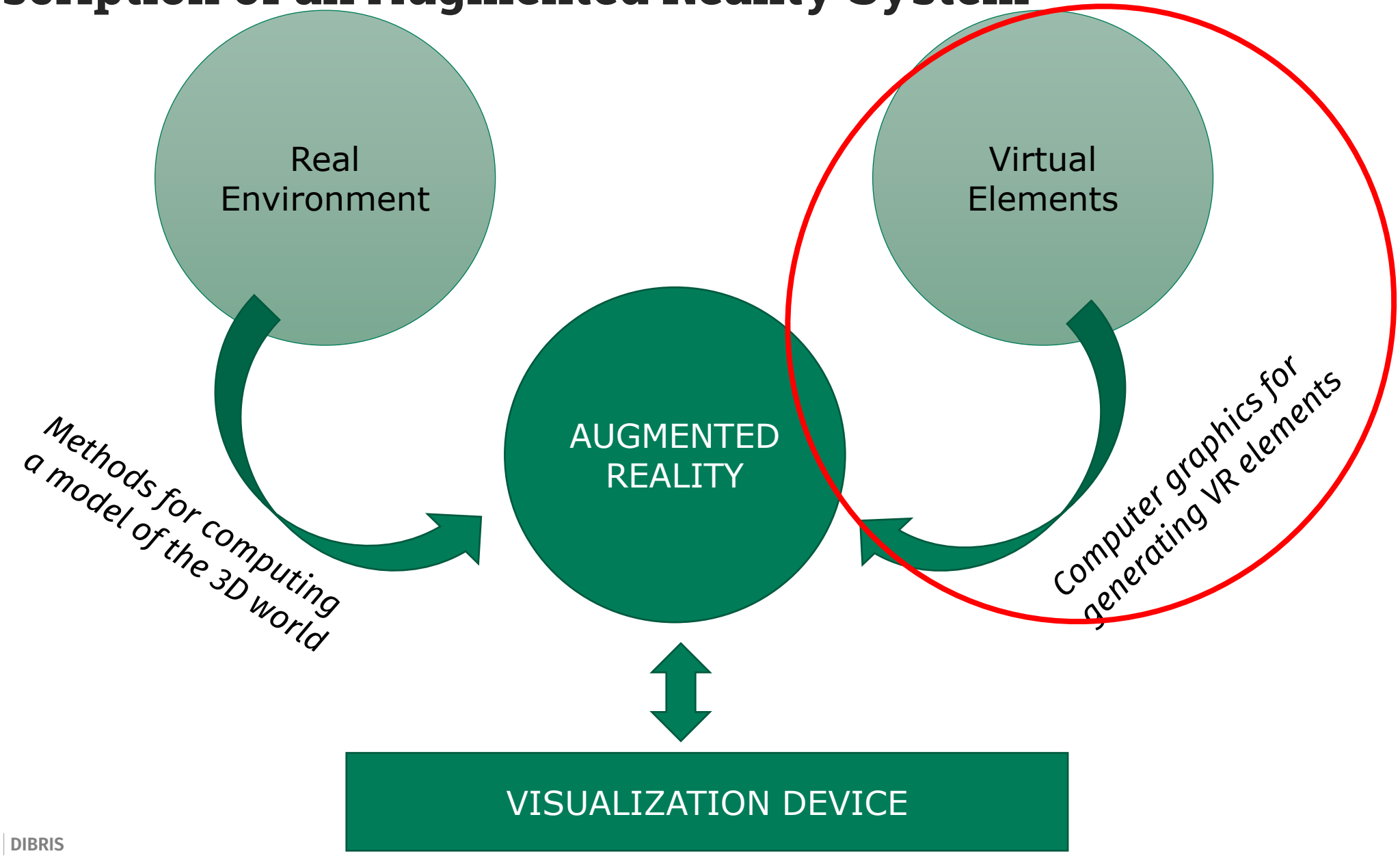
Università di Genova
DIBRIS DIPARTIMENTO
DI INFORMATICA, BIOINGEGNERIA,
ROBOTICA E INGEGNERIA DEI SISTEMI

