



# Achieving High-Quality, Low-Cost Skin: An Environment Approach

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# Character Skin Texturing Workflow: Overview

- Introduction
- Where we started
- Looking at skin like an environment artist
- Understanding Pores
- New workflow
- Next steps





# About Me

- Chief Environment Artist, Advanced Technology Division, Square Enix CO., LTD.
- Past credits include: *FINAL FANTASY XV, Bloodborne, The Last of Us, Uncharted 3: Drake's Deception*



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# Where we started



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# Where we started

Texture	Resolution	Purpose	Shared
Unique 1-to-1 map	2048×2048 ~ 4096×4096 (...and higher...)	Primary, secondary, tertiary details	No
Tiling microdetail	128×128	generic noise	Yes





# Issue #1

- Character sculpts have to carry an immense range of detail – from primary/secondary shapes, down to tiny pore details (tertiary/microdetail)
- The need to also represent highly detailed pore variations necessitated at least 2-4k resolution
  - High-res textures  $\neq$  pore detail quality (still not satisfied with results)





# Issue #2

- Microdetail map falls short: pore types differ throughout the human face in pore type and placement
  - can't get away with simply applying uniform tiling pores





# But...

- Unique map: Ignoring the microdetails, most facial characteristics (primary & secondary details) could actually be well represented with lower resolution textures







Various small details *and* larger forms? Sounds like a familiar problem...





# Environment texturing

- Assets as small as rocks, as large as mountains
- Tiling textures
- Can maintain high fidelity at close distances while keeping textures sizes fairly low
- Blend textures to produce different combinations of details





# Texture a character with tiling textures?

- Not a new concept
  - Microdetail for skin, usually in the form of a generic noise
  - Cloth weaves





# Looking at skin like an environment artist...

- First step in texturing an environment: identify common, repeated elements that will form the base tiling textures
- For skin, common, repeated elements = **pores**





# Understanding Pores

- Goal: Look for common pore patterns in terms of shape and placement





# Understanding Pores - Method

1. Collect reference:
  - Scan several faces around the office
  - Gather reference photos







# Understanding Pores - Method

2. Identify as many different microdetail types as possible
3. Then simplify these details into commonly occurring shapes







# 1. Shape

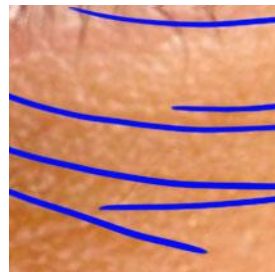
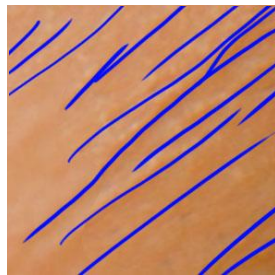
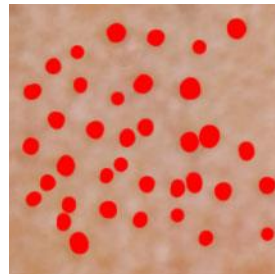
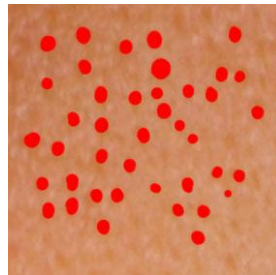
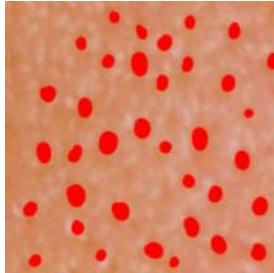
Skin detail can be generalized into “dot” and “line” patterns...





# 1. Shape

Skin detail can be generalized into “dot” and “line” patterns...





