

KARA

Newsletter – Issues 007 & 008

Welcome to the KARA newsletter. These newsletters will keep you informed about the research and development that the KARA project team are undertaking.

The project goal is to examine the potential of Gen AI in game development through applied R&D.

007. Agent Swarm #2: Creating and populating a grey-box picnic scene

In this edition, we explore one of the many use-cases of Agent Swarm in the context of game dev. We will prompt it to create a simple Unity prefab, then populate a “forest picnic” scene from it. We’ll then send the Swarm a sketch of an object layout to spawn into that scene.

008. Generating 3D Characters with an AI infused pipeline

In this edition, we explore generating 3D character models from 2D concept art for Detonation Racing. We will be focusing on how this technology can accelerate the production of multiple characters within a project.

IMPORTANT: Inclusion of tools in this newsletter does not imply their clearance for use.



Project Goal

Examine the potential of Gen AI in game development through applied R&D.



KARA

ELECTRIC SQUARE
A Keywords Studio



What is KARA?

▶ In 2023, Project AVA took on the challenge of utilising Generative AI tools to assist in the design and development of a videogame from scratch. This applied R&D approach gave us the best insights into the true potential of AI for video game development.

The AVA team went to GDC in 2024 to report on their findings ([watch the video](#)).

KARA is the continuation of this effort. Using Electric Square's *Detonation Racing* as a case study, the team's plan is to remaster the game using pipelines infused with Generative AI tools.

The goal of KARA is to further enhance our expertise in Generative AI for game development. This includes a focus on how GAI tools can boost 3D art pipelines.



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TOOL SPOTLIGHT

Creating and populating a grey-box picnic scene

Introduction

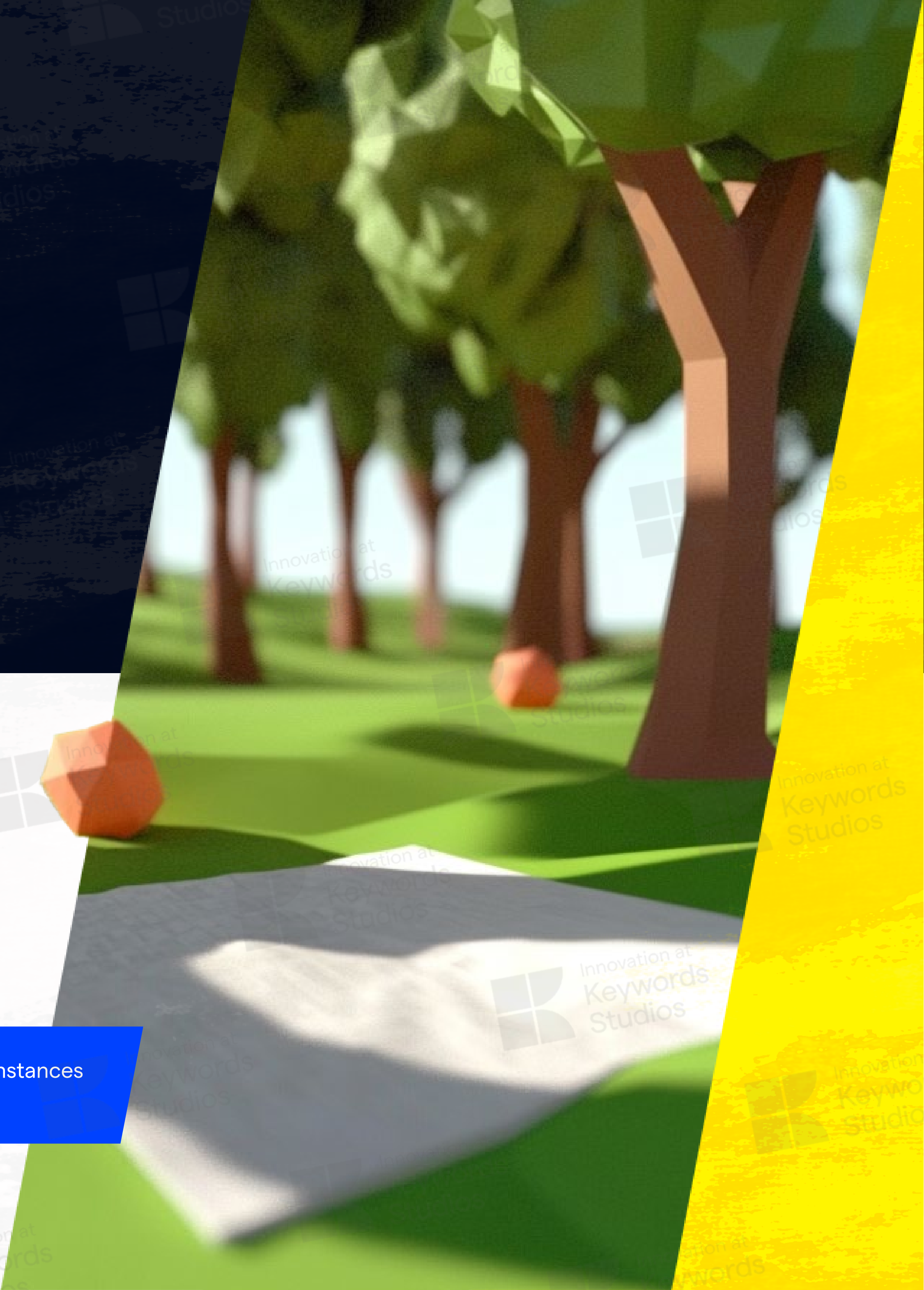
▶ Creating a grey-box scene is a great way to test out gameplay mechanics without needing to wait for artists to fully build and dress the scene first.

Traditionally this process might be carried out by a gameplay or level designer, and depending on which engine is used can be quite time-consuming. Simple prototype prop meshes can also be created to furnish the scene in order to get a feel for how a level might look or play, or the relative scales of objects. This also takes time.

In our case, we're going to use **Agent Swarm** to speed-up this step.

Agent Swarm is an in-house tool for connecting instances of LLM agents together to form a cohesive team.

*For more information see Newsletter #003



TOOL SPOTLIGHT

Creating and populating a grey-box picnic scene

STEP 1

Create prop(s) to populate the grey-box scene



Please create a simple tree prefab from cubes/spheres. Use existing materials from the project. Call it P_Tree

Sounds exciting to create a tree prefab! To make sure we create exactly what you envision, could you tell me if you'd prefer the tree to be made out of cubes or spheres?

a mixture!

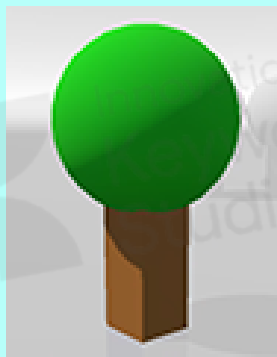
Great choice! A mixture of cubes and spheres will give your tree a unique look. How tall would you like the tree to be and do you have any specific configuration in mind for how the cubes and spheres should be arranged?

2m tall, no specific design

Awesome! So, we'll create a 2-meter tall tree using a mixture of cubes and spheres, without a specific design. Just to confirm, you'd like us to use existing materials from your project, correct? If there's anything else you'd like to add or modify, let me know. Otherwise, I can prepare to pass the details to get started.

begin!

TalkToTool::StartNewTopic(with: "CEO") => OK



The prefab "P_Tree" has been successfully created! If there's anything else you'd like to do, or if you have more tasks, feel free to let me know. Happy creating in Unity!



First, we prompt the Swarm to create a tree prop for us. It asks questions about how it should look and gathers requirements.

