

# Video Production summary

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# Video Production



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# Introduction



- Movie and TV production has been a multimillion industry for decades now, with big studios investing large amounts of money in this area of mass media entertainment.
- With today's high-quality gear, video productions can be made with equipment ranging from professional filming standards to low-cost consumer items.
- It all comes down to a foundational “know-how”. Knowing how to handle the equipment properly and effectively or how to organize your ideas and convey them convincingly.

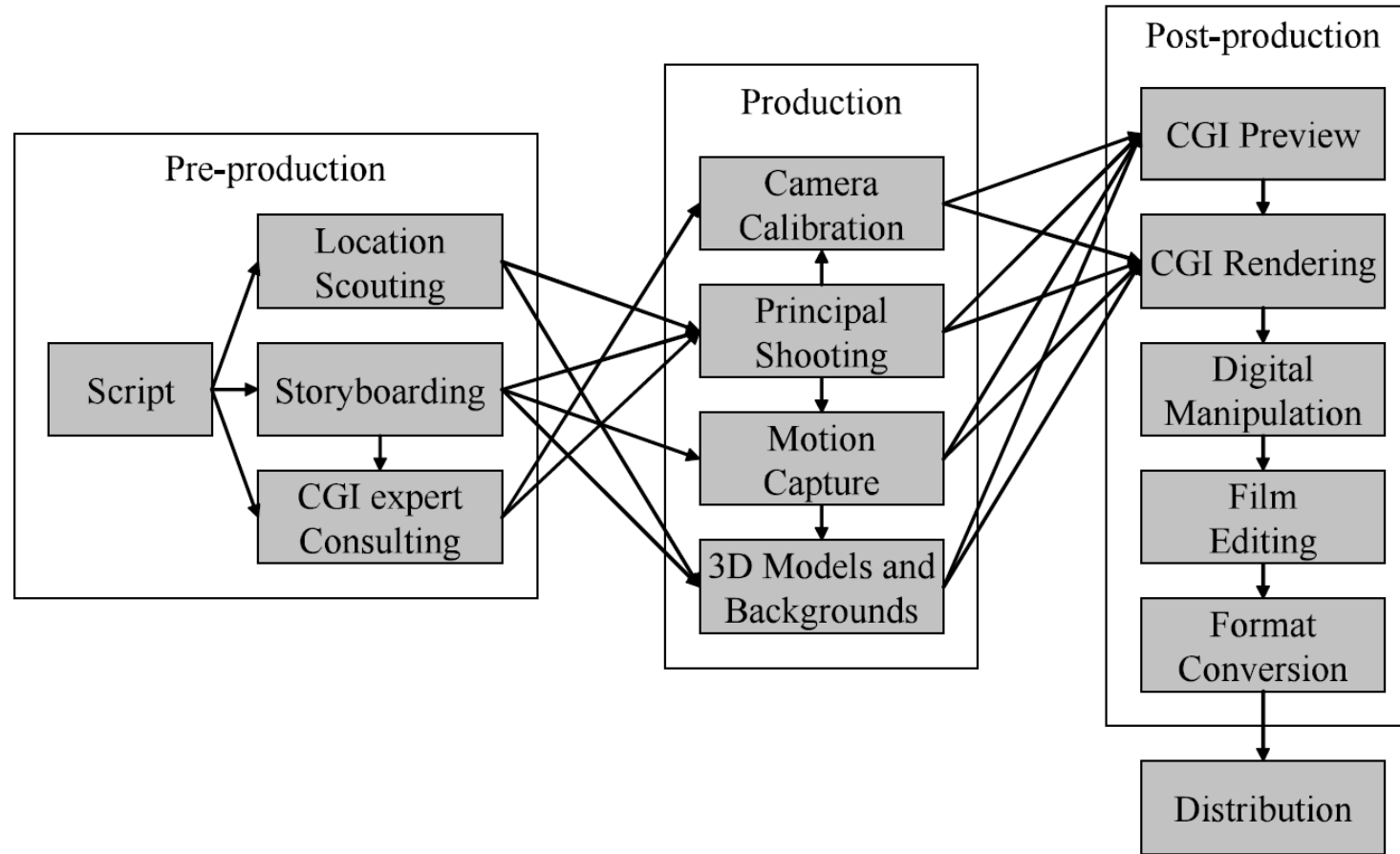