Augmented Reality

Lecture 4 – sw for VR development

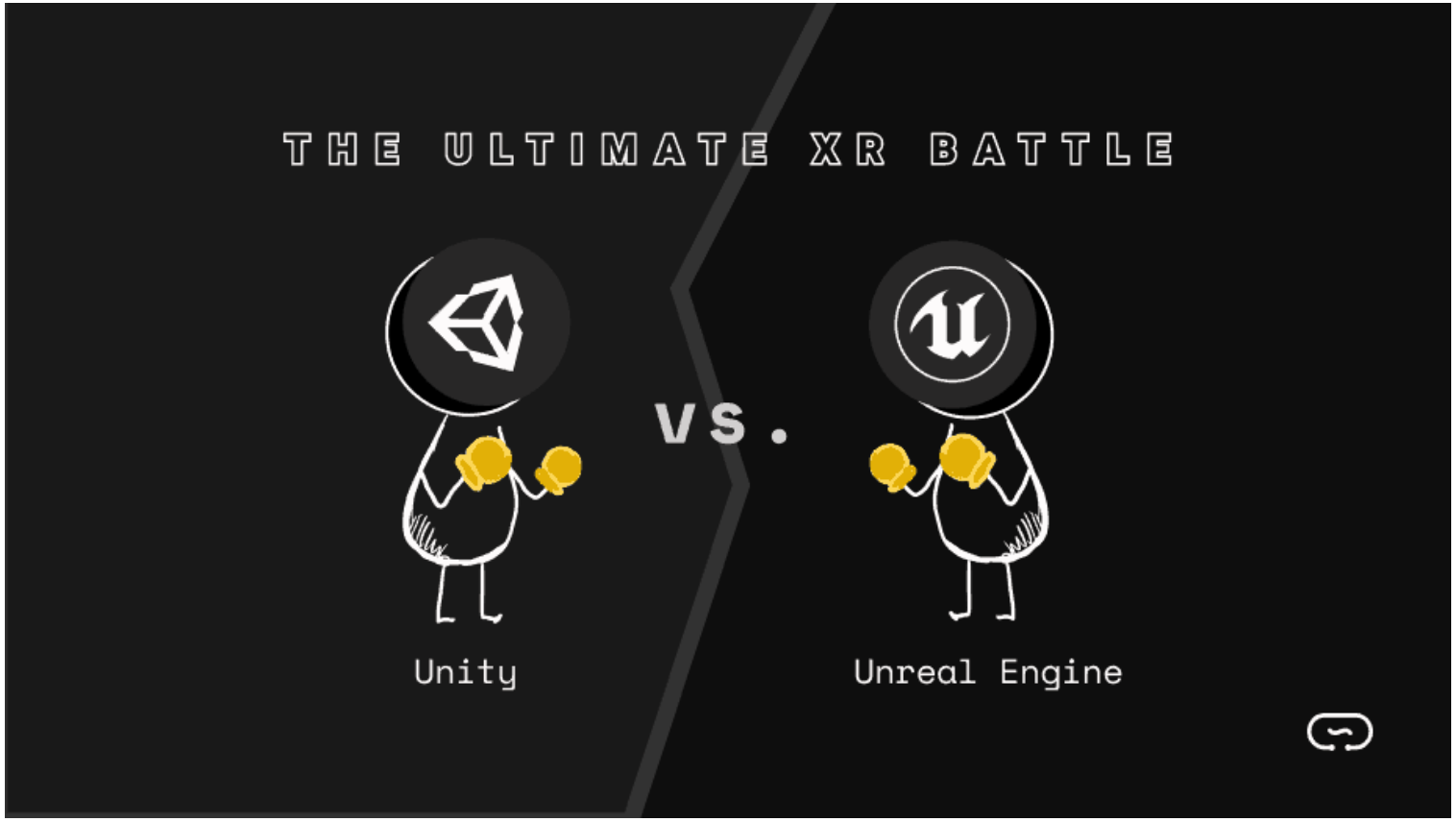
Manuela Chessa – manuela.chessa@unige.it
Fabio Solari – fabio.solari@unige.it

