

# Pipelines

# Pipeline?

- Macro level - The process required to get something from idea to an asset on screen in a game
- Micro level - The process used to perform a specific action or step necessary in creating a game. i.e. add animations to a specific character, sculpt terrain for a map, apply shaders to assets
- Pipelines are made up of pipelines
- Designing a successful pipeline requires iteration and pre production

Industry example

# Pipeline exercise

# Tools

- Tools are segments of a pipeline or a pipeline themselves
- Tools decrease the number of steps in an existing pipeline
- Tools automate and/or simplify segments of a pipeline
- Tools decrease time required to create something – transverse a pipeline
- Decreasing time required to create something increases amount of content that can be created
- This is essential in games right now

# Goals

- Improve Efficiency!
  - Assist in a complicated workflow
  - Automate a repetitive task
  - Manage Metadata
  - Incorporate external plugins seamlessly

# What Do Artists Want From Tools?

They want to spend their time being creative, and not...

- Debugging problems
- Learning new complicated processes
- Performing repetitive tasks
- Waiting to see how their art looks in game

# Tool Design Pillars

- Iteration
- Flexibility
- Automation
- Future-proof



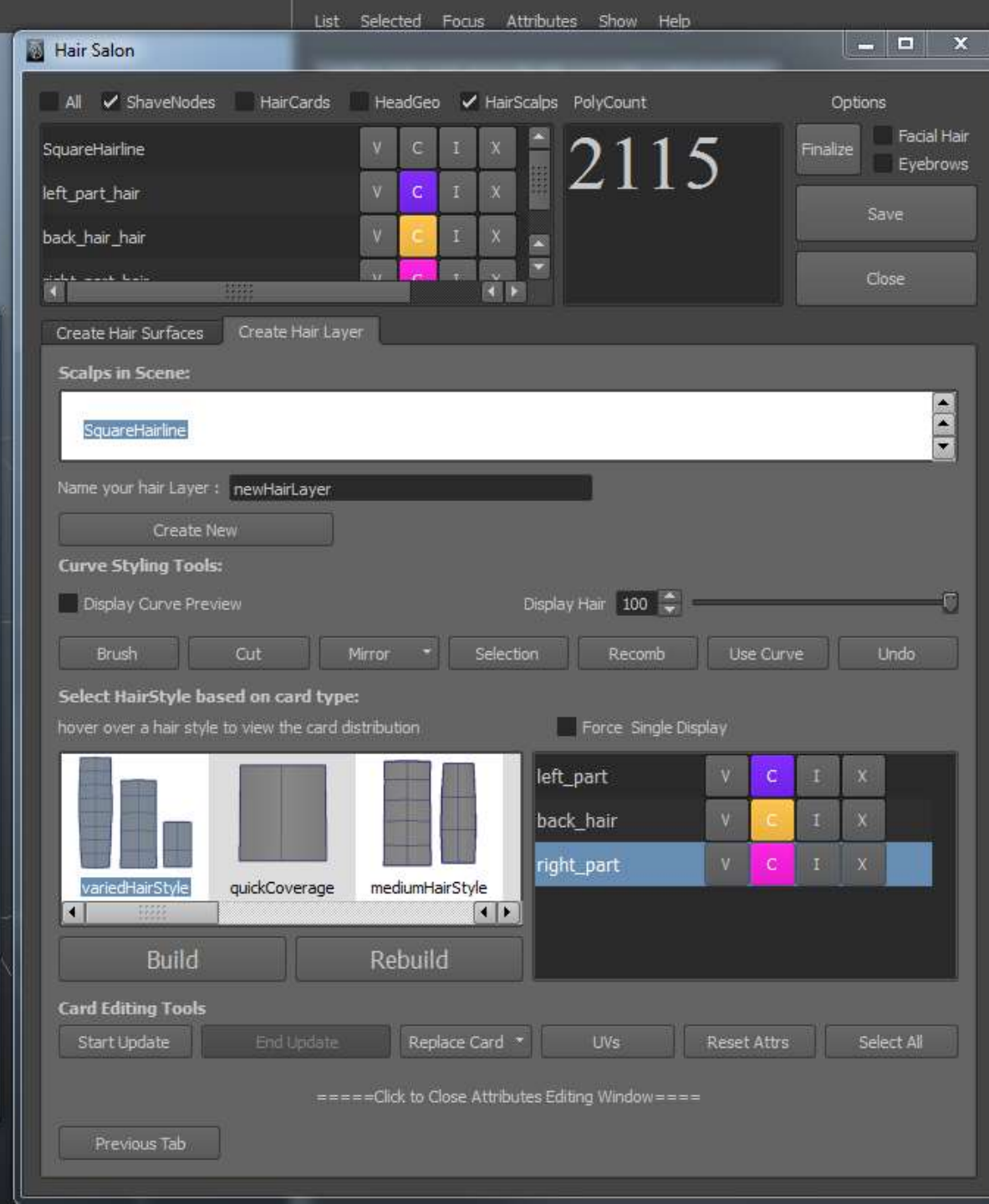
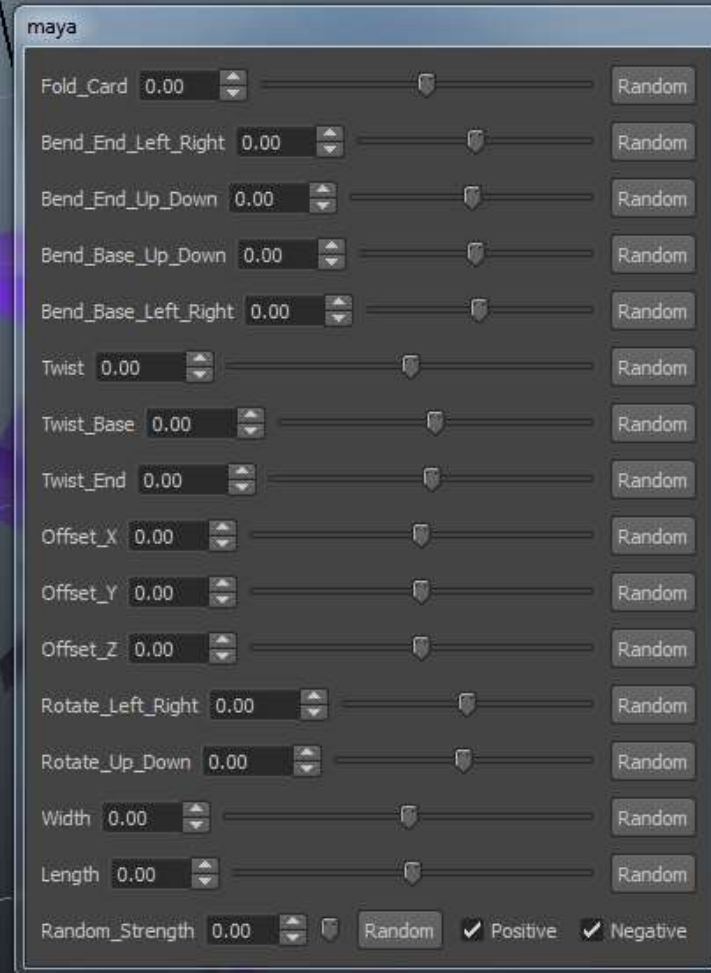
# Something Artists Want to Use

- Their involvement in development
- How it communicates through the user interface
- Doesn't disrupt their existing workflow

Involving your customers in  
development

<https://www.youtube.com/watch?v=wNYvOufzjQA>

# Early Development

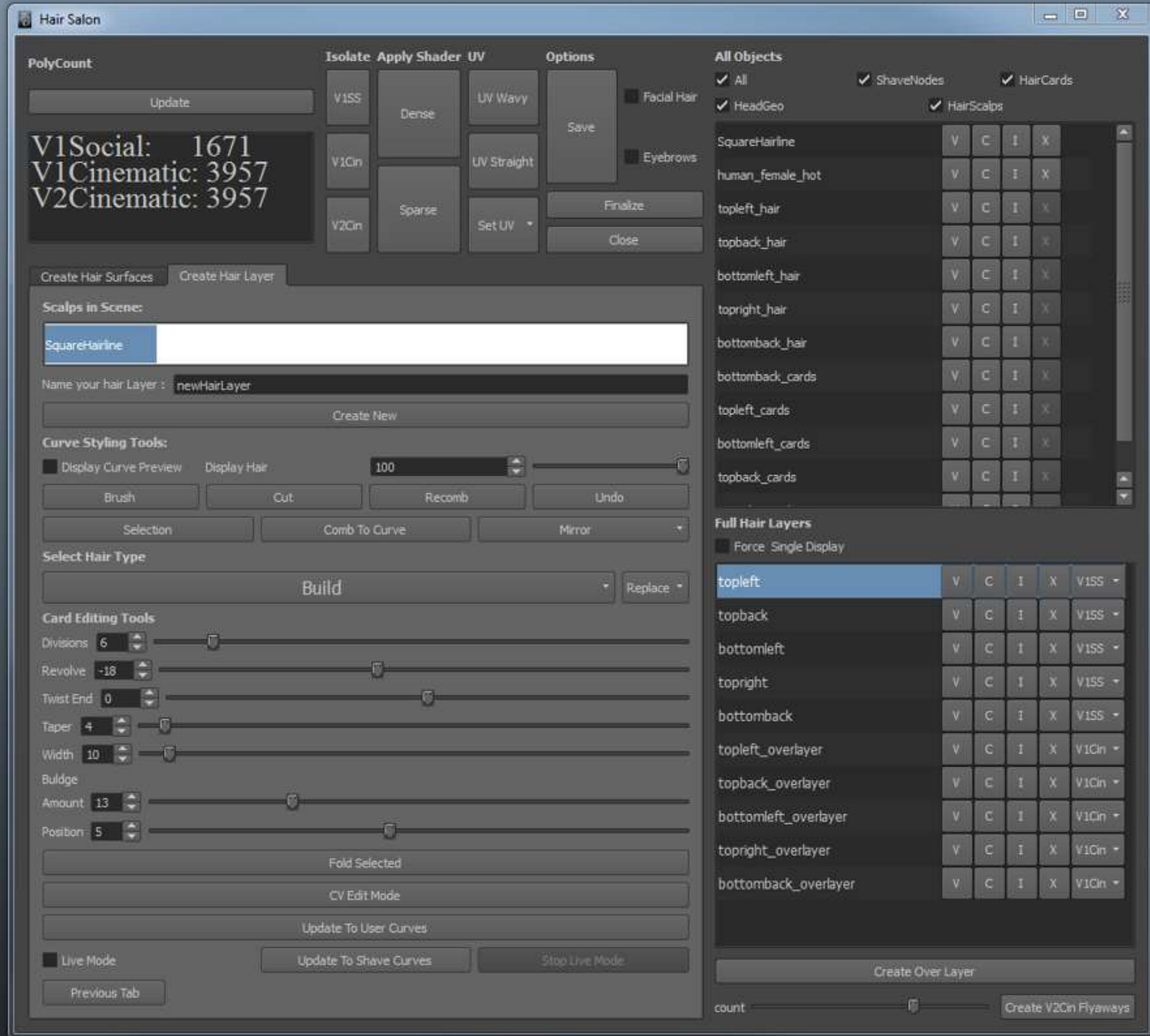


# Work With An Artist!

- Early Feedback
- Learn from how they work
- Find bugs
- Artists will feel involved in development
- Build a relationship

