

Join the Party in Social VR

Iffat Mai & Simon Chavez

Join the conversation #AU2017

Speakers



Iffat Mai

**Firmwide Development Manager
Perkins and Will
New York**



Simon Chavez

**Visualization Designer
Perkins and Will
Seattle**

Who are you?

- Architects
- Engineers
- Contractors
- Clients

Social VR

- What
- Why
- Who
- Where
- **HOW**

Learning Objectives

- Learn how to prepare a Revit model for VR export
- Learn how to bake materials and lighting in 3ds Max
- Learn how to setup rendered model in Unity game engine
- Learn how to setup social VR using Photon VR

Social VR

Multi-user VR Networked
VR


Social VR


Collaborative VR Holodeck

Cave



 Alexei

 Prayrit

 Lucy



facebook







Virtual Reality (VR) in Design









152189-MMC-CONGRESS

00: NORTH FACADE TO EAST 2...

Enable Screenshot Export Create View Camera Take Pictures My Resources Enable Settings Feedback About...

Active Document VR Help Escape 2.0 - View: 00: NORTH FACADE TO EAST 2 ELEV 90°

FLYMODE

3D View

3D View (3D - ZhengY)

Identity Data: <None>

View Template: (3D - ZhengY)

View Name: Independent

Dependency: View: (3D View: 00 - 2)

Title on Sheet: View: (3D View: 00 - 2)

Workset: Edited by: VIEW_ViewType_PWP...

Project Browser - 152189-MMC-CONGRESS ST - COR...

3D VIEWS - RENDER FINAL

3D View: (3D - ZhengY)

Elevation: ATRIUM ELEV - Exterior Elevatic

Elevation: ATRIUM ELEV - West Tru

Section: ATRIUM ELEV - East

Section: Section 3

Section: Section 1B

11:13 AM 10/27/2017

DA - Links (Congress-St) RVT Links: Linked Rvt Model

152189-MMC-CONGRESS ST - COR...

Shell (Not Editable)

Main Model

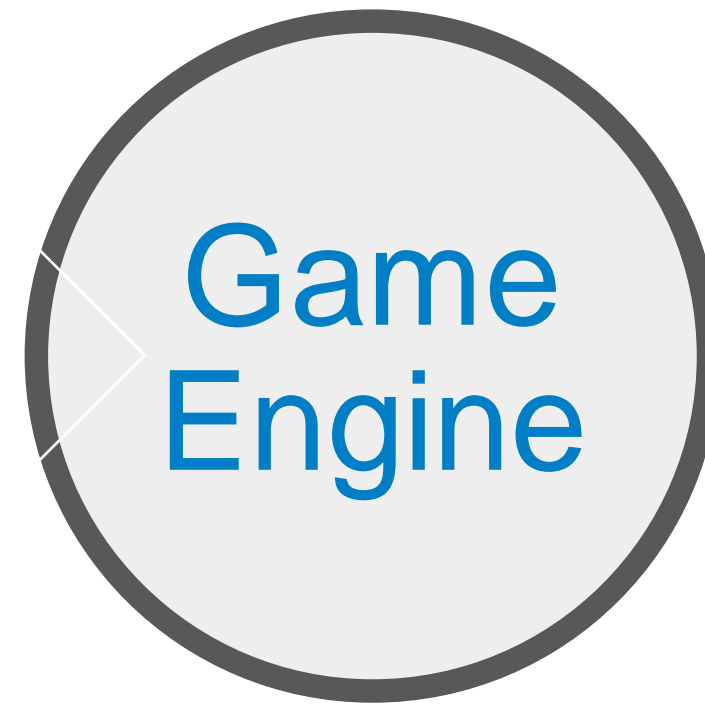
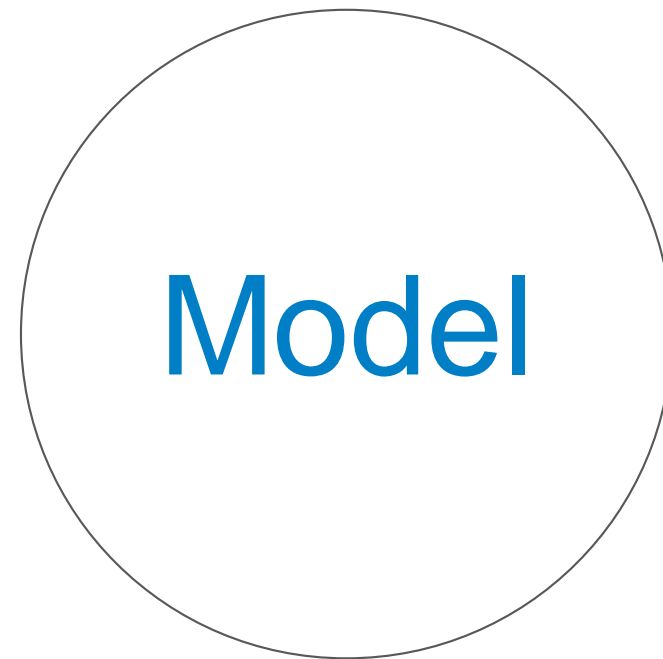
I'm Cortana. Ask me anything

NYO Conf - CentralPark





Basic Workflow



Rendered Workflow

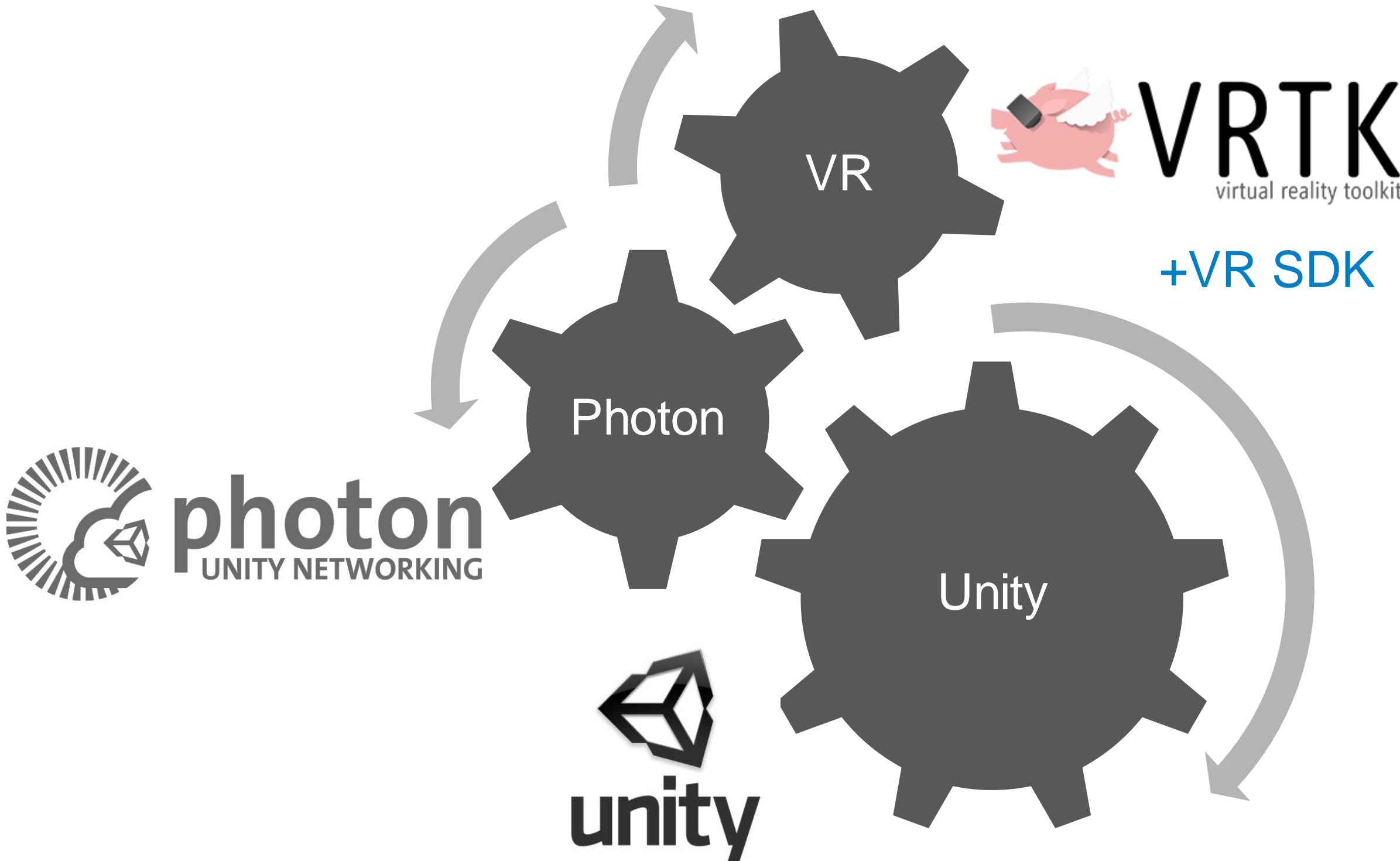
Model

Render

Game
Engine



Game Engine





Revit Export

Preparing Revit Model for Export

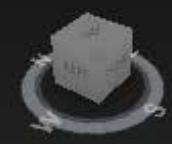
- Create a detached copy of your Revit model
- Delete anything you don't need to see
- Use Visibility/ Graphics Settings to turn off unnecessary objects
- Use Section Box to isolate what you do want to see
- Export to FBX
- Break the model into sub groups by views if the model is too large.



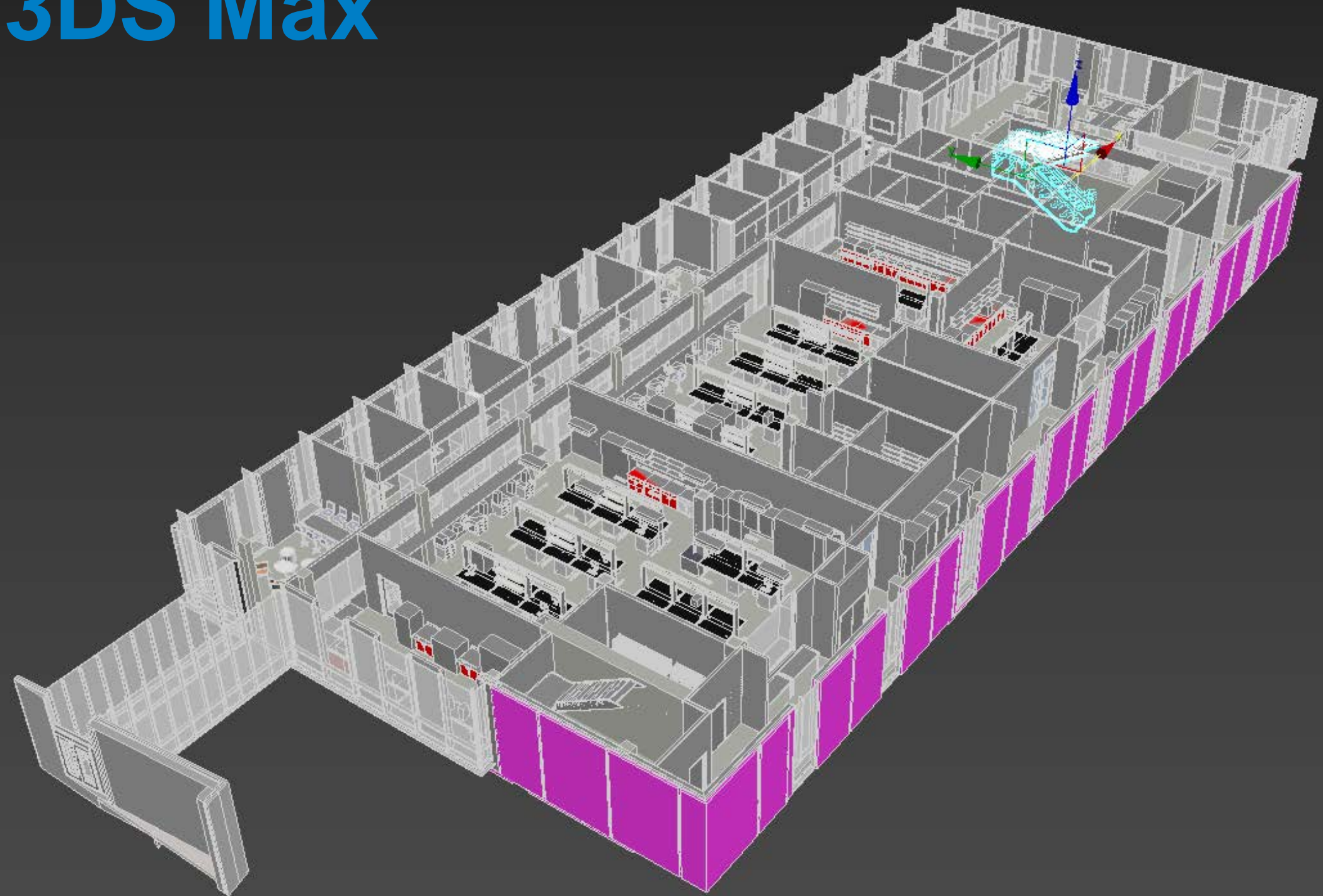
Update Material in 3DS Max

[+] [Perspective] [Standard] [Edged Faces]

Total 5 Objects Selected
Polys: 1,293,253 53,571
Verts: 740,039 33,019
FPS: 64.677

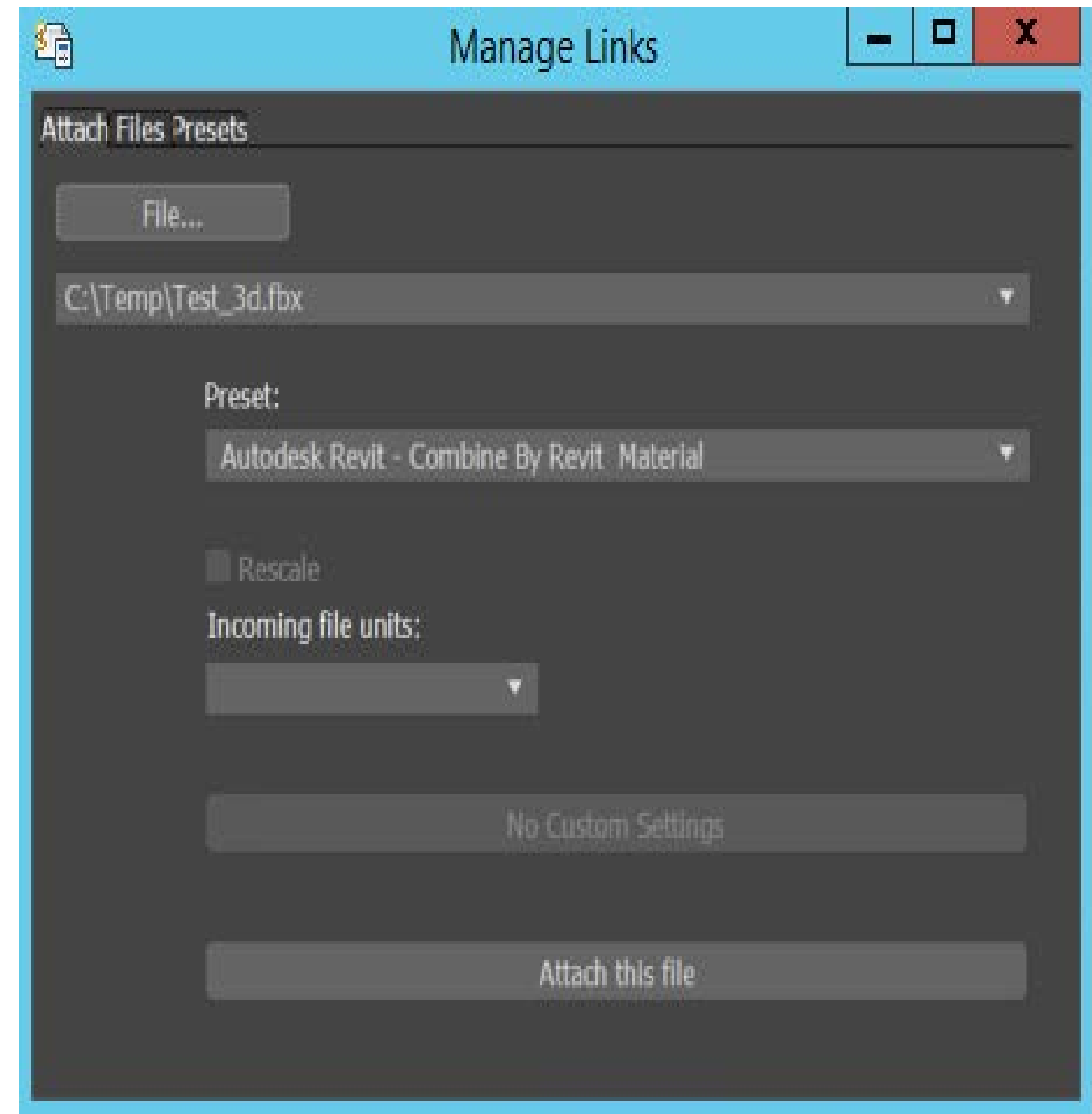


FBX in 3DS Max



Link FBX into Max

- Link Revit (FBX) into Max for continuous update and changes
- Select Combine entities By Revit Material

