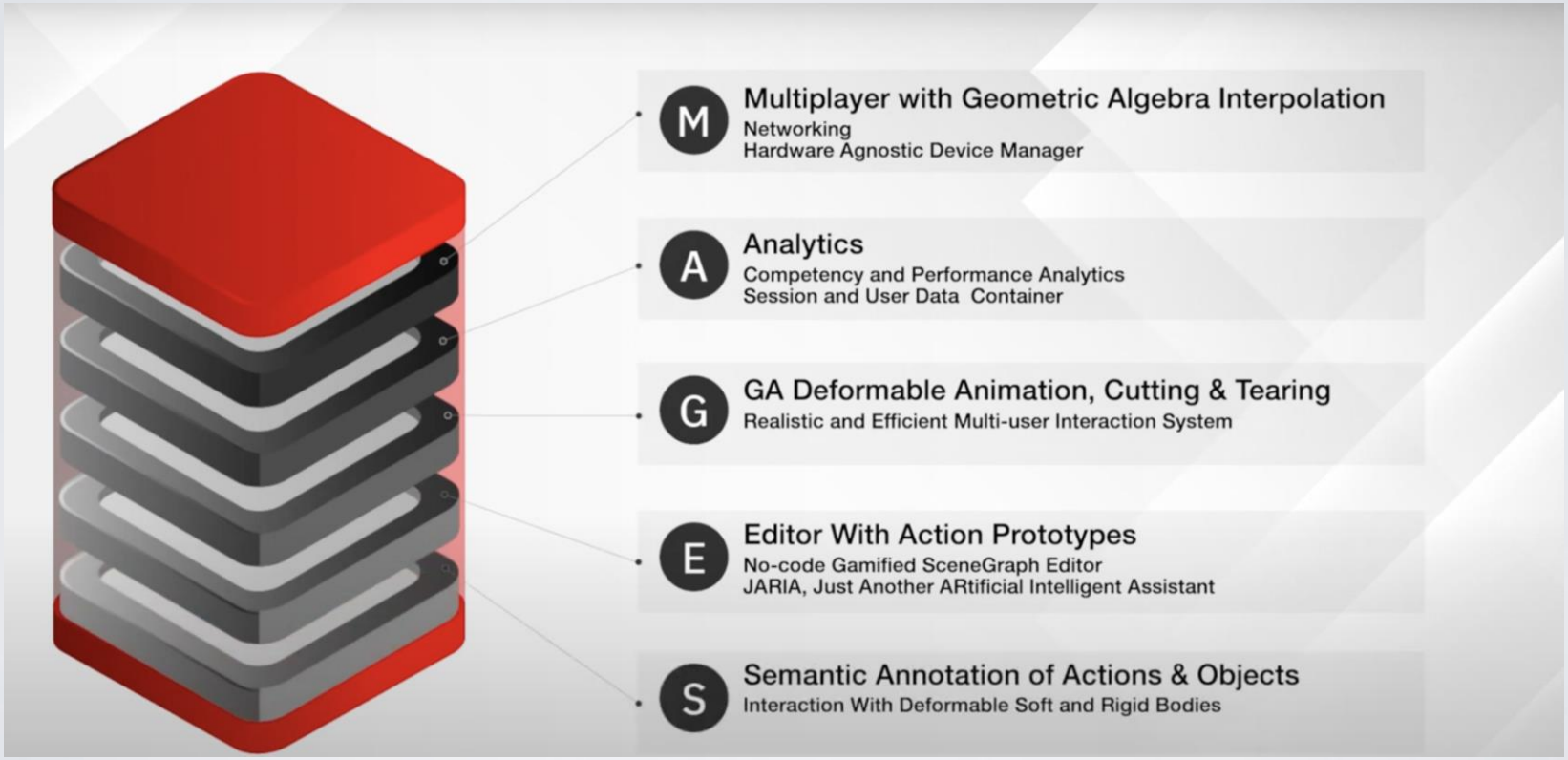
MAGES™ SDK Tutorial

Overview

- What is MAGES ™ SDK?
- Why MAGES ™ SDK?
- Installation in Unity
- Empty Scene Example
  - Action Patterns
  - Analytics
  - Testing in Play Mode

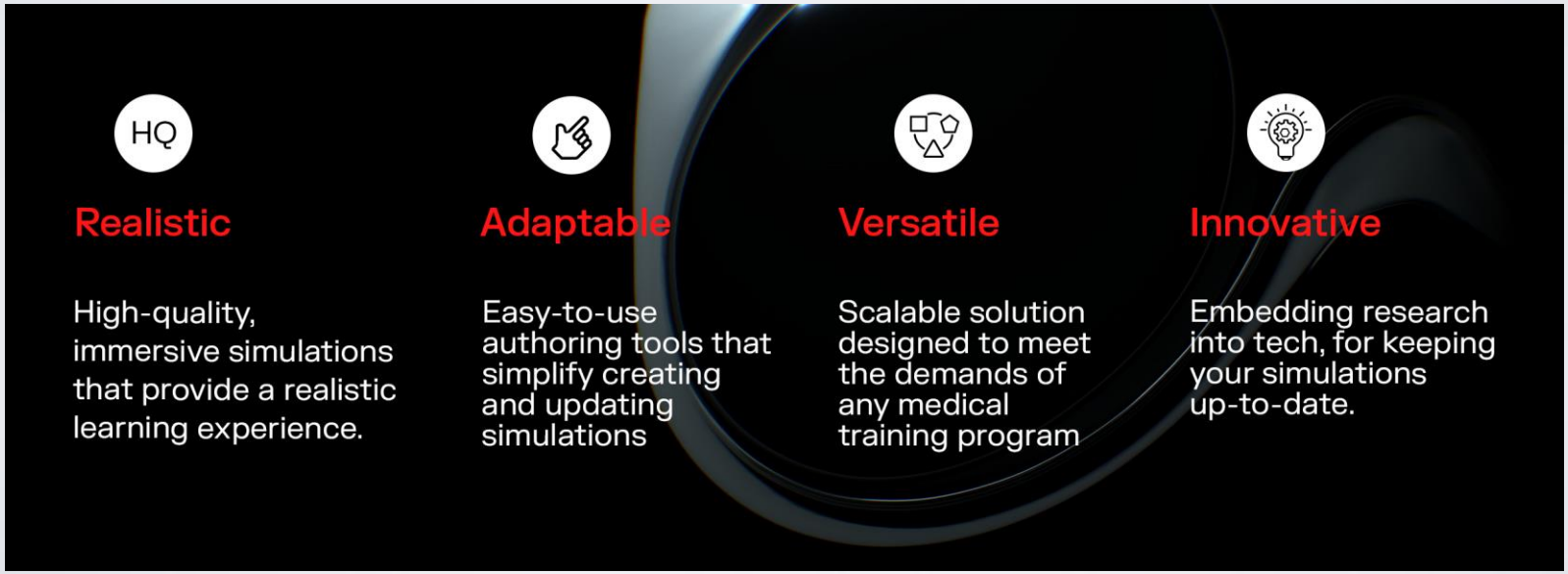
What is MAGES™ SDK?

- **MAGES™ SDK** is a powerful asset that lets you create immersive XR simulations.
- MAGES™ stands for:



Why MAGES™ SDK?

- Streamlines the process of creating high-quality XR simulations for training, assessment, teaching, and treatment.
- Allows developers to author, create, update, and future-proof simulations with the best technology can offer, in a fraction of development time.
- Provide accurate user task performance assessment, capable of reflecting the educational impact, enabling trainees to identify their missing skills and weaknesses and improve them.
- Efficacy of MAGES™ built simulations proven in multiple published clinical trials.



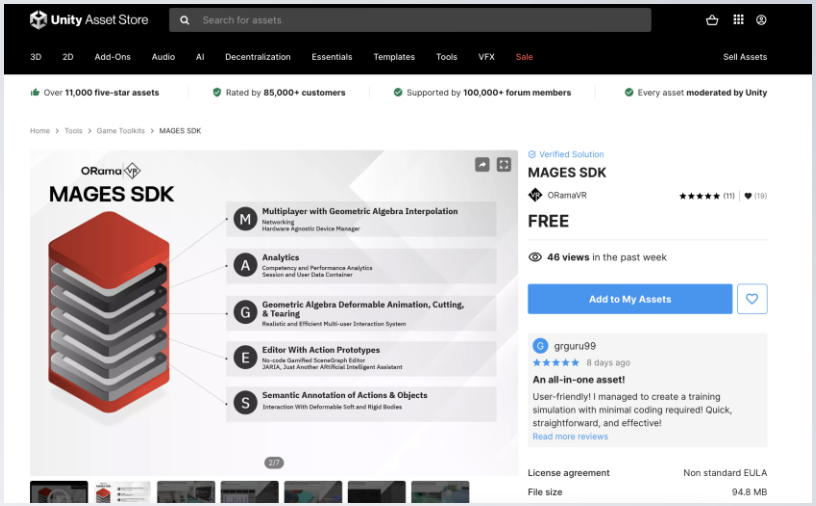
Why MAGES™ SDK?

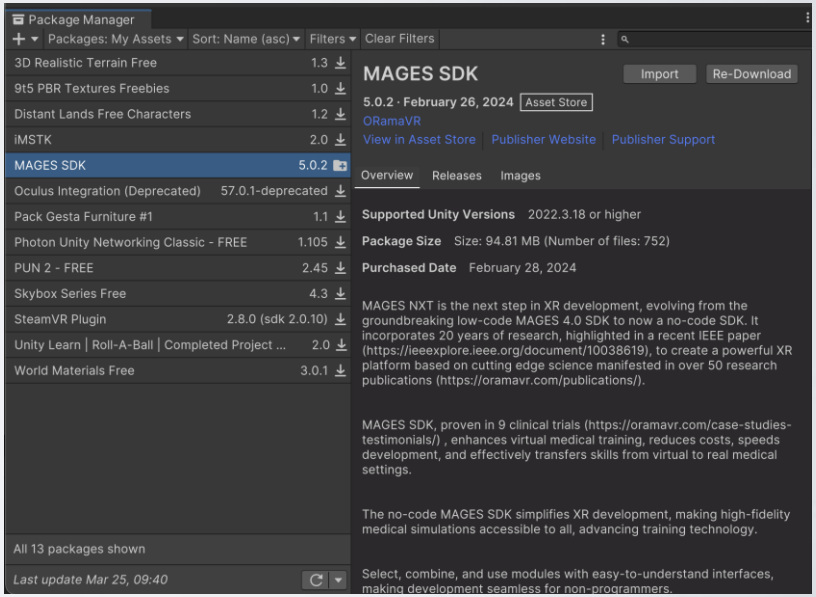
MAGES™ SDK Latest Version (NXT)

- The latest MAGES™ SDK version is the MAGES™ NXT, which these slides are about.
- MAGES™ NXT is the latest, largest update, providing a completely new way to experience MAGES™ SDK.
- It is an evolved version of the previous MAGES™ SDK version, allowing the developers to move from a low-code solution to a no-code solution for their simulations.