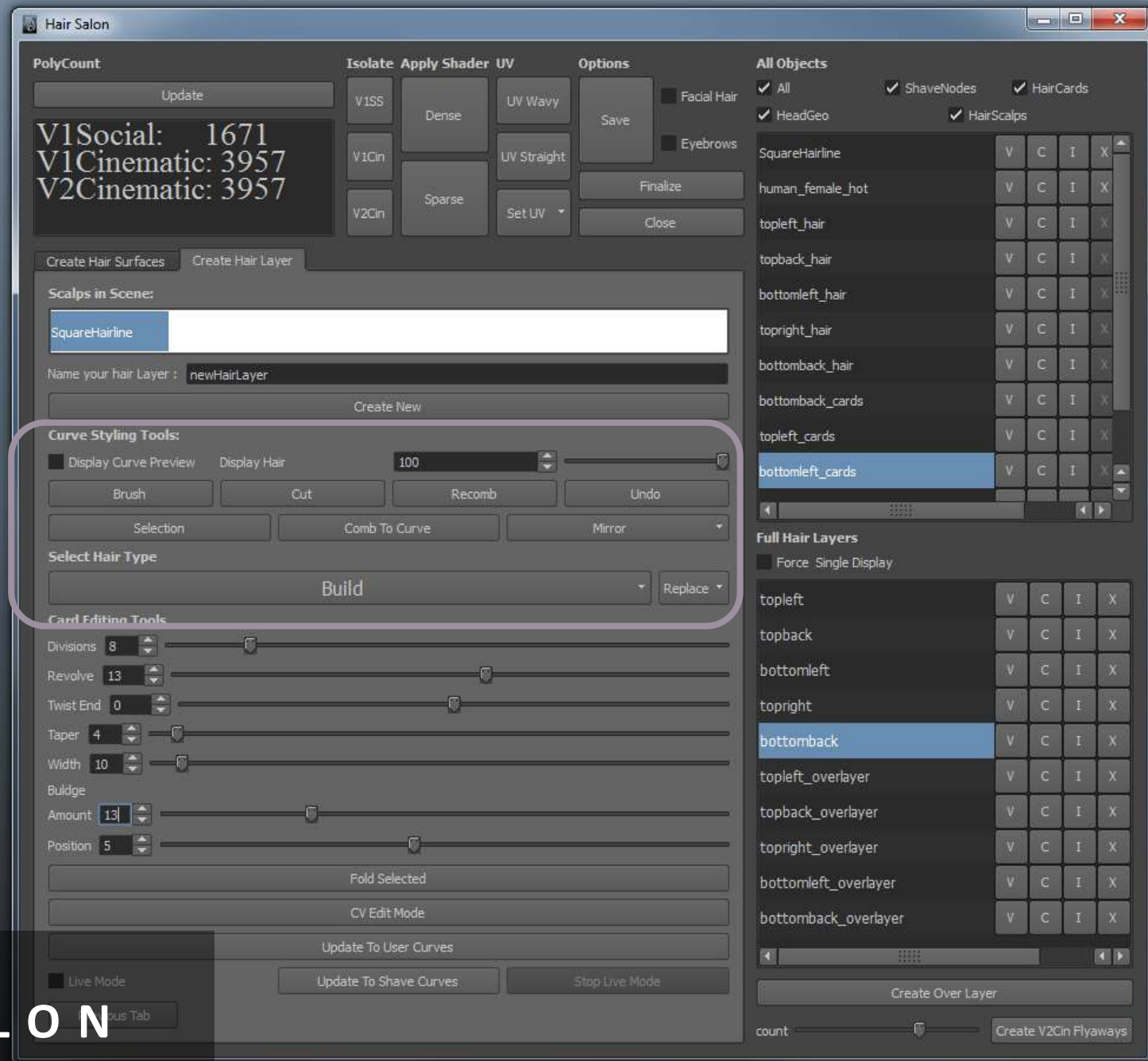
# Communication!!