# 1b. Compound Shapes

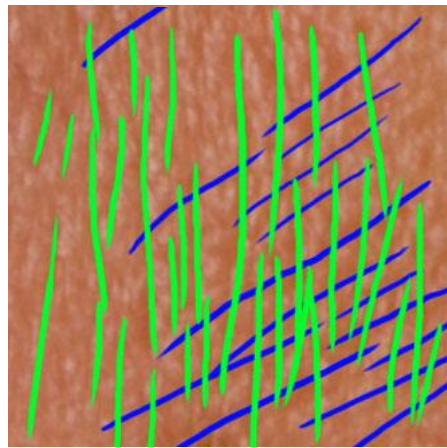
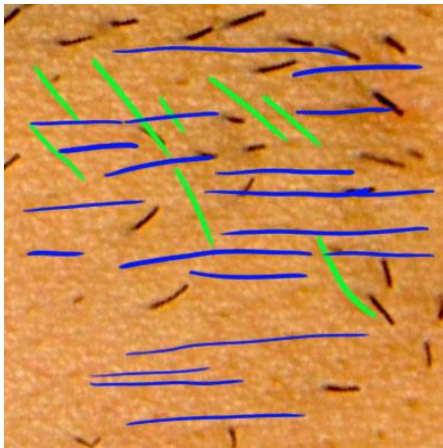
Additional details  
can be obtained by  
blending basic pore  
shapes together





# 1b. Compound Shapes

Additional details  
can be obtained by  
blending basic pore  
shapes together





# (...plus the nose)





## 2. Placement

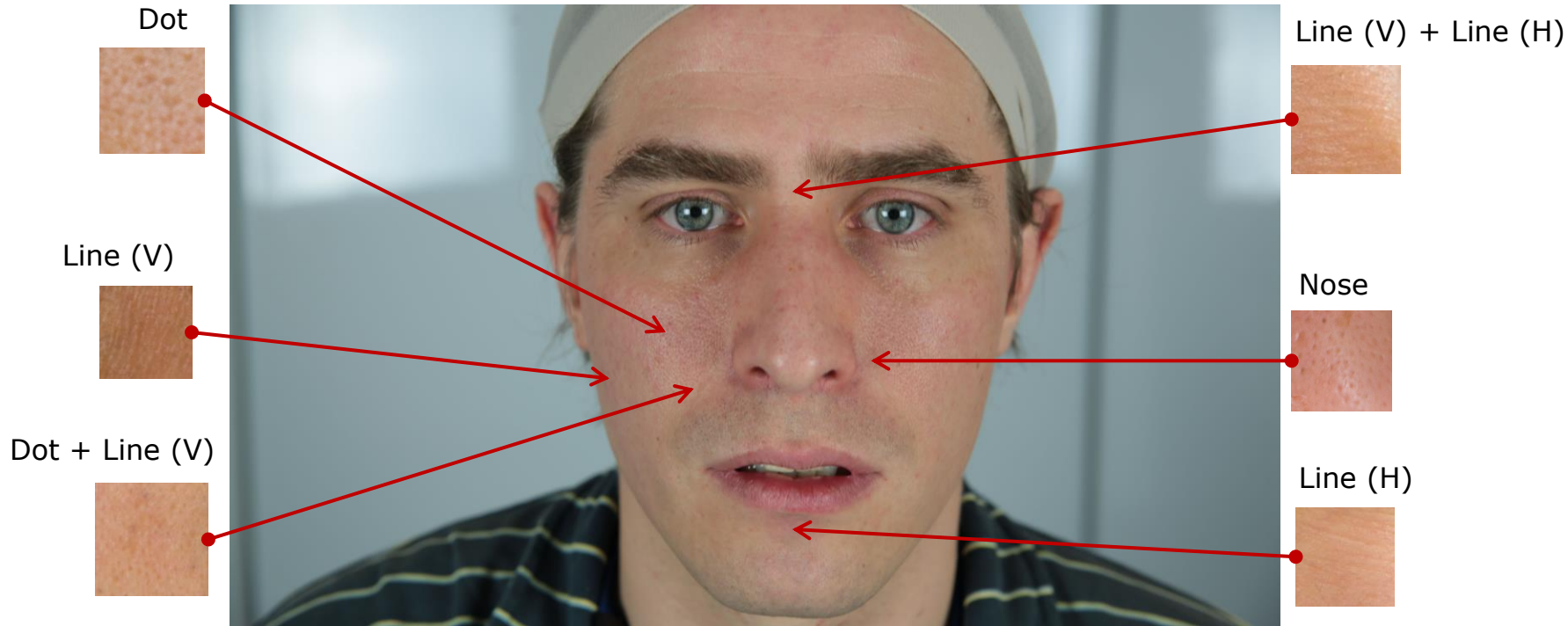
Certain types of pores generally tend to be found in the same areas of the face







