



# GDC 2008 Autodesk Mudbox:

## Integration and Use with Autodesk 3ds Max and Autodesk Maya

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Naughty Dog

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<http://www.rd3d.com>

2 0 0 8 G A M E D E V E L O P E R S C O N F E R E N C E

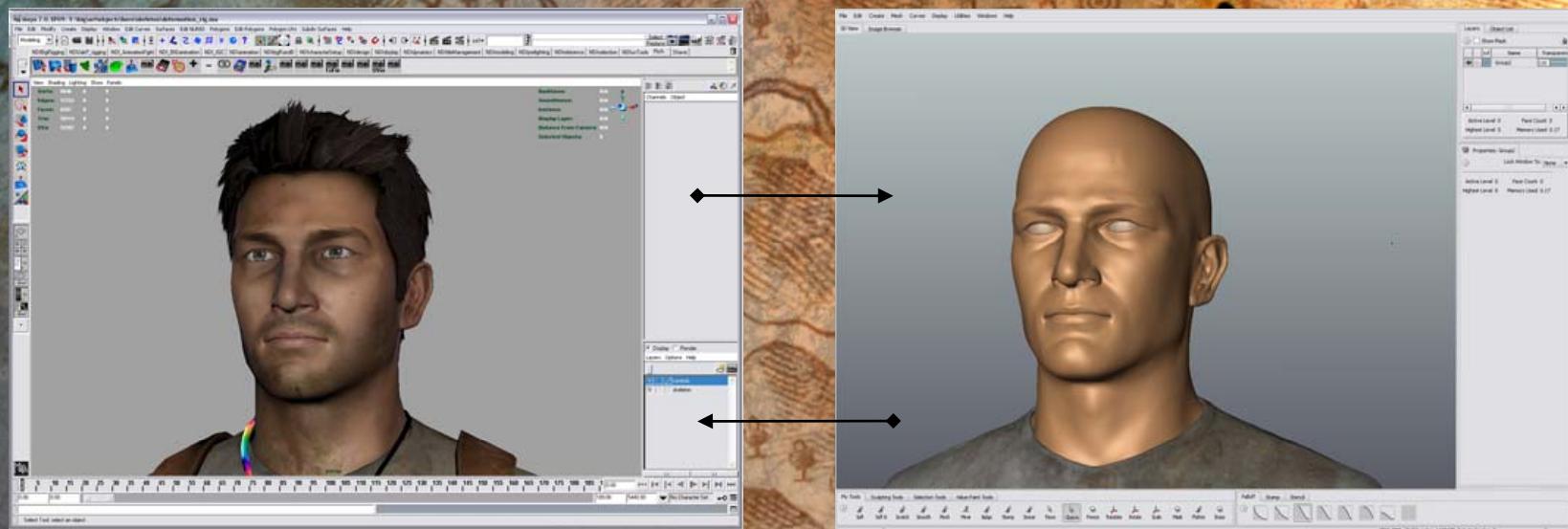
A dense jungle scene from the video game Uncharted: Drake's Fortune. The foreground is filled with lush green foliage and trees. In the center, there's a rocky outcrop or a small cliff edge. The background shows more of the jungle and some distant structures, possibly ruins, under a bright sky.

# Overview

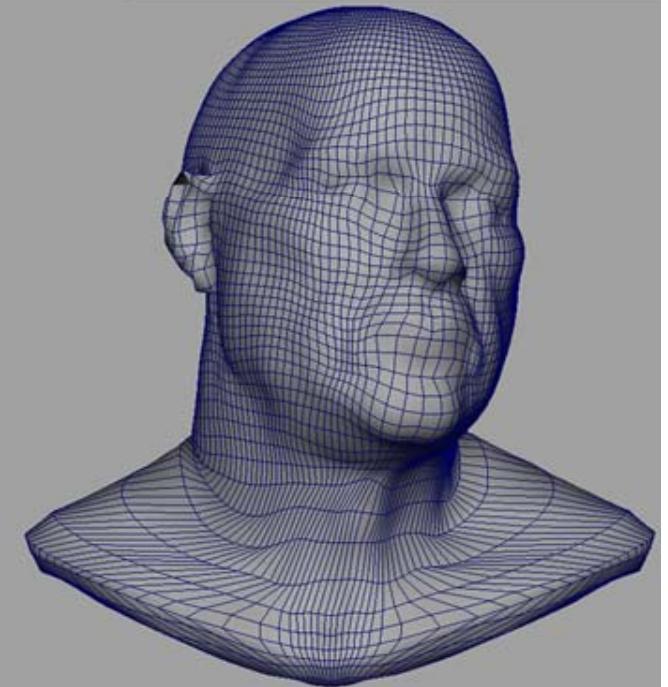
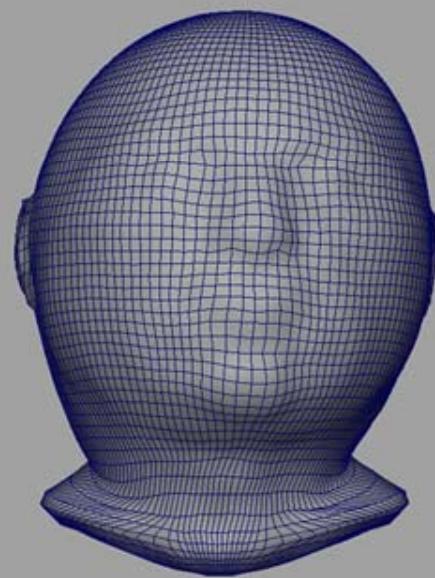
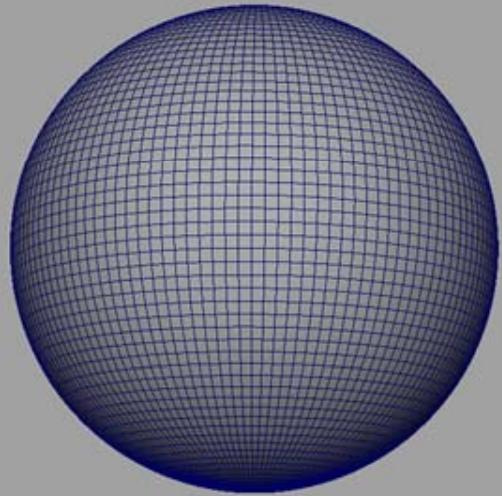
- Modeling Methods and Matching High Resolution Detail
- Uncharted: Drake's Fortune Pipeline
- Postmortem