TOOL SPOTLIGHT
Creating and populating a grey-box picnic scene

STEP 2

► **Populate the scene with organic props**

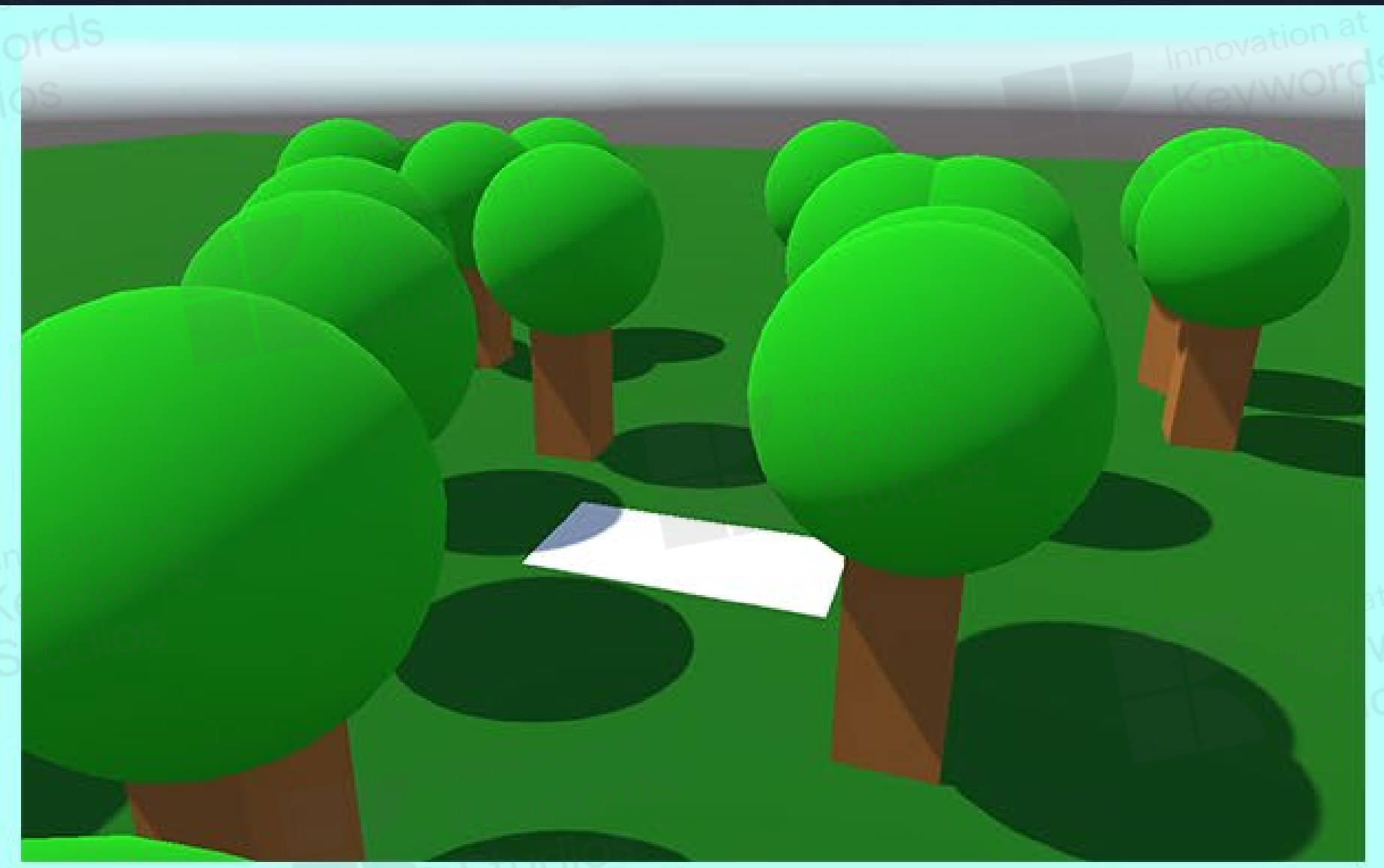


Please place 20 of our P_Tree prefab around the scene in an organic fashion (so, not a uniform grid). Place them around the centre of the scene.

The task is complete! 20 instances of the 'P_Tree' prefab have been placed organically around the centre of your Unity scene. If there's anything else you need help with, feel free to let me know!

Please place a picnic blanket in the centre of the scene - a white cube 2m by 1m, on the floor.

Let's place your picnic blanket in the scene.



The Swarm now populates the scene with our tree props in an organic, natural arrangement as per our prompt. We also prompt the system to create a picnic blanket in the centre of the scene.



TOOL SPOTLIGHT
Creating and populating a grey-box picnic scene

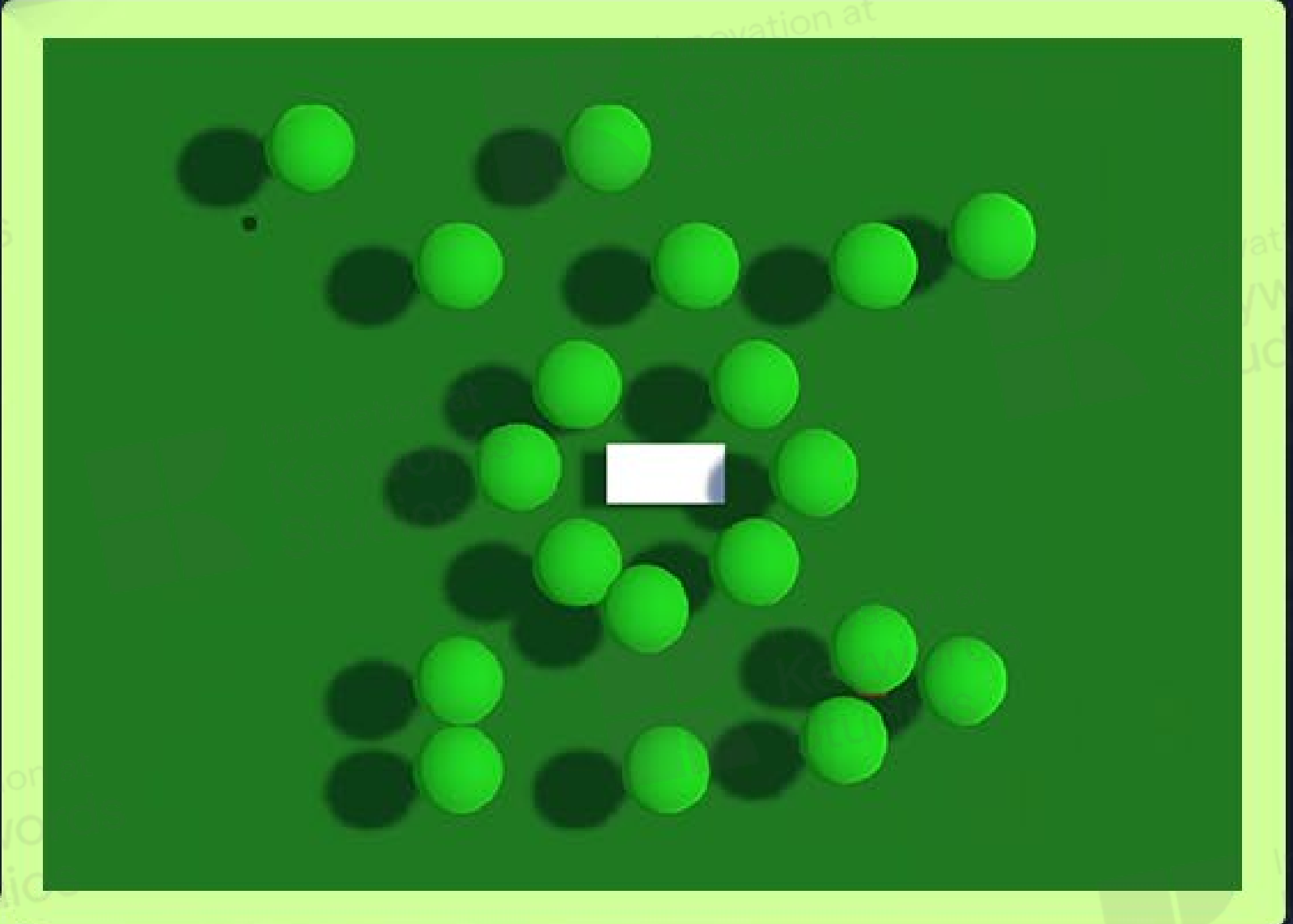
STEP 3
Ensure the scene looks reasonable



Please take a snapshot of the scene and ensure the trees and white picnic blanket are clearly visible.

Take a snapshot of the scene showing 20 'P_Tree' instances and a white 2m x 1m picnic blanket at the centre.

The snapshot has been taken! It includes the 20 trees and the white picnic blanket at the centre. If there's anything else you'd like to do or adjust, just let me know!



The scene shows 20 green trees and a white 2m x 1m picnic blanket at the centre. Let me know if you need any adjustments or further actions.



Computer vision is used to ensure the scene looks reasonable, and the agents are free to iterate.

TOOL SPOTLIGHT

Creating and populating a grey-box picnic scene

STEP 4

Populate the scene with additional elements

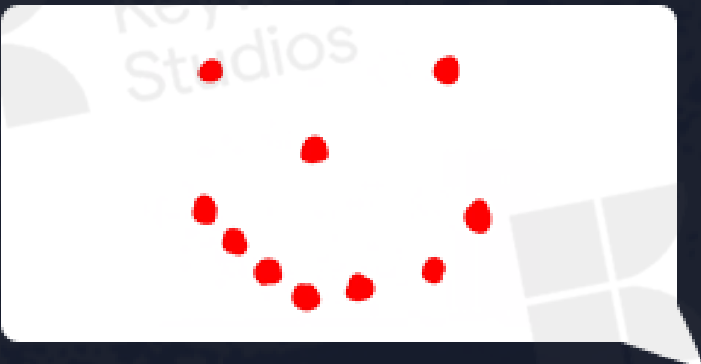


please spawn "oranges" (i.e., orange spheres) onto the picnic blanket, as shown in the attached doodle.

Great idea! To help you with this, could you please provide the following details?

- 1. Size of each orange sphere.
 - 2. The arrangement and spacing you'd like for the spheres.
- Any specific coordinates or should it match the layout in the doodle?

Once I have all this information, we can get started!



- 1. 1m spheres.
- 2. The arrangement must match the doodle - so describe it accurately to the swarm.
- 3. Match the doodle layout.

The orange spheres have been successfully arranged on the picnic blanket to form a smiley face. If you need any further adjustments or additional tasks, feel free to let me know!