Description of an Augmented Reality System



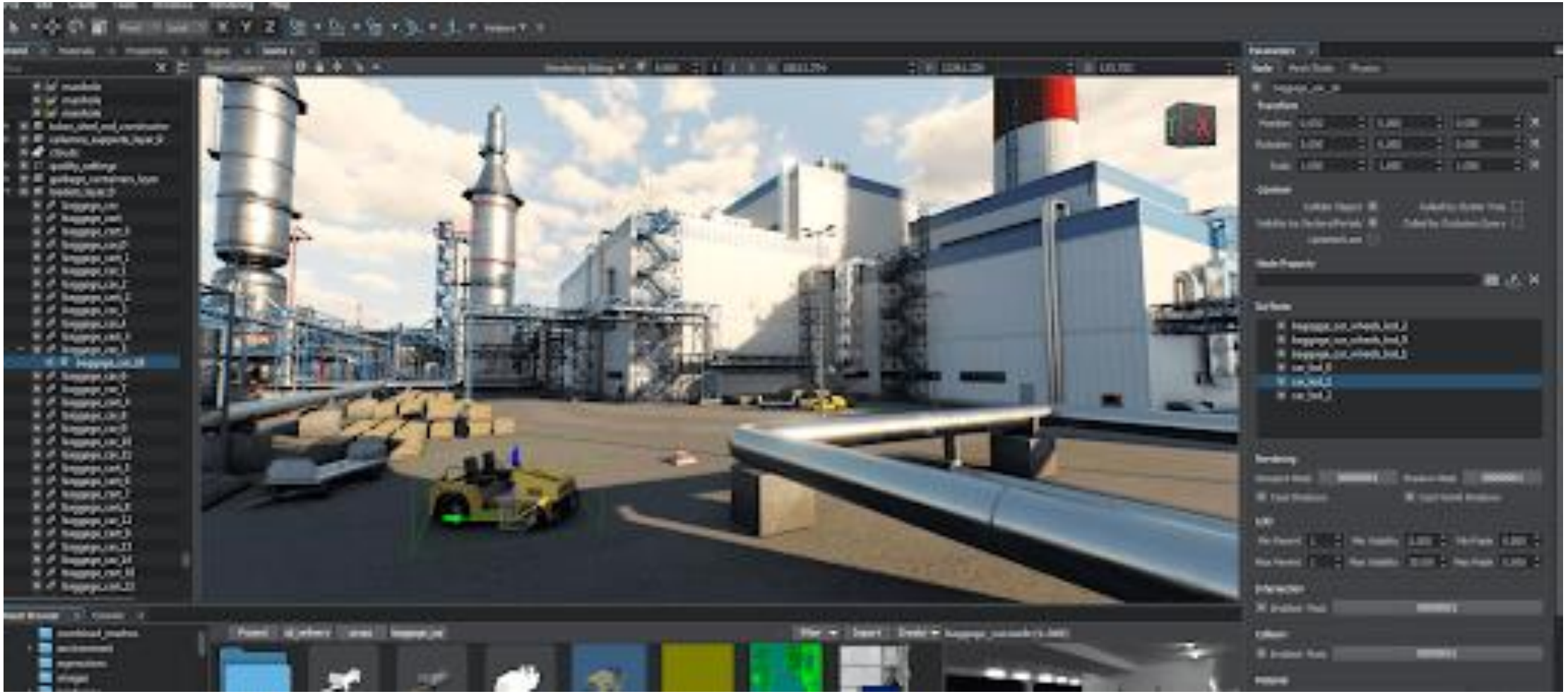
Frameworks for creating VR environments

Game engines



https://circuitstream.com/blog/unity-vs-unreal/

Unity - game engine



Unity - game engine

Unity is a cross-platform game engine developed by Unity Technologies, first announced and released in June 2005

Unity3D is a development engine that was first released in 2005. Since then it’s become the most popular 3D and 2D development platform in the world. Here are just a few stats:

