion, and occluded subjects, allowing the user to accurately track features throughout the entire shot.
- **More control:**
 A manual approach allows the user to have more control over the tracking process due to the lower amount of information introduced. This means that the user can make more precise decisions and adjustments during the tracking process.

Interactive tracking Cons:

- **Time-consuming:**
 Interactive tracking can be slower than automatic tracking because it is driven by a human user.
- **Prone to errors:**
 The user may introduce small errors as they follow objects through the scene, leading to “drift” over time.



In summary, automatic tracking is faster and more reliable when tracking stable and distinct features but is less effective in shots with motion blur or repetitive subject matter.

Interactive tracking is more accurate and flexible but is slower and can introduce small errors. Professional-level motion tracking often combines both techniques to achieve the best results.

Animatic

The next step in the VFX pipeline is to create an animatic, which is also referred to as the layout stage. During this stage, the border between the live-action elements and the 3D-elements begins to blur. An animatic is a continuation of the storyboard stage and serves a similar purpose, which is to represent the final shot, demonstrate the timing and layout of the 3D elements, and bring everything together.

The animatic is usually created by using the tracked footage as a base, and then adding rough 3D and/or animated elements to the scene, to get an idea of how they look in the shot, and whether or not the tracked elements work well. Checking this can reduce production time that may otherwise be wasted on shots that go unused in the final cut.

The animatic is an important tool for visualising the final shot and communicating the vision to the rest of the production team. It also helps in identifying any potential issues or challenges that may arise during the later stages of the VFX process, such as camera tracking errors, lighting mismatches, or difficulties with compositing.

Overall, creating an animatic for tracked footage is a crucial step in the VFX pipeline that helps ensure that the final shot looks realistic and seamless, and meets the vision of the director and the production team.

Assets

The asset creation stage is essential in the VFX pipeline. It involves creating 3D elements such as character models, props, background assets, mesh additions to live-action objects, and textures that resemble the live-action footage as closely as possible.

Industry standard software options for asset creation include Autodesk Maya, Blender, Zbrush, Substance Painter, Mari, and others.

Asset creation requires a blend of technical and creative expertise, and the 3D assets produced must be of the highest standard to ensure seamless integration with the live-action footage. Unlike most video game assets, film assets may only need to look good from one angle, but they still need some flexibility in case of changes. Understanding the final shots can optimise the asset creation process, for example an asset that will never be close to the camera may often be made to a lower quality than close-up assets.

Lighting

The lighting stage is an important step towards creating a realistic and believable link between your digital 3D elements and the live-action footage. It involves using various techniques to mimic the lighting from the live-action footage, so that the digital 3D elements appear lit in the same way, creating the illusion that they are sharing a physical space.

HDRI lighting is an important technique used in lighting. HDRI stands for High Dynamic Range Imaging. This technique involves capturing a series of photographs of the environment while shooting the live-action footage. With these photographs, the user can stitch together a 360-degree panorama of the environment.

The panorama can be used as a lighting source in the 3D software, allowing the digital 3D elements to be lit by the same lighting environment as the live-action footage. The user can then extrapolate any lighting sources from the footage and supplement the HDRI by manually placing extra lights.

Another important aspect of lighting in VFX is matching the lighting in the 3D scene to the lighting in the live-action footage. This can be done using Macbeth charts and reflective spheres with different material values. A Macbeth chart is a colour chart used for colour calibration in photography and film. The spheres are used for material and lighting calibration reference.

By placing a Macbeth chart in the live-action footage and then matching the colours in the 3D software to the colours in the chart, the lighting in the digital scene can be adjusted to match the lighting in the live-action footage. It is crucial to match the lighting in the digital 3D scene to the lighting in the live-action footage to create a realistic and seamless composite. This involves paying attention to the direction of the lighting, the colour and intensity of the lighting, and the shadows and reflections in the scene. A mismatch in lighting can cause the 3D elements to appear disconnected from the live-action footage, undermining the believability of the VFX.



Rendering

Rendering is the step in the VFX pipeline where we gather all our assets, such as lighting, look development, animation, and more, and combine them into a unified rendering environment to make the high-quality renders/image sequences needed to construct the final image. This process is usually performed on a render farm, where the different render jobs are distributed across different dedicated servers. This is needed because, in contrast to real-time rendering, offline rendering takes a significant amount of time.