## 2. Placement





## 2. Placement

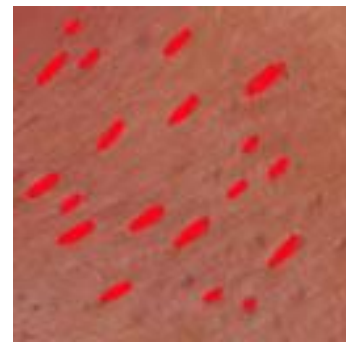
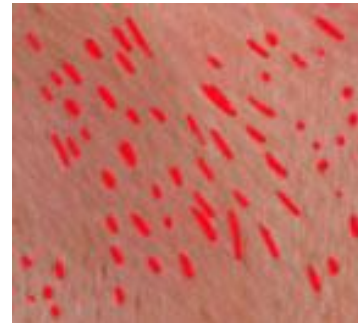






# 3. Directionality

- Static stretching – pore shapes in certain areas are by default “stretched” at neutral expression
- Pores on human skin generally follow the same directional pattern





# 3. Directionality





# New Workflow - Goals

1. Reduce texture memory -- Share textures between many faces
2. Reduce texture authoring time
3. Increase quality of microdetails
  - accurately reflect variation of skin pores
  - Maintain high fidelity at close distances
4. **Maintain artist control and flexibility**





# Primary & Secondary Details

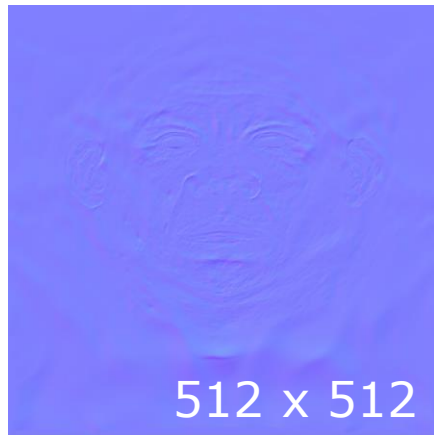
- Unique 1-to-1 map
  - $512 \times 512 \sim 1024$
- Large wrinkles, pockets of fat, medium to large scars
- **Does not** include pores, microwrinkle details
  - Sculpting time reduced by **40%**
  - Could use smoothed scan data





# Primary & Secondary Details

- Sculpt with only Primary and secondary shapes



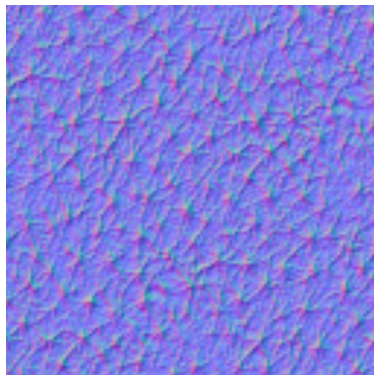
512 x 512



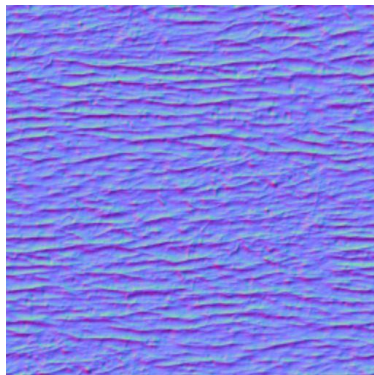


# Tertiary Details - Shape

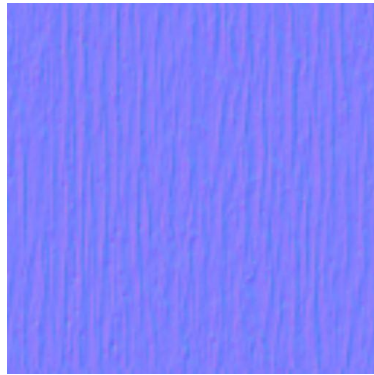
- = pores, microwrinkles
- 4 tiling pore normal maps (128x128) shared across every human character



