

HALO

CINEMATIC ANATOMY

A
Storytellers
Handbook

Our Halo Stories

Diversity

We cast and include under-represented characters with stories and perspectives that help to bridge the gap between what is known and expected. We make space for voices not often heard. We create characters that expose the joy, revelation, and idiosyncrasies of being a human. We create characters that expand our universe and shine a light in dark spaces.

Camaraderie

We believe in espousing interconnected worlds of collaboration. Our stories are a journey of discovery. Our characters become better together than alone. Our stories expose the humanity and soul within. Our stories are filled with pioneers who chose, or were chosen, to live the path less taken.

Spectacle

Our storytelling embraces the world beyond the frame. Our stories exist amongst an epic backdrop of conflict. We utilize scale, rising action, ratcheting conflict, and palpable tension to fill our stories with a fixating syncopation. Like any art, Halo stories need to undulate and allow for a sense of stillness and dynamism to the unfolding moment or crisis.

Adventure

Some of the best moments in Halo stories are when the audience and characters in the story are simultaneously in the process of discovery. When adventure is unfolding a clear path is waiting to be explored.

A fundamental core to our franchise is a feeling of exploration, hope, and wonder. Our stories represent a world in flux, teeming with life, and rich with possibility.

Community

Our goal is to create anticipatory moments laden with speculation and intrigue. We encourage and embrace the audience in the storytelling.

We leave room for the audience to insert themselves and create their own theories. We want our new and returning fans to feel like they are a part of a universe that is worthy of their devotion and time.

Meaning

Halo is an IP filled with questions, mystery, and stories yet to be told. Our characters are filled with considerations that share a sense of reciprocity with the audience. We speak in terms that are universal. We wrestle with concepts that are fundamental. Our characters have an emotional core the speaks and reflects our character's worlds, their hopes, their dreams, and their struggles.

Our Halo Stories



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Document Goals

CLARIFICATION

The general purpose of this document is to gather information and methodologies 343 Industries utilizes to author cinematics. This an experienced guide versus a decree. There's a sliding scale of difficulty based on the ambition and familiarity with our tool-set. Through this partnership we will discover aspects of our pipeline that

can scale and be refined. The goal is to find and cultivate a partnership of mutual trust and creative liberty. This document focuses on in-engine cinematics created via the Slipspace [Halo] engine. However, the ambition is that this partnership will span storytelling in various shapes and sizes.

01 Processes

Along with methodology and mentality, the Halo narrative team wanted to create a document that conveys a high-level view of the pipeline and processes that go into making an in-engine cinematic.

05 Terminology

There is a lot of terminology that exists inside of 343. The glossary aims to create clarity should any uncommon terms arise.

02 Team Sizing + Roles

The team size needed from each discipline to create Halo Infinite's campaign along with the roles employed in each team. This number varies on scope of project and team proficiencies.

06 Tutorialization

In the future, appended to the end of this document will be some tutorialization content. A lot more content is available via our internal sharepoint called Confluence.

03 Discipline Goals

Each discipline's three main goals they aim to achieve during the process of cinematic creation.

04 Example Timelines

General information on how long a cinematic scene takes from start to finish. Along with example milestones for cinematic work.

Overall Goal

Predictability

We want to create healthy processes that are highly predictable to support our fan's expectations and game's internal goals.

The next page outlines ways that the cinematic process can scale based upon time, the needs and strengths of the team, and estimated needs of the production for a given product.

Right Sizing

CINEMATIC SCALE

Onward

The next page

This is a primer for a larger conversation with the greater goal of taking on more of the production process as the partner team becomes comfortable with our tech base.

Scaling Cinematics

There are different ways to scale the onboarding process of the partner team. Below are some examples with the overall goal of, one day, having the partnership be a one-stop solution from pre-vis to completion.

These are purely examples and are up for exploration based upon the needs of the team

and project. Certain aspects of the project will always be handled by 343 and those are the constants stated below.

Think of this as a starting point for a longer conversation around team and cinematic ambitions as we begin this process.



343 Team Constants

These are the accountabilities of the Halo team. Especially in the early stages of a partnership.

343

1. Script Writing
2. Audio Mixing + Music
3. Character Rigged and Shaded
4. Level and Branch Setup
5. Engineering Support
6. Build Support
7. Discipline Tools Lighting/FX/Animation/Geo/Rigging Support
8. Creative Feedback
9. SKU Performance Profiling (PIX)

Partner Team Variables

These are the accountabilities of the Halo team. Especially in the early stages of a partnership.

Partner Team

1. Cinematic Direction
2. Mocap Shoot + Solving
3. Animation [Character + Camera]
4. Lighting
5. FX
6. Geometry Creation
7. Character Creation
8. Object + Character Rigging
9. UI Creation/Implementation
10. Bug Fixing

EXAMPLES

SCENARIO

01

343 creates a working script. The partner team creates the pre-vis, cameras, animation, and temp audio to refine and communicate the story. The partner team schedules mocap, integrates the mocap, cleans the animation, authors FX and Lighting.

343

1. Writing
2. Environment
3. Characters

Partner Team

1. Cinematic Direction
2. Mocap
3. Previs/ Animation
4. Lighting
5. FX

343

1. Bug Fixing
2. Performance Profiling (PIX)
3. Audio

SCENARIO

02

343 creates a working script. Partner team creates the pre-visualization cameras, animation, and temp audio to refine and communicate the story. 343 shoots the mocap and delivers it to partner team. Partner team then assembles the cinematic and authors the lighting and FX.

343

1. Writing
2. Mocap
3. Environment
4. Characters

Partner Team

1. Cinematic Direction
2. Previs/ Animation
3. Lighting
4. FX

343

1. Bug Fixing
2. Performance Profiling (PIX)
3. Audio

SCENARIO

03

343 creates a working script with pre-vis and integration of the rough mocap. The partner team then can adjust the camera (if needed), clean and refine the mocap, then author FX and lighting for the scene.

343

1. Writing
1. Environment
1. Characters
2. Pre-vis
3. Mocap
4. Integration

Partner Team

1. Cinematic Direction
2. Animation Clean Up
3. Lighting
4. FX

343

1. Bug Fixing
2. Performance Profiling (PIX)
3. Audio



COMMON TERMS

A

Anaconda

- Codename for an Xbox Series X Dev Kit.

Area Triage (AT)

- Team session to prioritize bugs, review user stories/features/etc., and escalate to Central Triage

Azure Dev Ops (ADO)

- Our sprint platform and product backlog(s)

B

Bitmap

- Converted images files (TIFs) that are used by the game engine. All images must become bitmaps.

Build Verification Test (BVT)

- Tests used to inform the stability and integrity of the code.

Branch

- Branches are repositories of segregated code used for various project, stability, or engineering needs.

C

Cache

- Caching files means that they are being stored in local memory. There is a proxy version of the files on your computer but they need to be downloaded to your computer. Running Halo L launcher will cache only the files you need to see your scene in action.

Central Triage

- Roll-up of prioritized bugs found in Area Triage

Change List Verification (CLV)

- Tool used in Perfcore (SV4) to check that any dependencies of the work a client is about to submit are correct. This helps to prevent build breakages.

Composer

- Proprietary timeline tool for animation, FX, lighting, and audio. All cinematic work comes together in a composition.

Composition

- A Composition is a container for all the data needed to house a cinematic or linear gameplay moment.

Confluence

- Confluence is an employee generated share of information. Similar to a Wiki or Blog created by employees to teach or inform on processes within the game and studio.

Curve Editor

- The Curve Editor is a tool inside of Composer. This allows the animation of various keyframes used strictly for lighting, FX, scripting, and post-effects. Animation is done in Maya then exported into a Composition.

Cyprus Share

- Cyprus is the name for our internal share used by all members of 343. Access to Cyprus is limited a VPN with approved Microsoft

D

Dante

- Codename for an Xbox Series S and X Dev Kit.

Distribution Group (DG)

- This is a mailing list with a designated team name where all participants of a given experience can be contacted at once.

Drop Pod

- Quarterly mini-release or game update between major releases (focus on community, content, and hot-fixes).

Durango

- Codename for the Xbox One Dev Kit (2013).

GLOSSARY CONTINUES

Dynamic World State (DWS)

- The 343 Lighting tech stack has a system called "DWS," this means Dynamic World State. Think of this like an advanced graphics state that can be scripted. They can even combine. They also can blend on and over a set period of time defined by the artist. Before any lighting begins these states can be authored or reused between scenes.

E

Enlistment

- An Enlistment grants the user access to builds of the game, folders on the network, or various other assets stored in different locations.

Environment Content Team (ECT)

- The Environment Content Team creates environment art and props for the Narrative team. ECT also is the primary team that creates environment materials and scenery for any cinematic.

F

Faber

- Faber the proprietary game editor created by 343 Industries for Halo Infinite.

Flighting

- Flighting is a program that the Halo Community and 343 Employees can opt to engage in. Flighting delivers pre-release versions of code or content to receive feedback for 343 developers or User Research.

Forerunners

- The Forerunners are a selected group of highly engaged fans that help us test concepts and gameplay of pre-released materials.

Franchise Team

- Franchise team aides in the sorting, classification, naming and writing of various aspects of Halo Lore. They are the custodians of consistency and good practice based upon prior games, books, TV shows, and other various mediums.

G

Gameplay Team

- Formally called the 'Sandbox' team. The Gameplay Team is in charge of anything related to gameplay. This means anything that is occurring at runtime that the player can directly interact with. For example: vehicles, weapons, and equipment. Inside of that team are animators, modelers, and programmers.

Get Builds

- This is a tool in the SlipSpace (Halo) Engine that, once clicked, downloads the newest content and tools authored by 343.

Guardian

- A location where first person shooter information and user folders are stored. Projects are docked under the Guardian path.

H

Haptics

- Rumble or shake that can be authored for the Xbox controller.

Halo Insiders

- Halo Insiders are part of the 343 Community. They consist of thousands of participants who can receive builds of the game prior to release for testing and User Research needs.

Halo Launcher

- Halo Launcher is a tool inside of Trojan Man that will run a packaged copy of the game. This tool compiles all the edited files and code on your computer to spot-check your work before submitting into Perforce (SV4). Running Halo Launcher makes Faber run faster because it caches all the content needed to edit your level.

I

imGUI

- Pronounced, "I'm gooey," imGUI is an open source tool used by game developers to access parts of the game code from inside a working build of the game.

imGUI is a menu initiated by hitting "function+F9" on the keyboard. The user can then turn on testing, validation, and feedback variables to debug the game.

K

Kits

- Kits are used as containers for streaming in large sections of the game. Anything can be put inside of a kit and then streamed in and out depending on the needs of the developer and the frustum of the player.

L

Last Known Good (LKG)

- This term 'LKG' is sometimes used to tell content creators the Last Known Good version of the engine and content.

M

Modules

- Modules is a term that colloquially means running Halo Launcher. Often the team will ask, "Did you build modules?" This simply means, "Did you run Halo Launcher?" And if they are asking that question, they probably want to know, "Did you cache your files?" All of this can determine why or how you may be running slower or having issues.

Monthly Active Users (MAU)

- MAU is a performance indicator number based upon user engagement and acquisition.

N

Narrative Team

- The Narrative Team is charged with any and all new storytelling in the Halo Universe's FPS video games.

Narrative Sequences (NSEQ)

- Narrative Sequences are non-linear moments where the player has the agency to interact with the cut-scene or are more environmental in nature--where the storytelling surrounds or comes to the player.

O

Olympus

- Olympus is the code name for Release 1 of Halo Infinite. Inside of Olympus exist other code names for various projects that are soon to be announced. Commonly Olympus is in reference to both Release 1's Multiplayer and Campaign offering that debuted in December of 2021.

ONI

- ONI is the name of the I.T. team who will assist with any build, connection, or computer issues.

P

P0 - Priority Designation

- A bug designation that is either completely **blocking** individual contributors (IC's) from working or poses an immediate schedule-based risk to product and/or IC's workflow.

P1 - Priority Designation

- A bug designation that has been deemed release blocking or has **critical** impact to product quality and/or workflow.

P2 - Priority Designation

- A bug designation that has **significant** impact to product quality/or workflow.

P3 - Priority Designation

- A bug designation that has **moderate** impact to product quality/or workflow.

P4 - Priority Designation

- A bug designation that has **minor** impact and/or very low reproducibility rates.

P4Main

- P4Main is the main branch where all work is done. Work is later moved to other branches before shipping so that the code can stabilize before shipping to consumers.

Project Environment Setup Tool (PEST)

- PEST is the name of a tool that updates all internal and external software, including drivers, needed to run and access builds of the game. PEST is located within the Trojan Man executable.

PIX

- PIX is a performance tuning and debugging tool for Windows and Xbox game developers using DirectX 12. It provides three main modes of operation:

- GPU captures for debugging and analyzing the performance of DirectX3D 12 graphics rendering.
- System Monitor displays realtime counter data while a game is running.

Pocket Level

- Pocket Level is the internal name for our Front End UI. The Pocket Level is akin to a diorama that is thematically updated at various intervals of the year to reflect the seasonal theme of the Halo Infinite product.

R

Release Candidate (RC)

- RC is a build of the game deemed worthy of release and therefore undergoes rigorous testing to ensure any game breaking bugs are absent. Checks are also done to uphold Xbox and PC technical certification requirements (TCRs) set in place to prevent catastrophic failures in Xbox or PC hardware. There are usually more than one Release Candidate's.

S

SV4 (Perforce)

- SV4 is the repository we use to submit files to and from the larger branch database. Files are stored locally then submitted through SV4. Files can be shared without submitting by 'shelving the files' or select files can be updated by forcing the latest content to update. All submitted files are denoted by a changelist number.

Slipspace

- Slipspace is the name of the game engine at 343 Industries. Creation began after Halo 5 and is deeply based on the code of Halo Reach.

Shooter Team

- Denotes the team that is working on anything related to a first person shooter at 343 Industries.

T

Tags

- Any file the game engine can use.

Taggraph

- Taggraph is a name used to denote a bespoke node graph editor inside of Faber. Multiple systems use this node based architecture like enemy character animation system and lighting.

Tatanka

- Tatanka (Ta-Tawn-KA) is a codename for a multiplayer project deep in development at 343 Industries.

Trojan Manager (Trojan Man, TM)

- Trojan Man is a hub for all the different applications needed to run 343's internal software. Trojan Man requires that the user has the appropriate credentials and is on the Internet via a Virtual Private Network (VPN).

X

Xbox Developer Kit (XDK)

- The specialized XBOX used for getting builds and playtesting

Z

Zero Bug Bounce (ZBB)

- A build has hit zero bugs but we are finding and fixing new bugs as they come through.

Zero Bug Release (ZBR)

- The build has zero bugs and can move to the next phase in preparation for public release.



Process

Next Pages

Goals, team size, methodology and order of operations for the disciplines of animation, lighting, FX, and motion capture.

CURRENT METHODOLOGY

01

This section details the process to extract visual storytelling for cinematics. Under the banner of animation: cameras, layout, animation, blocking, and pre-visualization.

Animation

ANIMATION



WEL COME Overview

The following pages

- The next few pages break down the macro processes that go into making a cinematics from the standpoint of animation, FX, motion capture, and lighting.

ANIM Goals

CINEMATIC PRIORITIES

01

The Practical Spine

- If writing is the creative spine for everything then animation is the practical spine. The length, actions, and beats are explored through animation and act as a proving ground for any needed clarity in the writing.

From animation all other disciplines derive work. The script can help to inform the work needed, the animation dictates the placement, frequency and intensity of the supporting work.

02

Framing and Priority

- The goals in a Halo story are to entertain on the micro and macro level. We have shot a lot of one-shots takes and that means zero (minimal) safety net. The animator and director must understand at a fundamental level what is necessary and excess in any frame. Why hold. Why move. Why focus on any given subject.

As we move deeper into the future of Halo Infinite there is room to break this formula and add more cuts, if needed, but that main principal of knowing the story's goals and momentum is imperative.

03

Be Bold

- The camera framing and animation need to convey the story but they also need to present the world in interesting ways. The place to experiment is during the pre-visualization phase.

How can we make the world feel dynamic? How do we take in the fact that there is another fight just beyond this wall? What is pulling at characters internally and how do we expose that in the character's blocking? The animation and framing is the place to help add layers to the script that were otherwise subtle or simply not there.

ANIM

Team Size + Roles

CLARIFICATION

The following conveys the total number of people and roles for a given discipline. The number represented here was for Halo Infinite's initial campaign release, however, this would be practical for a 13 week season of content.

01

Director

Directs actors, dictates camera language based on the needs of the story, works collaboratively across disciplines to guide the overall cinematic experience from the game's story goals to the audience's perception of cinematic story.

01

Lead Animator

Manages the team, responsible for overall animation quality, can direct actors, creates previs along with Senior Animators. Works with production to align on scope and deadlines.

03

Senior Animators

Creates previs and can handle the keyframe animation and mocap integration of an entire scene.

04

Animators

Animate and integrate motion capture. Usually does not animate cameras as much as a Lead Animator or Senior Animator.