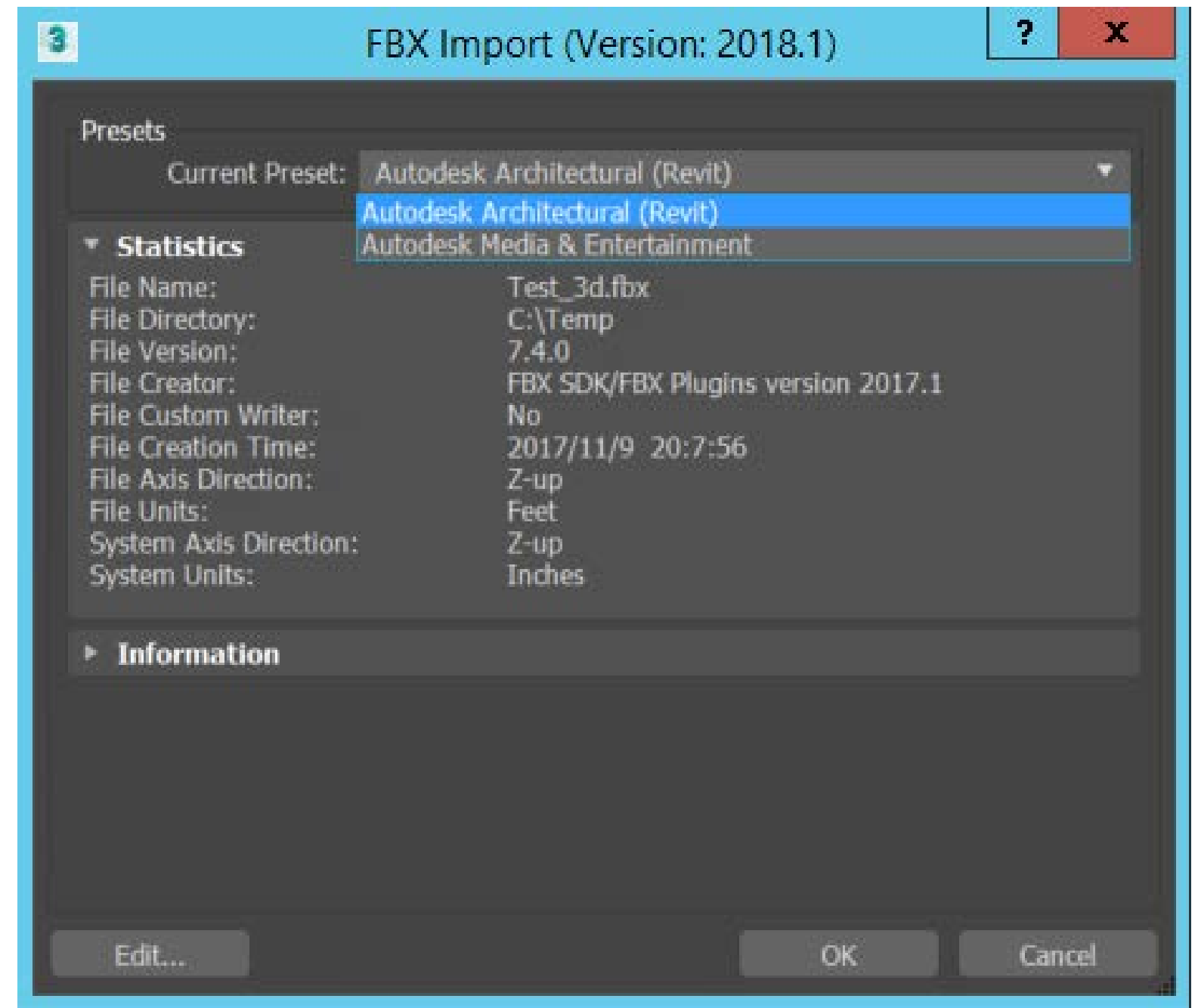


Combine Entities By Revit Material

- Revit entities assigned the same material become a single 3ds Max object.
- The object has the name of the material
- The object is placed on a layer that also has the name of the material.
- Revit metadata (Family and Category) does not appear in the 3ds Max Scene Explorer.
- Multi/Sub-Object material information is lost.
- Reduce Polygon Count
- Group objects as systems

Import FBX into Max

- Use Autodesk Architectural (Revit) Preset



Cleanup Step

- Convert all objects to Editable Poly
- In editable poly, click Quick Weld
- Run Pro-Optimizer (Built-in) – visualizer
- Identify super-high poly objects, run vertex cleaner script (Shiva3d)
- After everything is optimized, then select objects through proximity and materiality
- Run SmartScripts Attach/Detach for grouping (example: mullions)

List of Cleanup Scripts

- Smart attach/detach
 - <http://www.scriptspot.com/3ds-max/scripts/smartscripts-attachdetach>
- Vertex Cleaner Script
 - <http://www.scriptspot.com/3ds-max/scripts/vertex-cleaner>

Vertex Cleaner

Submitted by Shiva on Fri, 2009-02-06 05:17

28
votes

Version: 1

Date Updated: 05/01/2009

Author Name: Yegor Tsyba

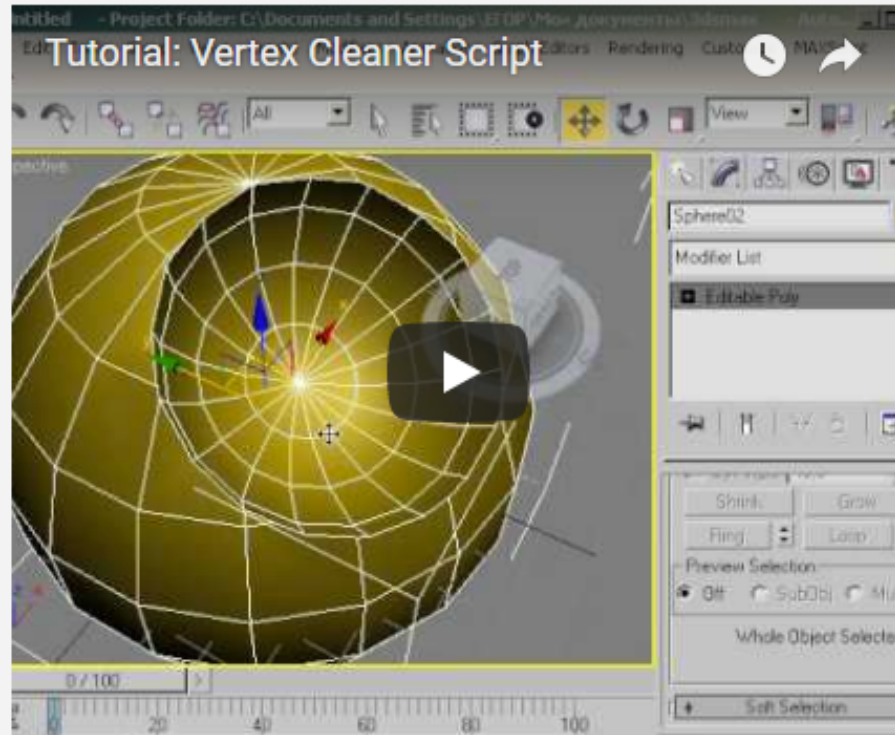
usage This script will help you to clean polygonal meshes from the useless vertex, for example after the Boolean operations. Script will find vertexes with 2 edges only and, depending from angle between edges (treshhold you can control), will clean it. So you can leave a corner vertexes and clean vertexes on straight lines.

Additional Info:

- 1) Download script
- 2) Run it via menu "MaxScript - Run Script" or DragAndDrop it on 3dsmax viewport
- 3) Choose "Customize - Customize user interface" and add script to Keyboard shortcut or in Menus, Toolbars or, like on image, in to the quad. You will find it in Category: Shiva Tools.

Version Requirement: 3ds Max 5 and higher

Video URL:



LINKS

Homepage URL: <http://www.shiva3d.net>

Download URL: <http://www.shiva3d.net/maxscripts/vertex-cleaner-maxscript/>

SmartScripts Attach/Detach

Submitted by Lande3D on Sat, 2015-12-05 03:17

0
votes

Version: .1b

Date Updated: 12/05/2015

Author Name: Lande3D

I am releasing these two small macroscripts i wrote to simplify my own workflow in 3dsmax.

they are inspired by the universal attach/detach macros made by Nik and feature much of the same functionality in addition to some extra ones. but code-wise they are complete rewrites.

SmartAttach MacroScript:

With single object selected does this:

- Disable any Turbosmooth/MeshSmooth/OpenSubDiv modifier(s) that are on top of the topmost "Edit modifier"
- Start attach mode

Works for: EditPoly, EditablePoly, Editable spline/line/EditSpline, Edit/EditableMesh, NURBSCurves,(Unwrap_UVW stitches verts))

With more than one object selected does this:

- Remove any Turbosmooth/MeshSmooth/OpenSubDiv modifier(s) that are on top of each of the objects topmost "Edit modifier"
- collapses and Attaches all Poly/mesh Objects together to the last selected Poly/mesh object
- collapses and Combines/Attaches all Splines together to the last selected Spline object
- All this works in one loop, so you can select a bunch of both splines and mesh/poly objects and the script will attach them together to 2 objects. if any objects are not compatible(like cameras/lights etc. they will be left out)

Works for: Any(not tested on Nurbs/Patch)

(uses a linear attach method with some optimizations)

Pro tip: if you want to attach to a specific object then select all the objects you want to attach then unselect and reselect the "attach to" object(if you are attaching both splines and mesh/polys at the same time then optionally deselect both the spline and the mesh/poly you want to be attached to and reselect those,it doesnt matter in which order)

SmartDetach MacroScript

With more than one object selected:

- opens the clone dialog

in subobject mode does this:

- Vertex/SplineKnot/Unwrap_UVW: break vertex/knot/Uv selection
- Edge/Border: Start create shape from selection dialog and select it if it was created
- Face/Element/Segment/Spline: Start detach dialog and if detached to a new object select it

Installation instruction:

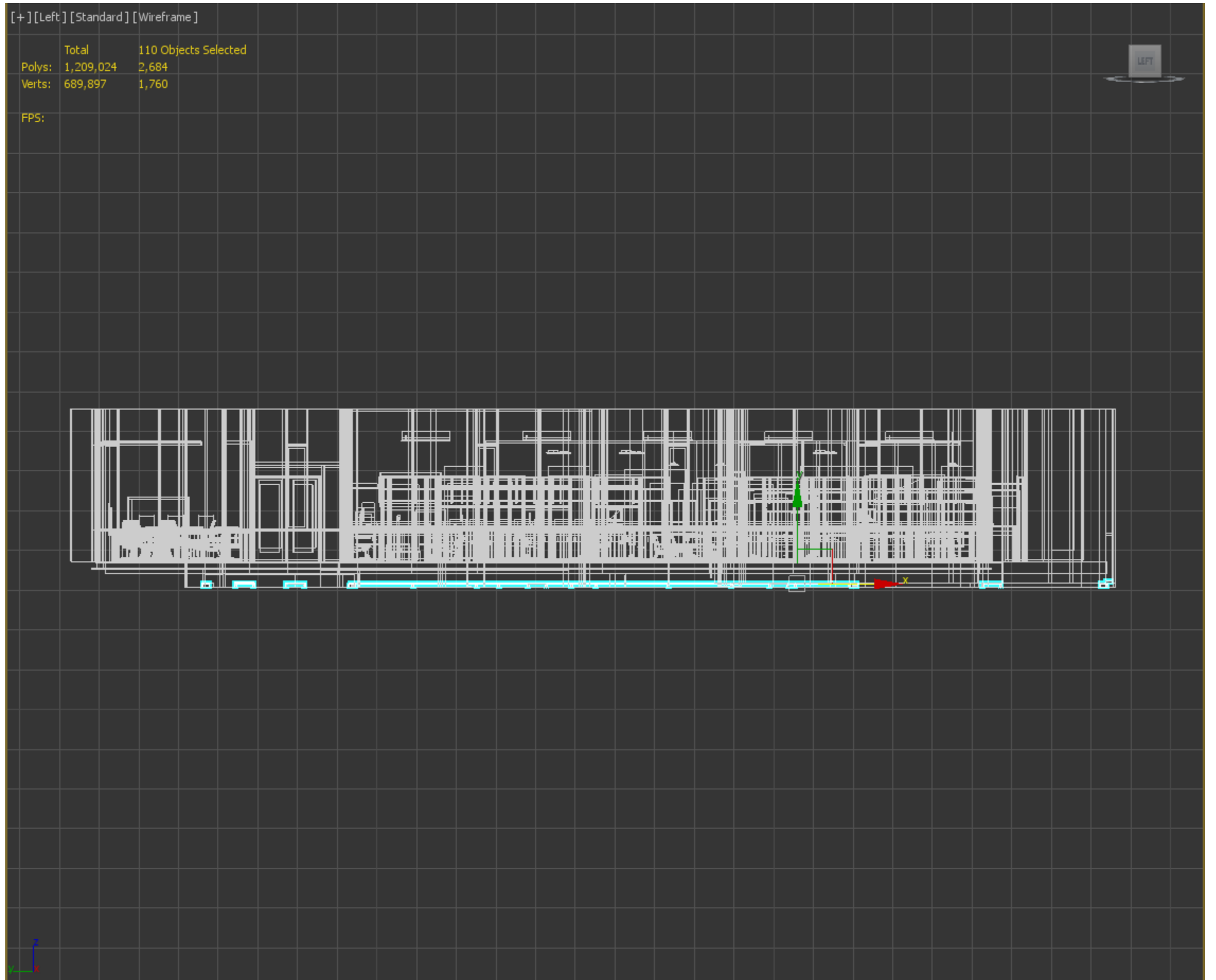
Exit 3dsmax. unpack the zip file and copy the folders contained inside to the root of the 3dsmax program folder(usually "C:\Program Files\Autodesk\3ds Max 2016" etc.) Restart 3dsmax

The macros will appear under the catagory "SmartScripts". Assign them to hotkeys and/or toolbar buttons

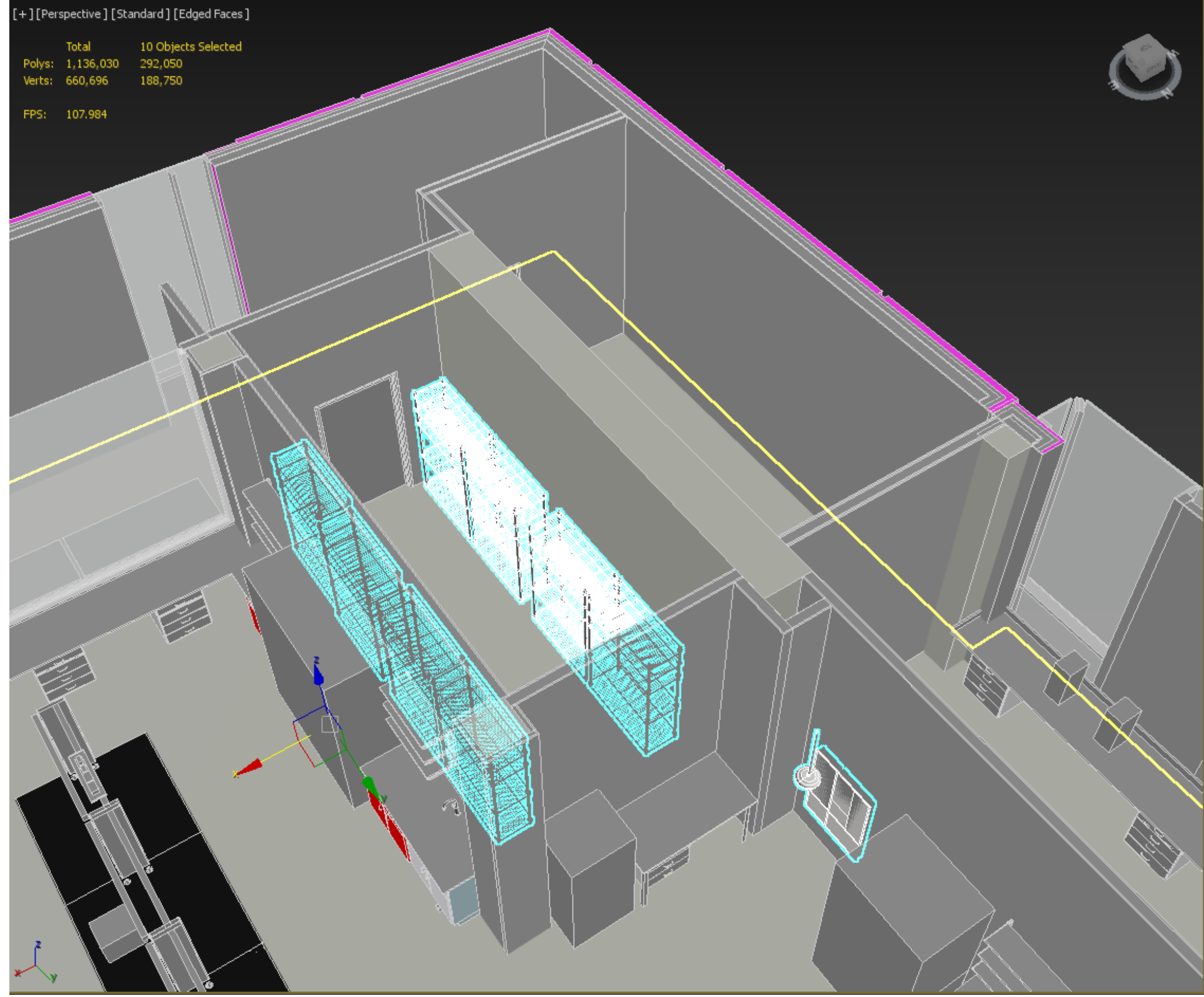
Written for and tested in 3dsmax 2016 sp1 and sp2 but should work for previous versions too(down to 2012?)

