



March 21-25, 2022  
San Francisco, CA

# Character Outfit Pipeline with Substance 3D Suite

Kedong Ma @ Epic Games

#GDC22



# Disclaimer

- The presentation is **exclusively** about the character pipeline at Harmonix
- Assets included in this presentation are from Dance Central VR and Harmonix internal prototypes
- The content does **NOT** reflect the current state of character pipeline at Epic Games

- Intro: character pipeline Dance Central VR
- Part 1. Outfit color variant tool in Substance Designer
- Part 2. Switching to Substance Painter
- Wrap up

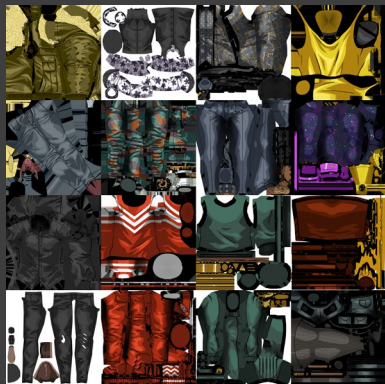
# Intro: Dance Central VR (DCVR)





# Character Material

4x4 atlas



Color ID mask atlas



RGB



Color Variant

Primary



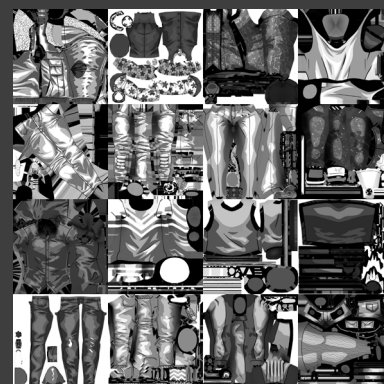
Secondary



Tertiary

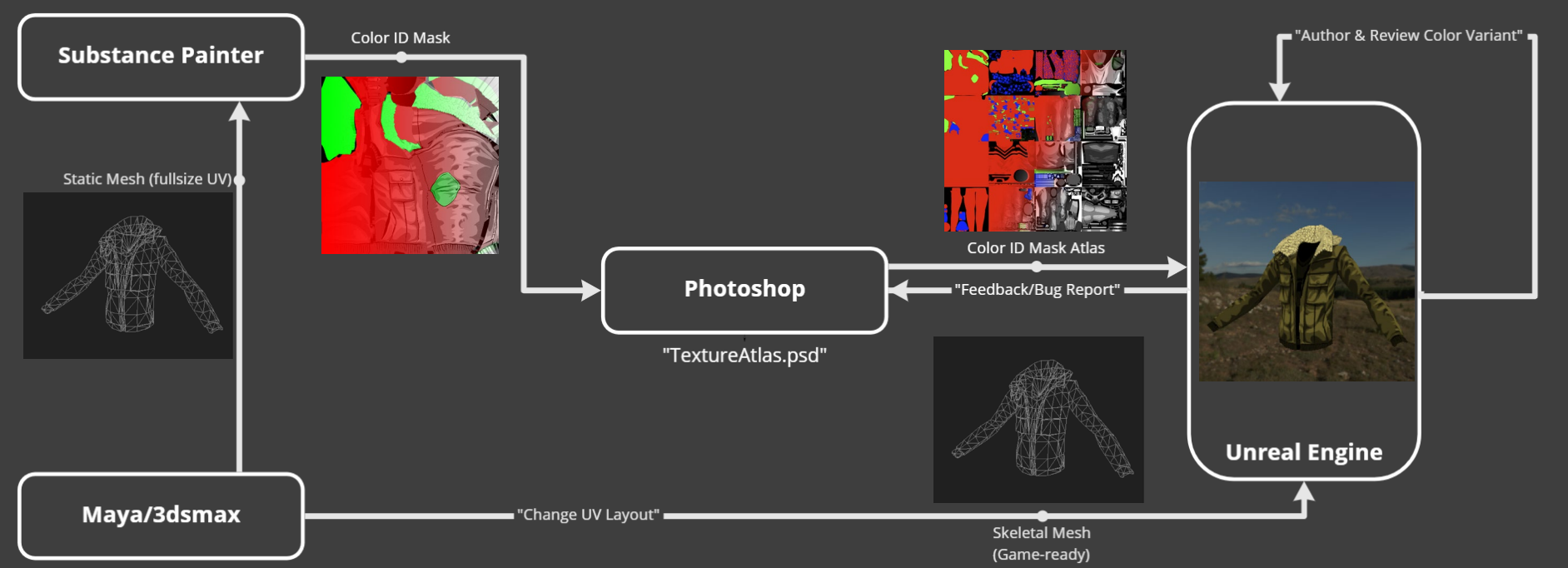


Color ID mask atlas



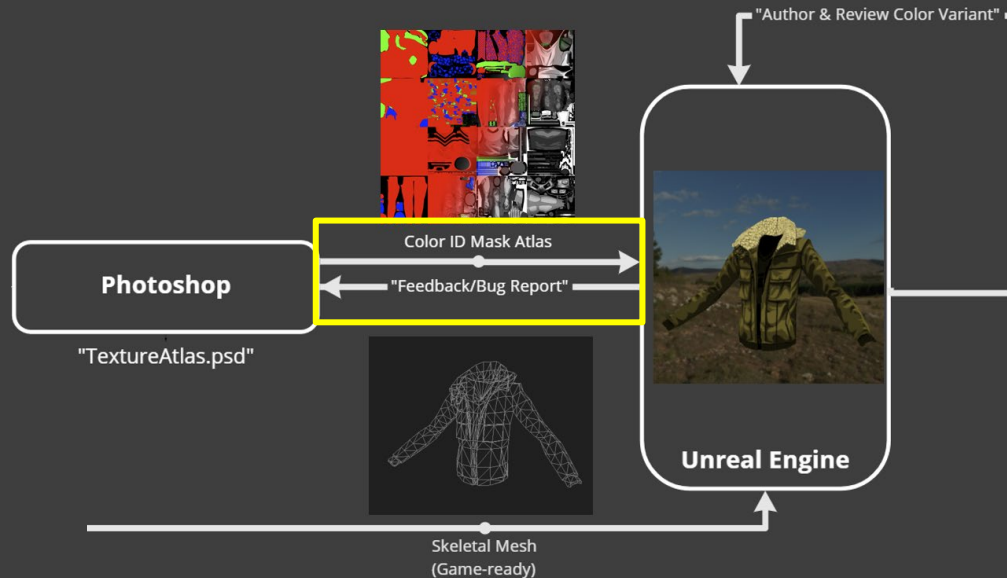
Alpha

# Initial Character Pipeline



# Pipeline Challenge

- Slow Color ID Mask iteration
- Authoring Color variation
- Outsource

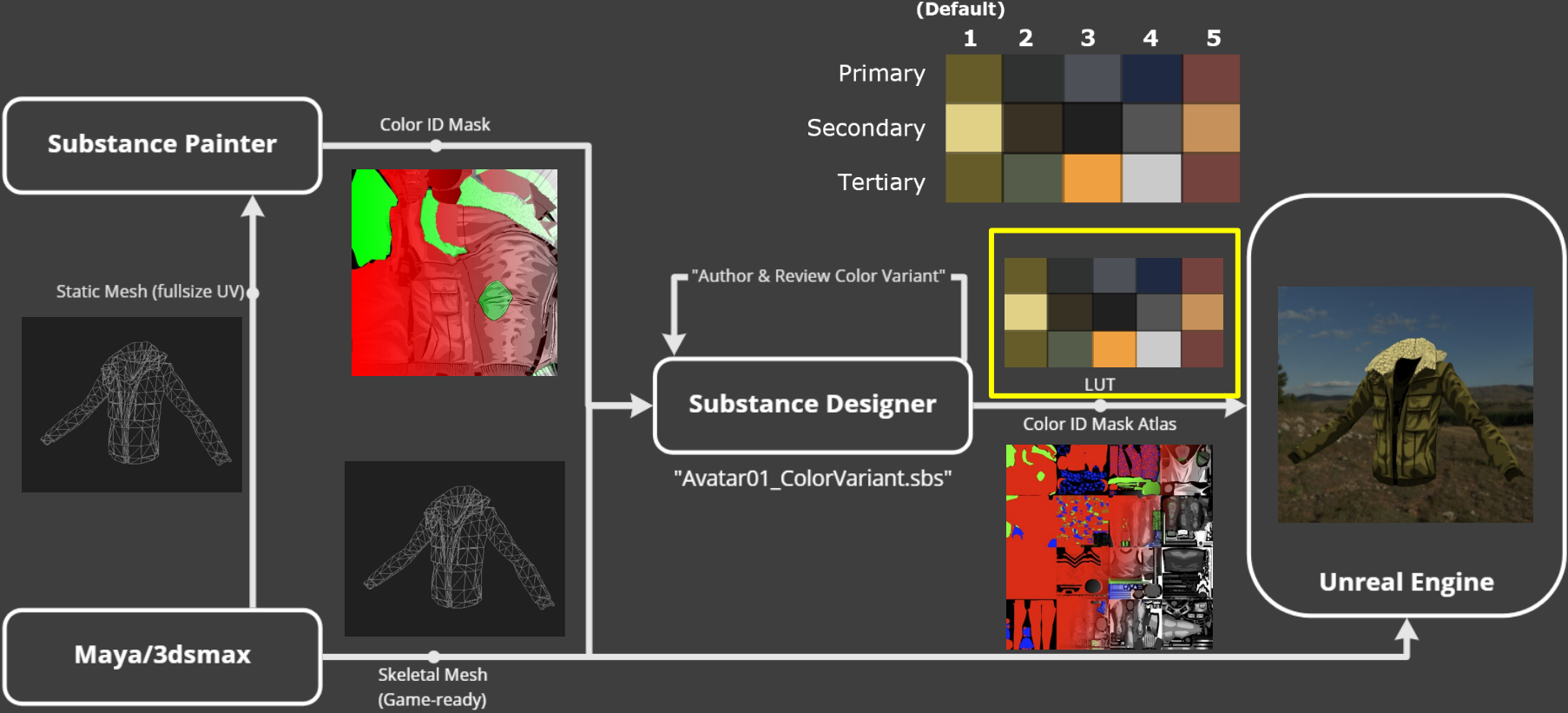


# Substance Designer Tool

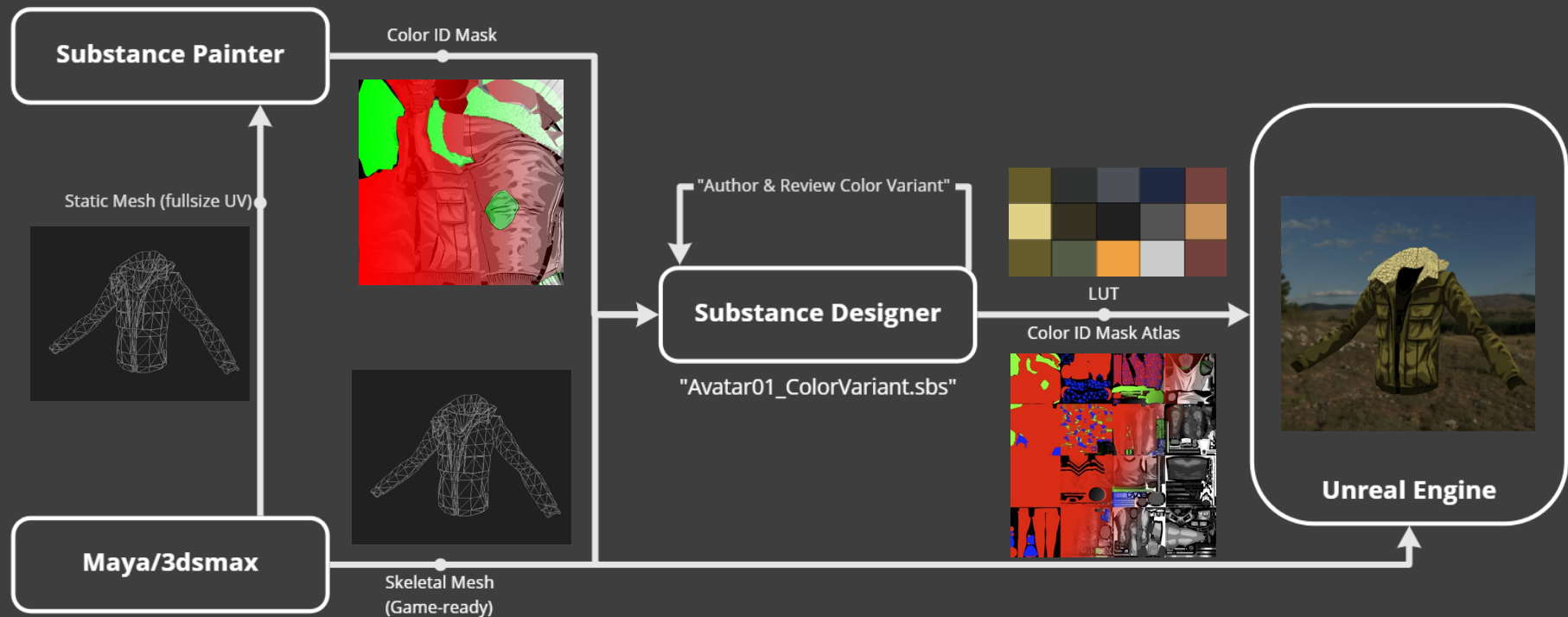
- A graph for authoring color variant and color ID mask atlas
- Previewing the outfit with different color variant in realtime
- Procedurally generating color ID mask texture atlas
- Independent from Unreal