There are different software options available for rendering, such as V-ray, Arnold, Karma, Blender Cycles, and Octane. The choice of a rendering package that is most appropriate for your needs depends on the particular 3D software package you are using. For example, V-ray and Arnold are usually used in conjunction with Maya, Blender Cycles and/or Octane are used with Blender, and Karma is used with Houdini.

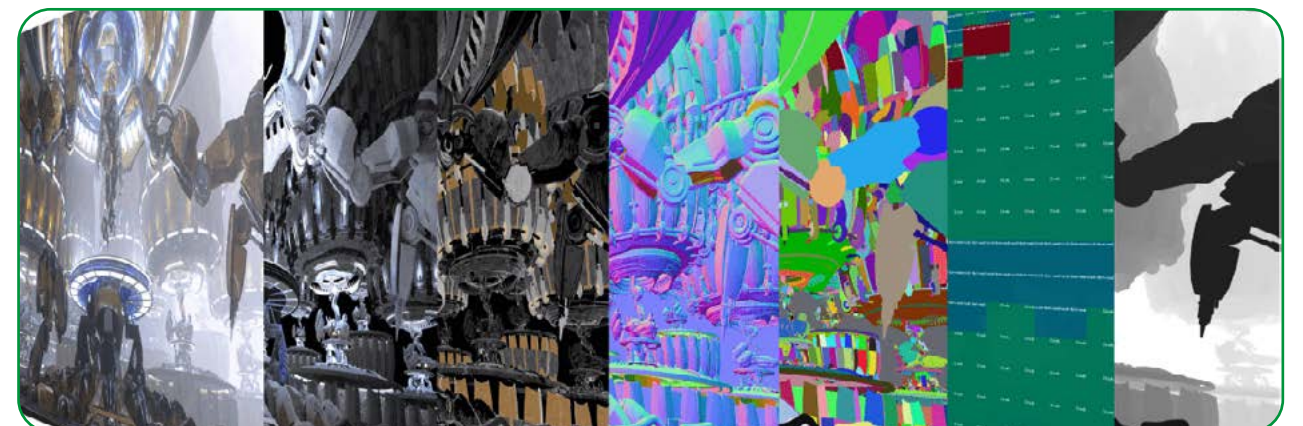
There are many ways to go about the render portion of the project, and it is important to know which aspects of your render will need to be edited during compositing. A 3D render comprises many different elements, such as albedo, specular, roughness, metallic, shadow passes, indirect illumination, ambient occlusion, normals, z-depth, and so on. These are commonly referred to as render passes, and/or cryptomattes.

Some of these render passes are individually authored through the use of materials and textures, and some are automatically calculated at render time, and are a way to store 3D-information.

Cryptomatte

Cryptomatte is an open-source plugin that outputs ID representations of a 3D scene, to create image masks for 3D objects. They are supported by most render engines and compositing software.

The program itself calculates an ID matte of a scene that can create, for example, image masks for single or multiple objects in the scene. The ID matte has a very distinctive look and itself is sometimes referred to as cryptomatte. These cryptomatte images are often very colourful, due to assigning each object or material a different random colour. The program creates mattes that support motion blur, transparency and depth of field using data that is already available at render time.



Compositing

Compositing is the step in the VFX pipeline, where all the different elements are assembled to create the final image. This process involves combining visual elements from different sources, such as live-action footage, rendered CGI footage, and other post-processing effects, to assemble the final shot.

Compositing is the stage in the VFX pipeline where all the different elements come together, created in various departments such as modelling, texturing, animation, and lighting, and, of course, the live-action footage. Compositing is the discipline of blending all these individual components together to assemble a believable final image.