- Close proximity
- Desk-side support
- Flexibility
- Observation and assistance





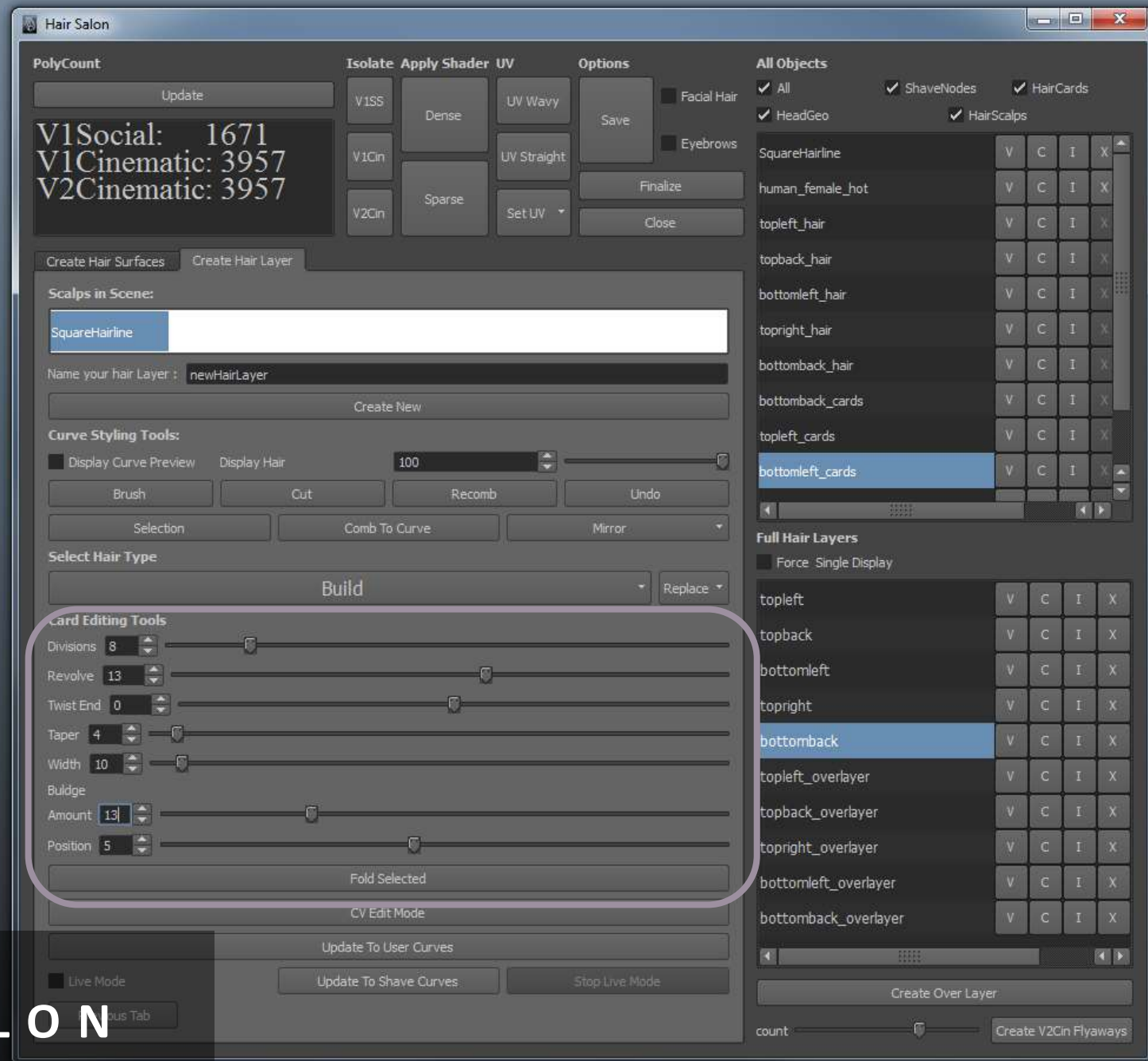
# BUNGIE'S HAIR SALON





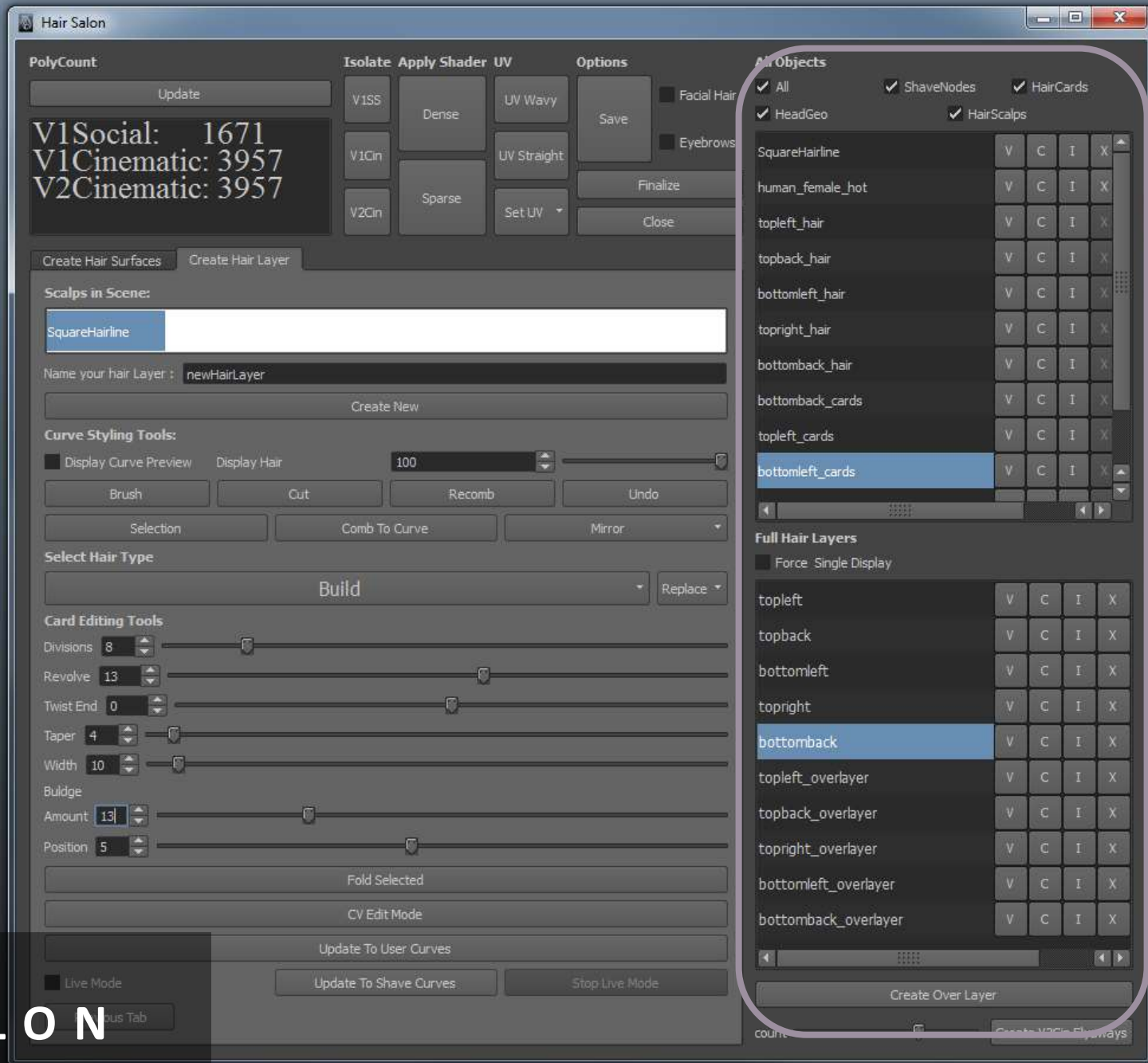


# BUNGIE'S HAIR SALON



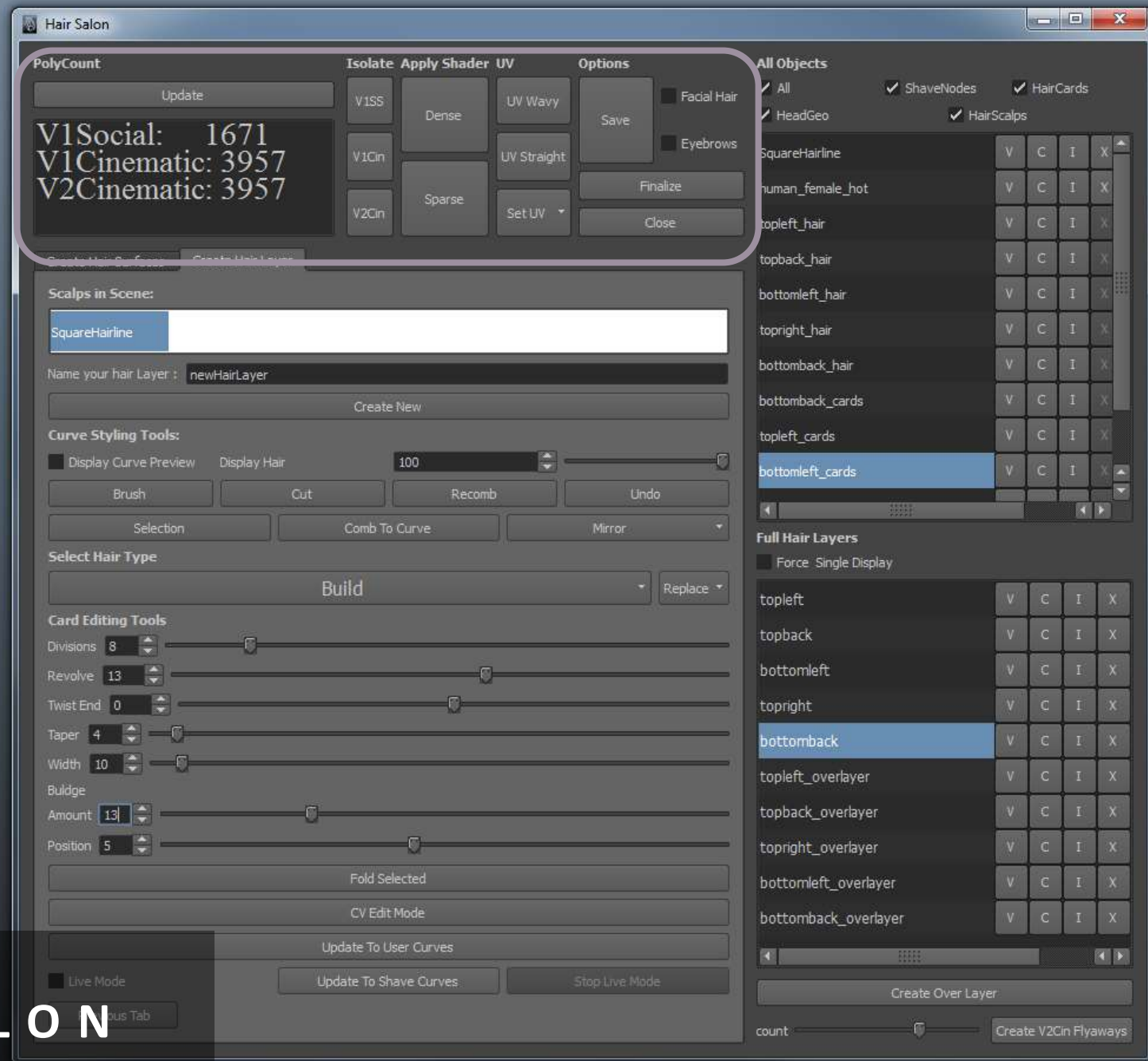


# BUNGIE'S HAIR SALON





# BUNGIE'S HAIR SALON

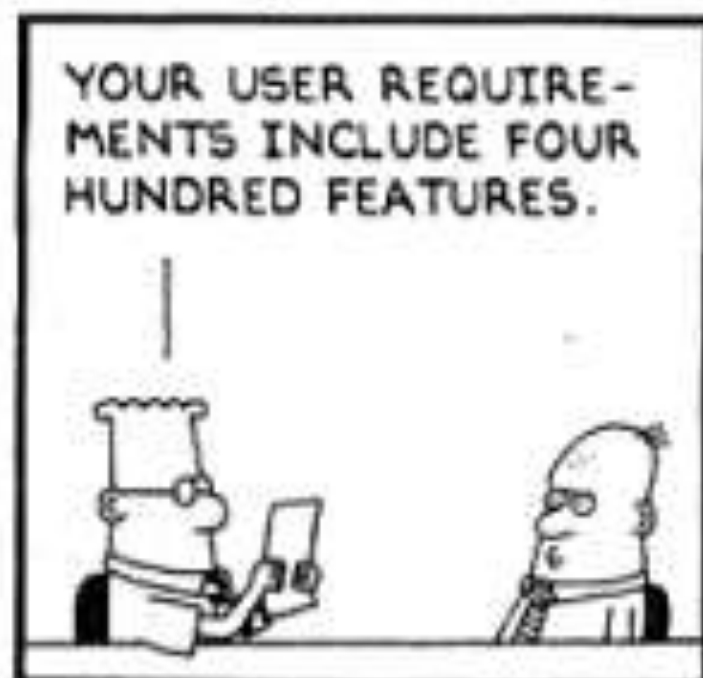


# UX Design

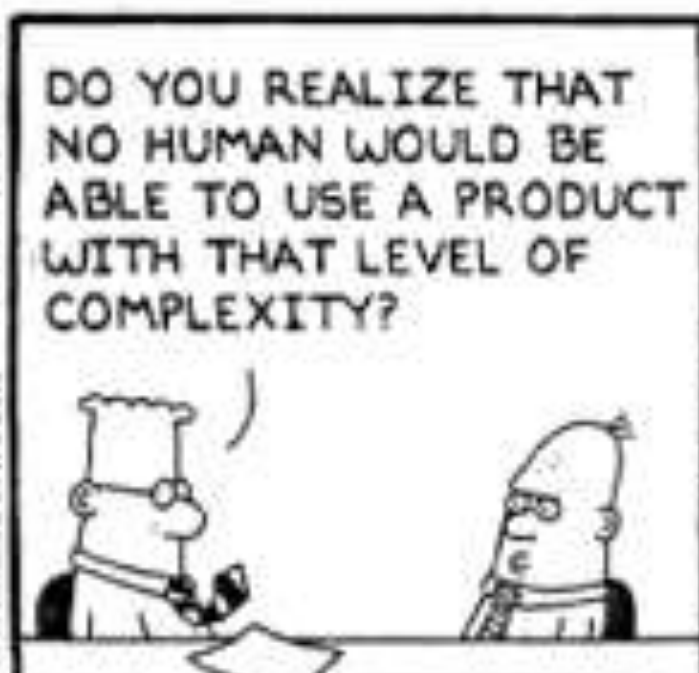
The process of enhancing user satisfaction by improving the usability, accessibility, and pleasure provided in the interaction between the user and the product

# Examples of Bad User Experiences

**DILBERT** by Scott Adams



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© 2001 United Feature Syndicate, Inc.



www.dilbert.com  
© 2001 United Feature Syndicate, Inc.





## Bulk Rename Utility

File Actions Options Help

Computer

- Local Disk (C:)
- DVD Drive (E:)
- BD-ROM Drive (F:)

Name	New Name	Sub...	Type	Size	Created	Modifi...	Acce...
------	----------	--------	------	------	---------	-----------	---------

## RegEx (✓ R)

Match   
Replace   
☐ Include Ext.

## Repl. (✓ R)

Replace   
With   
☐ Match Case

## Remove (5) (✓ R)

First n  Last n   
From  to   
Chars  Words

## Add (7) (✓ R)

Prefix   
Insert   
at pos.

## Auto Date (✓ R)

Mode   
Type   
Fmt

## Numbering (10) (✓ R)

Mode  at   
Start  Incr.   
Pad  Sep.

## File (2) (✓ R)

Name

## Case (4) (✓ R)

Same   
Excep.

Crop 

☐ Digits ☐ High ☐ Trim  
☐ D/S ☐ Accents ☐ Chars  
☐ Sym. Lead Dots

Suffix 

☐ Word Space

Sep.  Seg. 

Custom   
☐ Cent. Off.

Break  ☐ Folder

Type   
Roman Numerals

## Move/Copy (6) (✓ R)

## Append Folder Name (9) (✓ R)

Name  Sep.  Levels

## Extension (11) (✓ R)

Same

## Selections (12)

Filter  ☒ Folders ☐ Hidden Name Len Min  Max   
☐ Match Case ☒ Files ☐ Subfolders Path Len Min  Max

## New Location (13)

Path   
☐ Copy not Move

Reset

Revert

Rename

\*\* Love Bulk Rename Utility? Try ViceVersa PRO, file sync and backup software for Windows. [Click Here To Find Out More ...](#)

0 Objects (0 Selected)

Favourite

## PX4, XP300, XP400, X-Ray Pairing Instructions

1) Power the headset off and disconnect the transmitter from the USB port on the console, then plug the Transmitter back in. The **Power/Pairing LED** on the transmitter should be slowly blinking and the LED on the headset should be off.

2) Press and hold the **PAIR Button** on the transmitter for about 5 seconds until the **Power/Pairing LED** begins to flash rapidly (twice per second), then release the button.

*Note: If it is blinking much more than 2 times per second, the button was held for much too long (15+ seconds), and you must start over from Step 1.*

3) Press and hold the **Power Button** on the headset for **6-8 seconds** until you hear a **second set of two beeps**. You will hear two beeps (headset on), followed by three ascending beeps (Bluetooth on), then the second set of two beeps (pairing headset). The Power LED on the Headset should now be blinking rapidly like the transmitter (twice per second).

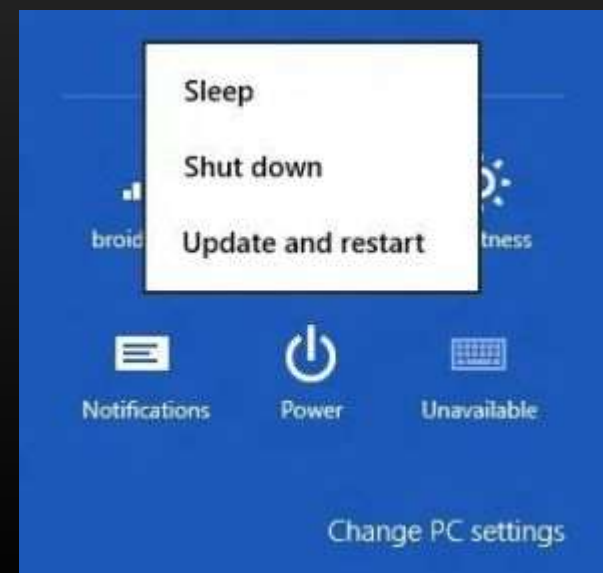
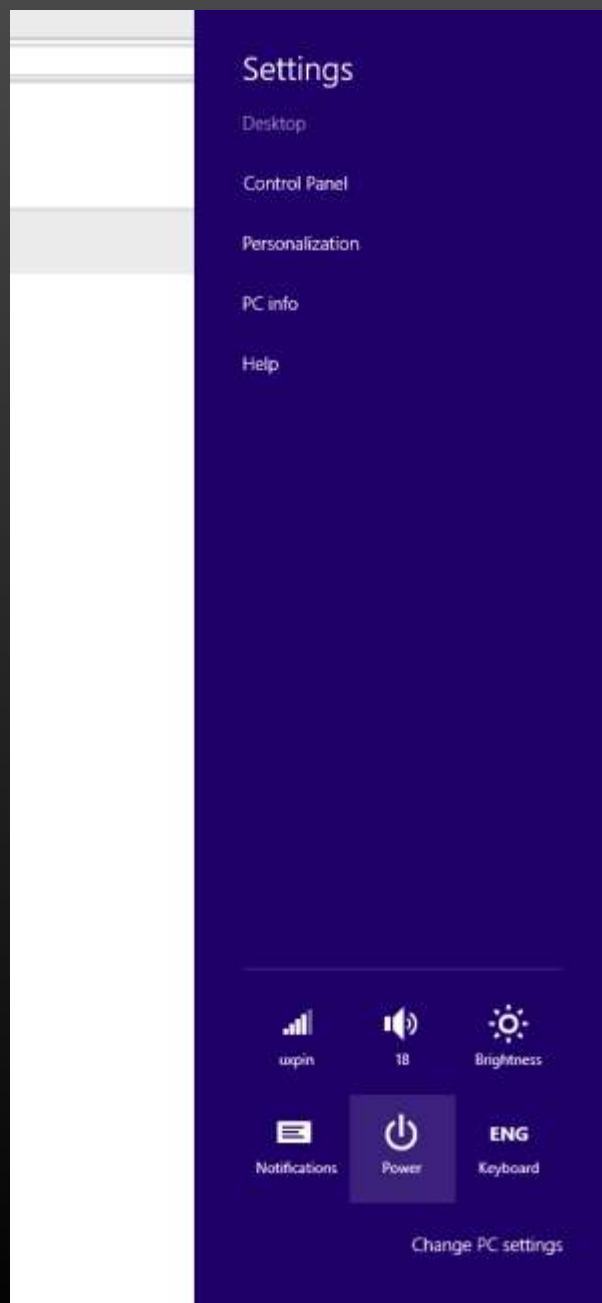
*Note: If it is double blinking (two quick blinks followed by a pause), then the button was not held long enough, and you must start over from Step 1.*

4) Wait about 10 to 15 seconds. **The Power/Pairing LED** on the transmitter should be **solid**, and the Power LED on the headset will be blinking once per second.