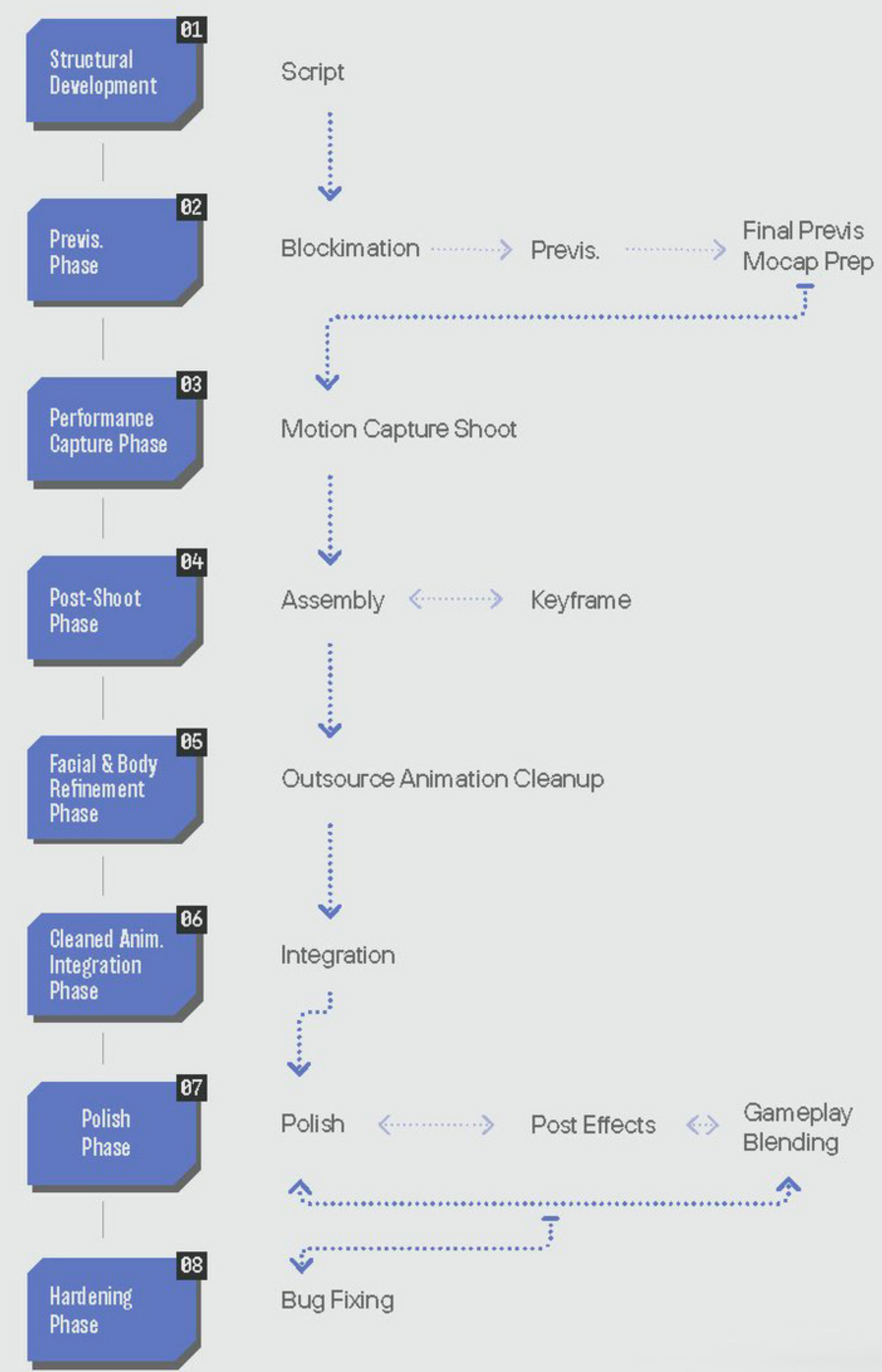
02

Technical Animators

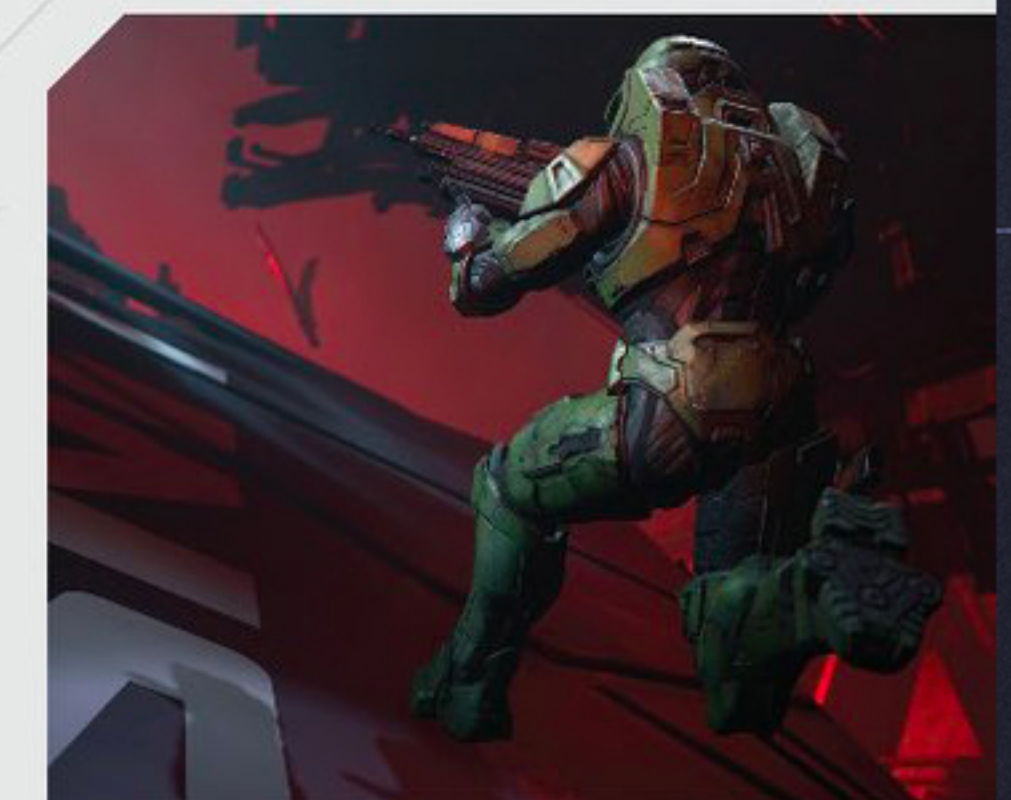
Rigging, asset wrangling, and R&D tools to assist the animators, production, and story.

11 *Total*

ANIMATION OVERVIEW



GOING FORWARD
The next page will break down these 8 phases of animation.



ANIMATION PROCESS

01 - PHASE ONE 1st Draft Script

Story is understood

- First draft of the script is written in its entirety. This is the main structure and contains the thematic change for the story.
- From the first script draft animation can begin very rudimentary changes that will help to inform future script iterations on timing, beats, blocking, and tightening the overall shape of the story.



02 - PHASE TWO Blockimation

Using geometric primitives, roughly block out the action, actors, and cameras. Include anything pertinent to convey the larger beats and general timing of the story.

Pre-visualization

Refine previs of body and camera for script iteration.

Final Previs + Mocap Prep

Finalize pre-visualization based on final draft of script

- Account for camera, actor blocking and timing, and any key elements that the actor needs to consider.

Mocap Shoot Request Tool

- Fill out information for the tool. Shoot date. Previous. Set geo. Character information. Plan.

Export camera to engine (if level exists)

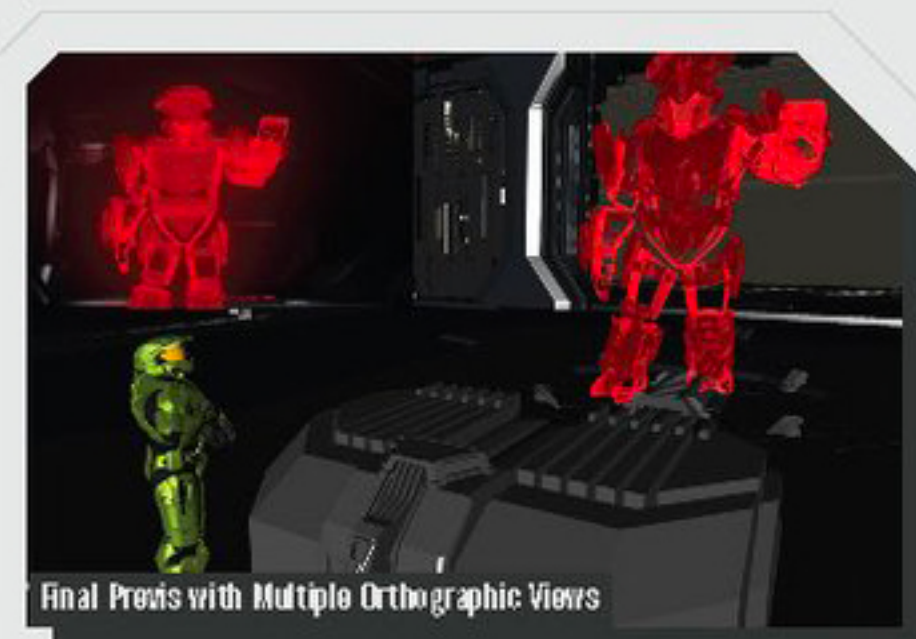
- Update previous camera animation and export body animation. Create and update composition.

PHASE 2 ITERATION

Actors cast. Any necessary training or considerations for the actor need to be known and scheduled.

SIMULTANEOUSLY

- Schedule actors.
- Schedule motion capture stages.
- Contracts and scheduling with outsource partners.



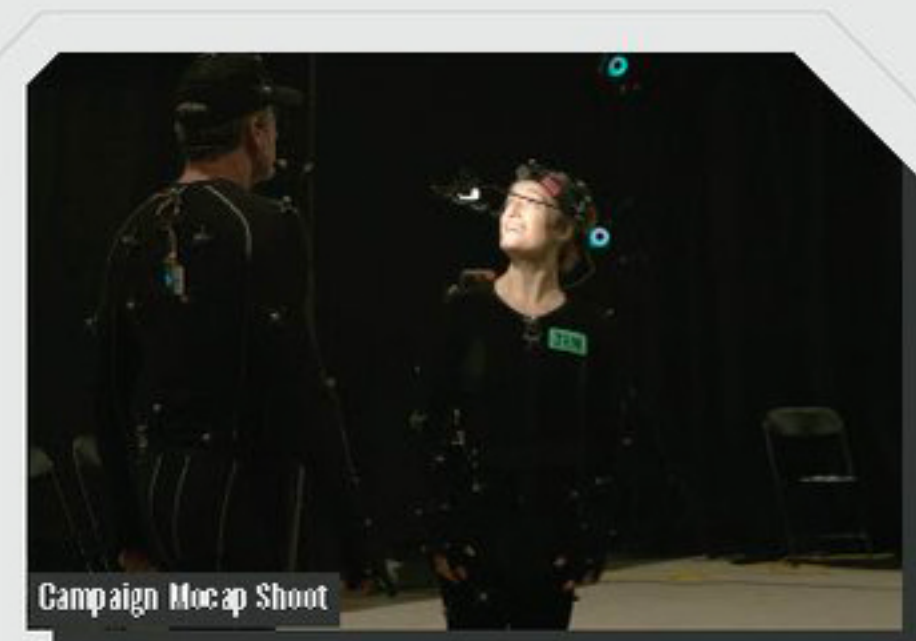
03 - PHASE THREE Motion Capture Shoot

Work with motion capture team to capture data

- Follow the created plan to capture performances.

Make selects

- Making selects day-of speeds up the turn around time for getting processed data back.



PHASE 3 ITERATION

Once Selects have been made, post-mocap shoot, the motion capture team can isolate and deliver the selects to the animation team.

04 - PHASE FOUR Assembly

Assemble processed motion capture into scene

- Use time editor to pull clips in, align them, and rebuild the scene over top the pre-vis. During this phase audio is available for timing.
- Where environment geo is available integrate that into the scene.
- Line up audio into scene with body data where appropriate.

Update cameras

- Update cameras to reflect intention with motion capture in place.

Note: Not Final Camera Movement

Export camera and body animation

- Update previous camera animation and export body animation. Create and update composition.

Keyframe

Keyframe non-mocap elements

- Keyframing of props, vehicles, and non-motion capture characters.

05 - PHASE FIVE Outsource Animation Cleanup

Prepare facial takes for outsource

- Mocap team takes facial selects and prepares them for partner.

Prepare body data for outsource

- Animation team bakes down animation and uploads Maya files and playblasts of scenes.

Prepare assets for outsource

- Character team preps props and characters for partner teams, uploads to partner.

PHASE 5 ITERATION

Once Phase Five has begun there is a lot of back and forth between fixing animation data for the outsource team and bringing in their finished data into Maya and the game engine.

06 - PHASE SIX Integration

Integrate cleaned up facial and animation data

- Use time editor to update animation with cleaned up data.

Update exports

- The next export pass now has cleaned up animation.



07 - PHASE SEVEN Polish

Polish based on renders

- Animation, in particular facial looks different as lighting begins to solidify. The stage is to address final animation polish for keyframe and motion captured elements.

07A - PHASE SEVEN A Post Effects

Settings for Camera Transitions

- For gameplay to narrative transitions, cameras need to be set in Faber, 343 Industries proprietary game editor, appropriately and tuned.
- Internally, this term is called 'Campunt' referring to matching the camera to the player. The player's camera is the center of the player's biped.

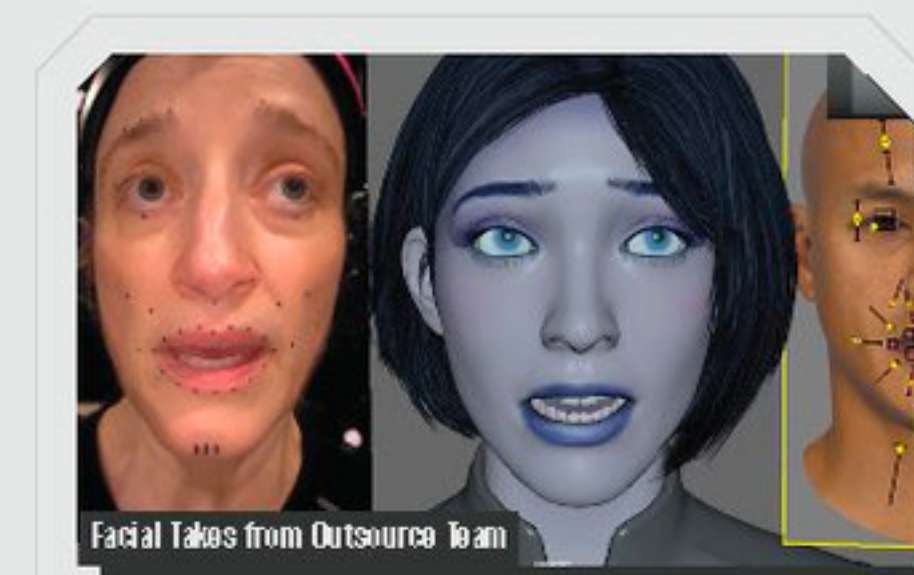
Camera Depth of Field

- For clarity, the camera is authored in Maya then is 'pushed' to Faber. Inside of Faber Depth of Field is adjusted using a bespoke tool called 'Composer'.

07B - PHASE SEVEN B Gameplay Blending

Animation variants created by BYOG

- BYOG stands for 'Bring Your Own Gun'. Different versions of the scenes are authored for each supported weapon class, e.g., rifle, pistol, heavy, etc.*
- These variants need to be setup in Faber, 343 Industries proprietary game editor.



08 - PHASE EIGHT Bugs

Fixing things that break

- Things will break as new assets and animation come online. The last phase before shipping is to fix any new bugs that occur.

*This is only considered for scenes that need to move directly from cinematic to gameplay.

CURRENT METHODOLOGY

02

Visual FX covers all the work that goes into grounding the scene. This includes things like rain, snow, muzzle flashes, small particulates, lens flares, UI, and screen shake.

Visual FX

VFX



Overview

The following pages

- The next few pages break down the macro processes that go into making a cinematic from the standpoint of Visual FX.

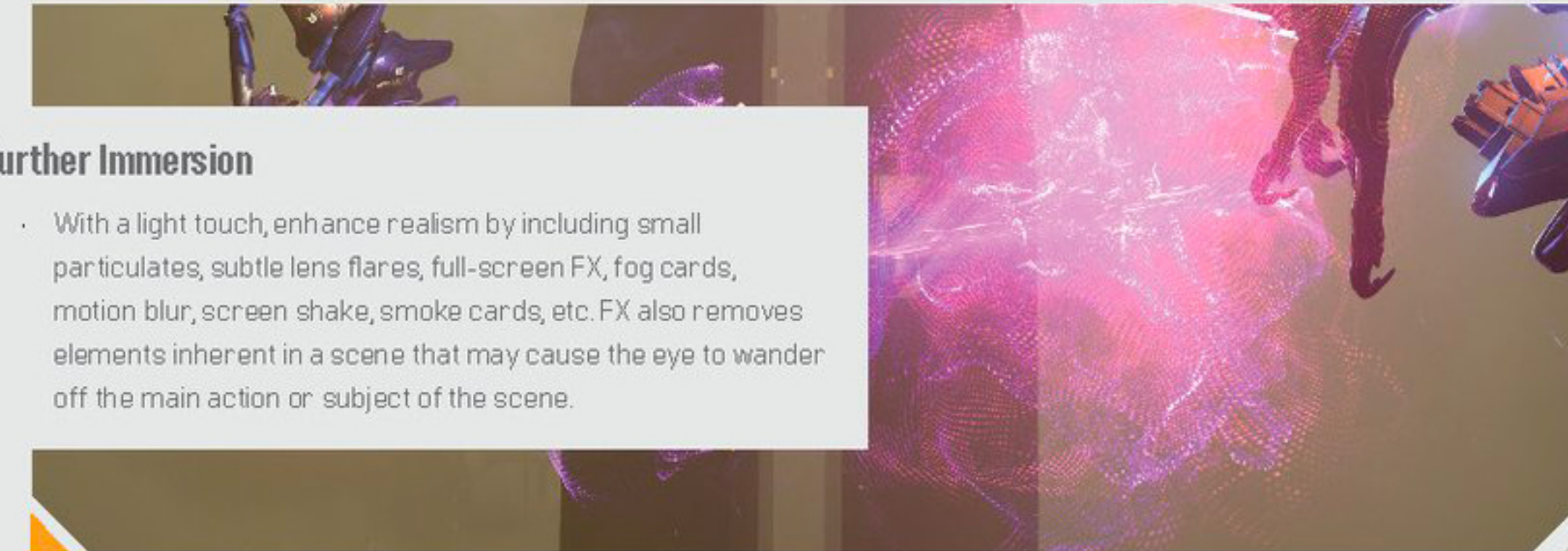
Goals

CINEMATIC PRIORITIES

01

Further Immersion

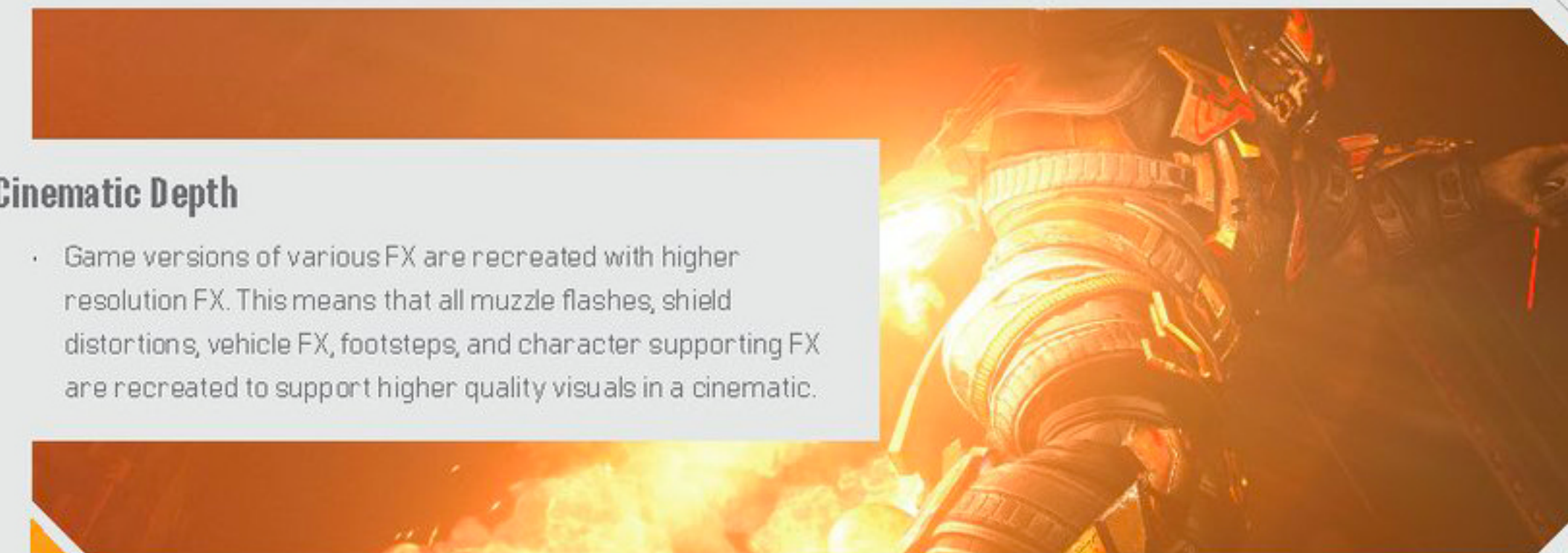
- With a light touch, enhance realism by including small particulates, subtle lens flares, full-screen FX, fog cards, motion blur, screen shake, smoke cards, etc. FX also removes elements inherent in a scene that may cause the eye to wander off the main action or subject of the scene.