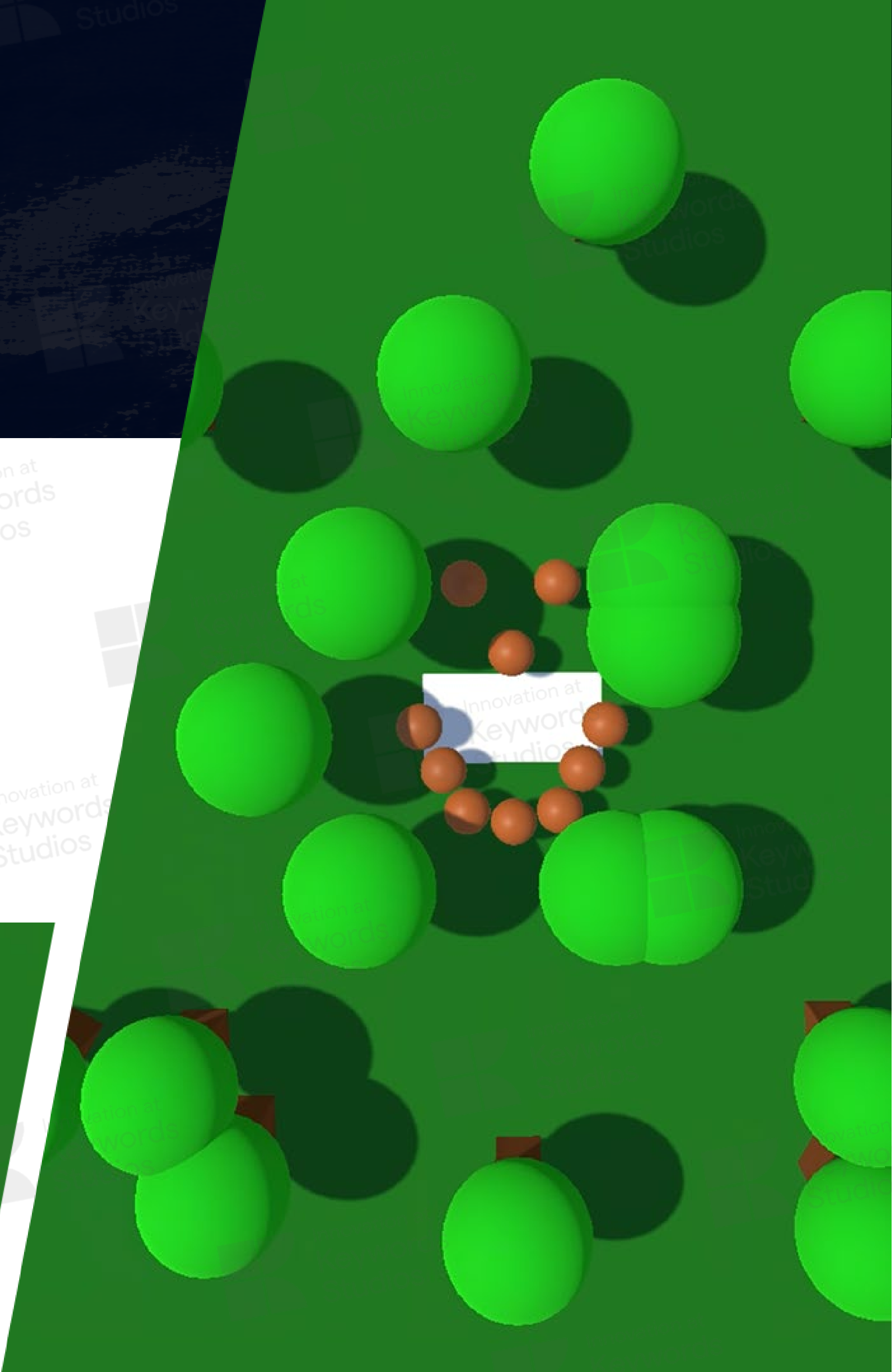
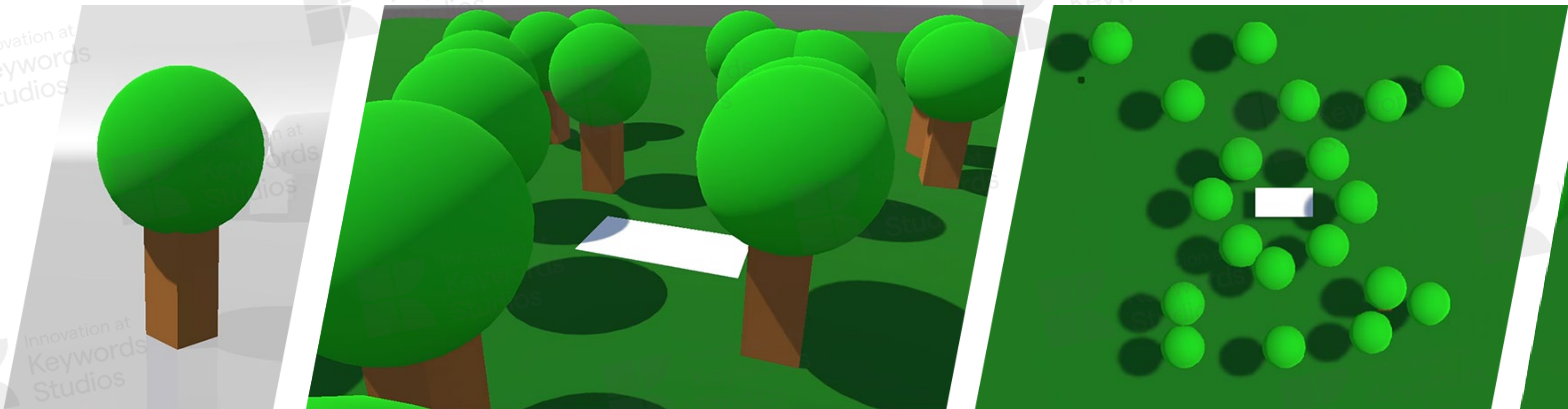
We now send the Swarm a diagram of how we would like to populate our picnic blanket.

Final Summary

This showcase demonstrates a very small snapshot of some of Agent Swarm’s capabilities, across Computer Vision (image inputs), Tool Use (interaction with Unity), spatial reasoning, and multiple agents working together to achieve a shared goal.

The result of this prototype scenario is an effective grey-box scene built to a user-defined specification. In this small-scale example, it could be argued that a human-only approach without LLM agents would have been quicker and more accurate than the output from Agent Swarm, but by automating the process we enable rapid iteration and the ability to scale. Furthermore, a human-only approach would require trained designers or artists - where we enable level construction by anyone of any discipline.

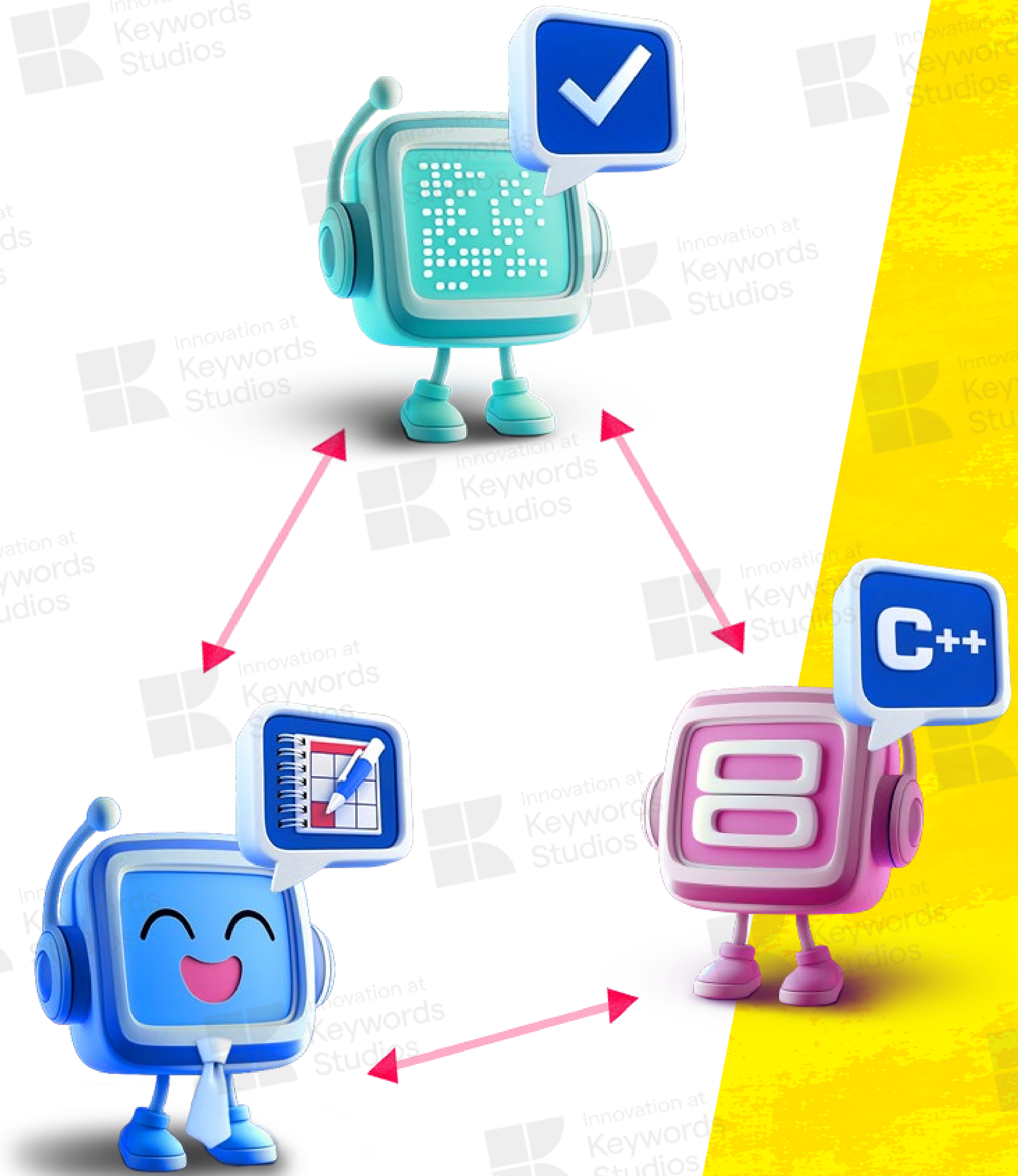
The Agent Swarm approach can be applied to a far wider array of domains. The power comes from being able to blend natural language, integrate the use of tools and computer vision, and harness specialised LLMs dedicated to each task.