2 0 0 8 G A M E D E V E L O P E R S C O N F E R E N C E

# Matching High Resolution Detail



**NAUGHTY DOG**

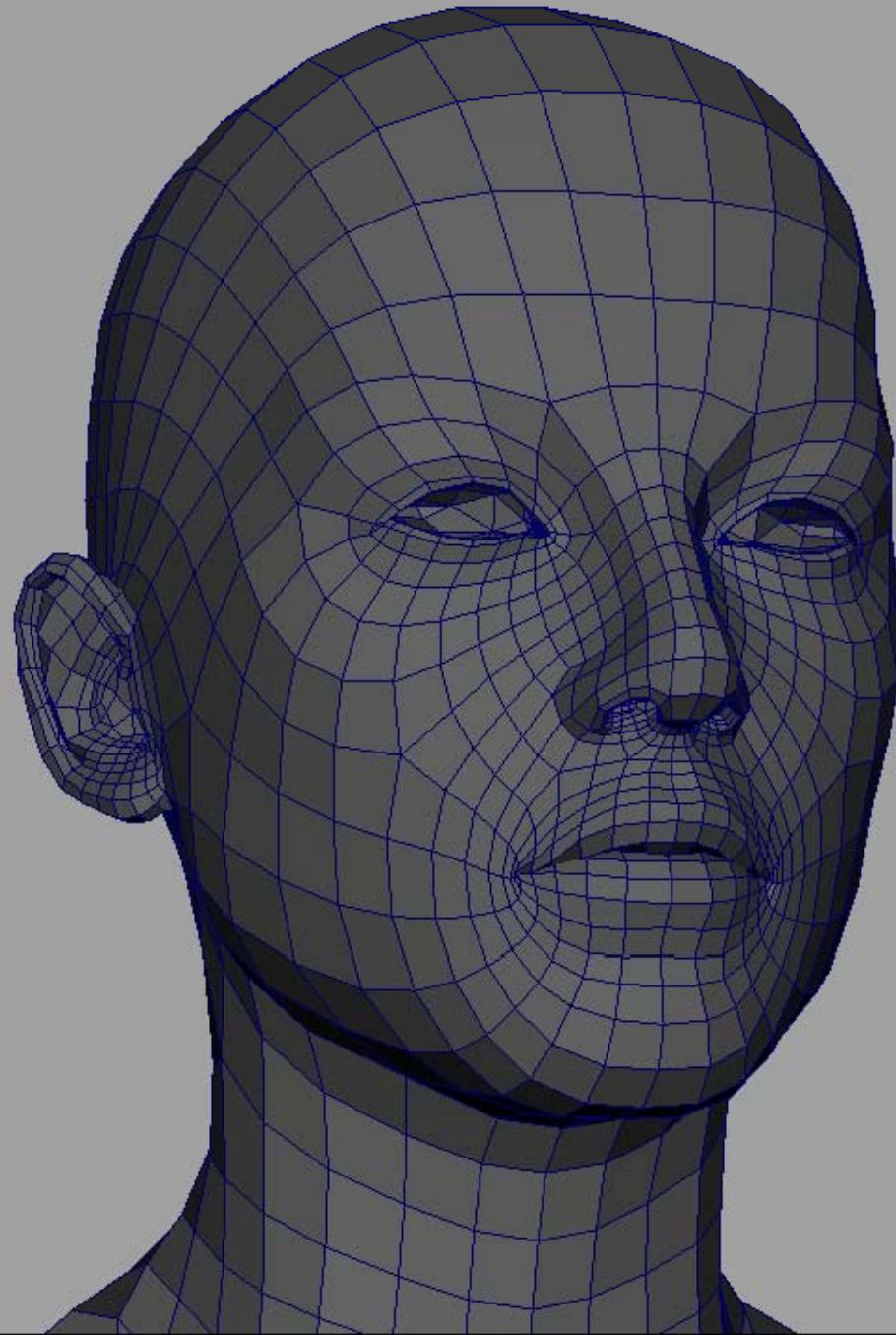


From a random model

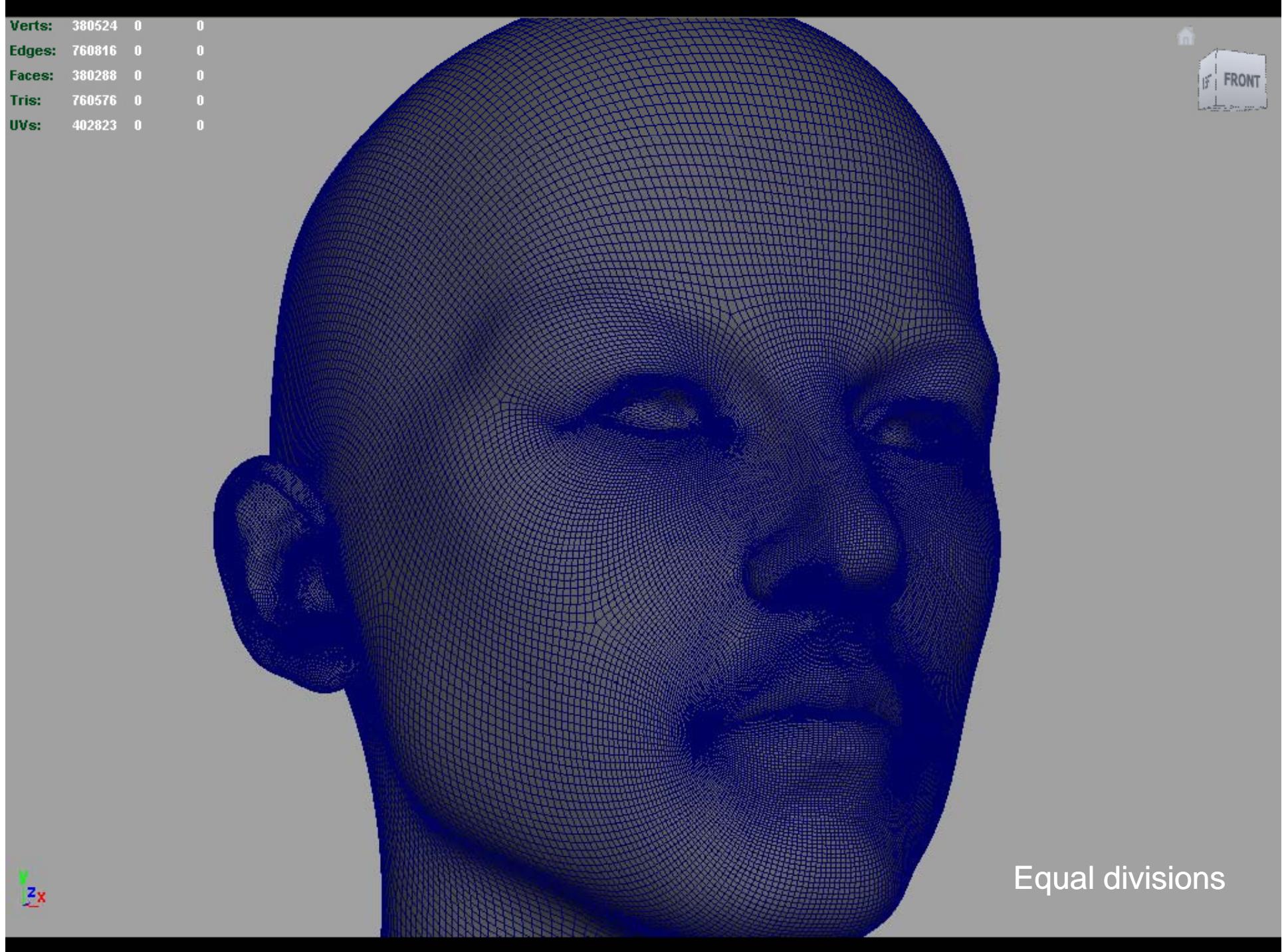


Model by Ricardo Ariza

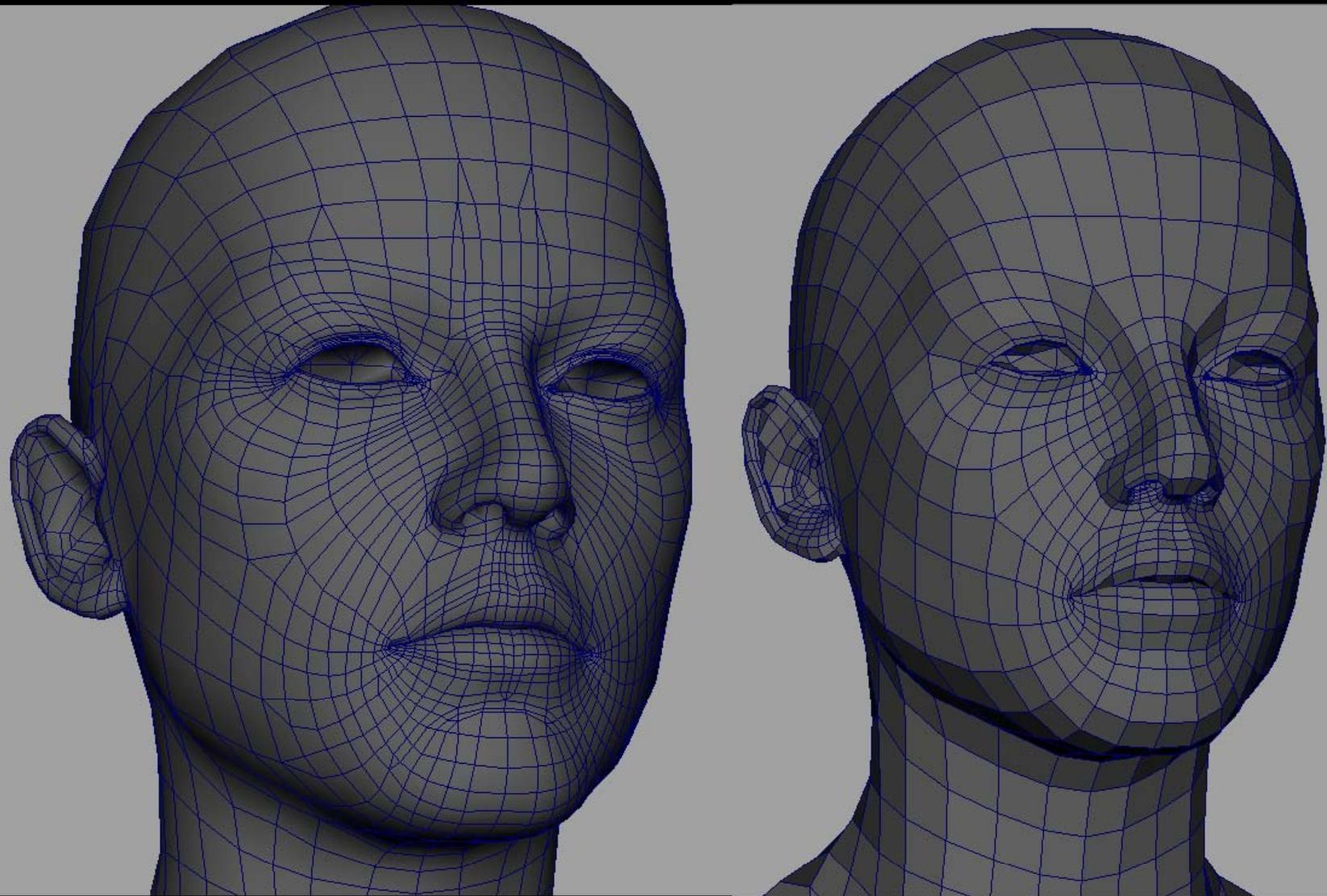
**Verts:** 2072 0 0  
**Edges:** 4184 0 0  
**Faces:** 2112 0 0  
**Tris:** 4086 0 0  
**UVs:** 3495 0 0



Pre-built Mesh



# Comparison



Arbitrary Mesh

Pre-built Mesh

**UNCHARTED**

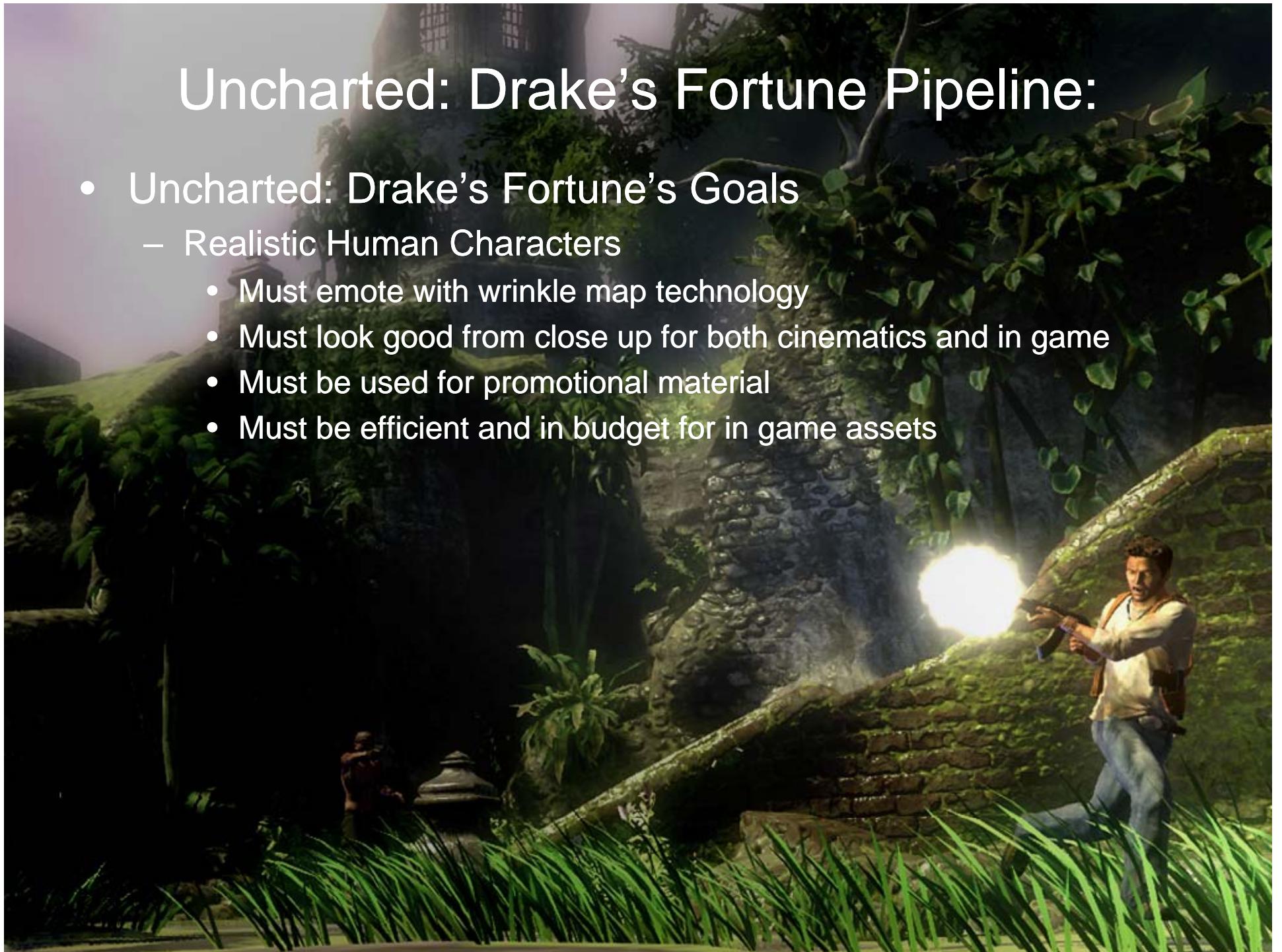
Throw your crap in and hit render!

**NAUGHTY DOG**



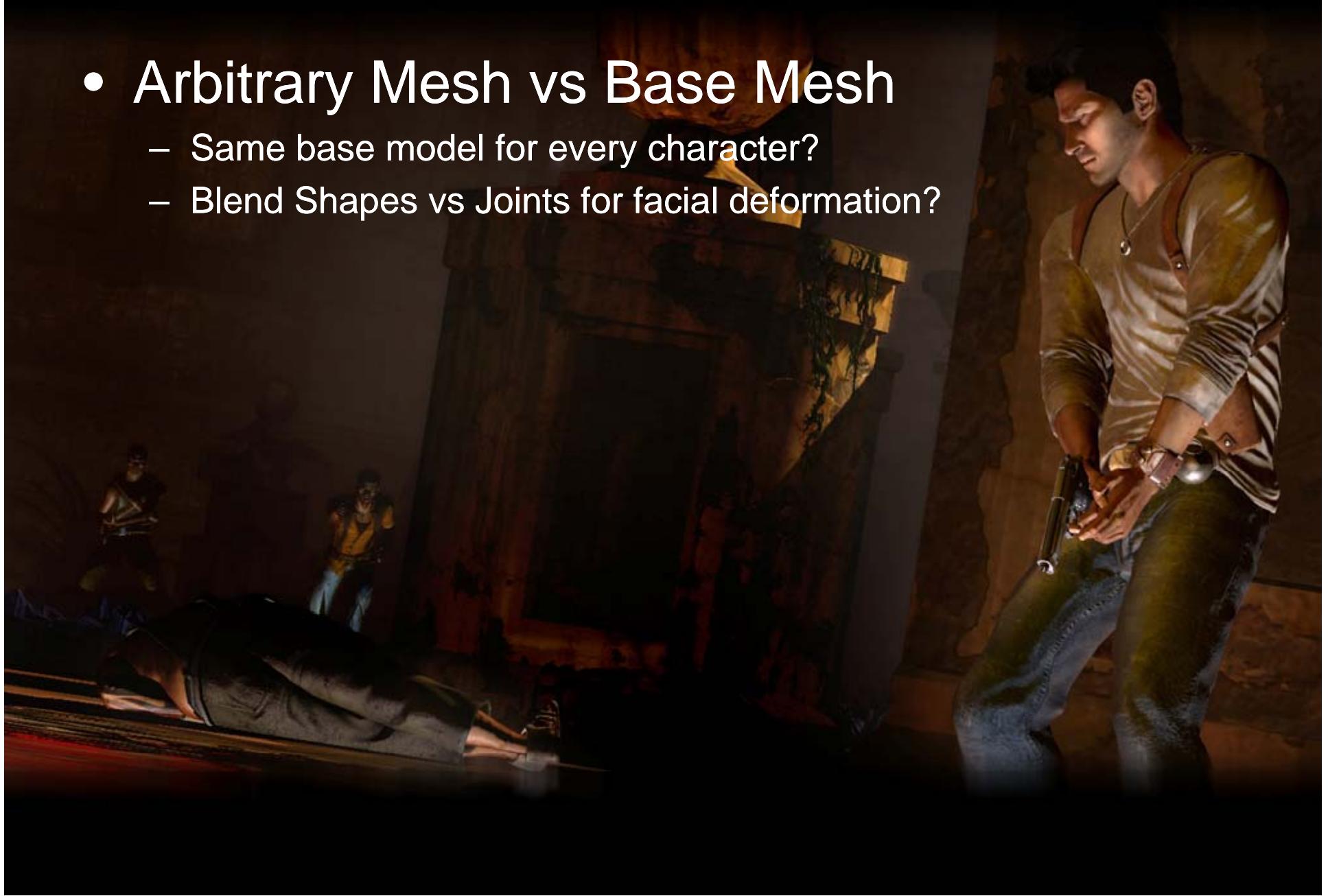
# Uncharted: Drake's Fortune Pipeline:

- Uncharted: Drake's Fortune's Goals
  - Realistic Human Characters
    - Must emote with wrinkle map technology
    - Must look good from close up for both cinematics and in game
    - Must be used for promotional material
    - Must be efficient and in budget for in game assets



# Possible pipelines:

- Arbitrary Mesh vs Base Mesh
  - Same base model for every character?
  - Blend Shapes vs Joints for facial deformation?



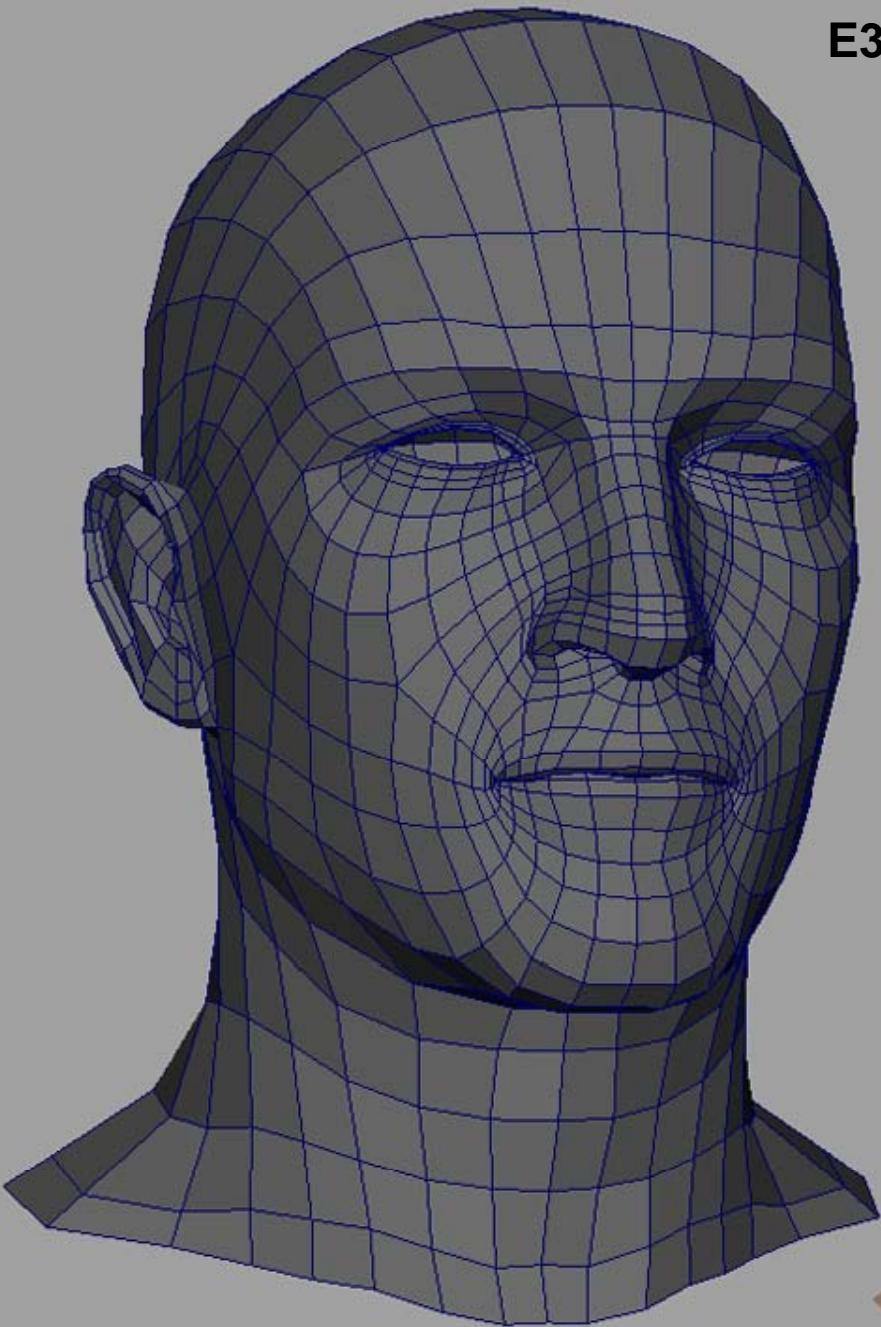
# Pre E3 2006:

- Base Mesh



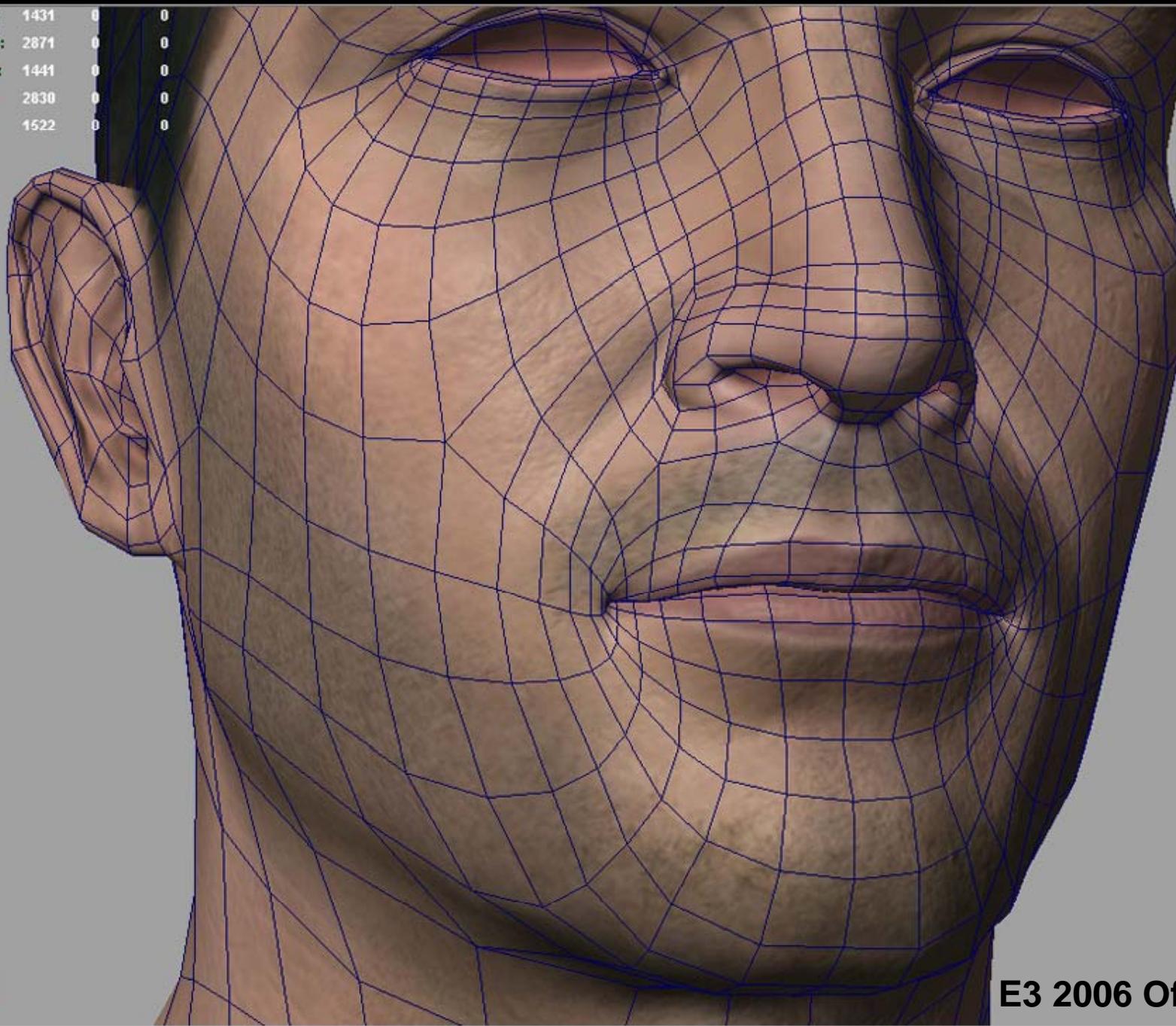
NAUGHTY DOG

E3 2006



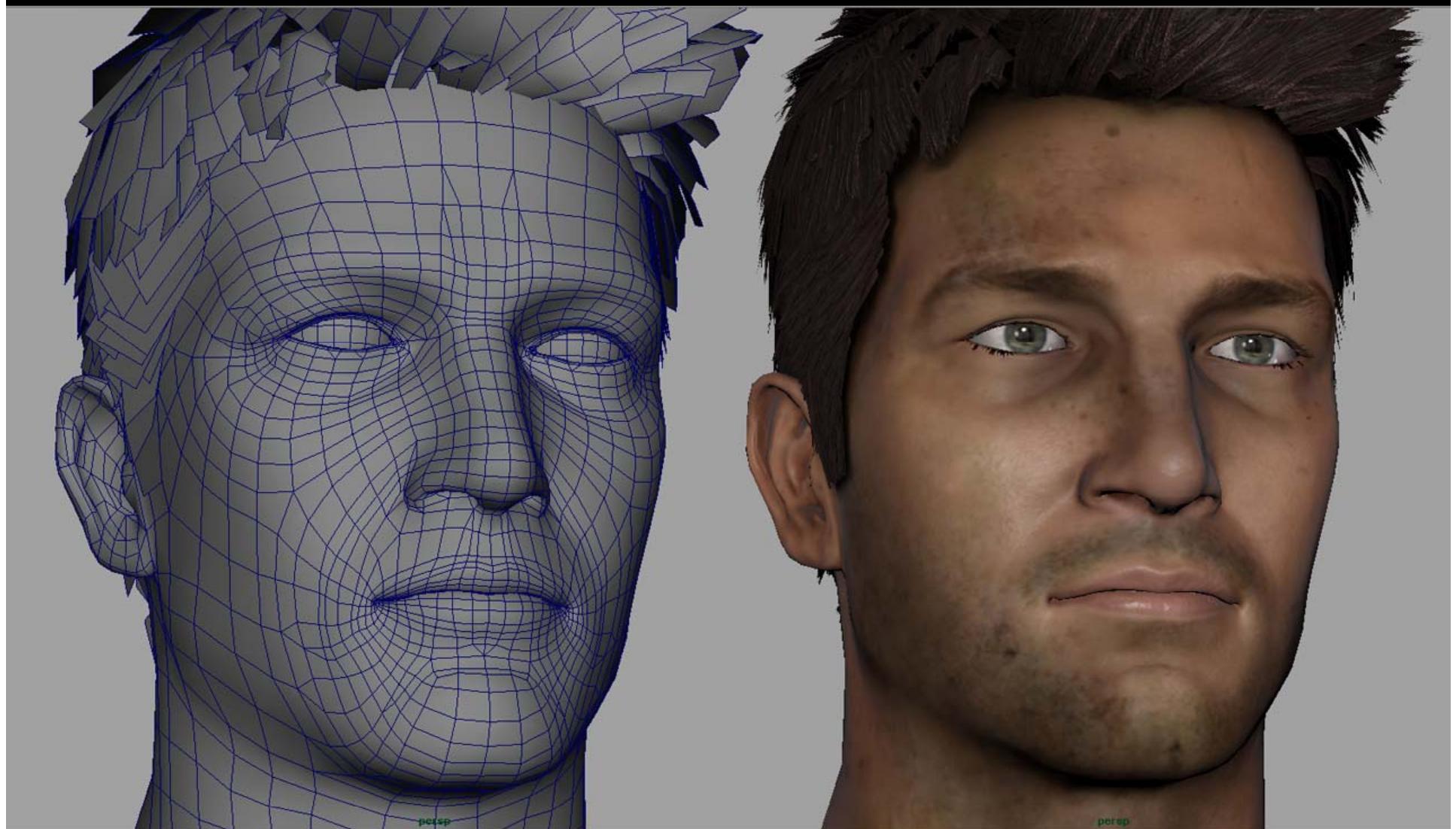
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Faces: 1441 0  
Tris: 2630 0  
UVs: 1522 0