- 60% of AR/VR content and 50% of mobile games are made with Unity3D

- Over 24 billion installs of engine in the last 12 months

- Supports 28 platforms (from iOS and Android to Oculus and Windows Mixed Reality and all in-between)

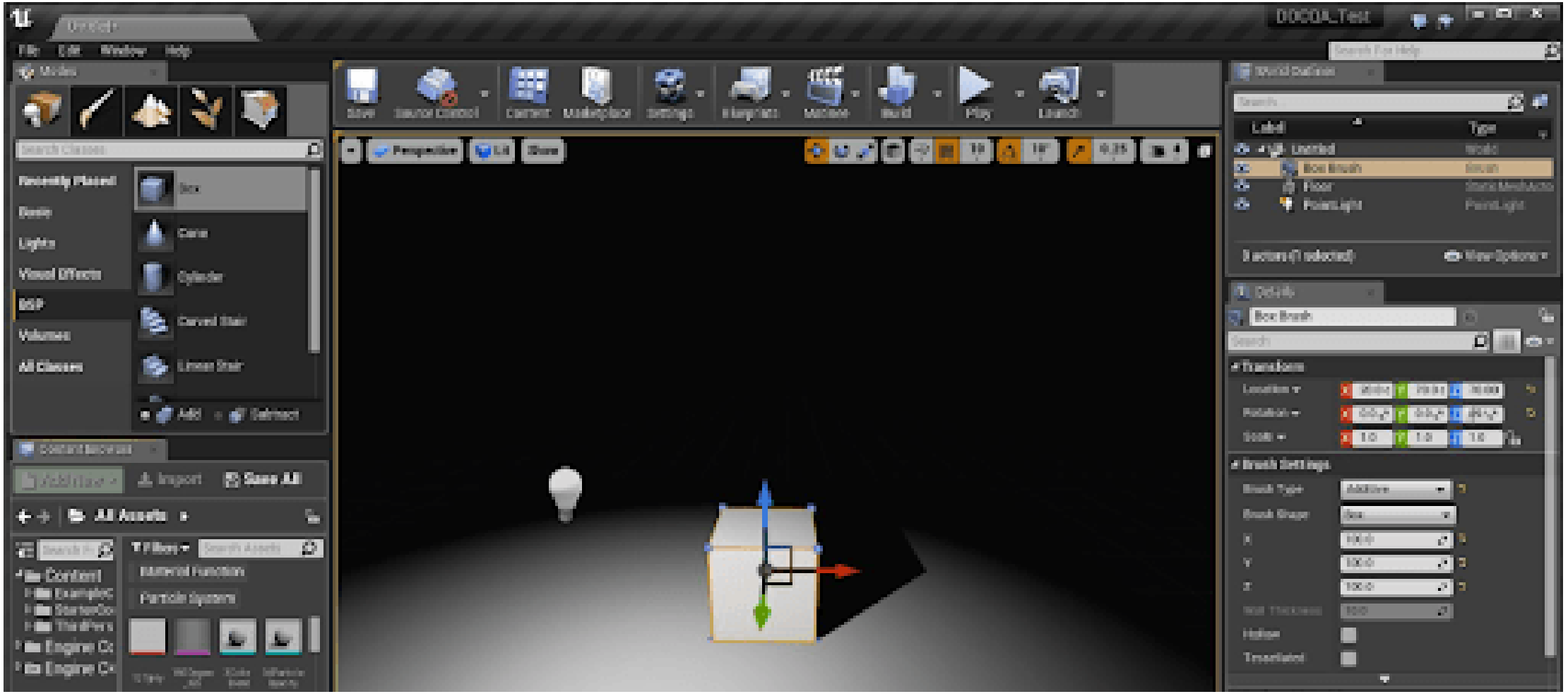
Unity - game engine

Due to its high popularity with mobile platforms, there's a persistent myth that Unity3D is only good for mobile-oriented projects.

That is mostly because, in the past, Unity3D themselves heavily targeted the mobile market, especially during the rise of the Apple's AppStore and Google's Play Market.

In truth, in the last few years the engine has advanced so much that now it's a multi-faceted development platform that can be used for any complex XR solution.