02

Cinematic Depth

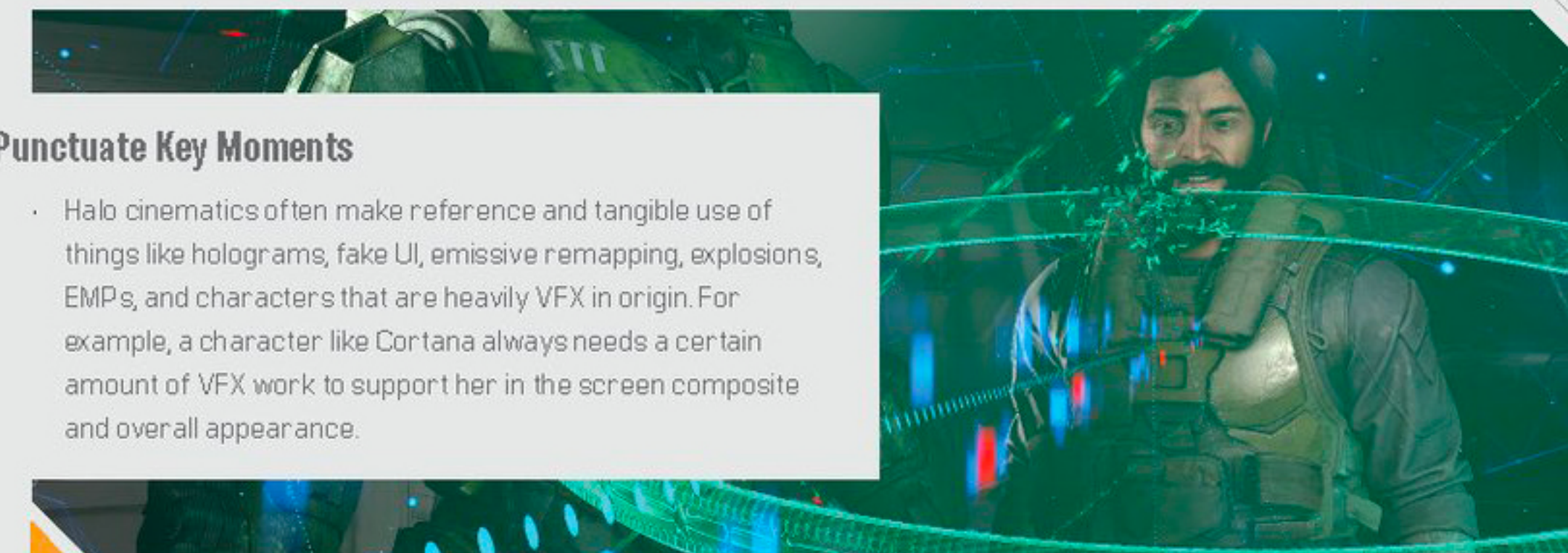
- Game versions of various FX are recreated with higher resolution FX. This means that all muzzle flashes, shield distortions, vehicle FX, footsteps, and character supporting FX are recreated to support higher quality visuals in a cinematic.



03

Punctuate Key Moments

- Halo cinematics often make reference and tangible use of things like holograms, fake UI, emissive remapping, explosions, EMPs, and characters that are heavily VFX in origin. For example, a character like Cortana always needs a certain amount of VFX work to support her in the screen composite and overall appearance.





Team Size + Roles

The following conveys the total number of people and roles currently working content for a given discipline.

01

FX Lead

The FX Lead is responsible for the quality of all cinematic FX artists. They work on scenes as well as do R&D for new FX authoring on marquee characters or moments. FX Leads are responsible for assigning work and reporting to production estimates and remaining time needed on any given shot.

04

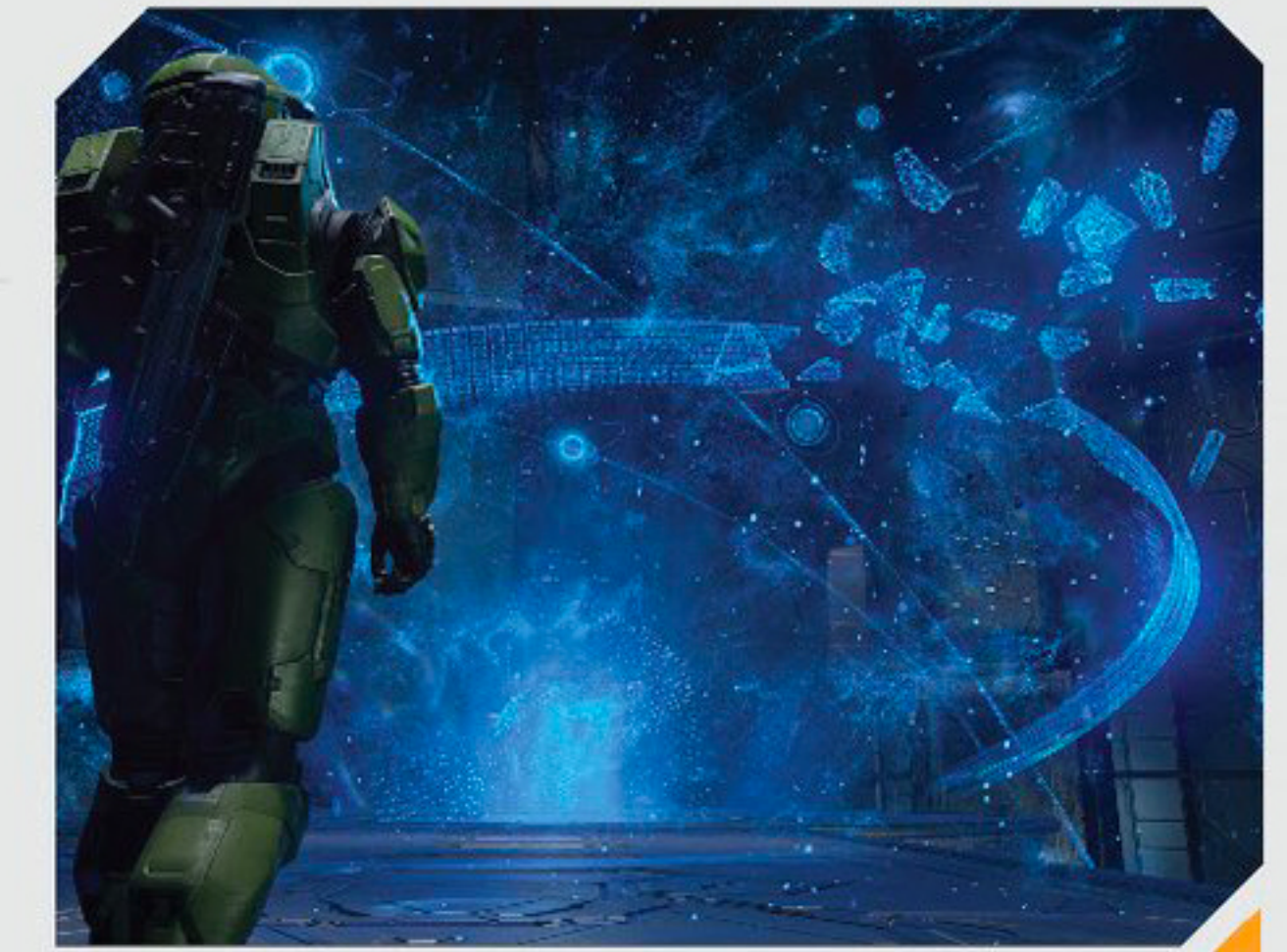
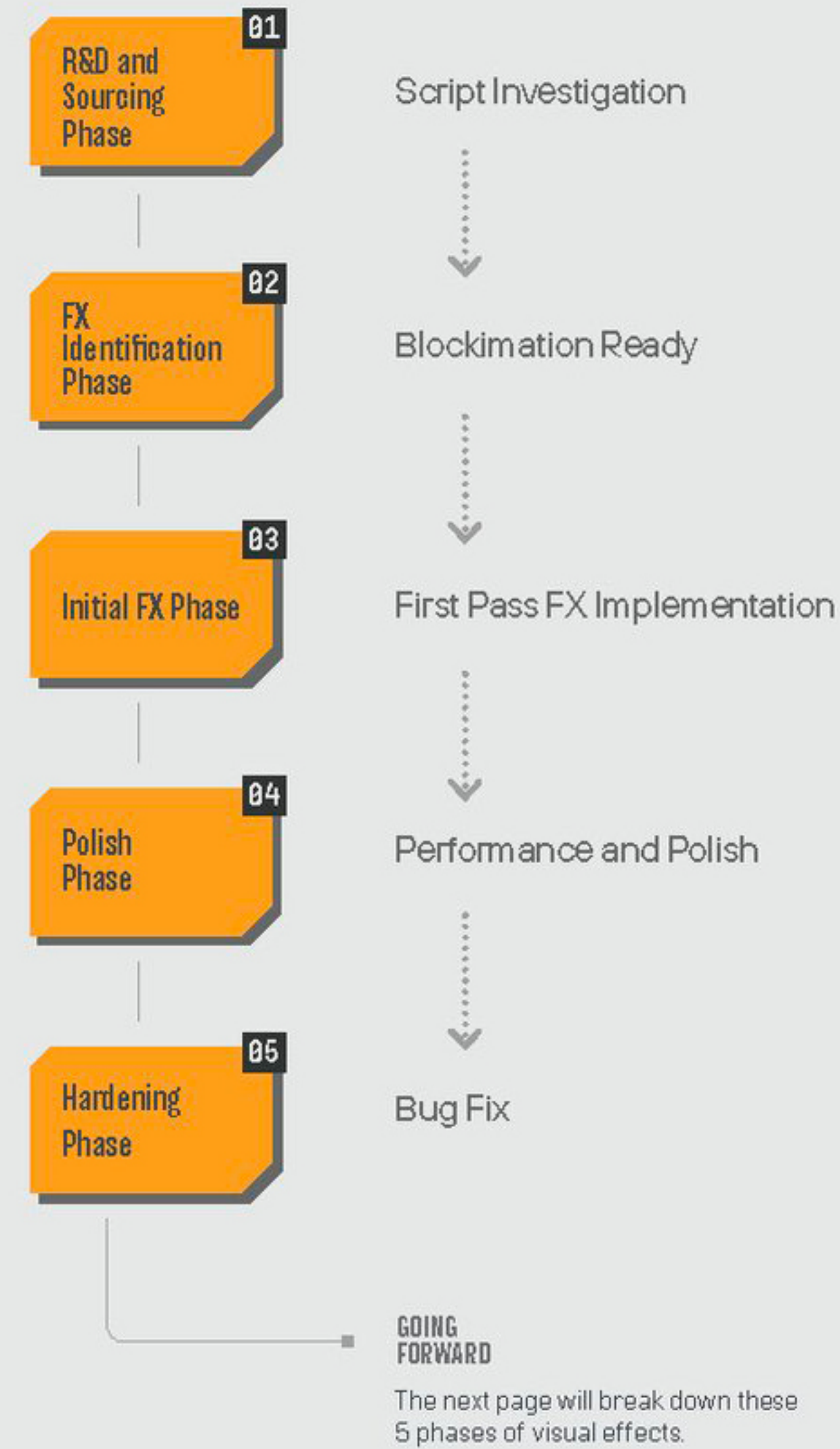
FX Artists

An FX artist is assigned a scene and is responsible for implementation, content, iteration, and performance passes.

05

Total

FX OVERVIEW



VISUAL FX PROCESS

01 PHASE ONE Script Investigation

Story is understood

- Identify potential problems
- Identify major elements that might not exist / require new tech / special attention from other teams, etc.
- Propose possible ideas or mitigations to achieve a similar result.

PHASE ONE Actions

If necessary, request concept art support.

02 PHASE TWO Blockimation Ready

Preparation and planning

- Walk through shots with Animators/Director or asking questions and identifying sequence goals/FX requests.
- Identify potential creative and/or technical problems.
- Identify elements that might require support from other teams.

PHASE ONE Actions

- Generate **list of all FX required for each scene****.
- Broadly categorize fx into groups.
- Create ADDs*** for each group and each sequence.
- Find reference for FX
- Begin prototyping any new FX

03 PHASE THREE Assembly Ready – First Pass FX

Dependencies to Begin

- Compositions in game, representative sets, correct level.
- Characters, cameras, props in game with reasonable timing and animation (we can do some work if not all puppets are present, see below).
- Ideally, blinks setup for each comp and unlimited playbacks.*

Dependencies to Complete

- First Pass Lighting – necessary to make sure FX are setup correctly (especially for unlit FX).
- Usually some back and forth between FX and lighting to support each other.
- All props/puppets represented with reasonable keyframe animation/mocap.
- Gameplay / Dynamic assets setup with any necessary before/after states.

PHASE THREE Actions

- First Pass FX - Implement FX based on ADDs from above.
- Leverage feedback from reviews (team and narrative) to drive FX quality and make sure goals of AD/CD/ND are being met
- Continually test in Halo Launcher**** on PC/Durango (highest and lowest spec).
- Record videos for Narrative and FX team reviews.
- Implement anything from supporting teams that is necessary (FUI screens, materials etc).
- Work with other teams (Environment/Lighting/Animation/Rigging) to make progress / divide labor as necessary.
- Close *1st* pass tasks and create Polish tasks. One task per shot.

Goals

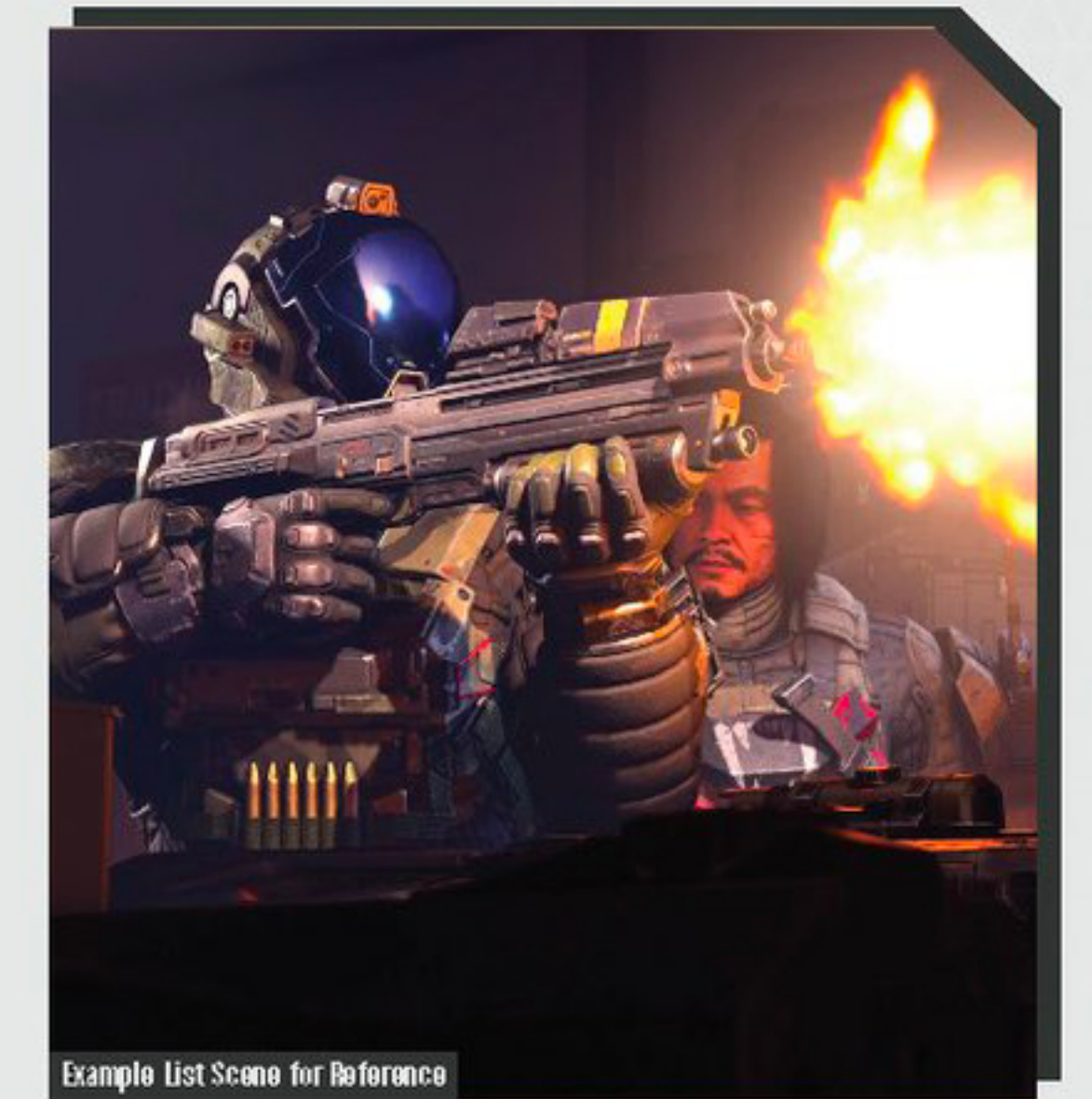
- At least "Alpha" quality FX for entire sequence.
- Unblock Audio to start.
- Not blocking Lighting in any way.

**EXAMPLE LIST BREAKDOWN

Example list of all FX required for a given scene.

X- 03 100 Firing Range

- Ambient FX
- Ecklund firing Assault Rifle
- Dinh playing with AI chip - does it need fx like Weapon/Cotana would have?
 - Golden Hour?
- Grenade Explosion 1- Foreshadow
 - Off to side of tunnel kind of hidden - debris/smoke
- Bullets coming in and hitting walls around door
- Grenade Explosion 2 - Main Close Up
 - Concrete breaking
- Pri. 1:** Paint destroyed so ONI signal is revealed
- Pri. 2:** Bubbling paint shown to reveal symbol
- Pri. 3:** State swap
 - Care about showing that door hastily covered over to hide symbol.



Example List Scene for Reference

04 PHASE FOUR Performance + Polish

Dependencies to Begin

- First Pass FX complete
- Animation/Camera timing locked and stable
- Lighting Solid – Ideally far along as we might be relying lighting to polish our FX/performance.

Dependencies to Complete

- First Pass Lighting – necessary to make sure FX are setup correctly (especially for unlit FX).
- Usually some back and forth between FX and lighting to support each other.
- All props/puppets represented with reasonable keyframe animation/mocap.
- Gameplay / Dynamic assets setup with any necessary before/after states.