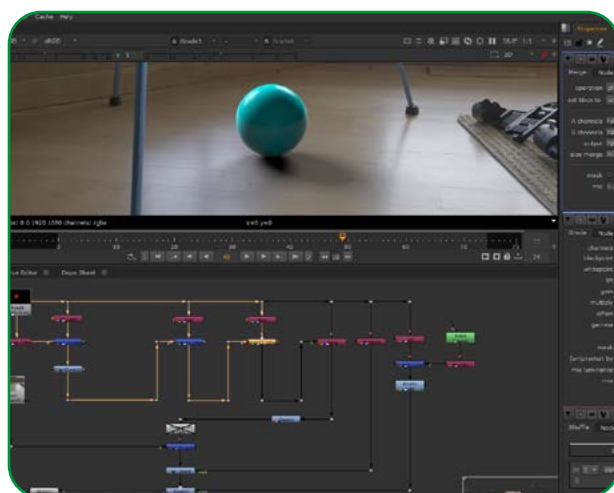
There are different software options available for compositing. The most popular ones include Nuke, After Effects, Fusion, and Flame. Nuke, with its node-based workflow, is the industry standard, and allows for complex and advanced compositing.

After Effects is also very popular and is often used for simpler composites and motion graphics.

Fusion, which is part of the DaVinci suite, is a more affordable alternative to Nuke, and just like Nuke it has a node-based workflow.

And finally, you have Flame, which is an all-in-one VFX solution, with compositing being one of its main features.

The general workflow for compositing involves importing all your different elements, for example your render passes, live-action footage sequences, and so on. The next step is to arrange them all together in a layering system, which allows us to blend them together with the various tools in your compositing software. As such, the aim of the compositing artist is to ensure all these separate elements blend together seamlessly, while keeping realism and believability intact.



Soundscape Design

A film soundscape, also known as a film sound design or simply film sound, refers to the collective use of sound in a film to create a specific audio environment or atmosphere that complements the visuals and narrative of the story. It involves the creation, selection, and integration of various sound elements, such as dialogue, music, sound effects, and ambient sound, to enhance the emotional impact of a scene and convey a sense of space, time, and mood.

A film soundscape is an integral part of the post-production process and is usually created by a team of sound designers, composers, editors, and mixers and mastering engineers. They work closely with the director and the editor to ensure that the sound complements and enhances the visuals, and that it is in sync with the pacing and rhythm of the film. The sound elements are mixed together to create a cohesive and immersive audio experience for the audience.

Sound Layers

Soundscapes are a group of sound layers. They can include voice, sound effects, ambient noise, and music. Each layer is typically recorded, edited, and mixed separately to create a cohesive sound mix for the final film. By layering these different sounds together, filmmakers can create a rich and immersive sound experience for the audience.

Voice: This is the spoken words of the characters or narrator, usually recorded on set or in a studio during post-production.

Sound effects (SFX): These are sounds that are added to enhance the visuals and provide a sense of realism. Examples include footsteps, gunshots, and explosions.

Ambience: This layer provides the background noise of the setting, such as traffic, birds, or people talking.

Music: This is the score or soundtrack of the film, which can be composed specifically for the film or selected from existing music.



Image credit: Freepik

Sound Mixing

To create a cohesive and immersive soundscape that enhances the storytelling and emotional impact of the film, sound layers need to be mixed. The sound layers are imported into a digital audio workstation (DAW), where they can be arranged, manipulated, and mixed together. The sound mixer will adjust the levels, panning, EQ, and other effects of each individual sound element to create a balanced and effective mix.

The mix is typically created in several stages, starting with a rough mix, which provides an initial balance of the various sound elements. This is followed by a series of refinements and adjustments, often involving feedback from the director, until the final mix is complete.

Finally, the finished mix is exported from the DAW and integrated back into the film’s final edit. The result is a fully realized sound design that enhances the visual storytelling and creates a more immersive and engaging viewing experience for the audience.

Balancing

In a balanced sound mix, all of the sound elements, including dialogue, music, and sound effects, are mixed together at appropriate levels so that they complement each other and create a cohesive listening experience for the audience. The different sound elements are carefully balanced and mixed to ensure that no single element overpowers the others.

In contrast, an unbalanced sound mix can result in certain elements being too loud or too soft in relation to the other elements. This can be distracting for the audience and detract from their overall experience of the film, but it can also be used for artistic emphasis by intentionally making certain elements of the audio louder or quieter than others to create a specific emotional or narrative effect. For example, in a horror movie, the sound of a character’s breathing or footsteps may be emphasised and made louder to create a sense of tension and suspense. In an action movie, the sound of explosions and gunshots may be emphasised to make the scene more intense.