Version Requirement: 3dsmax 2012

Cleanup



Reduce Poly Count



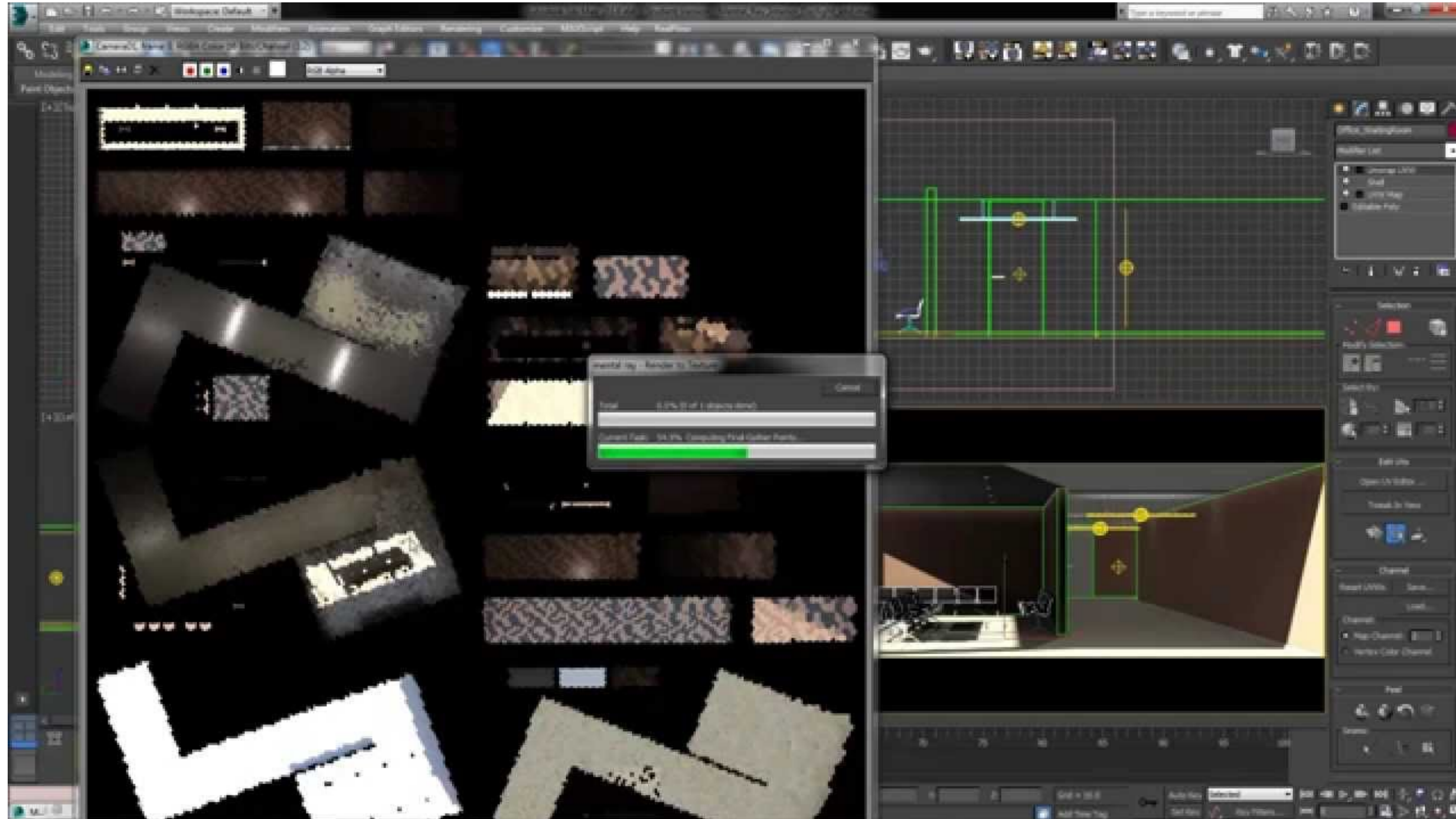
3DS Max 2017 – Scene Converter

- Use Scene Converter
- Select conversion script “Autodesk Material to Standard Material”
- Change the Standard material name to different unique material names
- Textures - Make sure your textures are sourced already from your Unity project or copied into a folder called \textures in your project
- For objects with bump maps that are not exported.
 - Converted bump map into Normal map
 - Re-assign to objects

Light and Material Baking in Max

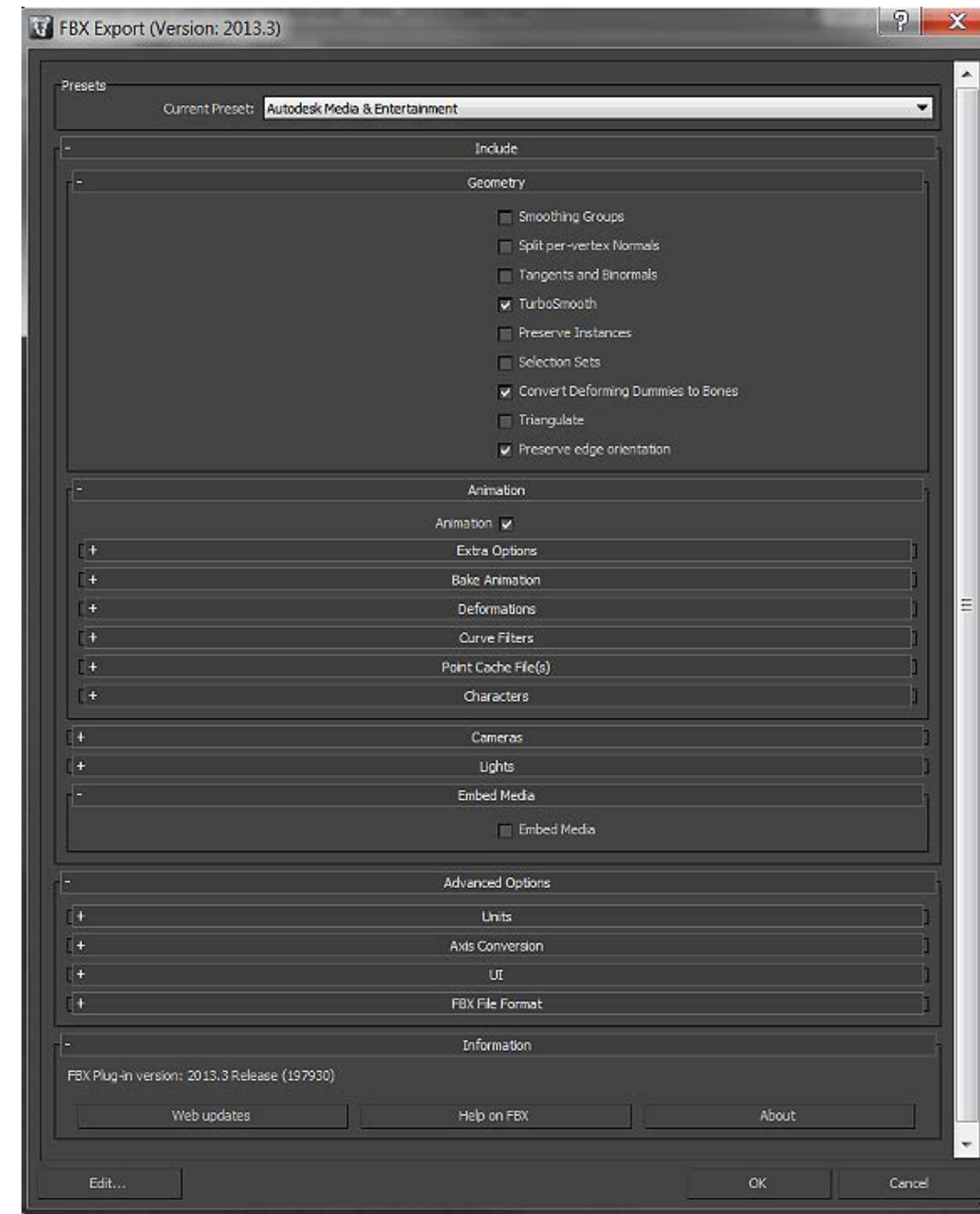


Render to Texture (hotkey: 0)



Export to FBX from 3DS Max to Unity

- Cameras and Lights are not currently imported into Unity
- For baking Vray lighting onto material in Max, in Unity, you want switch from standard shader to the unlit texture shader for efficiency and better frame rate.



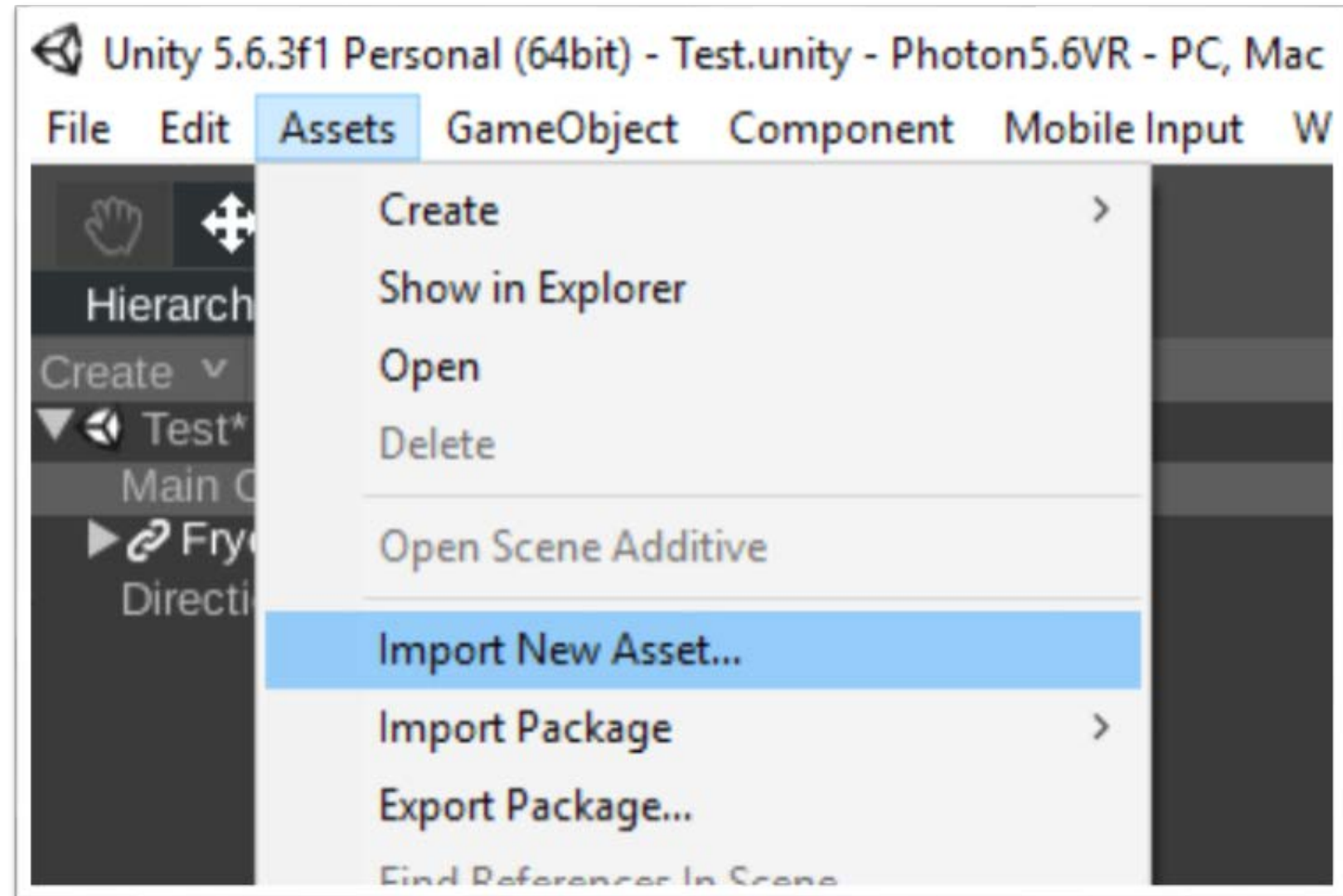


Unity3D and template

Unity Template for Social VR

- Import the 3D FBX model
- Light Baking & Skybox
- Material adjustment
- NavMesh Baking
- Virtual Reality Toolkit (VRTK) from StoneFox
- Create the Player Prefab
- Photon Unity Networking (PUN)

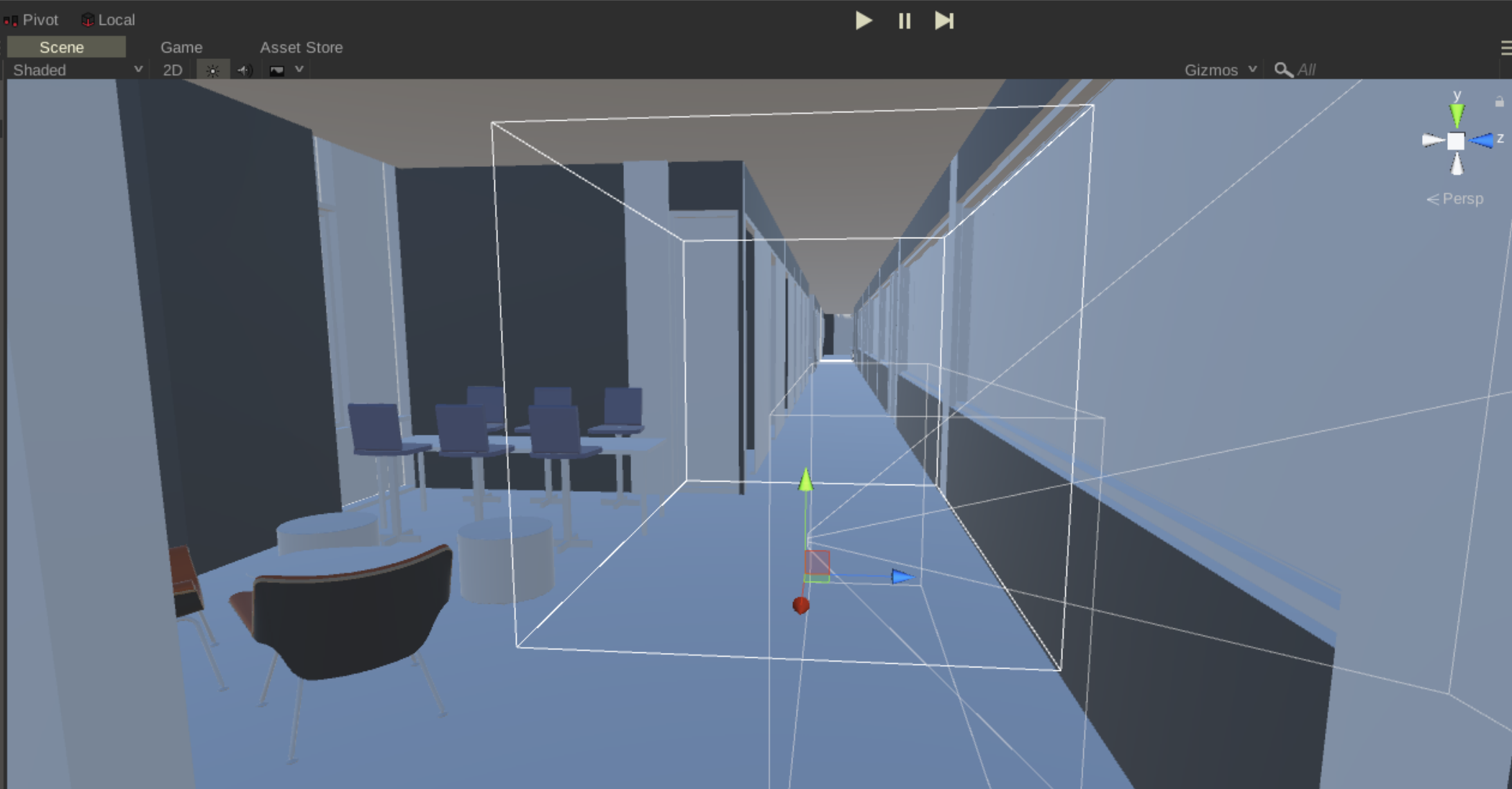
Import FBX



Hierarchy

Create ▾ All

- Untitled*
- Directional Light
- Player (1)
- FloorSlabs
- GAHFBX



Inspector

Navigation Lighting

Player (1) Static

Tag Untagged Layer Default

Prefab Select Revert Apply

Transform

Position	X 70.69559	Y 63.70322	Z -32.31257
Rotation	X 0	Y 0	Z 0
Scale	X 1	Y 1	Z 1