Goals

- FX are shippable and in frame across platforms
- AD/CD/ND happy with shots

PHASE FOUR Actions

- Take FX quality from Alpha to Shippable/Polished,
- Continue iterating with narrative and FX teams to improve quality and meet vision of shot.
- Check performance across platforms, specifically Durango.
- Check multiple aspect ratios: 16:9, 21:9, 32:9

ASPECT RATIOS

Faber, 343's proprietary game editor supports the ability to check the camera's viewport at multiple different aspect ratios to support Ultra-Wide monitors.

05 PHASE FIVE Bug Fix

Support and correct errors as needed until release

- Most common bugs at this point are pops (FX popping on and off) and performance.

REFERENCE General FX Quality Chart



* Blinks are a term that we use to denote a command that can be initiated to skip immediately to the exact scene in-engine.

*** ADD stands for Azure Dev Ops. It's a task management tool much like Jira, where all tasks are kept and monitored at 343.

**** Halo Launcher is a tool that makes an instance of the game based upon all the edited files that are currently stored on your computer. This helps to see what exactly it will look like when it ships with all the game systems running.

CURRENT METHODOLOGY

03

Lighting covers all the work that goes into illuminating and color timing the scene. Cinematic lighting is highly character focused and has to take into account a very strict budget for best possible results.

Lighting

LIGHTING

Overview

The following pages

- The next few pages break down the macro processes that go into making a cinematic from the standpoint of lighting.

LIGHTING Goals

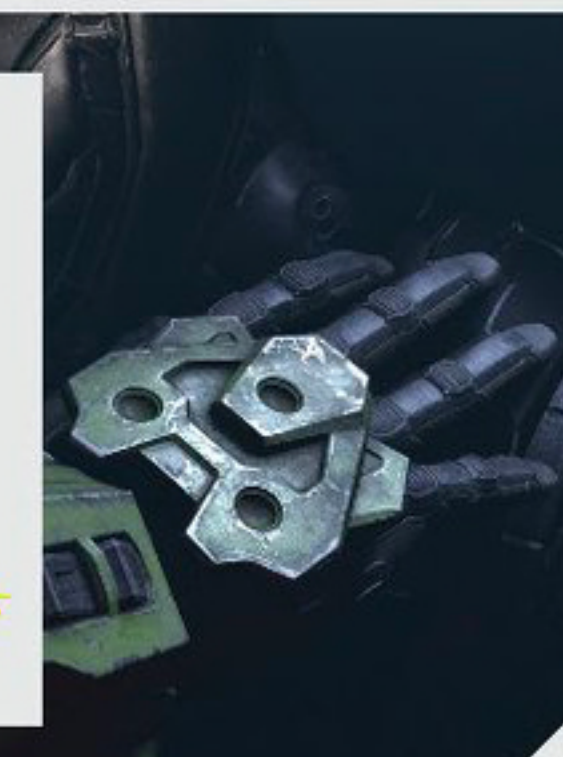
CINEMATIC PRIORITIES

01

Focus the Eye

- A lot of our scenes require the lights to dim in the room. Then play out as if a stage play with a few lights illuminating the subjects. Characters are always priority. Then environment and grounding the scene in a sense of cinematic realism.

The background need to dim to reduce any noise that draws the eye to areas of the screen that don't contain information to help propel the story forward. Most feedback largely resolves around asking, "Is the lighting helping to focus my eye on the characters in the scene?" If it's not then we need to revisit how we can make that statement true.

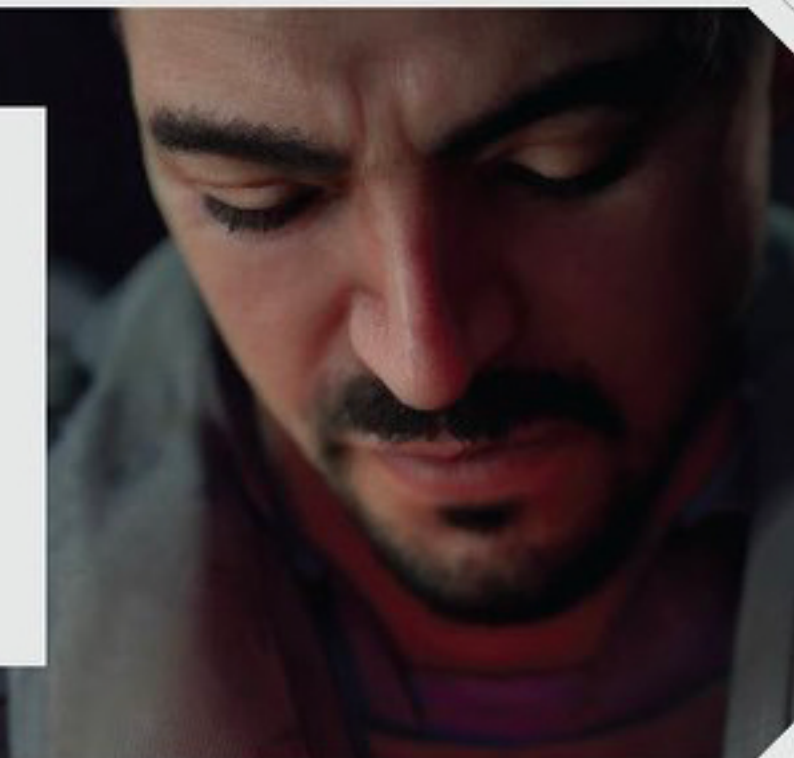


02

Set the Mood

- Lighting is largely one of the first elements that helps subconsciously cue the viewer how to feel. The lighting needs to convey the emotions of mystery, wonder, warmth, danger, disarray, etc.

Lighting, like depth of field and camera direction, draws the eye around the frame. Lighting can act as a natural vignette and then color correction is purely used as a modifier once the lighting is nearly complete in the scene.

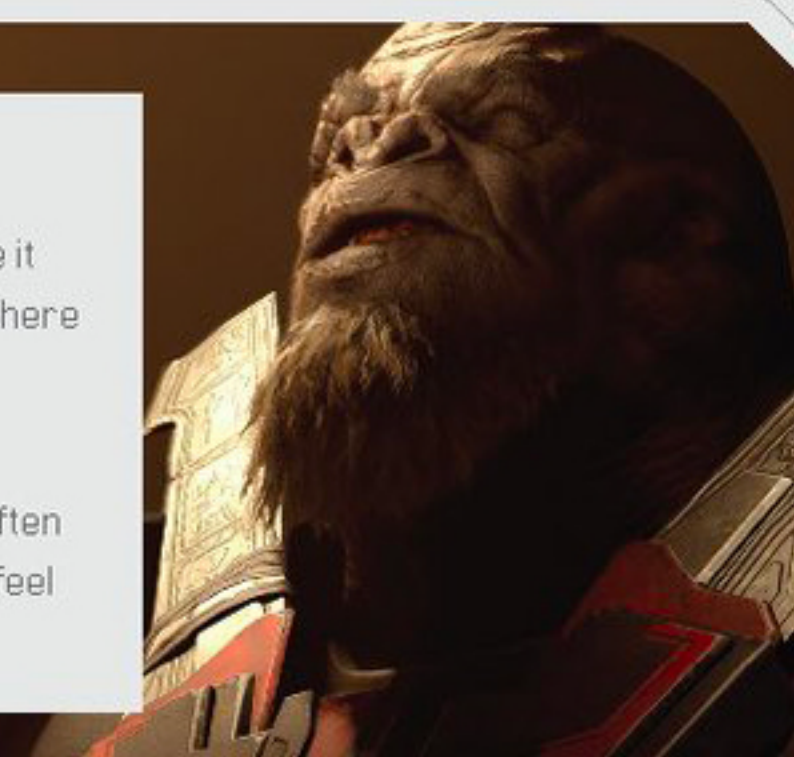


03

Support Disciplines + Guide Perception

- This goal is largely around supporting the practical elements in the scene, be it some mechanic, FX, or some path-finding element to help the player know where they need to go next.

Lighting largely plays a role in shifting the player's perception as to what's important and where they need to go next. The feeling of 'good graphics' is often a result of good lighting. When the lighting is off it can make an entire scene feel broken or uninspired.



LIGHT

Team Size + Roles

The following conveys the total number of people and roles currently working content for a given discipline.

01

Senior Lighter

Works closely with the director to understand the intent and feeling that should be present in any given moment. The Senior Lighter is responsible and accountable for the lighting quality of the scene. The Senior Lighter also works with their team to communicate production realities and deadlines.

06

Lighters

One lighter is assigned to a scene. Depending on the complexity or length of a scene there may be multiple lighters. They are accountable to work with other disciplines to ensure they support the needs of the storytelling, animation, and FX artists.

03

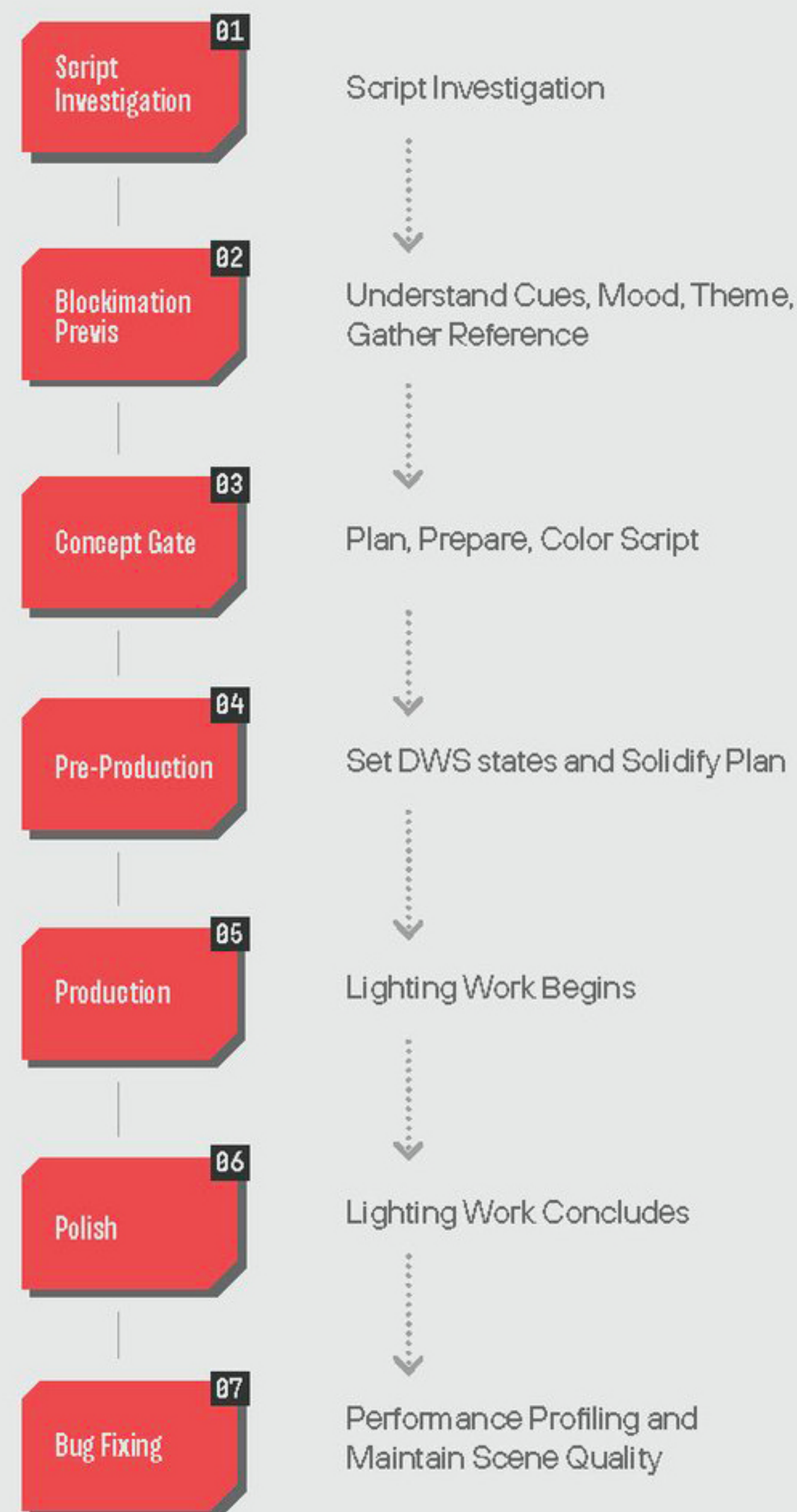
Technical Lighters

Technical Lighters fix global or local problems that can be scripted related when it comes to certain lights in a scene. They can also set up various things for the lighters to help them do their job with speed and efficiency.

09

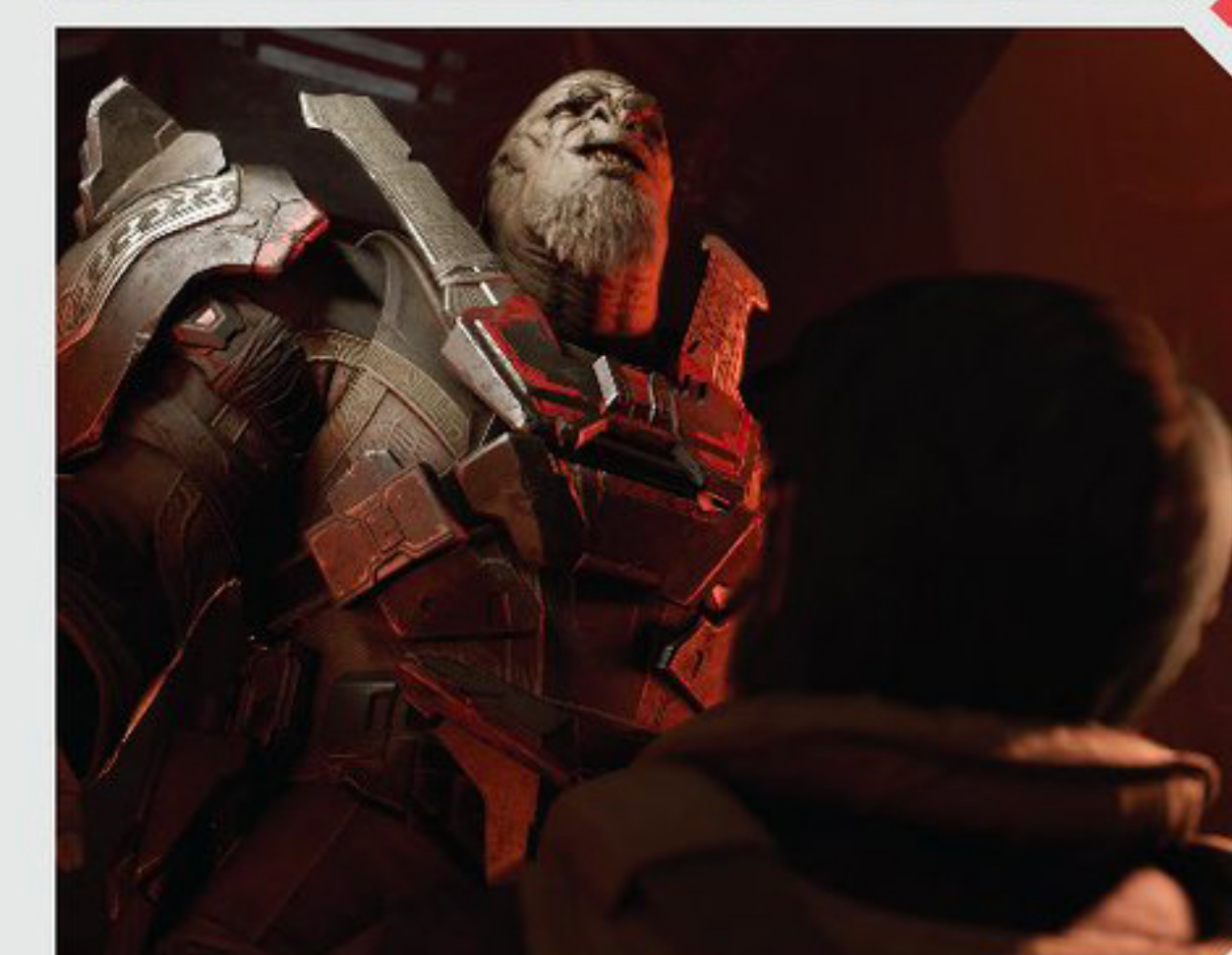
Total

LIGHT OVERVIEW



GOING FORWARD

The next page will break down these 7 phases of Lighting.



LIGHTING PROCESS

01 PHASE ONE Script Investigation

Story is understood

From the script the lighter can understand the following:

- Number of characters, vehicles, and approximate runtime.
- Beats of the story that will need extra attention.
- Complex actions that will require any extra consideration or lighting states to swap between.

02 PHASE TWO Blockimation Previs

Blueprint

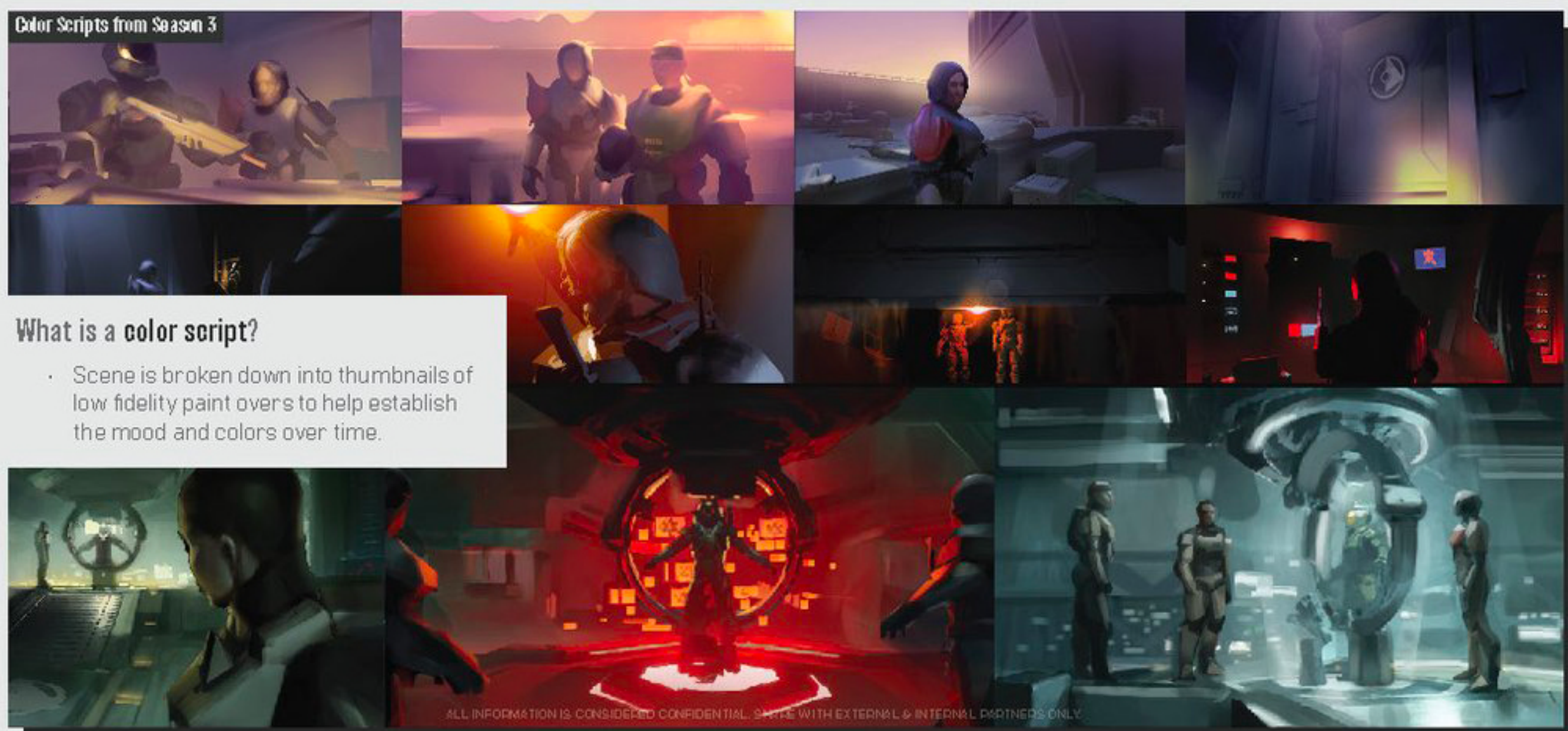
- The pre-vis should communicate the number of characters on screen at once and any touch-points clearly visible in the shot.
- Timing of events that lighting can replicate and add to should a window of opportunity become present.