FRONT

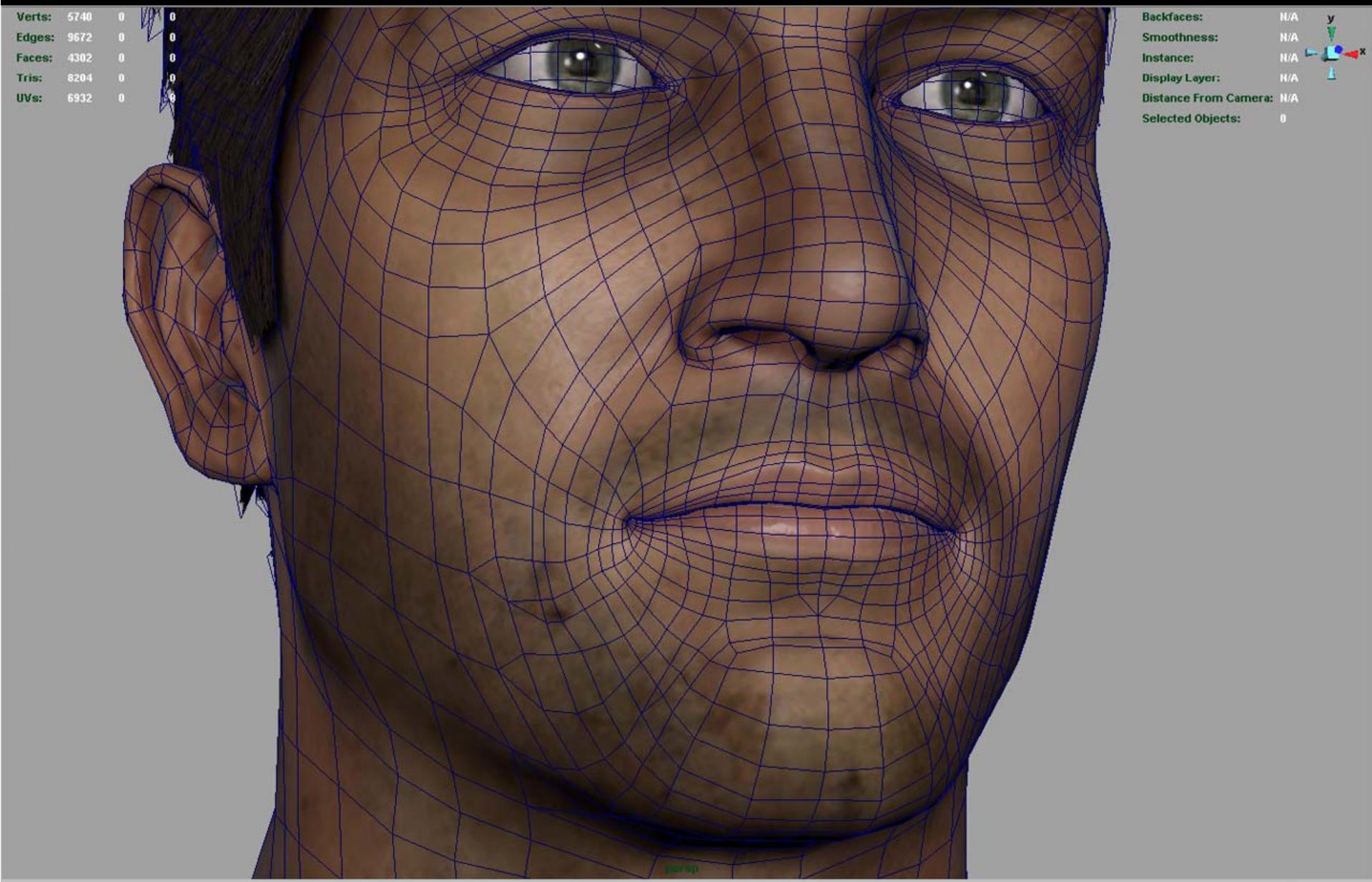


E3 2006 Off Topology

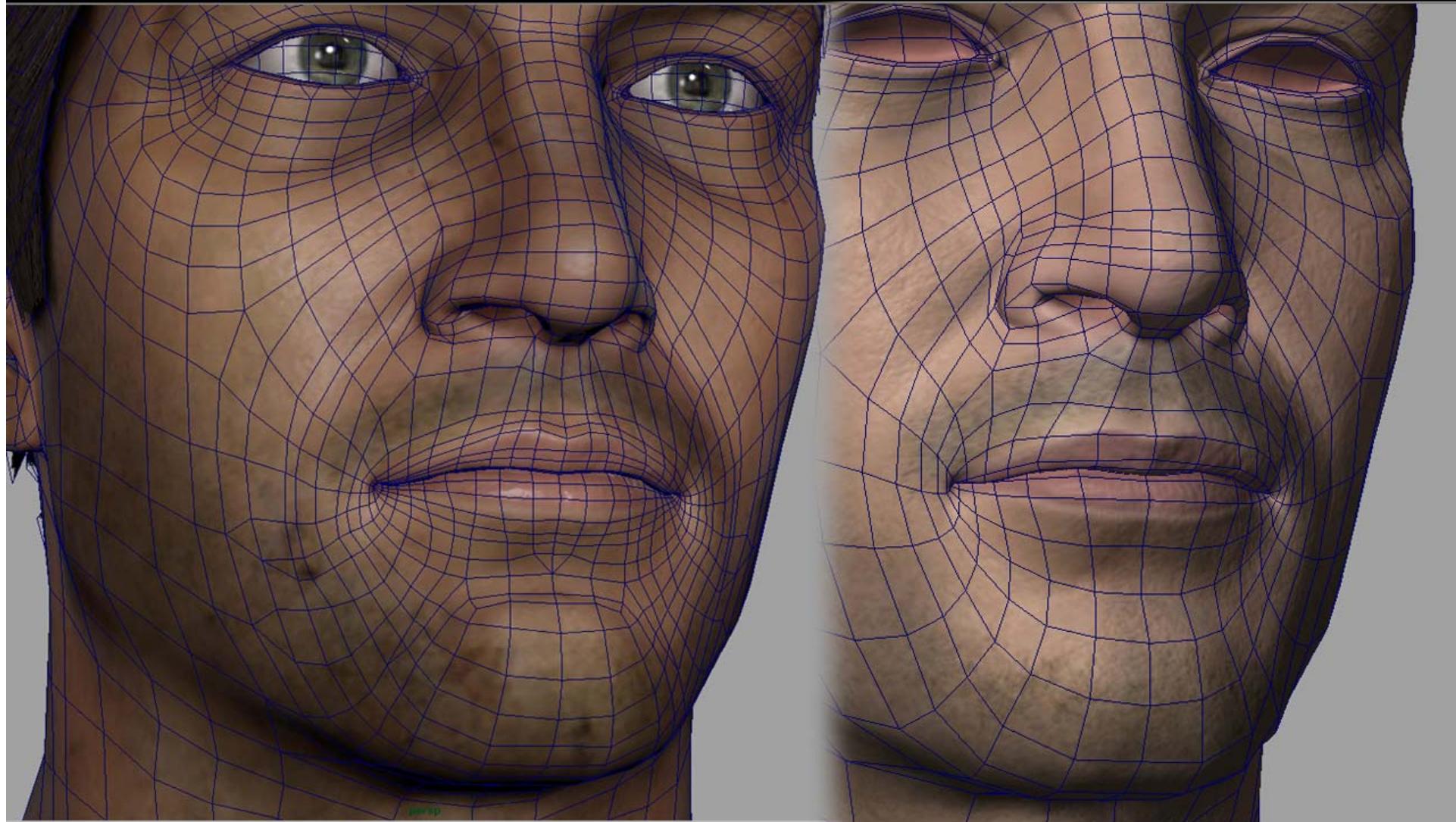
## Post E3 2006    Arbitrary Mesh



## Post E3 2006 Fitting Topology



# Comparison



## Where to go from there:

- Identify new problems and solutions with arbitrary meshes
  - Problems
    - Keeping models in sync
    - Blend Shapes?

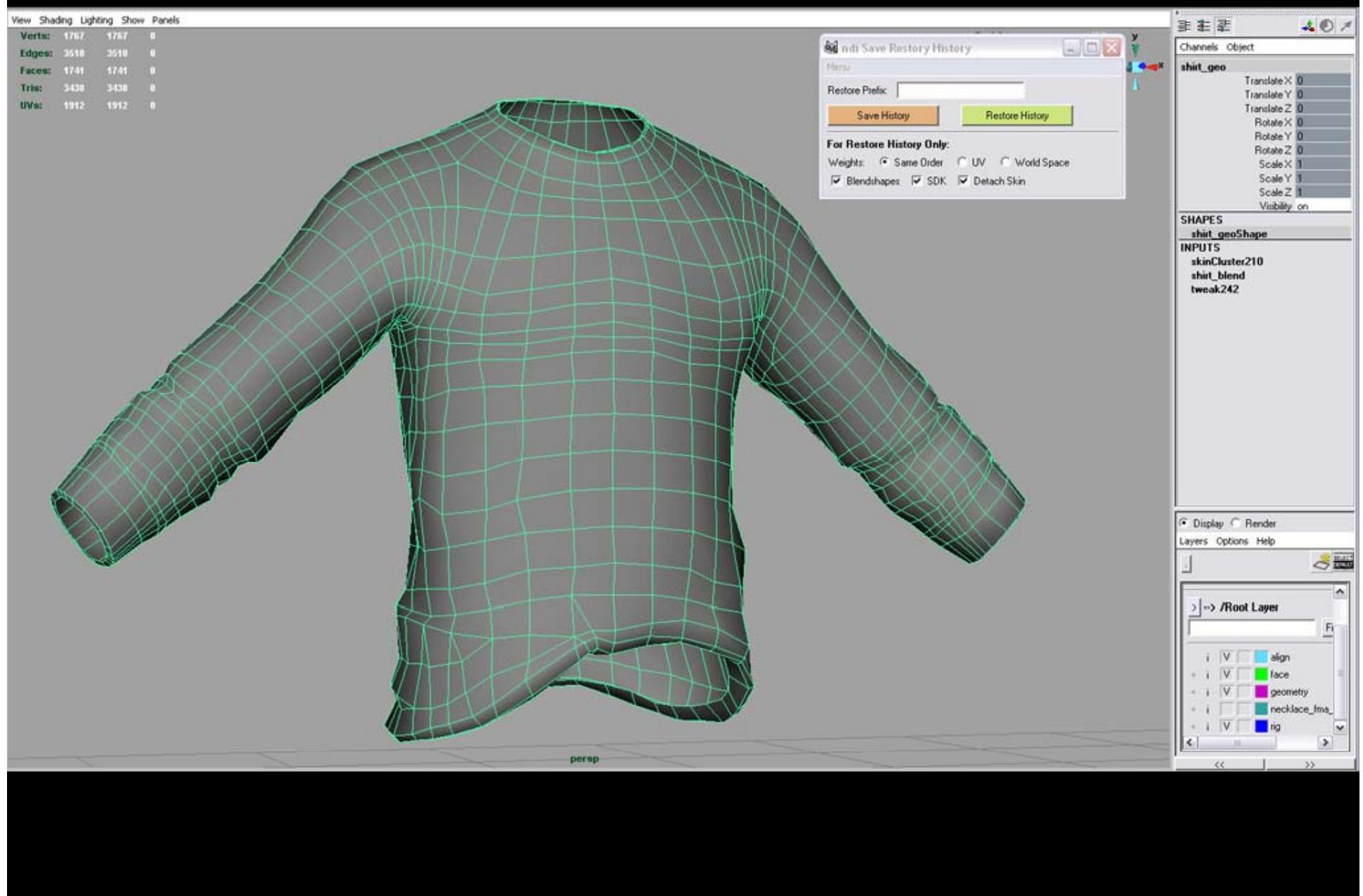
The logo for Naughty Dog, featuring the word "NAUGHTY" in a bold, sans-serif font next to a stylized paw print icon, followed by the word "DOG" in a similar font.