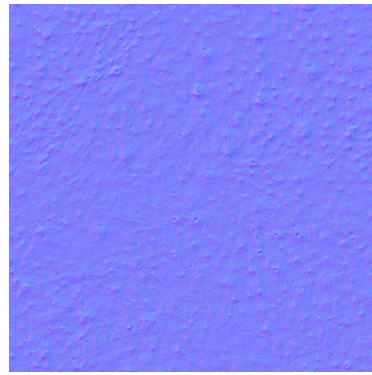
Dot



Line (HORIZONTAL)



Line (VERTICAL)



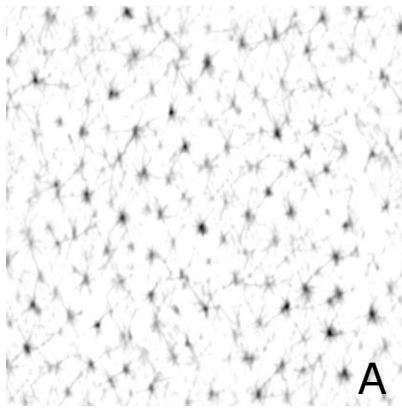
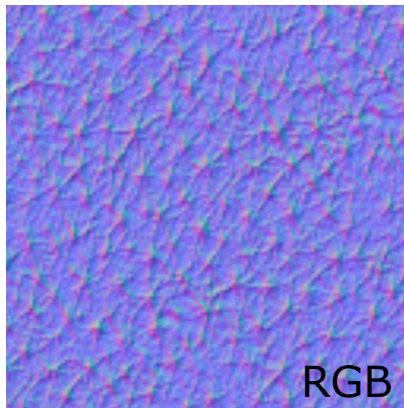
Nose





# Tertiary Details - Shape

- Cavity map in the Alpha channel → used as a mask to add detail to base colour, roughness channels





# Compound Shapes & Placement

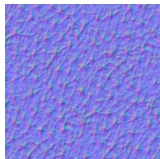
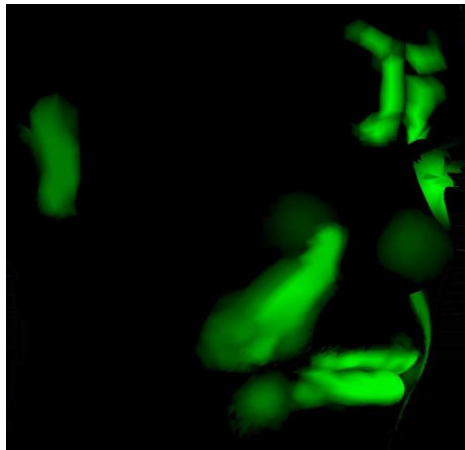
- Blending/pore placement is controlled via vertex colour
- Artist controls how strong/prominent certain pore types are and where they are placed
  - Vertex colour intensity, overlapping pore types → can make characters look older, younger, more wrinkled, etc.







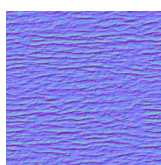
# Compound Shapes & Placement



Dot



Line  
(VERTICAL)



Line  
(HORIZONTAL)



Nose





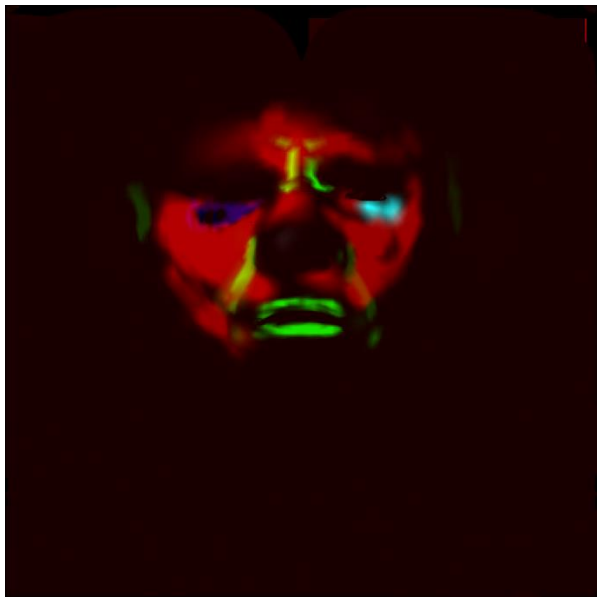
# To speed up vertex painting...