03 PHASE THREE Concept Gate

Color Script creation

- Gather ideas to help and inform the color scripts. These can be any sort of reference that evoke mood, desired artistic challenge, and reinforcement of the theme.
- A Concept Artist confers with lighter and director to create a **color script**. A color script is similar to a contact sheet with multiple narrative beats done with low fidelity paint-overs.
- Optional high fidelity key-art to help establish the mood and tone of the cinematic. These can come as paint-overs as needed later.

Color Scripts from Season 3



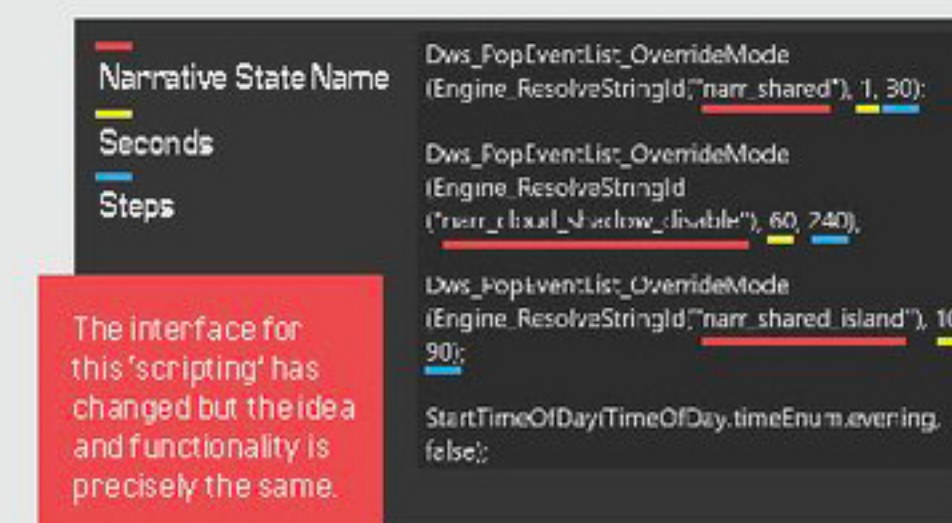
What is a color script?

- Scene is broken down into thumbnails of low fidelity paint overs to help establish the mood and colors over time.

04 PHASE FOUR Pre-Production

Dynamic World State

The 343 lighting tech stack has a system called "DWS," this means **Dynamic World State**. Think of this like an advanced graphics state that can be 'pushed' [*meaning: on*] and 'popped' [*meaning: off*]. They can even combine. They also can blend on and over a set period of time defined by the artist. Before any lighting begins these states can be authored or reused between scenes.



The interface for this 'scripting' has changed but the idea and functionality is precisely the same.

- Understanding the fundamentals of the 'DWS' system is the key to unlocking great cinematic lighting in the Halo engine.
- Examine how practical lights or gobos can be used in the scene to create a feeling of a world beyond the frame.
- The more in-engine lighting that is authored the more it becomes a game of min/maxing. Where do you spend your budget? If you know you are limited to a very small amount of static shadows but have a large cast of characters, what is important to shadow? Where is the eye supposed to go and where is the eye going to rest?

Lighting is a task of constantly asking yourself what is important.

05 PHASE FIVE Production

Dependencies Completed

- Level setup (BSP)
- Color Scripts Completed
- Geo is in place to get roughly lit.
- Level lighting is in place well enough to start if a shared space, e.g. a multiplayer map or campaign map.
- Main lights then used to generate:
 - Indirect lighting
 - Cubemaps
- Animation assembly needs to be near 50% or above completion.
- Facial and body animation 50% or above completion.
- Camera needs to be 80% or above completion.
- Character material should be near complete, beyond approximation.
- Set dressing (Props / Interaction) should be in place even if proxy art.

Set the composition up

- Create separate tracks for organization and check out:
 - Environment
 - Characters
 - Vehicles
 - Scripting / DWS States / Lighting States
- Create rim, key, and fill lights for each character.
- Trim light track length for each character to the moments the character is on screen. If needed duplicate the light and track and shift to later moments the character comes back on-screen.
- Link all lights to the composition and shut their 'active' state to 'off'. This will allow the lights to only be active if they are linked to a scene.
- Name each light with a denotation of "L_s" or "L_ns" to delineate if they have a shadow or are shadow-less.

Block out characters first

- Lay in lights to illuminate the characters roughly. This includes practical lights that would be used as a key or rim lights. Always try to use as few lights as possible early on.
- Light characters first. This will help you understand the focus of the shot.
 - Think of this phase almost like a gray sketch to understand values. Later, the lights can be colored and background lighting can be added and foreground character lighting can be adjusted depending on the environment or practical light source usage.

Review

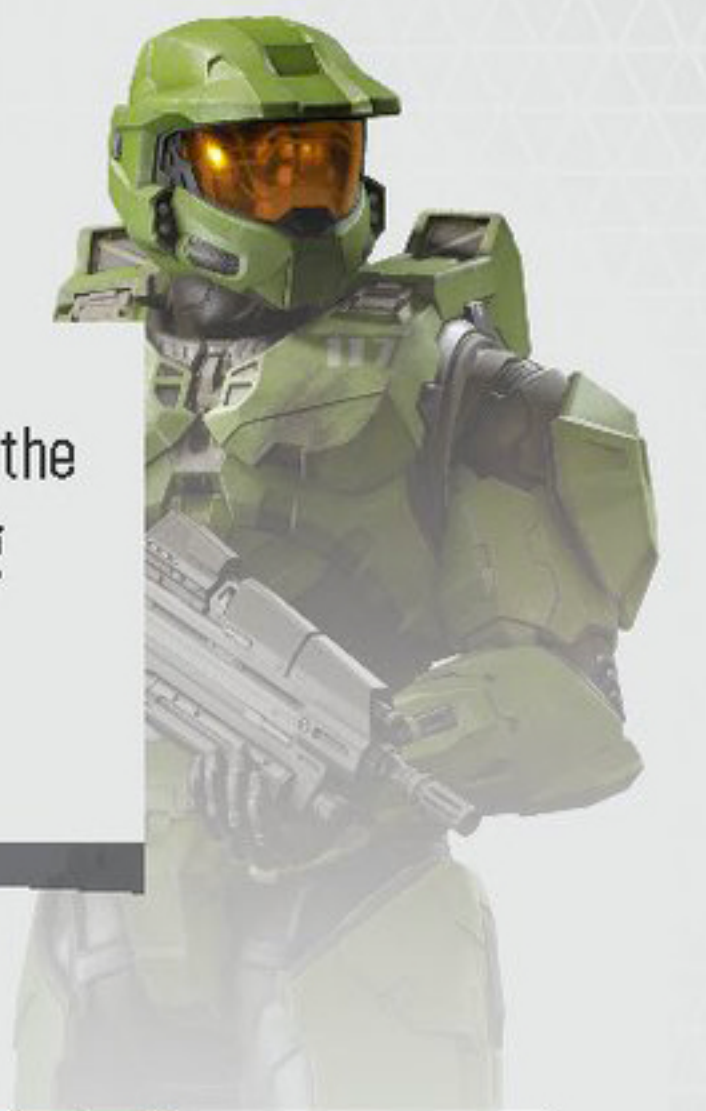
- Review with the director in its earliest stages to understand if the lighting is exhibiting the right amount of focus to the scene.
- Correct [based on feedback] and/or continue.

Animate Lights

- The closer the light is to the subject or object, the sharper the shadow will be. With that notion in mind, the way to get the best results out of our spotlights is to parent the spotlight to the character's markers and then use an aim constraint to keep the light affixed to parts of the body or surface.
- To the right you can see our curve editor. The first image represents the light moving in 3D space. The blue line is the intensity of the light. The second image is depicting the way color values can be keyframed off of a (r)255, (g)255, (b)255 numerical value.

Review + Iterate (Cycle)

Understanding the fundamentals of the 'DWS' system is the key to unlocking great cinematic lighting in the Halo engine.



Dynamic World State Adjusts Graphical Settings

Lighting Track Organization

DWS Node Graph Editor

Example DWS Properties

- Ambient Occlusion
- Sun AO, Spot Light AO, Omni Light AO
- CWV Lighting: Character accent lighting used for gameplay. Always shut this off in cinematics via a DWS script.
- Time of Day
- Ground Fog, Ceiling Fog, Volumetric Fog
- Intensity, density, noise, movement, height, fall-off, color.
- Screen Space Reflection Intensity
- Deferred Reflection Intensity
- Probe Depth
- Cubemap Intensity

Curve Editor - Light Translations

Curve Editor - Color Translations

NEXT PAGE

Polish and Bug Fixing Phases

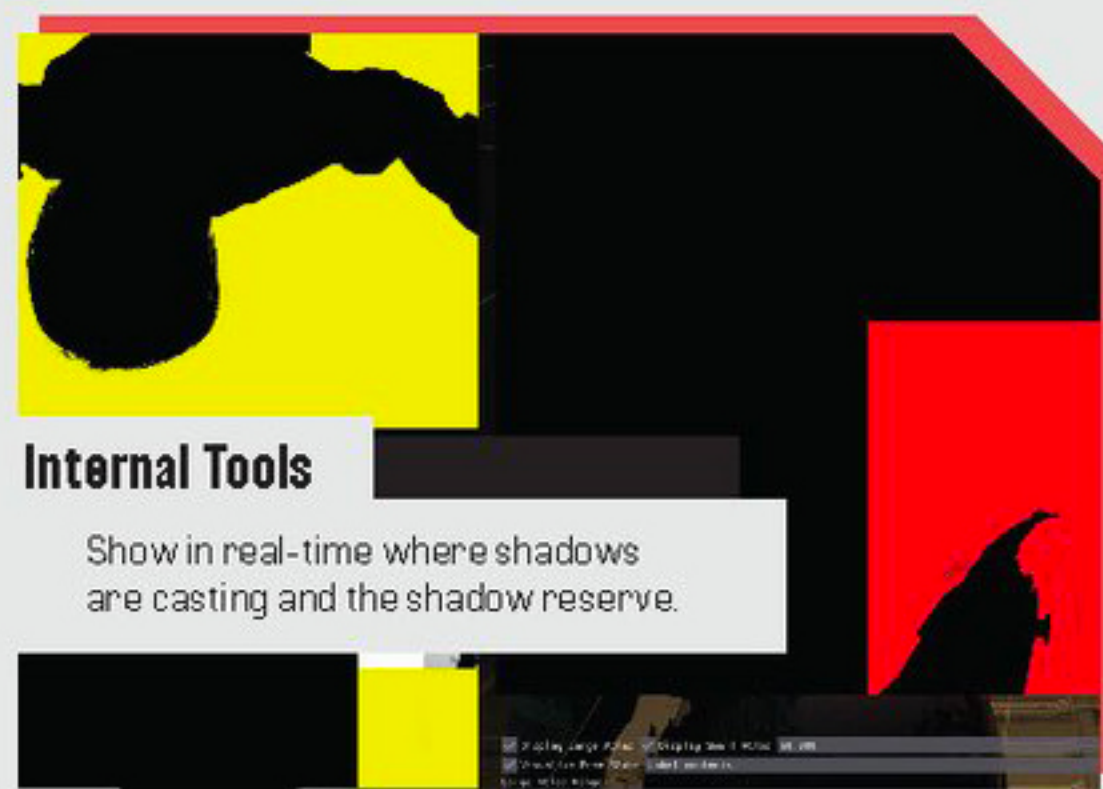
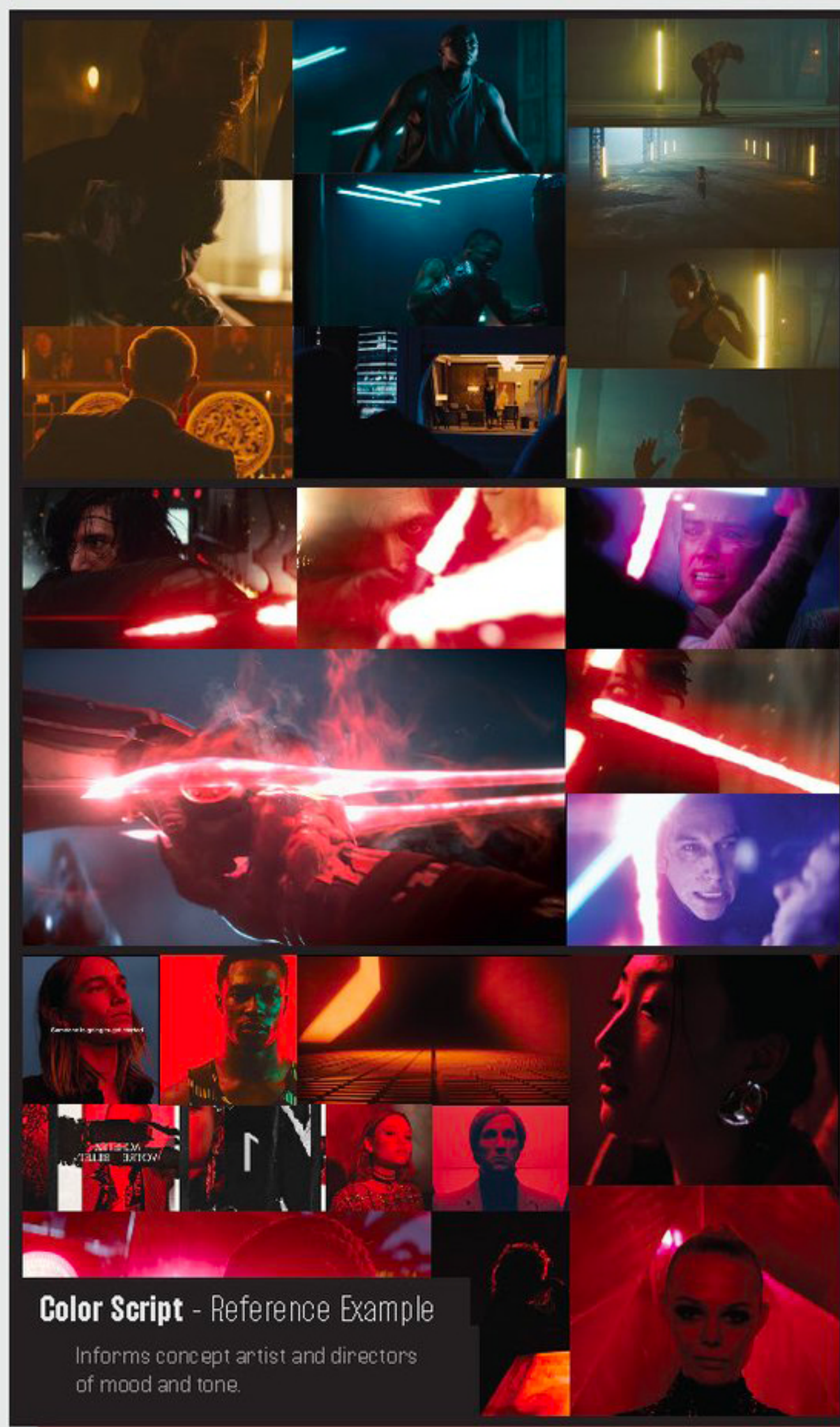
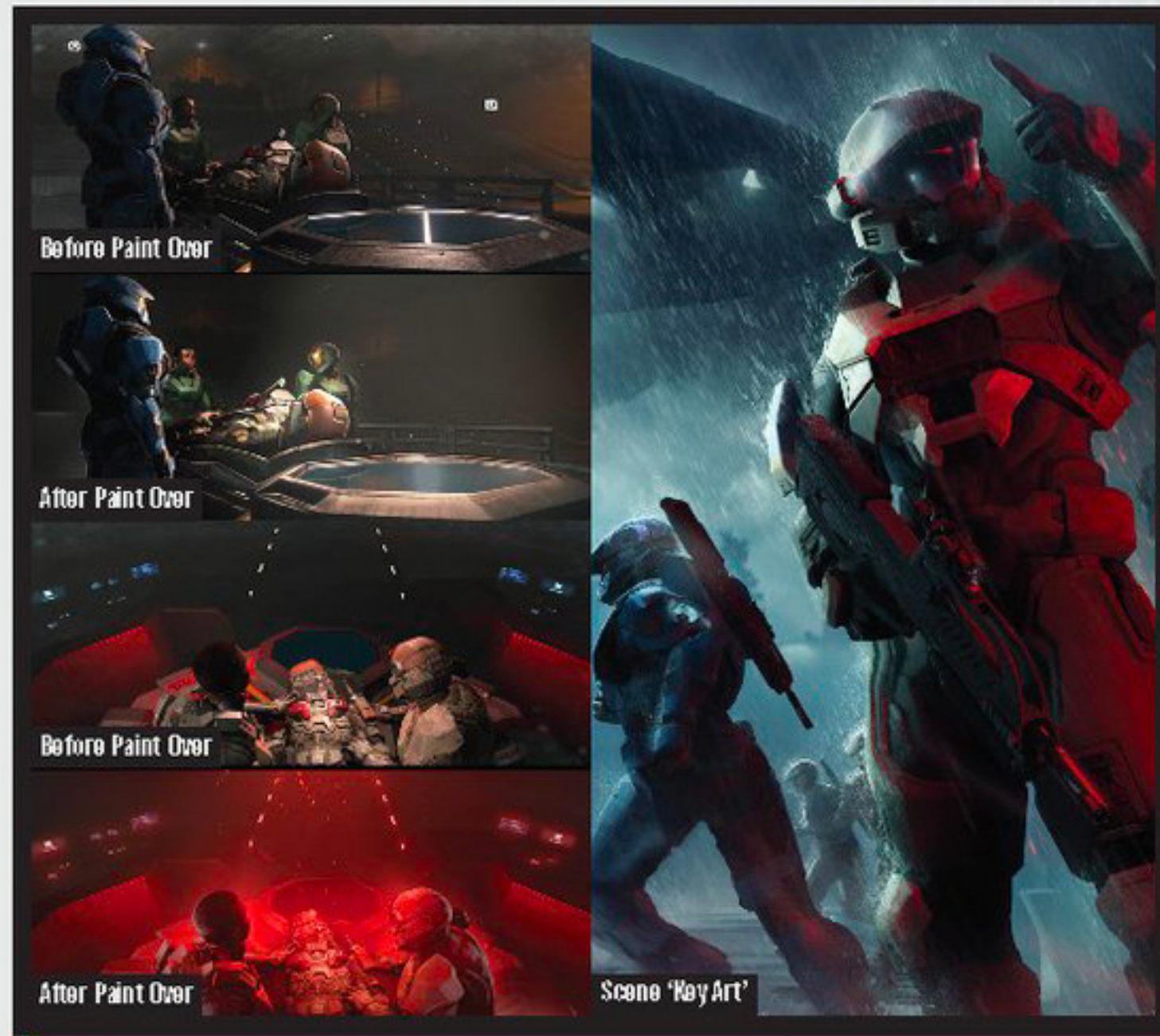
06 PHASE SIX **Polish**

Dependencies Completed

- Concept paint overs (as needed)
- Final Camera Position
- Props Final Object / Position / Materials
- World Building Final Geo / Placement
- World Building Final Materials
- Character Final Animation
- Character Final Materials
- FX Near Final (Above 50% Completion)
- Depth of Field is authored in Faber.