# Solutions:

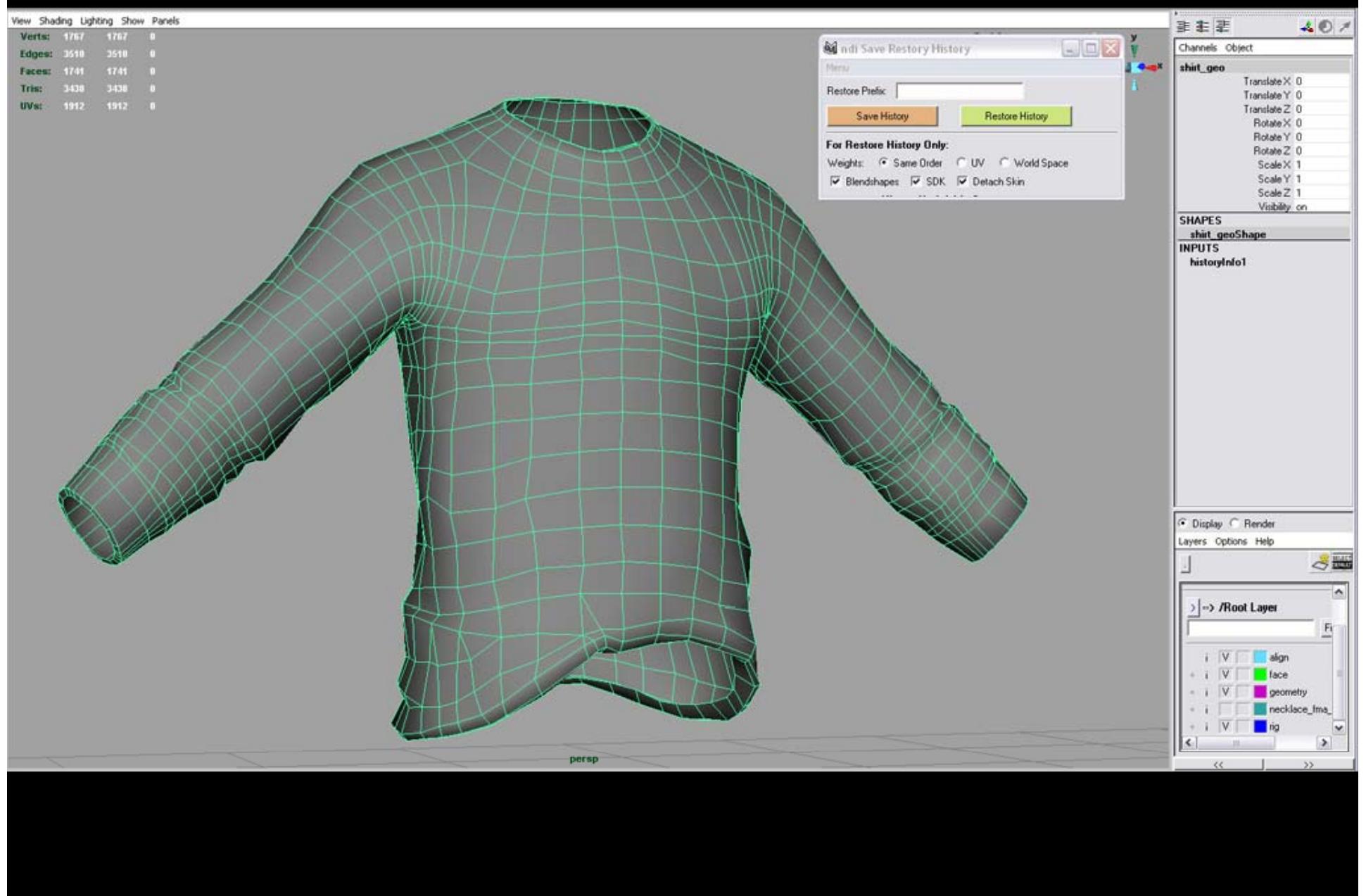
- How to keep arbitrary mesh and high mesh in sync
  - Organization was key
- Blend Shapes?
- Created custom tools

The logo for Naughty Dog, featuring the word "NAUGHTY" in a bold, sans-serif font next to a stylized paw print icon, followed by the word "DOG" in a similar font.

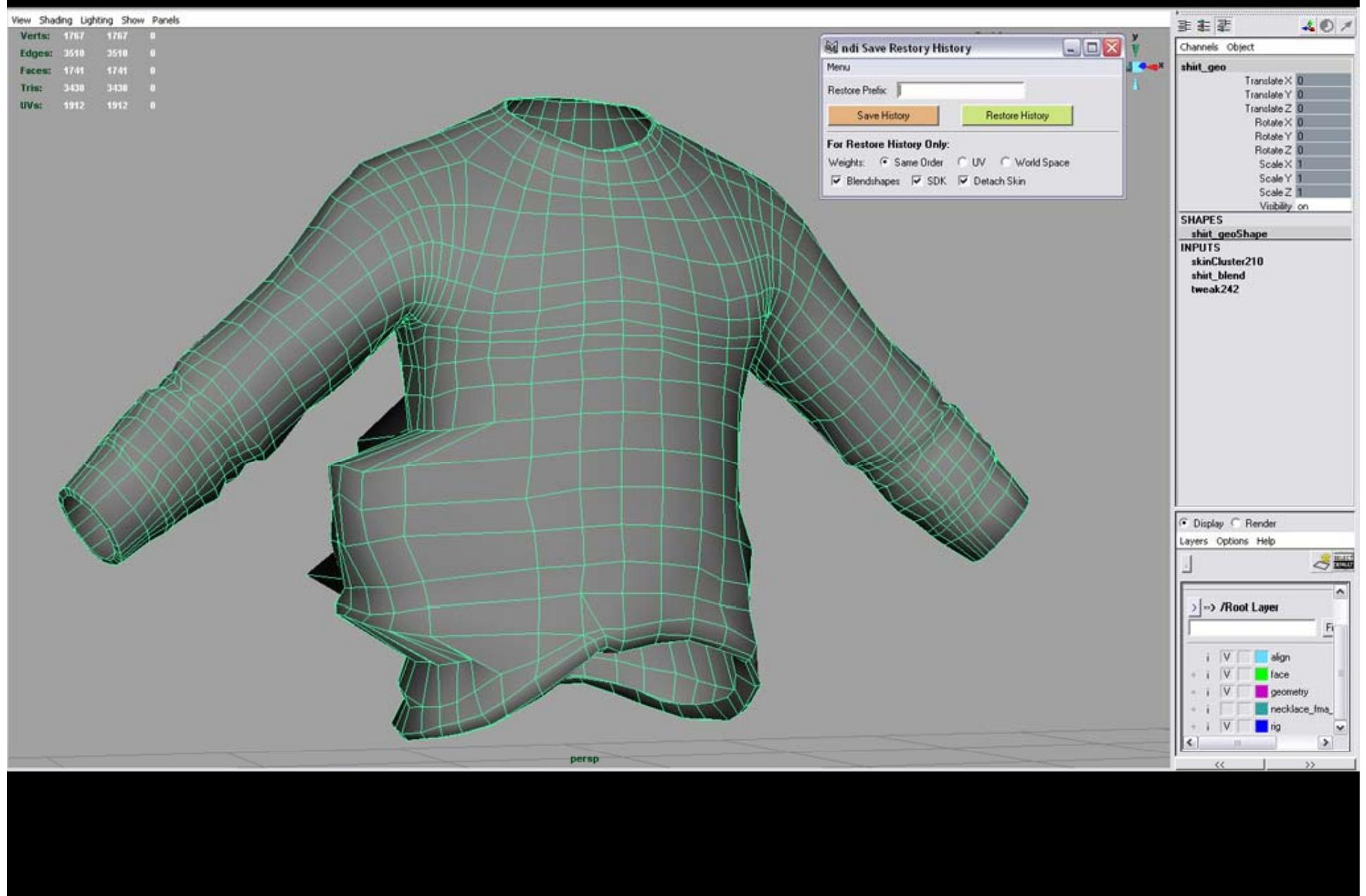
# History Tool: Shirt with skinCluster and history



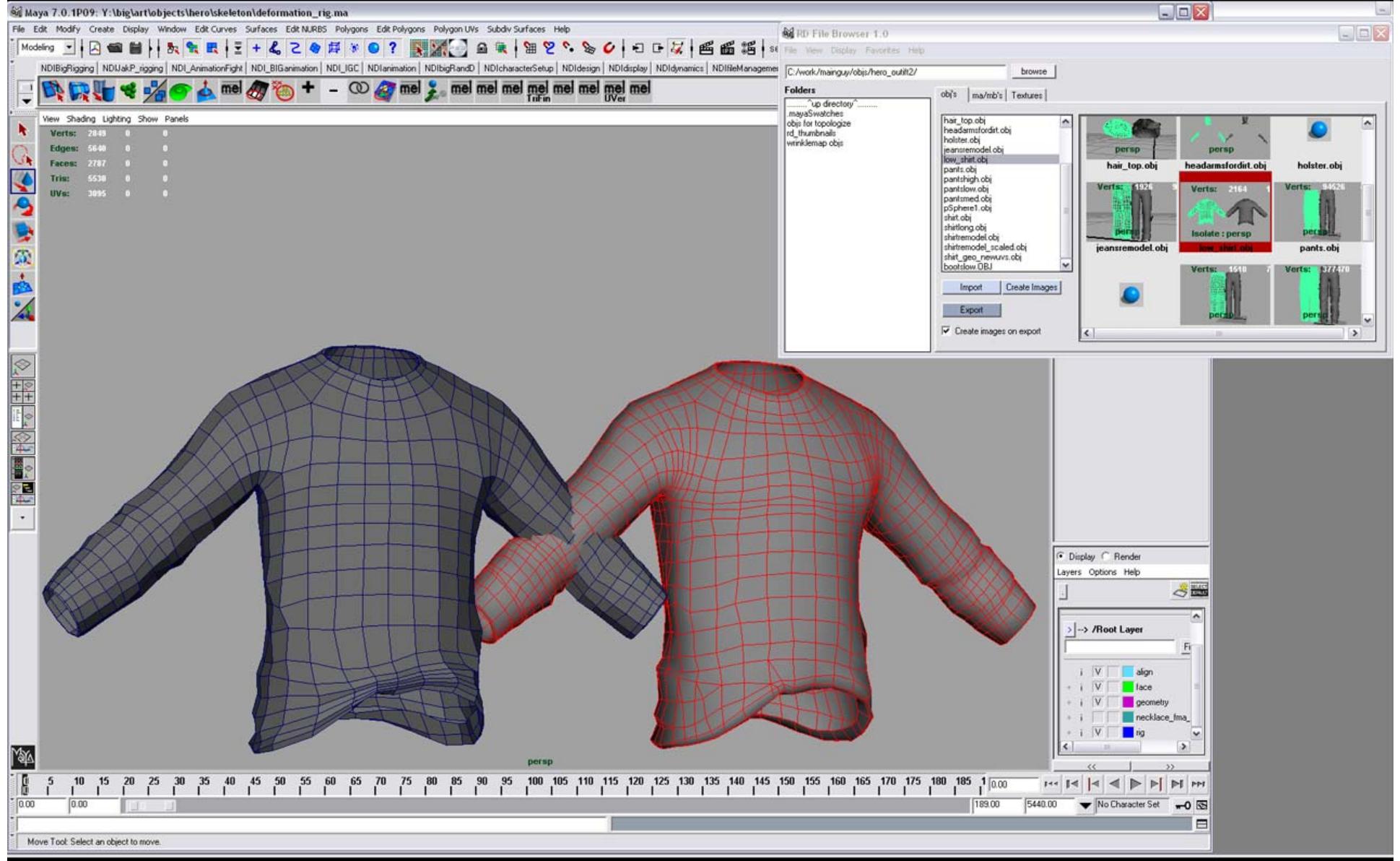
# History Tool: Shirt with History Node and information stored