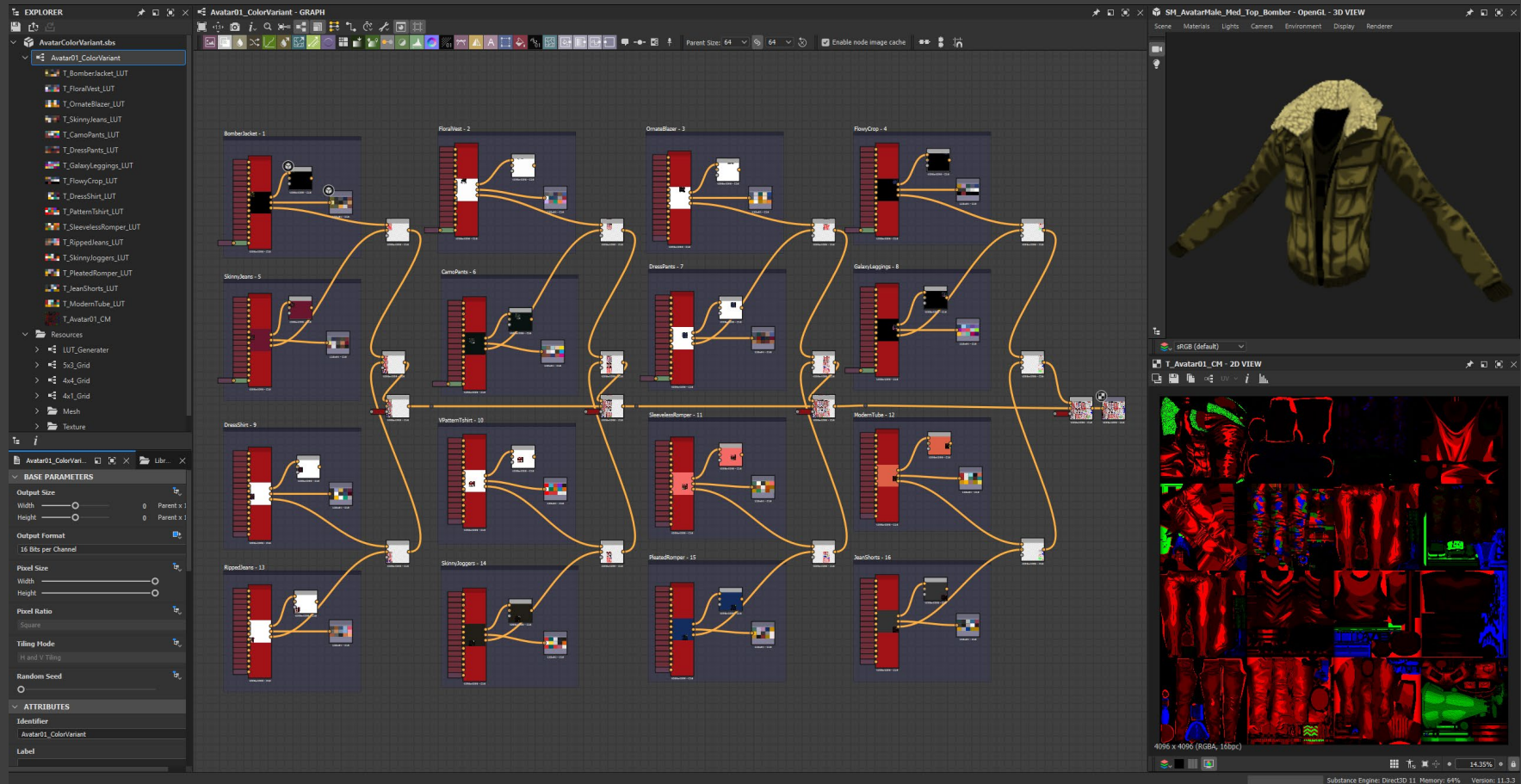
# DCVR Character Pipeline



# Part 1. Substance Designer pipeline tool for DCVR

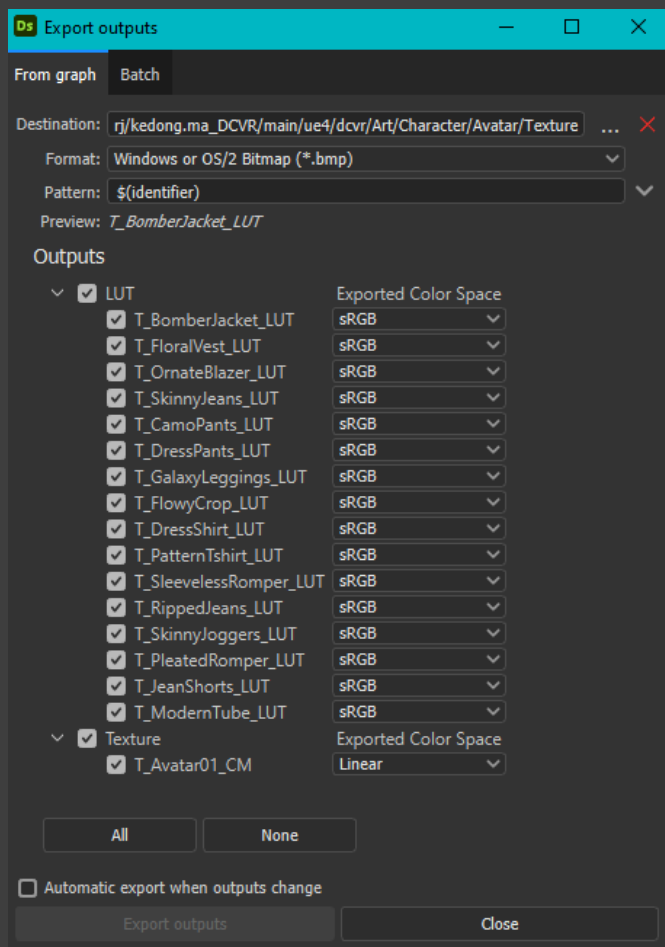
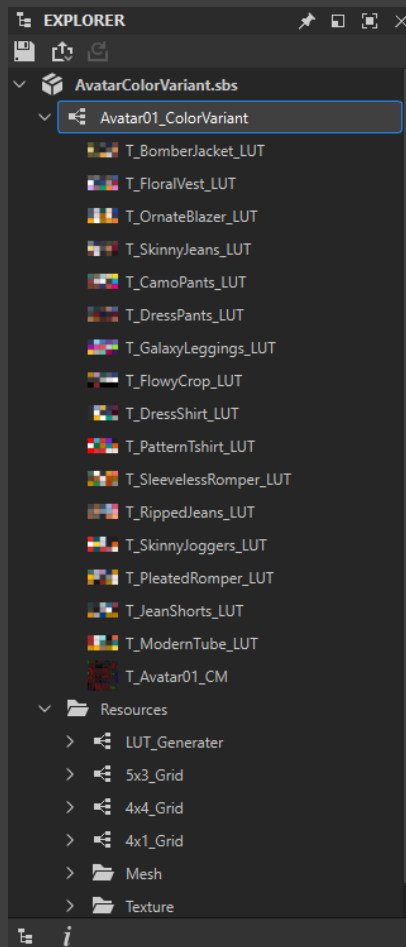