Unbalanced sound can also be used to create a sense of disorientation or confusion, such as in a dream sequence or a scene depicting a character’s mental state. By manipulating the balance of different audio elements, the viewer can be made to feel disoriented or emotionally overwhelmed, adding to the impact of the scene.

In contrast, a balanced sound mix aims to present all audio elements at an equal level, allowing the viewer to focus on the dialogue and other important sounds without being distracted by overly loud or quiet elements. A balanced mix is typically used in more traditional narrative films or documentaries where the goal is to present the story in a clear and straightforward manner.

Concepts

On-screen	Off-screen	Diegetic	Non-diegetic
On-screen sound refers to any sound that is source is physically present within the scene being shown on the screen. For example, if a character is speaking and their voice can be heard, that would be considered on-screen sound.	Off-screen sound, on the other hand, refers to any sound that is source is not physically present within the scene being shown on the screen but is still part of the overall soundscape of the film. This can include things like sound effects, or dialogue that is heard but not seen.	Diegetic sound refers to sound that originates from a source within the world of the film or scene. For example, a character talking, footsteps, or a car honking are all examples of diegetic sound. These sounds are heard by the characters on-screen and are part of the scene’s reality.	Non-diegetic sound, on the other hand, refers to sound that is added to the film for dramatic or storytelling effect and is not part of the scene’s reality. Examples of non-diegetic sound include background music, voiceovers, or sound effects that are added for emotional impact, tension, or atmosphere.

Designing a Soundscape

Typically, before the design soundscape for a scene is its advised to watch it multiple times, paying close attention to the visuals and mood of the scene, and we advise the following process.

- **Diegetic sounds:** Identify all key diegetic sounds that are already present in the scene, such as dialogue, sound effects, and background noise, consider on and off-screen sounds.
- **Add additional sounds:** Decide which additional sounds you want to include in the soundscape. This could be ambient noise, music, or sound effects that are not present in the original footage.
- **Spatial location:** Use panning and spatialisation to create a sense of depth and directionality in the soundscape or use the sense of perspective. For example, you can pan a sound from left to right to create the illusion of movement, or the volume of a sound layer decreasing when object is moving away from the camera.
- **Non-diegetic sounds:** Consider adding the emotional impact by adding sound effects and/or music. For example, you might use eerie sounds to create a sense of tension and suspense, or calming sounds to create a sense of relaxation and tranquillity.
- **Experiment with the levels:** Adjust the levels of the sounds to create a balanced soundscape. You want to make sure that the sounds are clear and audible, but not overwhelming or distracting.
- **Test and refine:** Finally, test the soundscape in context with the visuals and refine it as necessary until you achieve the desired effect.

Voice

Speech is a fundamental aspect of human communication, allowing individuals to convey their thoughts, feelings, and ideas to others. It is a complex process that involves the coordinated movements of various muscles, including those involved in respiration, phonation (i.e., the production of sound), and articulation (i.e., the shaping of sound into meaningful speech sounds).

In addition to conveying information, speech can also convey social and emotional meaning, such as tone of voice, emphasis, and other non-verbal cues. This allows individuals to express their emotions, establish relationships, and navigate complex social interactions.

Monologues and Dialogue

Monologues and dialogues play an important role in sound design by conveying information, emotions, and characterization to the audience.

In the case of monologues, a character speaks aloud, either to themselves or to the audience, conveying their thoughts, feelings, or inner conflict. The sound design for monologues can help to create a sense of intimacy, closeness, or even claustrophobia by using close-up or intimate microphone techniques. The use of reverb or other effects can also help to reinforce the character's emotional state or the environment they are in.

Dialogues, on the other hand, involve a conversation or exchange between two or more characters. Sound design for dialogues is crucial for ensuring that the audience can hear and understand what is being said. Proper use of microphone placement, EQ, and volume levels can help to create a sense of space and perspective and convey important details about the characters and their relationships with one another.

In both cases, sound design can also be used to enhance the emotional impact of the performance. The use of music, sound effects, and other audio elements can help to underscore or counterpoint the emotional content of the dialogue or monologue, creating a richer and more immersive experience for the audience.