Unreal - game engine



Unreal - game engine

Unreal Engine has a long history as a game engine dating back to 1998. Over its lifespan it was licensed to a handful of AAA-studios for titles like Unreal/Unreal Tournament, and Deus Ex. It's had several iterations, such as Unreal Engine 2 & 3.

Things took a U-turn in 2015, when the 4th version of this ubiquitous development engine was made free to the general public.

Unreal - game engine

There is no royalty if you are using the Unreal Engine for architecture, automotive, film, television, broadcast, live events, training and simulation, or other non-games projects

- More than 7 million users from the design and enterprise community
- Over 15 supported platforms

Unreal Engine 4 can be used for VR/AR development, 2D games, 3D and mobile development alike. It is true that Unreal is used far more often on PC games while Unity is dominating the mobile game market.

Unity vs Unreal

Both have an infrastructure that consists of assets stores, documentation, and community.

You can create 3D assets from scratch using a 3D modeling software such as Maya, Blender or 3ds Max, or you can purchase the assets via the Assets Store.

Both Unity and Unreal Engine have assets markets that allow you to purchase pre-made 3D models, objects, environments and so on.

Unity vs Unreal – the development process

Perhaps, the biggest difference between the two engines is that they utilize different programming languages.

Although there are several programming languages you can use with Unity3D, the primary language for the platform is C#.

Unreal Engine 4, on the other hand, allows developers to choose between C++ programming and Blueprint visual scripting system.

Unreal - blueprints

The Blueprint Visual Scripting system in Unreal Engine is a complete gameplay scripting system based on the concept of using a node-based interface to create gameplay elements from within Unreal Editor.

Unity vs Unreal – graphics comparison

Myth: If you need stunning graphics, use Unreal Engine 4

Truth: Both Unreal Engine 4 and Unity3D are capable of creating photo-realistic scenes and provide tools for creating stunning visuals

With Unity3D, you may need some tweaking to get the best out of your 3D assets.

However, if you're using Blueprints, complex node workflows may cause performance issues.

A large amount of nodes, complicated math, and resource-demanding operational loops may slow things down compared to an optimized C++ code solution.

Other less famous game engines

Cryengine (another game engine,multiplatform)

Amazon Lumberyard – O3DE

Other…

Creation of 3D contents (not exhaustive list)