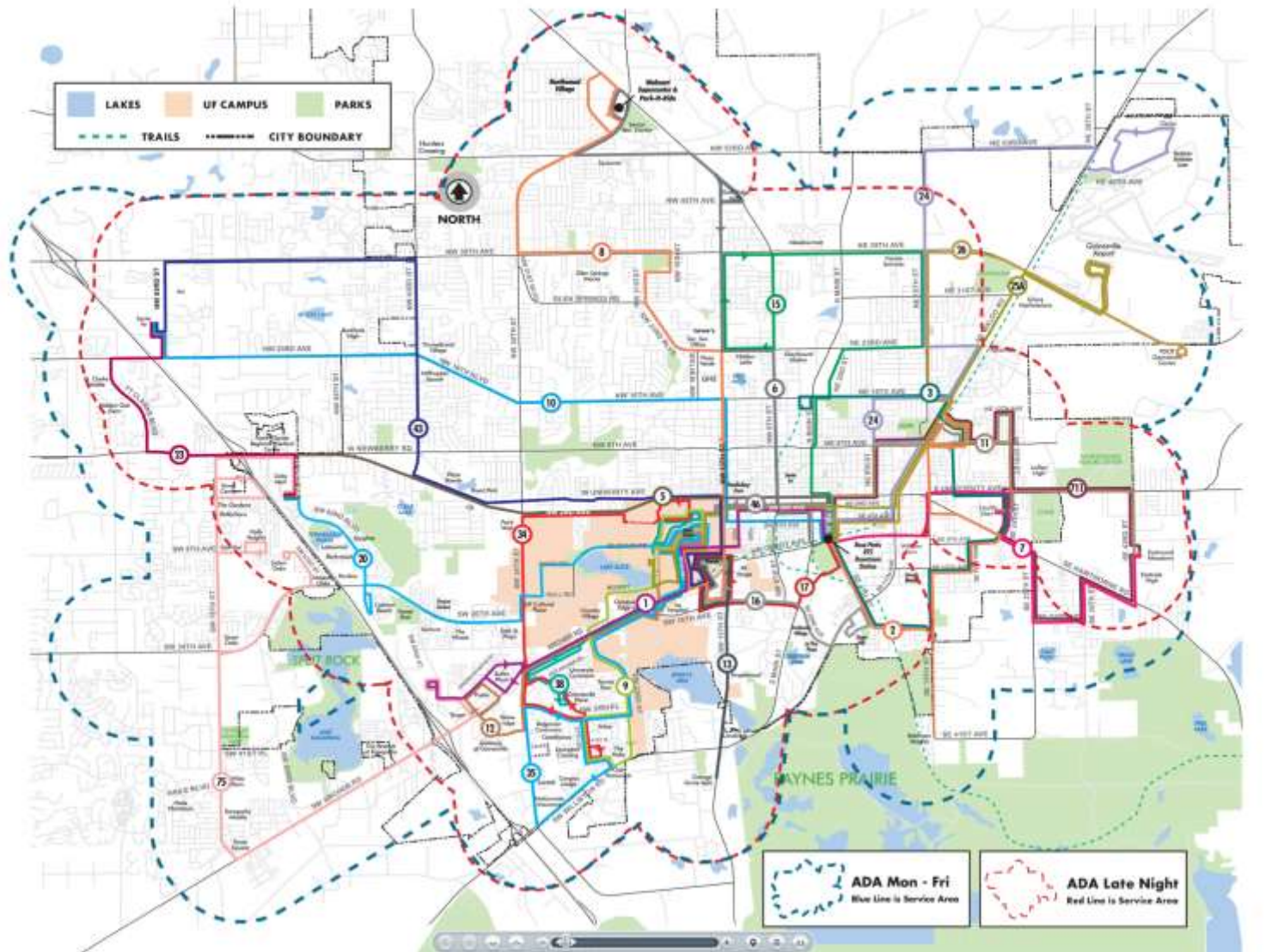
The headset is now paired to the transmitter and is ready to play game audio.



In Windows 8, it  
requires four  
actions to shut  
down your PC



# Examples of Good User Experience



RTS

REGIONAL TRANSIT SYSTEM

Select Language

Search the site

HOME

SCHEDULES

ADA

ABOUT RTS

FEEDBACK

HOW TO RIDE

CONTACT

RTS EMPLOYEE LOGIN

SUMMER 2016

CITY ROUTES

CAMPUS ROUTES

HOLIDAY/REDUCED

ADA

TUTORIAL

LATER GATOR

GATOR LOCATOR

CHOOSE ROUTE MAPS & SCHEDULES

3

Rosa Parks RTS Downtown Station To North Main Post Office

Monday to Friday Every 40 min.

Saturday/Sunday No Service

A

ROSA PARKS RTS DOWNTOWN STATION

B

NE WALMART SUPERCENTER

C

N MAIN POST OFFICE

C

N MAIN POST OFFICE

B

NE WALMART SUPERCENTER

A

ROSA PARKS RTS DOWNTOWN STATION

1,2,5,6,7,10,11,15,17,24,25,26,27,46

2,11,26

15

15

2,11,26

1,2,5,6,7,10,11,15,17,24,25,26,27,46

To N Main Post Office

To Downtown

R-RUNS ON REDUCED SERVICE DAYS

MONDAY TO FRIDAY

9:30am

10:30

11:30

12:30pm

1:30

2:30

3:30

4:30

9:47

10:47

11:47

12:47

1:47

2:47

3:47

4:47

9:55

10:55

11:55

12:55

1:55

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9:59am

10:59

11:59

12:59

1:59

2:59

3:59

4:59

10:05

11:05

12:05pm

1:05

2:05

3:05

4:05

5:05

10:22

11:22

12:22

1:22

2:22

3:22

4:22

5:22

R

R

R

R

R

R

R

R

All buses wheelchair accessible

Site by Author Inc.

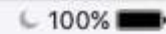
File 11.000

NTAS

NO ACTIVE ALERTS



9:41 AM



[Settings](#)

## Do Not Disturb

Manual



When Do Not Disturb is enabled calls and alerts that arrive while locked will be silenced, and a moon icon will appear in the status bar.

Scheduled



Allow Calls From

Favorites >

Incoming calls from your favorites will not be silenced.

Repeated Calls



When enabled, a second call from the same person within three minutes will not be silenced.

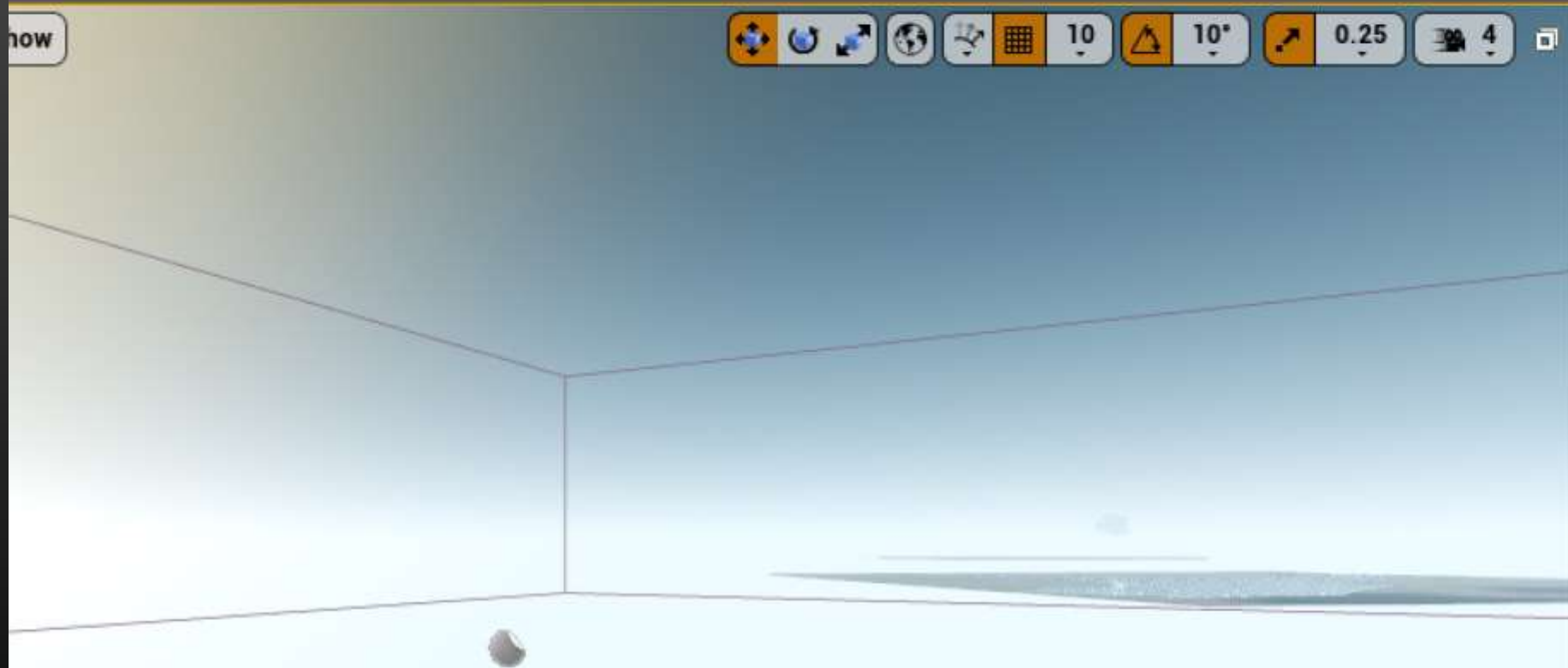
SILENCE:

Always

Only while iPhone is locked



Incoming calls and notifications will be silenced while iPhone is locked.



This tutorial points out each of the key interface elements for the Unreal Editor.

Next →

World Outliner

Search...

Label

- GDC\_Landscape\_
- Audio
  - GDC\_Ambien
  - lake\_loop\_01
  - lake\_loop\_01
  - lake\_loop\_01
  - lake\_loop\_01
  - lake\_loop\_01
  - lake\_loop\_3a

125 actors

Details

Select an object t

# Design Principles

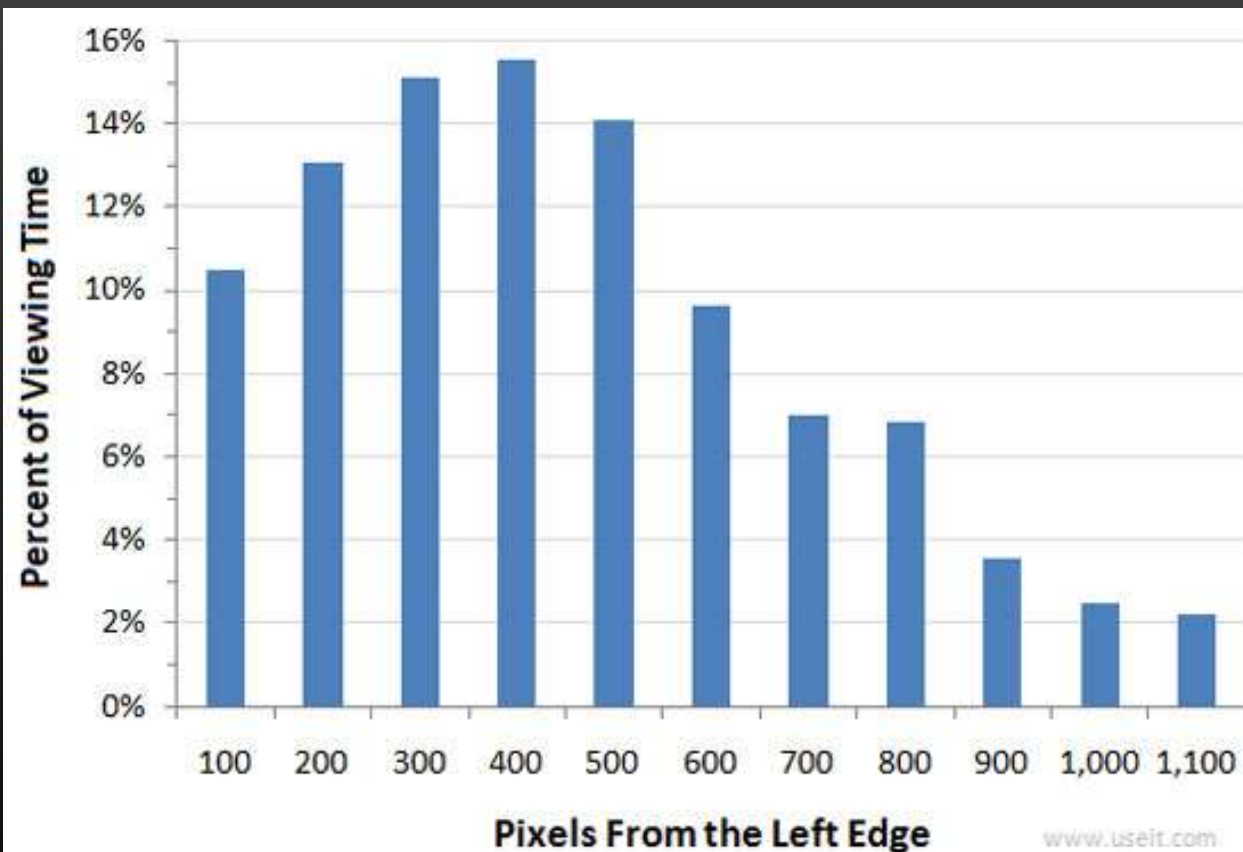
# Formatting

- Read from left to right
- Read from top to bottom
- The golden ratio is real!