Narration

Narration is a technique used to convey information to the audience through a spoken commentary. It can be used to provide exposition, clarify complex ideas, and guide the audience's emotional responses.

Narration is often used in documentaries to provide context or background information, or to offer insights into the story being told. It can also be used in feature films to provide voice-over commentary, or to convey the inner thoughts of a character.

Narration can be delivered by an on-screen character, or it can be provided by a voice-over artist. The tone and style of the narration can vary depending on the film's genre and the intended audience. Some films use narration sparingly, while others rely heavily on it to tell the story.

Narration can create interesting artistic and creative style, it is a non-diegetic sound (except when there is a 4th wall disruption), and can be an effective storytelling tool, but it can also be overused or poorly executed. A good narrator should be clear, engaging, and able to convey the intended tone of the film. The narration should also complement the other elements of the film, including the visuals, sound effects, and music. When used effectively, narration can enhance the overall impact of a film and provide the audience with a deeper understanding of the story being told.

ADR – Automatic Dialogue Replacement

ADR is a technique used in post-production to re-record dialogue for a film or television show. This is done when the original dialogue recorded on set is unusable due to poor audio quality, background noise, or other technical issues.

During ADR, the actor watches the footage and records their lines in a sound booth, syncing their performance to match the lip movements of the on-screen character. This new recording is then edited into the film to replace the original dialogue. ADR is often used to fix minor errors in dialogue but can also be used for entire scenes or performances if necessary.

ADR can also be used for creative purposes, such as adding dialogue or changing the meaning of a line after filming has wrapped. In some cases, entire performances may be recorded in ADR, either to match the lip movements of a foreign-language version of the film or to achieve a specific vocal effect.

LED walls and computer studio noise can affect the quality of voice recording during filming. LED walls are essentially large displays that use LED technology to create visual backgrounds in a studio. While they offer many benefits, including the ability to create realistic lighting and backgrounds, they can create unwanted reflections and sound reflections that affect the quality of the audio recording.

To mitigate these issues, sound engineers and filmmakers may use various techniques, including using directional microphones, adjusting the placement of the microphone, and using noise-reducing software during post-production. Additionally, they may use soundproofing materials in the studio or recording booth to prevent outside noise from entering the recording environment, still sometimes ADR is required.



Sound Effects

Sound effects play a crucial role in film soundscape as they help to create a realistic and immersive auditory environment for the audience. They can be used to enhance the natural sounds that occur within a scene, such as footsteps, or they can be used to create entirely new sounds that help to convey a certain emotion or atmosphere. Overall, sound effects are an important tool in film sound design, helping to bring the visuals to life and create a more immersive and engaging cinematic experience for the audience.

Examples of sound effects that may be used in film sound design include nature or animal noises, ambience, but also explosions, gunshots, car crashes, and weather sounds like thunder or rain. Sound effects can also be used to create otherworldly or supernatural sounds, like the roar of a dragon or the hum of a UFO.

Sound as Information

Sound effects is often a source of information to the spectator, providing information which is often missing in the footage to build the bridge between shots, and can also be used as a way to create tension and anticipation for the viewer. They enhance the visual storytelling by adding a layer of sonic information that supports the visuals and immerses the viewer into the film's world. For example, the sound of a door opening and closing can provide information about a character's entrance or exit from a room, or the sound of footsteps can indicate movement or create a sense of suspense.

Sound effects can also create anticipation by setting up expectations for what is going to happen on screen. For example, a low rumbling sound can foreshadow an impending disaster, or the sound of a ticking clock can create tension and build suspense. Sound effects can also add emotional impact to a scene, such as the sound of a gunshot or explosion, which can create a feeling of shock or fear.

Foley

Foley is the process of creating and recording sound effects in a studio that are synchronized with the actions on screen. Foley artists use a variety of props and surfaces to mimic the sounds of footsteps, clothes rustling, objects being handled, and other sounds that are difficult to capture on set.

The term "Foley" comes from its creator, Jack Foley, who developed the technique in the early days of sound cinema. Foley artists perform their work in a special sound studio, where they watch the film and create the sounds live while recording them with specialized microphones. The resulting sounds are then edited and mixed with other elements of the soundtrack to create a final mix.