Installation in Unity (1/2)

- MAGES™ SDK is available for free in the Unity Asset Store.
- Click “Add to My Assets”.
  - Make sure that your **Unity Version is 2022.3.12 or later**.
- Open Unity and create a new project.
- Navigate to Windows → Package Manager.
- From the dropdown menu “Packages: In Project”, select “My Assets”.
- You should see MAGES™ SDK in the list. Download and import it to your project



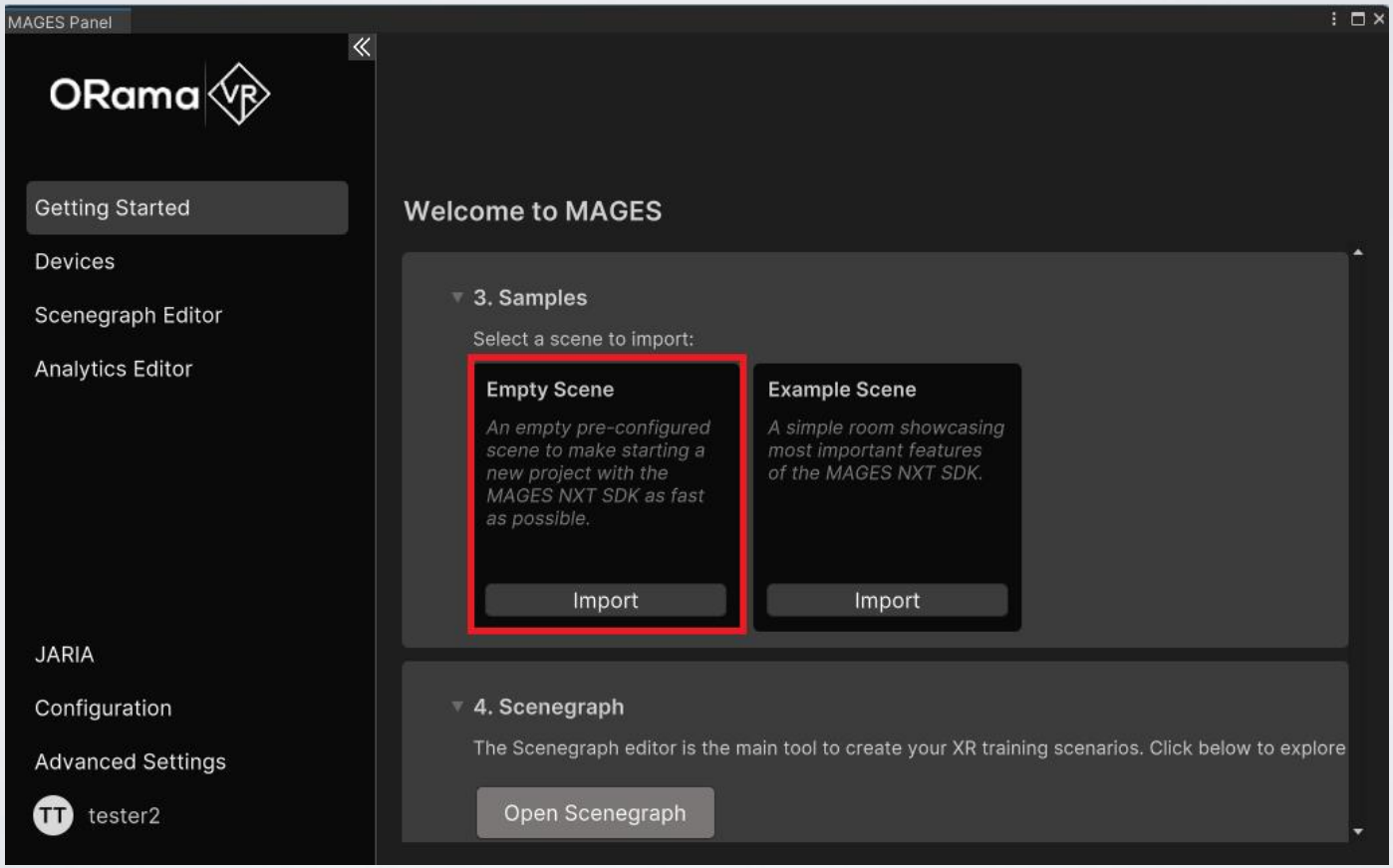


Installation in Unity (2/2)

- After the importing procedure is complete, follow the instructions mentioned in the official documentation, to proceed with the installation.
- You will need to sign up with a free ORamaVR account to use MAGES™ SDK.
- Always remember to consult the MAGES™ SDK documentation for every problem you may encounter, or extra information needed.

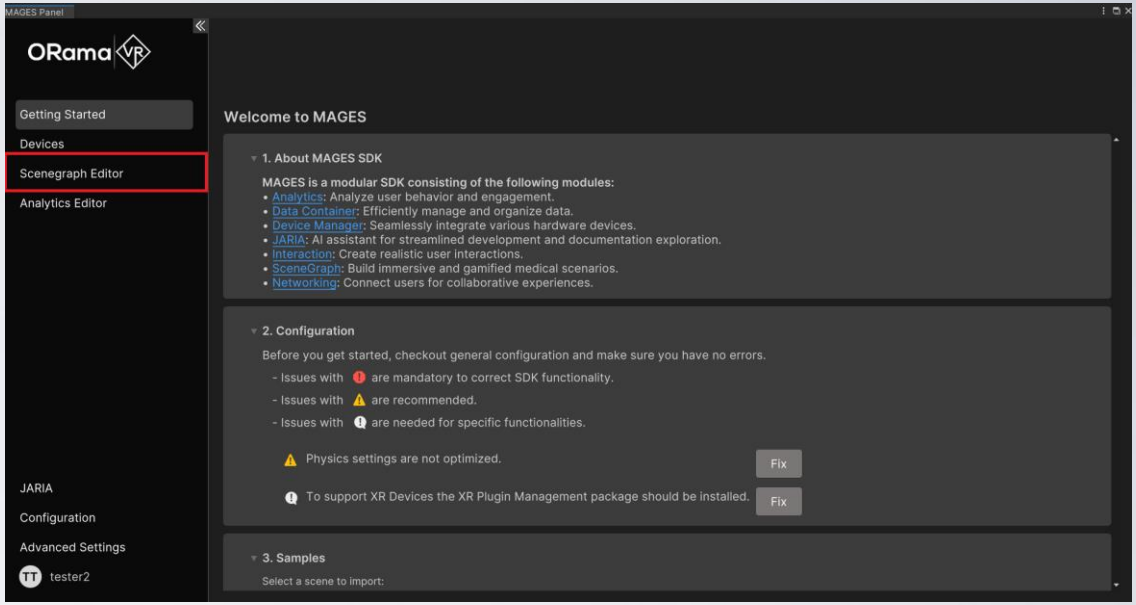
Import the MAGES™ Empty Scene

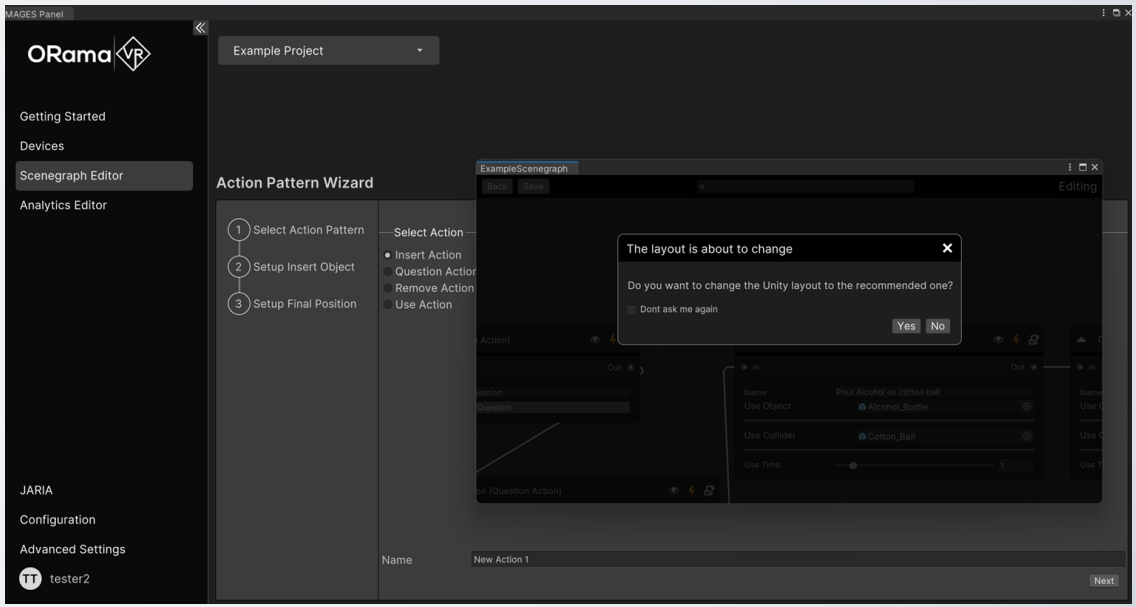
- From Unity's top bar menu:
  - Navigate to MAGES → MAGES Panel → Getting Started → Samples.
  - Import the Empty Scene MAGES sample.



Scenegraph Set Up

- In the Unity Editor, go to MAGES → MAGES Panel and click on the Scenegraph Editor tab.
- You will be then redirected to the Action Wizard. Additionally, the Scenegraph editor of the active scenegraph will pop up, and you'll have the option to activate the recommended layout. Choose as you wish.