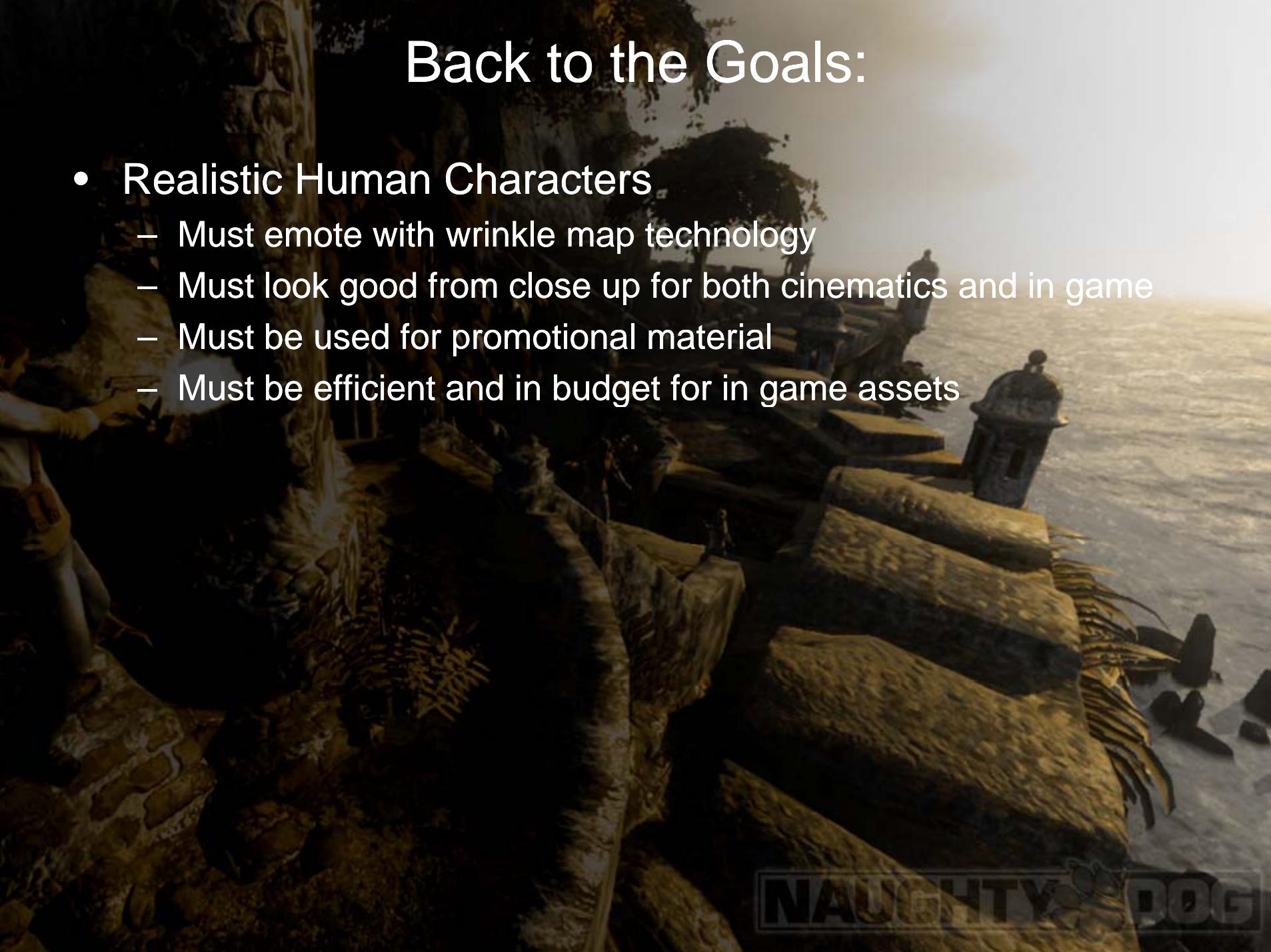
# History Tool: Shirt with original history reapplied



# RD Browser and Shirt retopology vs Base level



[RD File Browser movie](#)



## Back to the Goals:

- Realistic Human Characters
  - Must emote with wrinkle map technology
  - Must look good from close up for both cinematics and in game
  - Must be used for promotional material
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NAUGHTY DOG

**Wrinkle Map off**



**Wrinkle Map on**



**Wrinkle Map off**

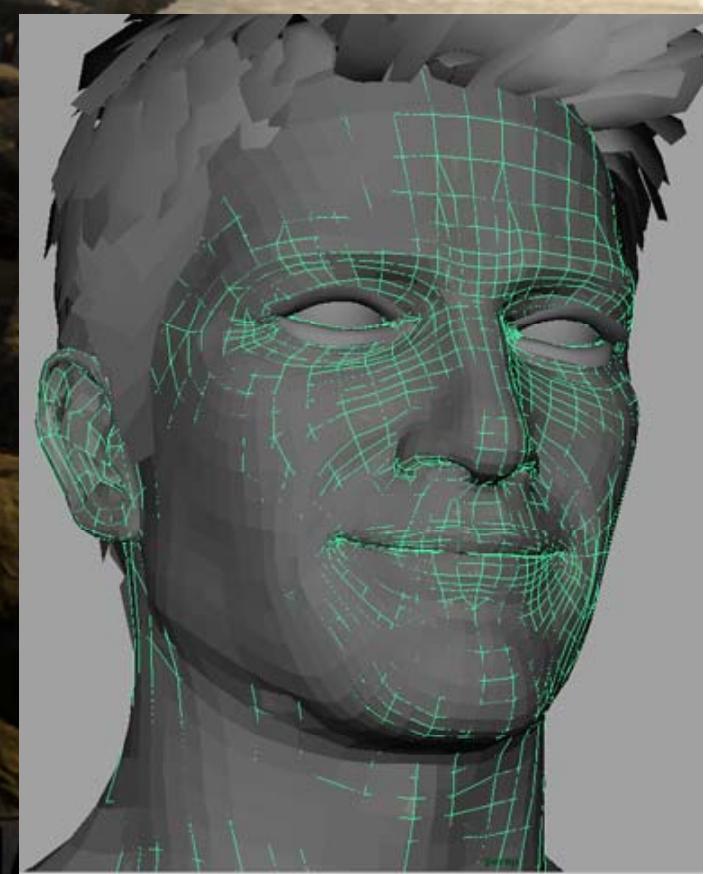
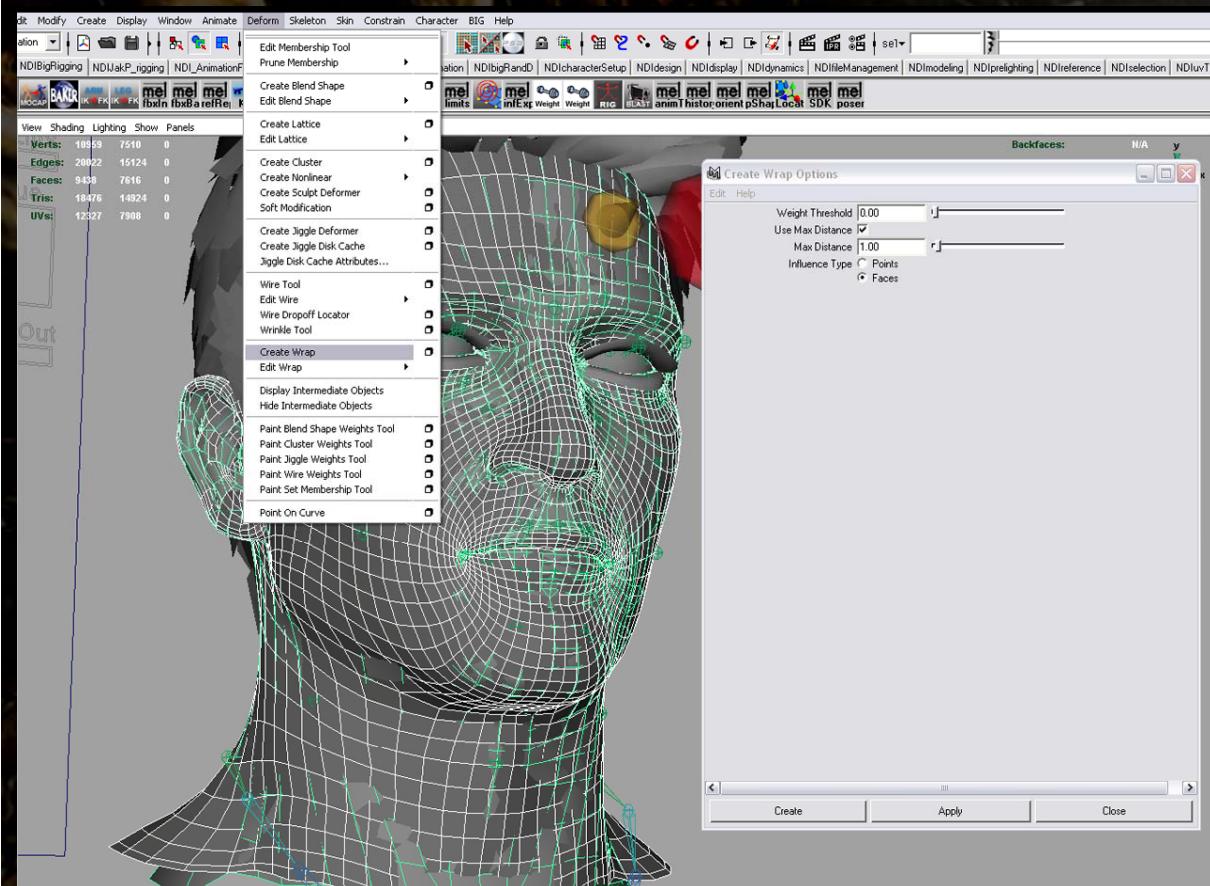