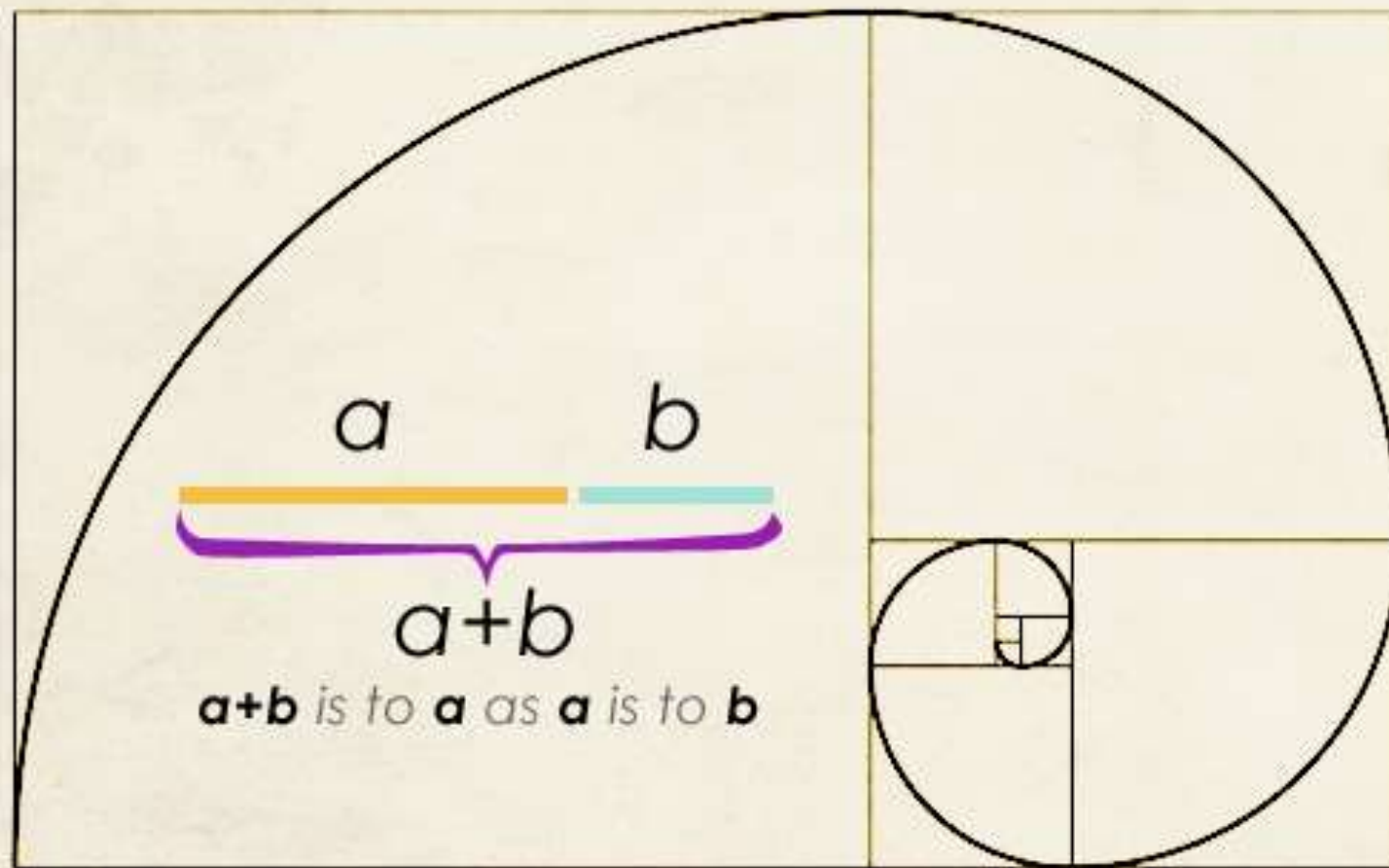


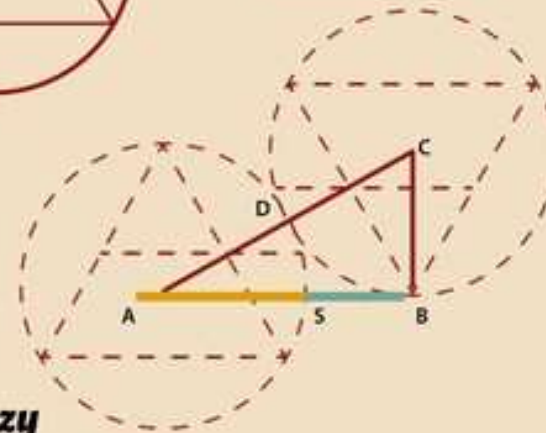
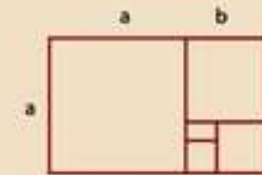
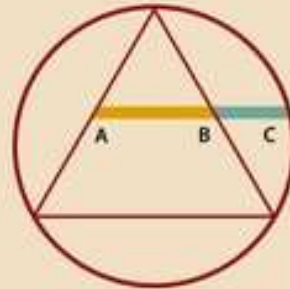
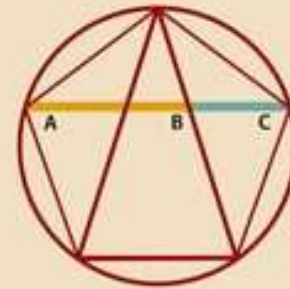
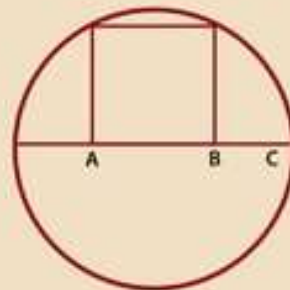
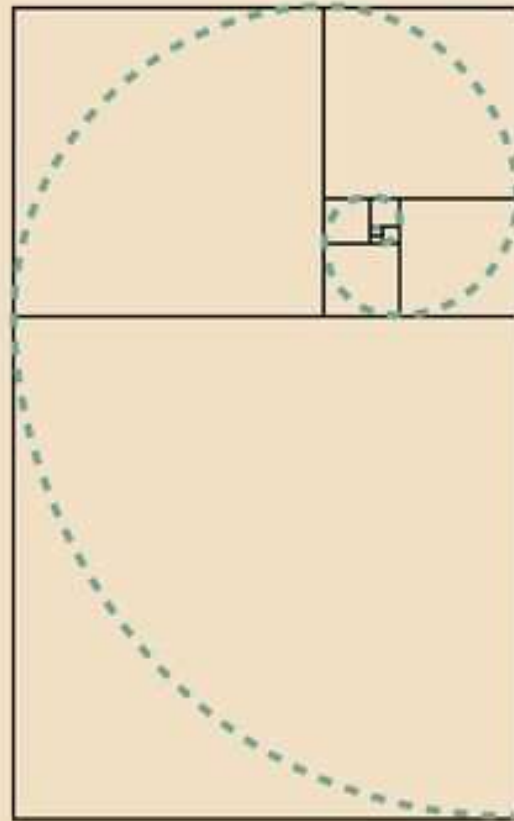


www.useit.com



## -The Golden Ratio-





Designed by **Vecteezy**

# Emphasize

- Use color to draw attention
- Use Images to draw attention
- Use scale changes to draw attention
- Don't clutter

# Communicate

- Show meaning through color usage
- Embed documentation
- Include tooltips
- Carefully consider all wording
- Iterate on terminology

# Cloth Simulation Tools as an Example of Good VS Bad UIs



# Havok cloth tool

- Create a Mesh
- Set attributes in Maya
- Launch the Havok Plugin Cloth Setup Tool (different for each Maya)
- Set up your cloth
- Export data for game
- Get data to work in the game



An improved version of the  
Havok cloth tool

## Add Sim Meshes

Add


Remove


Select


## Look for Problems


## What Kind of Garment?

 Player Badge

 Player Cape

 Player Cape (Long)

 Player Cape (Short) (One Shoulder)

 Player Robe

 Fallen Cape

 Hive Shroud

## What Type of Fabric?

 Cotton

 Leather

 Silk

 <Custom>

## Setup Steps

Setup Regions

Choose Skeleton

Choose Colliders

Setup LOD

Triangulate

Setup Skinning

Advanced

Preview Cloth

Done

# Creating a Positive User Experience

- Communicates with the user
- Influences the user's progress
- Provides feedback
- A simple and clean User Interface

# Cloth Tool Specifics

- Translates Havok data terminology to familiar terms
- Automates as much as possible
- Incorporates documentation into the tool
- Checks for problems throughout setup

## Add Sim Meshes


Add


Remove


Select

## Look for Problems


## What Kind of Garment?


 Player Badge


 Player Cape

 Player Cape (Long)

 Player Cape (Short) (One Shoulder)

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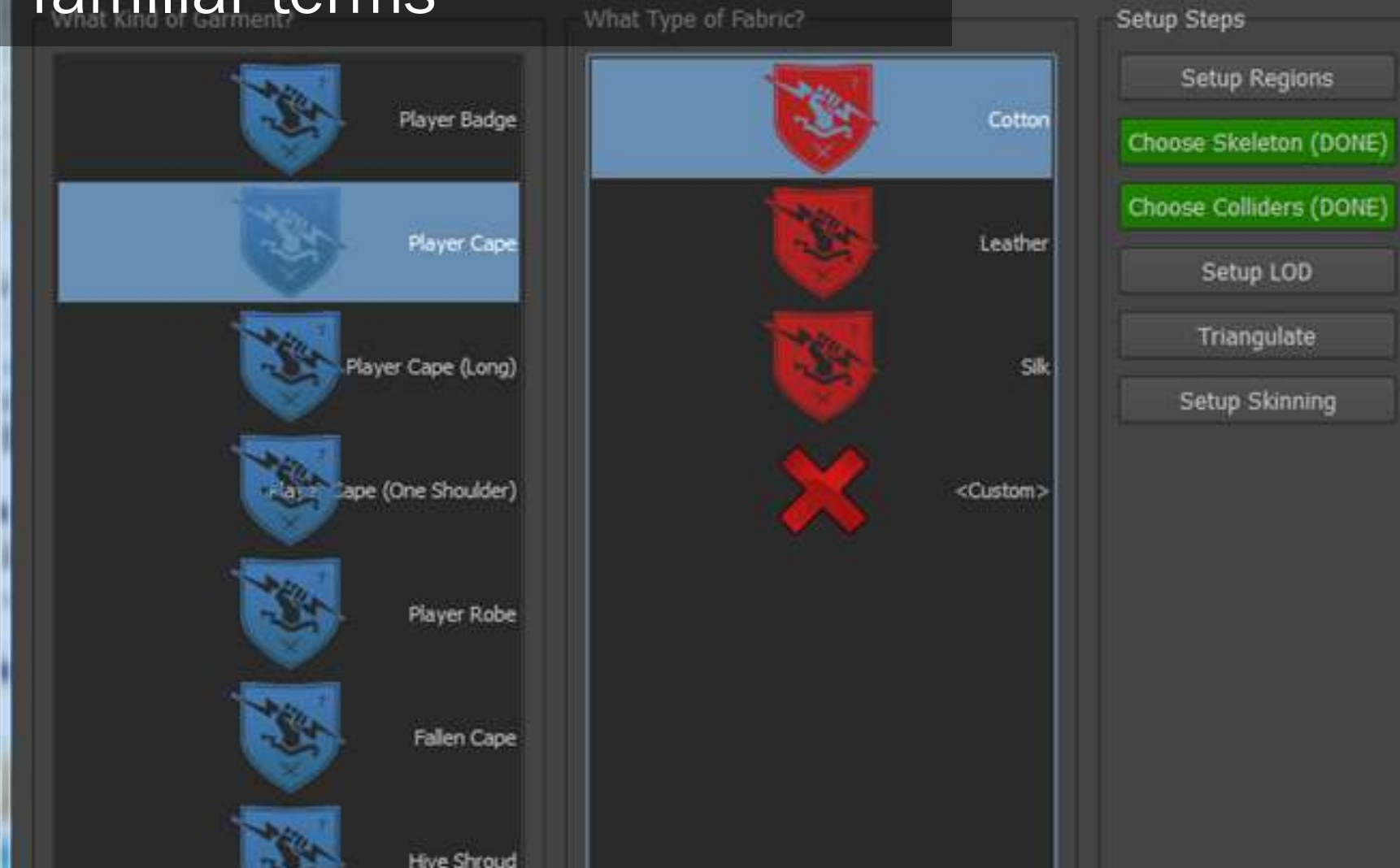
Advanced