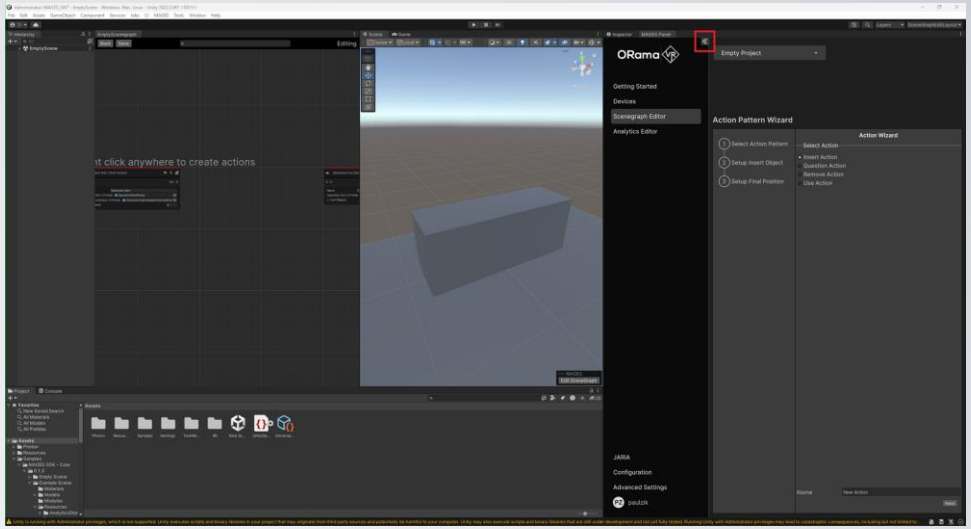


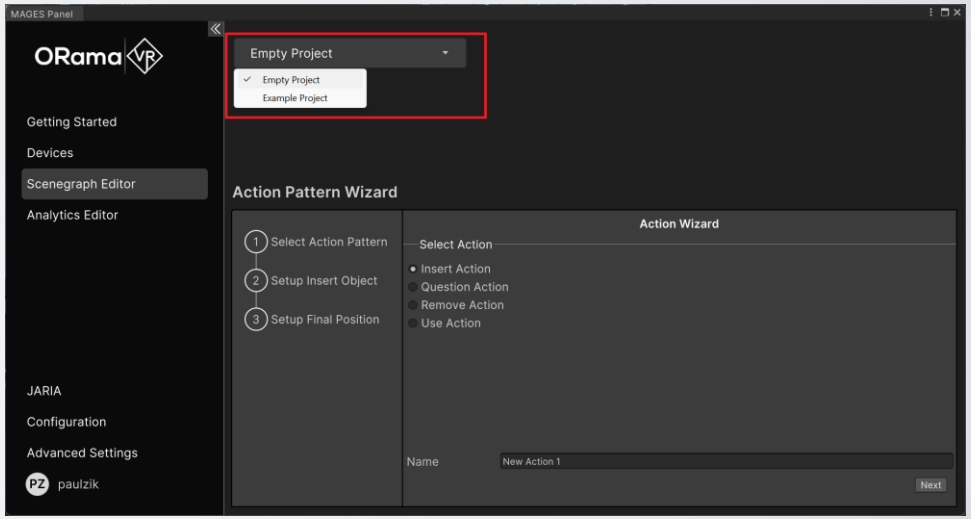
What is an Action Pattern?

- In MAGES™ SDK there are classified behavioral tasks into clearly defined entities. Those can be the insertion of objects, removal, assembly, cuts, etc.
- These are called Action Patterns.
- The classification of surgical processes is a common practice in medicine to translate the surgery steps into programmable entities.
- Additionally, the Action Patterns form a unique software design pattern to reflect the needs of development. Thus, there is available a library of basic Actions that covers most cases in VR, with an easy-to-extend methodology. It is constantly being updated to match the evolving demands for realistic interactions in XR.

Action Editor

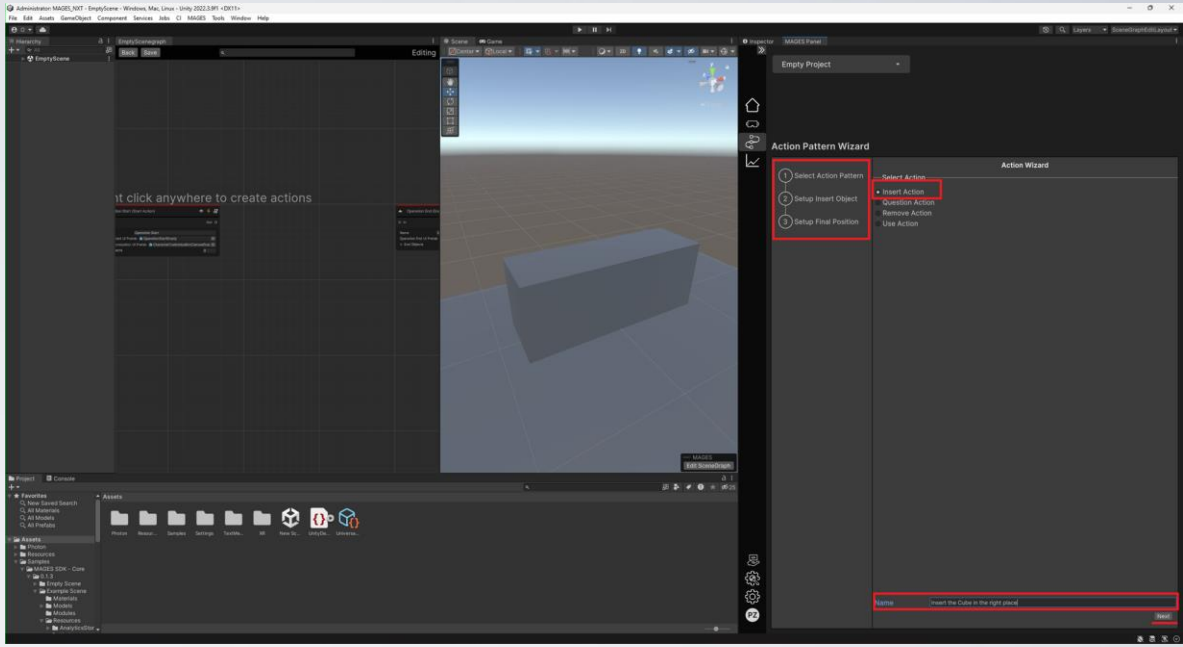
- If you select the recommended layout, your Unity Editor will be set up as follows. Click on the collapse button of the MAGES Panel to better view the wizard.
- Once done, you can see the available actions, select the one you want to create, the active scene, and the active scenegraph editor.
- Make sure that you have selected the Empty Project from the dropdown list.

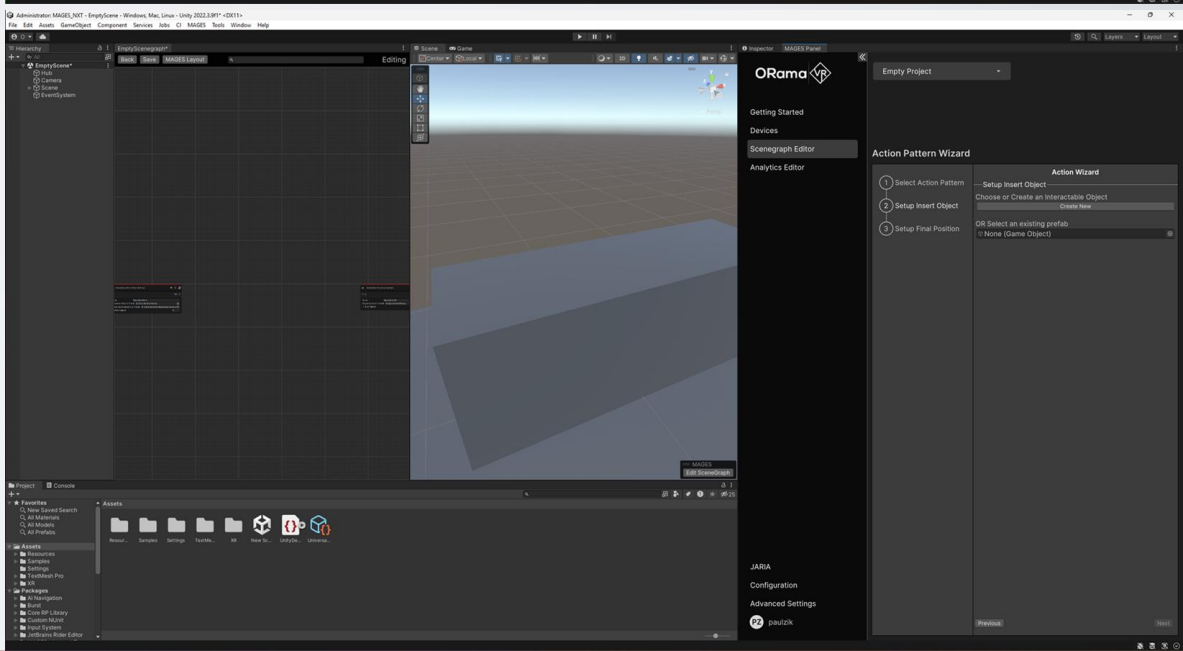




Example Tutorial – Insert Action

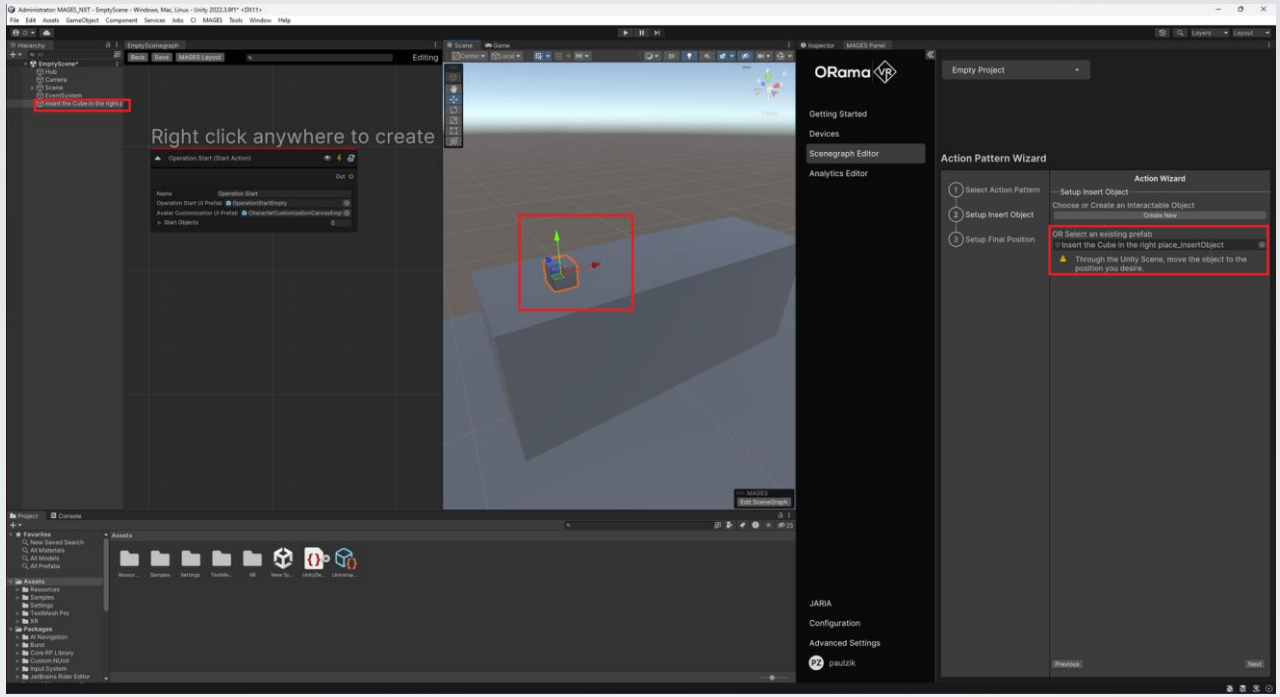
- We will create an action that will require the user to take a cube and insert it in a new position.
- Click on the Insert Action button among the available actions. The side panel displays the necessary steps to create the action. Enter your action's name in the name property, then click the Next button to proceed.
- After clicking Next, you will be redirected to the Setup Insert Object step. Here, you can either create a new GameObject from a model in your assets or select an existing prefab from your assets.