Blender: an open-source 3D creation suite, and it's free

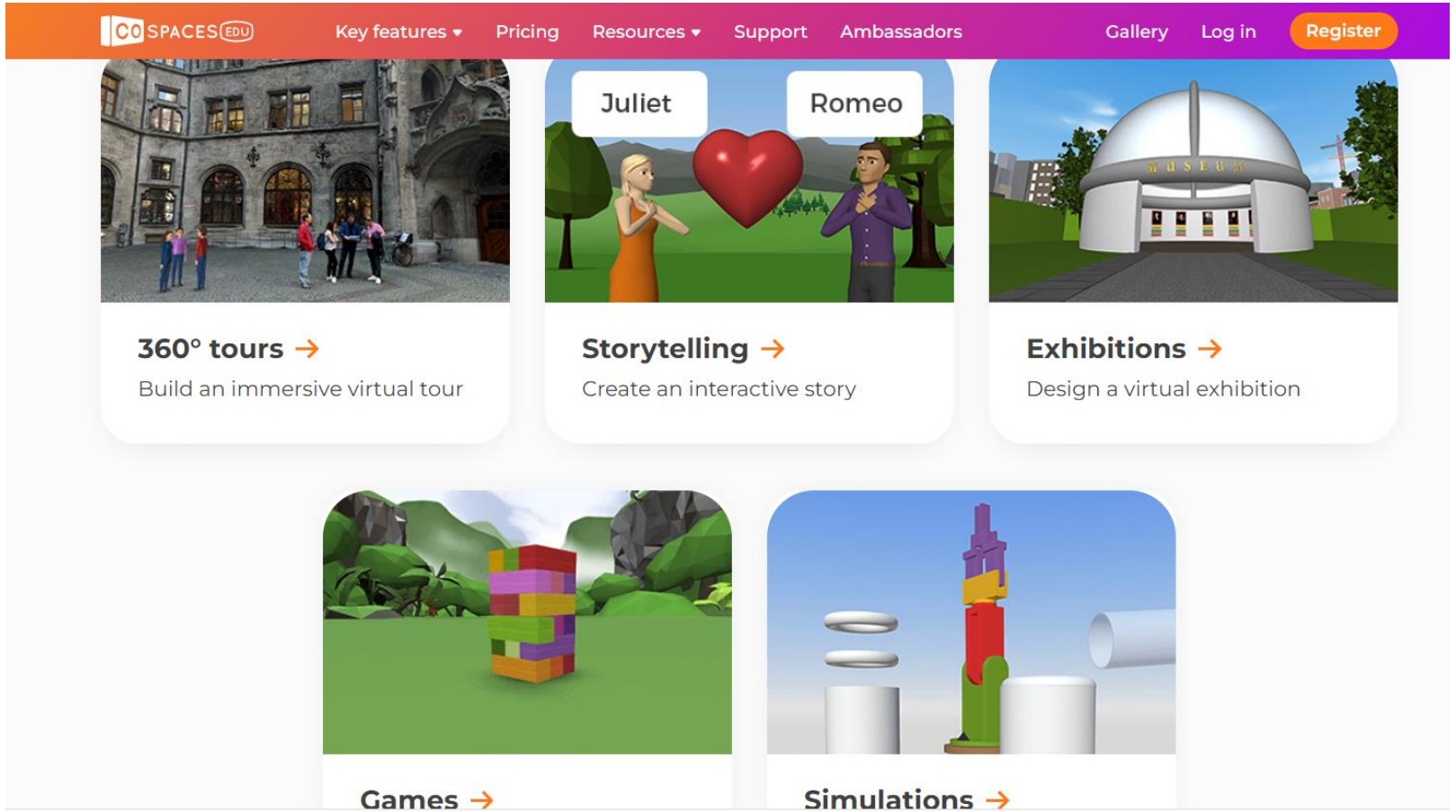
3ds Max: popular 3D modeling and rendering software from Autodesk, and you can use it for design visualization, creation of video games, etc

Sketchup Studio: 3D modeling tool focused on the construction industry and architecture, but you can use it for virtual reality app development.

Maya: VR software development tool from Autodesk. With Maya, you can create 3D animations, motion graphics, and VFX software.