Next Steps

▶ In the future, Agent Swarm will also be able to perform even more tasks, such as:

- Directly interacting with your desktop using mouse clicks and key presses
- Consuming and indexing codebases (in C++ or C#; Unreal, Unity, or other engines)
- Consuming and indexing knowledge bases (such as Confluence/Notion, JIRA)
- Consume error and output logs, and summarise them
- Integrate with Source Control such as Perforce
- Write high quality source code which matches the coding standards of the project
- Generate or transform data assets in batches



Generating 3D characters with an **AI infused pipeline**

Introduction

Characters can play an integral part in video game experiences, but can also be highly complex to create, often requiring many artistic and technical disciplines to bring them to life.

We teamed up with Didimo on KARA aiming to breathe new life into Detonation Racing's original characters. Using their AI-infused tool 'Popul8', we were able to generate textured 3D head models from our 2D concept art. This experiment allowed us to assess the potential impact of AI on 3D character creation pipelines.

In this issue, discover how Detonation Racing's 3D character creation pipeline evolved with the integration of AI.



PIPELINE SPOTLIGHT

Generating 3D Characters
with an AI infused pipeline

STANDARD PIPELINE

AI INFUSED PIPELINE

STANDARD PIPELINE

To establish a baseline for our AI-infused pipeline, let's first examine the traditional character pipeline. Although the original Detonation Racing team initiated development of 3D character models, they were never completed.

As part of our R&D for KARA, we updated an existing model to serve as both a benchmark for comparison in our AI-assisted character creation pipeline, as well as a source model for generating AI characters using Didimo's technology.



PIPELINE SPOTLIGHT

Generating 3D Characters with an AI infused pipeline

STANDARD PIPELINE

Considerations

In Detonation Racing, characters play a minor role, appearing mainly in UI and as pre-rendered briefers or announcers between stages. This allows for simpler character modelling compared to games where characters are more central. Consequently, we'll focus on the portrait area, specifically the head and front view of the characters.

1/7

2D Character Concept Art

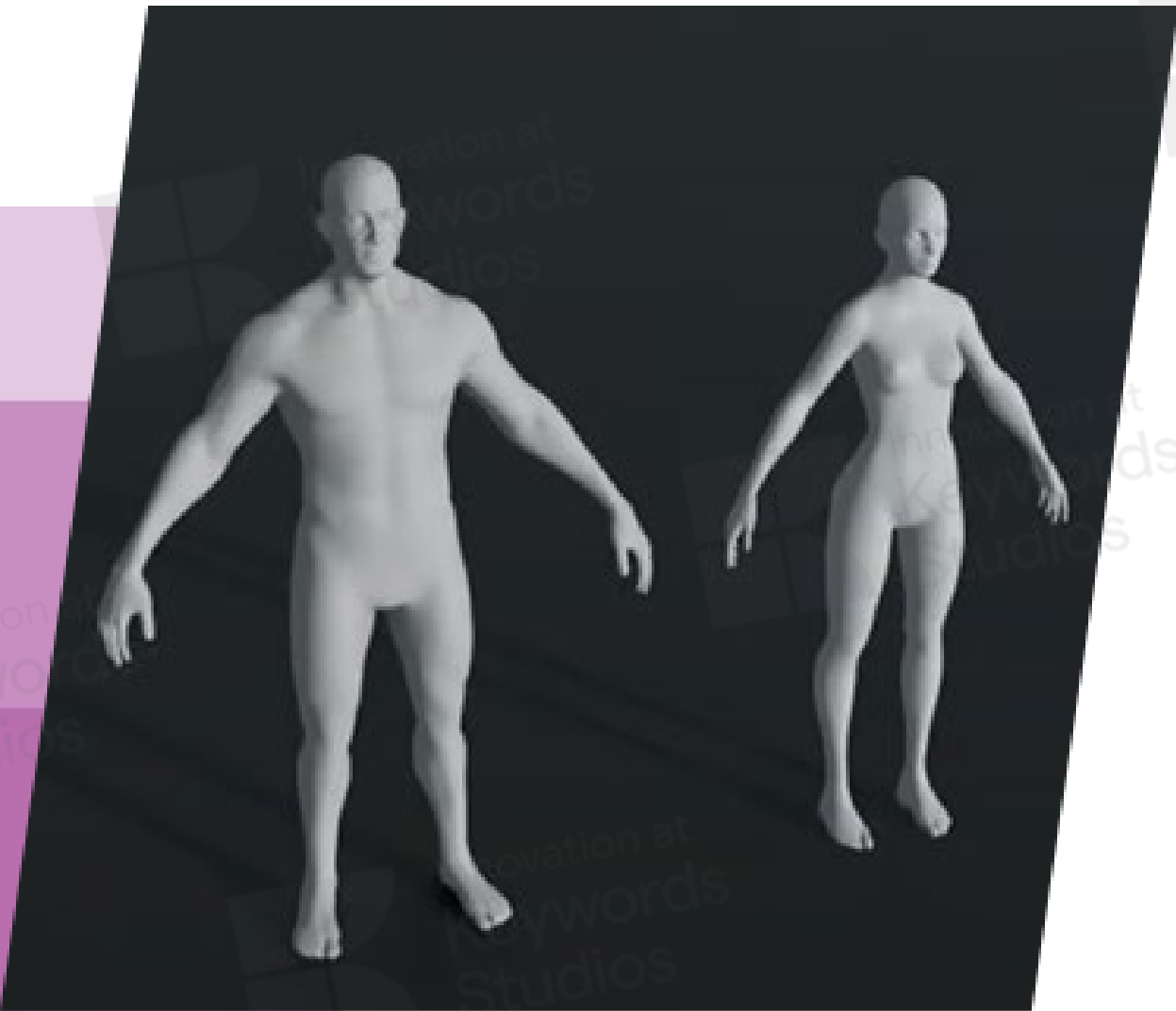
The process begins with conceptualising ideas, gathering references, and sketching thumbnails before refining drawings, selecting colours, and rendering details. Character briefs help guide the design, exploring visual options and finalising multiple views for 3D modelling reference.



2/7

Blocking

The base mesh is the foundational 3D geometry that establishes the character's overall shape and proportions. This stage, carried out in 3D modelling software such as Maya, Blender, or ZBrush, focuses on broad forms, silhouette, and flow rather than intricate details.