Example Tutorial – Insert Action

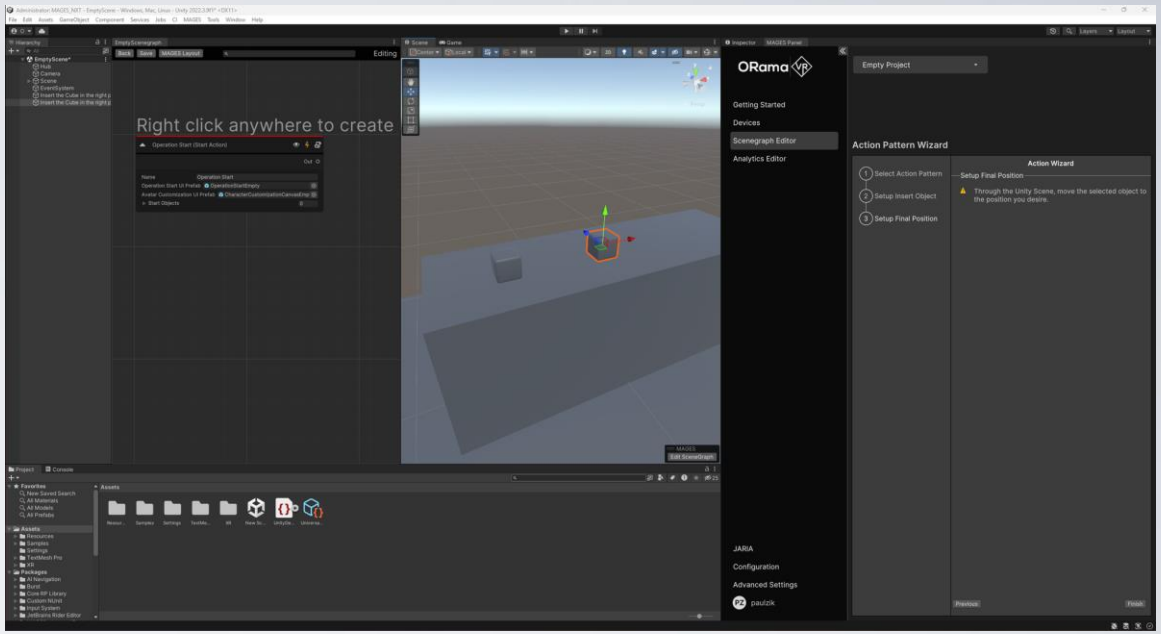
- Click the Create New button, then select the Cube model from your assets. This creates a GameObject of the cube in your scene that you can position as desired. This will be the position that the GameObject will be initially spawned.

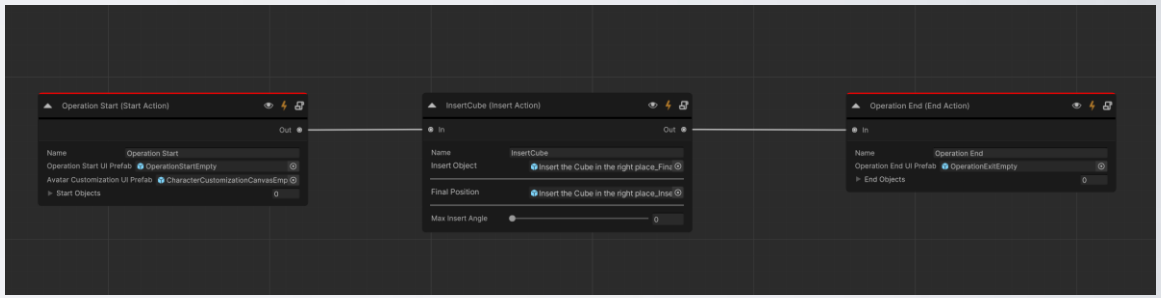


- Position the Cube on the table in your scene using the gizmos, and then click the Next button again.
- You will be redirected to the final step, where you need to set up the final position of the insert object. In this step, a new GameObject of the cube will be spawned to represent the final position.

Example Tutorial – Insert Action

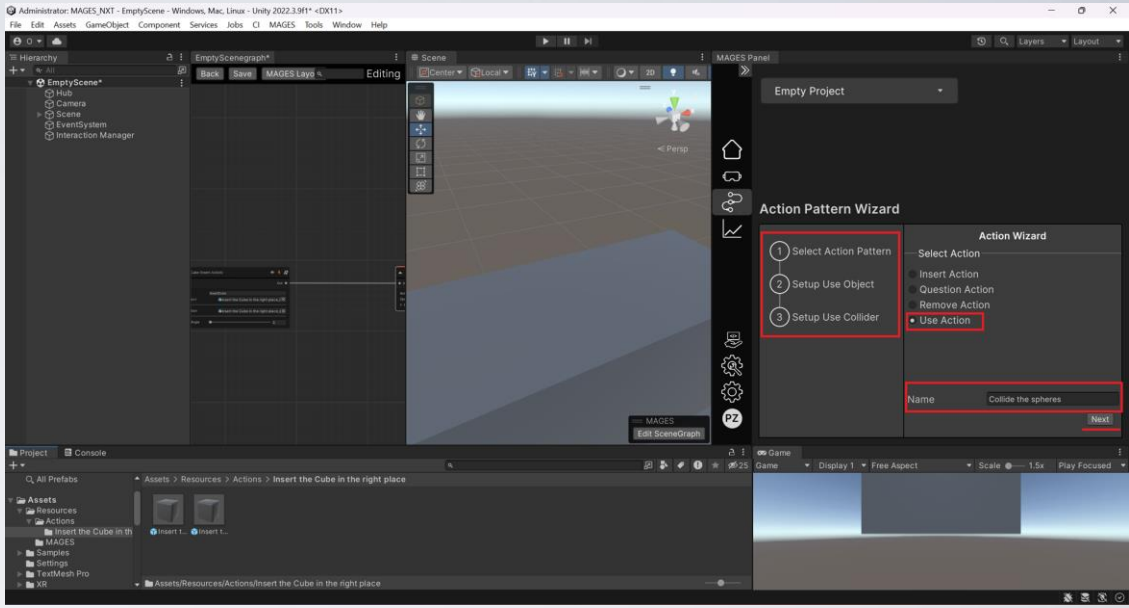
- Once again, using the gizmos, move the final GameObject to the position where you want to be inserted and then click the Finish button.
- Your insert action has been created and placed in your scenegraph as the second action, ready to be used.
- Make sure to save the Scenegraph editor by clicking the Save button.

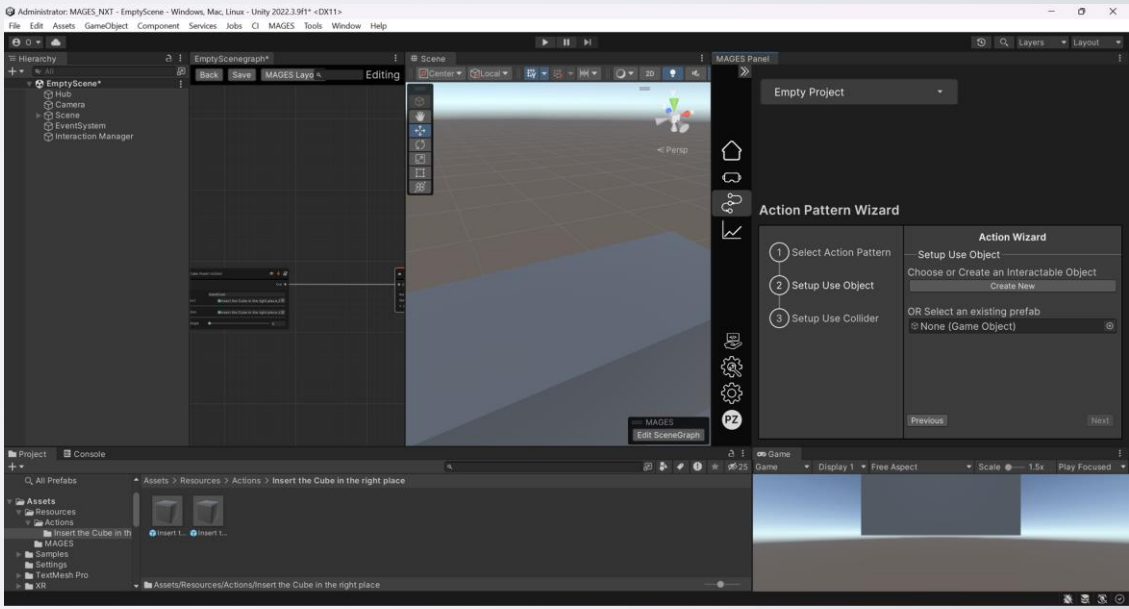




Example Tutorial – Use Action

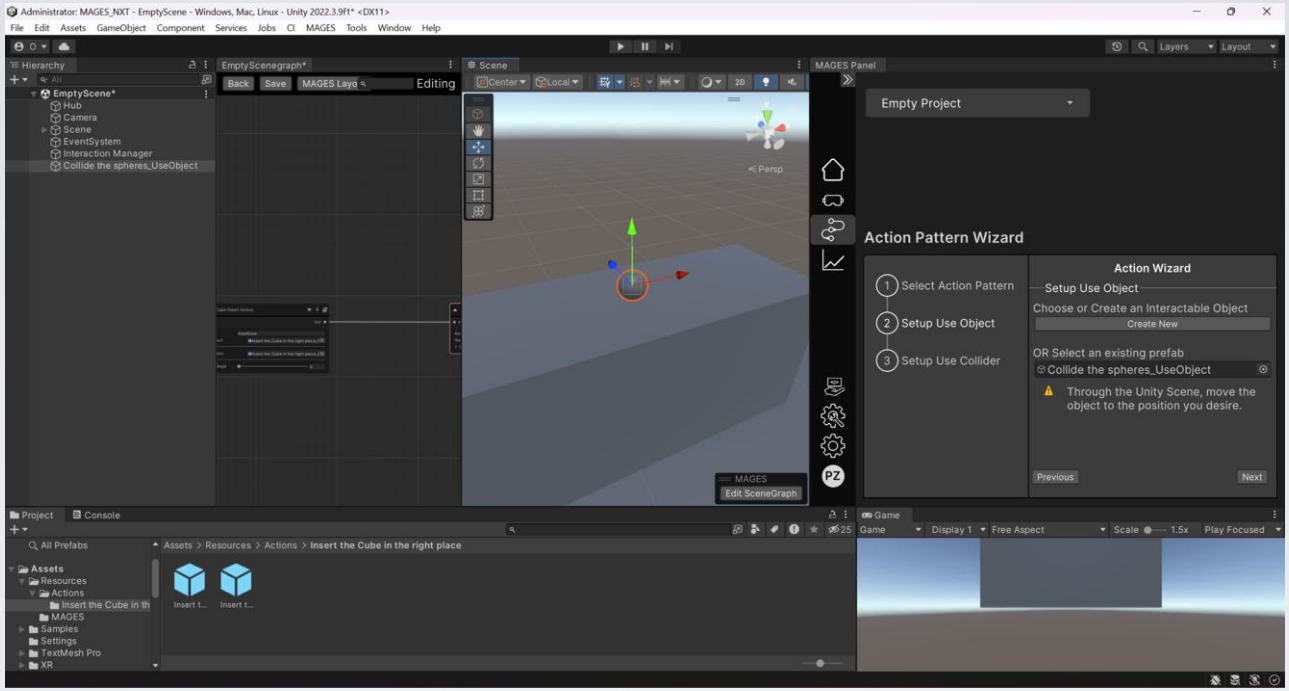
- Click on the Use Action. Enter your action's name in the name property, then click the Next button to proceed.
- After clicking Next, you will be redirected to the Setup Use Object step. Here, you can either create a new GameObject from a model in your assets or select an existing GameObject from your assets.