# Introduction



- Equivalently, at an early stage of the production, questions regarding the main purpose of the movie/program or the intended audience, must have been settled.
- The three basic stages of a production process are:
  - **Pre-Production:** The necessary preparations to be made before shooting starts.
  - **Production:** Covers the actual shooting of the movie combined with audio recordings, practical effects etc.
  - **Post-Production:** Includes the digital process of the film using CGI/visual effects or color-grading and ultimately the editing.



# Introduction



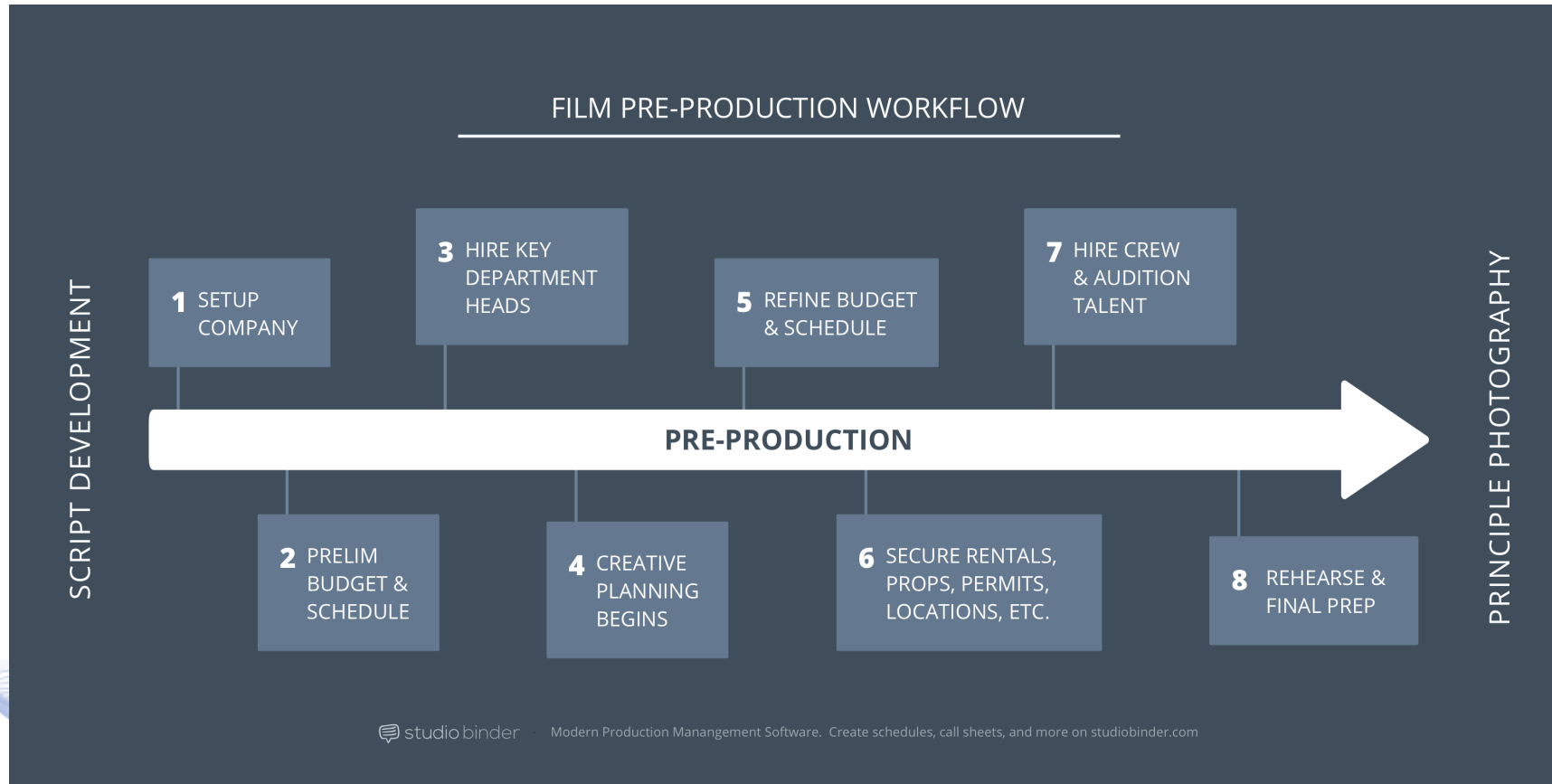
(1.1) Pitas, Video Production (chapter)

