

# Production Support Material: Planning and Development

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Computer Generated Imagery Tools



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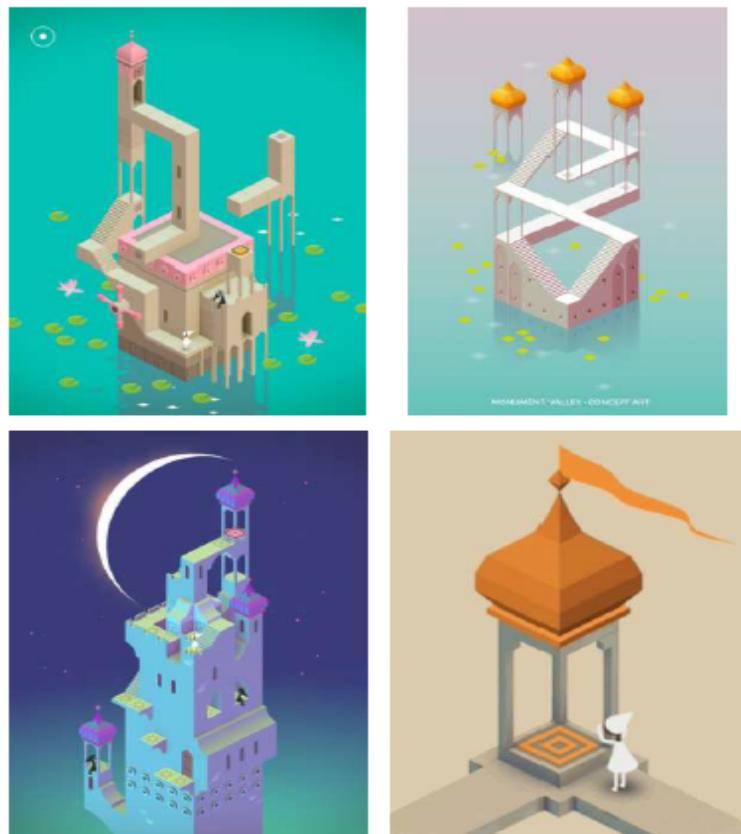
The project idea is to show the animation of a bouncing ball interacting with the model of an impossible construction.