Add Component

Project Console

Create ▾

- All Prefabs
- All Modified
- All Conflicted

Assets

- @Themes
- _Scenes
- FBX
- GAH
- HDRI
- Photon Unity Networking
 - Editor
 - Plugins
 - Resources
 - UtilityScripts
- PhotonChatApi
- Plugins
- Prefabs
 - Resources
- PSR Kitchen pack
- PUNVoice
- Scripts
- SteamVR
- vr_controller_vive_1.5

Assets

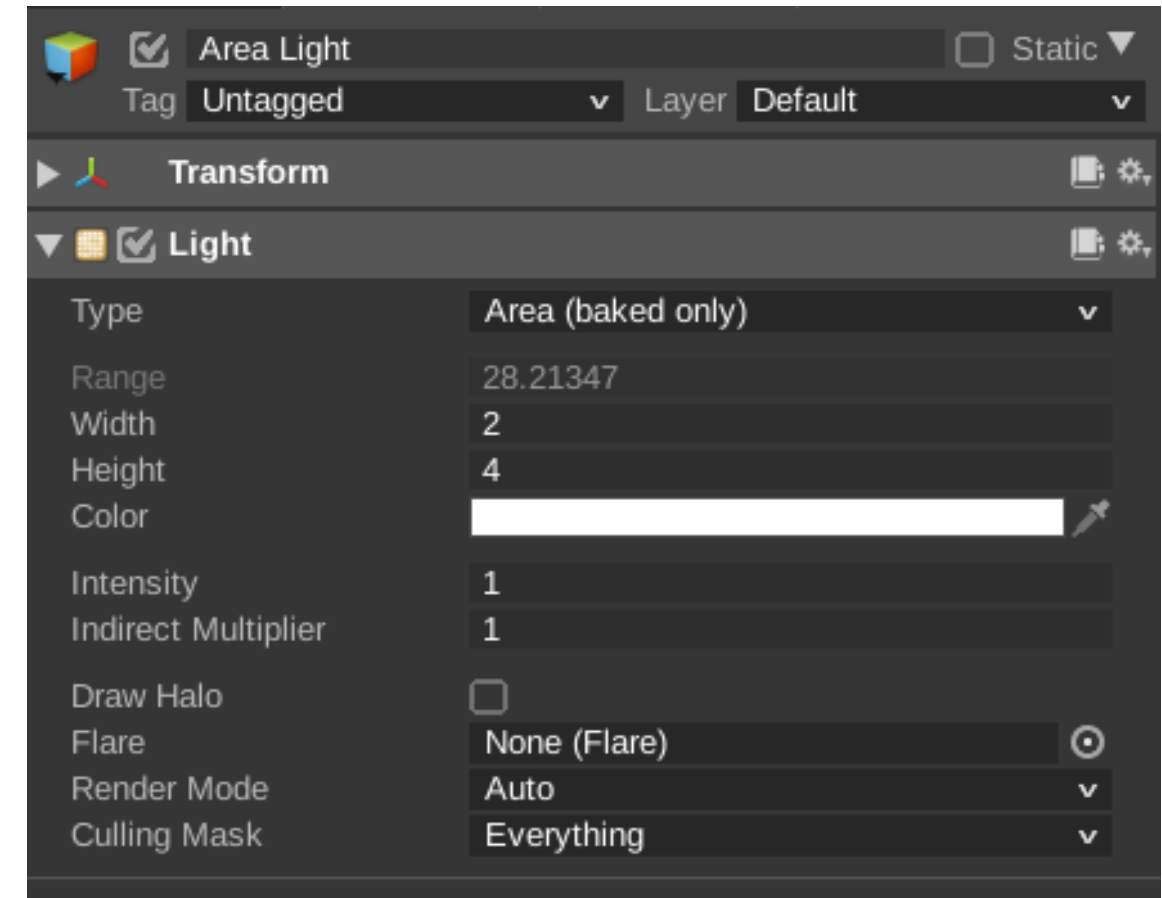
@Themes	_Scenes	FBX	GAH	HDRI	Photon Unity N..	PhotonChatApi	Plugins
Prefabs	PSR Kitchen p...	PUNVoice	Scripts	SteamVR	vr_controller_vi..	VRTK	Wood

Lighting

The image shows a spacious, modern interior, likely a lounge or waiting area. The ceiling is the focal point, featuring several large, overlapping circular recessed lighting fixtures that create a dynamic, layered effect. The floor is a light, polished material that reflects the ambient light. In the foreground, a vibrant green lounge chair with a unique, curved design is positioned on the right. In the middle ground, a seating area with beige sofas and armchairs is visible. The background shows a brightly lit area with white columns and a service counter, suggesting a professional or public setting. The overall atmosphere is clean, bright, and contemporary.

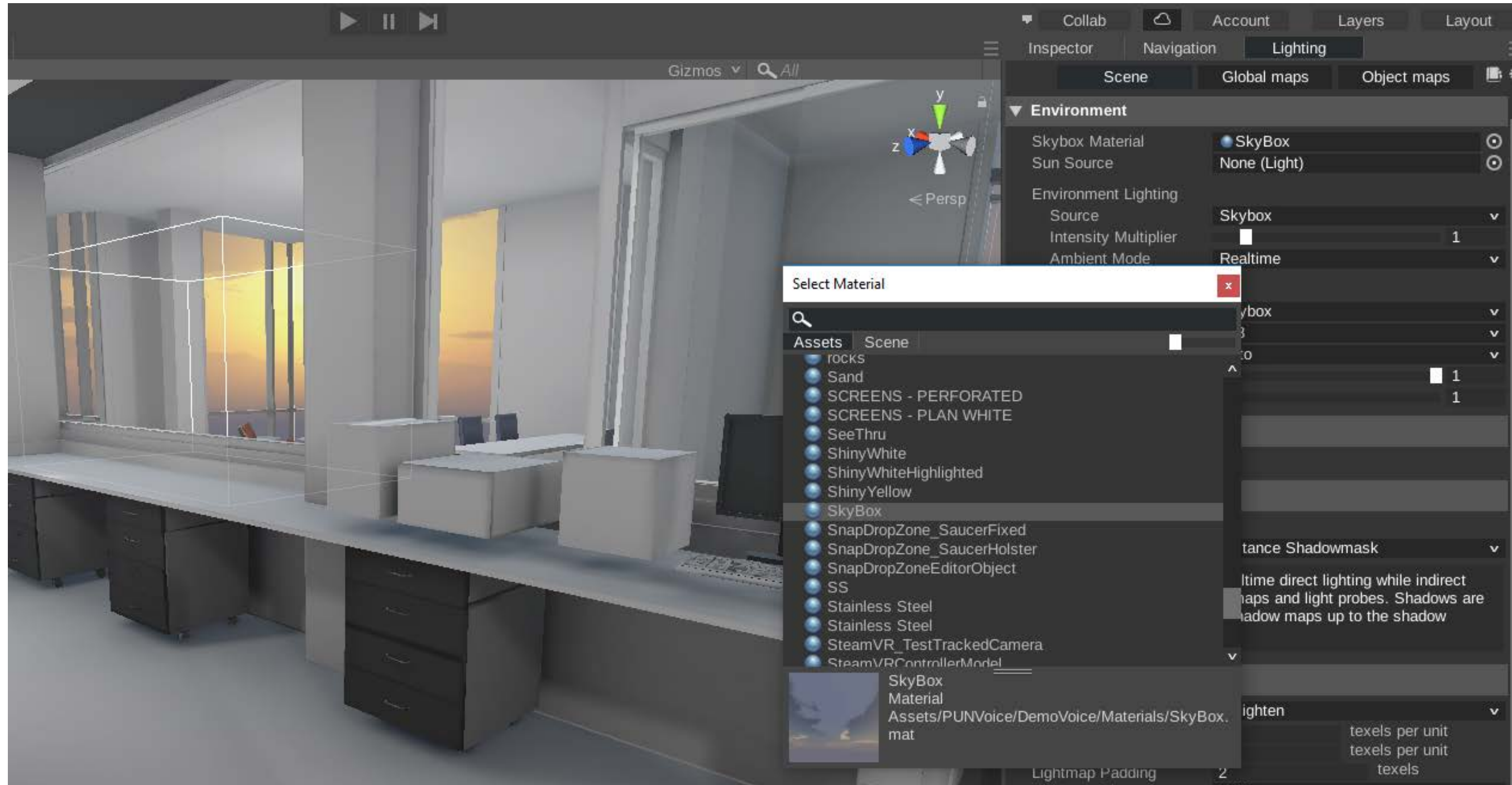
Sun and Lights

- Leave Sun (Directional Light) in real time
- HDR Light (change default sky)
- Add Area light (bake option only) to simulate ceiling mounted lights
- (example 2x2 or 2x4 ratio, adjust for ft-in)
- Change color as needed
- Use point light for downlights



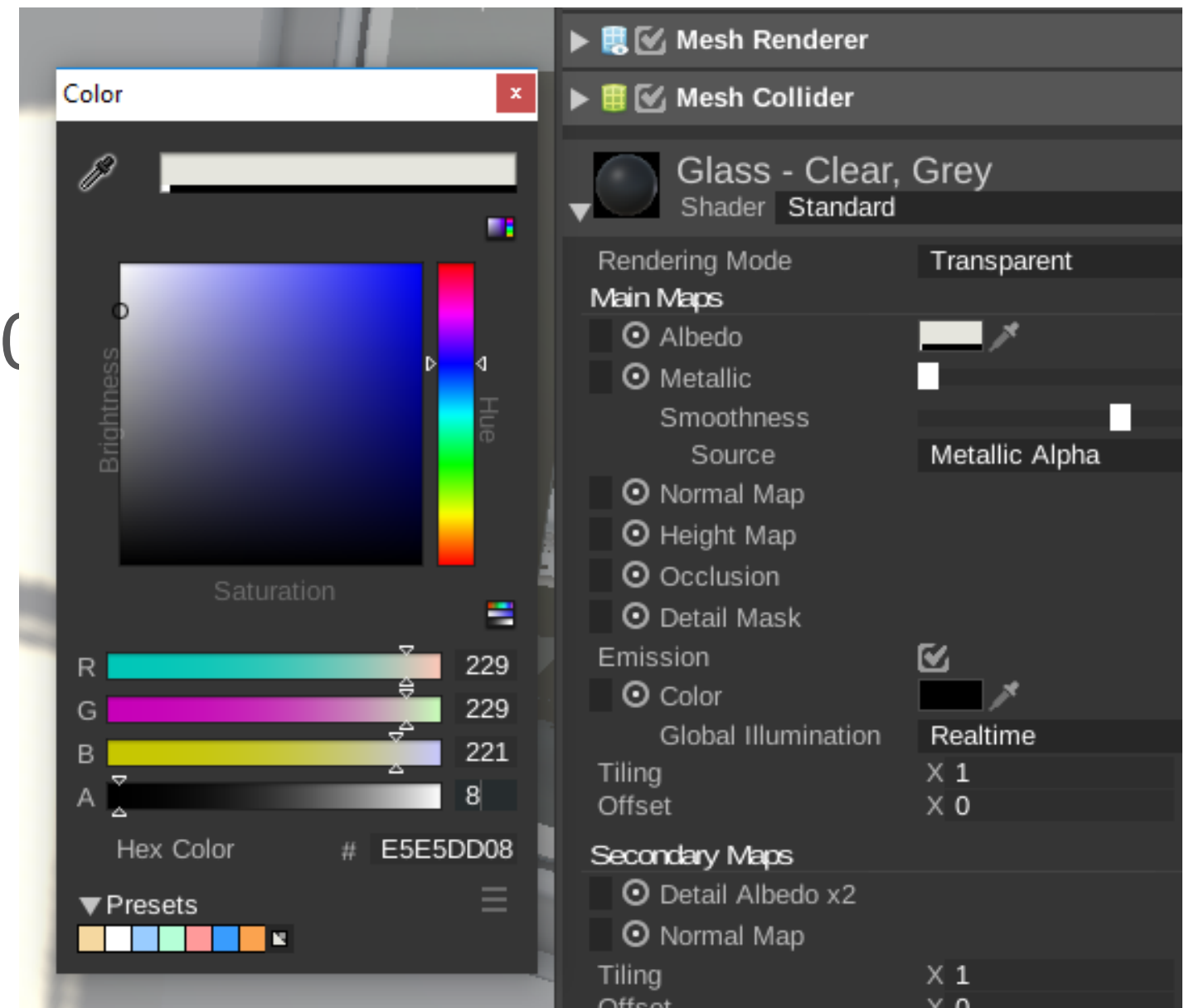
Skybox

- Lighting tab, select Skybox



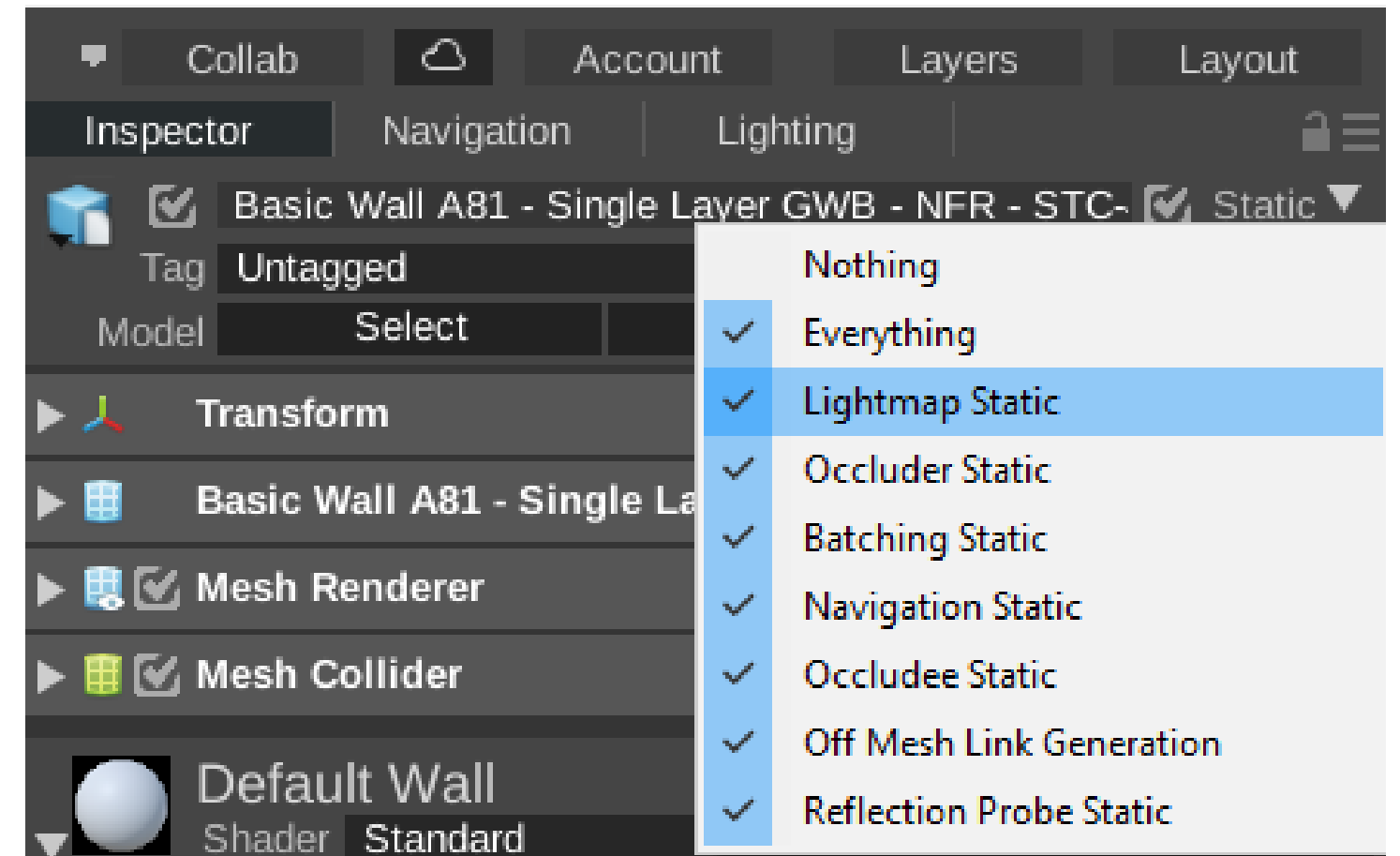
Adjusting Glass Transparency

- Select the Glass Panel object
- Under Glass Shader
- Select the Albedo color
- Changing the Alpha channel value to 0
- Max out smoothness