3/7

Detailing

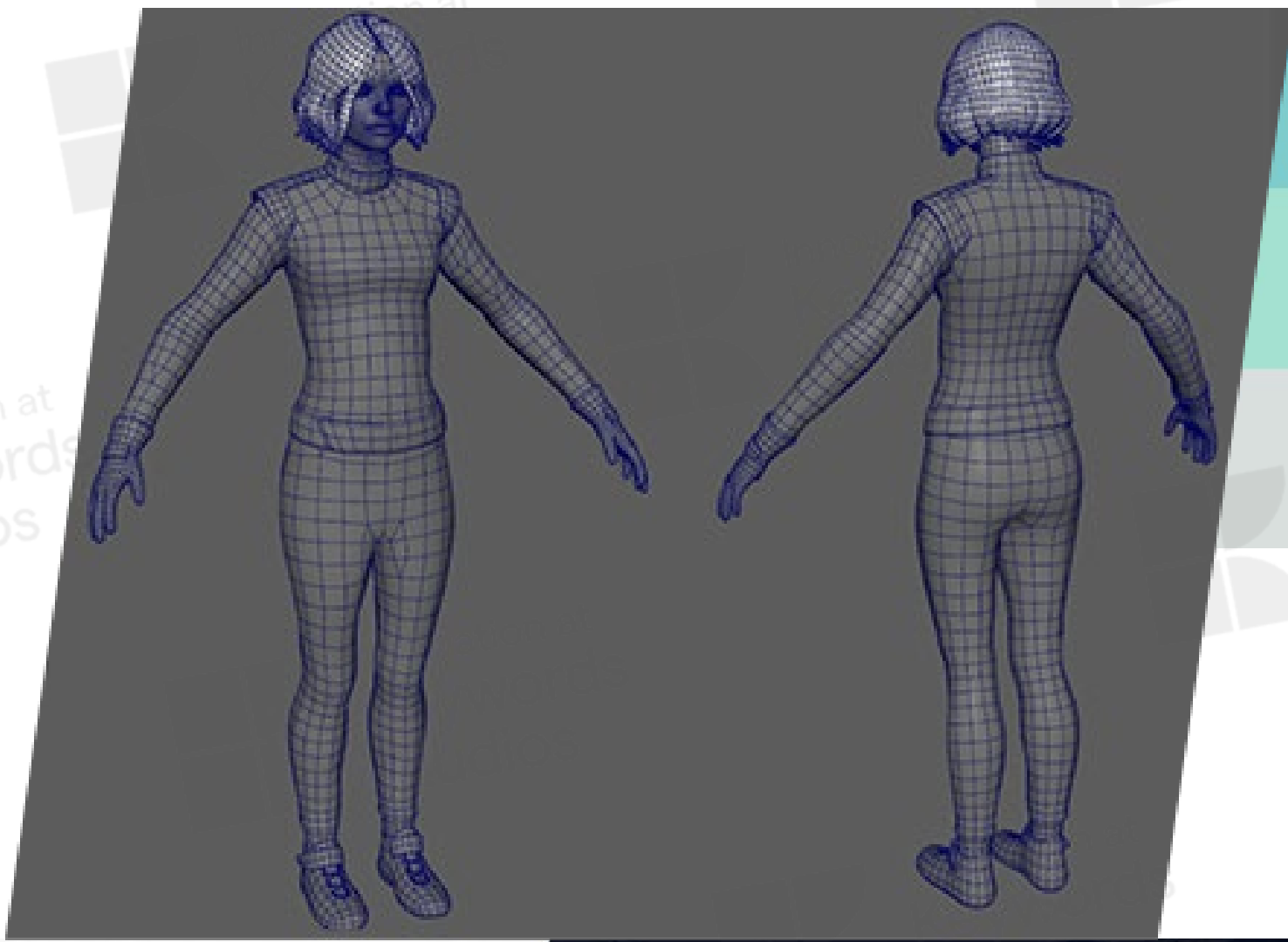
Once the base mesh is in place, the next step is high-poly sculpting. Sculpting tools such as ZBrush or Blender enable the addition of fine details by subdividing polygons. This allows for enhancements like muscle definition, skin texture, surface imperfections (scratches, wear), and extra elements such as bolts or holes on character apparel and equipment.



4/7

Retopology

After the high-poly sculpting is done, retopology is performed to create a clean, low-poly version of the character that is more efficient for use in production. The goal is to ensure good edge flow for animation, reducing unnecessary polygons and optimising for real-time performance.



PIPELINE SPOTLIGHT

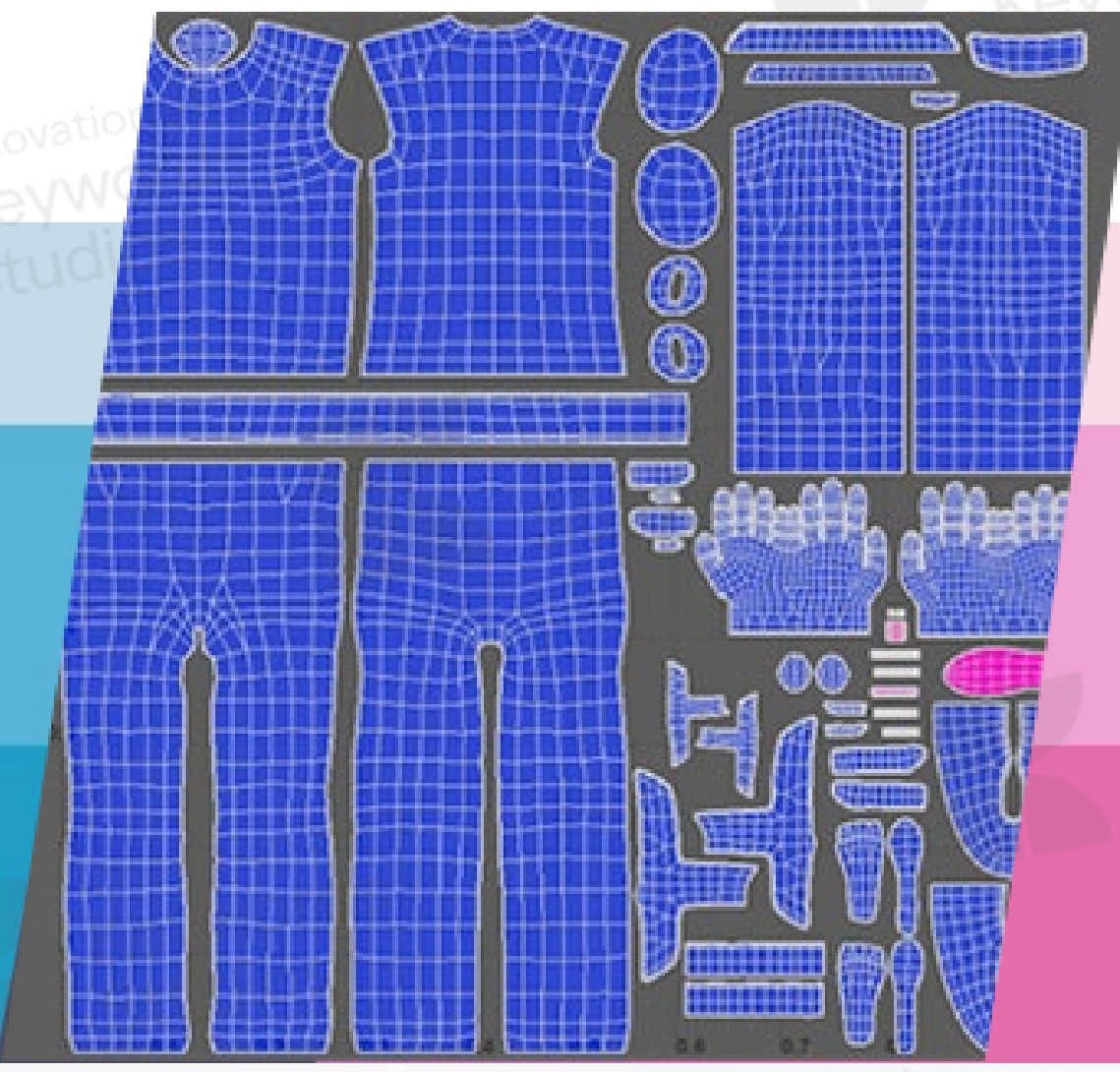
Generating 3D Characters with an AI infused pipeline

STANDARD PIPELINE

5/7 UV unwrapping

The 3D model's surface is flattened onto a 2D plane to ensure textures can be correctly applied.