- ...we would begin by importing vertex colours from a standard pore placement map
  - certain types of pores generally tend to be found in the same areas of the face
  - Hero/main characters: good jumping-off point for the artist to customize exactly how he wanted the pores to appear
  - Generic characters (e.g. NPCs): vertex colours were used as-is





# Standard Pore Placement



Pore placement map (not used in-game)



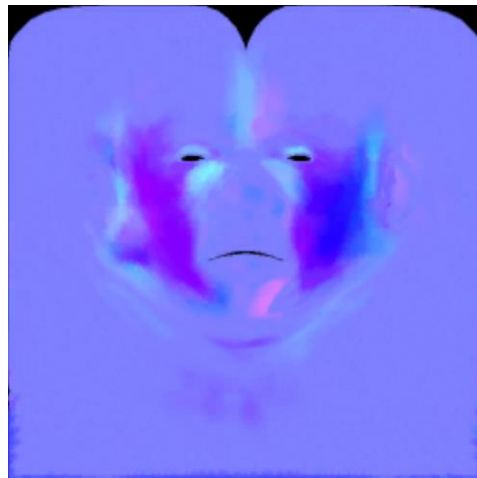
Vertex colour

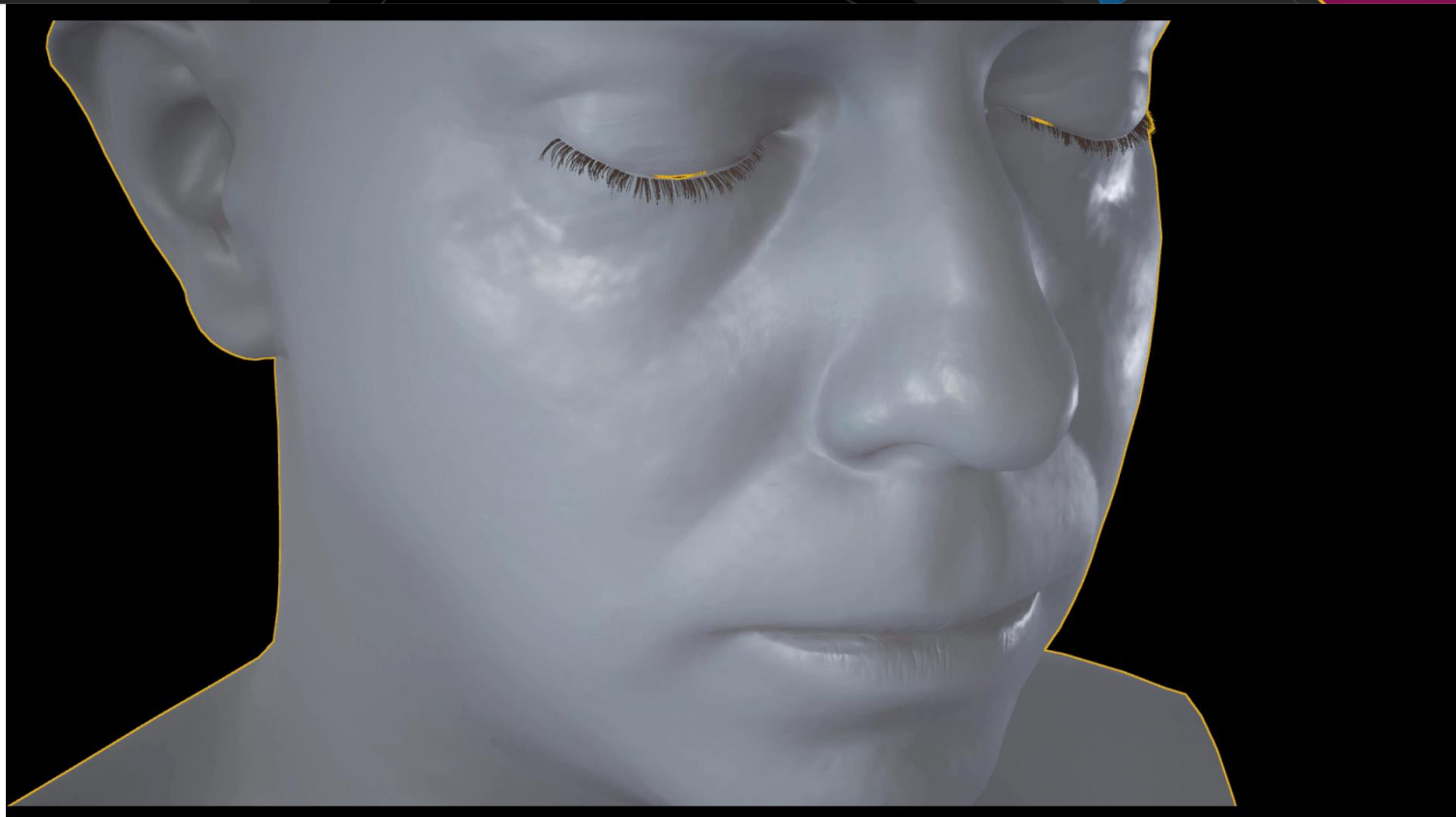




# Directionality

- Smear map (256x256) to control directionality
- Remember: Pores on human skin generally follow the same directional pattern
  - NPCs: shared smear map
- But directionality can vary significantly among individuals based on age, etc.
- Artist has control of smear map to achieve desired look
  - Hero/Main: custom







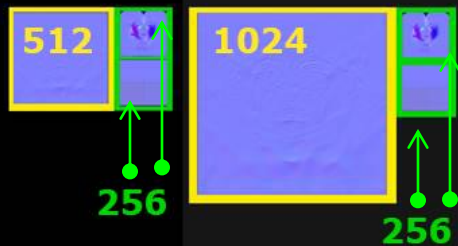
# Texture Summary

Texture	Resolution	Purpose	Shared
Unique 1-to-1 map	512×512 ~ 1024×1024	Primary & secondary details only	No
Tiling microdetail maps	4 x 128×128 Or 1 x 256×256 atlas	Tertiary Details	Yes
Smear map	256×256	Directionality (stretching)	No/Yes