# Substance Designer Graph



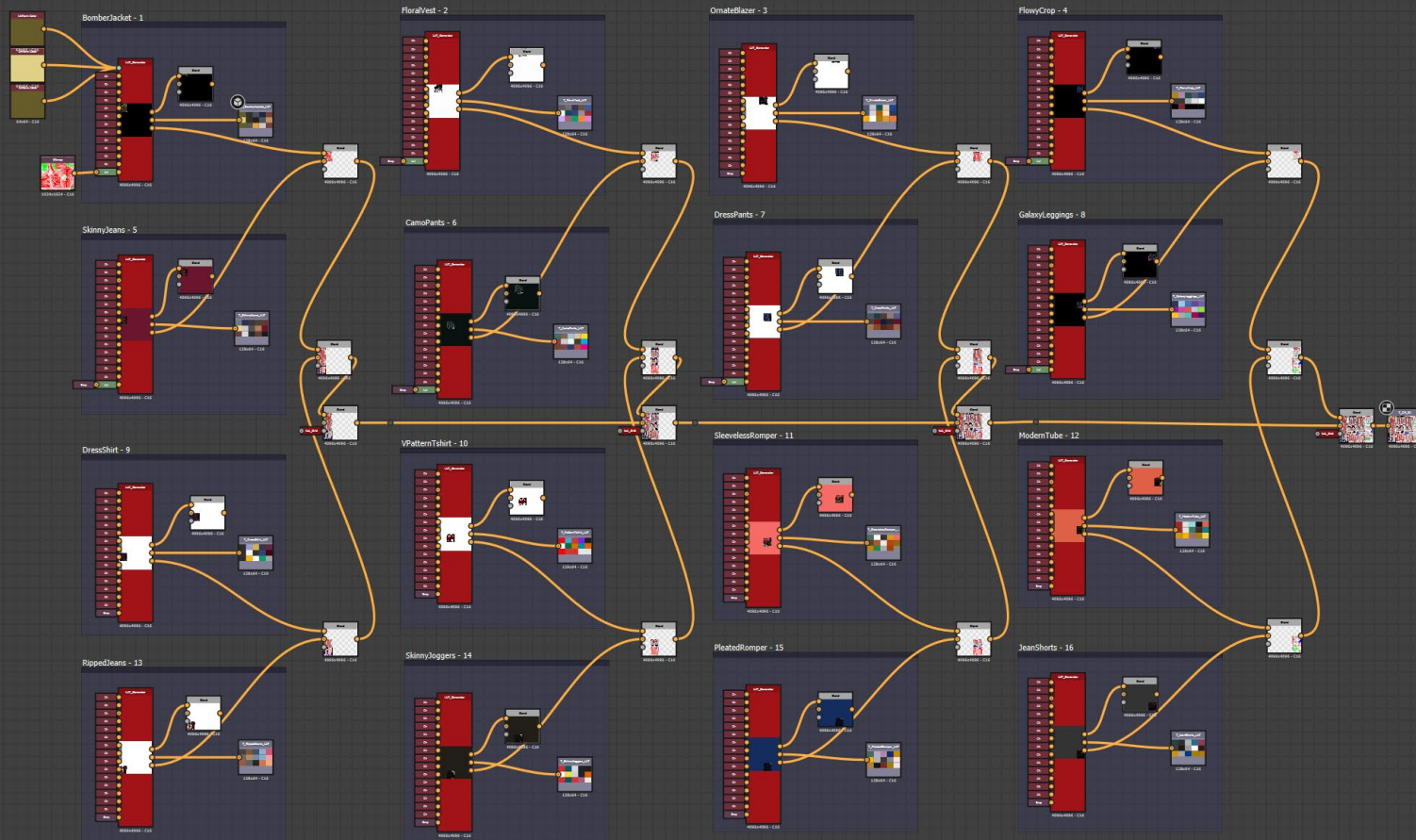
# Substance Designer Graph

- Output:
  - 16 LUT texture
  - 1 Color ID Mask texture

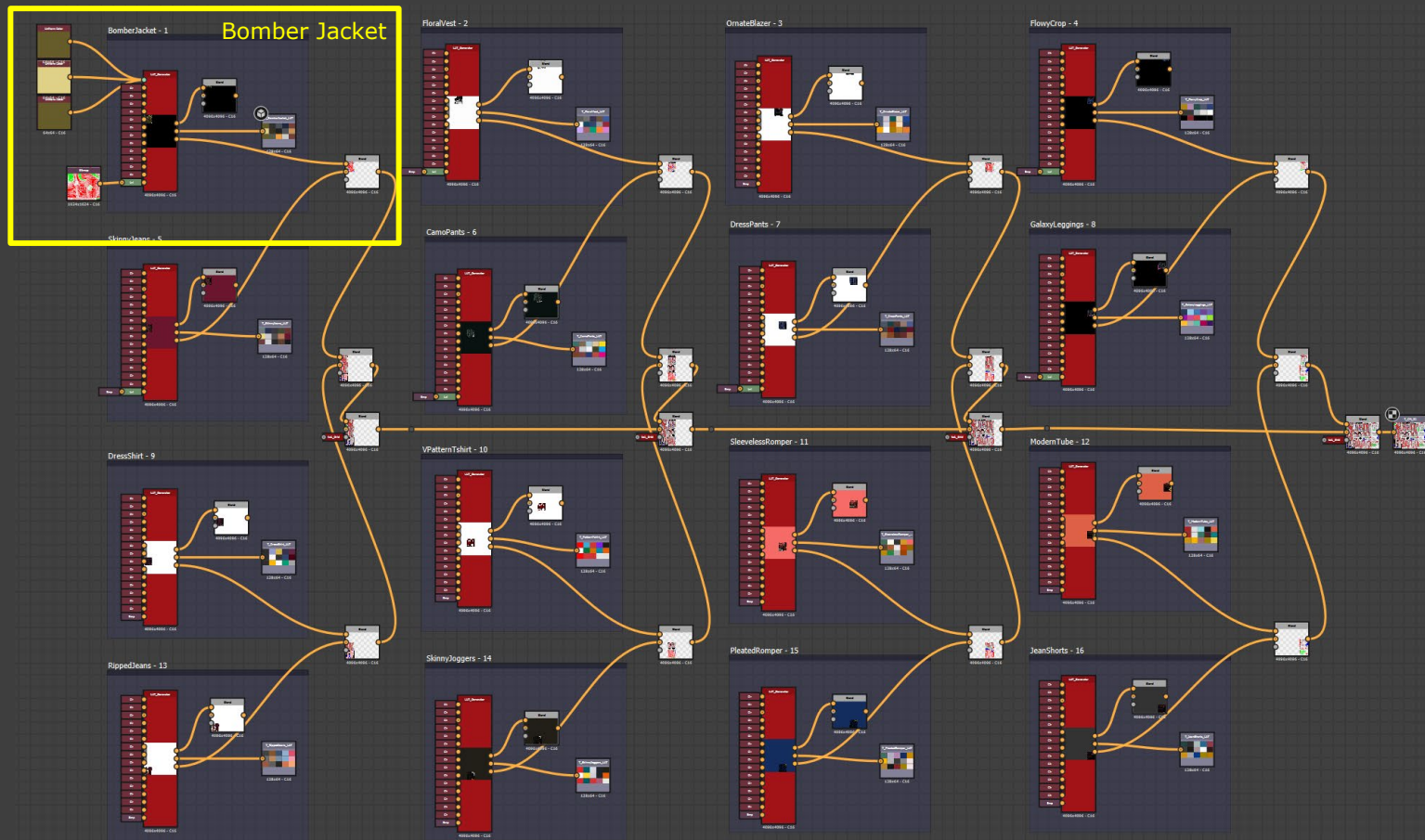




# Substance Designer Graph

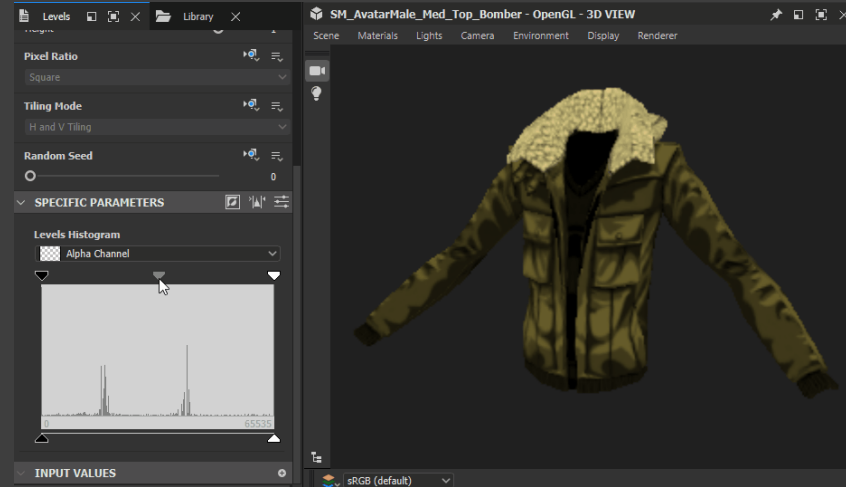
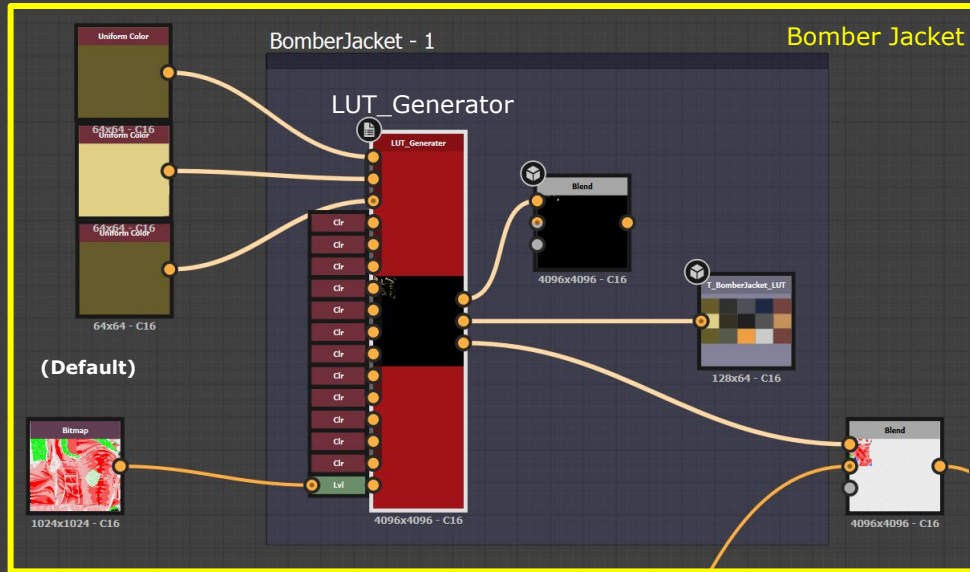


# Substance Designer Graph

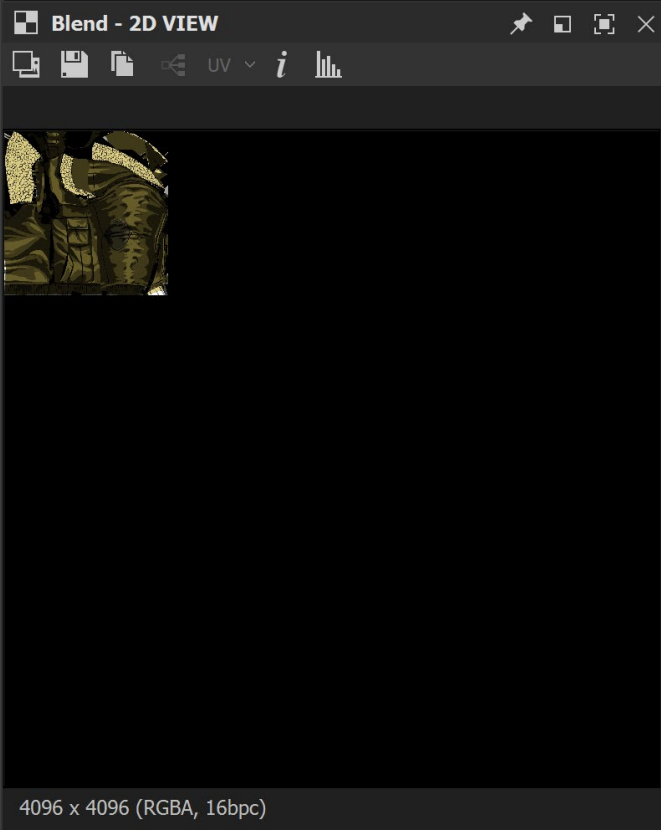
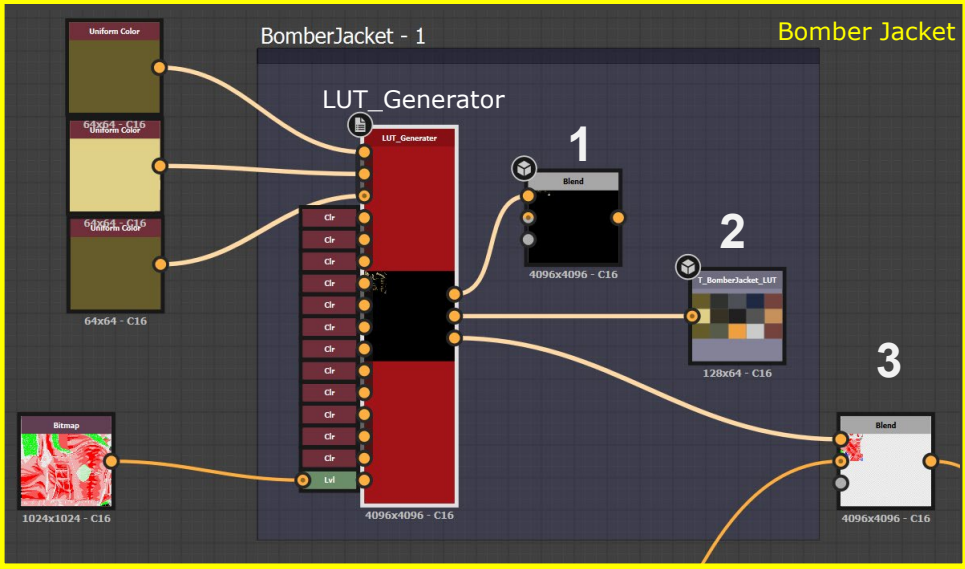




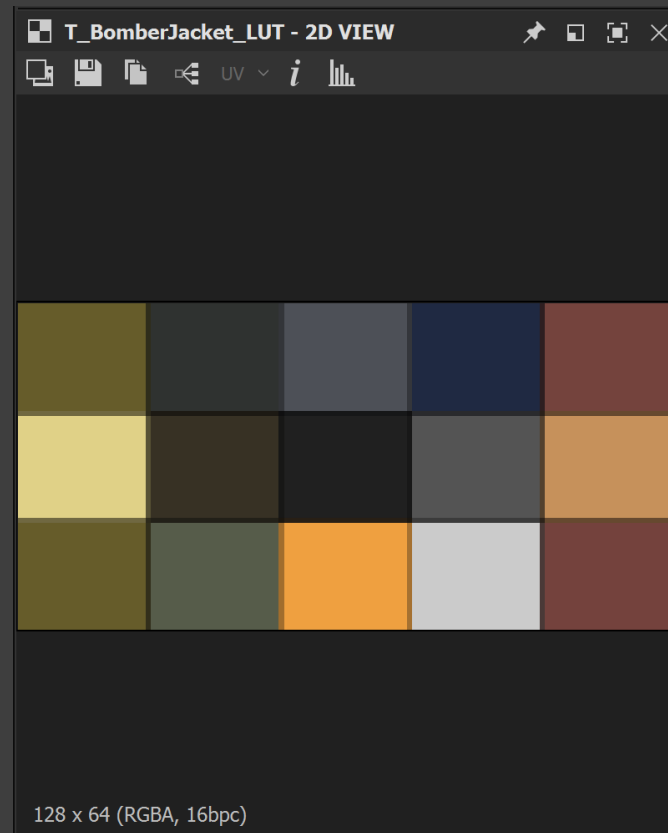
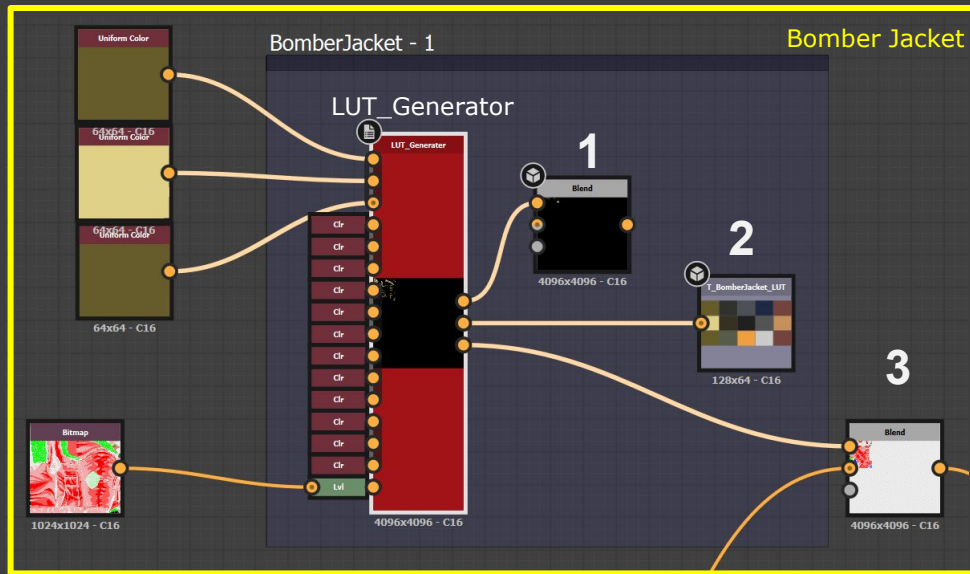
# Substance Designer Graph