# Pre-production



- Pre-production phase starts by gathering the preliminary budget and subsequently hiring the principal heads of the crew (director, cinematographer, production designer etc.)
- A schedule must be arranged for the crew to follow and avoid costly overruns which affect the budget.
- Screenplay is finalized and converted into a shooting script accompanied with storyboards, that serve as a reference when filming.
- Scenery sets are built and filming locations are selected as backgrounds for the shooting.

# Pre-production



(2.1) Arnon Shorr, How to Produce a Movie: The Pre-Production Process Explained

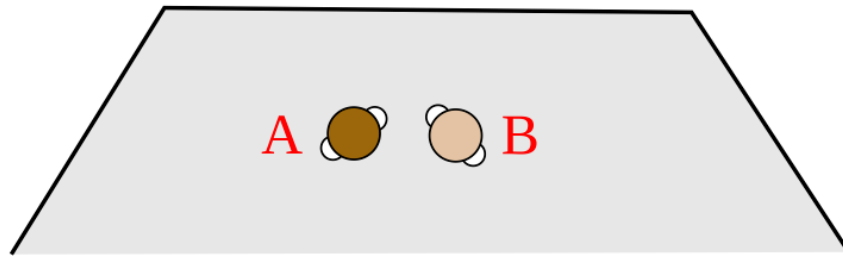
# Production



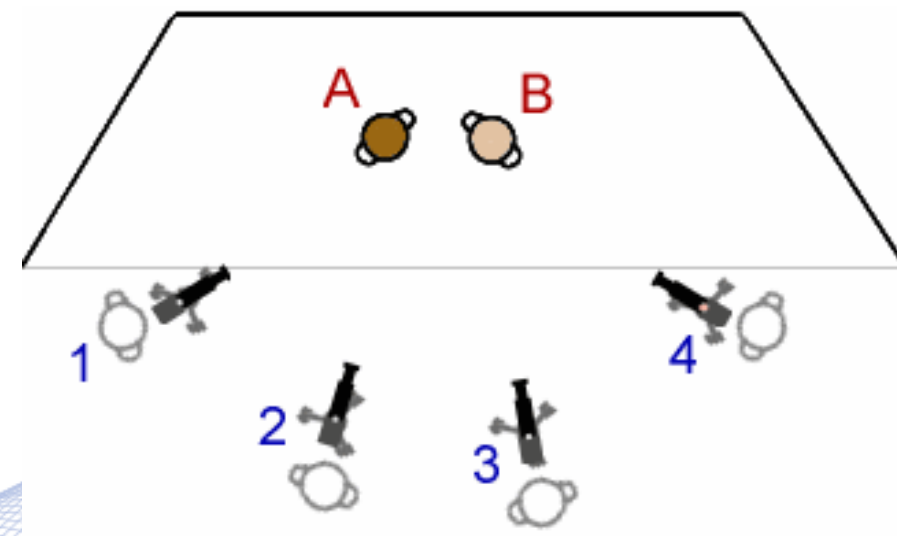
- Also known as, principal shooting, is the stage where camera records the actual footage of the movie.
- There is an abundance of techniques that can be implemented in this stage in order to capture the desired product.
- The two main options for shooting a video production are:
  - **Single-camera** production, in which one camera is used to shoot the show.
  - **Multicamera** production, in which two, three, or more cameras are linked, and their outputs are selected or edited in post-production.