Preview Cloth

Done

# Real World Terms

Parameters abstracted to familiar terms

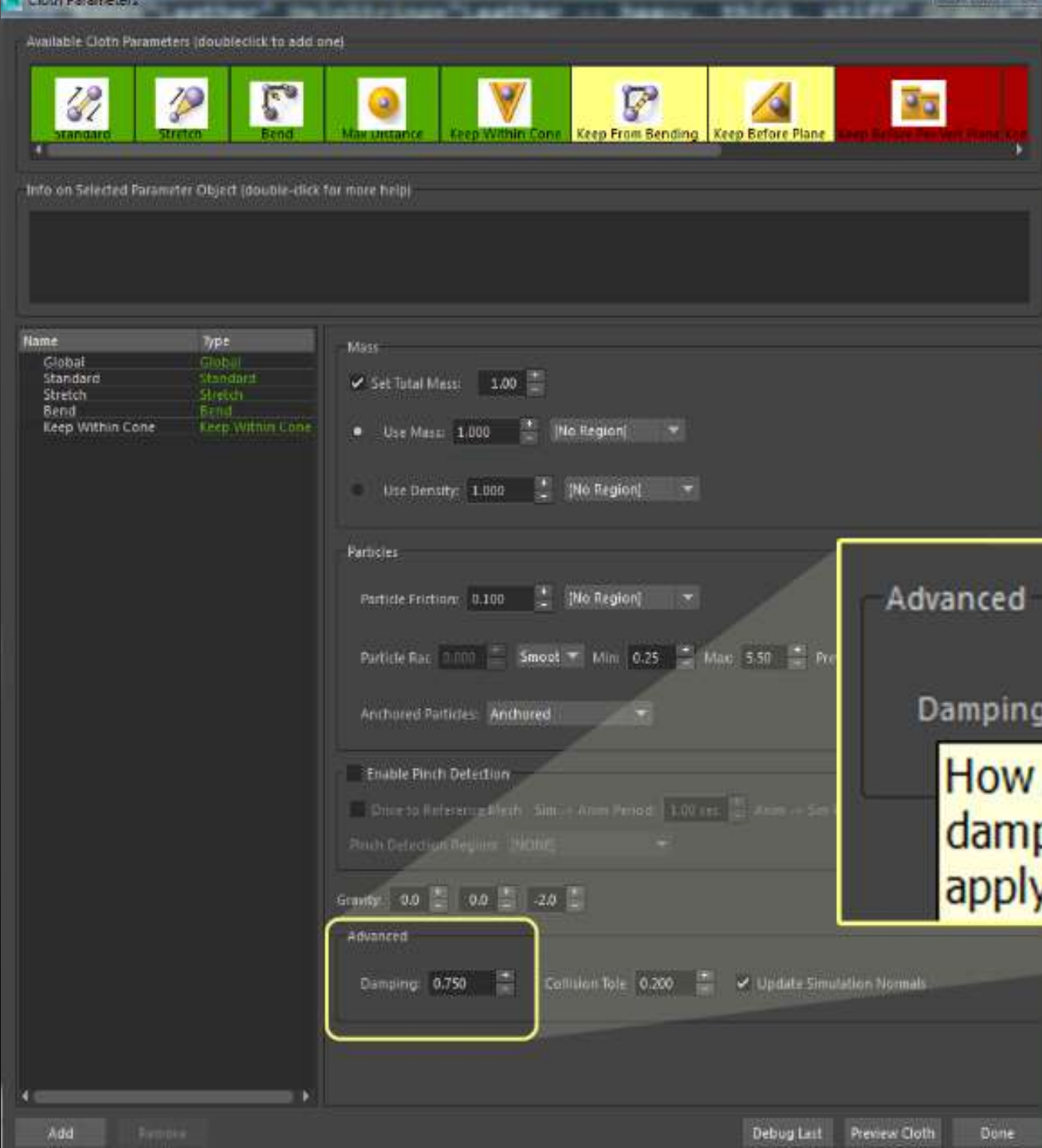


# Internal Workings

```
<Fabric Name="Leather" HelpString="Leather -- heavy, thick, stiff" Order="2">
  <GlobalParameter Name="Global" Type="Global" Gravity="0 0 -3">
    <Value Name="Particle Friction" Value="0.33">
    </Value>
    <Value Name="Damping" Value="0.95">
    </Value>
  </GlobalParameter>
  <Parameter Name="Standard" Type="Standard">
    <Value Name="Stiffness" Value="1.0">
    </Value>
  </Parameter>
  <Parameter Name="Stretch" Type="Stretch">
    <Value Name="Rigid Factor" Value="1.0">
    </Value>
    <Value Name="Stretch Stiffness" Value="1.0">
    </Value>
  </Parameter>
```



# The artist still has full control



## Advanced

Damping: 0.750

How much particle  
damping do we  
apply?



Region Wizard		
Skinned	Selection	DONE! (19 verts)
Anchored	Selection	DONE! (7 verts)
Simulated	AutoWeight	DONE! (36 verts)
Top_Half	Selection	Not Started
Bottom_Edge	Selection	DONE! (7 verts)
Bottom_Corners	Selection	DONE! (2 verts)
Checkerboard	AutoWeight	DONE! (27 verts)
MiddleAndBottom	AutoWeight	DONE! (14 verts)

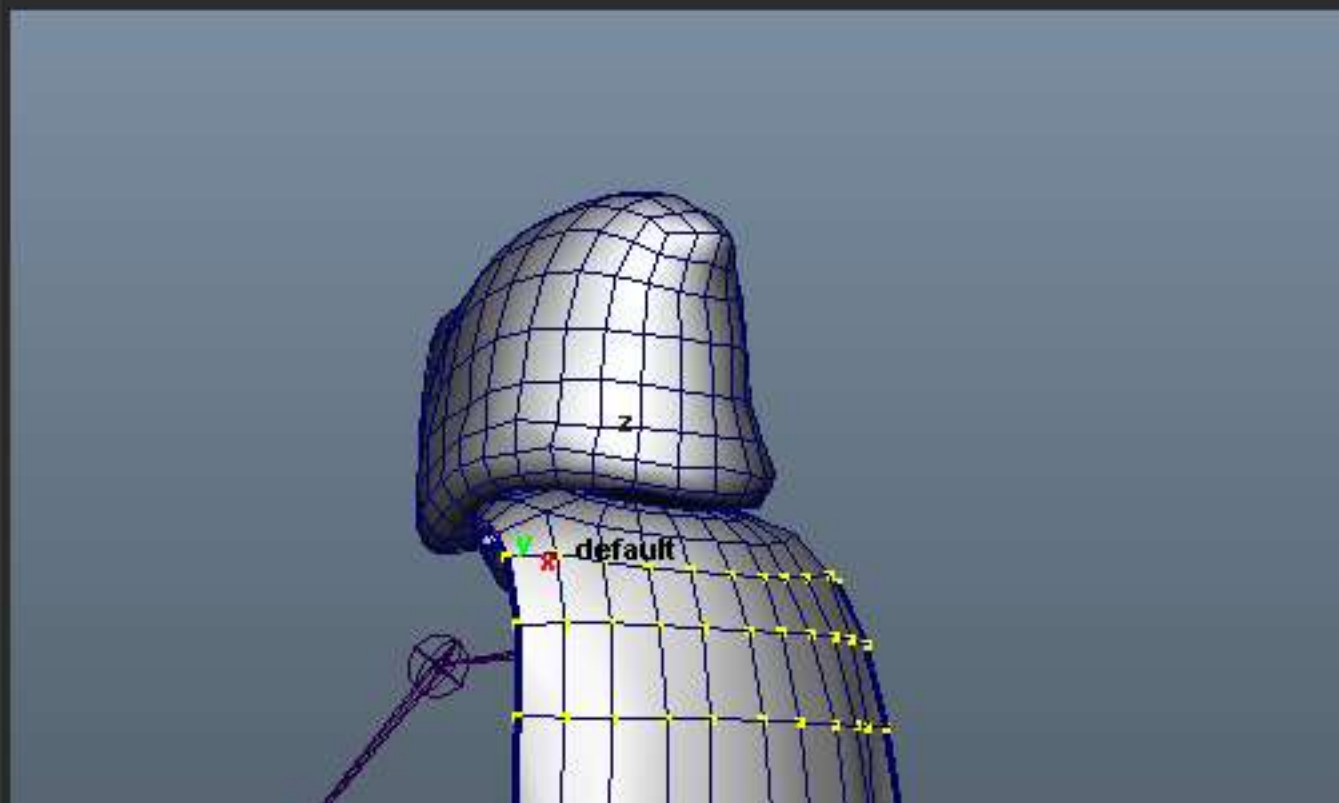
Top\_Half

Selection

Not Started

#### Info About Current Region

These are the points of the cape that collide with the **top half** of the player. This is what the *upper arms* and *back* collide against.



```
Region Name="Skinned" HelpString="[b]Skinned[/b] points are where the cape attaches to the character"
</Region>
Region Name="Anchored" HelpString="[b]Anchored[/b] points are the [i]last span[/i] of the skinned region"
</Region>
Region Name="Simulated" HelpString="[b]Simulated[/b] points: these get moved by the cloth simulation"
```

```
<Region Name="Top_Half" HelpString="These are the points of the cape that collide with the
[b]top half[/b] of the player. This is what the [i]upper arms[/i] and [i]back[/i] collide against."
HelpImage="CapeLong-TopHalf.png" VertexSelectionOnly="True">
</Region>
```

```
Region Name="Bottom_Half" HelpString="These are the points on the cape at the [i]bottom half[/i] of the player"
</Region>
```

```
<Collider Name="Collidable_b_spine_3" HelpString="Spine 3 collider"
CollisionRegion="Top_Half">
</Collider>
```

```
<Collider Name="Collidable_b_l_upperarm" HelpString="Left UpperArm collider"
CollisionRegion="Top_Half">
</Collider>
```

```
<Collider Name="Collidable_b_r_upperarm" HelpString="Right UpperArm collider"
CollisionRegion="Top_Half">
</Collider>
```

© Bungie

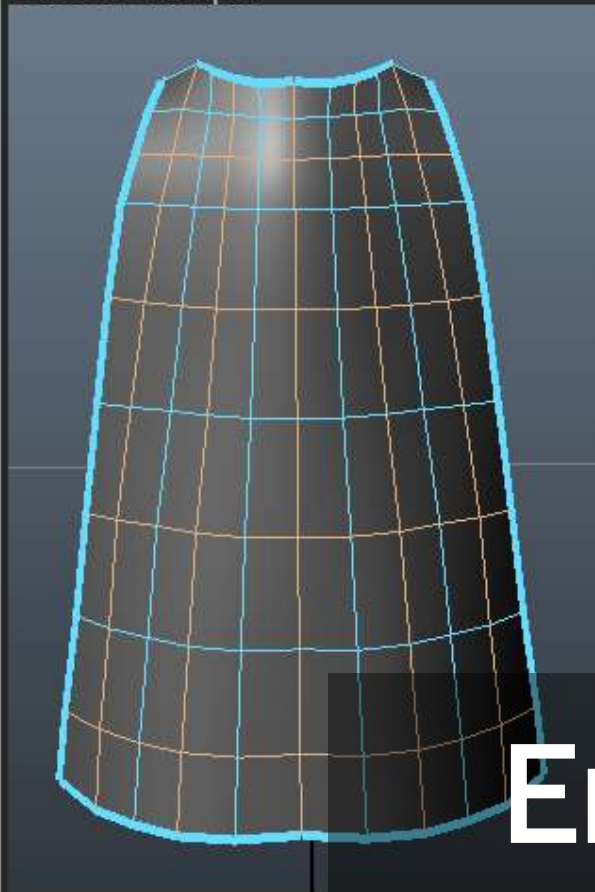
```
<Collider Name="Collidable_b_l_calf" HelpString="Left Calf collider" CollisionRegion="Bottom_Half">
</Collider>
```

The engine will switch to simulate the low-res mesh when the character is far away, or if there are lots of cloth garments close to the camera.