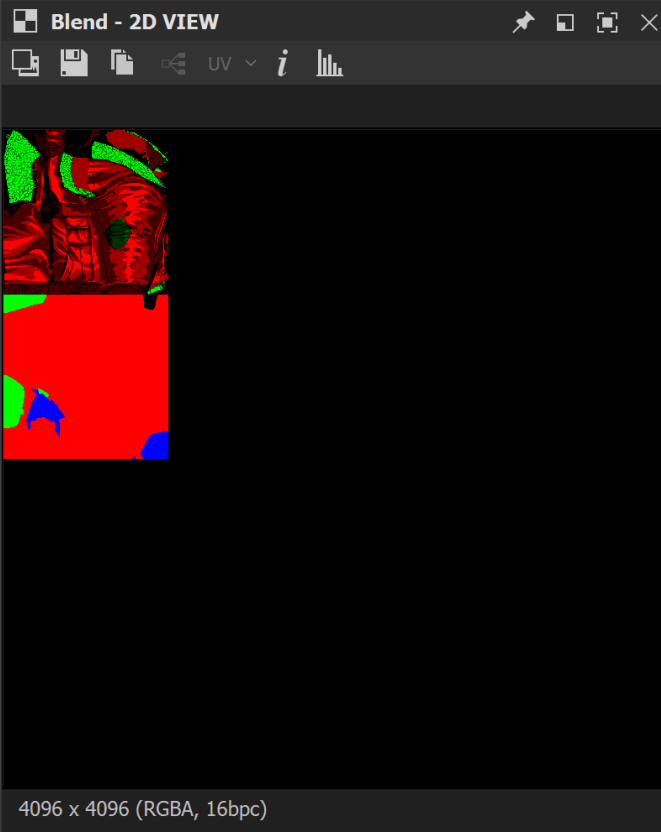
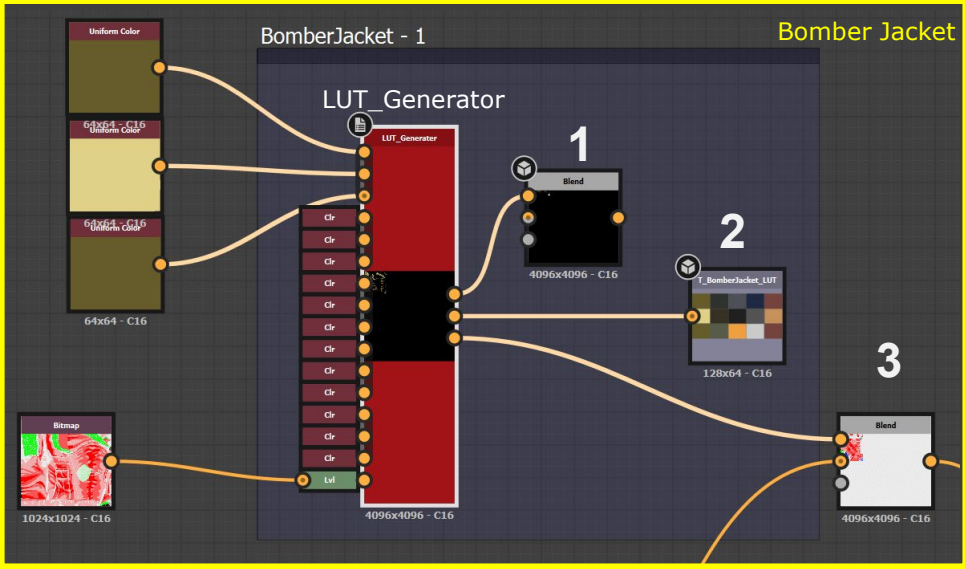
# Substance Designer Graph



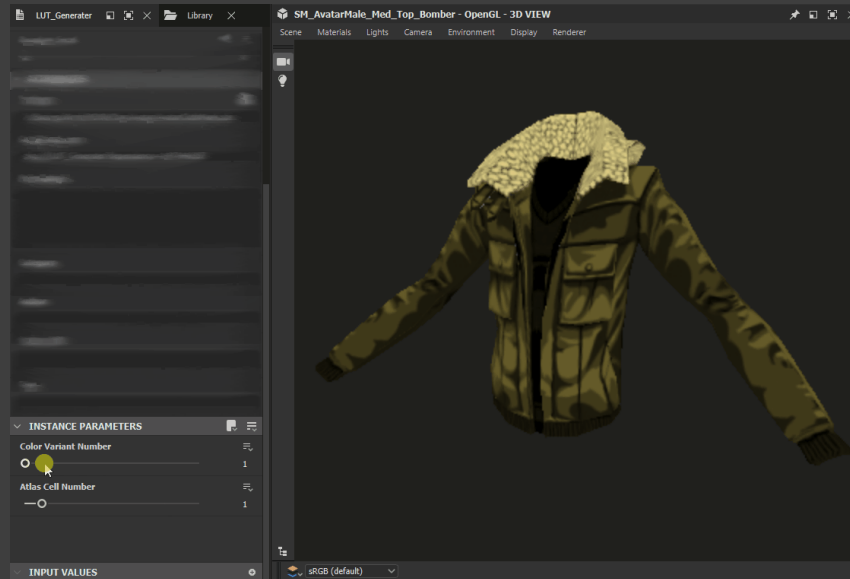
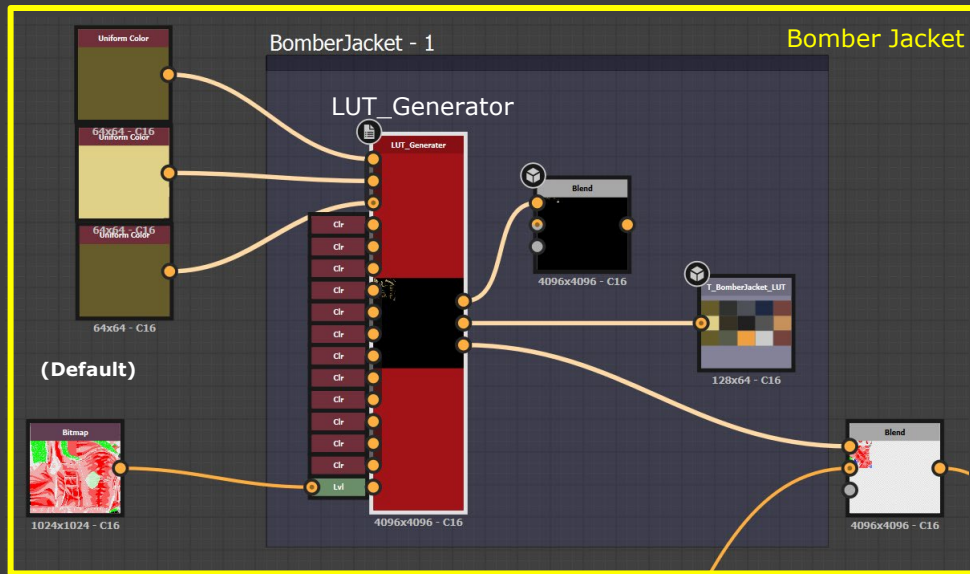
# Substance Designer Graph



# Substance Designer Graph

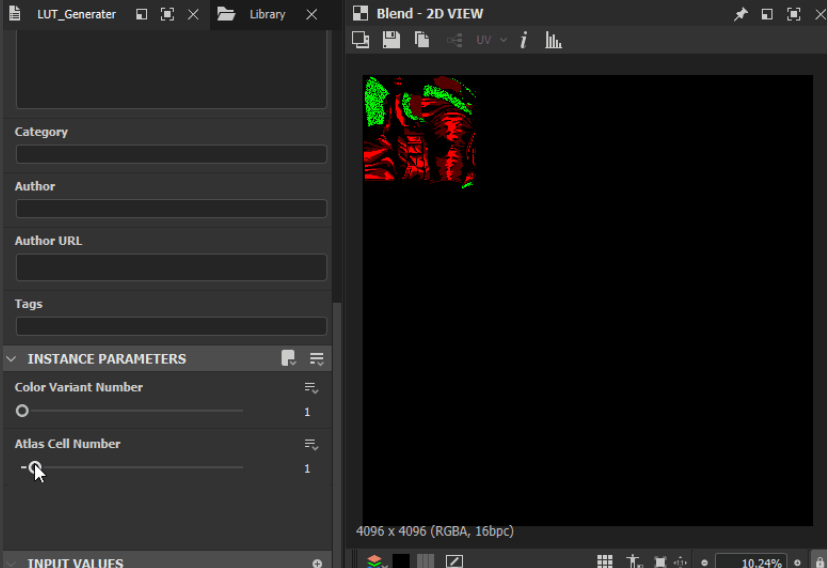
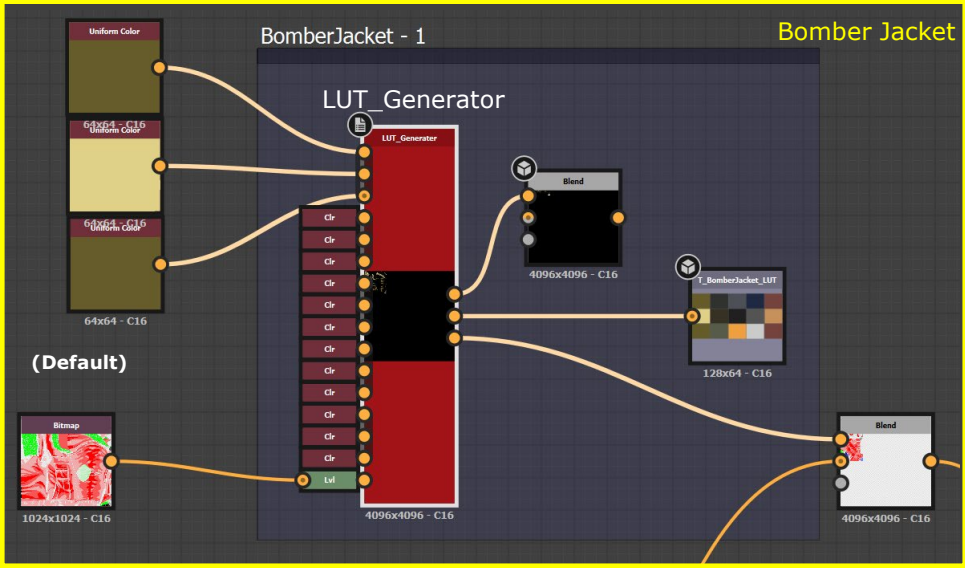