Example Tutorial – Use Action

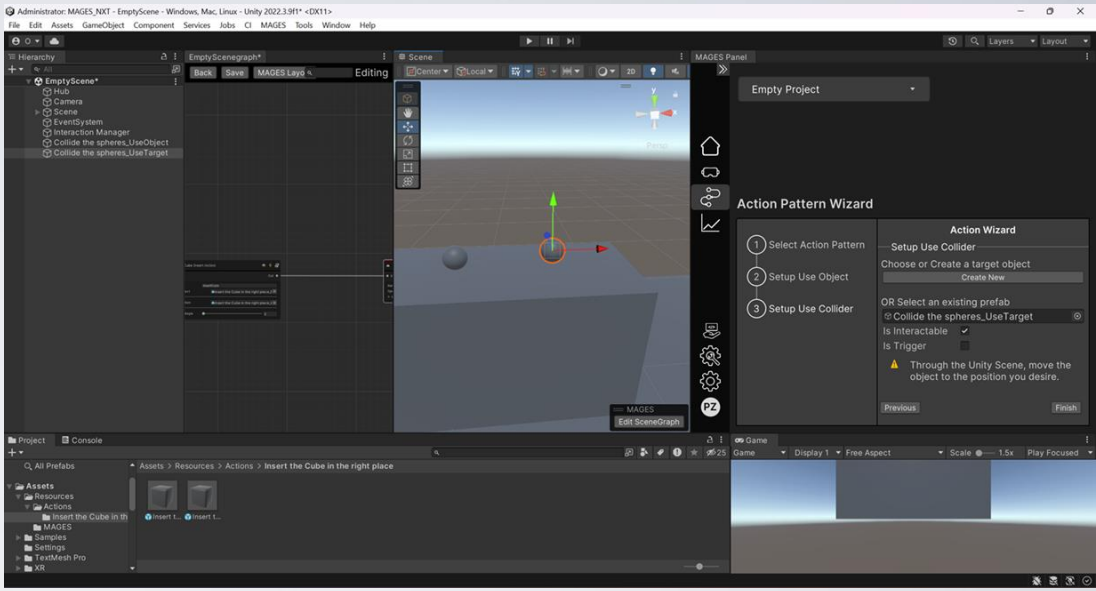
- Click the Create New button, then select the Sphere model from your assets.

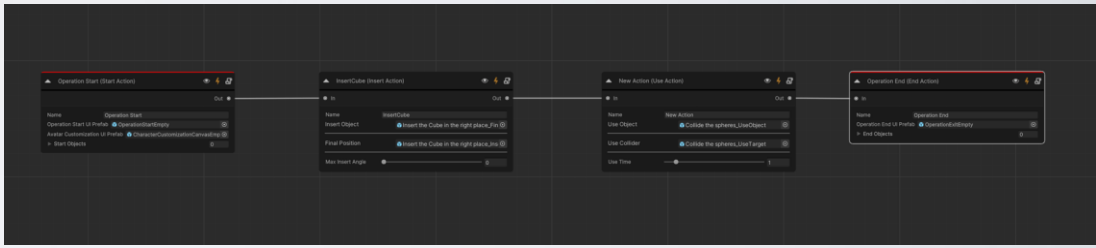


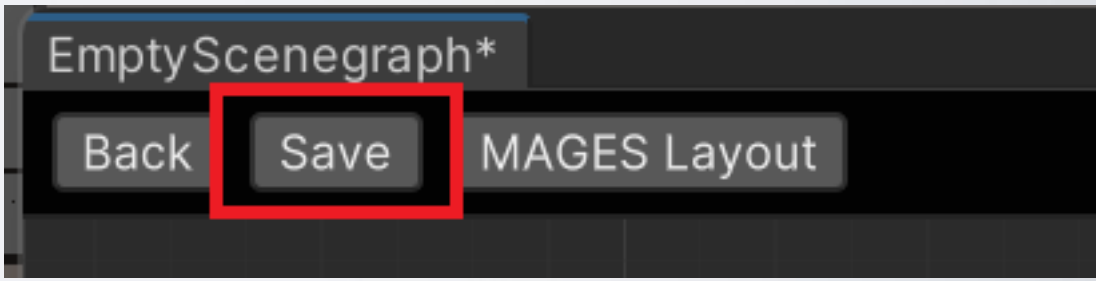
- Position the sphere in your scene using the gizmos, and then click the Next button again.
- Now you need to set up the use collider of the use object. Again, press the Create New button, and select the Sphere model from your assets.

Example Tutorial – Use Action

- Once again, using the gizmos, move the use collider GameObject to your desired position, where you want the Cube to be used, and then click the Finish button.
- Click the Finish button, the use action will be created in your scenegraph after the Insert Action.
- Make sure to save the scenegraph editor by clicking the Save button.

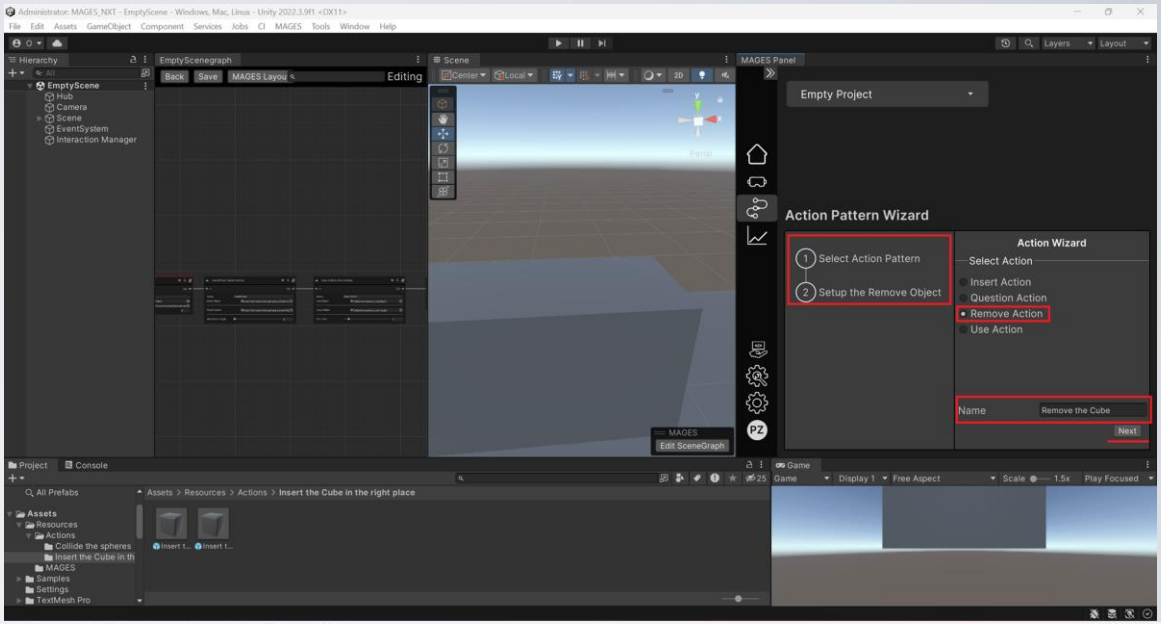


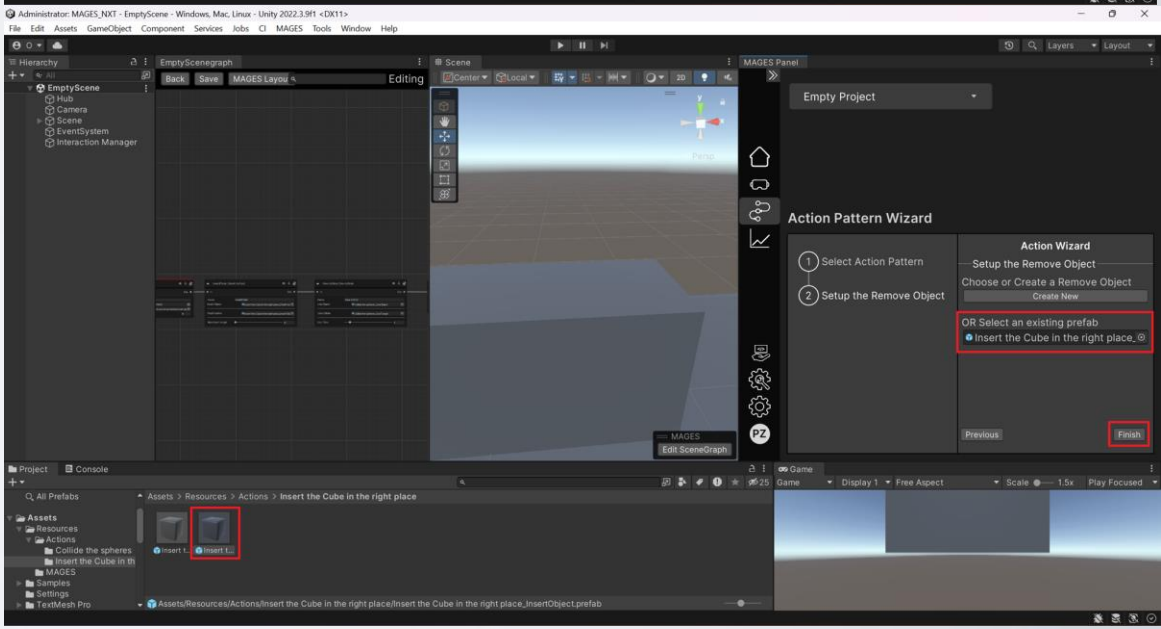




Example Tutorial – Remove Action

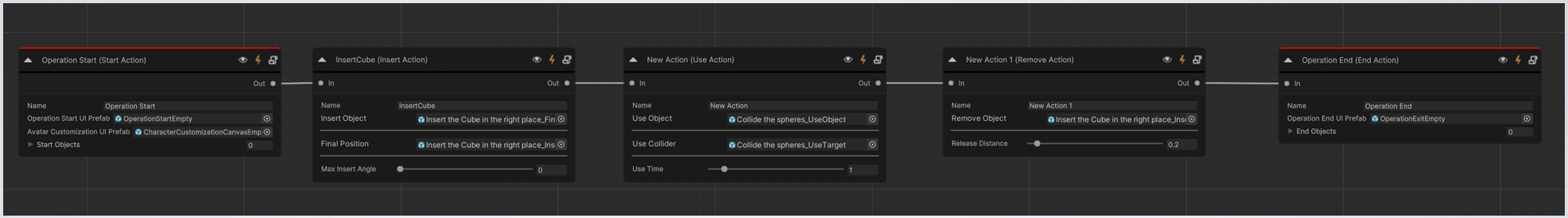
- Our Action will require the user to grab the cube once again and throw it away.
- Click on the Remove Action. Enter your action's name in the name property, then click the Next button to proceed.
- Since we will use the cube from the previous Insert Action, search the interactable cube (not the final position) from your Assets and drag and drop it in the prefab field.