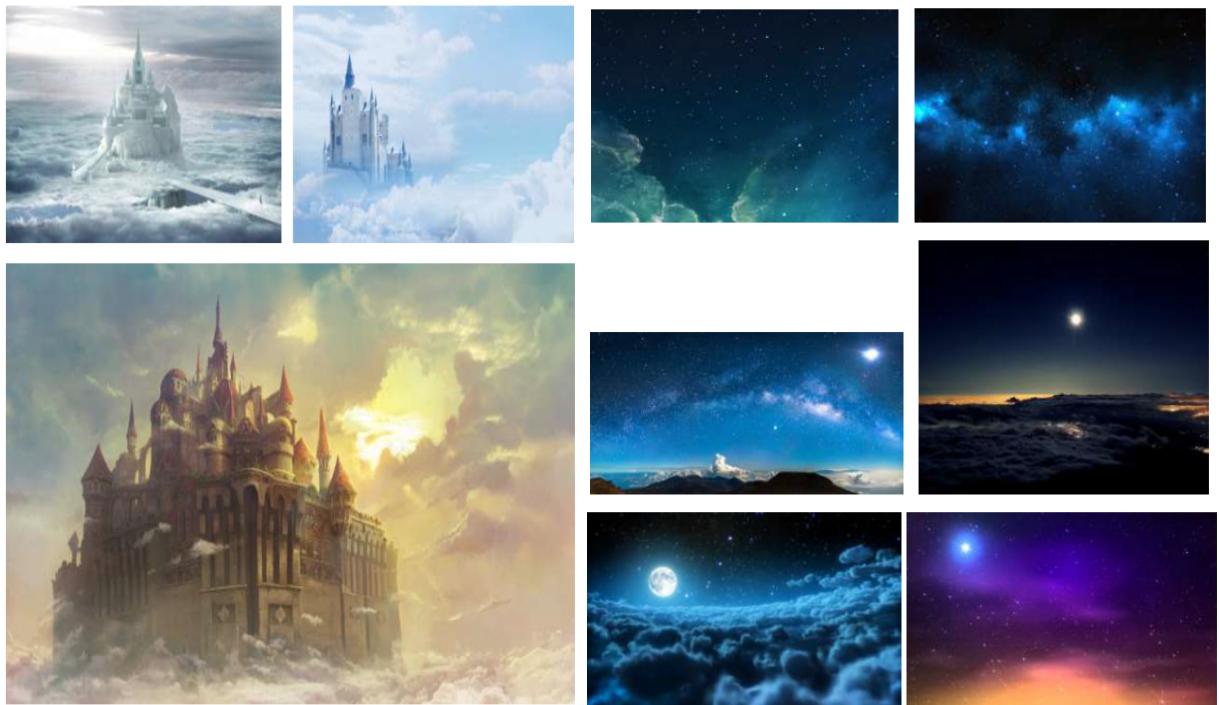
## 1. Artistic Aspects

### 1.1 Modelling

#### 1.1.1 Design Idea

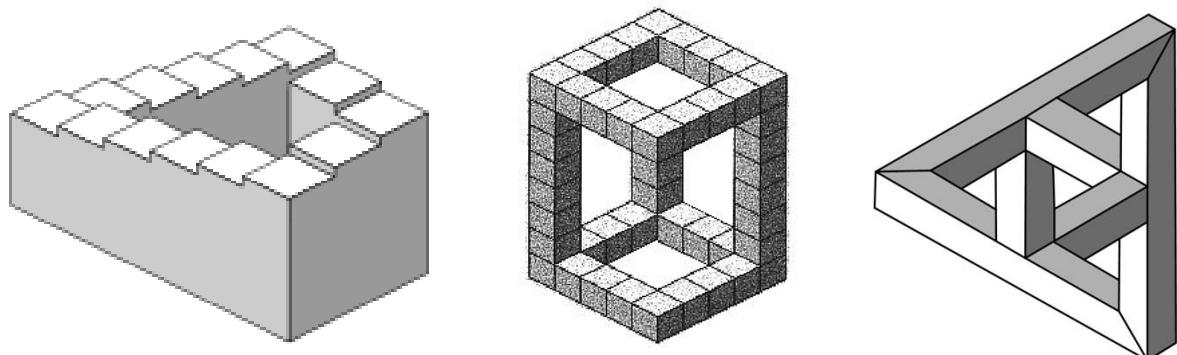
The base design is inspired from M.C. Escher's work used in the game '*Monument Valley*'. Model ideas from three different monuments are combined for the final construct with the entire scene set up in an extraterrestrial environment. The main base was kept almost similar to the original reference and the extended pathway and light pillars were added to give a more complete and broader look. It is designed to look like a celestial light tower with each tower holding a light bulb and the bulb for the main tower will be the ball to be animated. The clouds and starry backdrop is added to offer the ethereal ambience and appeal.