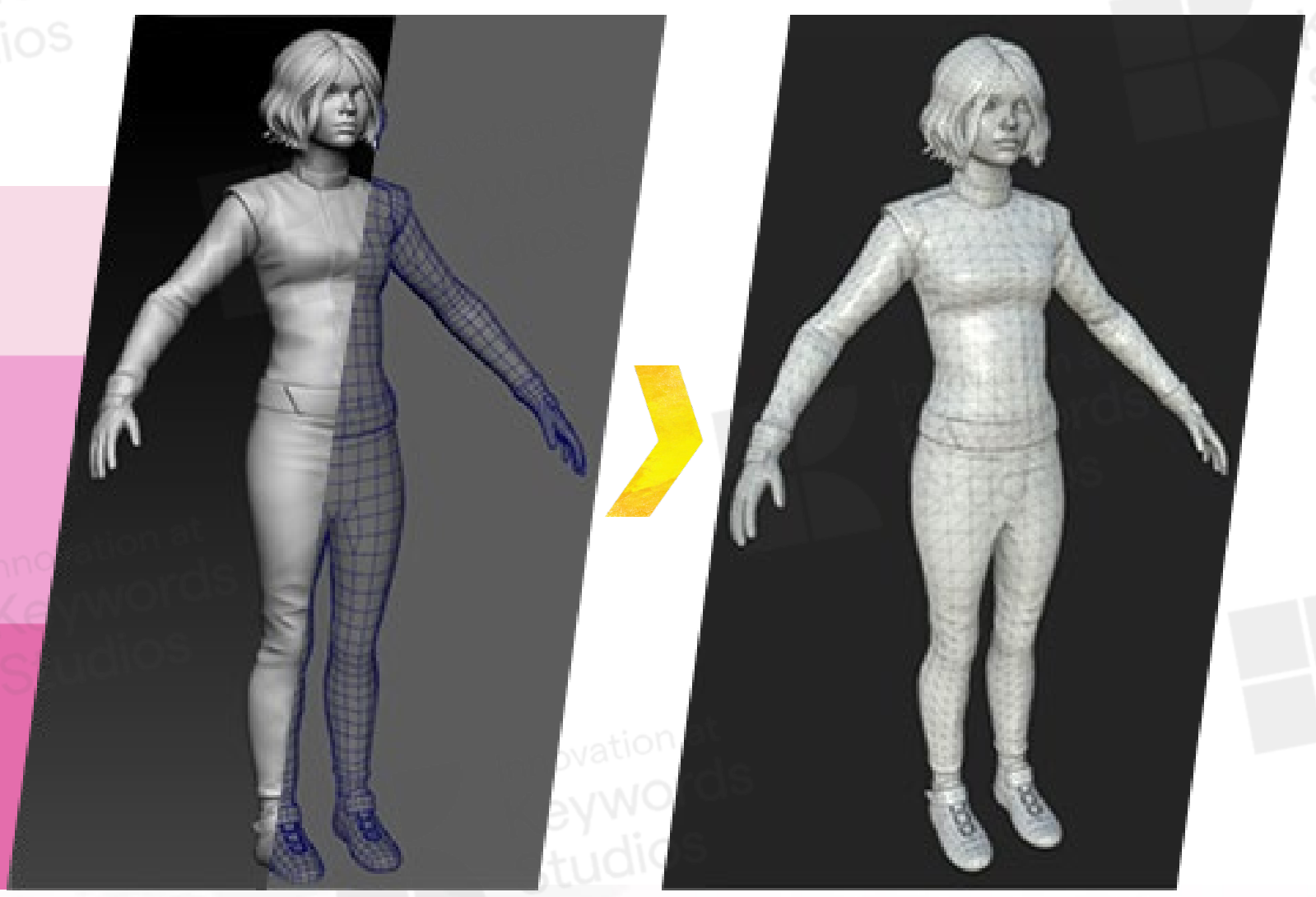
The unwrapped model is then used for applying 2D textures, such as skin tones, clothing, and other surface details.



6/7 Baking Details

Intricate details from the high-poly model can be baked into texture maps, allowing the low-poly model to retain a high level of detail without increasing polygon count.

This process can be carried out in 3D modelling software such as Maya or ZBrush, or with specialised tools like xNormal and Substance Painter.



7/7 Creating Textures

This process adds colours and details to low-poly models, working alongside shader materials in renderers or game engines for final visual output.

Texture maps are created using software like Substance Painter or Photoshop. The extent of texturing depends on visual and technical requirements. PBR textures include:

- Diffuse/Albedo (Colour)
- Normal Maps
- Specular/Roughness Maps
- Metalness Map
- Opacity/Alpha Maps
- Ambient Occlusion (AO)



Original Detonation Racing 3D Character Models

PIPELINE SPOTLIGHT

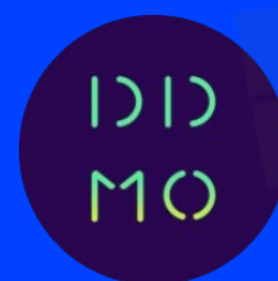
Generating 3D Characters with an AI infused pipeline

STANDARD PIPELINE

AI INFUSED PIPELINE

Next, we explored integrating AI tools into our character creation pipeline. We worked alongside the Didimo team, aiming to utilise their technology in creating 3D characters for the remaster.

Collaborating directly with Didimo allowed us to work on a custom pipeline, taking into account our team composition and project scope.



“**Didimo Popul8** transforms 3D character production by automating the creation of diverse, high-quality characters at scale. It streamlines character generation for game development, enabling developers to create thousands of unique characters that align with their game's art style and topology.”

PIPELINE SPOTLIGHT

Generating 3D Characters with an AI infused pipeline

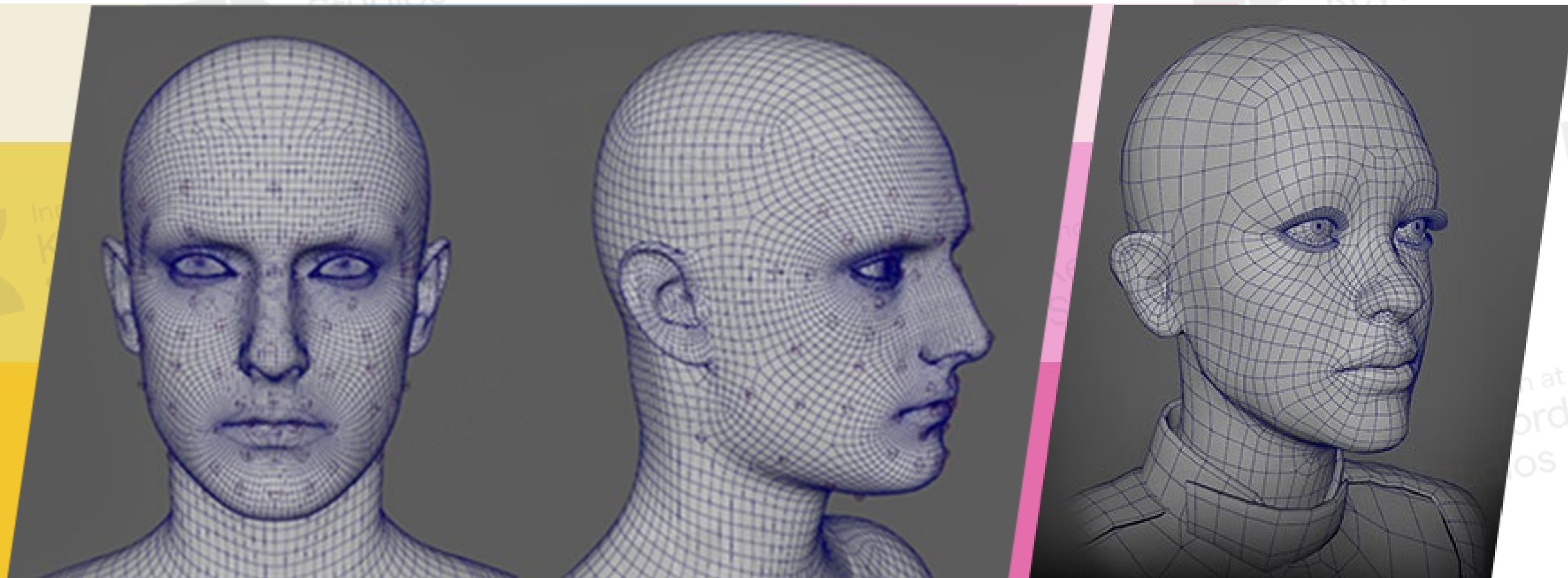
AI INFUSED PIPELINE

1/4

Preparing the base model

Didimo GAI transfers visual data from 2D images to pre-existing UV-unwrapped 3D models. We're using the updated model from the original game along with head and eye geometries for generation. Didimo provides a high-poly base model alongside the user's model.

Other head features like teeth and hair need to be manually added.