Aesthetic and performance are finalized

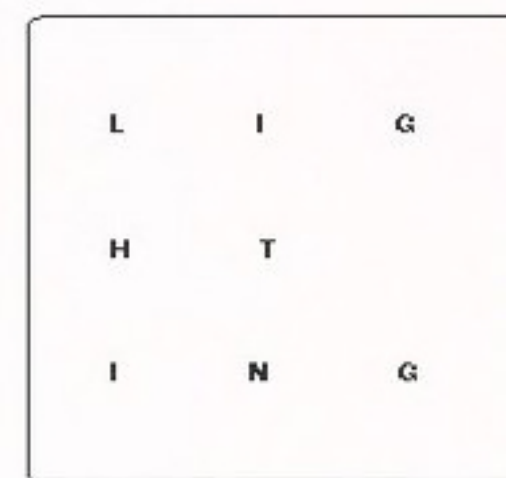
- Fix and finalize any discrepancies or light animation that seems incongruous with the scene.
- Apply color correction. Continually work back and forth with the director around color timing the scene.
- Check support for 16:9, 21:9 and 32:9 to make sure at every supported aspect ratio lights are not popping off in binary ways.
- Open in GUI and check that the main 4 static shadows are properly lighting the characters. Anything about 4 that shadowed lights will only work on higher end PCs and Xbox Series X.
- Record the polished scene. You'll need to use this for reference as the performance pass is underway.



07 PHASE SEVEN **Bug Fix**

Aesthetic and performance are finalized

- Fix bugs
- Test performance and quality on the range of devices to ensure that it maintains the intended performance and aesthetic targets.
- Record a final video for QA to continually test the scene.



Goals Reiterated

MAKE IMPORTANT

A lot of our scenes need the ability to "turn down the house lights" in order to focus the scene. A lot of larger [campaign] scenes function like a traditional stage play. A few characters talk, some bit of information or crisis propel the narrative forward, and the house lights come back on while shifting to player control. The lighting plays an important part in signaling that we want to shift the player's attention. It's the distinction between the game story and the player's story.

REMOVE NOISE

Elements in the background can compete with the eye and shift focus away from the narrative.

ALWAYS ASK YOURSELF

- 81 Is the lighting bringing you closer to connecting to the characters?
- 82 Is the lighting helping me know what to do next as a player?
- 83 Is the lighting immersing me in the scene or am I consciously fixate on the lighting, the FX, or some other element?

All disciplines should be working together to make each other stronger and sell the immersion of the environment, the emotion of the scene, or a sense of anticipation about what lies beyond. We're best when we're invisible and the audience gets lost.

TABLE SETTING

Lighting denotes mood. Cinematic lighting helps set the table for what is to come. It's all subtle cues that work in tandem with the FX, music, and performance to illicit an emotion.

With a lot of our Chief and Weapon shots it's helpful to mix lighting temperatures. Especially with rim lights.

Many times I will say, "bring the warmth" into a scene and sometimes it's helpful to bring more color temperature warmth into the scene to subconsciously signal to the audience that hope is around the corner.

LOGICAL SOURCES

As much as possible use lighting sources that are already plausible in the given environment. Cue off of practical elements or characters bounce, glow, emissives, and the FX in the scene.

Think more about taking away lights than adding them. Too many lights often doesn't help sell the realism of the scene.

CURRENT METHODOLOGY

04

Our motion capture team is a bit unique compared to other studios. We do all planning, capturing, tracking, solving, re-targeting, and assembling a foundational scene.

Motion Capture

MO CAP



Overview

The following pages

- The next few pages break down the macro processes that go into making a cinematic from the standpoint of motion capture.

MOCAP Goals

CINEMATIC PRIORITIES

01

Support an Idea

- Early in the process the role and reciprocal relationship between the story, the director, and the motion capture team is to help facilitate ways to bring the story to life. This manifests as deeply understanding the assets needed to bring each character and moment to life.

02

Deliver a Dream

- The motion capture team facilitates the art of expression. They carry the weight of keeping the production on track during very intense days of harsh scheduling. They then are accountable for delivering all the data and early quad cam footage to facilitate early edits for the director, animators, and audio.

03

Improve and Iterate

- Every shoot has its own challenges. Things that seem easy can be very hard. There is an element of always improving and always learning how to expedite the process so that the act of storytelling focuses more on the art of human connection.

MOCAP

Team Size + Roles

The following conveys the total number of people and roles currently working content for a given discipline.

01

Senior Technical Mocap Animator

Works closely with the director to understand the needs of the story and build assets that actors will interact with during the course of the scene. The Senior Technical Mocap Animator is responsible and accountable to ensure quality mocap data. The Senior Technical Mocap Animator must communicate with their team, production and the director to communicate realities and deadlines.

03

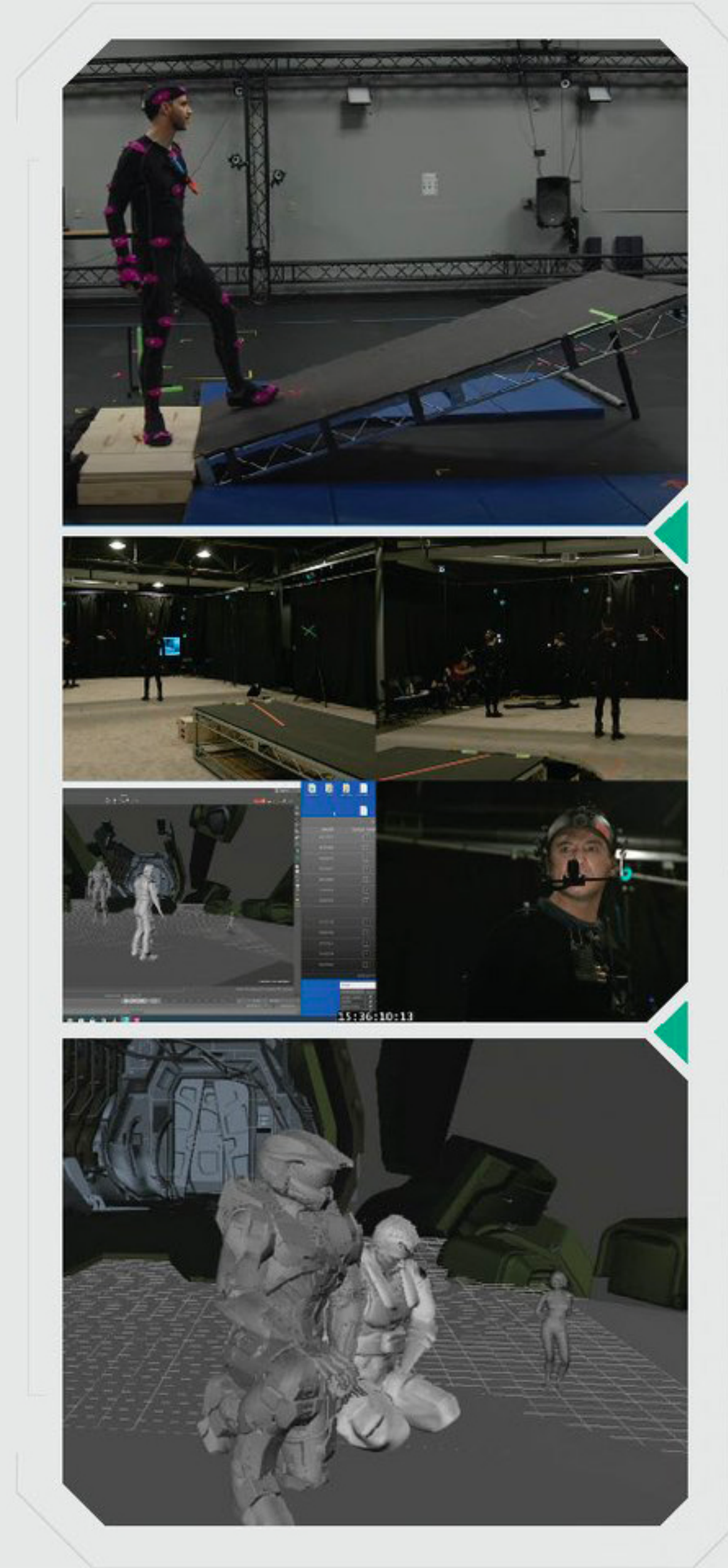
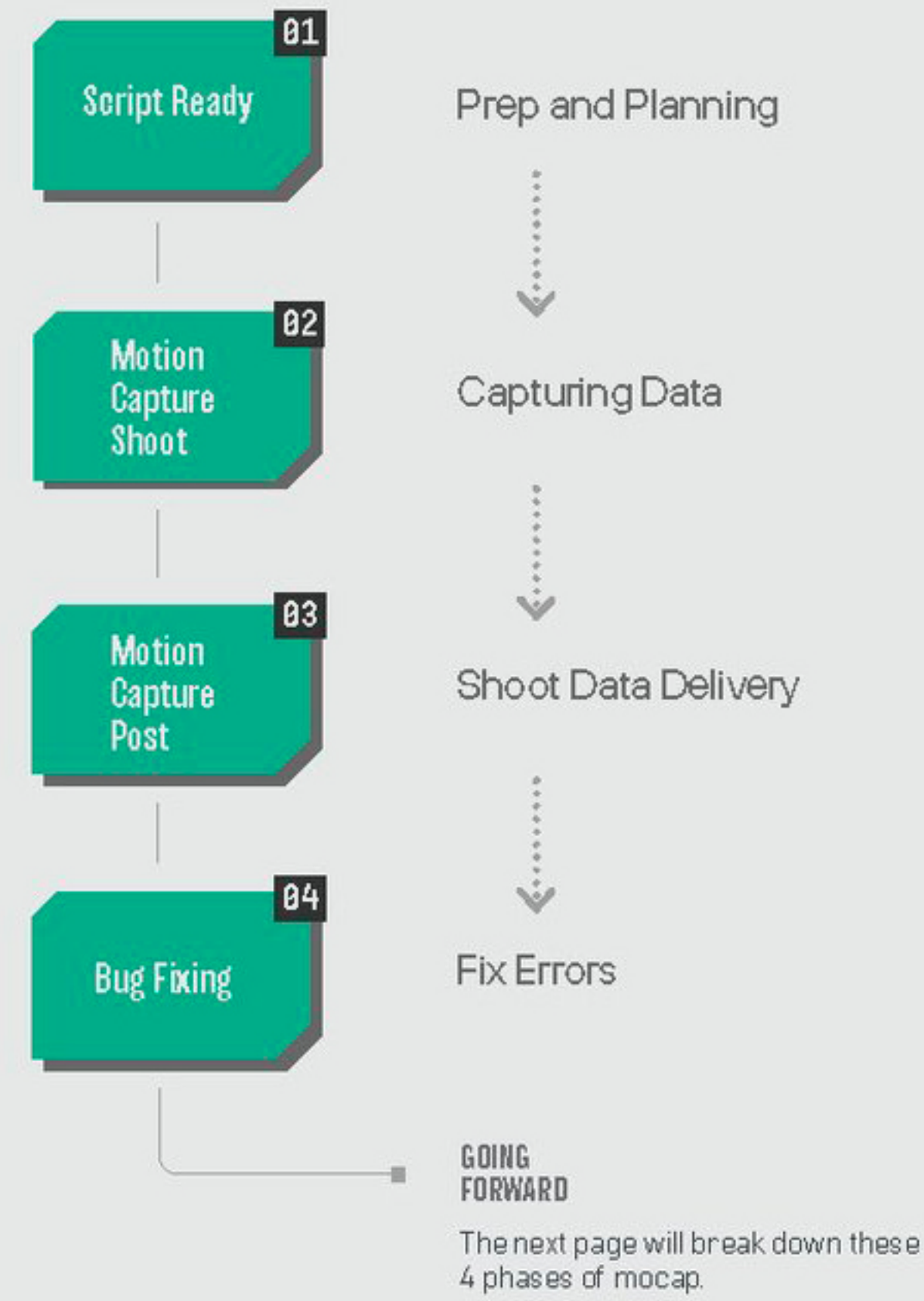
Technical Mocap Animators

The 3 people we had were all Technical Mocap Animators. The Mocap Team took care of the end to end process until it moves into animators hands. We planned, built, captured, tracked, solved, re-targeted almost all assets that were captured on set. [Weapons, Actors, Extraneous Props]

04

Total

MOCAP OVERVIEW



MOCAP PROCESS

01 PHASE ONE Script Ready

Prep and Planning

- Initial kick-off with key stakeholders to identify goals and objects of the request.
- Understand how many actors will be on set and what they will be doing on set (stunts, face capture, body capture, finger capture, audio, stand in, etc.)
- Script walkthrough to help identify early problems for the motion capture build and real-time team, as well as propose new ideas to help improve performances on set.
- Plan and coordinate for upcoming motion capture shoot and build special documents that will be used for the shoot across the crew.
- Create real-time assets and build out scene's pre-shoot.
- Craft real-life props that are scaled to human-sized items (for example, scale down Spartan props to human-sized props, so that a can utilize them in their performances).

PHASE ONE Actions

- Request Concept, Previs, RT Environments, RT Props, RT Characters, Call Sheets, Shot List

Take	Start	End	Shot Type	Camera	Character	RT View
001	00:00:00	00:00:10	Wide	01	01	01
002	00:00:10	00:00:20	Medium	02	02	02
003	00:00:20	00:00:30	Close	03	03	03
004	00:00:30	00:00:40	Wide	04	04	04
005	00:00:40	00:00:50	Medium	05	05	05
006	00:00:50	00:01:00	Close	06	06	06
007	00:01:00	00:01:10	Wide	07	07	07
008	00:01:10	00:01:20	Medium	08	08	08
009	00:01:20	00:01:30	Close	09	09	09
010	00:01:30	00:01:40	Wide	10	10	10
011	00:01:40	00:01:50	Medium	11	11	11
012	00:01:50	00:02:00	Close	12	12	12
013	00:02:00	00:02:10	Wide	13	13	13
014	00:02:10	00:02:20	Medium	14	14	14
015	00:02:20	00:02:30	Close	15	15	15
016	00:02:30	00:02:40	Wide	16	16	16
017	00:02:40	00:02:50	Medium	17	17	17
018	00:02:50	00:03:00	Close	18	18	18
019	00:03:00	00:03:10	Wide	19	19	19
020	00:03:10	00:03:20	Medium	20	20	20
021	00:03:20	00:03:30	Close	21	21	21
022	00:03:30	00:03:40	Wide	22	22	22
023	00:03:40	00:03:50	Medium	23	23	23
024	00:03:50	00:04:00	Close	24	24	24
025	00:04:00	00:04:10	Wide	25	25	25
026	00:04:10	00:04:20	Medium	26	26	26
027	00:04:20	00:04:30	Close	27	27	27
028	00:04:30	00:04:40	Wide	28	28	28
029	00:04:40	00:04:50	Medium	29	29	29
030	00:04:50	00:05:00	Close	30	30	30

Example shot list from January 2020

02 PHASE TWO Motion Capture Shoot

Prep and Planning

- We do true PCAP shoots, 343 does not do ADR.
- Build out sets on stage and mark placements.
- Make notes on all takes captured and ensure that selects are differentiated from the rest for post.
- Run Witness Deck, HMC Deck, Body Deck, RT Deck, AD.

PHASE TWO Actions

Storage

- Capture all raw optical data and deliver on a shared server, organizing all data captured in their respective folders

Witness Deck (Telestream)

- Recorded at 30FPS
- Timecode displayed on quads
- Files compressed in .MP4
- We can deliver a Apple ProRes 422 HQ .MOV if requested
- 3 Witness Cameras + RT View
- Live Streaming to Remote Crew

HMC Deck (Faceware)

- Recorded at 60FPS
- Files recorded in .MOV with Timecode

Audio Deck (Pro Tools)

- Pro tools session (1 per day)
- Recorded at 24bit/96Khz/30FPS
- Markers for each take and scene
- Files recorded as .WAV with Timecode
- No edits to recordings, and selects pulled to separate track
- 1 - 2 tracks per actor depending on Mic set-up

03 PHASE THREE Motion Capture Post

Delivery

Dependent on the Witness system used

- Deliver each camera sources and compiled quads on .MP4's and .MOV's within shared server.
- Separate camera sources and quads into different folders for easy sorting.
- Share information on where quads are for timecode selects
- Once timecode selects have been made, note this for the motion capture team.

Dependent on the HMC system used

- Deliver .MOV's
- Trim face using Adobe Premiere or Faceware Analyzer.
- Using face tracking models, auto track the face.
- QA and polish tracking.
- Deliver .FWR and Assembled Scene from Narrative.
- Deliver .XML of Character Setups
- Deliver .FWSP of Shared Posed Libraries.
- Deliver trimmed .WAV files that are split from the face files. This is used for assembling scenes.
- Compress face data to 30FPS.