# Production



(3.1) Wikipedia, Single-camera setup



(3.2) Wikipedia, Multiple-camera setup

# Production



(3.3) Camera mounted onto tripod



(3.4) Camera moving on railed tracks (Dolly shot)



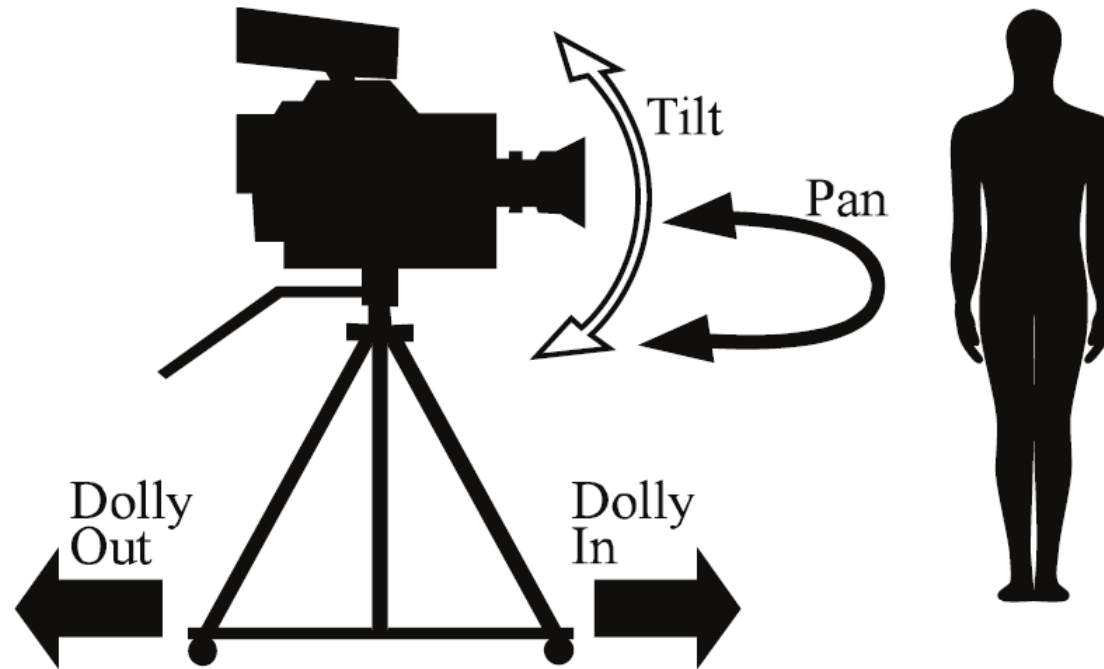
(3.5) Camera stabilizer vest

# Production



- There are six degrees of freedom, in which a camera can move and by that the terminology used is:
  - **Pan**, when the camera is moving left or right in place.
  - **Tilt**, when moving the camera viewpoint up or down without shifting the mounting.
  - **Dolly**, the smooth camera motion in a straight line on the horizontal plane (usually achieved with railed tracks system).
  - **Truck**, when the camera moves in orbit around an actor.

# Production



(3.6) Camera movements

# Production



- Changes in the **camera lenses** can also affect a camera shot.
- Modifying the camera **zoom** (magnification factor) can either enlarge the image (*zoom-in*) or narrow it (*zoom-out*).
- Also, changing the focal length can affect the *focus* of the shot.



(3.7) Focus pull technique (changing the focal length)

# Production



- **Point of view (POV)** shot, captured from the perspective of the subject (first person perspective). The camera acts as the eyes of the character.
- **Over-the-shoulder** shot, is placed just behind an "off-screen" actor so that their shoulder is shown. Usually, it serves as a signal of understanding between the two characters and helps to orient the viewer.