2/4

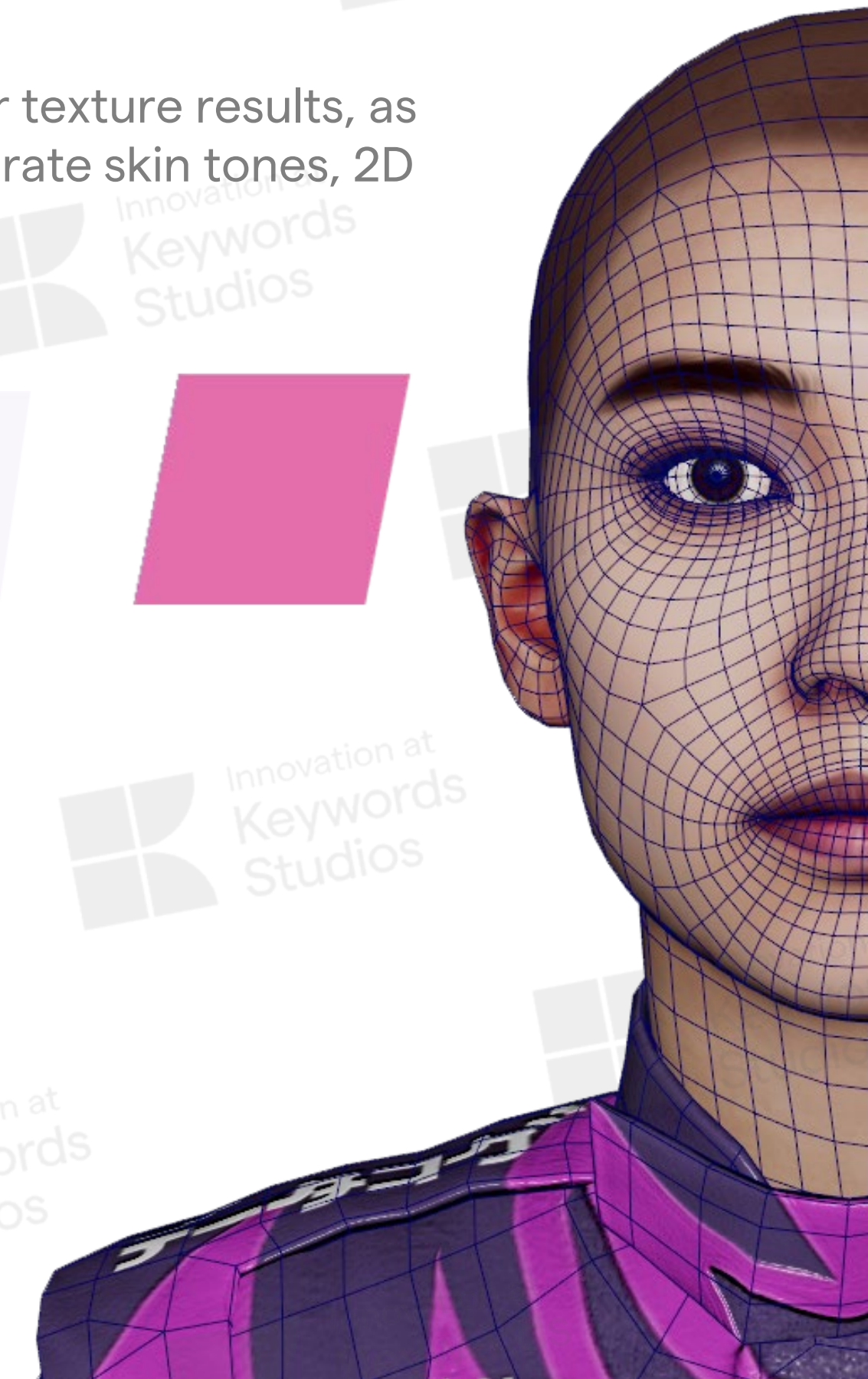
Head model generated by Didimo

Using 2D concept art and 3D base models, Didimo's GAI generated nine head models with good likeness in minutes.

Higher polycount head geometry yields better likeness and base colour texture results, as seen in the comparison with our lower poly base model. For more accurate skin tones, 2D portraits with flat lighting or colour swatches can be provided.



Tool used:



PIPELINE SPOTLIGHT

Generating 3D Characters with an AI infused pipeline

AI INFUSED PIPELINE

3/4

Creating hair cards

While Didimo GAI did not support generating low-poly hair with hair card meshes, artists completed this process using standard 3D tools. Once the hair geometry is created, Didimo's technology is able to scale and fit it to any subsequent AI generated head models. Base hair geometry and hair cards were created in Maya, and Adobe Substance 3D Painter was used to do further texturing.

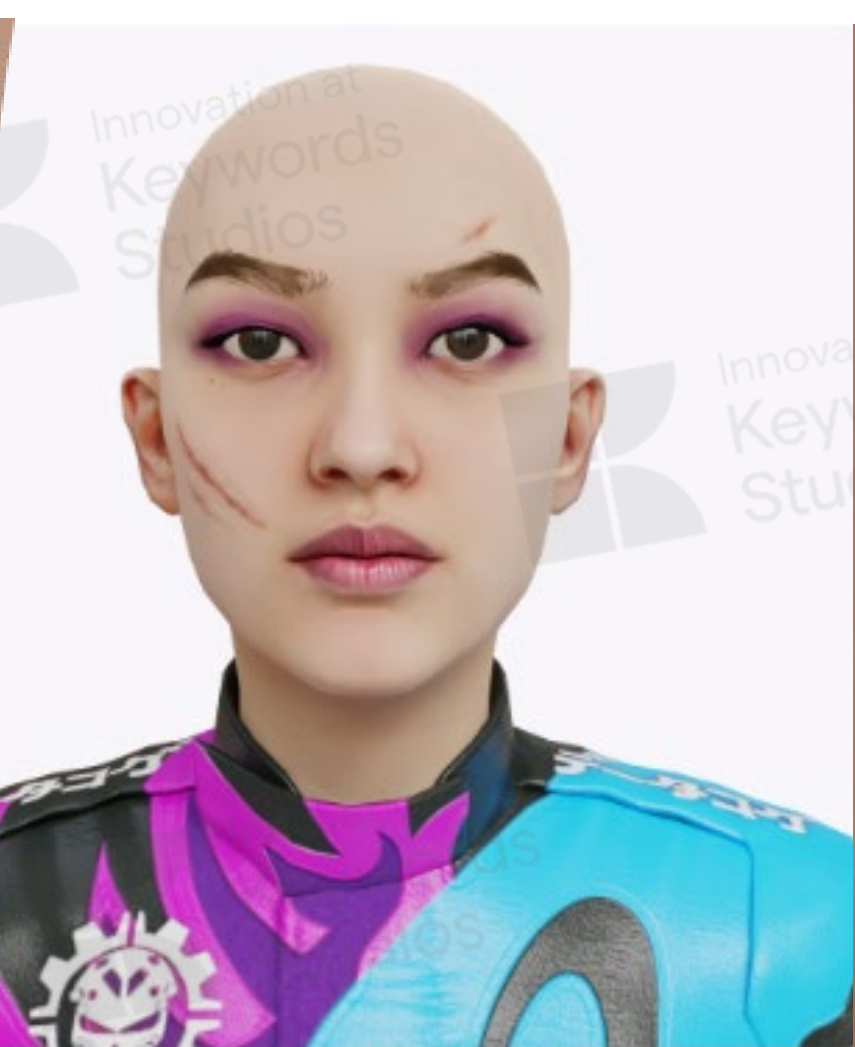
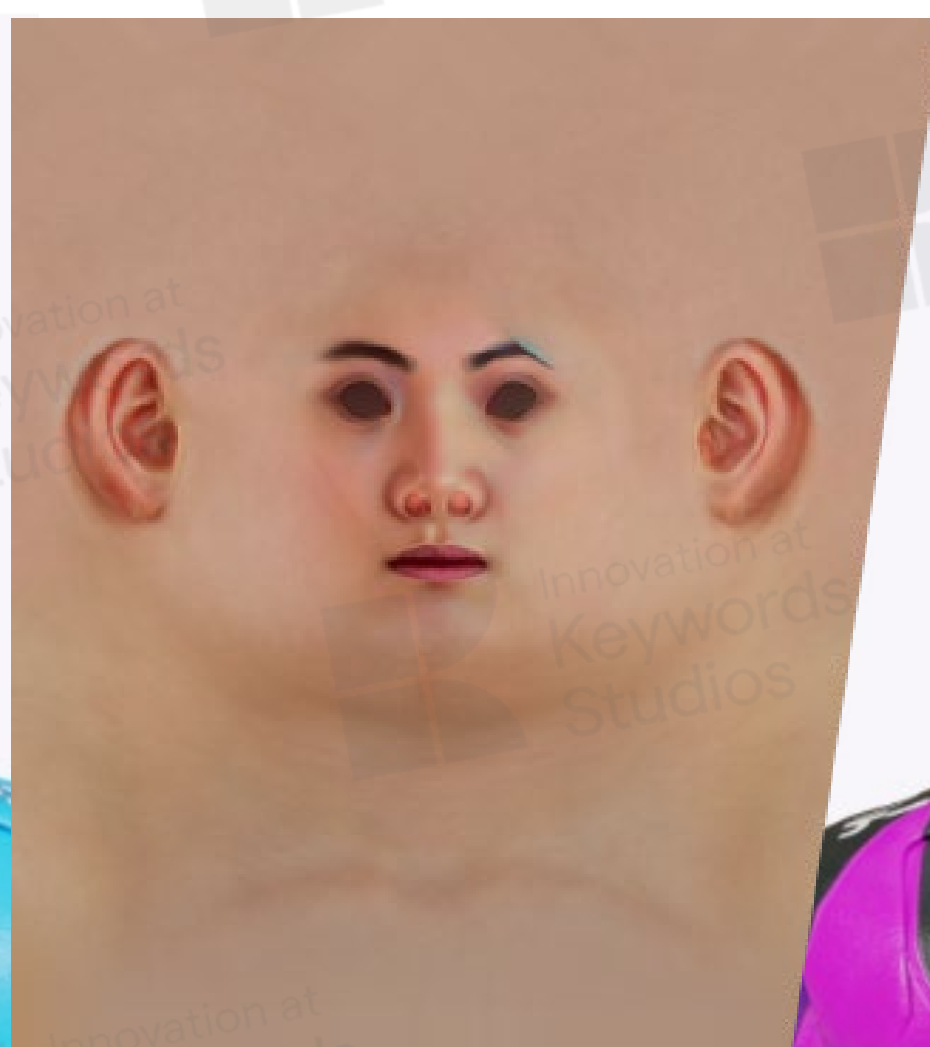
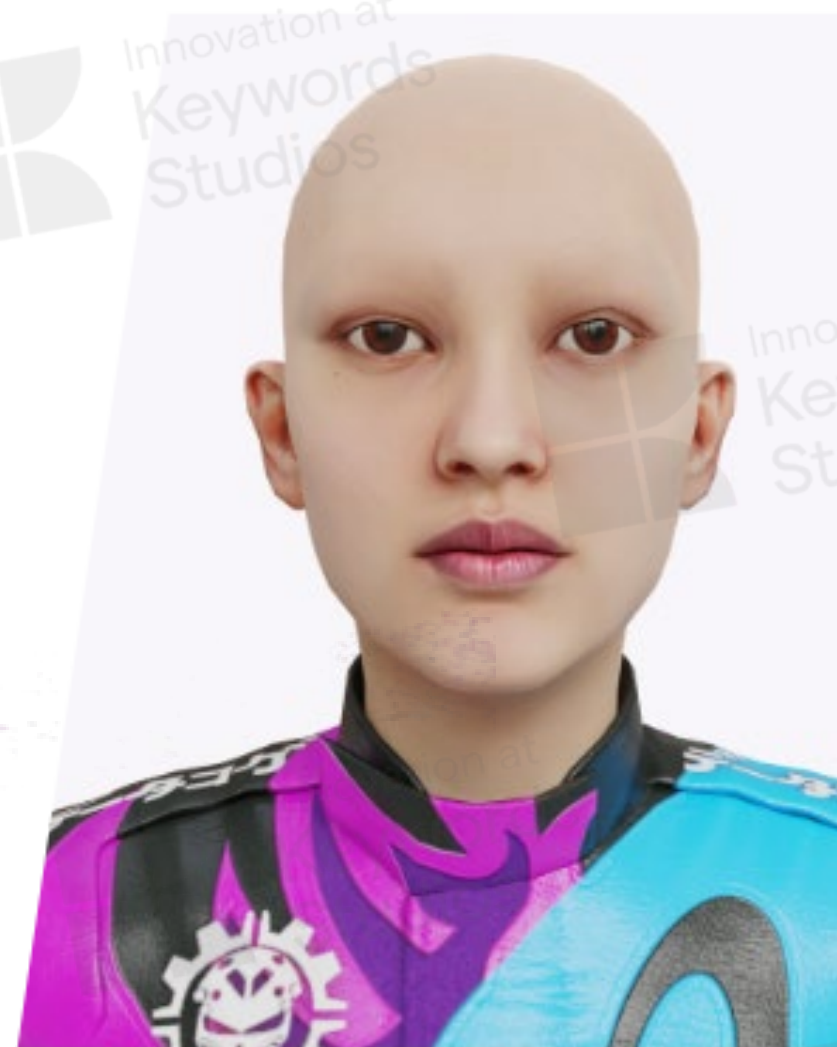