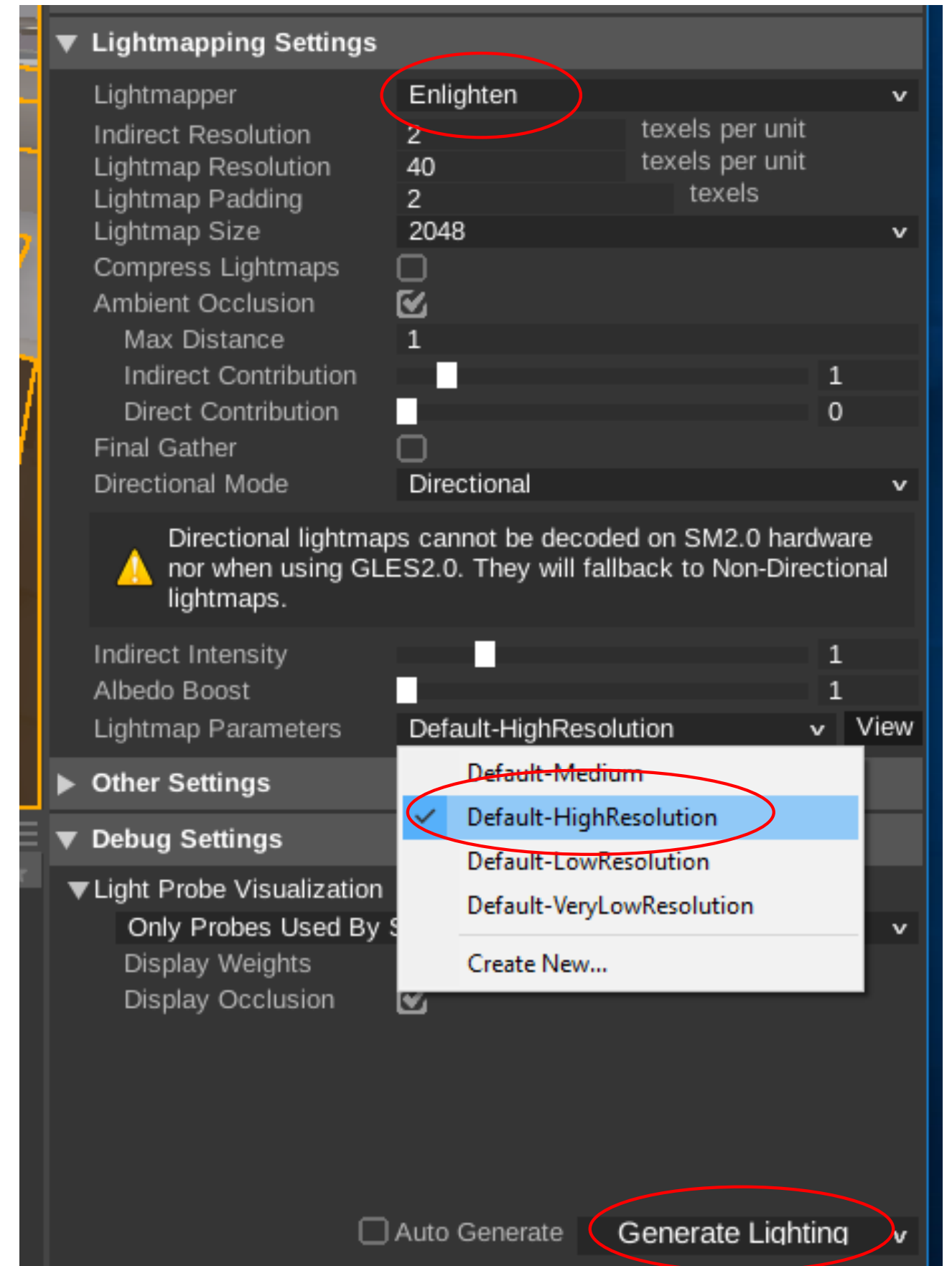
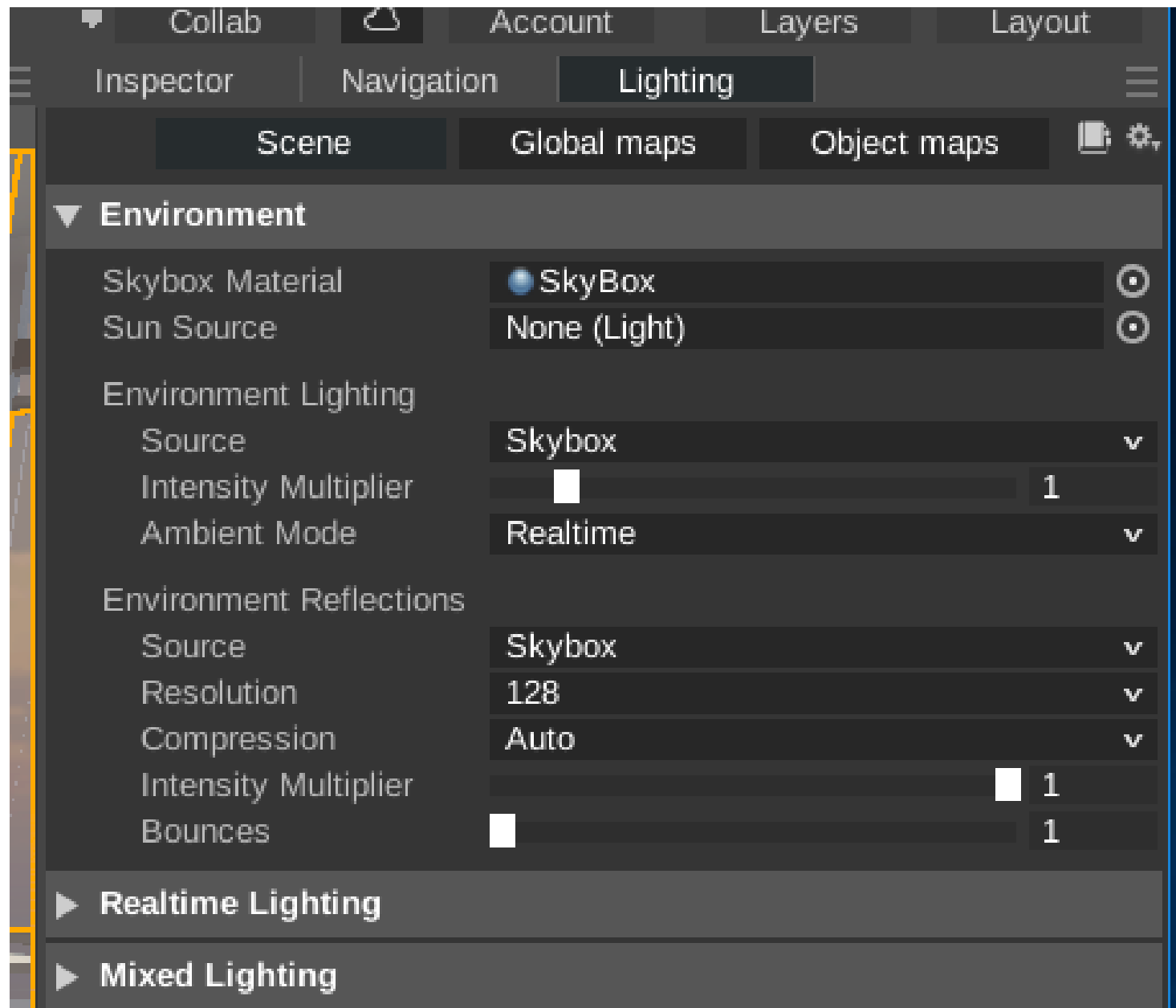


Lightmap Static

- If light baking in Unity3D, using Enlighten
- Select all none moving objects, and check Lightmap Static option
- Select all lights (other than the Sun)
- Set the lights to bake

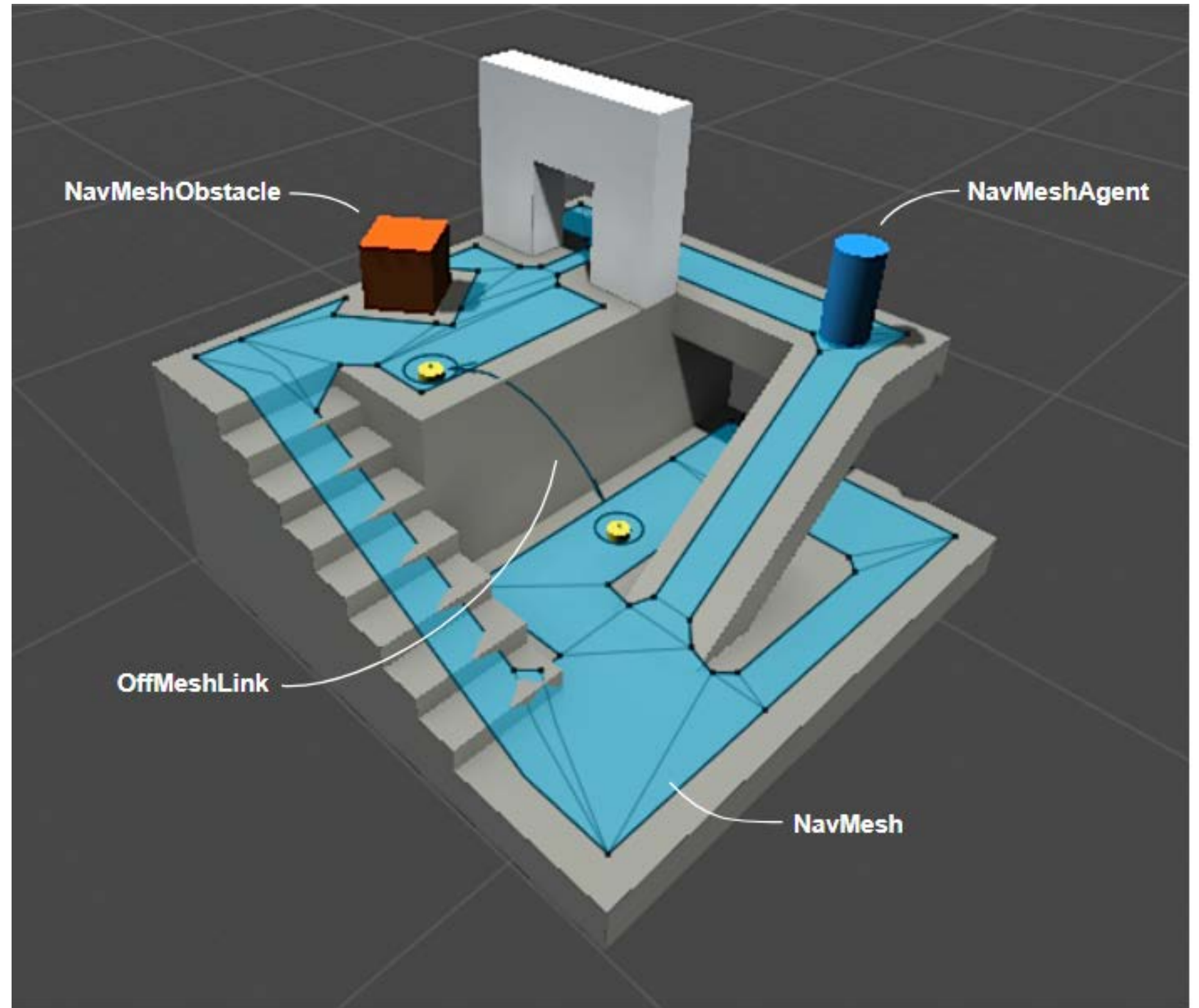


Generate Lighting (Baking)



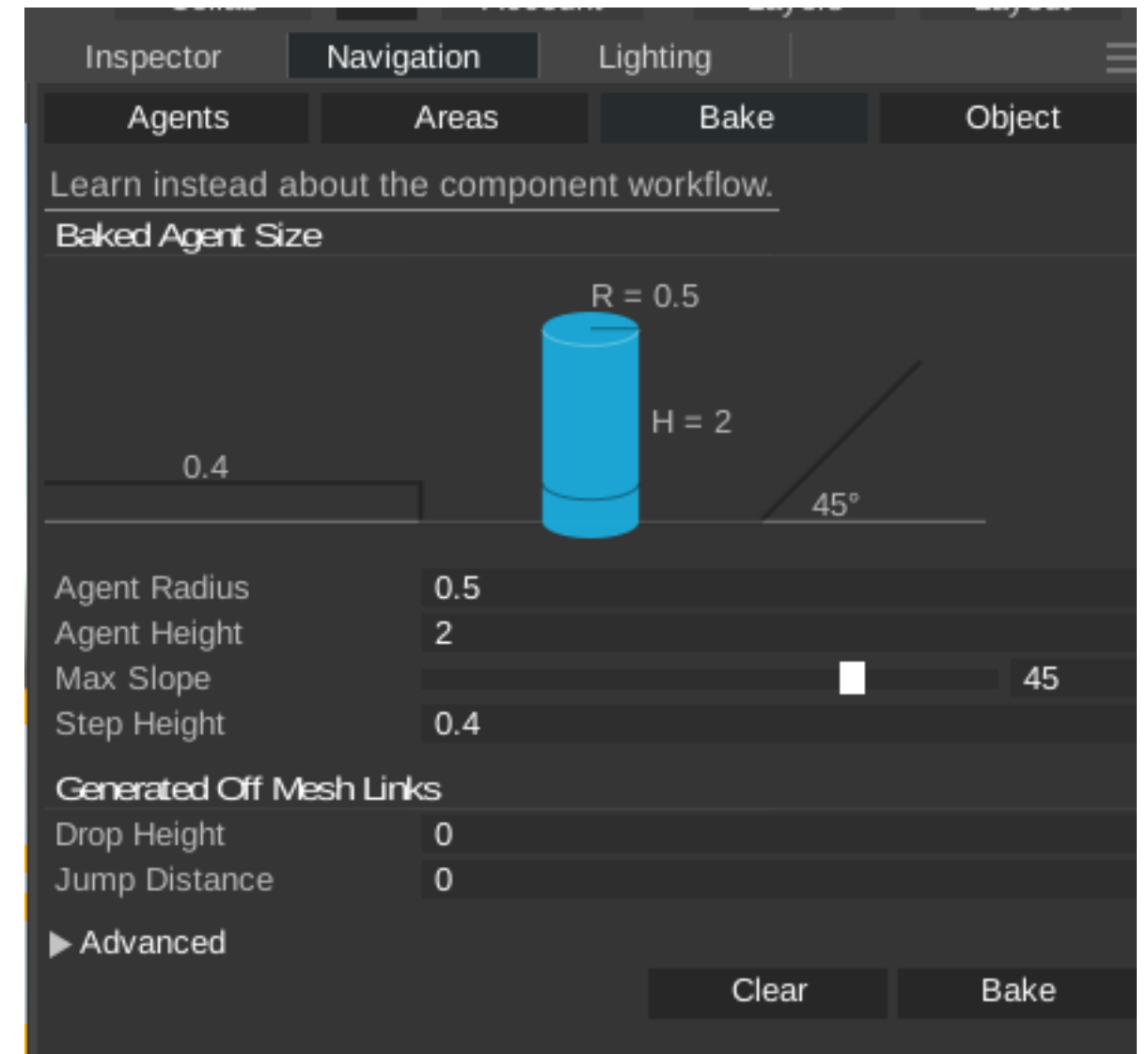
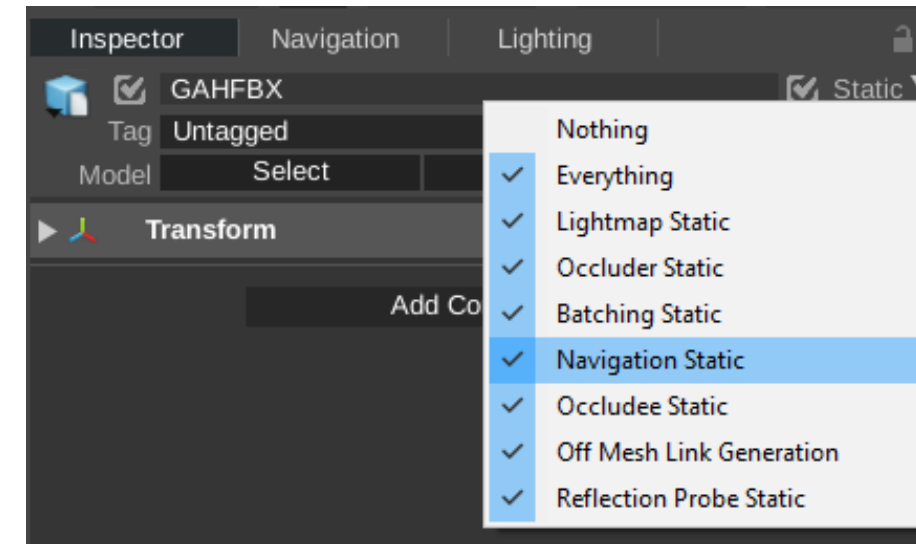
NavMesh