### This is what you do:

- Select spans that should be deleted in the low-res mesh.
- Start by selecting **every other span**.
- Watch the **Current LOD Verts** number to the right.
- Repeat selecting spans until you have the right number of verts for the LOD mesh.

Here's an example:



We'll automatically build an LOD mesh from this selection later.

- Don't actually delete these spans! We'll do that later (on a copy of the mesh).
- Selecting spans in the skinned section of the cloth is okay, but *doesn't count* for LOD.

40

LOD Vert Goal:

40

Over/Under by:

0

Sel Skinned Verts:

21

# Embedded Documentation

Tool communicates with the  
artist throughout setup

# Embedded Documentation

- User feels confident with decisions
- No worries about forgetting steps
- Mistakes are harder to make and less frequent
- Eliminates confusion

Conclusion: Cloth Tool



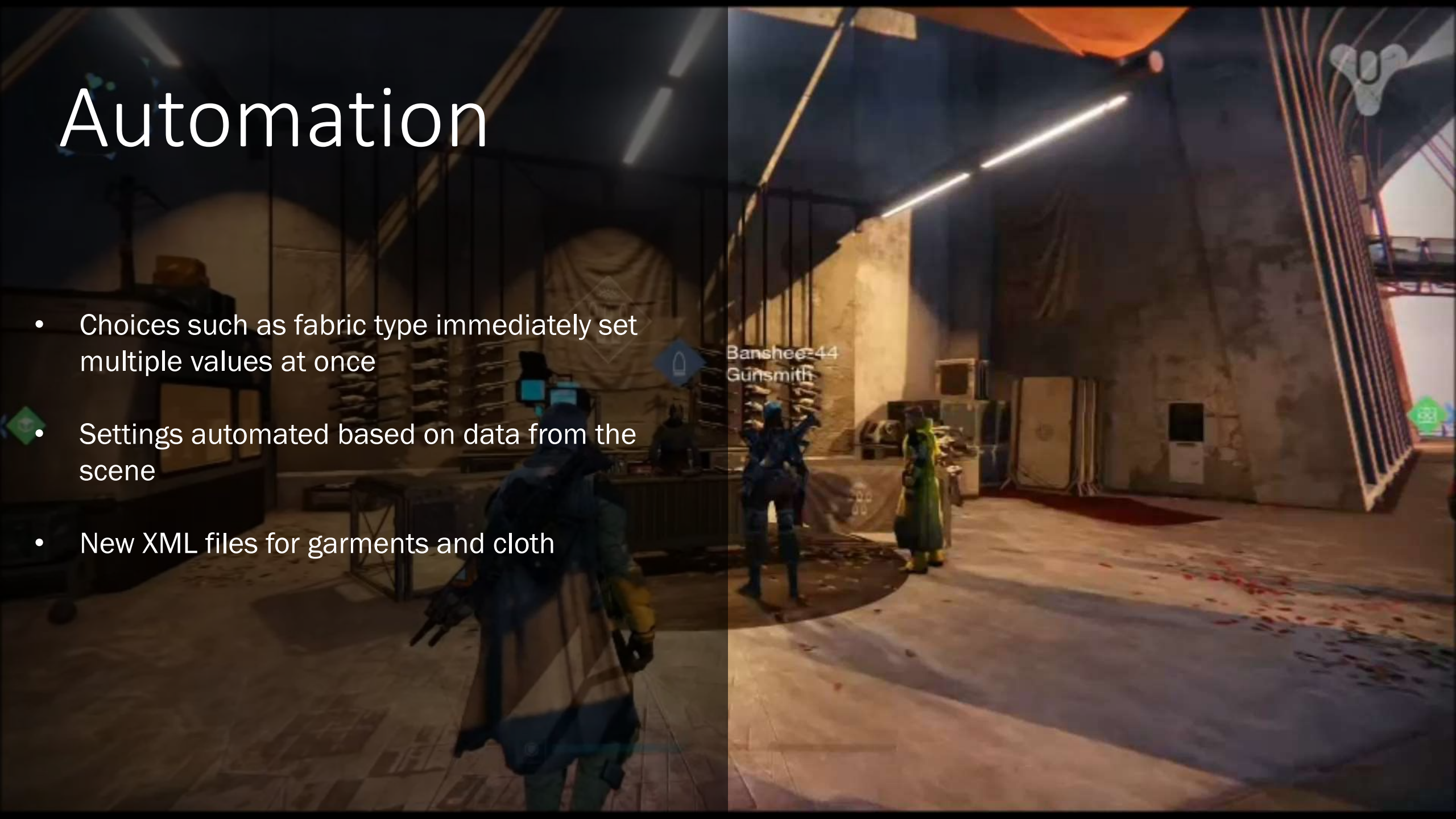
# Iteration

- Setup is quick
- Setup issues are easy to find
- Clear workflow makes artists able to fix simulation bugs early on
- Simulation parameters are easy to change



# Automation

- Choices such as fabric type immediately set multiple values at once
- ◆ Settings automated based on data from the scene
- New XML files for garments and cloth





# Future Proof

- Pipeline can easily scale to 400+ garments
- New garments and fabrics are easy to add by a technical artist
- Supports Havok specific components, but fundamentals could still work for all simulation tools





# Flexibility

- Artist retains full control
- Advanced options are slightly hidden, less clear than other tool features
- New garments require technical art support

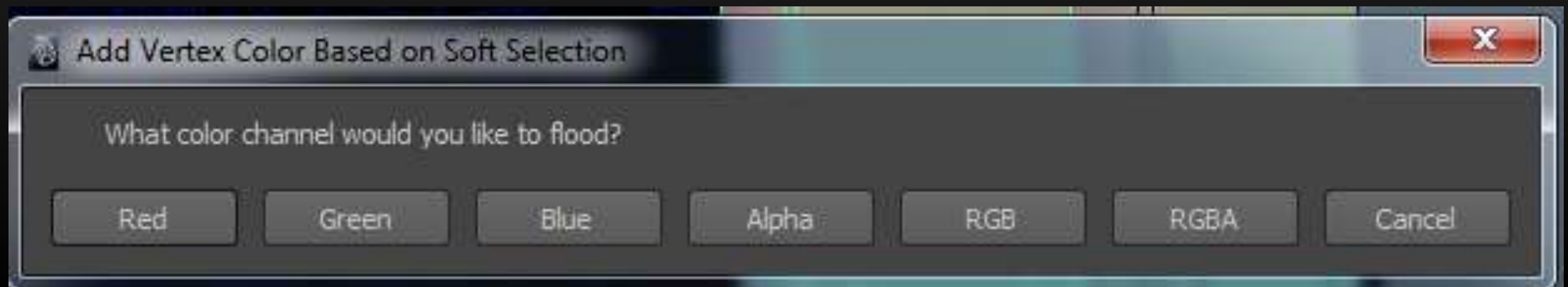
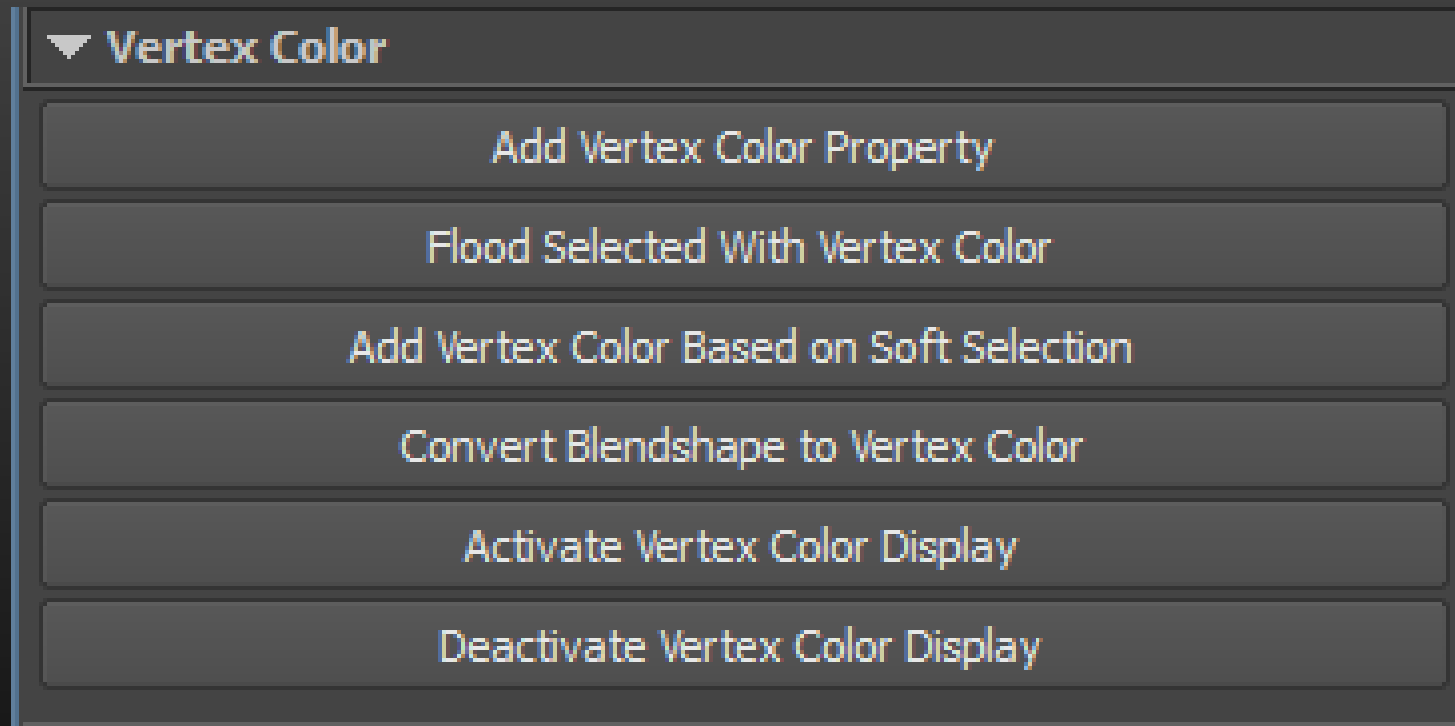


# Overall...

- Very successful at meeting design pillars
- Builds a positive user experience
- Takes a complicated workflow (cloth simulation) and breaks it down into easy to understand steps
- Embedded documentation
- Technical artist can add new features without editing code