Example Tutorial – Remove Action

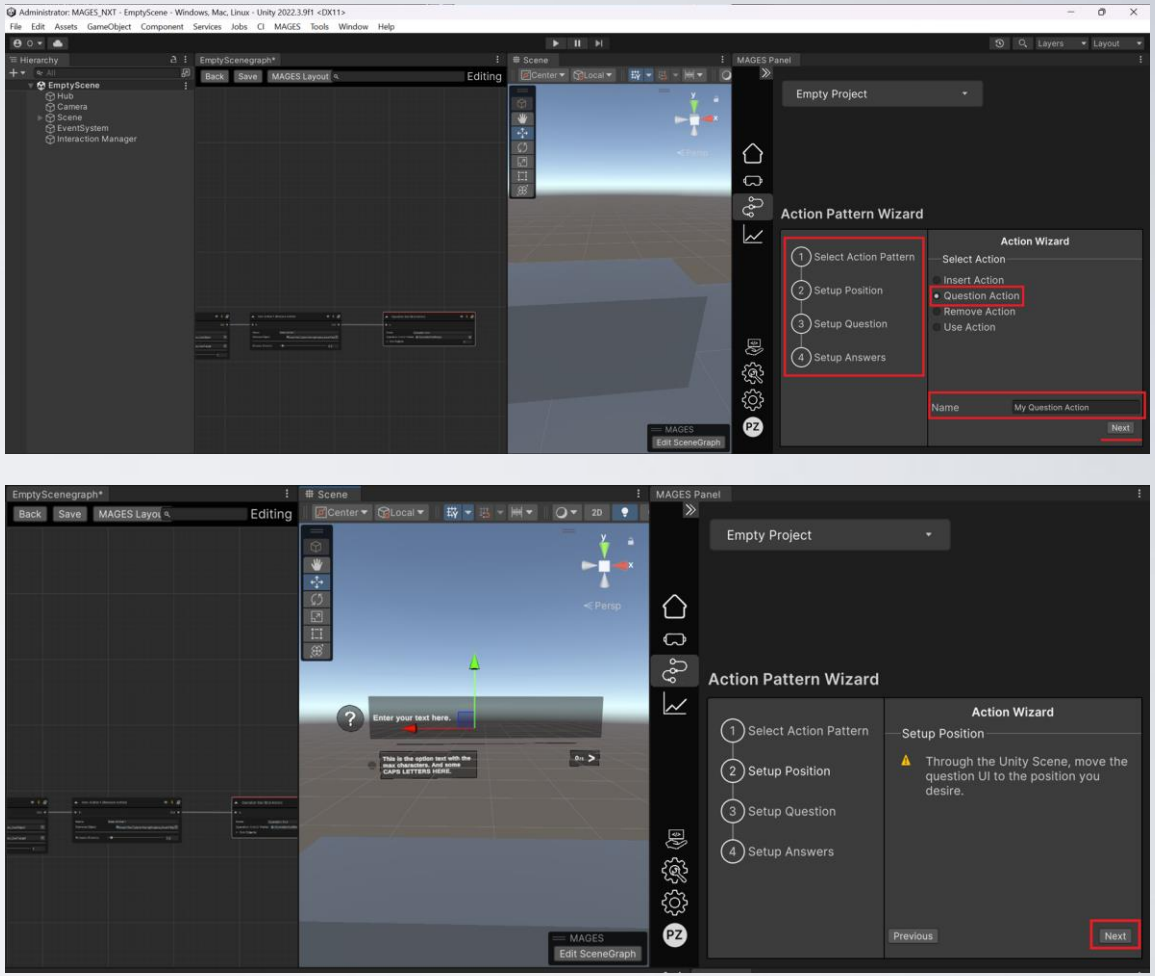
- Click the Finish button. The remove action will be created in your scenegraph after the Use Action.



- Make sure to save the scenegraph editor by clicking the Save button.

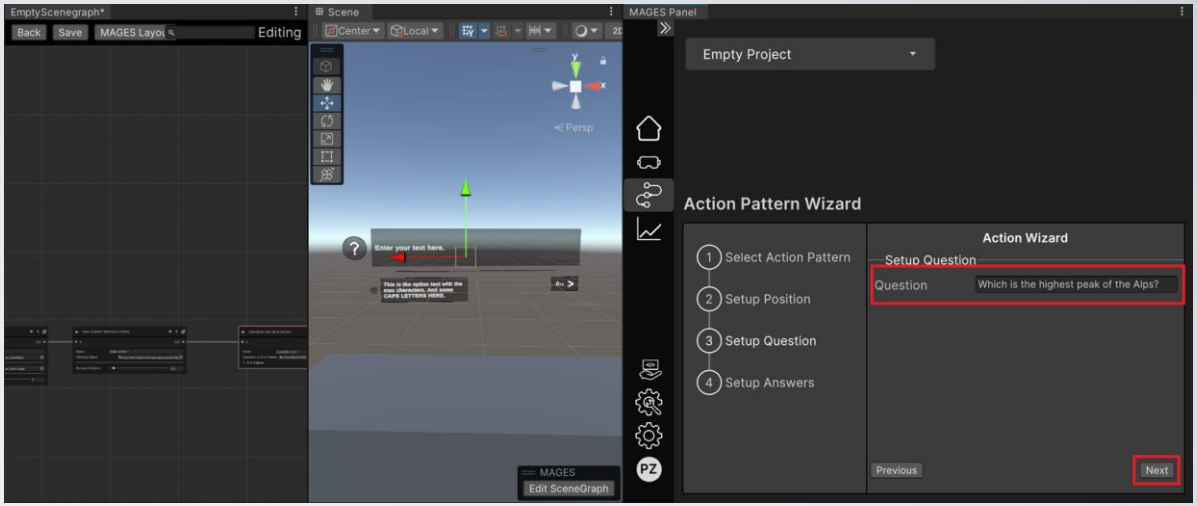
Example Tutorial – Question Action

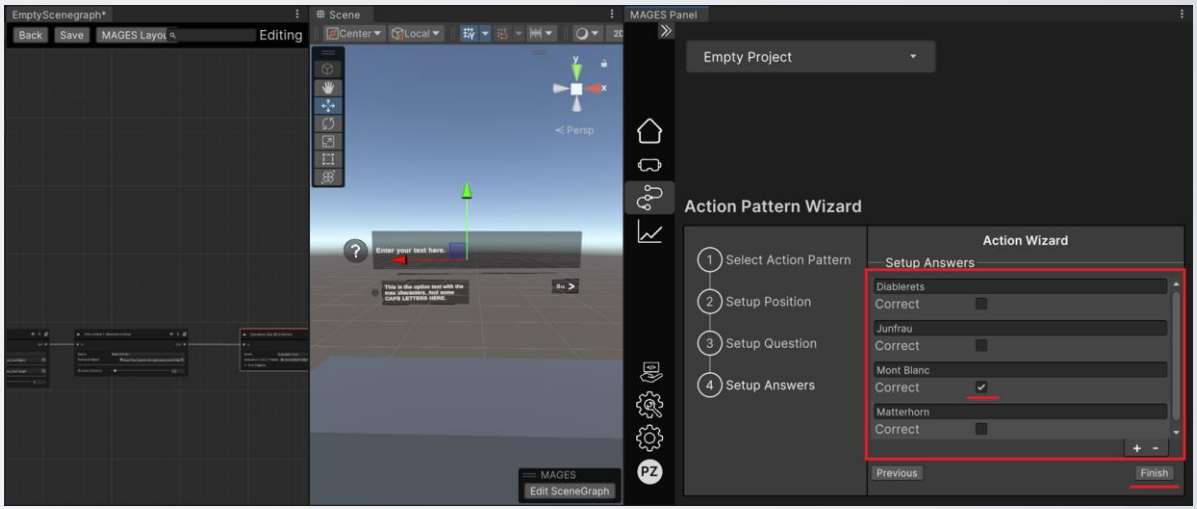
- Our Action will require the user answer a simple question.
- Click on the Question Action. Enter your action's name in the name property, then click the Next button to proceed.
- Position the question object where you wanted to be and click the Next button.



Example Tutorial – Question Action

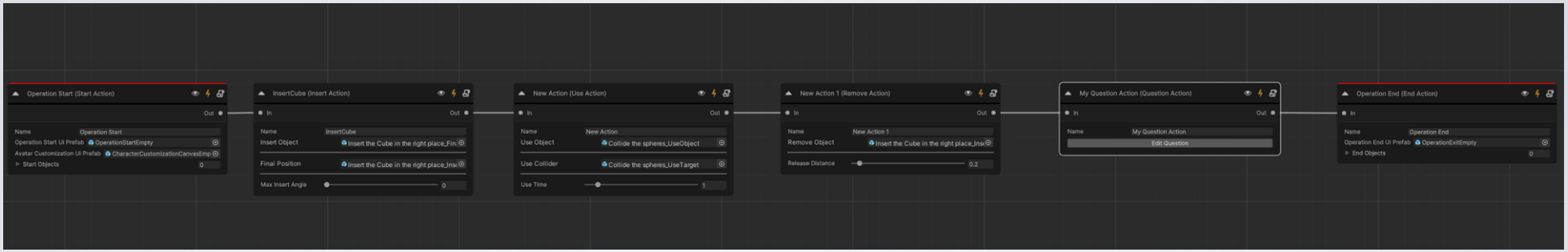
- Fill the question to be asked and click the Next button.
- Populate a list with possible answers to this question by clicking the + button. Also select which answer is the correct one by clicking the correct button. Then click the Finish button.