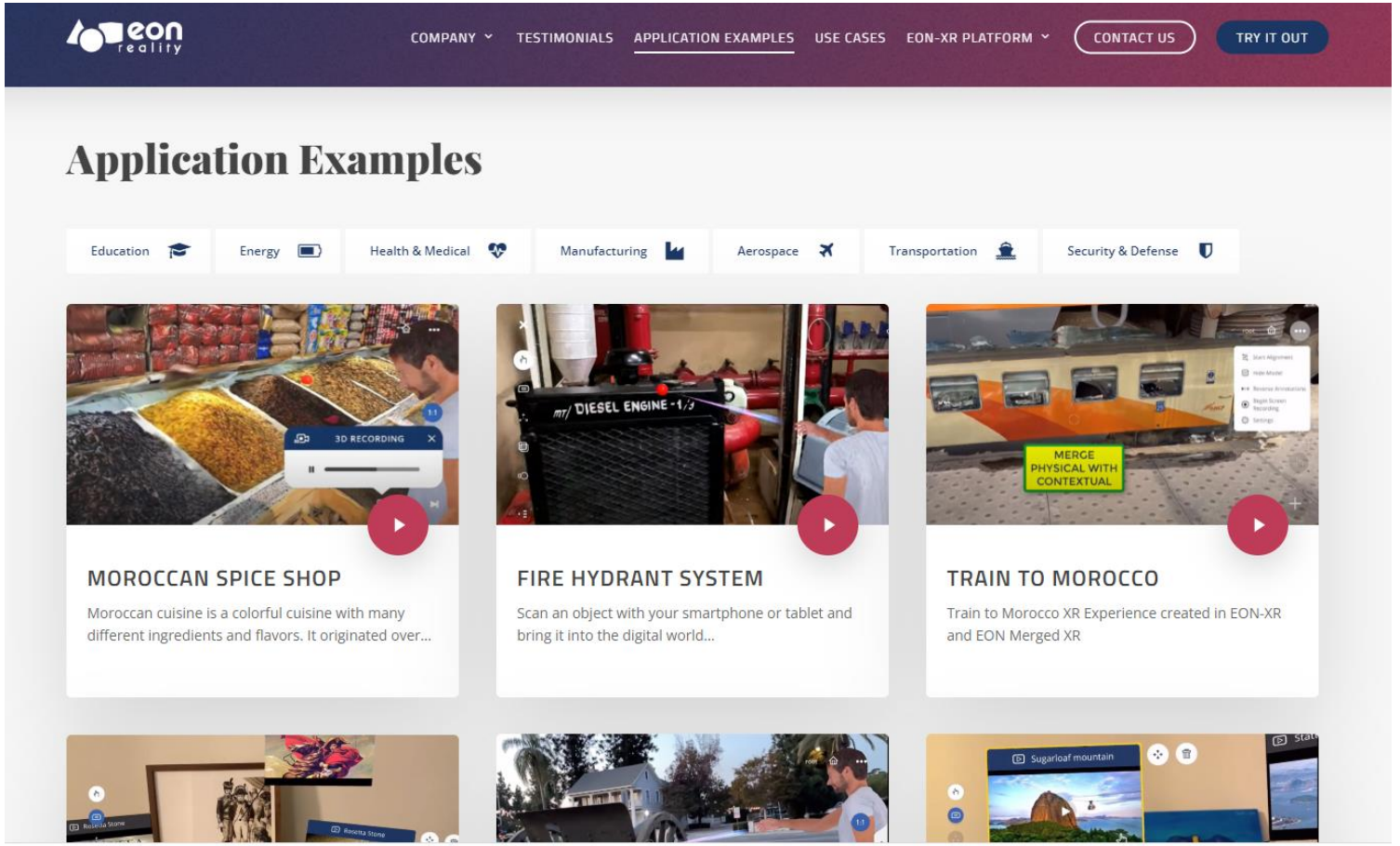
Creation of VR contents (for educational)

Cospaces: https://www.cospaces.io/edu/



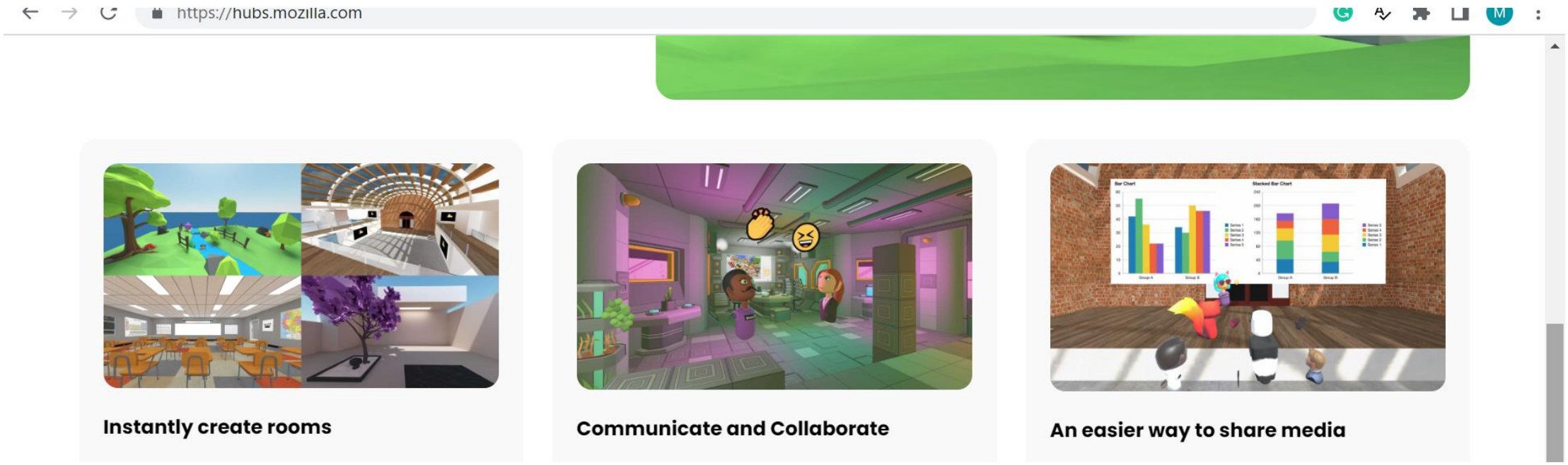
Creation of VR contents (for educational, exhibitions,…)