Build from existing workflows

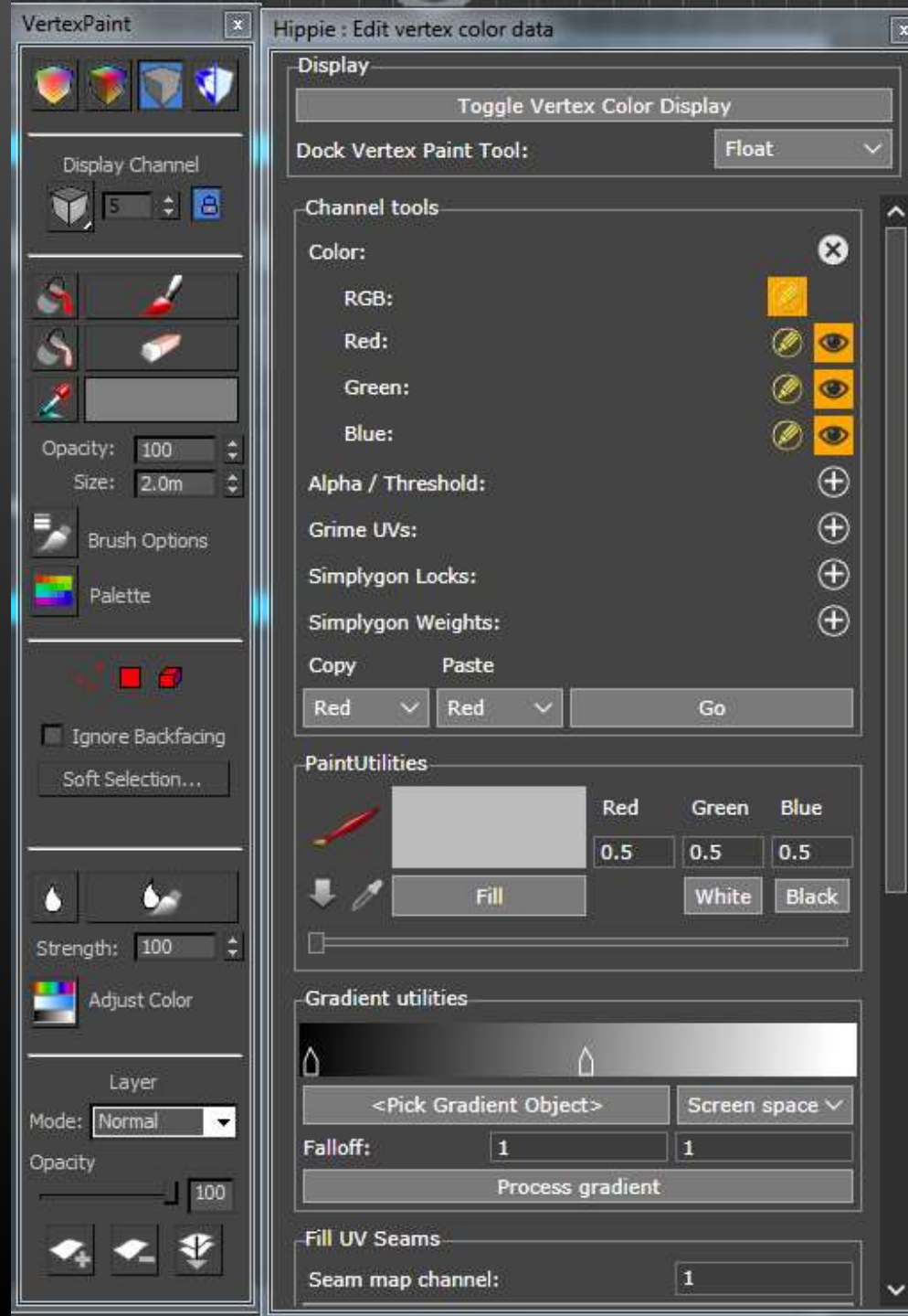
# Vertex Color



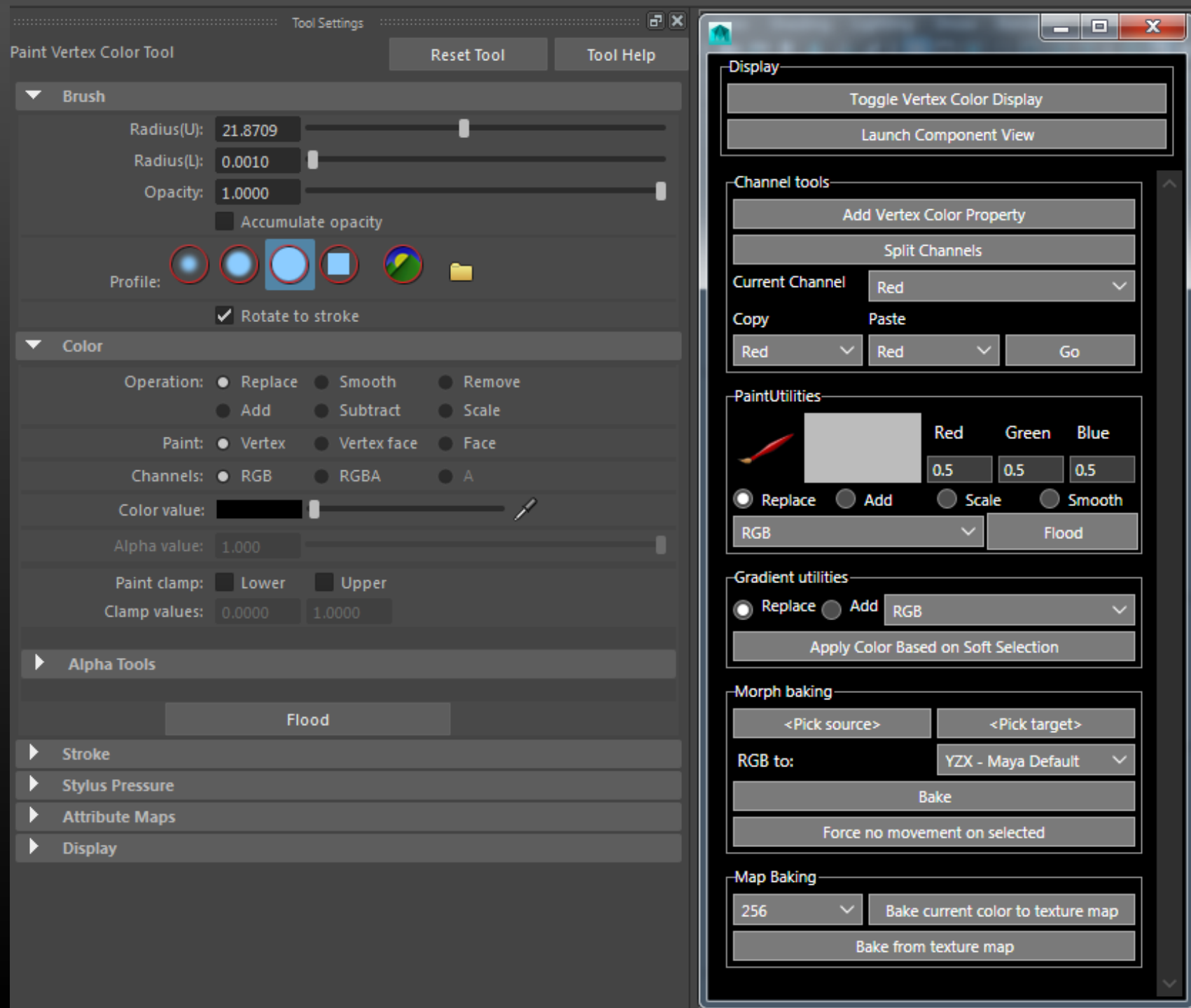
# Problems

- Not artist friendly
- Fully numerical, no visual color representation
- Minimal control and flexibility
- Existing application tools were ignored
- Inconsistent workflows between applications

# Vertex Color Tool - 3D Studio Max



# Vertex Color Tool - Maya





Platform Agnostic Code

UI

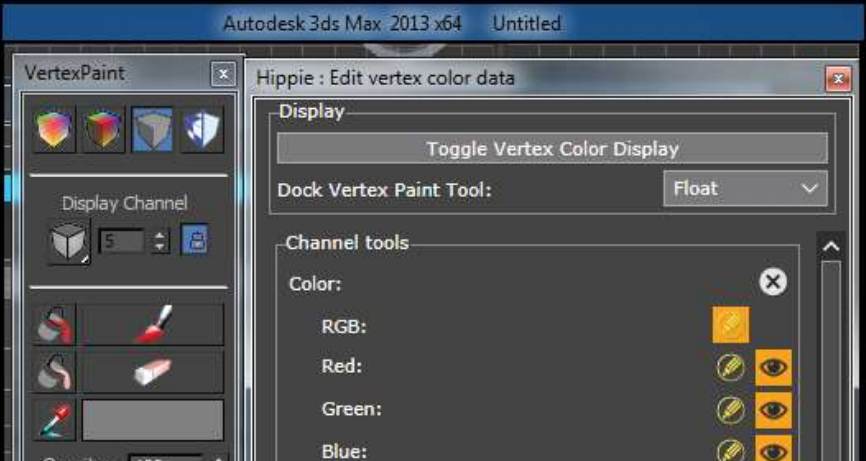
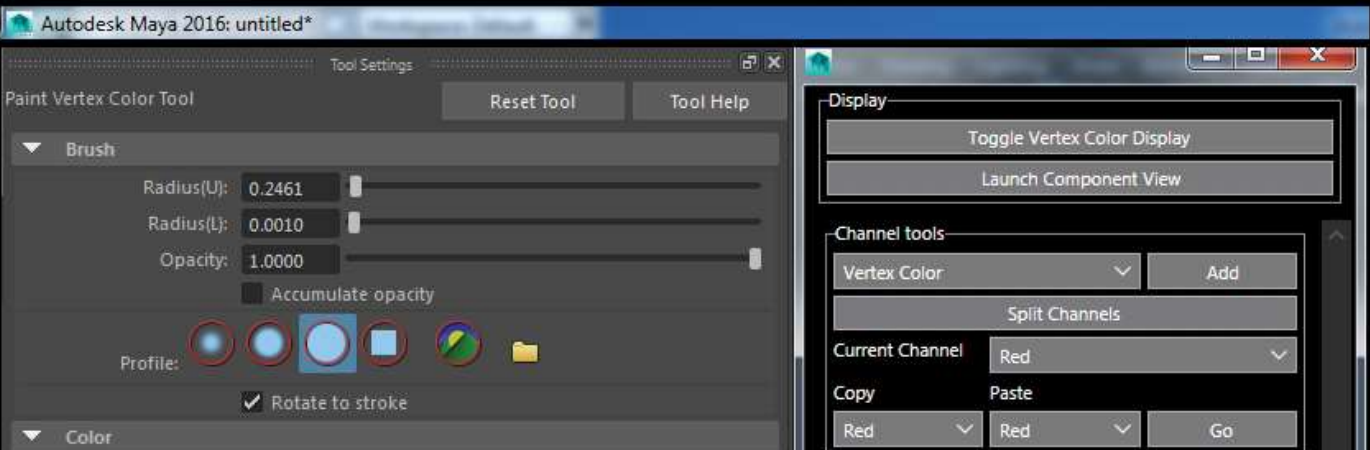


Application Specific Code



Maya

3D Studio Max





# Sharing Tools Across Applications

- Workflow familiarity
- Easy transition between applications
- Less tool support required
- Still able to customize based on application

# Metadata

Data that serves to provide context or additional information about  
other data

# Metadata in Tools

- Save information about the content being worked on
  - General info about the asset
  - Progress on the asset
  - Number of iterations
  - Who has worked on the asset
  - Tool revisions
  - Scene hierarchy
  - History

# Why is this useful?

- Even if functionality exists for a task, rewriting that functionality as a proprietary tool for your specific pipeline is beneficial due to metadata
- Metadata can help developers quickly obtain relevant information about the asset being worked on
- Allow quick queries and sorting of game assets
- Increased automation possibilities
- Allow for batching of changes or fixes for content
- Make bug fixing easier

# Example

- Content management
  - Tools for opening an assets in Maya
    - Connect to source control
    - Talk to other tools
    - Set default settings based on the mesh type - environment, character, vehicle, etc.
    - Know current development progress and track scheduling of the asset – base mesh, production mesh, fixing a bug, etc.
  - Tools for exporting assets to Game
    - Connect to source control
    - Check for issues with setup
    - Give budget estimates
    - Organize file structure

# How?

- External databases
- Hidden UI elements
- Properties on the file
- Network nodes in Maya
- On the content itself

# Storing information in unexpected places

- UV channels can store float2 values for each vertex
- Vertex color channels can store float3 values for each vertex
- 3 mono maps can be stored in a single RGB map
- curve data can be saved on generic attributes
- custom tool settings can be saved as attributes on empty scene nodes in Maya

# Some specific examples

- Storing material blending amounts in a UV channel
- Storing health multipliers in vertex color
- Storing vertex offsets in vertex color
- Storing the current opened tabs of a tool as an attribute on an asset in Maya
- Tracking how many times a specific mesh is placed in an engine for analytics