Foley is an important part of film sound design as it helps to create a more immersive and realistic sound environment for the audience. The sounds created through Foley can add a level of detail and texture to a film that would be difficult or impossible to achieve through traditional sound recording techniques. Foley artists are skilled in creating sound effects that not only match the actions on screen but also help to enhance the emotional impact of a scene.

Music

Music can be a powerful tool for enhancing the emotional impact and storytelling of a film and should be considered an important part of the soundscaping process. Music can be used in different ways in soundscaping. It can be used as a standalone element, or it can be integrated with other sound effects and dialogue. It can also be used to transition between different scenes or to signal changes in the narrative.

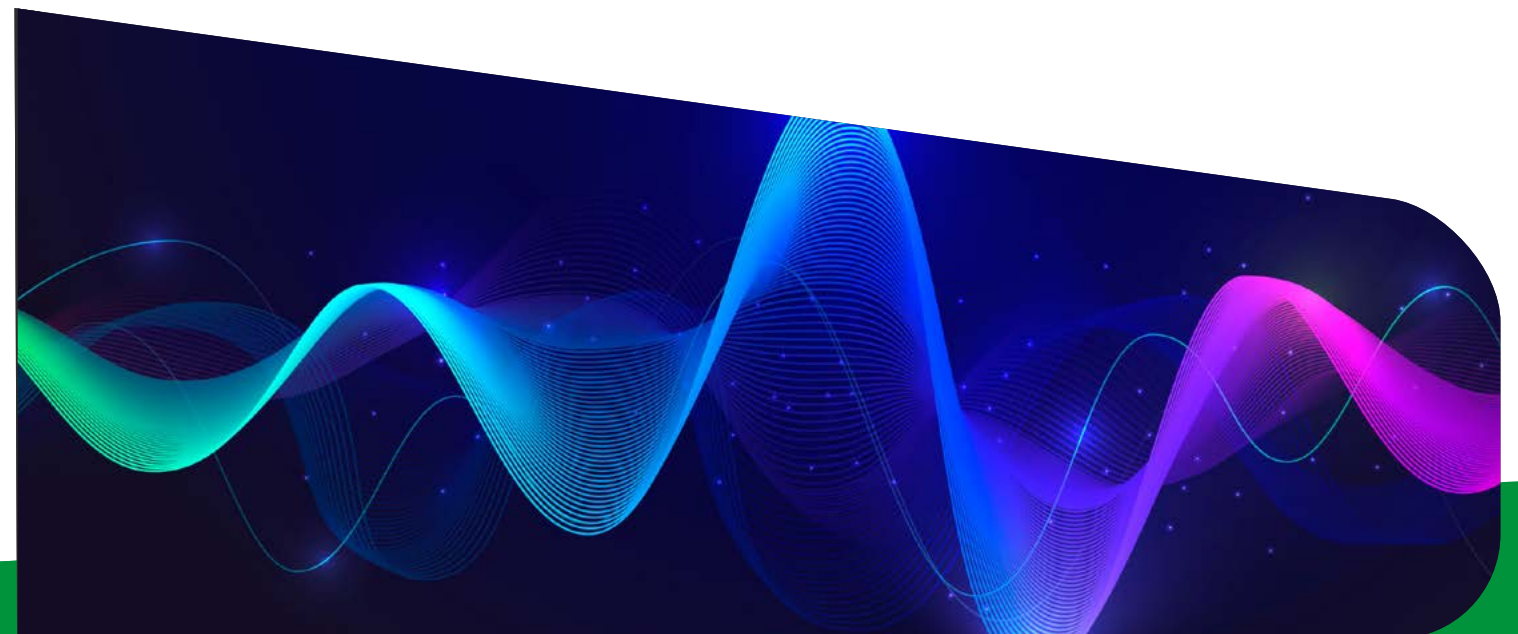
In addition, the choice of music can also help to establish the time period, location, or cultural context of a scene. For example, using traditional music from a specific region can help to establish the location or culture, while using music from a particular time period can help to create a sense of history or nostalgia.

Major and Minor Scales

In music theory, the concept of major and minor scales refers to the arrangement of notes within a particular key. Major scales have a bright and upbeat sound, while minor scales have a more sombre and melancholy feel. When selecting music for a film, the use of major and minor scales can be a powerful tool in shaping the emotional tone of a scene.