Eon XR: https://eonreality.com/



Creation of collaborative VR environments

Mozilla Hubs: https://hubs.mozilla.com/



VR on the web

WebXR: https://www.w3.org/TR/2022/CRD-webxr-20220601/

VR on the web

A-frame: https://aframe.io/

A-Frame is a Web framework from Mozilla that allows building VE experience in the browser using HTML and Entity-Components.

A-Frame is a framework based on entity-component to build efficient VR modules through three.js structures

aframe.io/examples/showcase/helloworld/

A-FRAME

GET STARTED

Blog

A-Frame 1.1.0 - AR, Quest 2 ...

Examples

Hello WebVR

Model Viewer

Hand Tracking

Responsive UI

360° Image

360 Video

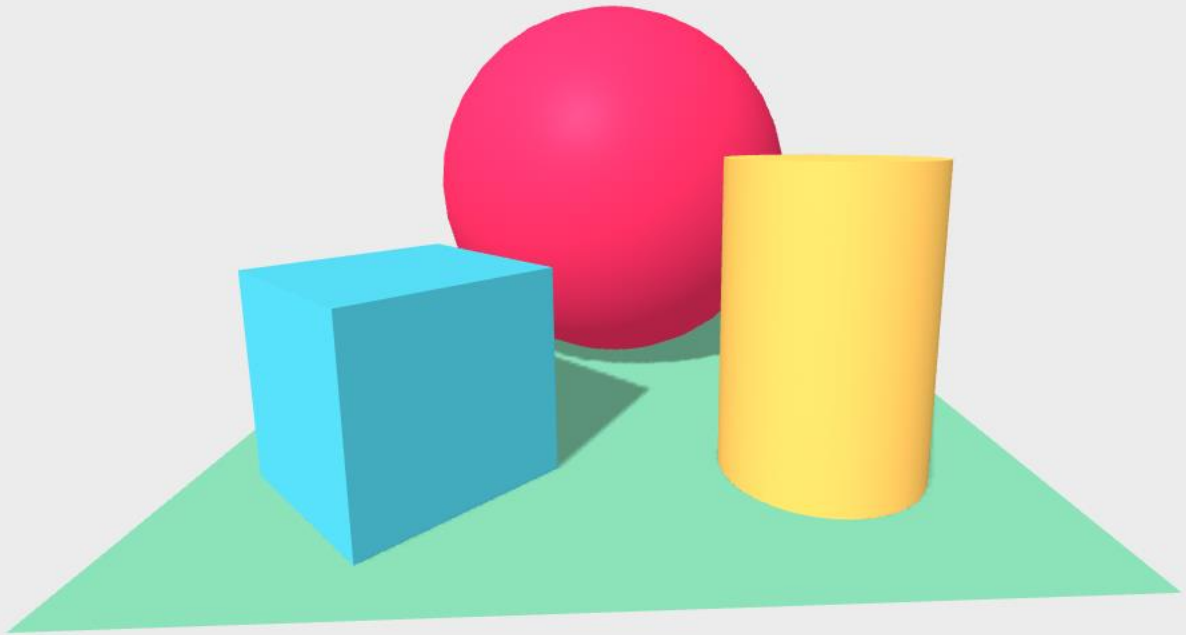
Anime UI

BeatSaver Viewer

Moon Rider

Gunters of OASIS

VISUAL INSPECTOR VIEW SOURCE



VR

Unity

UniGe

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