- Nav Mesh
- Nav Mesh Agent
- Off-Mesh Link
- NavMesh Obstacle

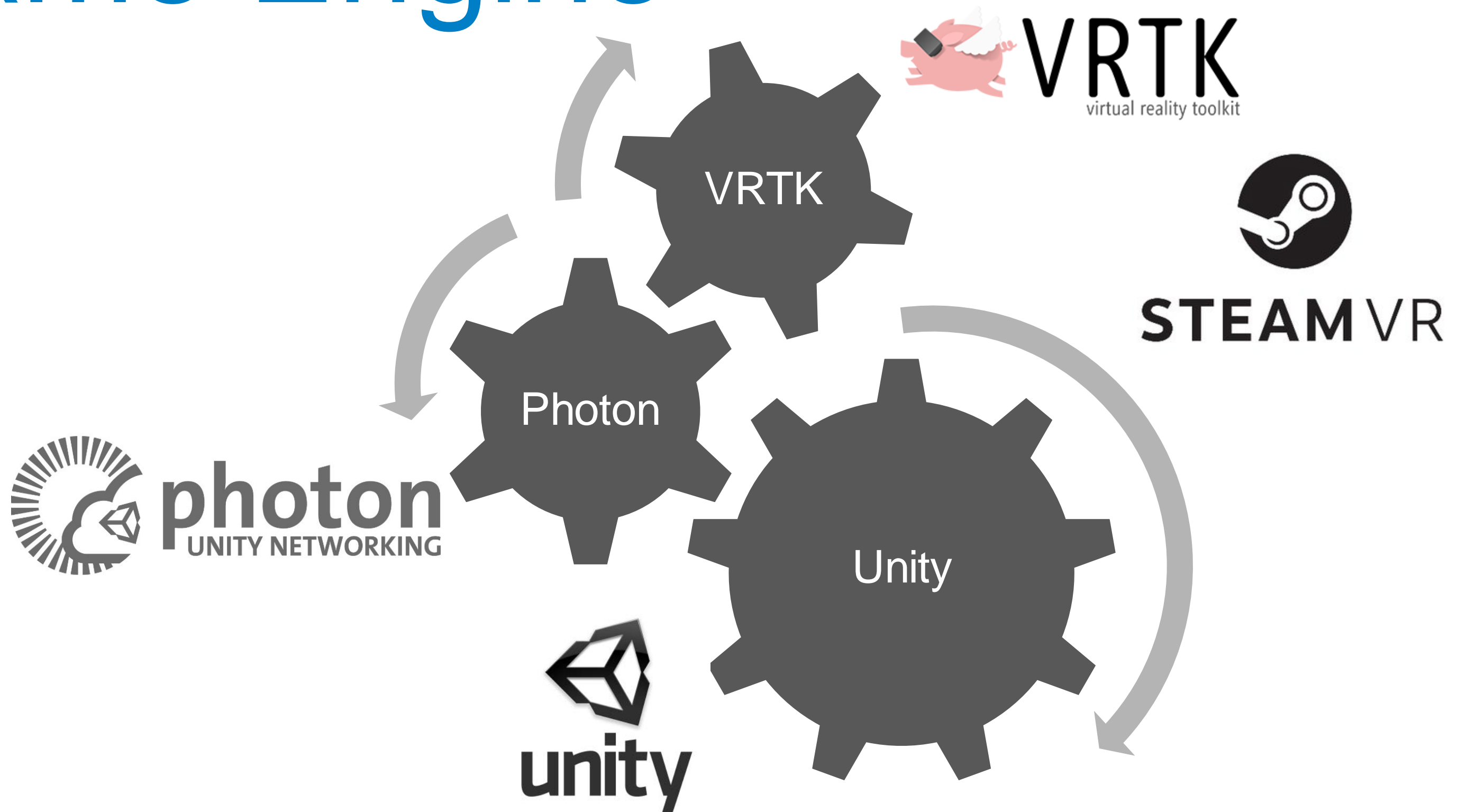


NavMesh Baking

- Select all building objects
- Check Navigation Static
- **Adjust agent size**
 - *Agent Radius*
 - *Agent Height*
 - *Max Slope*
 - *Step Height*
- Open Navigation tab
- Click on Bake button



Game Engine





VR

VR Download

- Download Virtual Reality Toolkit (VRTK) - <https://vrtoolkit.readme.io/>
- Download SteamVR (Vive)

OR

- Download Oculus (Rift)

SUPPORTED SDKS

Supported SDK	Download Link
VR Simulator	Included
SteamVR	https://www.assetstore.unity3d.com/en/#!/content/32647
Oculus	https://developer.oculus.com/downloads/package/oculus-utilities-for-unity-5/
*Ximmerse	https://github.com/Ximmerse/SDK/tree/master/Unity
*Daydream	https://developers.google.com/vr/unity/download

Unity Asset Store

unity Unity Services Made with Unity Learn Community [Asset Store](#)

Sell Assets Blog Publisher Login Link Maker Help

VRTK - Virtual Reality Toolkit - [VR Toolkit]

Scripting
Sysdia Solutions Ltd
★★★★★ (1,443)
FREE
[Add to Downloads](#)

Requires Unity 5.5.3 or higher.

The SDK Manager was updated in 3.2.0 - Any scenes using the old SDK Manager set up will need to be updated. Watch this video

unity Unity Services Made with Unity Learn Community [Asset Store](#)

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SteamVR Plugin

Scripting
Valve Corporation
★★★★★ (1,889)
FREE
[Add to Downloads](#)

Requires Unity 4.7.1 or higher.

ATTN: When upgrading from an older version, it is best to first delete the SteamVR folder in your project, and then import the package. You may also want to delete any "openvr_api" files in your Plugins folder and its subfolders before importing the new package.

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Oculus Integration

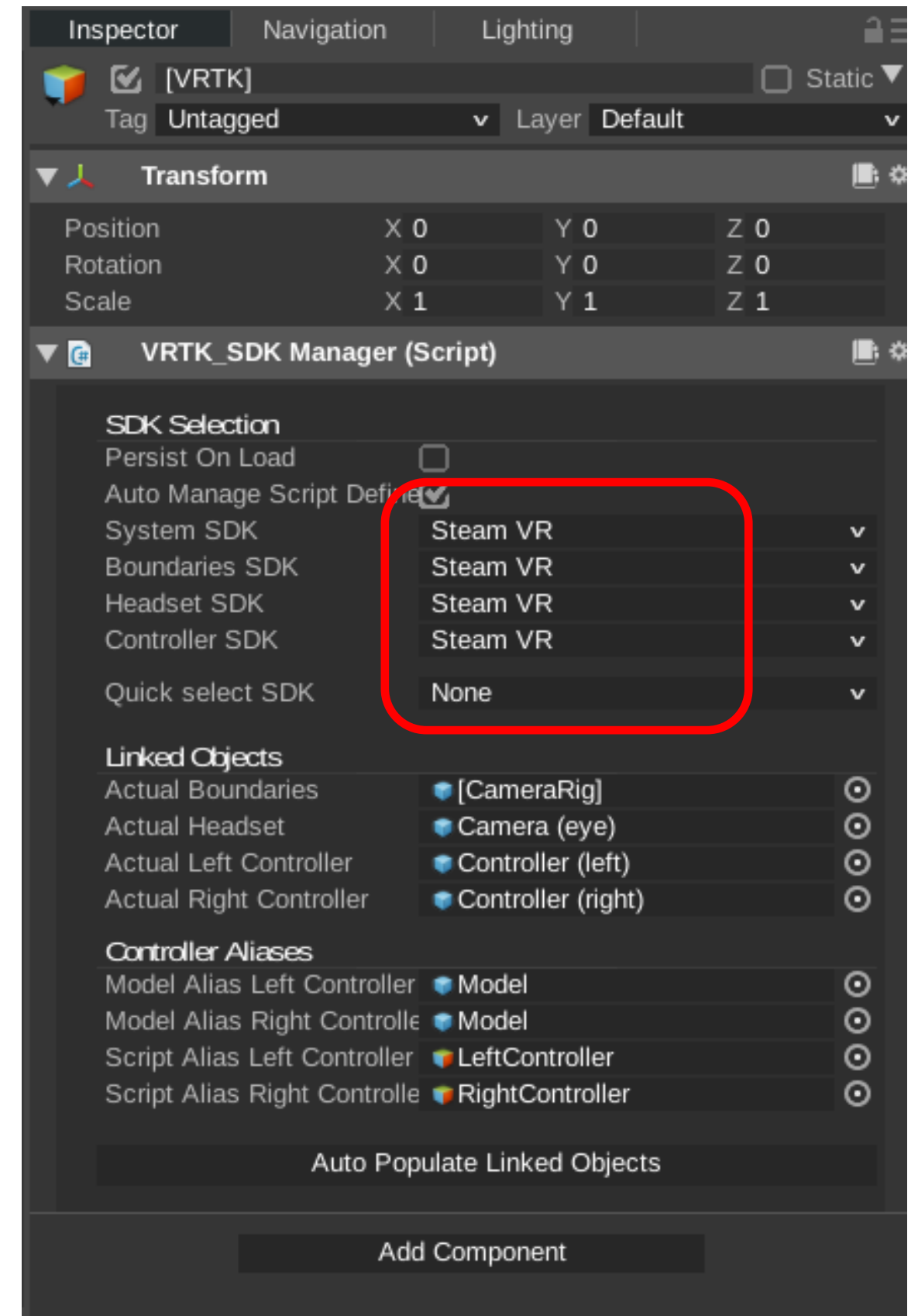
Scripting/Integration
Oculus
★★★★★ (118)
FREE
[Add to Downloads](#)

Requires Unity 5.4.3 or higher.

Advanced Oculus Rift, Touch, and Gear VR support for rendering, audio, social, and avatars. VR: Input and haptics, roomscale (experimental) tracking, layered rendering. Audio: spatializer fine-tuning, room model settings for reverb and early reflections. Platform: Entitlement check, identities, rooms, matchmaking, VoIP, peer-to-peer

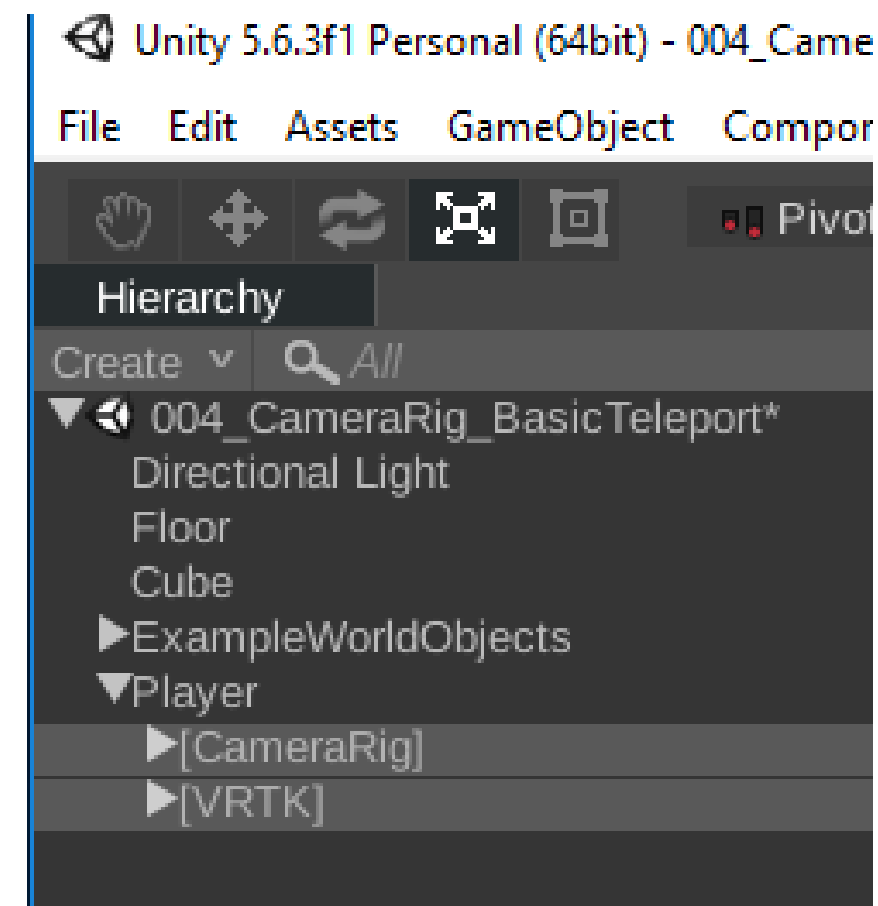
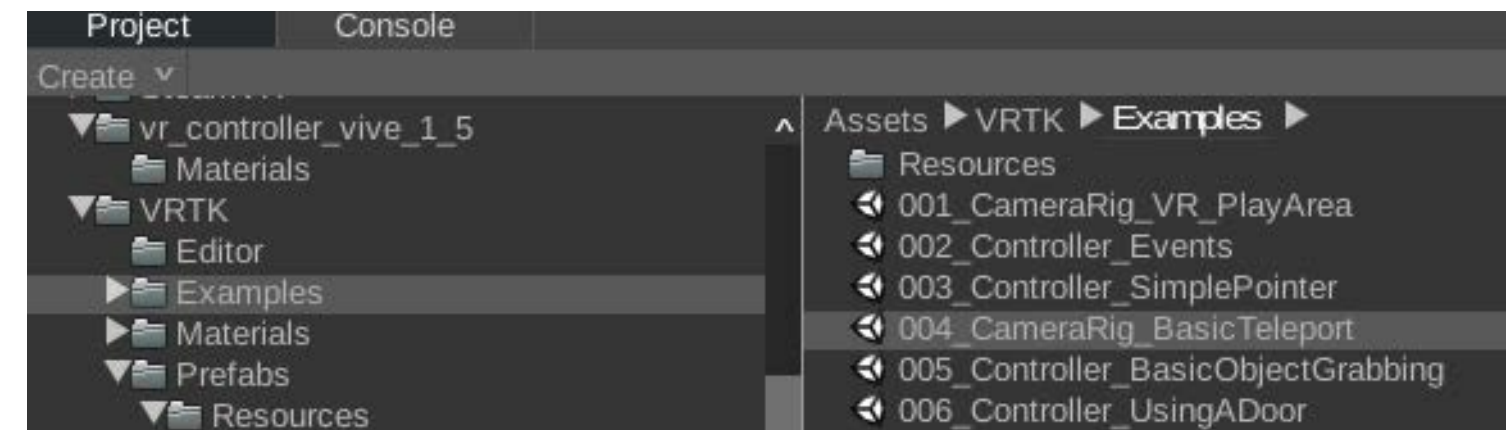
VR Setup Overview

- Import Assets/VRTK folder into your Unity project
- Create an empty gameobject VRTK_SDK
- Add the VRTK_SDK Manager script to the empty VRTK_SDK Game Object
- Add the SteamVR_SDK as a child to the VRTK_SDK



VR Setup shortcut

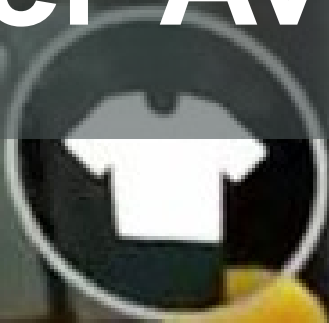
- Open Example Scene (Basic Teleport)
- Create an empty gameobject at 0,0,0
- Rename it “Player”
- Then drag into the player
 - [CameraRig]
 - [VRTK]
- Then make a prefab out of the player