*Fig 1: References for model design, cloud castle and starry backdrop*

### 1.1.2 Impossible Construction



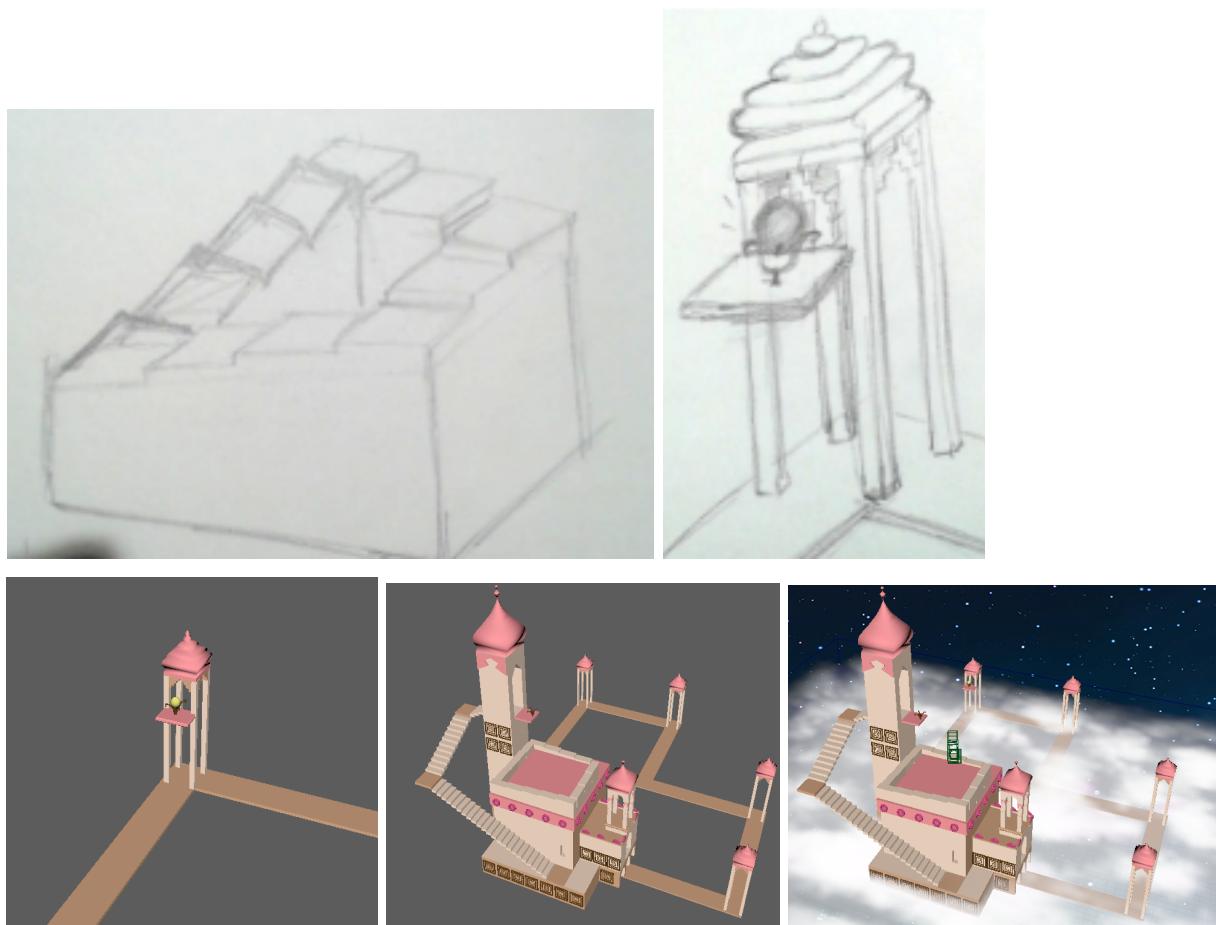
*Fig2: References for the impossible construction*

The original model reference uses an impossible square which was modified to include the impossible staircase. Impossible triangle was also a choice looked into but considering the animation of bouncing ball, staircase fitted better in terms of both the area for movement and visibility of action.

### 1.1.3 Implementation

The model once decided was hand sketched to check the view and placement of each part and was implemented likewise in Maya.

A bit of a conflicting decision was if to introduce fluid effects for clouds. Because of the difficulty in attaining the fluffy cloud like texture and the extensive render time required, clouds didn't seem a good idea. Decision to keep the clouds was based on the final image which was rendered both with and without clouds. Without clouds, the model simply appeared to be hanging in the air and the celestial appeal was missing.