# Substance Designer Graph



### Color Variant Number Slider

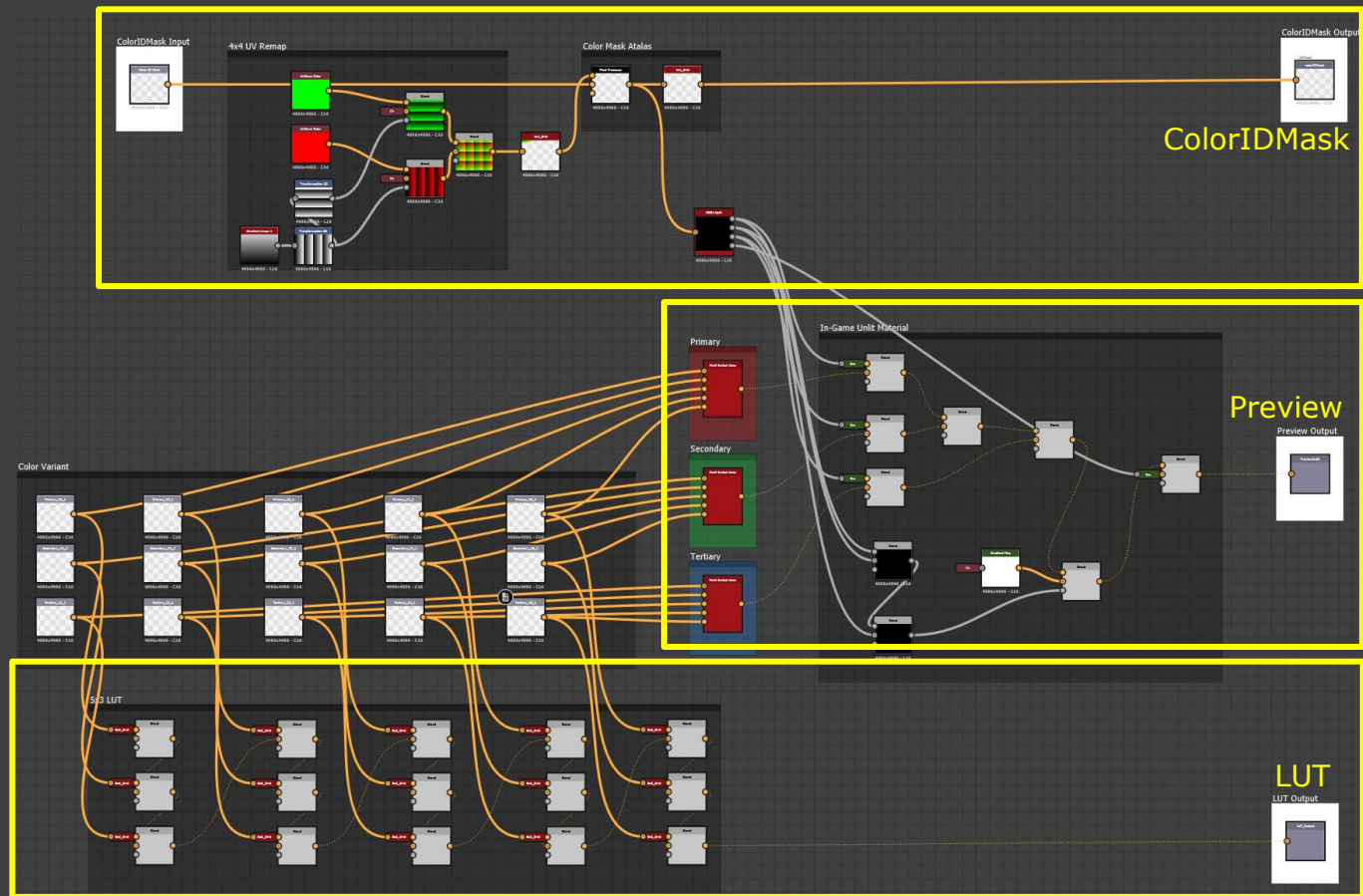
# Substance Designer Graph



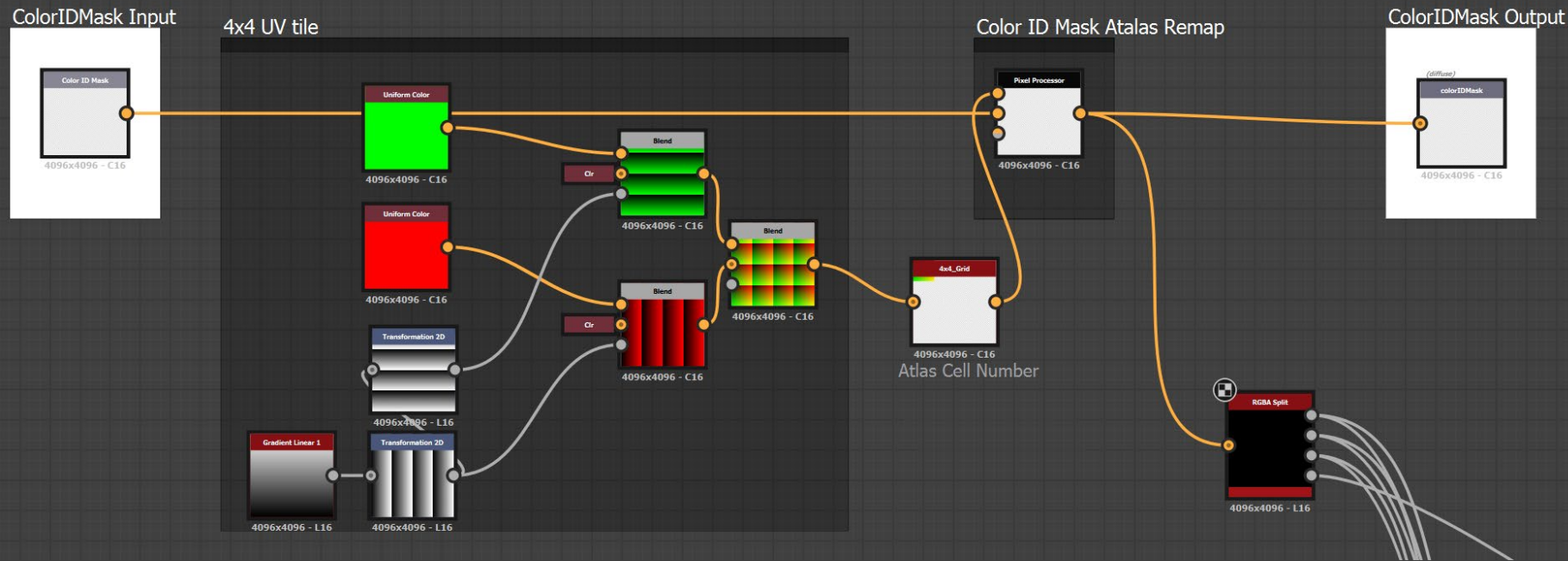
Atlas Cell Number Slider



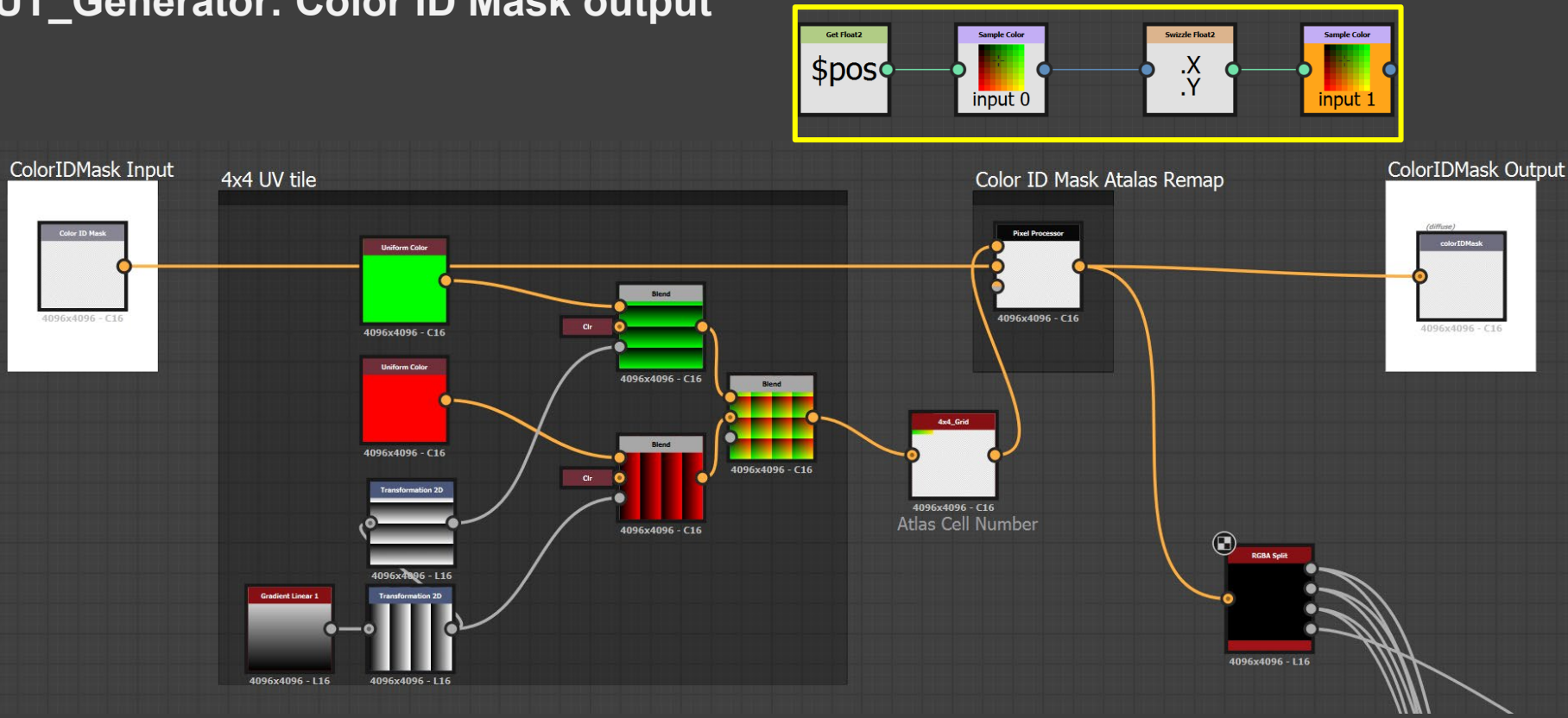
# LUT\_Generator: Overview



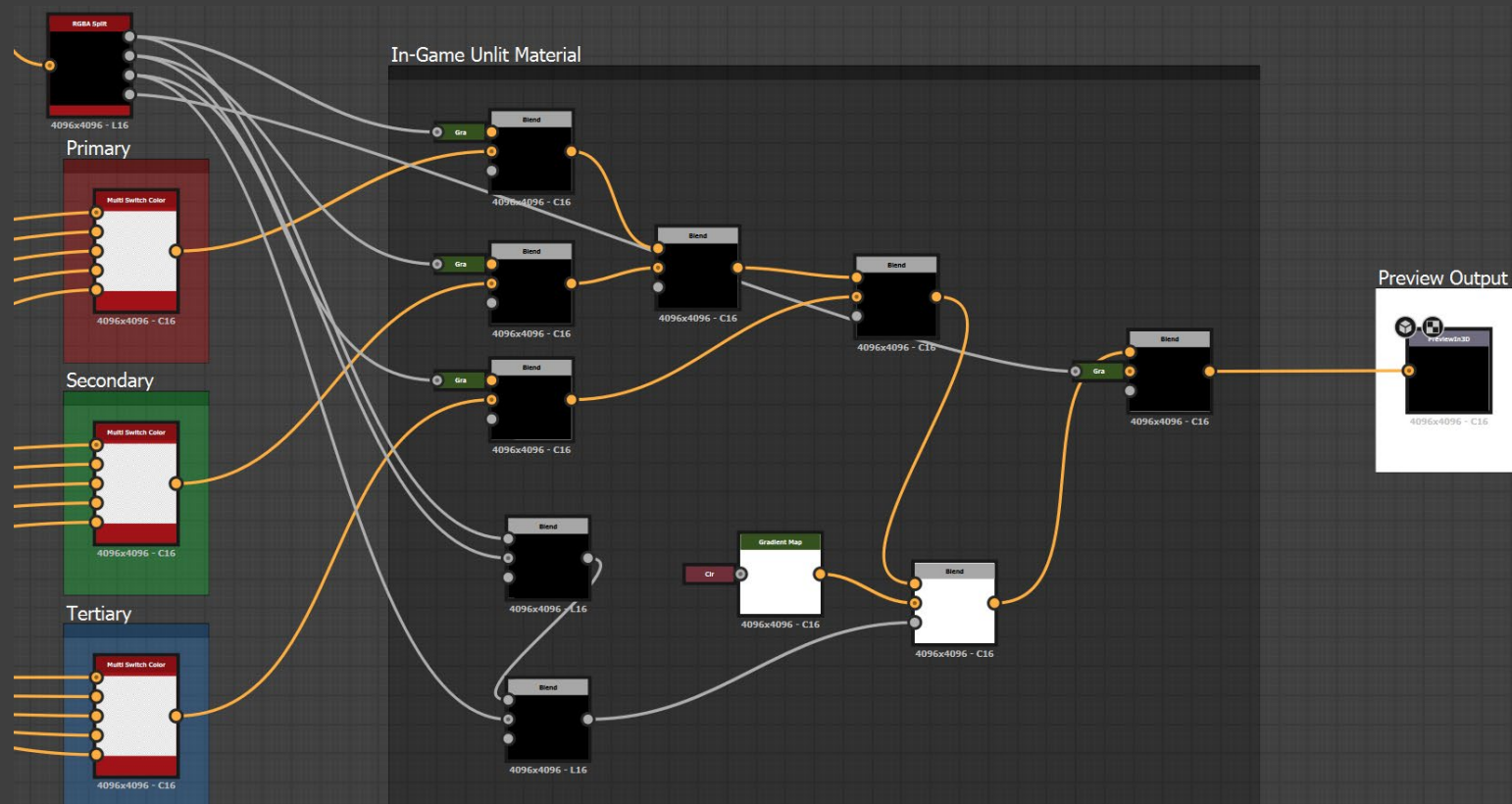
# LUT\_Generator: Color ID Mask output



# LUT\_Generator: Color ID Mask output



# LUT\_Generator: Preview output

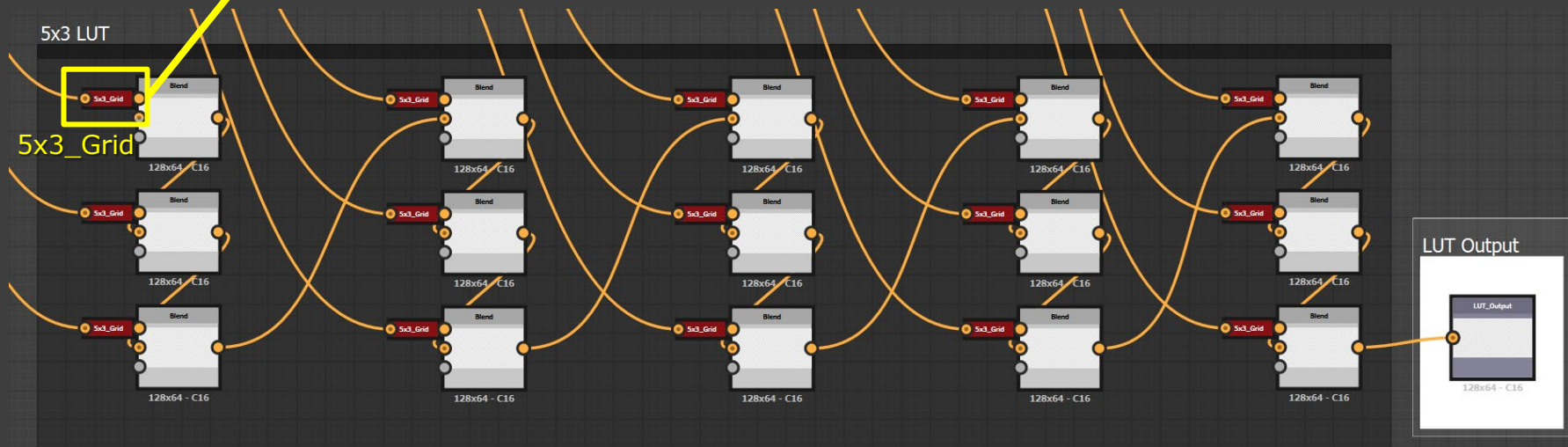




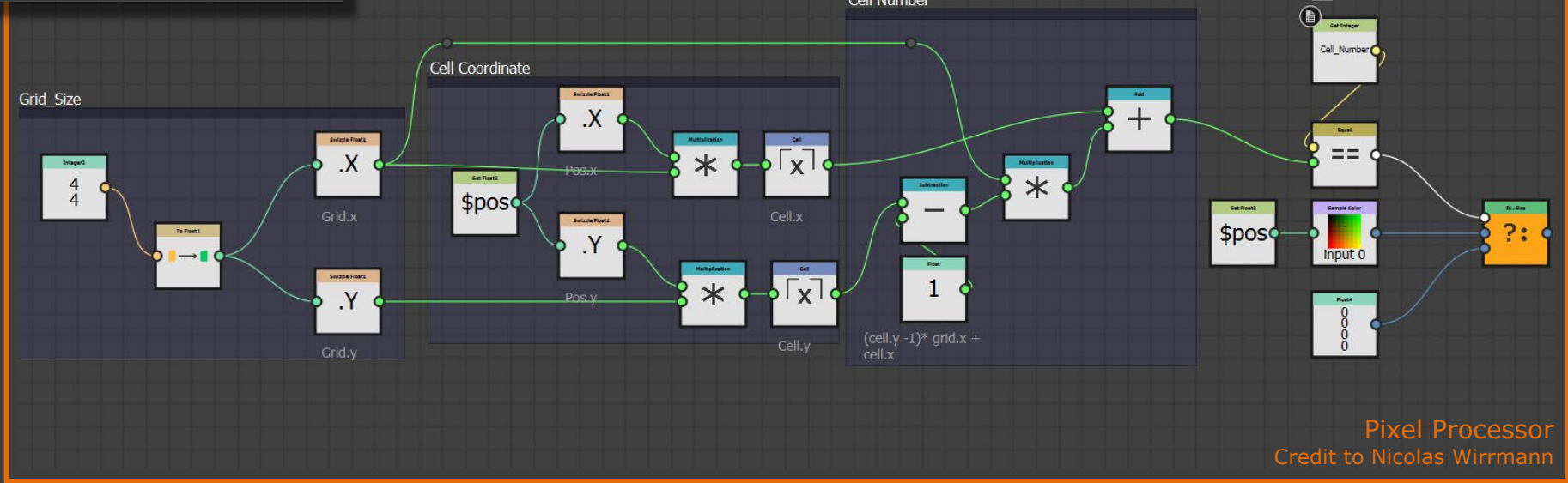
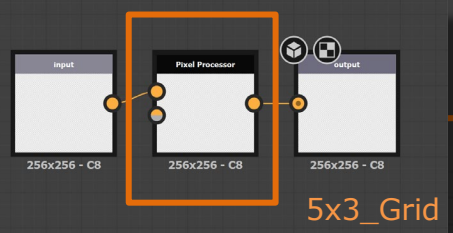