Scene Setup

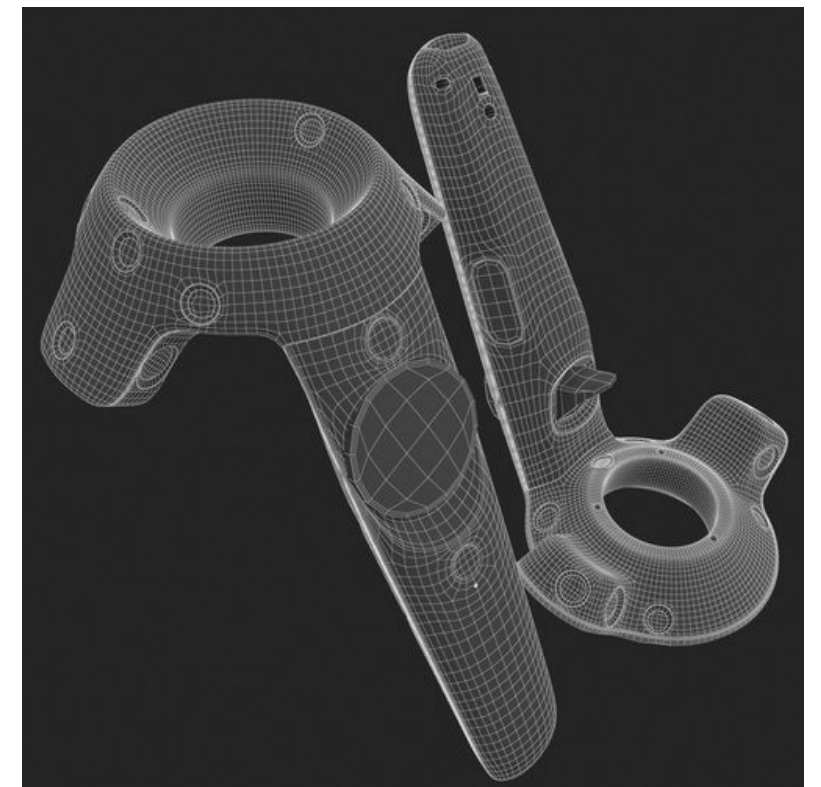
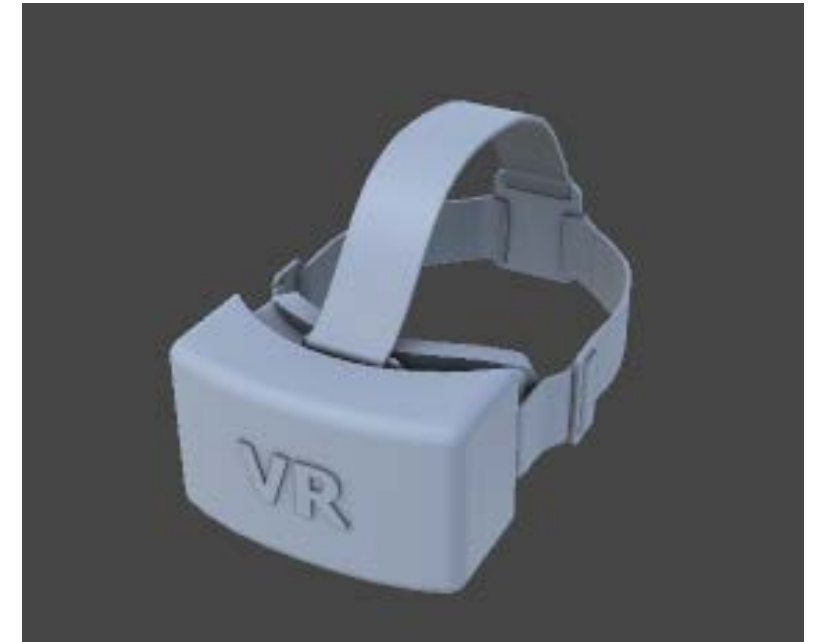
- Open your new scene
- Drag “Player” prefab into your scene
- Delete the existing “Main Camera”

Player Avatar



Player Avatar

- Create a box, add a custom logo
- Or use any 3D model, double check orientation
 - Y as UP, -Z as Forward (FBX export)
- Use the headset model from SteamVR folder



The background features a dark blue world map with a complex, glowing network of white lines and nodes overlaid on it. The nodes are represented by small, bright white circles, some of which have a soft, circular glow around them. The lines connect these nodes, creating a dense web of connections that spans across the continents. The overall aesthetic is futuristic and technological, suggesting global connectivity and data networks.

Networking

Photon vs. Unity Networking

- **Host Model**
- **Connectivity**
- **Performance**
- **Features & Maintenance**
- **Master Server**

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Photon Unity Networking Free

Scripting/Network

Exit Games

★★★★★ (1637)

FREE

Add to Downloads



Requires Unity 4.7.2 or higher.

The ease-of-use of Unity's Networking plus the performance and reliability of the [Photon Cloud](#).

Photon Unity Networking FREE:
this package is all you need to easily add



photon

UNITY NETWORKING

FREE Edition

#1 Platform for -Multiplayer

- ✓ Unity Network Compatible
- ✓ **FREE** 20 CCU Subscription
- ✓ 5 Demos + Code

More than 200,000 Developers:

glu

RILISOFT

SEGA



cmune

SQUARE ENIX

KILOO

Get Started!

Your Free Plan is just an e-mail away:

I'm not a robot



reCAPTCHA

[Privacy](#) [Terms](#)

Your Photon Cloud Applications

Show

All Apps ▾

in Status

Active ▾

Sort by

Peak CCU ▾

Order

Descending ▾

[Create a new App](#)

App ID: e3b7187f-c...

This app is on the free plan.
We recommend you to [upgrade before using it in production.](#)

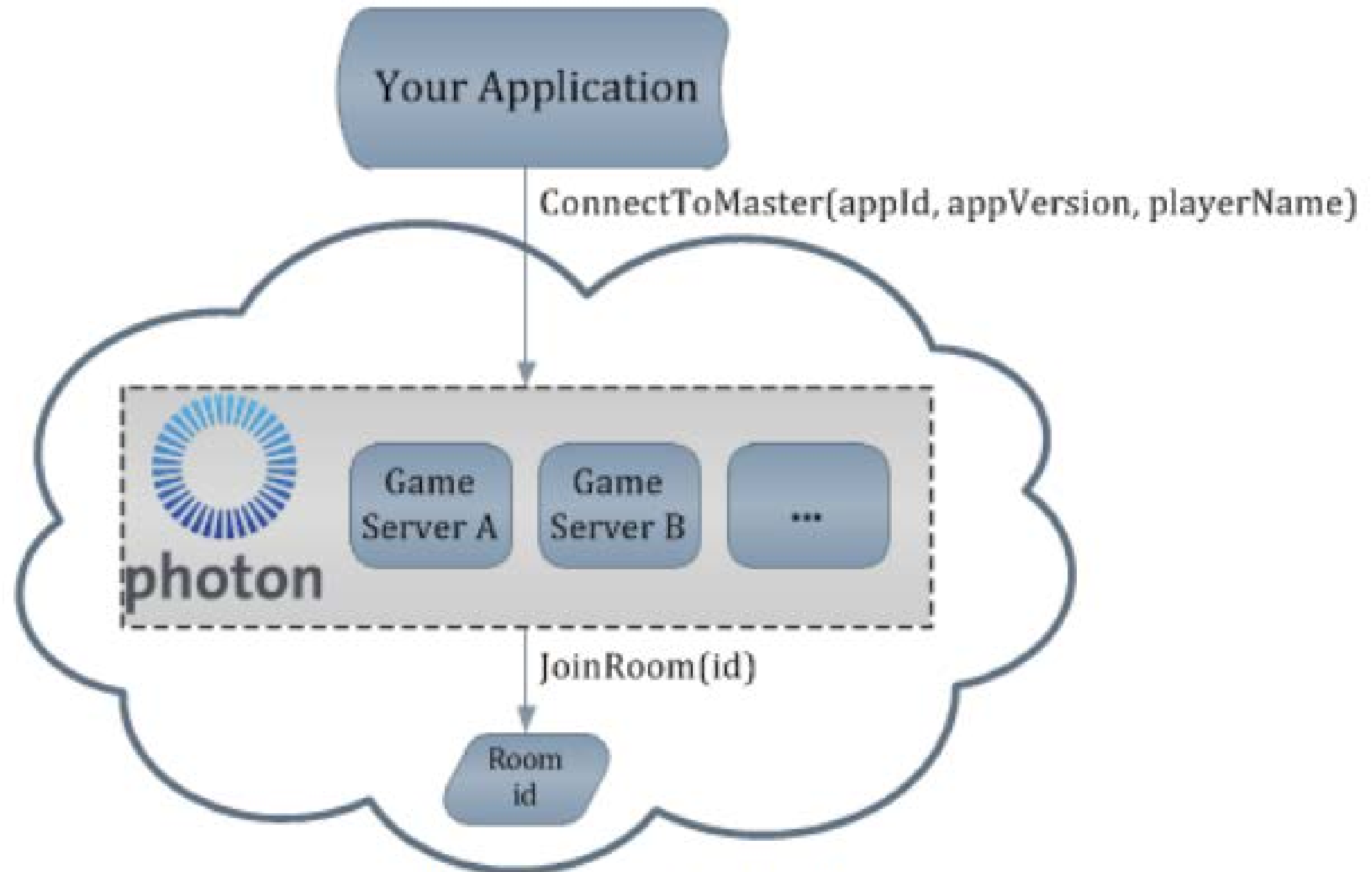
Plan	20 CCU
Peak Current Month	0 CCU →
Peak Previous Month	0 CCU
Rejected Peers	0

[Analyze](#)[Manage](#)[Change CCU](#)[Add Coupon / PUN+](#)

App ID: 911a6e64-0...

This app is on the free plan.
We recommend you to [upgrade before using it in production.](#)

Lobby, Create Room and Join Room

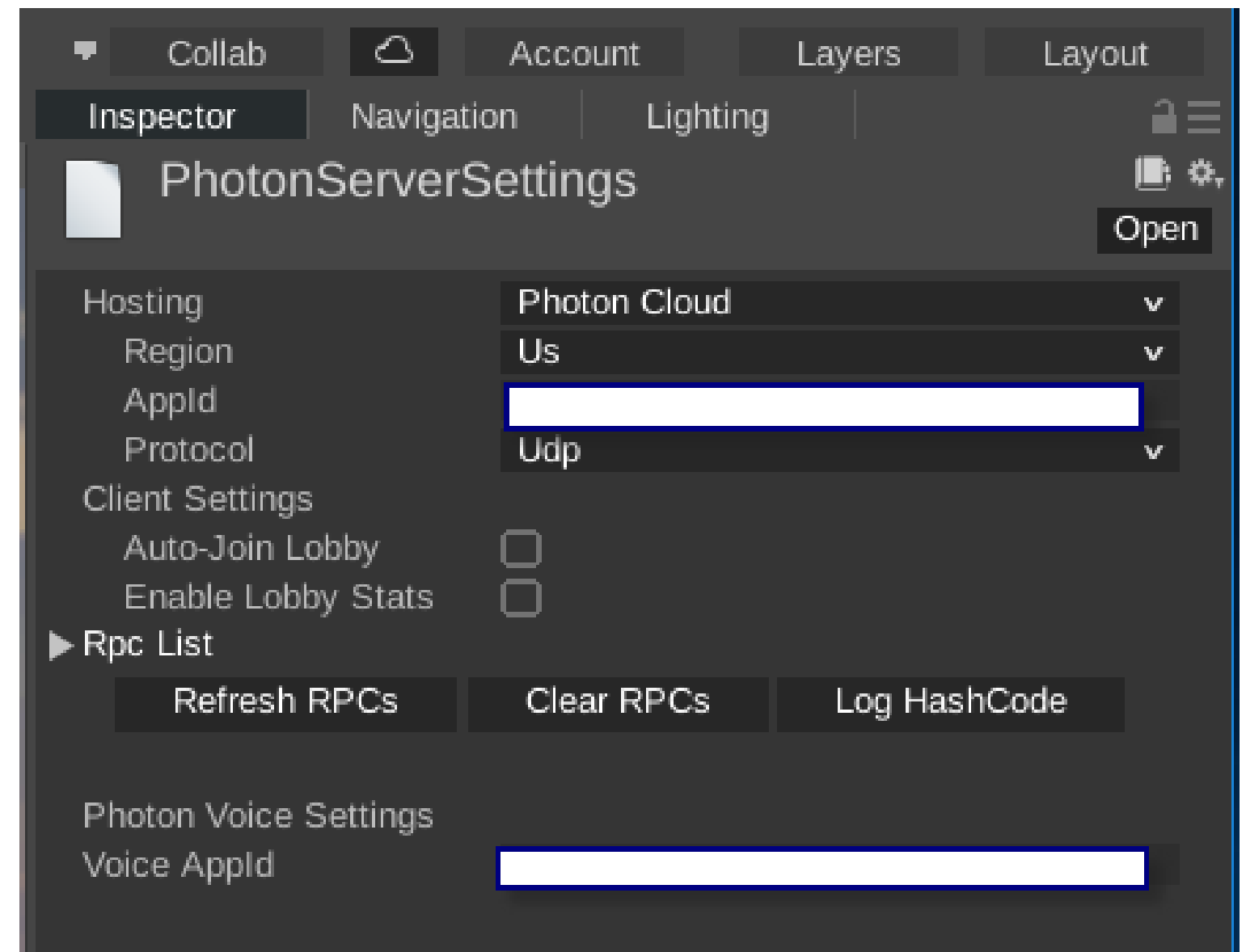
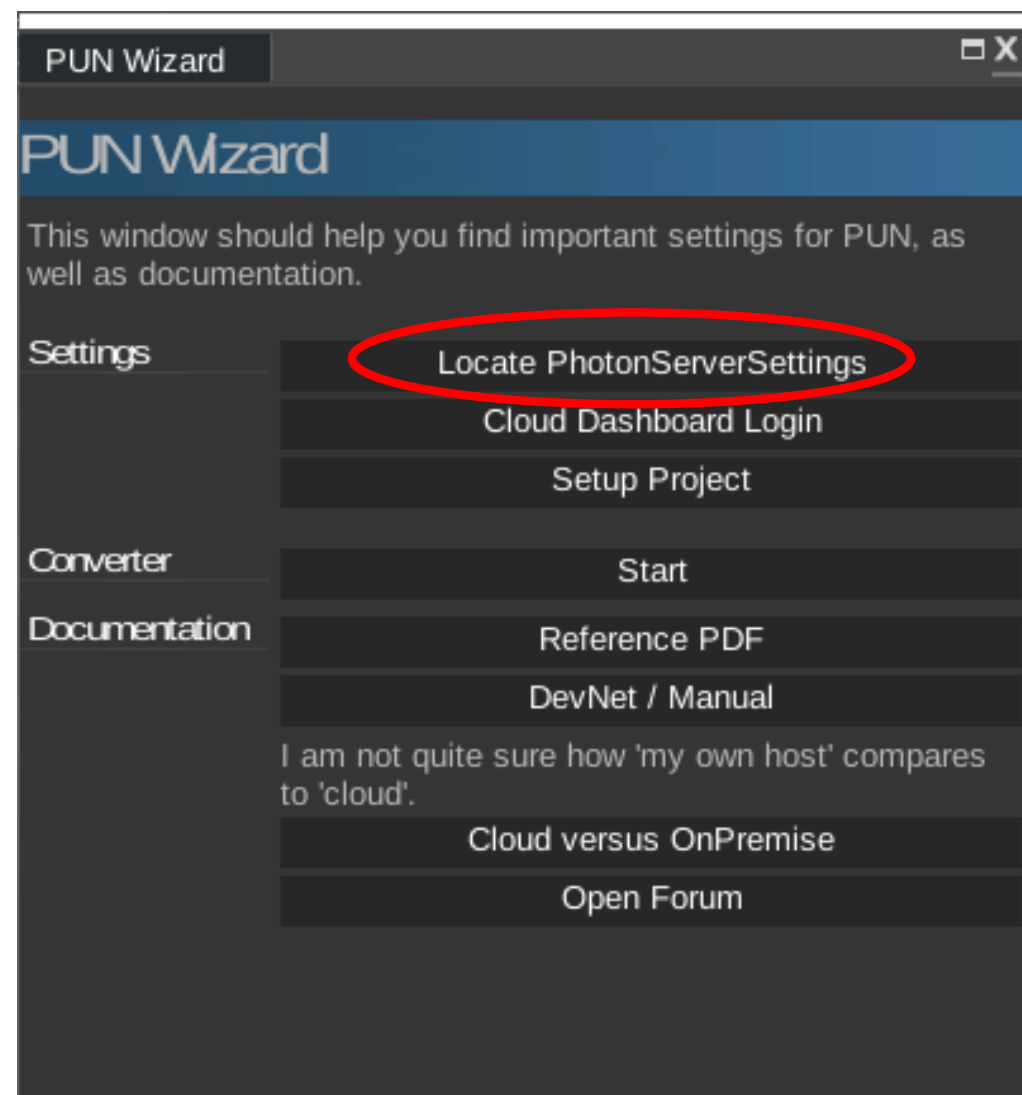
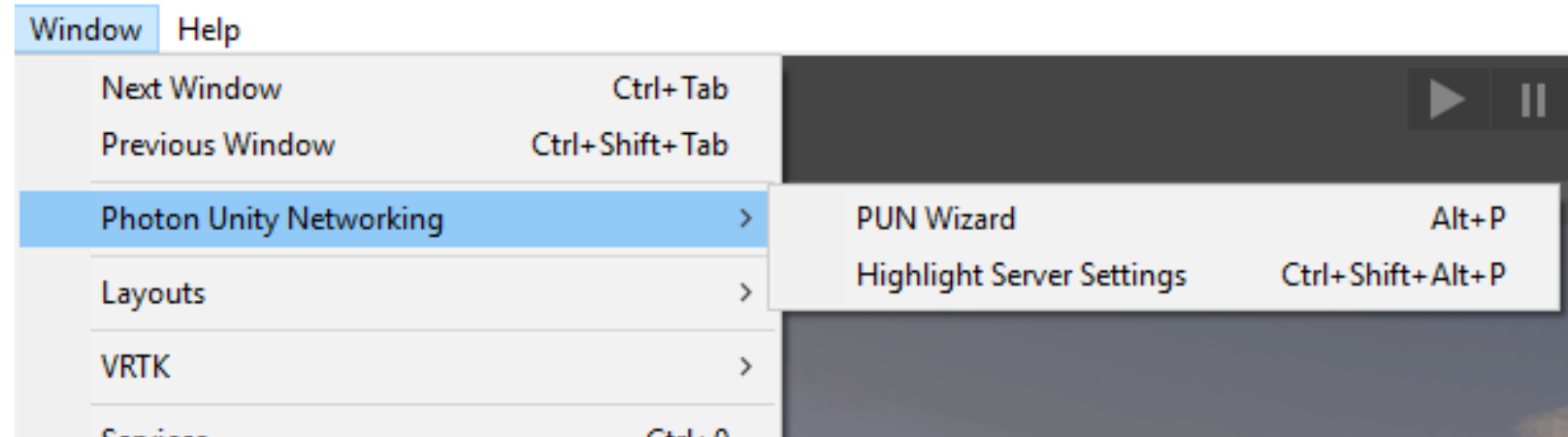