(3.8) Wide shot (or long shot)



(3.9) Medium shot (or mid shot)



(3.10) Point of view (POV) shot

# Production

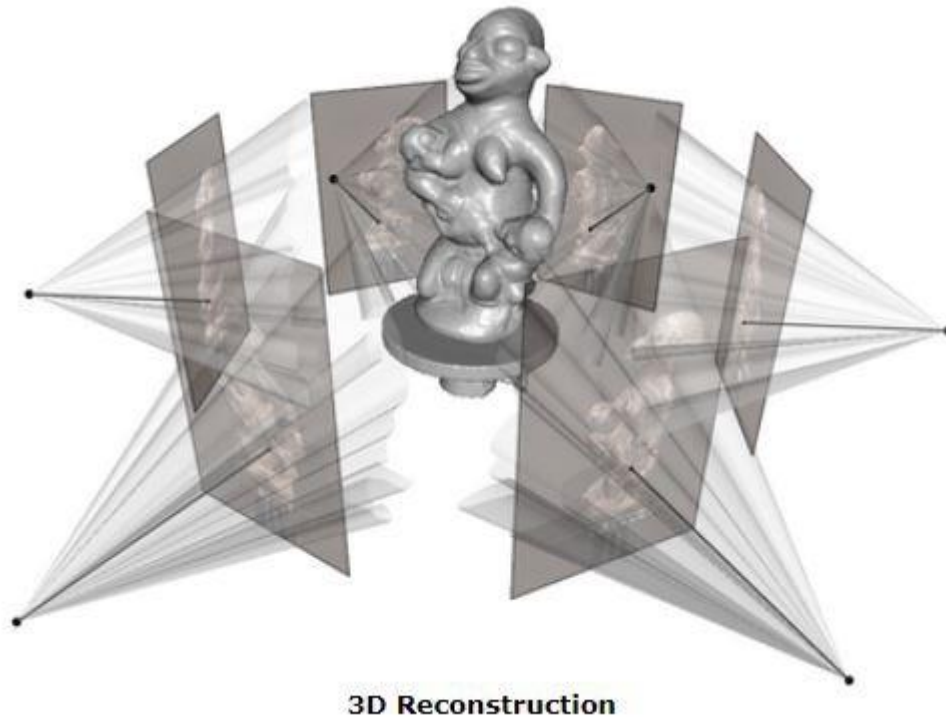


(3.12) Floodlight beam



(3.13) Spotlight beam

# Production



(3.13) Keenan James, 3D Reconstruction with Stereo Images



Telephoto image



Depth map

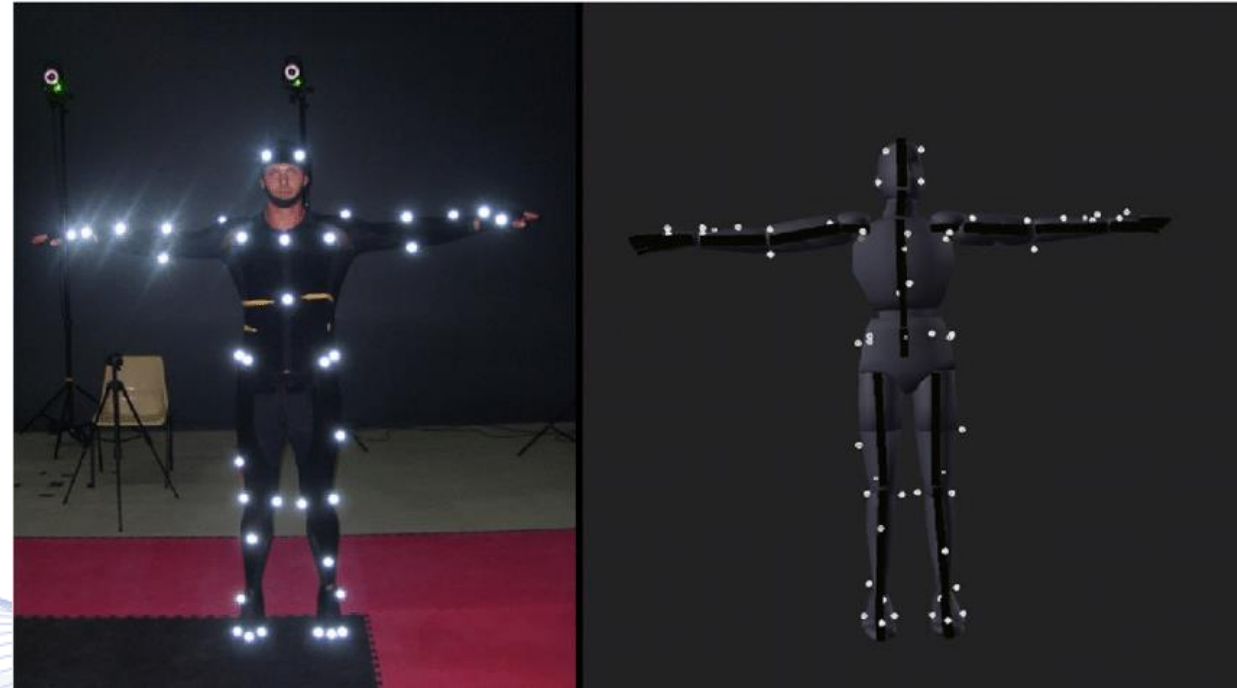
(3.14) Depth map image



# Production



(3.15) Magnetic system trackers



(3.16) Active visual markers

# Production



- Shot framing can be subject to several guidelines in order to train the AI model.



(3.17) “Avoid/minimize empty space”



(3.18) “Avoid cutting off tops of heads”

# Post-Production



- The final phase of the video production process is **post-production** and takes place after the principal shooting has been completed.
- In this stage, special effects are inserted, unwanted artifacts and reflections are removed, and colors are being corrected for the final product to be made.