Example Tutorial – Question Action

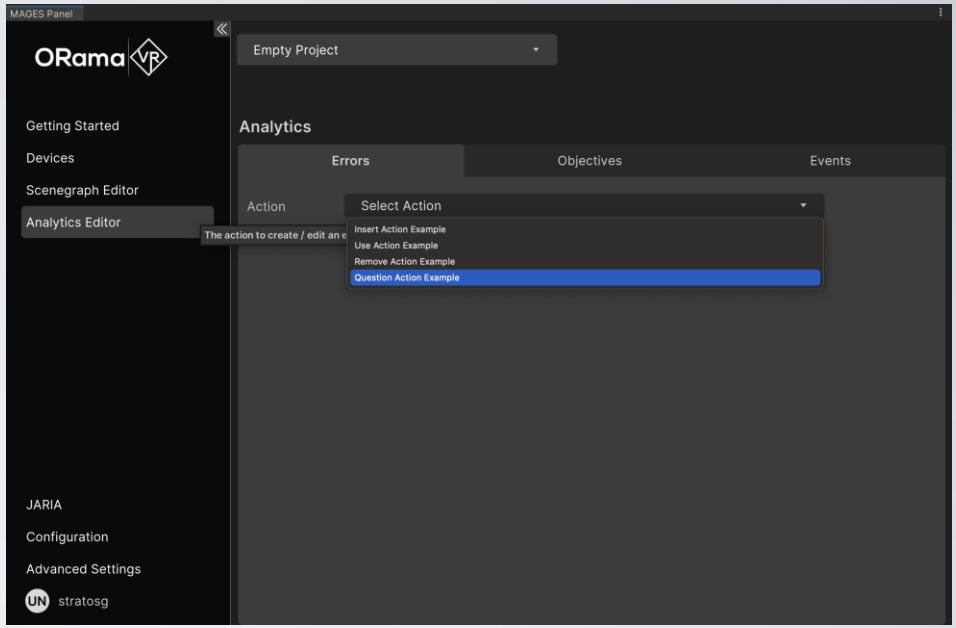
- The Question action will be created in your scenegraph after the Remove Action.



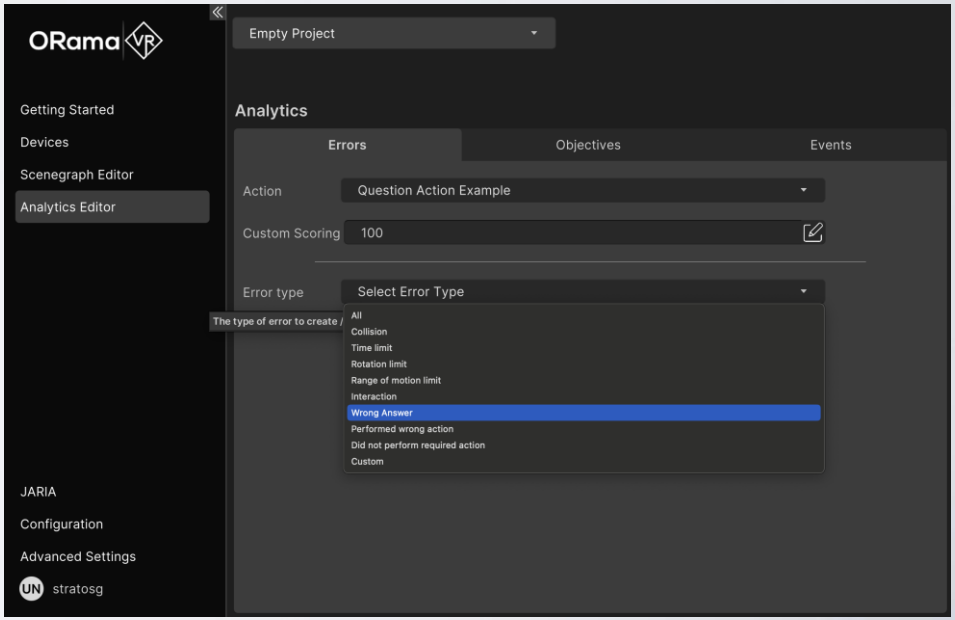
- Make sure to save the scenegraph editor by clicking the Save button.

Example Tutorial – Analytics Setup

- From the MAGES Panel navigate to the Analytics Editor and select an Action to add Analytics. In our case we will setup the Question Action.

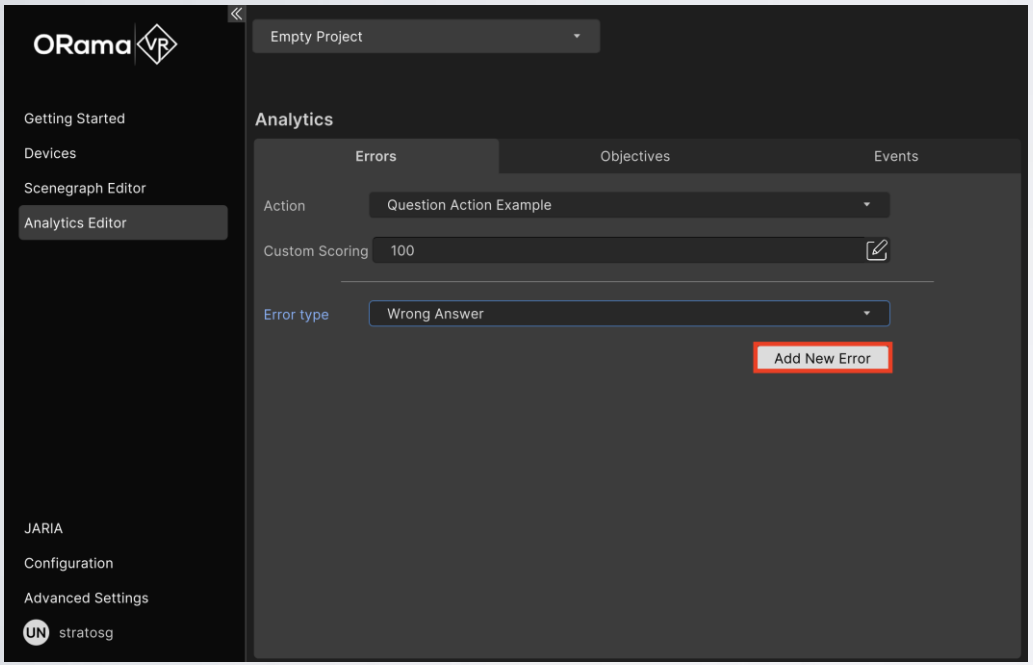


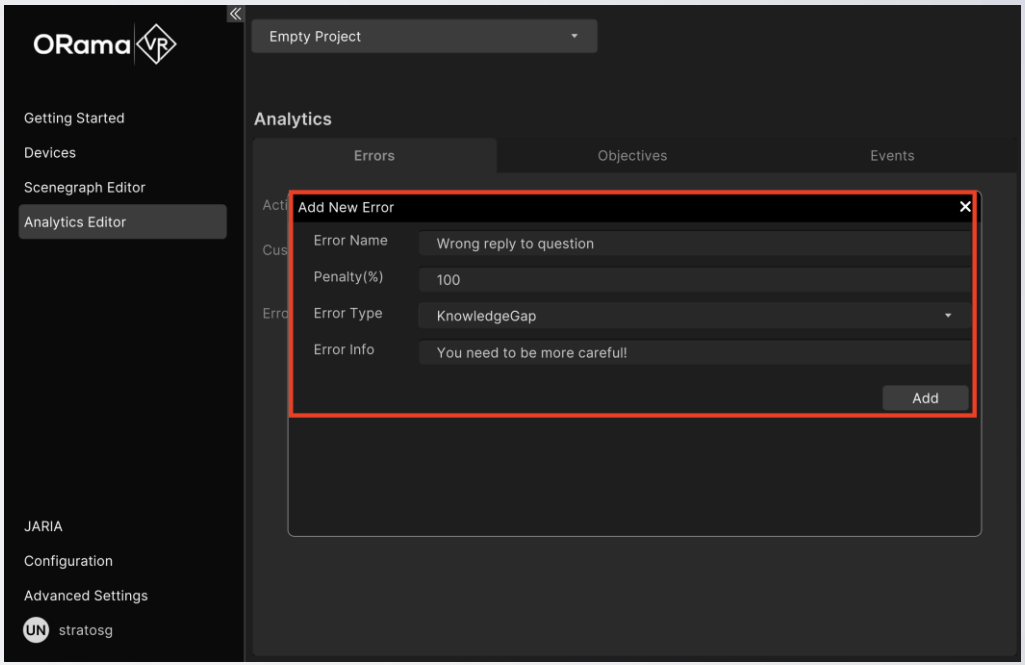
- Select the Analytics type for the Action. We will select the Wrong Answer to track if the user replied to the question correctly. If not, the penalty will be applied.



Example Tutorial – Analytics Setup

- Click the Add New Error button and configure the wrong answer analytic. We will set the penalty percentage to 100 meaning that users will take zero if replied incorrectly. Click the Add button to save your changes.

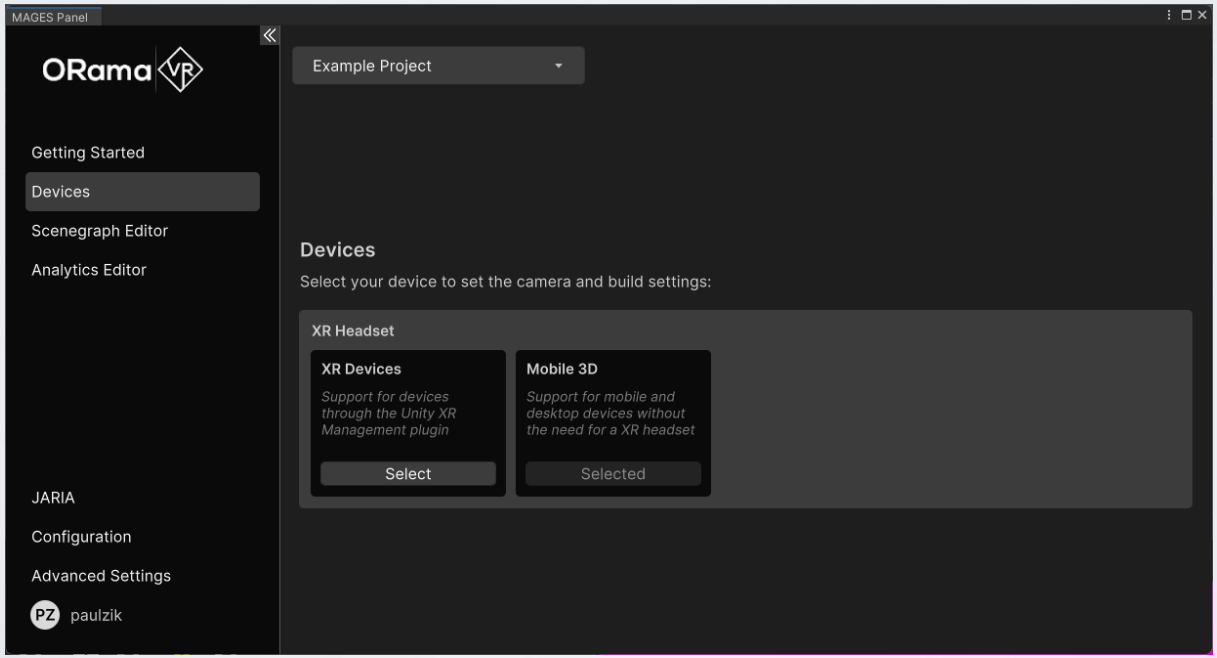




- You configured the analytics for this action!