Photon Cloud Simple Workflow

PUN – Photon Unity Networking

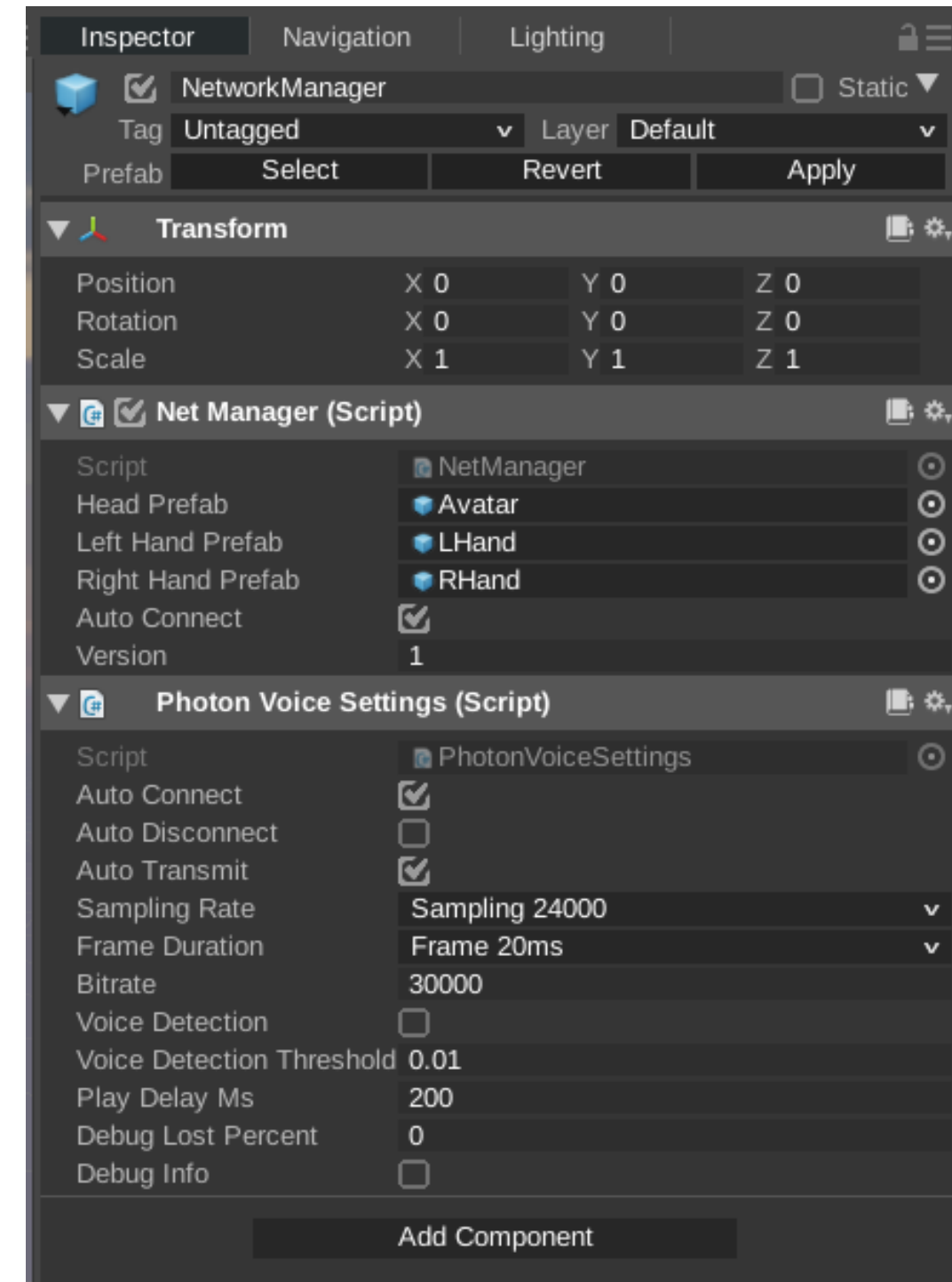
- Installing the Photon Unity Networking package
- Setup Photon account
- Implement server creation and joining an existing host.
- Spawning as a player and how objects can be created on the network.
- Network communication using State Synchronization and Remote Procedure Calls.
- Interpolating and predicting values between data packages.

PUN Wizard



Create Network Manager

- Create NetworkManager under Player
- Create Net Manager Script
- Create Photon Voice Settings script



Connect

- Create Net_Manager script
 - Add connection string to Start()
 - Add OnConnectedToMaster() → PhotonNetwork.JoinRandomRoom()
 - Add OnPhotonRandomJoinFailed() → PhotonNetwork.CreateRoom()
 - Add OnFailedToConnectToPhoton() → Disconnect if failed to join
 - Add OnJoinedRoom → Successfully joined a room
 - Instantiate game objects

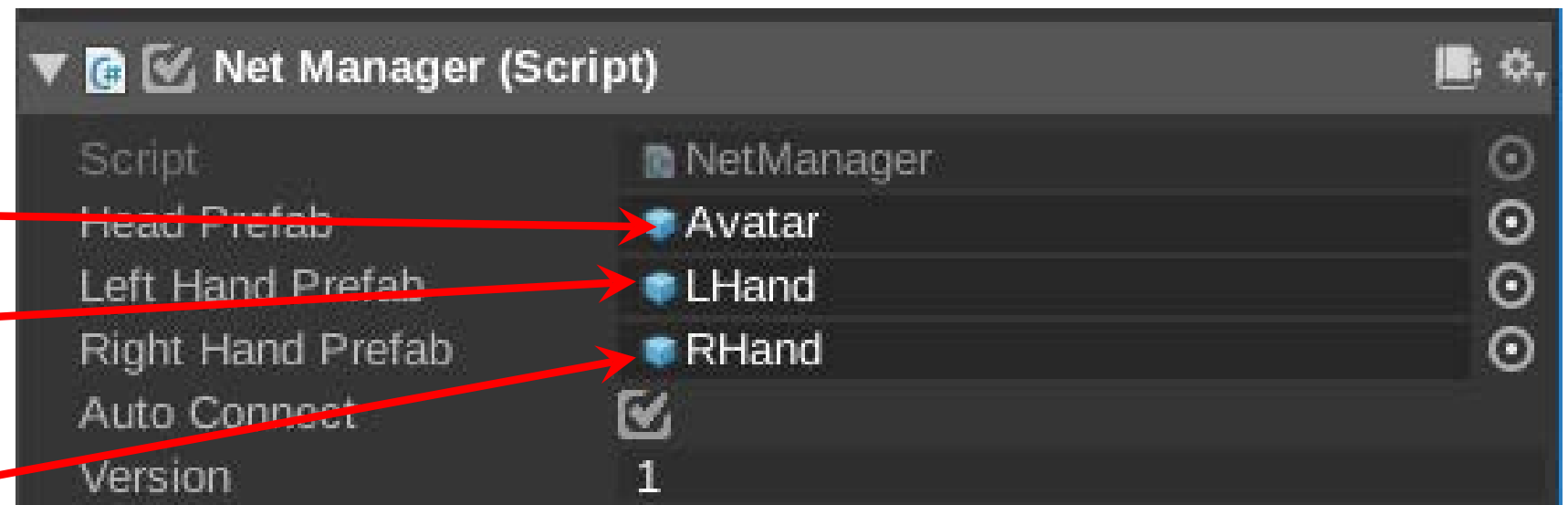
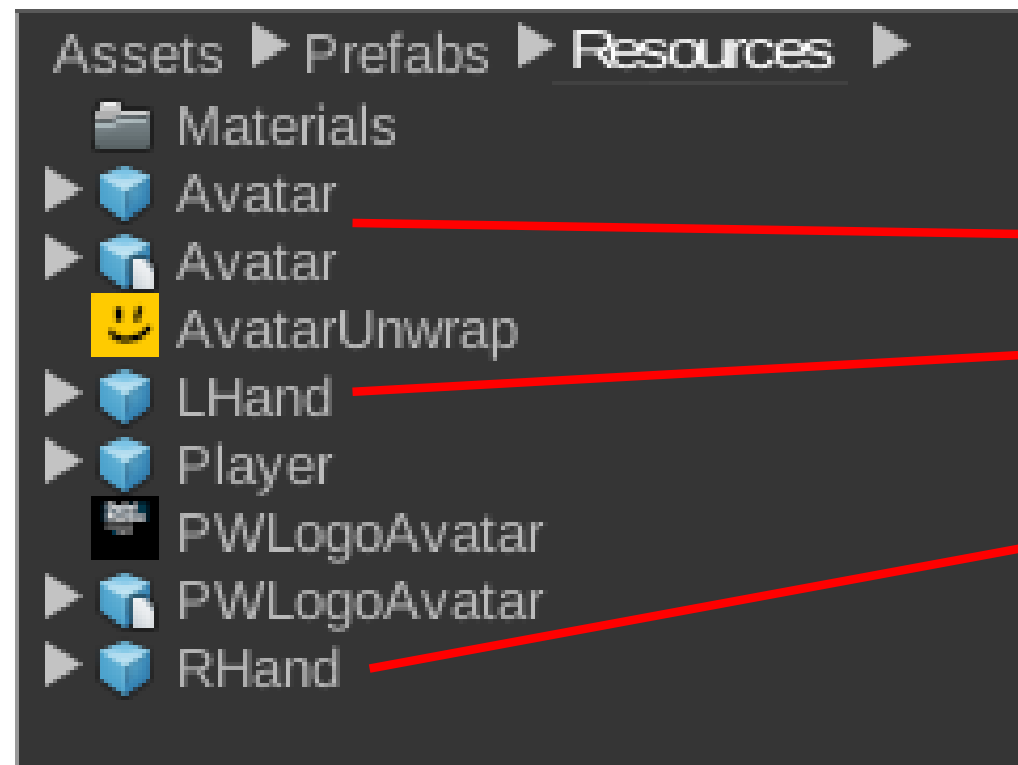
PhotonNetwork.Instantiate(PrefabName, position, rotation, group, data)

OnJoinedRoom()

```
public class NetManager : MonoBehaviour {  
  
    public GameObject headPrefab;  
    public GameObject leftHandPrefab;  
    public GameObject rightHandPrefab;
```

```
public void OnJoinedRoom()  
{  
    Debug.Log("OnJoinedRoom() called by PUN. Now this client is in a room. From here on, your game would be running. For reference, all callbacks are listed in  
    PhotonNetwork.Instantiate(headPrefab.name, ViveManager.Instance.head.transform.position, ViveManager.Instance.head.transform.rotation, 0);  
    PhotonNetwork.Instantiate(leftHandPrefab.name, ViveManager.Instance.leftHand.transform.position, ViveManager.Instance.leftHand.transform.rotation, 0);  
    PhotonNetwork.Instantiate(rightHandPrefab.name, ViveManager.Instance.rightHand.transform.position, ViveManager.Instance.rightHand.transform.rotation, 0);  
}
```

Resources



Net Manager

```
NetManager.cs* PhotonVoiceSettings.cs Object Browser
Photon5.6VR NetManager
1 using System.Collections;
2   using System.Collections.Generic;
3   using UnityEngine;
4
5 public class NetManager : MonoBehaviour {
6
7     public GameObject headPrefab;
8     public GameObject leftHandPrefab;
9     public GameObject rightHandPrefab;
10
11     /// <summary>Connect automatically? If false you can set this to true later c
12     public bool AutoConnect = true;
13
14     public byte Version = 1;
15
16     /// <summary>if we don't want to connect in Start(), we have to "remember" if
17     private bool ConnectInUpdate = true;
18
19     + public virtual void Start()...
24
25     + // below, we implement some callbacks of PUN ...
27
28     + public virtual void OnConnectedToMaster()...
33
34     + public virtual void OnJoinedLobby()...
39
40     + public virtual void OnPhotonRandomJoinFailed()...
45
46     // the following methods are implemented to give you some context. re-impleme
47
48     + public virtual void OnFailedToConnectToPhoton(DisconnectCause cause)...
52
53     + public void OnJoinedRoom()...
60 }
61
```

Selfie

Lucy



RenderTarget & Texture2D

- A very quick way to make a live selfie camera in your game:
- Create a new Render Texture asset using **Assets >Create >Render Texture**.
- Create a new Camera using **GameObject > Camera**.
- Assign the Render Texture to the **Target Texture** of the new Camera.
- Create a wide, tall and thin box to represent the selfie camera screen
- Drag the Render Texture onto it to create a Material that uses the render texture.
- Enter Play Mode, and observe that the box's texture is updated in real-time based on the new Camera's output.

Selfie

```
1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4
5 public class HiResImage : MonoBehaviour {
6
7     public int resWidth = 2550;
8     public int resHeight = 3300;
9
10    public SteamVR_TrackedObject controller;
11
12    public Camera camera;
13
14    private bool takeHiResShot = false;
15
16    public static string ScreenshotName(int width, int height)
17    {
18        return string.Format("{0}/screenshots/screen_{1}x{2}_{3}.png",
19            Application.dataPath,
20            width, height,
21            System.DateTime.Now.ToString("yyyy-MM-dd_HH-mm-ss"));
22    }
23
24    public void TakeHiResShot()
25    {
26        takeHiResShot = true;
27    }
28
29    void LateUpdate()
30    {
31        var device = SteamVR_Controller.Input((int)controller.index);
32        takeHiResShot |= device.GetTouchDown(SteamVR_Controller.ButtonMask.Trigger);
33        if (takeHiResShot)
34        {
35            RenderTexture original = camera.targetTexture;
36            RenderTexture rt = new RenderTexture(resWidth, resHeight, 24);
37            camera.targetTexture = rt;
38            Texture2D screenshot = new Texture2D(resWidth, resHeight, TextureFormat.RGB24, false);
39            camera.Render();
40            RenderTexture.active = rt;
41            screenshot.ReadPixels(new Rect(0, 0, resWidth, resHeight), 0, 0);
42            camera.targetTexture = original;
43            RenderTexture.active = null; // JC: added to avoid errors
44            Destroy(rt);
45            byte[] bytes = screenshot.EncodeToPNG();
46            string filename = ScreenshotName(resWidth, resHeight);
47            System.IO.File.WriteAllBytes(filename, bytes);
48            Debug.Log(string.Format("Took screenshot to: {0}", filename));
49            takeHiResShot = false;
50        }
51    }
52 }
```

- <https://answers.unity.com/questions/22954/how-to-save-a-picture-take-screenshot-from-a-camer.html>

Selfie picture



Selfie Group Shot!



Thank you

Please fill out your survey

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Make anything.