## LUT\_Generator: Color LUT output

"Cell\_Number"

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15



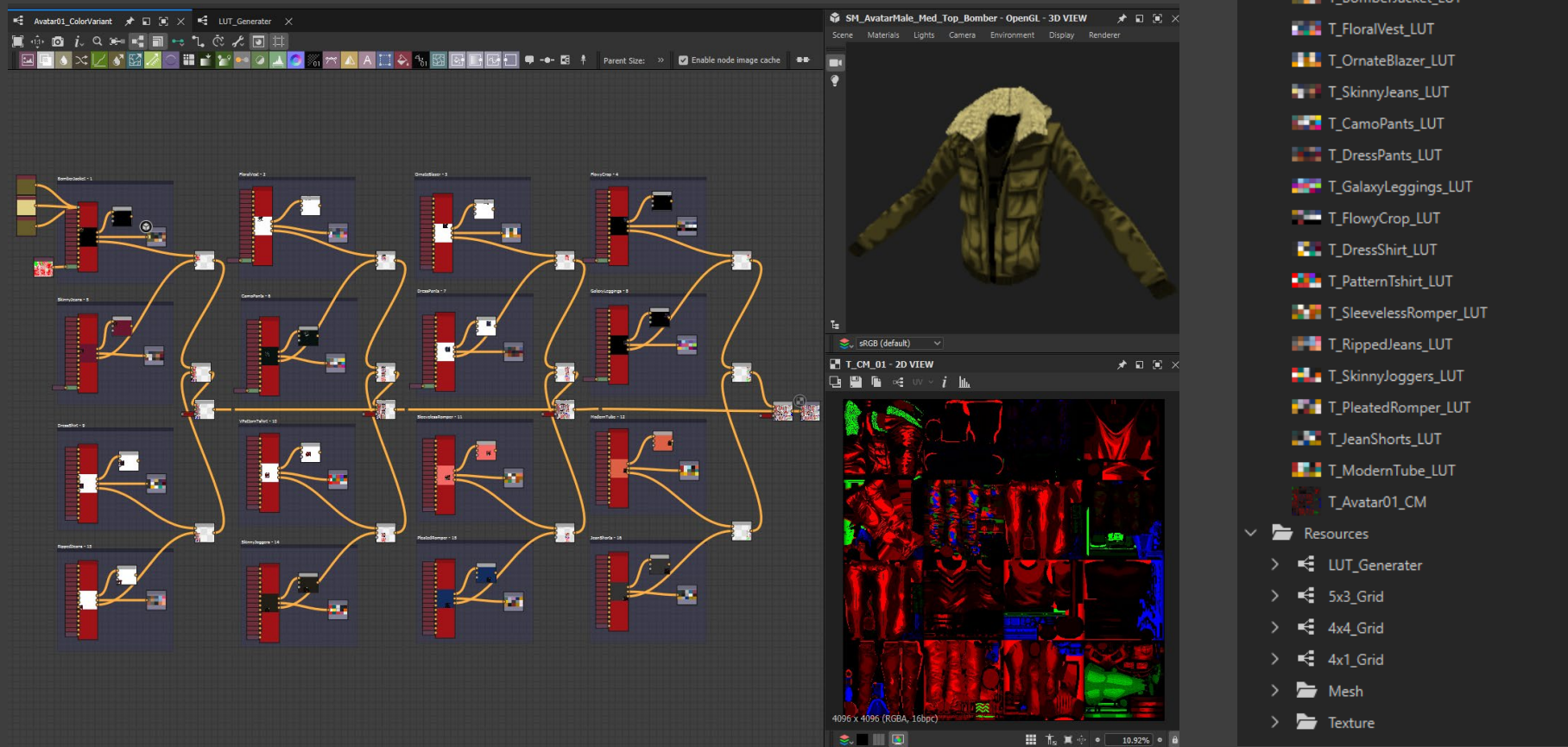
# 4x4\_Grid / 5x3\_Grid



Pixel Processor  
Credit to Nicolas Wirrmann



# Part 1 Recap



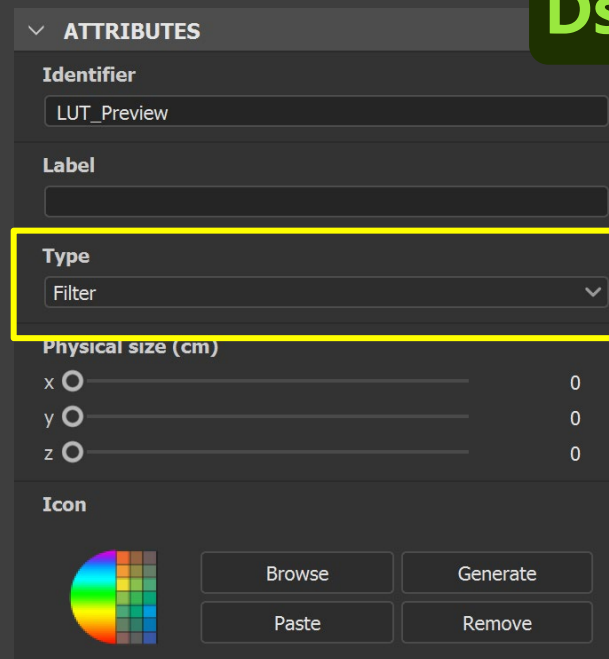
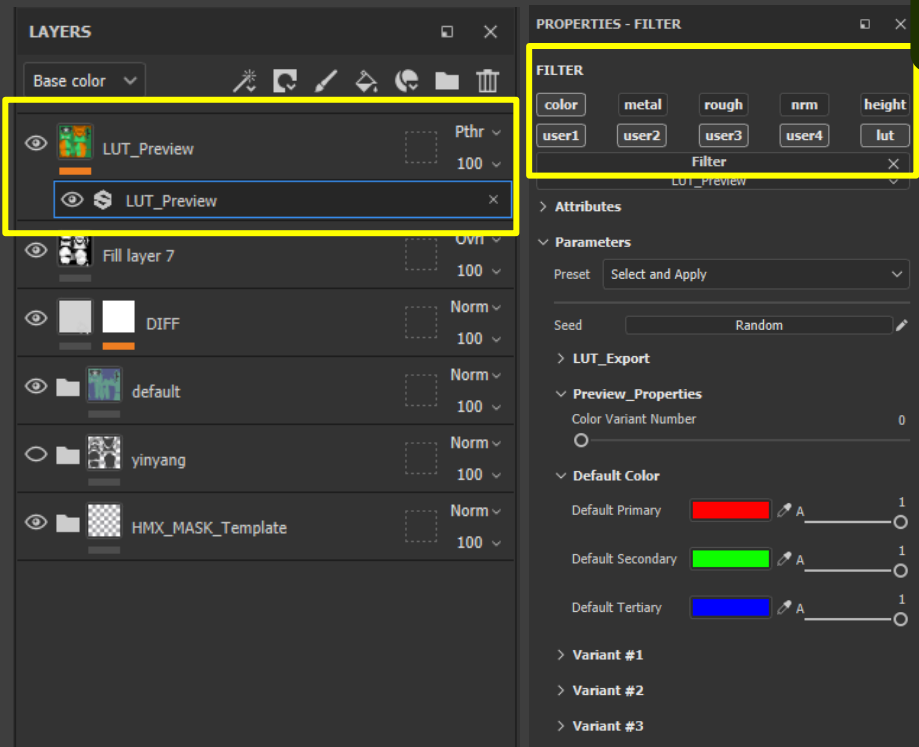
## Part 2. Switching to Substance Painter

- Streamlined workflow using Substance Painter
- Supporting PBR Material
- Color preset to speed up the authoring process
- Improved integration process in Unreal