- Also, the editing process takes place to combine the several shots taken in Production phase in a presentable way.
- If a film camera has been used in cinema production, the camera negative must be scanned and converted into a digital video for the above-mentioned tasks to be done.

# Post-Production

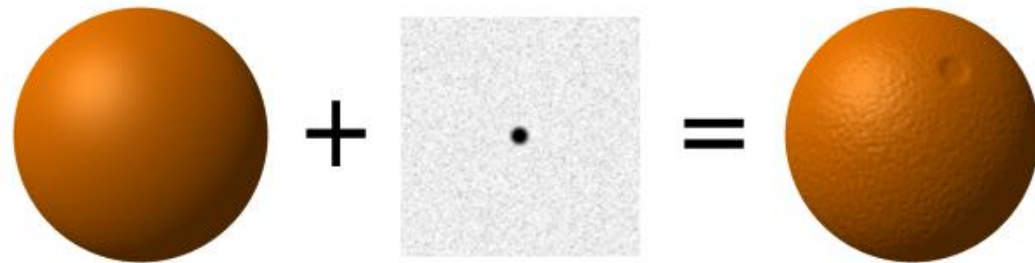


- **Computer Generated Imagery (CGI)** has been used extensively in movie and television productions for the past decades.
- Some of the **advantages** that CGI brought to the field are:
  - Composition of scenes that would be too expensive to shoot in real life.
  - Manipulation of camera views in otherwise impossible ways.
  - Bringing a movie closer to the director's vision by using beyond real-life effects and set pieces (prominent in Sci-Fi movies).
  - Convenience of shooting inside a studio rather than trying to find the real-life locations and having to transport all the production there to film.