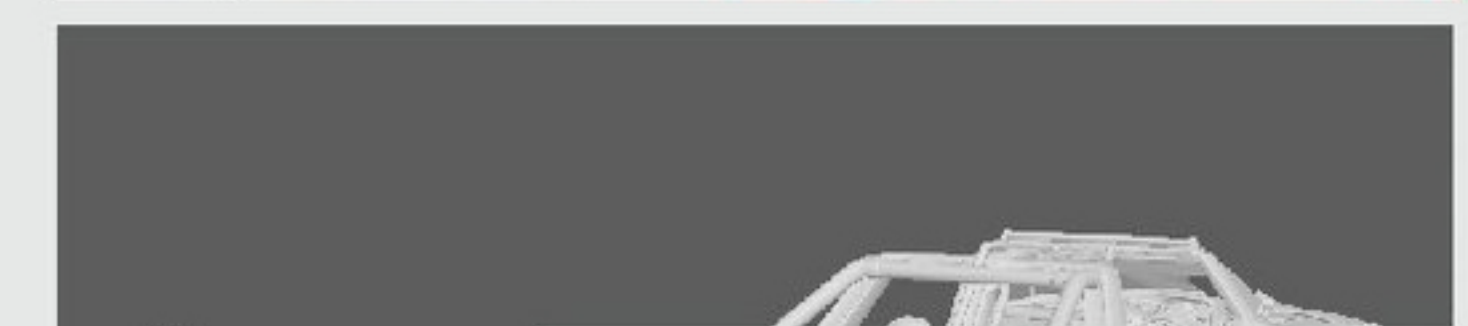
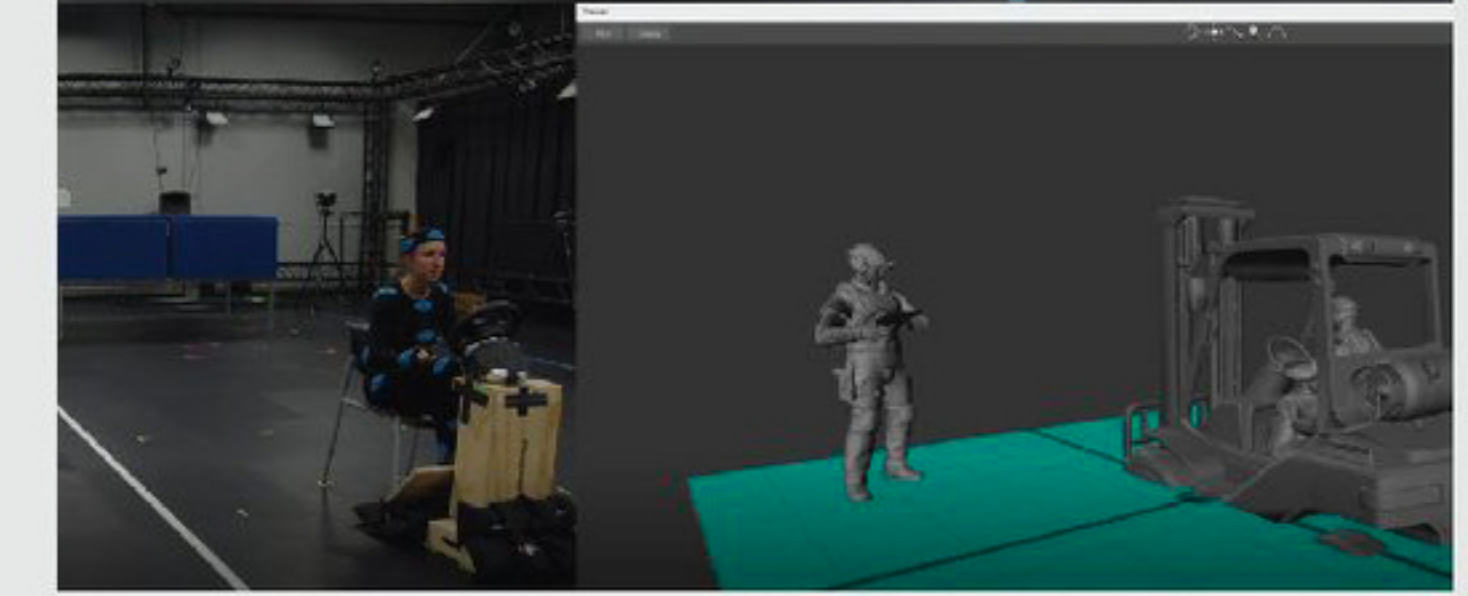
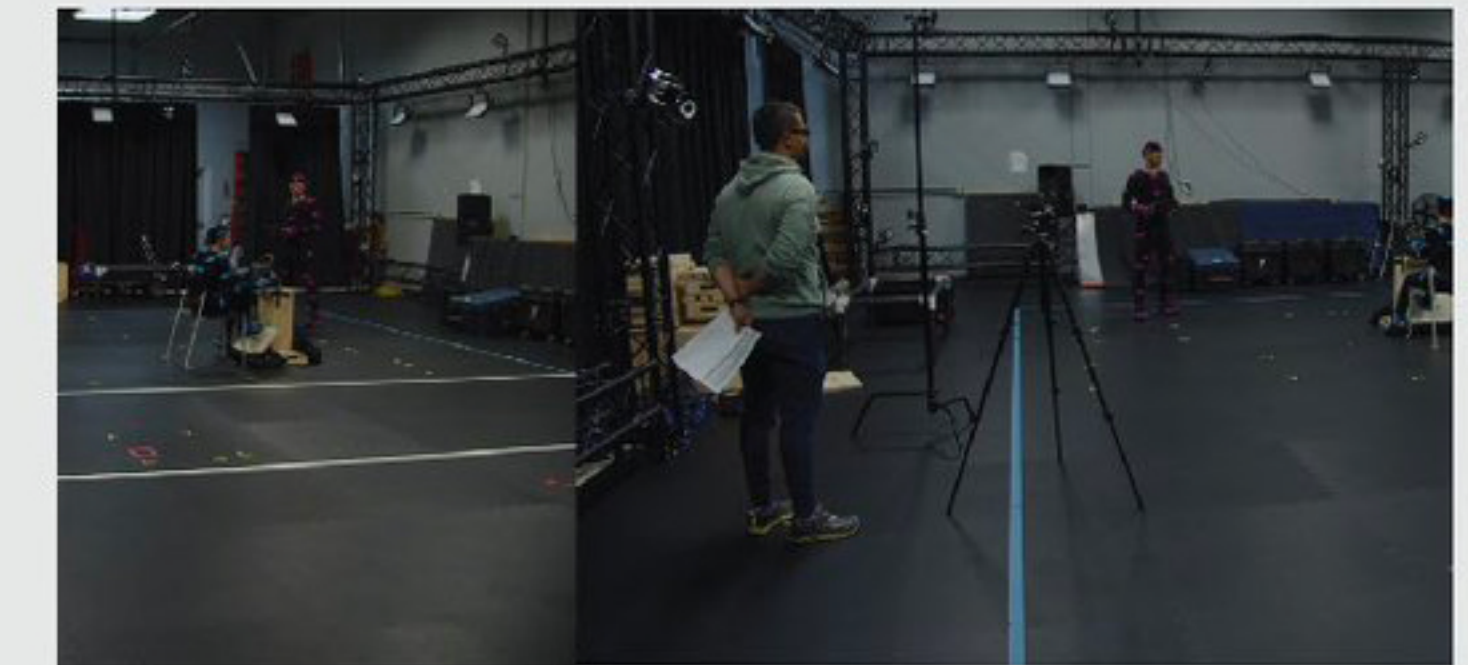
Dependent on the Body system used

- In Motive, reconstruct and export .TAK's into .FBX's with the following settings:
 - Scale 1.0
 - Use Timecode
 - Use Marker Nulls
- In Vicon Shogun, import cloud-point data onto solver:
 - Export to .FBX skeleton data and open MOBU
 - Import MOBU RT.
 - Using HIK and Characterization Settings drive the mocap source data onto the RT rig within MOBU.
 - Assemble using Story Mode.
- In Motion Builder, deliver assembled and baked down keys .FBX's at 30FPS.
- In Maya, import character mocap_rigs and import .FBX's onto that skeleton. Bake down the driven mocap skeleton to the animation controls.

04 PHASE FOUR Bug Fixing

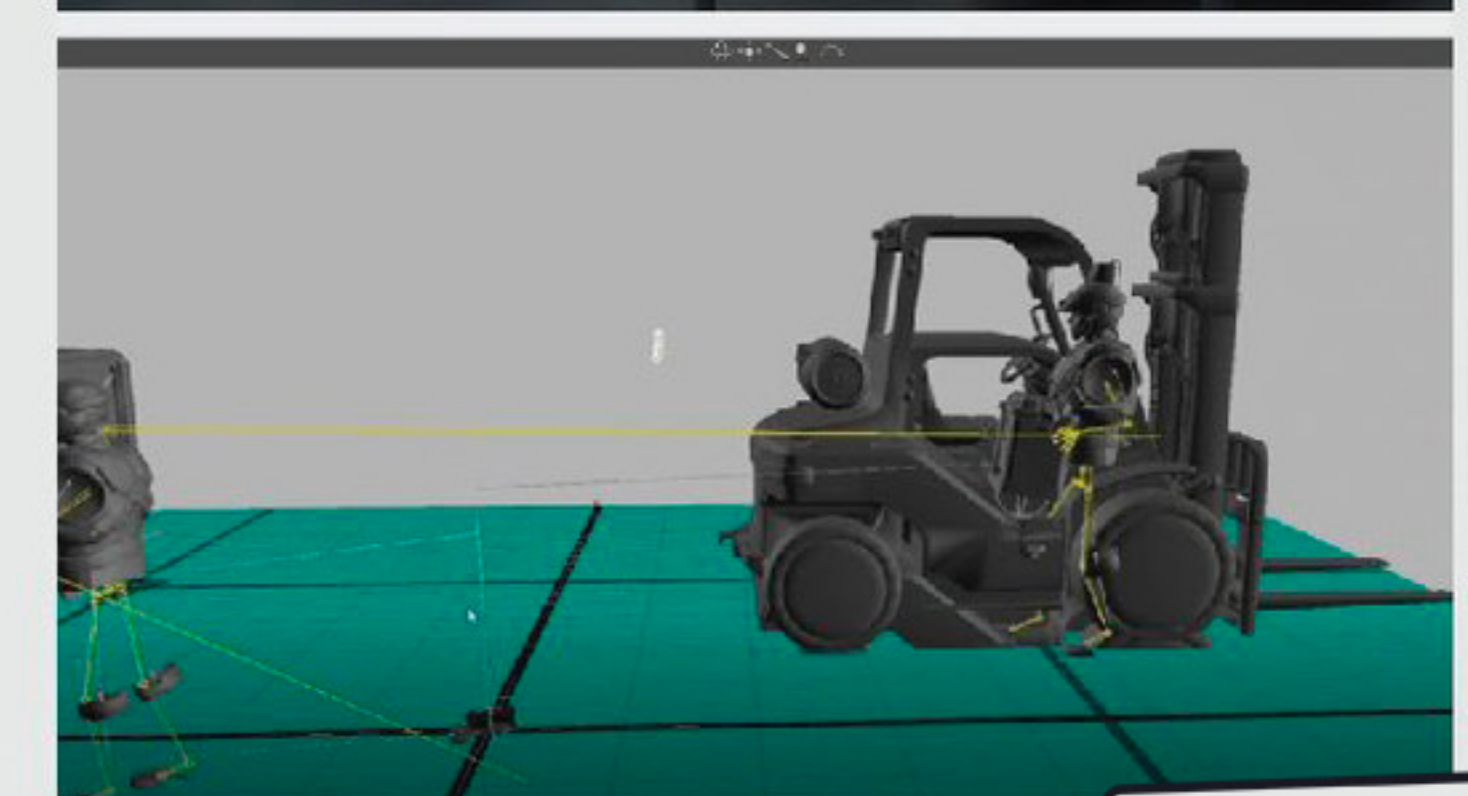
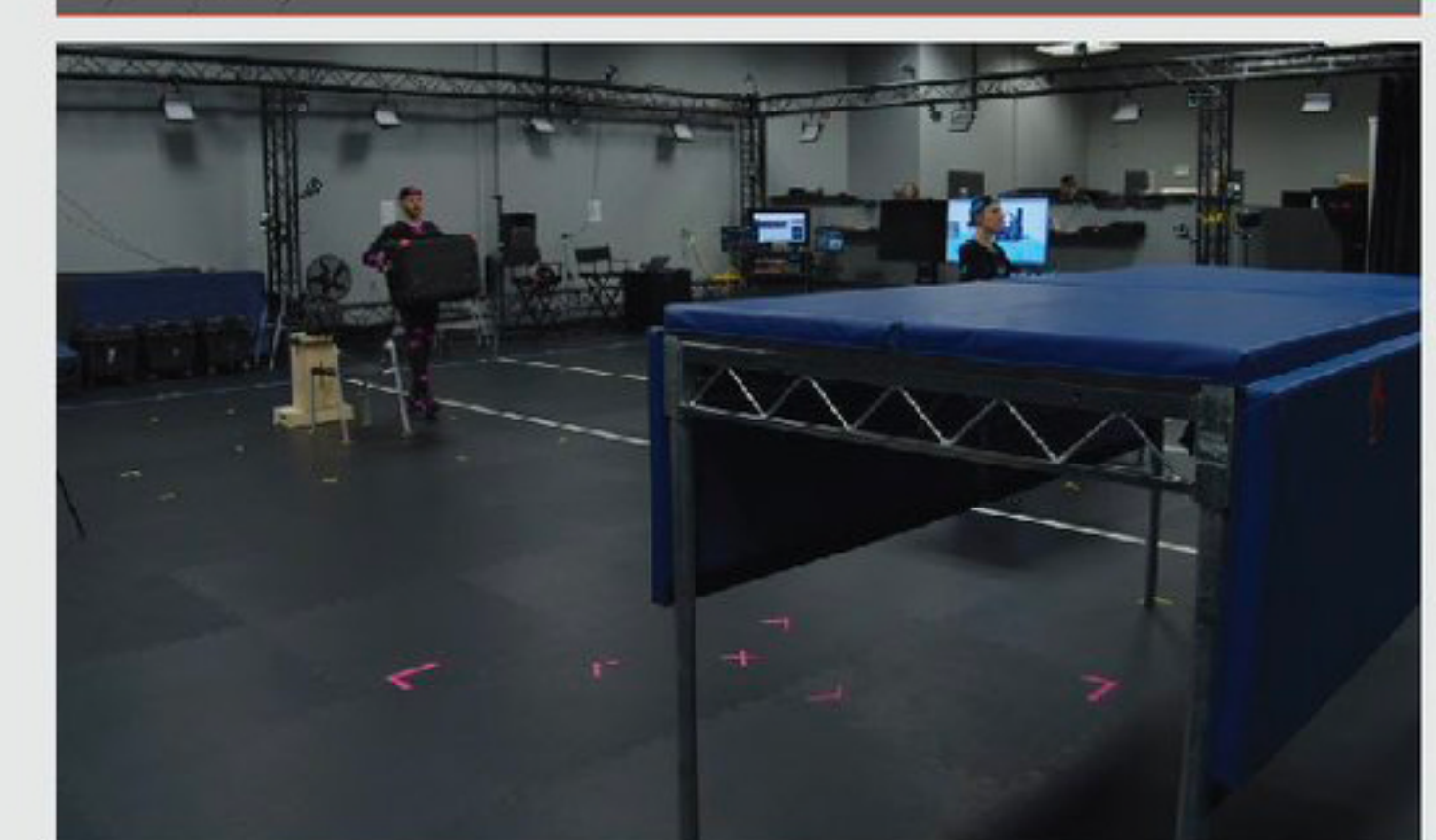
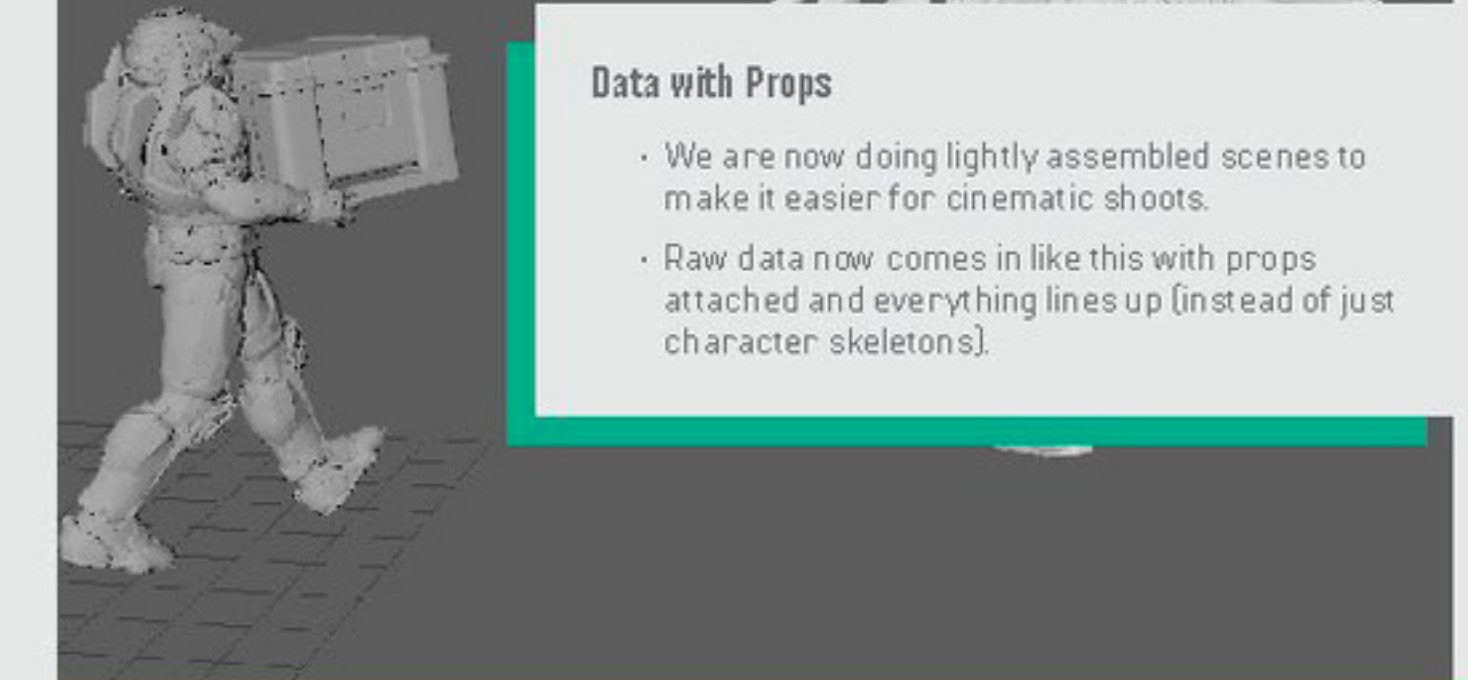
Prep and Planning

- Fix bugs related to motion capture and help animators get their content successfully assembled.



Data with Props

- We are now doing lightly assembled scenes to make it easier for cinematic shoots.
- Raw data now comes in like this with props attached and everything lines up (instead of just character skeletons).





PROCESS TIMELINE



This is an example to show the various stages of these processes coming together. Actual milestones will vary.

Milestones

Milestones

GOALS M1

Enter

- Season theme understood. Story goal understood. Character sheets written.

Exit

- Story and scenes are locked. Downstream teams can turn script and pre-visualization into tasks and deliverables that support the themes and moments.

Simultaneously

- Any new actors are cast near revision 2 of the script.
- Motion capture stage availability is explored in this phase.
- Actor availability is explored and communicated to build a schedule.
- Once the pre-visualization is locked in Milestone 1 the music team can begin exploring themes and getting work scheduled.

Creative Direction



Character Work Has Begun

- Concept finished.
- High resolution model is in development.