*Fig 3: Implementation of design idea in pencil and in Maya*

## 1.2 Texturing

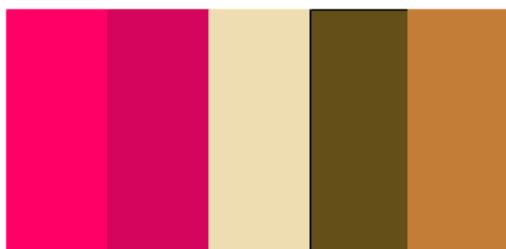
### 1.2.1 Color Palette

Having included the starry textured backdrop and clouds, the plan was to keep the model basic and natural. Simple, subtle and linear colors have been used taking note to bring out the gentle glow and shine during interaction of colors with light. Bright and high toned colors are avoided in order to maintain the soft textural balance and enhance the cumulative effect.

Choices considered:



Palette used:



## 1.3 Lighting

### 1.3.1 Ornamental Lights

Apart from main vray lights, additional sources of lights included are the light bulbs on the pillars. Though not very significantly lit light sources and used only as ornamental addons in the model, the bulbs are enabled to have self illumination property allowing diffused but visible emission of light (motivated by the works of Leonid Afremov).

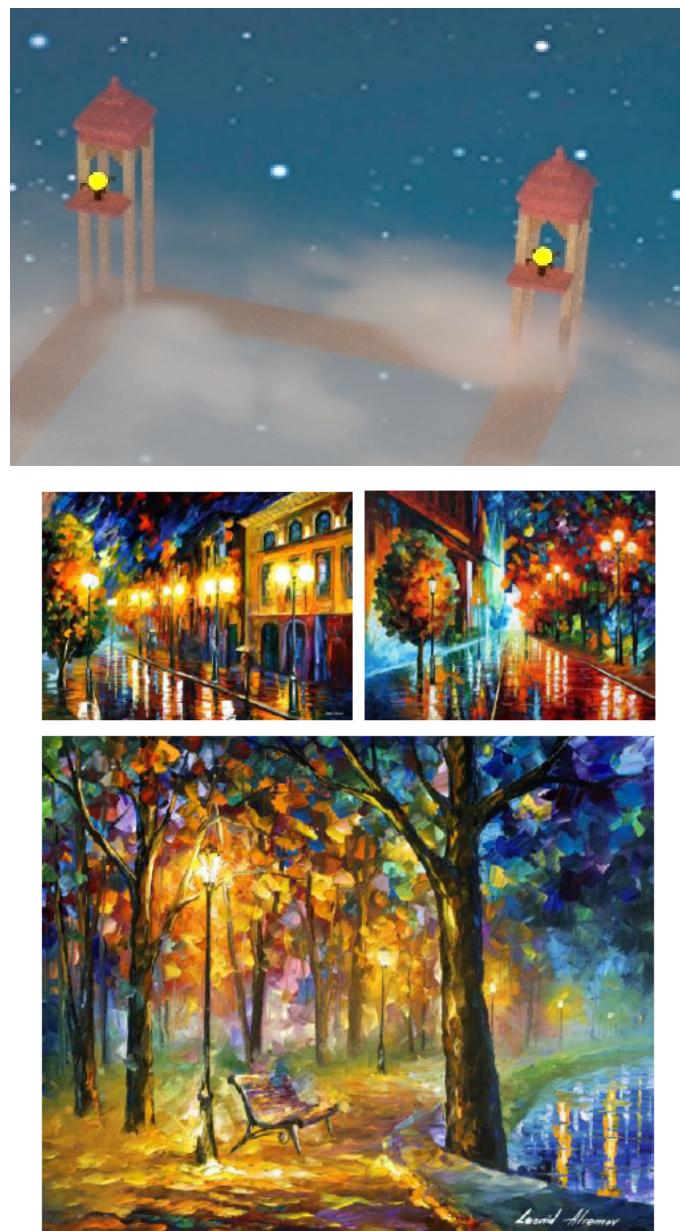


Fig 4: Light pillars inspired from works of Leonid Afremov

## 1.4 Ball Animation

Initially the idea was to start the ball movement from the light bulb of main tower, making it roll across the impossible staircase and jump over to one of the light pillars making the bulbs glow and finally freeze in space. The idea worked well but on closer examination certain problems were encountered with transition from jump to roll, squash and stretch during jump and almost no distortion during roll seemed to change the type of ball and finally the animation was slightly inconsistent and physically incorrect at some instances. The entire animation was scratched and redone keeping the motion simple and restricting the path to the impossible staircase. This offered better control of the animation, squash and stretch and overall motion of the ball.