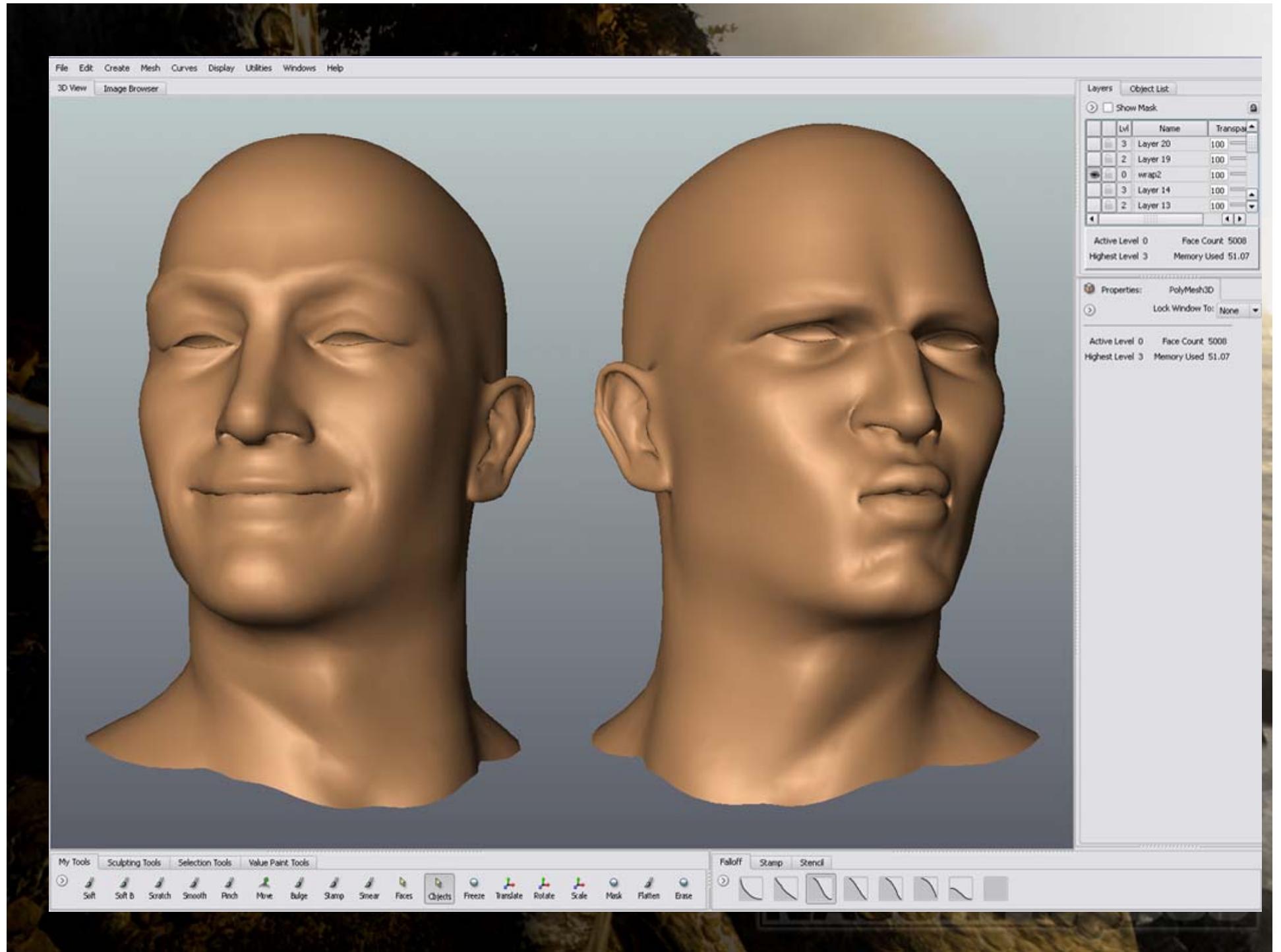
**Wrinkle Map on**



# How we created wrinkle maps:

- Lowest level from Mudbox was Wrap deformed to the in game Arbitrary mesh
  - When the in game mesh deformed with joints, it moved the Mudbox mesh accordingly



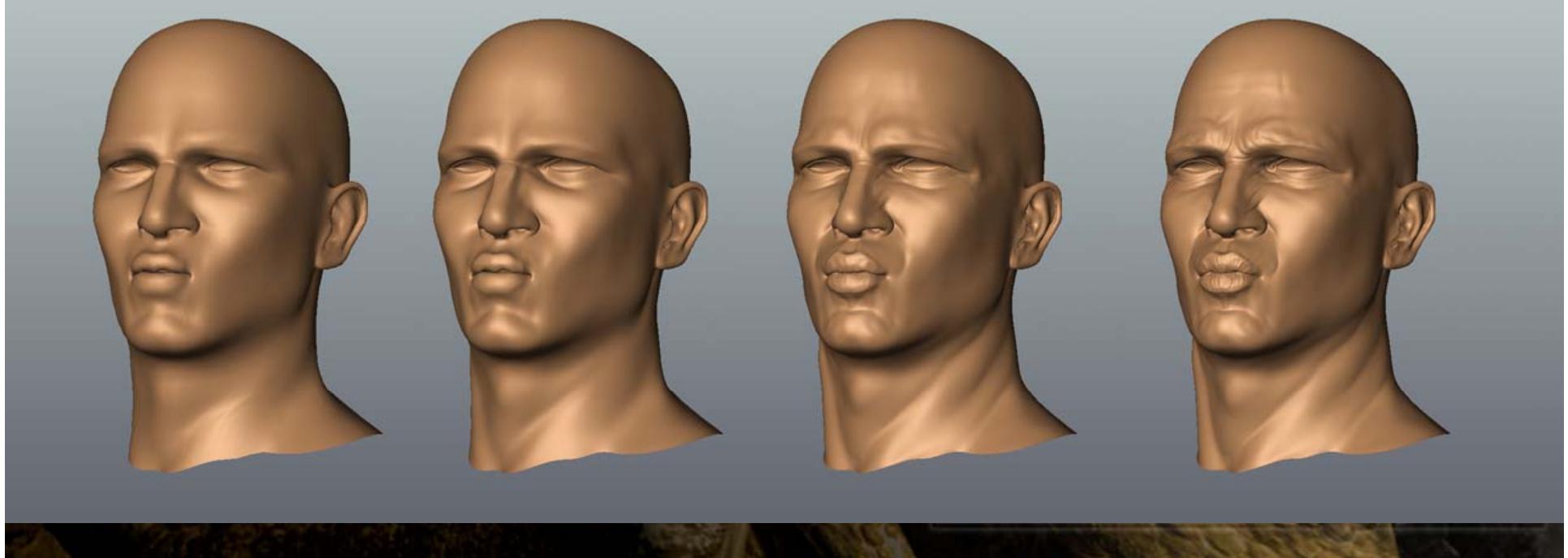
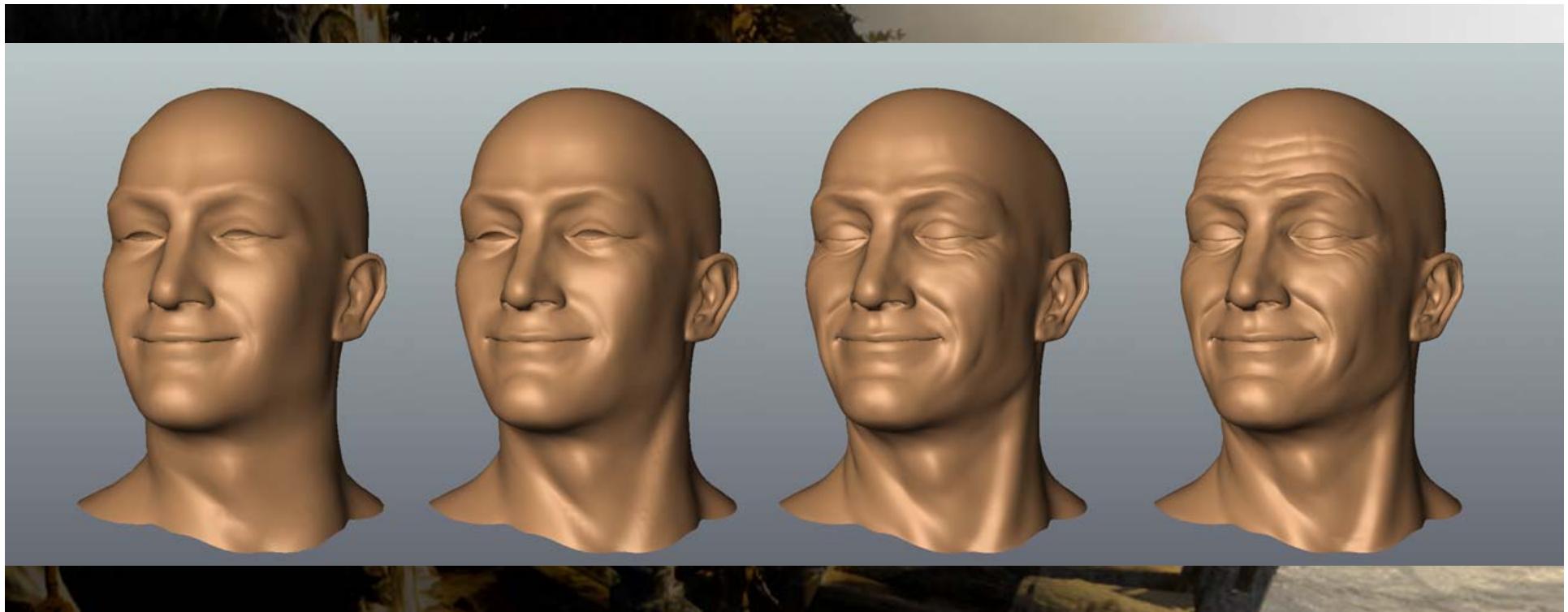


- Sculpted a new pose with new wrinkles



- Sculpted a new pose with new wrinkles

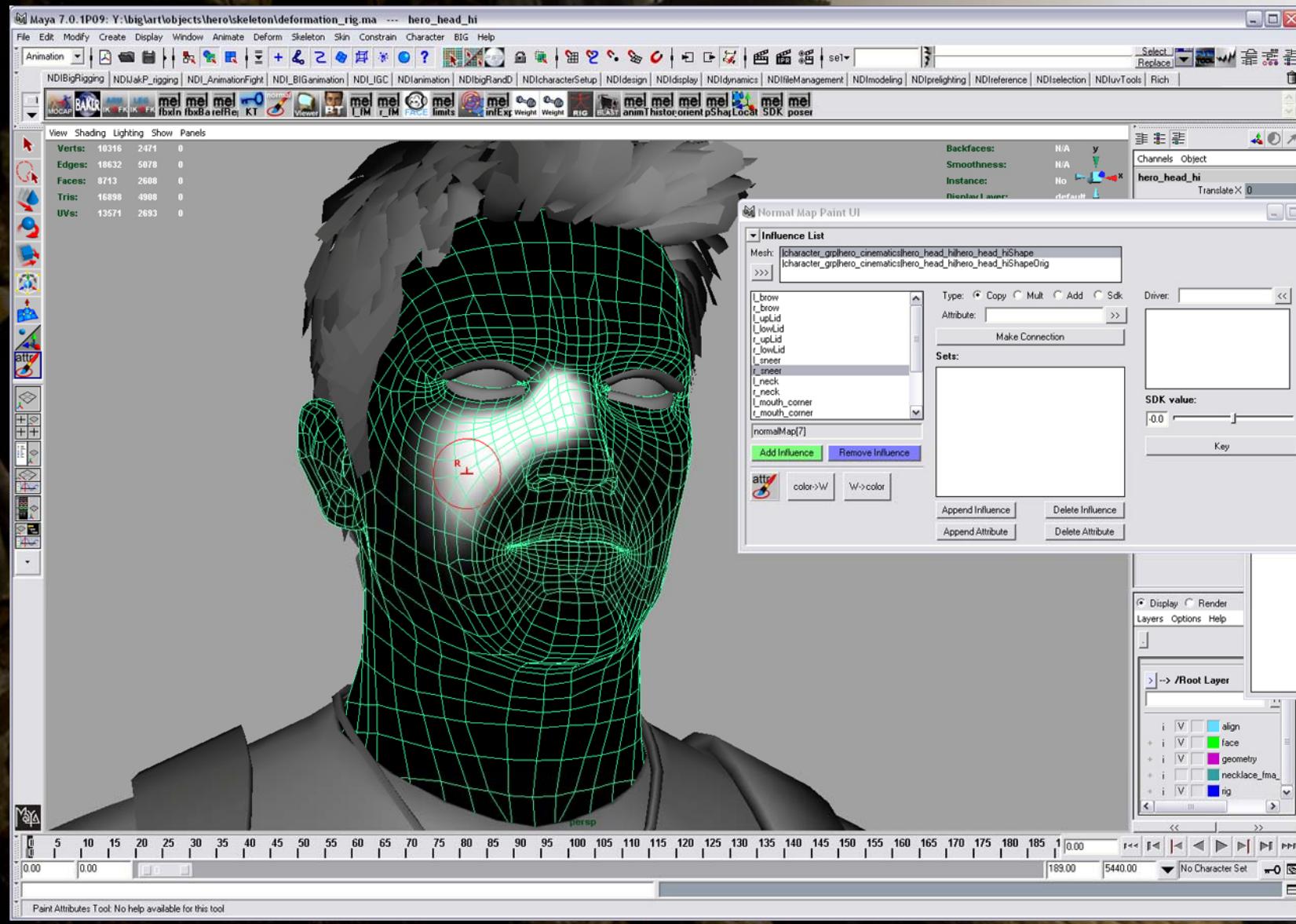




- Generated a new normal map from the in game posed mesh to the new sculpted pose