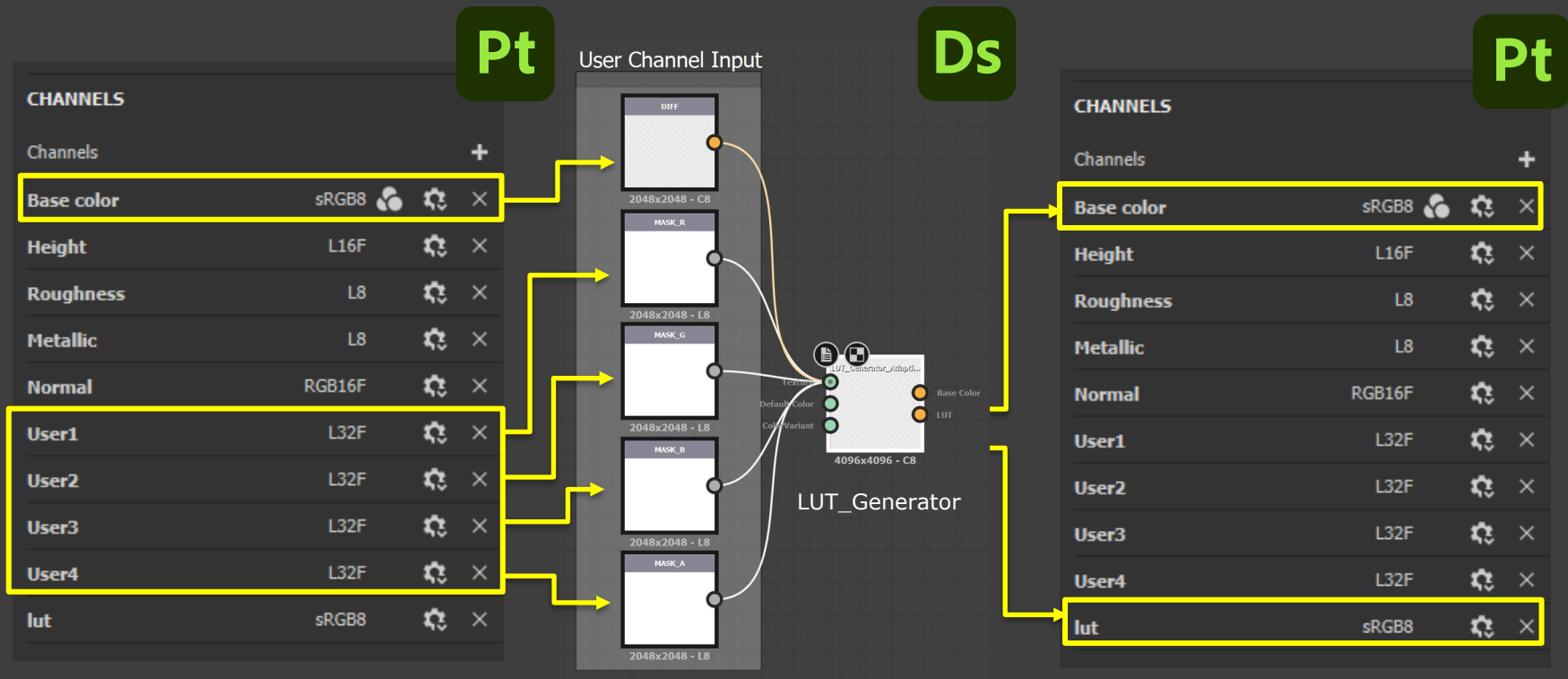
# LUT\_Preview Filter

Pt

Ds



# LUT\_Preview Filter

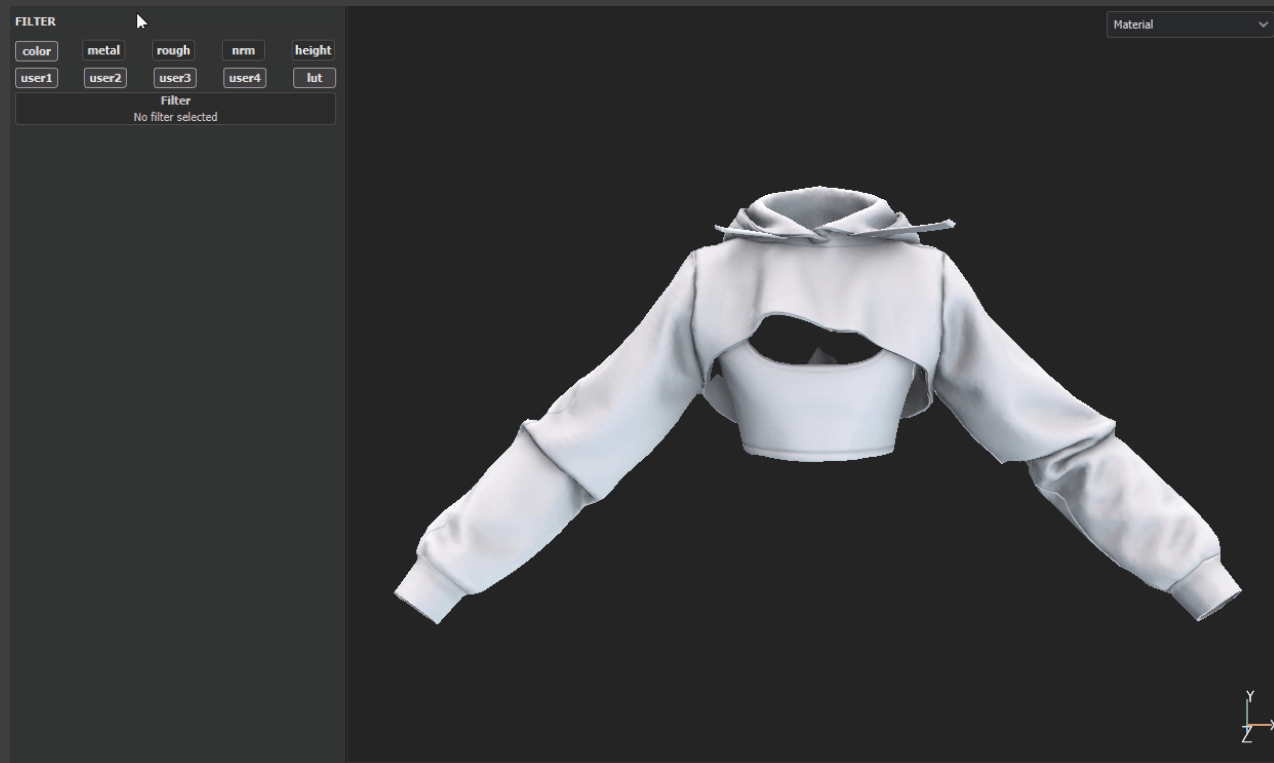


# Channel Preparation

Pt



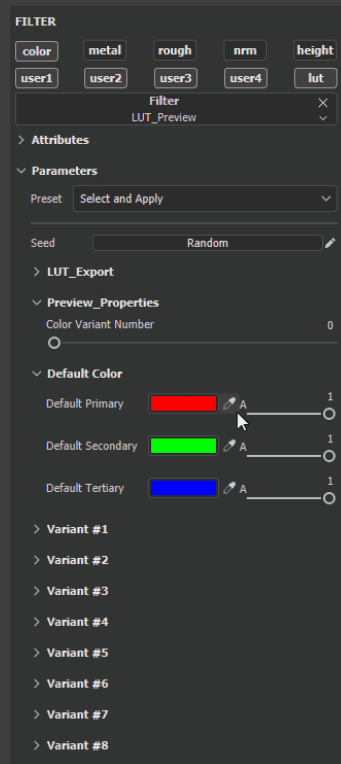
# Adding layer filter



Default Color Variant

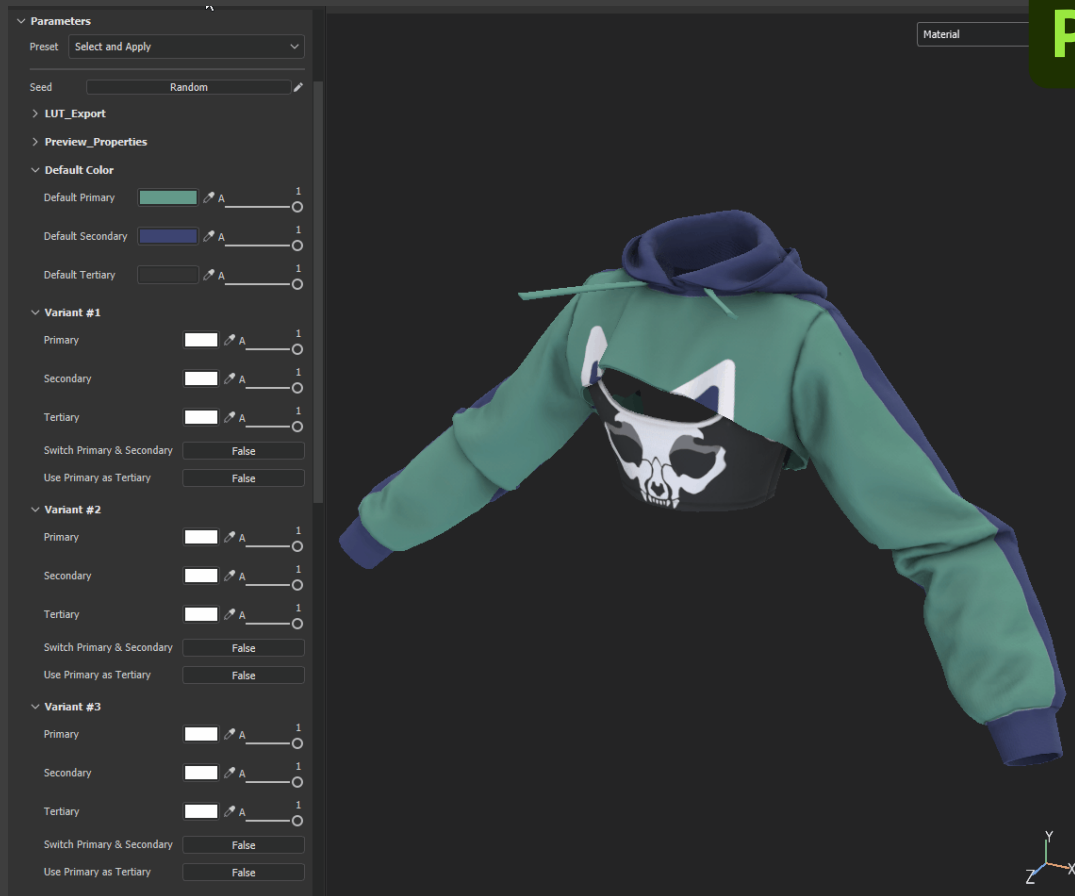


# Recreating the outfit default color

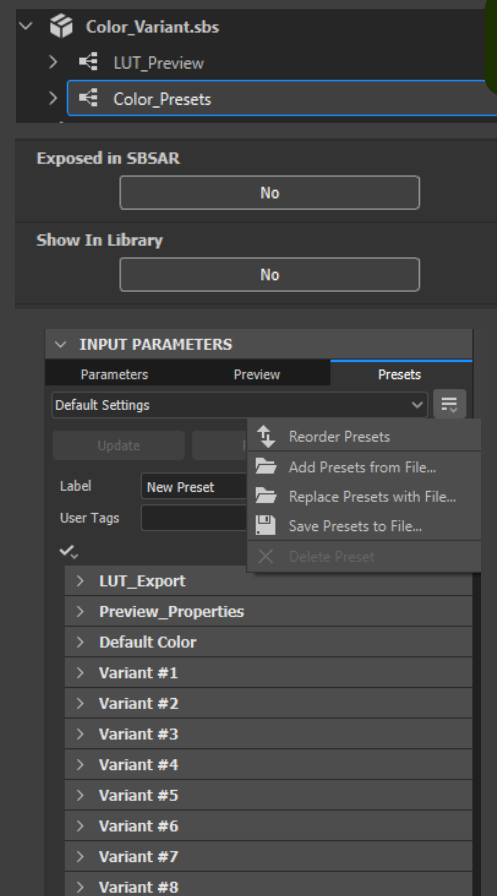


Default Color Variant

# Author color palette with color presets



Pt



Ds

# Review color variants

“Color Variant Number”