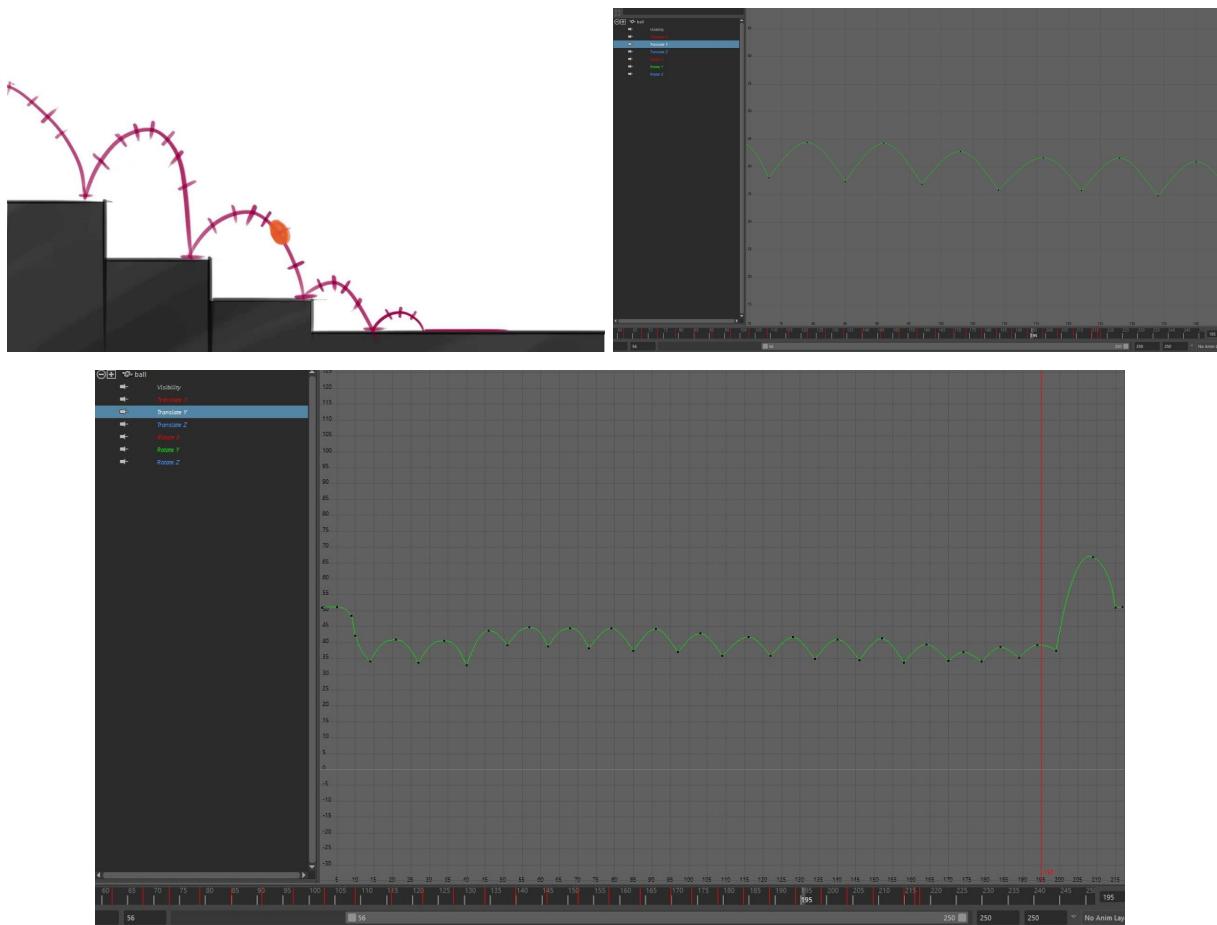


Fig: Animated ball graph editor with an external reference

## 2. Technical Aspect

### 2.1 Lighting

#### 2.1.1 VRay Lights

The entire scene is lit up using Vray lights which have been positioned and directed in a way to reach specific areas of the model and also illuminate the model as a whole; intensity multiplier, focal length, shadow bias were modified to support the ambience of the scene and complement the fluid particles. Light saturation for clouds didn't work well with Maya Software and Mental Ray so the choice of using VRay was made.

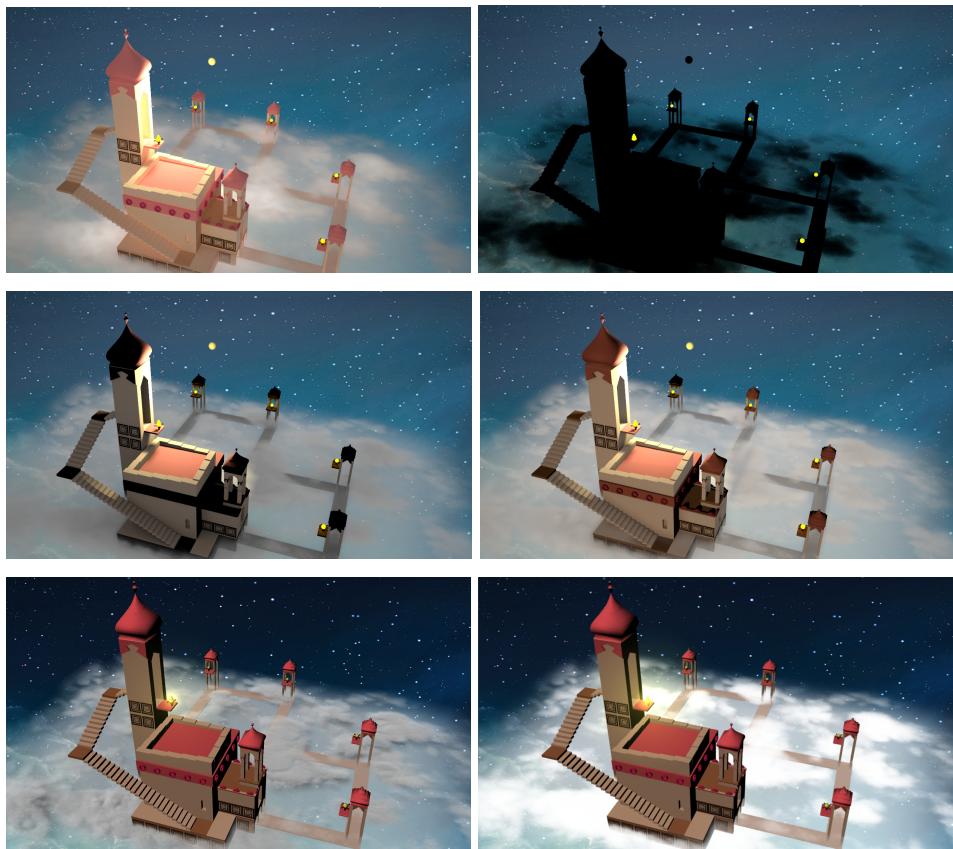


Fig 2: Light setup trials with VRay. Mental Ray and Maya Software

## 2.2 Python Scripting

The staircase in the model is generated using python scripting. A user interface is build to control the number of steps and dimensions of the steps.



All the inputs are restricted to integers to avoid any accidental float input from the user.

When the *Apply* button is clicked, it sends the call to the function where staircase generation is being performed. In the function, the user input is taken and the number of stairs is stored in a list which is then finally outputted at the origin.

On clicking the *Cancel* button, the command is send to delete the interface and the window is closed.

## 3. Final Output



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