- Defined normal map regions on in game mesh
  - Custom tool written to define regions and export to game engine





Wrinkle Map Expressions

## Back to the Goals:

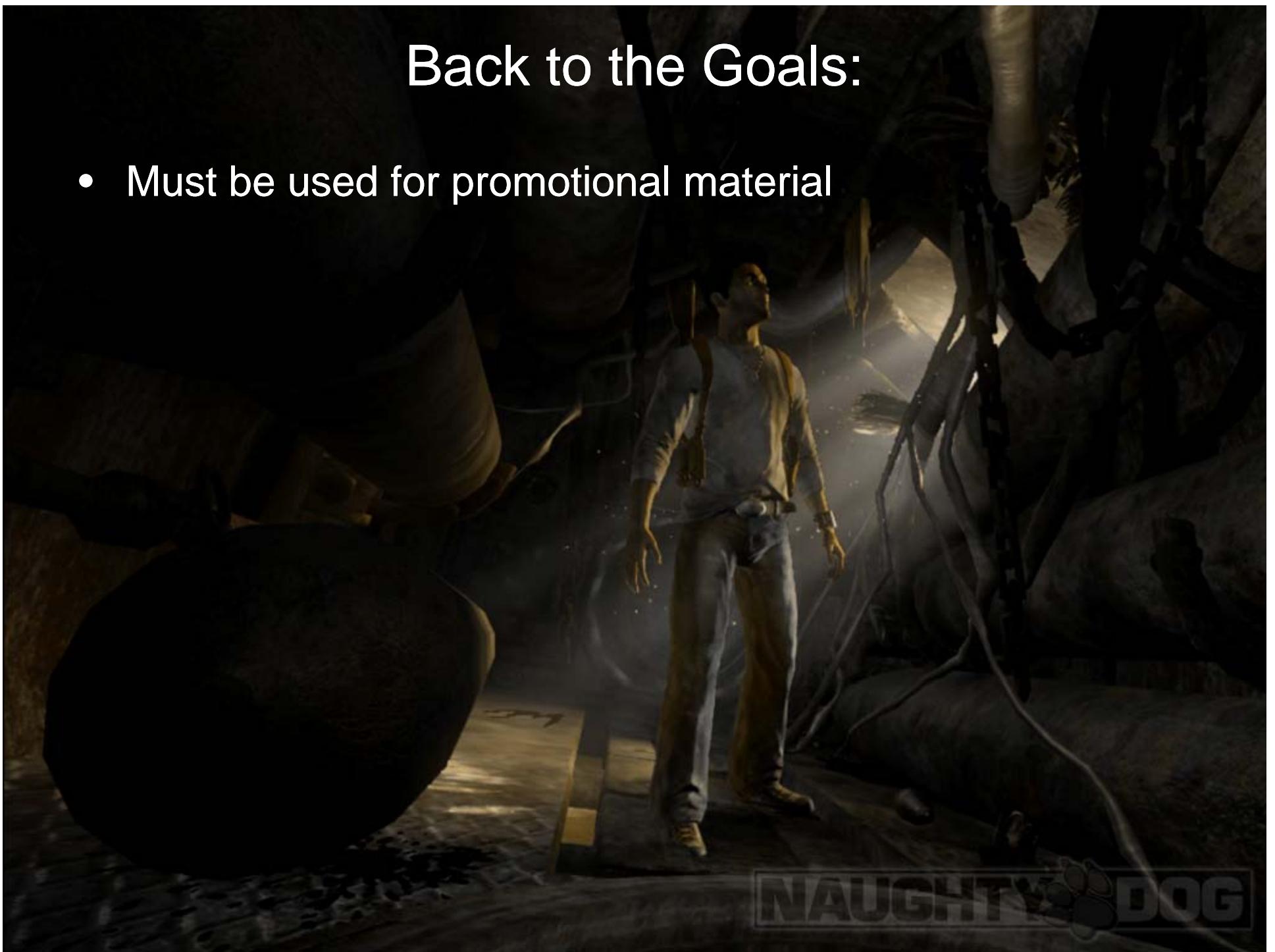
- Must look good from close up for both cinematics and in game

The logo for Naughty Dog, featuring the word "NAUGHTY" in a bold, sans-serif font next to a four-petaled flower icon, followed by the word "DOG" in a similar font.

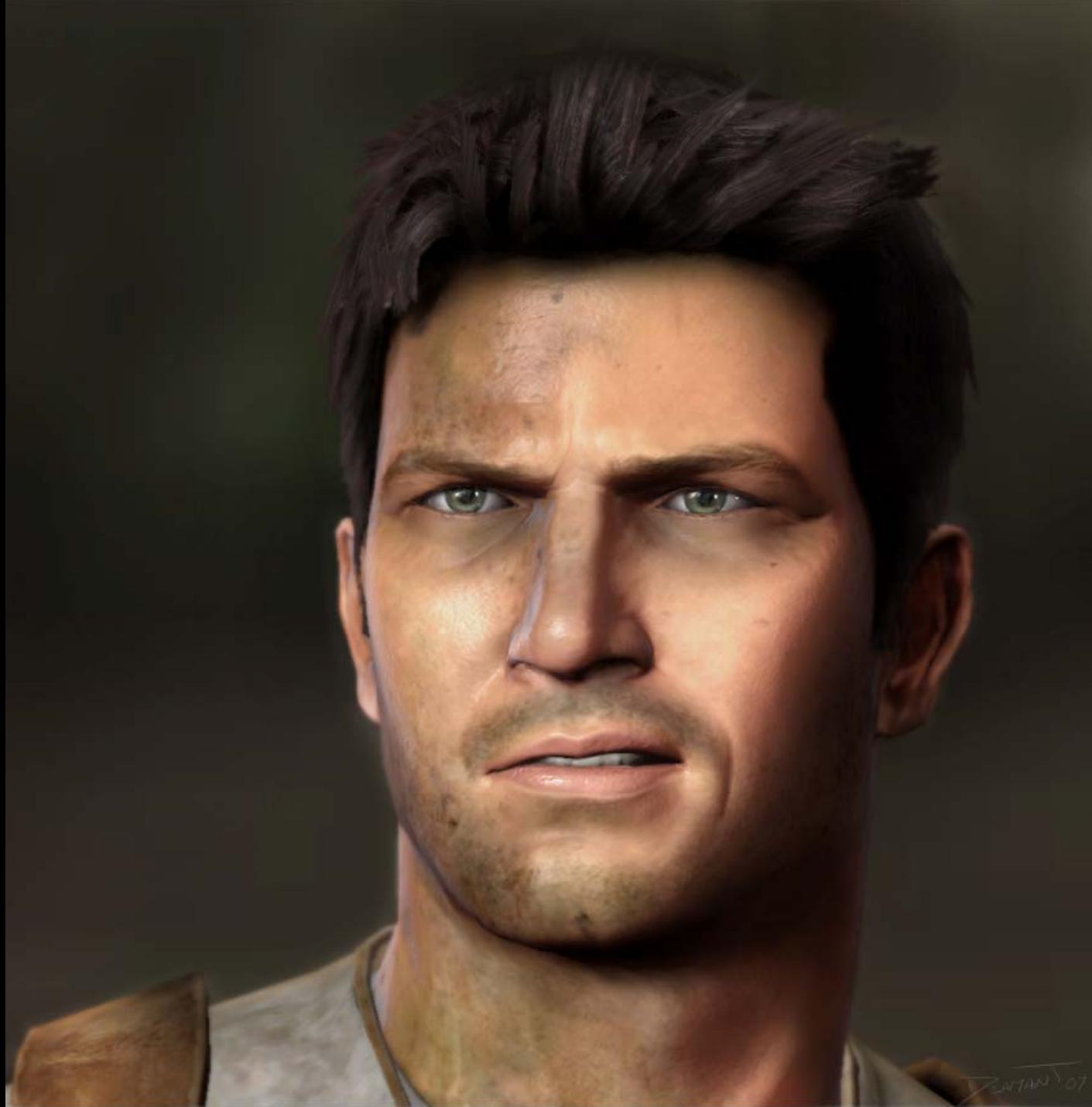


# Back to the Goals:

- Must be used for promotional material



NAUGHTY DOG







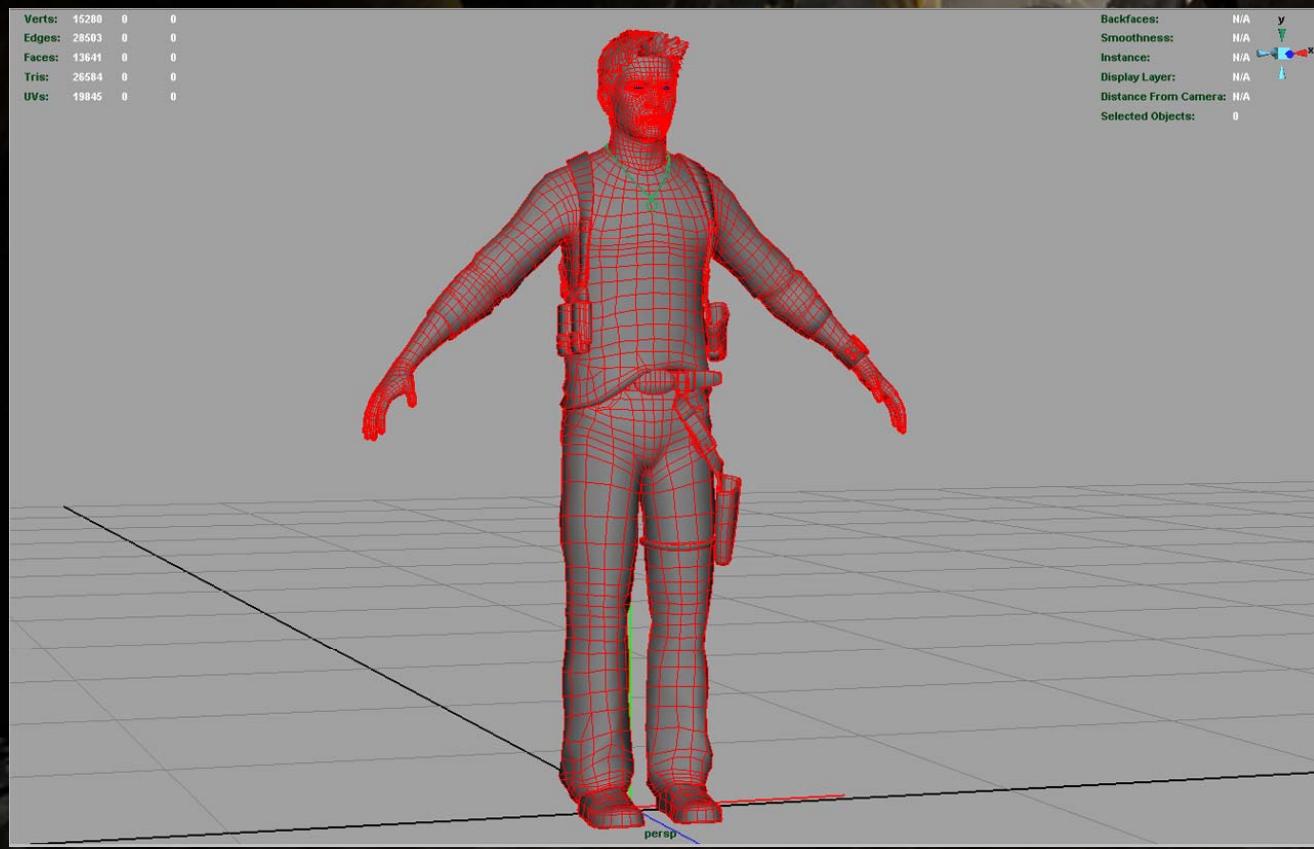






# Back to the Goals:

- Must be efficient and in budget for in game assets
  - The Playstation 3 and our engine allowed us to really push the envelope in regards to texture budgets and polygon budgets
    - 10 – 15 megs per main character of compressed texture memory
    - 20 – 30 thousand polygons per main character



# Postmortem:

- Happy with our decision to use arbitrary meshes
- Tools were important
- Not happy with keeping models in sync



**NAUGHTY DOG**