4/4

Character customisation with Didimo

Didimo GAI generates clean skin textures that match the overall skin tone on the back of the head while removing unwanted details from 2D images. This allows flexibility in base colour, texture refinement, and the removal of undesired elements.

Additional details, such as tattoos or scars, are added using layered PSD or Substance Painter files. Major elements, like hair and clothing, are treated as separate geometries that can be refitted to different character models.



Tool used:



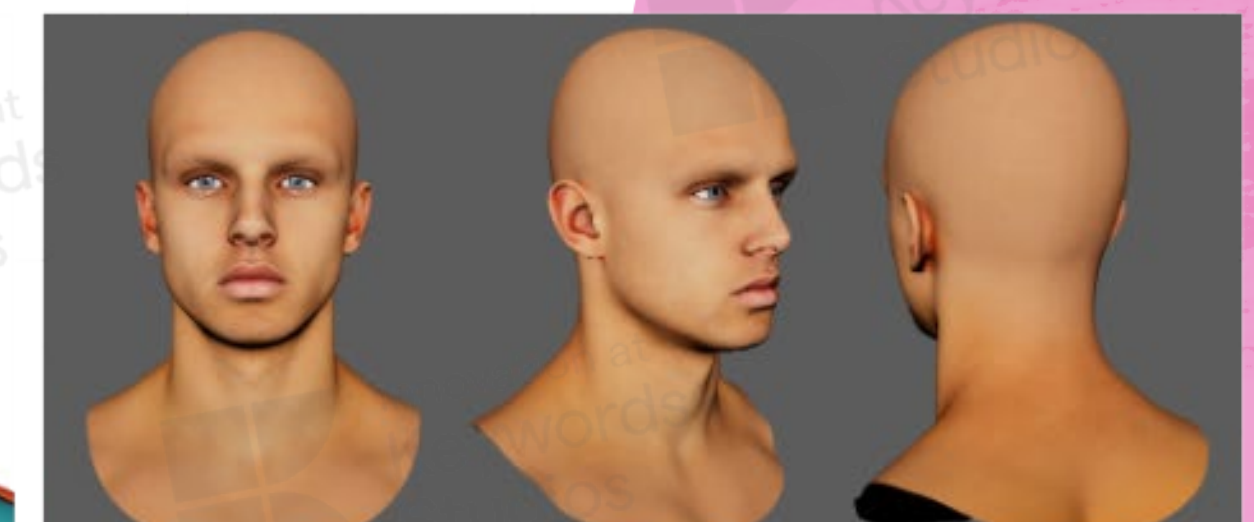
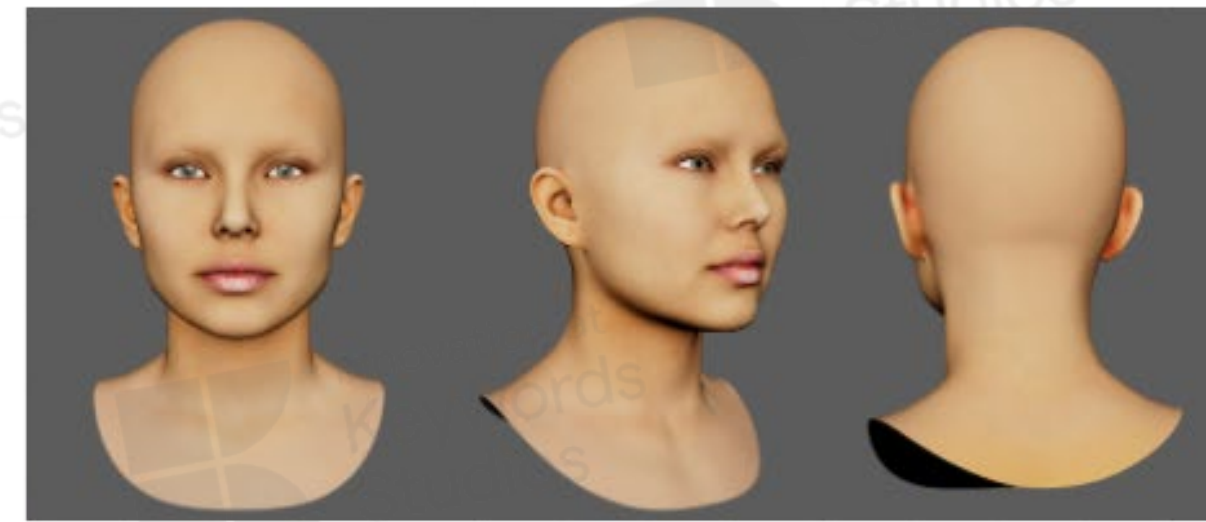
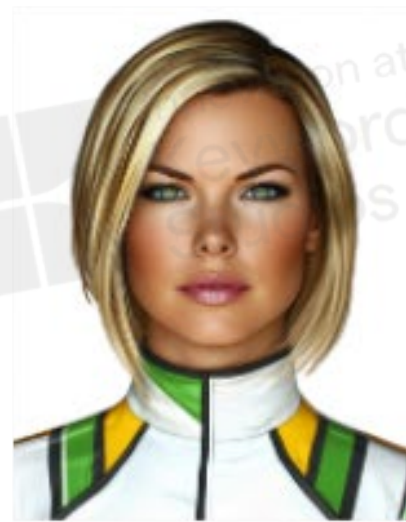
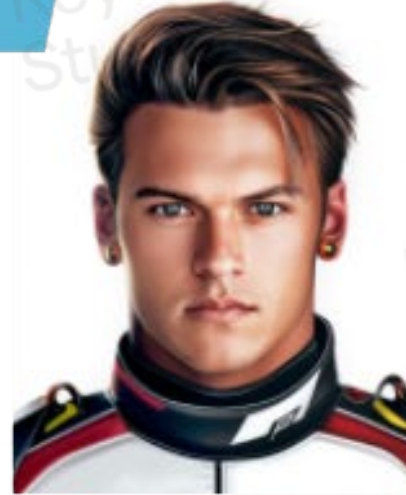
PIPELINE SPOTLIGHT

Generating 3D Characters with an AI infused pipeline

AI INFUSED PIPELINE



While characters aren't a core focus of our game, investing in a single character with this technology allows for rapid generation of multiple variations once set up. For games requiring a diverse cast, this can provide significant scalability and value.



Tool used:

DIIDIMO

PIPELINE SPOTLIGHT

Generating 3D Characters with an AI infused pipeline

AI INFUSED PIPELINE

Tool used:

3D DINO



Thank you.