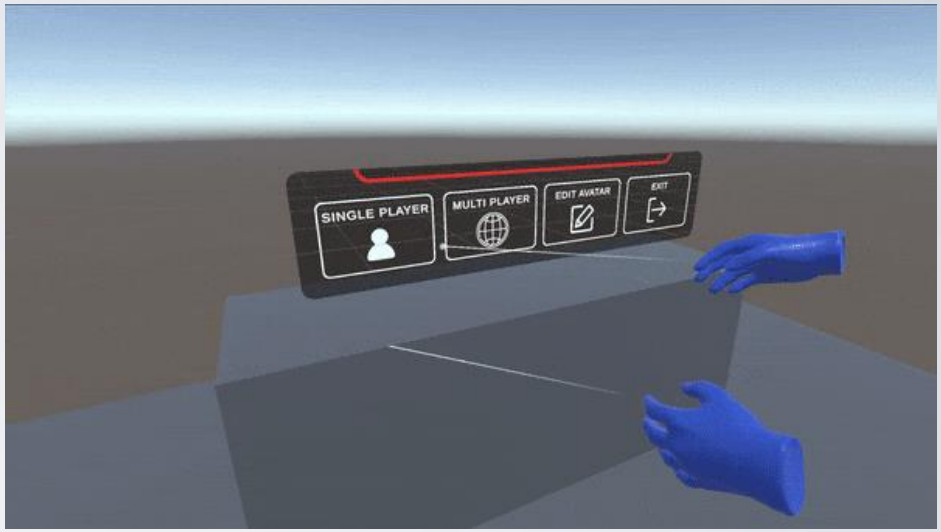
Example Tutorial – Play Mode

- Select the appropriate device from the MAGES Panel. Mobile 3D refers to the device for non-VR play mode, while XR Devices refers to using a Head-Mounted Display (HMD). For detailed controls associated with each device, please consult the information located at the bottom of the page.
- The Mobile 3D camera is only for spectating as it does not support any interaction with the 3D objects. You can only perform and undo the Actions by pressing the corresponding buttons on your screen.



Example Tutorial – Play Mode

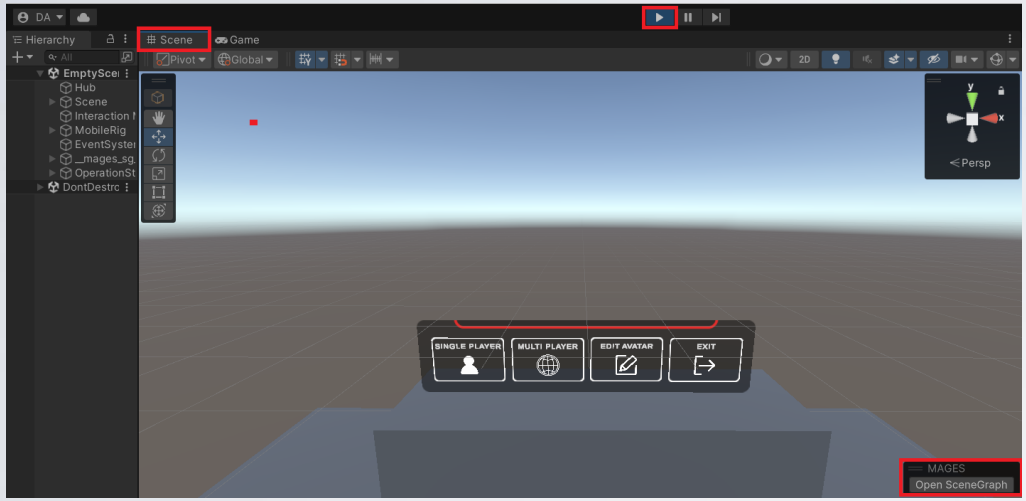
- Press the play button to play your simulation.
  - Playthrough using the XR Device and a VR Headset.

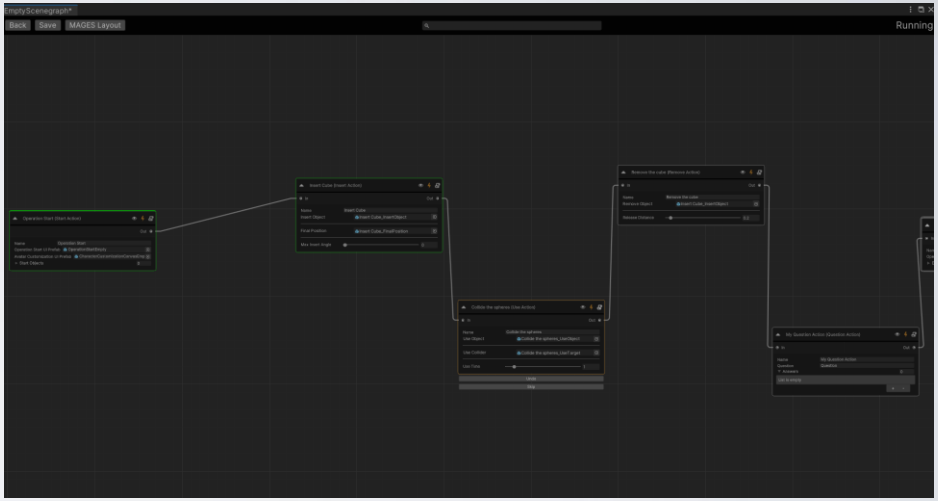


  - Playthrough using the Mobile 3D device.

Example Tutorial – Play Mode

- While in play mode, by clicking the Open SceneGraph button at the bottom right during the scene preview, you can watch the Scenegraph in running mode.





- Each node has a different outline color. A green outline means the action has been performed. An orange outline means the action is activated and waiting to be performed, and the grey outline means the action is still locked. Under each active node, there's a skip and undo button.

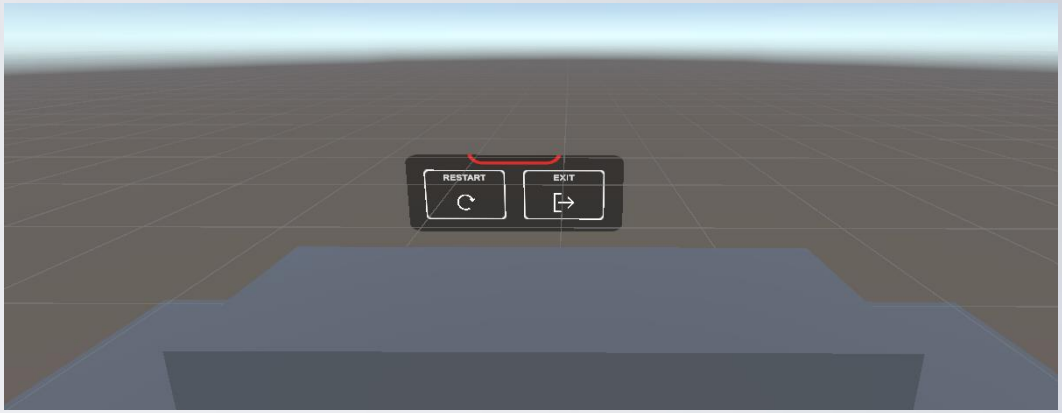
Example Tutorial – Play Mode

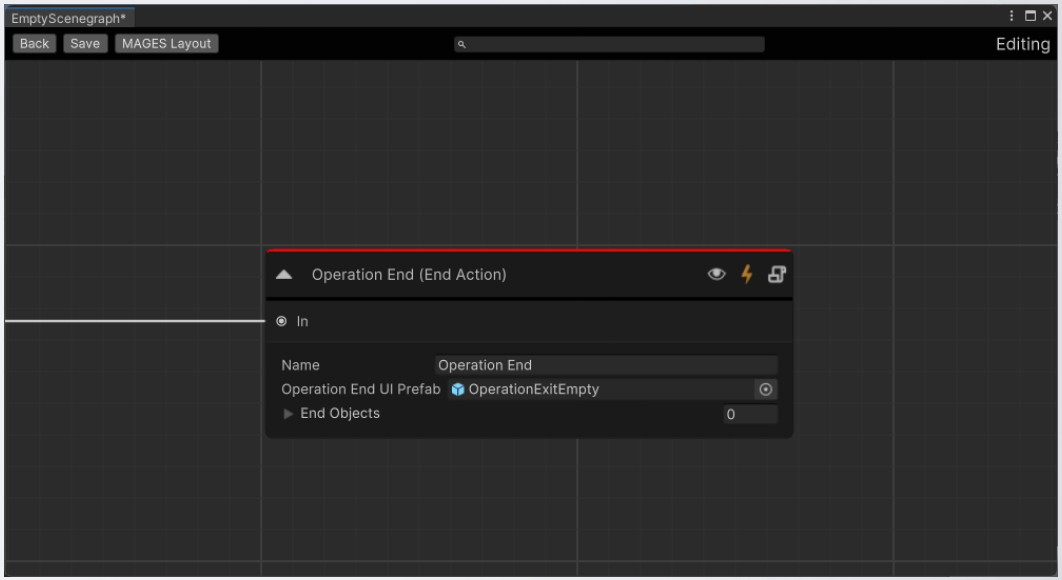
- Regarding movement, you can find the controls for every supported platform and headset.

	Oculus Quest	**VIVE**	**Windows Mixed Reality**	**Mobile 3D**
Grabbing Objects	Grip Button	Grip Button	Grip Button	
UI Selection & Usage of Tools	Trigger Button	Trigger Button	Trigger Button	Left Mouse Button **(Works only for UI Selection)**
Toggle Movement	Press Left Touch Thumbstick	Left Menu Button	Right Menu Button	
Positional/Rotational Movement	Left/Right Touch Thumbstick	Left/Right Trackpad	Left/Right Thumbstick	Left/Right On Screen Joystick
Toggle In-game Options	Press Right Touch Thumbstick	Right Menu Button	Right Menu Button	

Example Tutorial – End of the Operation

- When you reach the Operation End Action. This menu appears on the screen.
- From this menu you can **restart** or **exit** the application.
- You can modify the UI shown on the Operation End Action by applying another prefab in the scenegraph editor.





Thank you!