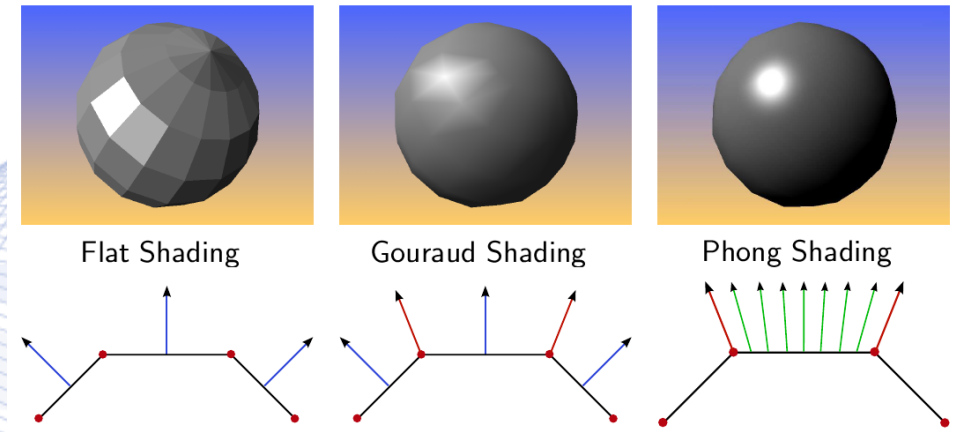
# Post-Production



- Basic elements of 3D models are **polygons** and **shading models**. However, in the last decades there has been numerous new techniques that improved computer graphics realistic aspect.
- Bump mapping added a more abrasive appearance on the objects and particle effects have evolved to realistically simulate things like smoke or explosions.



(4.1) “Bump mapping addition”



(4.2) “Shading models”

# Post-Production



- **Visual effects** (VFX) refers to manipulations of the video image material in order to change some of the content or its aesthetic value.
- For example, the use of green/blue screen in order to substitute the background of an image which replaces the monochrome background with a digital image of another location.

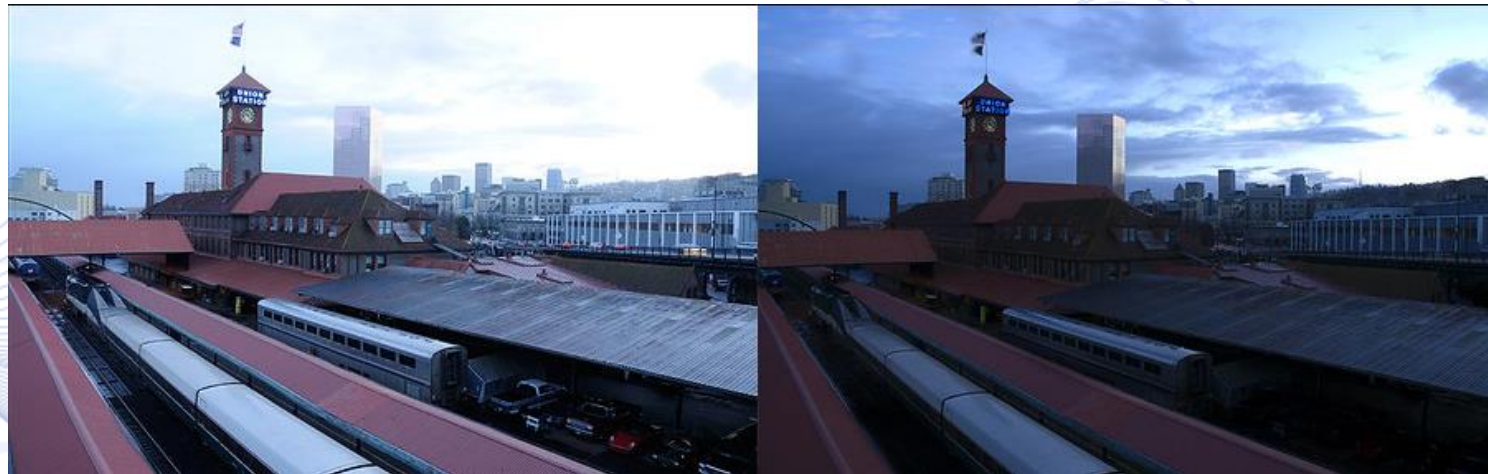


(4.3) “Blue screen substitute VFX”

# Post-Production



- **Retouching**, helps removing movie artifacts the are unwanted in the final product. Such artifacts can be problematic reflections, wires that show up on the frame and other things that maybe went unnoticed while shooting.
- Tonal range refers to the pixel intensity which varies from low (shadows) to high (highlights). Editing tonal range (**tone mapping**) through histogram results to the enhancing of image contrast.