FILTER

color

metal

rough

nrm

height

user1

user2

user3

user4

lut

Filter

LUT\_Preview

> Attributes

> Parameters

Preset

Select and Apply

Seed

Random

> LUT\_Export

> Preview\_Properties

Color Variant Number

0

> Default Color

Default Primary

A

1

Default Secondary

A

1

Default Tertiary

A

1

> Variant #1

> Variant #2

> Variant #3

> Variant #4

> Variant #5

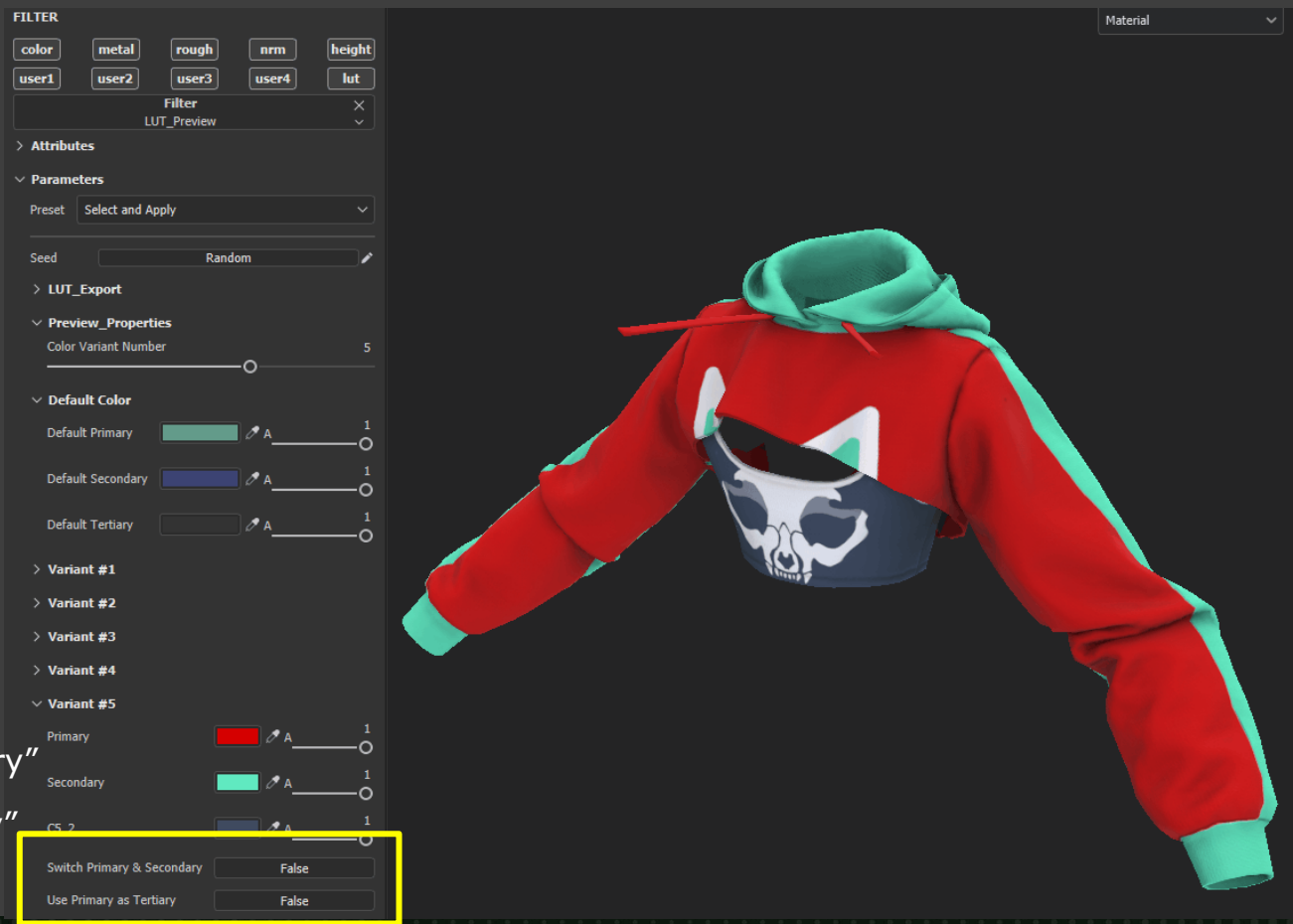
> Variant #6

> Variant #7

> Variant #8

Material

# Review color variants



“Swith Primary&Secondary”

“Use Primary as Tertiary”

# Export LUT

Current preset: LUT

Output maps Create: Gray RGB R+G+B RGB+A R+G+B+A

LUT\_\$project \$ RGB png 8 bits

General Export Parameters

Output directory C:/Users/zbmak/Desktop/GDC R

Output template LUT

File type Based on output template

Size 128

Padding No padding (passthrough) 16

☐ Export shaders parameters

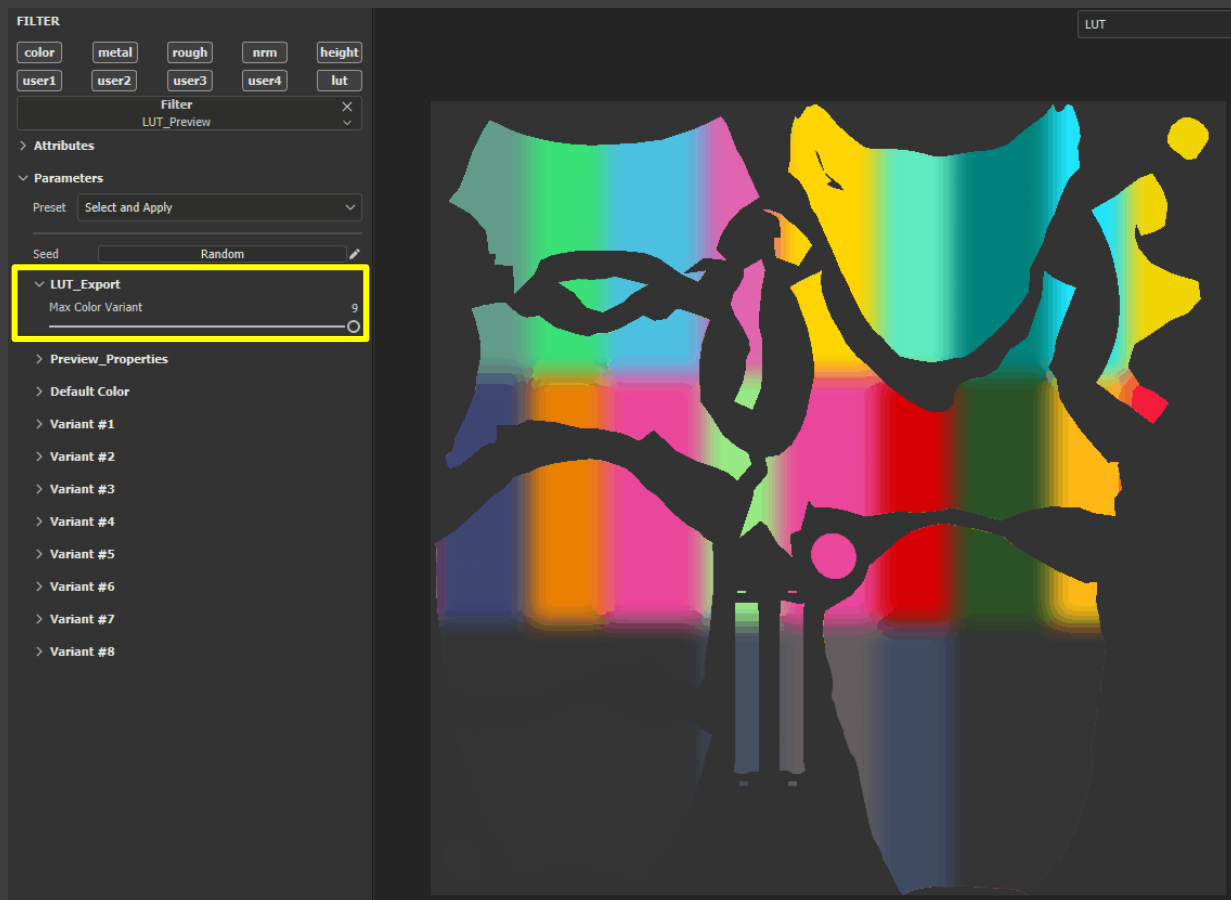


LUT\_AssetName.png



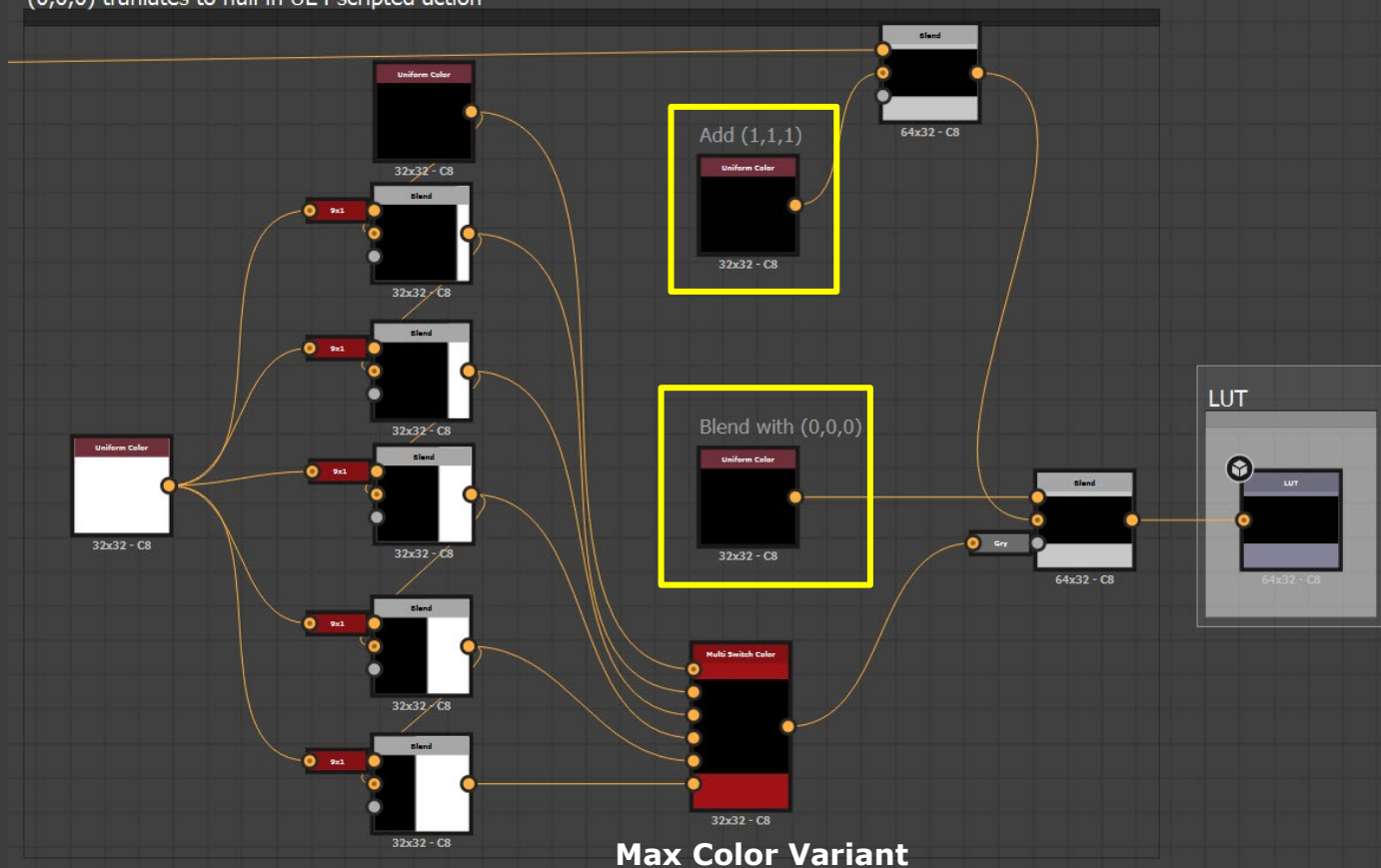
# Integrating LUT in Unreal

“Max Color Variant”

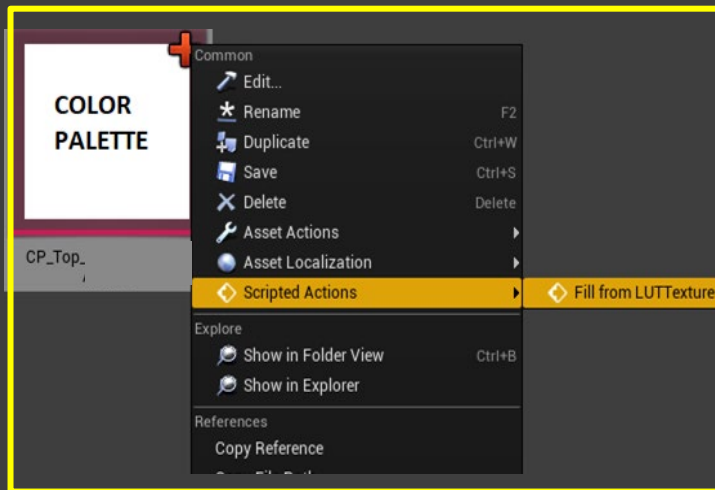
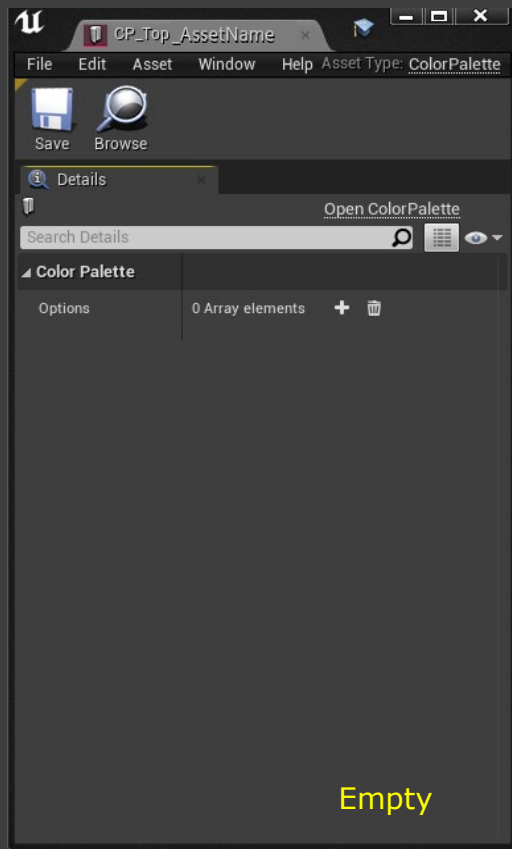


# Integrating LUT in Unreal

(0,0,0) translates to null in UE4 scripted action



# Integrating LUT in Unreal



Run Scripted Actions  
& Select LUT texture



# Wrap Up!

- **A Pipeline tool for creating consistent, high-quality asset through fast iterations**
  - Think out of the box and explore different workflows in Substance Designer
- **A good pipeline tool should be easy to adopt and can scale with the project**
  - Use custom filters, generators and smart material in Substance Painter