1st Draft Script

REV. 01



Pre-visualization Draft

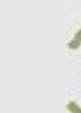


2nd Draft Script

REV. 02



Pre-visualization Update



Finalized Script

REV. 03



Pre-visualization Finalized

Tech Art Creates Level

- This level will be the location where all work happens while inside of Faber for the specific moment or Season.

NOTE

- This is an example to show the various stages of these processes coming together. Actual milestones will vary.

Milestones

GOALS M2

Enter

- Story is locked. Level is created. Character work is fully underway

Exit

- All of the initial work to head into the longest phase of development is completed.
- Refining facial and body animation.
- Music / Audio-Post
- Lighting
- FX
- Hand-key animation

Simultaneously

- In it's rough shape all disciplines should be able to watch the raw assembly and understand the flow and location of major beats in the story.

NOTE

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Character Work Underway

- High resolution model is nearly complete.
- Low resolution model and rig and worked on during this phase.

Concept Art Kick-Off

- Assets to populate the environment.
- Color scripts or key-art for lighting.
- FX concepts to expedite exploration.

List Creation

- Shot
- Asset
- FX
- Lighting

Asset Wrangling

- Environment assets in production.
- Assets are under construction for mocap shoot.
- Prefabricated prop and level sections are re-contextualized.

Composition Created

- Composition anchor is set. The origin of the scene is known.

FX + Lighting R&D

- Asset and pre-production work is done during this time to achieve some of the themes and desired concepts in the scene.

Environment + Asset Creation

- Any props or environmental assets are created, revised, or rigged.

Actors Scheduled

- Actors availability is locked in, along with stages or booths for ADR/VO.

Mocap Shoot

- All scenes are shot with actors, stunt performers or auxiliary cast. Body/Face/Voice.

Environment Blockout

- While the shoot and storytelling is being authored with actors. The environment team is moving levels or assets to the cinematic location where the scene will live.

Assemble Mocap Selects

- Using quad cam footage from the motion capture shoot the scene selects are chosen and communicated to the mocap team for rough solving.

Character Rig Finalized

- Game resolution character asset is available for use by animators.
- Rig is stable and refined animation can be applied to the rig.

Mocap Engine Integration

- Using quad cam footage from the motion capture shoot the scene selects are chosen and communicated to the mocap team for rough solving.

Milestones

GOALS M3

Enter

- All of the work to stand up the scene has been done and is clear, albeit rudimentary form. Any discipline can watch the scene and see all the animation playing in a 70% ^[or higher] representative environment.

Exit

- Story and scenes are locked. Downstream teams can turn script and pre-visualization into tasks and deliverables that support the themes and moments.

Simultaneously

- Music is understood and the beats for sound design are understood at the start of the milestone so that foley work can begin.
- Before lighting production begins a film grain shader is applied to the scene at the start of production because this is an additive effect, meaning it can boost the exposure between .25 to .50 f/stop.

NOTE

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Engineering Creates 'Blinks' to Scene

- Engineering creates fast 'warps' to the scene inside of our internal menus. This allows the content creator and other teams to quickly view and test the scene.

Non-mocap Assets Keyframed

- Any prop or assets that needed to be hand-keyed are keyframed. This includes things like boxes or small dynamic objects like wires swinging, etc.

FX, SFX, Lighting Production

- Production for downstream teams is in full production and not blocked by various factors like broken cameras or deeply unfinished level geometry.

Face + Body Animation Cleanup

- Motion capture clean up or solving is coming online at consistent and predictable intervals.

Asset Integration

- Any bespoke assets are fully integrated. Set dressing is complete early on in this phase.

Environment Finalizes

- All materials and geometry is complete.

Cleaned Up Animation Integration

- 95% of all body and facial animation is complete. Remaining bits of animation may be on fingers or very small connections.

Milestones

GOALS M4

Enter

- Most production work is done. FX and Lighting are around 85% complete and they are putting the final touches on the scene.

Exit

- All major cinematic work is complete. OA has videos they need to write bugs should anything change prior to shipping the content.

Simultaneously

- During this phase some extra bits of quality are added through the inclusion of controller haptics.
- Performance work is done by the internal 343 team to ensure that these spaces are performant before ship.

NOTE

This is an example to show the various stages of these processes coming together. Actual milestones will vary.

Camera Final Animation

- Camera translation is locked and will not be further tuned.

DOF and Post FX Authored

- Depth of field is set inside of Faber.

Lighting Polish

- Lighting has time to finish their shots with the expectation that they finish mid-milestone.
- Color correction is applied to the scene.

FX Polish

- FX has time to finish their shots with the expectation that they finish mid-milestone.

Sound Design Near Complete

- Audio is last to complete any work. The audio team is still hard at work completing any sound design and ambiences.

Performance Passes

- Lighting team is engaged in PIX captures to ensure that they are within performance budgets. FX does the same with their internal tools.

Quality Assurance

- Final videos are recorded by the FX and Lighting teams that encapsulate their expectations for their given disciplines. This is used for QA passes.

Bug Fixing

- This level will be the location where all work happens while inside of Faber for the specific moment or Season.

Timeline

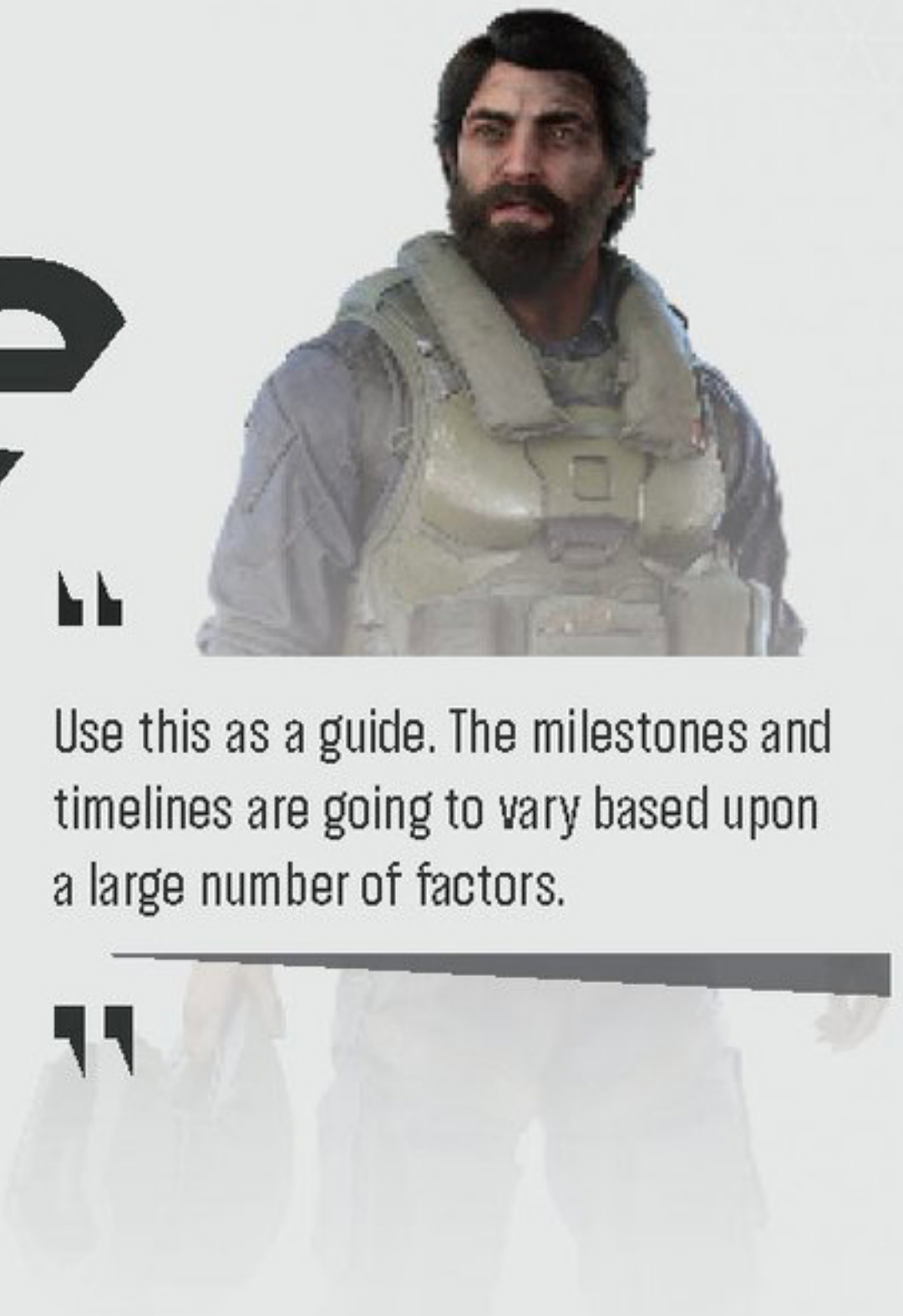
Example

This timeline is an example. A lot of different factors can change the velocity. Is the environment already built? Are the characters already rigged and created? The proficiency and size of the team can bring this number in by weeks. It all depends on the scope, ambition, and needs of the project. The timeline below is roughly how long it takes a very small team of people to make a cinematic.

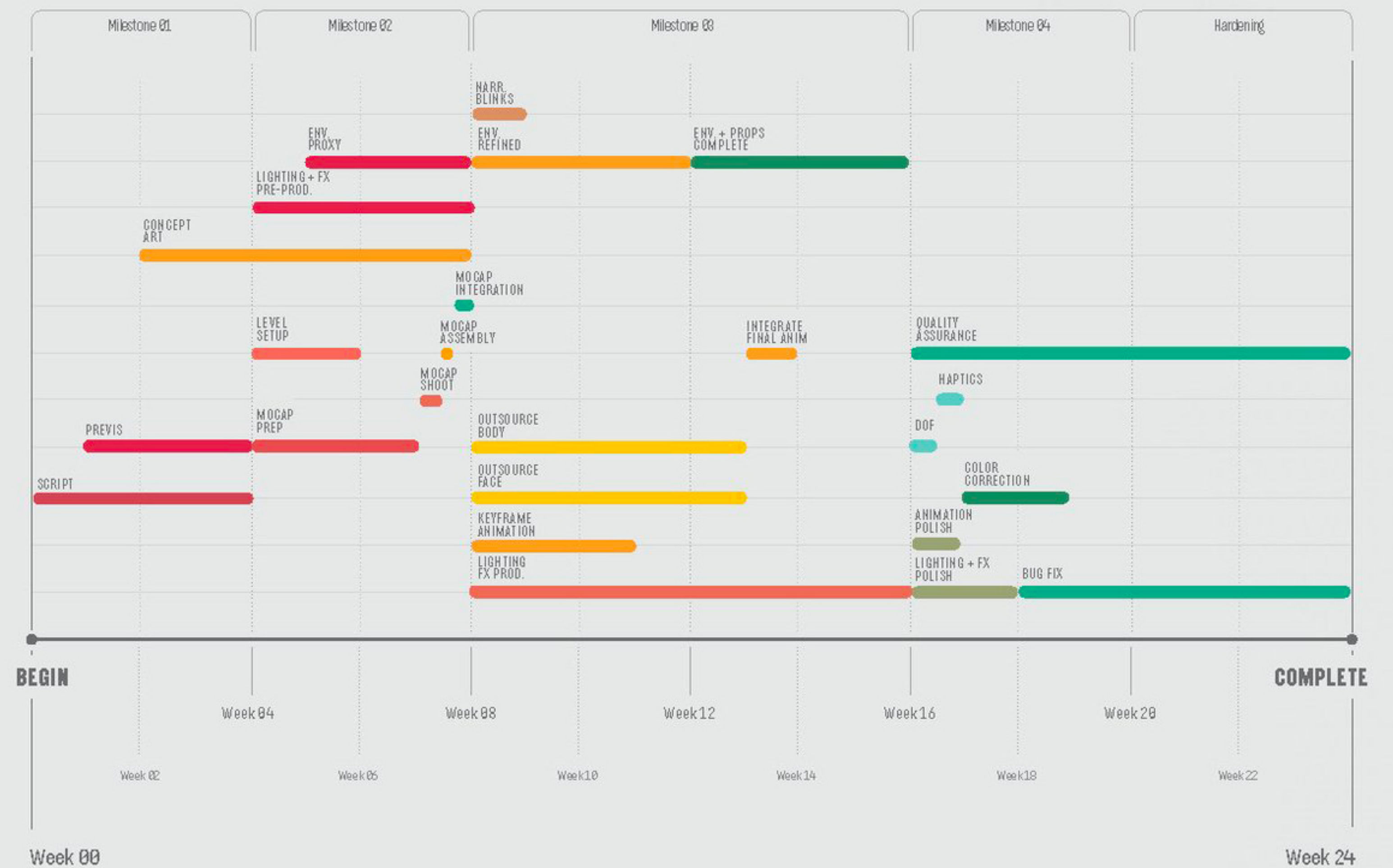
This number was different during the creation of Halo Infinite because all of the environments were locations inside the game

Very little was created specifically for a scene and all the scenes were shot over the course of 3 months. Once everything was shot it was all put together in bulk.

We did shoot some new scenes 18 months later that were completely new. They did follow this rough timeline. Use this as a guide. The milestones and timelines are going to vary based upon a large number of factors.



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FRAMING CONSIDERATIONS

Camera Goals

MAKE NOTE

The following were guidelines for how to handle cinematics where the camera does not cut.

The future is an open book. Cuts can be made. If the cinematic brief calls for no-cuts this section is very helpful to align around ways we gave visual logic to our scenes.

The camera considerations on the next two pages are guidelines and ways of thinking about the camera as a character or companion. Still valid in a world with cuts.

Worth reading as a primer, but do not take these words as creative handcuffs.

If the result helps the story clearly express scale, intimacy, contemplation, spectacle and joy then the goals have been met.



CAMERA GOALS

01

Camera as Character

The one-shot camera in Halo Infinite's campaign is like a documentarian. It's chronicling the world around it. It doesn't know what will happen so it's reliant on an external cue to pull focus away from whatever is on-screen.

There are times where the camera exists outside of time. The camera observes information while objects outside the bounds of the frame move at a completely different plane of existence. The camera is not bound to the present.

also can push through the visor, the back of the helmet, or the side of the helmet with ease.

The idea isn't to present real-life. The goal is to make the game/story connection feel coupled together. The game is focused on making the player feel powerful. Cinematics are preoccupied with making the player want to know more, be engaged, and feel something emotionally stirring. We'll succeed if we have a perspective and transform words on paper into a clear escalation of tension, curiosity, vigor, etc.

02

Always Follow. Never Lead.

Camera always reacts, it never knows what is about to happen. It must wait for the action to occur and then go to the action, sound, or cue.



Cinematics are preoccupied with making the player want to know more, be engaged, and feel something emotionally stirring.



03

A Grounded Feeling

The camera should help express what it's like to follow a man clad in a, literal, ton of armor. The camera is weighty, heavy, grounded but also has the latitude to do things that are fantastical. Our camera should have a weightiness to it that mimics real-life, complete with shake that feels appropriate and constrained, but it occasionally can go into places and do things that a real cameraman could not do. The camera can push through areas that are smaller and more confined if it is following action. Our camera

04

Camera as Character

Movement is our way of cutting with a single camera. When you can't rely on cuts in cinematics then actors, the environment, or sounds need to do more heavy lifting. If a character moves that means the camera can follow and take notice of their curiosity. If a character talks off-screen the camera can move to focus on them--especially if they have a lot more dialogue to deliver. If Chief is about to grab his gun but then balls his fist then the camera can take notice. Reaction to new information can inspire movement which then can motivate the camera to follow.

05

Withhold Information

This has to do with knowing what matters. Using clever blocking you can withhold information from the audience that signals to the viewer a greater question. When you withhold information it causes the viewer to wonder why and they'll stay enamored because they are subconsciously wanting the answer. Ultimately, thinking about what you're not going to say is a crucial part of preparation because what you don't show is as important as what you do show. Create suspense, create tension, and unravel the story in pieces.

06

Know What Matters

The person or thing emoting is most-likely the focus. Master Chief doesn't emote a lot. One of the key differences between Halo Infinite and the games previously made by 343 is a keen desire to rebuild the legend of Chief. This is largely done by not trying to show cracks in his armor. He can be better. He can be the aspirational figure. He's often not the focus of scenes, the way people react to him needs to be the focus of scenes.

More than anything, reactions to Chief build his legend. Go to him when it makes sense. Seek his reaction when there needs to be compliance, agreement, rapport, or action. Chief's every movement is methodical because he is so limited in his ways to emote. If he's moving it must be saying something otherwise the other characters in the scene have priority.

07

Importance of Sound

Sound can cue movement. Sound can instill tension. Sound can remind the view or something off-screen. Think about what the room would sound like if you were standing there. The room tone. The vibrations behind the walls. The creaks and the steps. Sound can suggest a world larger than the one you can visibly see. All of that can establish mood, urgency, and create further questions.

08

Blocking

There are three elements to this. The first to remember is you have permission to make characters gesture and dynamic. The Pilot is best when moving around and being physical in a scene. The same is true for the Weapon because she so often is static. By her very function she has to be in proximity to Chief. The Weapon can move around but she's largely tied to a small structure like a hand, table, or plinth. Giving her hand gestures or having her look around gives the camera, and the audience, a sense of dynamism because it can follow her movements and the things she fixates upon.

The second element of blocking to remember is that you can change the characters blocking off-screen. If you are moving the camera to focus on the antagonist when the camera comes back around to catch Chief, the protagonist, he can be in a different location. Sound can help

communicate that while he's off-screen or depending on the moment the surprise of his movement will be an acceptable reveal for the audience.

The third element of blocking is that the Weapon should almost always look up to Chief. Two levels beyond fiction—talking about the story metaphorically—she's functionally his conscience. She's also new and her awe of him has an element of nostalgia as one would imagine a child seeing a paternal figure. She upholds a pillar of wonder and is excited to go on this adventure with Chief and the Pilot.



We want you to be creative collaborators. Take the time to think about whether or not a word would help the scene flow better.



09

Dialogue Timing + Additions

One thing I'm trying to instill is an idea I simply call naturalism. It's not realism. It's something different. It's that the delivery of words should have a lyrical flow to them. The audience shouldn't be awkwardly waiting to hear a response if there is dialogue between two characters it should flow with ease. We don't want to bore people with slow exchanges. That being said in the layout phase if it makes sense to have a character pause, think, and react—then do it. There's no right way if it feels correct. The scene has to call for the drama or transformation and if it does the pauses can aide that goal.

We want you to be creative collaborators. Take the time to think about whether or not a word would help the scene flow better. Often times, in the layout phase, we find that it would and we go in to add a line here or there. As long as the central idea is upheld, and the narrative is not maligned, the additions are welcome.

10

Player Consideration

Always end a scene into gameplay with Chief in the direction facing their next objective. A key difference between Halo Infinite and past Halo games is that we desire to always honor the player's choice and want to make going-in and out-of-scenes as frictionless as possible.

When a scene is over, and about to return to gameplay, we need to position Chief in such a way where there is a clean continuation of gameplay—almost to the point where the player isn't 100% sure when the scene has returned full control.

343
INDUSTRIES™ | Thank You