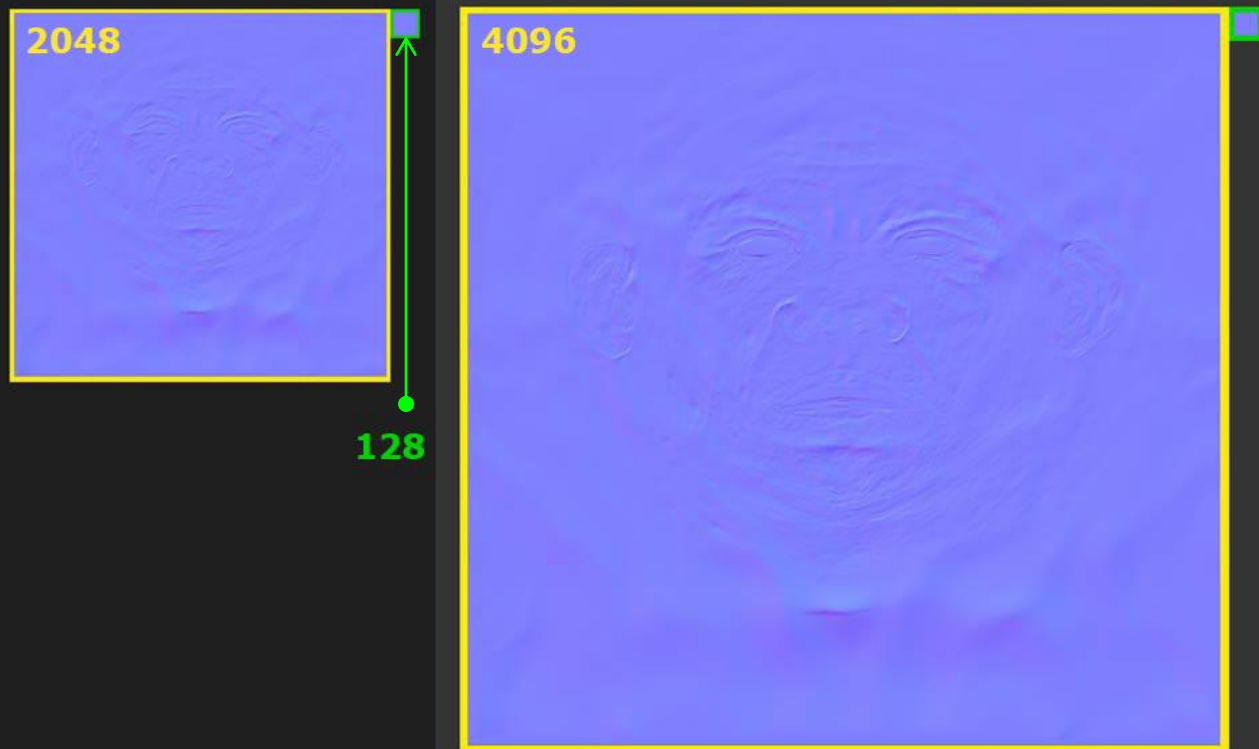




## New Workflow



## Old Workflow



- Unique textures
- Shared textures





# Old Workflow







## New Workflow





## Close-up - Old Workflow





## Close-up - New Workflow







**Even closer up - New Workflow**





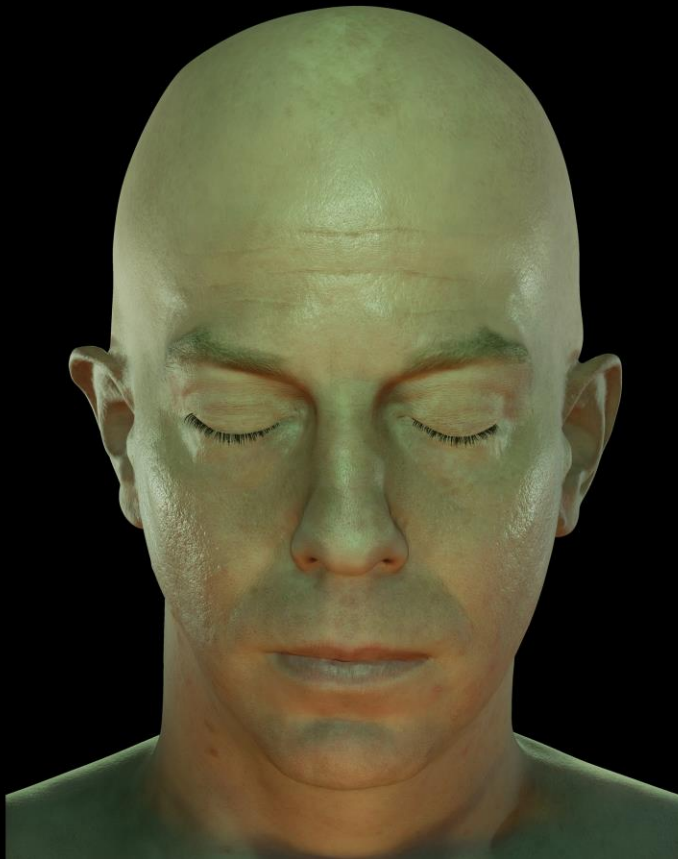
















# Next steps

- Procedural Substances in lieu of bitmaps
- Pore distortion for facial animation
- Increase variations using two layers of RGBA
- Further ways to customize
  - Optional masks to allow for decal application (e.g. warpaint)





# Interdepartmental collaboration!

- Different disciplines require such specialized skills that we often remain isolated from each other
  - Character artists and environment artists don't typically work together
- Encourage collaboration and dialogue between departments – inspiration can come from unlikely places!





# Special Thanks

- Eduardo Mosená
- Jason Lacroix
- Chida Kazuhisa
- Ishii Haruya
- Graeme Murray
- Hendrik Skubch
- Paul Chandler





# Questions?

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