For example, a scene depicting a joyous event such as a wedding or graduation might be accompanied by music in a major key, conveying a sense of celebration and happiness. Conversely, a scene depicting a tragic event such as a funeral or a serious illness might be accompanied by music in a minor key, conveying a sense of sadness and mourning.

Of course, the use of major and minor scales is just one factor to consider when selecting music for a film. Other factors, such as tempo, instrumentation, and genre, can also play a role in shaping the emotional tone of a scene. Ultimately, the goal of soundscaping with music is to enhance the emotional impact of a film, and the selection of music should be made with this in mind.



Instrument Types

Piano The piano is often associated with elegance, sophistication, and class. It can evoke a wide range of emotions, from sadness and melancholy to joy and excitement. 	Violin The violin is often associated with romance, passion, and intensity. It is commonly used in classical music but can also be heard in other genres like country, folk, and rock. 	Guitar The guitar is one of the most versatile instruments and can be used in almost any genre of music. It is often associated with youthfulness, rebellion, and freedom. 
Brass Brass instruments are often associated with power, celebration, and victory, but are also often associated with sensuality, romance, and bluesy melodies. It is commonly used in jazz and classical music. 	Flute The flute is often associated with beauty, tranquillity, and nature. It is commonly used in classical music but can also be heard in folk and world music. 	Drums The drums are often associated with energy, excitement, and rhythm. They are commonly used in rock, pop, and hip-hop music. 

It's important to note that these associations can vary based on cultural context and bias.

Tempo & Volume

Tempo and volume are two important elements in music that contribute to the emotional impact and overall feel of a piece of music. They can be adjusted and manipulated by a composer or sound designer to enhance the emotional impact of a scene or to create a specific atmosphere or mood.

Tempo refers to the speed or pace of a musical composition. It can range from slow and relaxed to fast and energetic. A slower tempo can create a feeling of calmness and tranquillity, while a faster tempo can evoke excitement or even anxiety. The tempo of a piece can also be used to match the pacing of a scene in a film or video, creating a more cohesive overall effect.

Volume, on the other hand, refers to the loudness or softness of the music. It can be used to create a sense of tension or drama, as well as to create contrast between different sections of a piece. A sudden increase in volume, for example, can be used to create a sense of surprise or to draw attention to a particular moment in a scene.

Besides tempo and volume, other properties of music that can convey emotional impact include:

Melody: The melody of a piece of music can evoke certain emotions depending on its complexity, range, and pitch.

Harmony: Harmony refers to the chords and progression of the music. The use of major or minor chords, for example, can convey different emotions.

Timbre: Timbre refers to the tone colour or quality of sound of an instrument or voice. Different instruments and voices have their unique timbres, which can evoke specific emotional responses.

Rhythm: Rhythm refers to the pattern of notes and beats in the music. The use of syncopation, for example, can create tension or excitement.

Lyrics: If a piece of music has lyrics, the words and their meaning can convey emotions.

Musical structure: The structure of a piece of music, such as the use of repetition, can evoke certain emotions.

All of these elements work together to create the emotional impact of a piece of music, and they can be manipulated by the composer or music supervisor to achieve a specific emotional effect in a film or other media.

Virtual Production Studio Network

The Virtual Production Workshop Manual Series was created by Breda University of Applied Sciences within the scope of the VPSN ERASMUS+ Project.

Virtual Production Studio Network (VPSN) aims to connect creatives and technical professionals, focusing on Virtual Production within the media industry and associated educational frameworks.

Our objective is to foster a deeper understanding of the impact of Virtual Production, set up learning frameworks, host hands-on workshops for educators and students, and create educational materials for Virtual Production expertise.



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Credits

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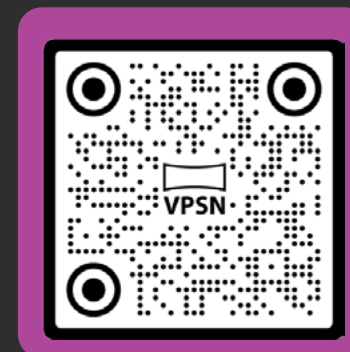
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