(4.4) “Tone mapping”

# Post-Production



- **Color grading** (color correction) can be used to correct muted colors that wasn't correctly captured and, in that way, make the image look better.

For a given region  $S$ :

$$C_{new}(i, j) = C_{old}(i, j) + \frac{(\sum_{x_s \in S} [CN(x_t) - CN(x_s)])}{keyNumInS}$$

where,  $(i, j)$  is a pixel of the region  $S$ ,  $C_{old}(i, j)$  and  $C_{new}(i, j)$  are the color values before and after the color correction respectively,  $x_t$  and  $x_s$  are keypoints from the target and source image respectively (found by feature point detection techniques),  $keyNumInS$  are the total of keypoints in region  $S$  and finally  $CN()$  is the mean values of colors in a 3x3 neighbour.



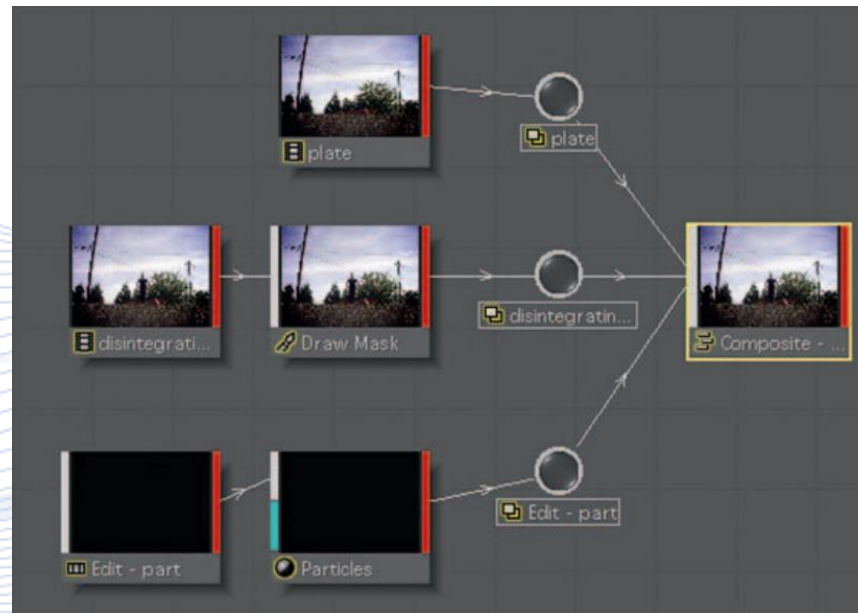
(4.5) “Color corrected image”



# Post-Production



- **Scene compositing** is the step where everything comes together, from CGI effects and objects to real world background shooting.
- The various parts of the composition lie separately in layers and each layer suggests, in consultation with the depth map, which one should be in front or how shadows will be cast.



(4.6) “Bill Byrne, Scene composition”

# Post-Production



- The last stage of post-production includes **editing** of the finished shots to produce the final cut of the movie.
- In order to avoid scenes that drag on and may bore the audience cuts must be made and there are several transition effects that may be of use. Most common transition effects are **Fade (In or Out)** and **Dissolve**, which can both be implemented as some combination of chromatic scaling operations.



(a) Fade In



(b) Fade Out



(c) Dissolve

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# Q & A

**Thank you very much for your attention!**

**More material in  
<http://icarus.csd.auth.gr/cvml-web-lecture-series/>**

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