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Master of Science in Game Design and Development

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Through the Lens

by Hungry Turtle Studios

By

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Project submitted in partial fulfillment of the requirements for the
degree of Master of Science in Game Design and Development

**Rochester Institute of Technology
School of Interactive Games & Media
B. Thomas Golisano College of Computing and Information
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Acknowledgments

We wish to extend our esteemed gratitudes to our committee members, friends, and faculty for their continued support and assistance over the past year.

Thank you to our committee members, who were always willing to provide feedback and answer questions that we had as problems or complications arose. They were there for us when we needed guidance through the stressful times and encouragement through the entire process. We are grateful for your support.

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Once again, thank you all.

Executive Summary

Through the Lens is an atmospheric, 3D first person, narrative-focused exploration puzzle game with the intent to nurture curiosity in an abandoned city. The player is challenged to match their surroundings to the photos within their album and find the location they were taken from. Their reward for following the narrative progression that comes with the photo's past is cherished yet lost items from the main character's family, and with it a clearer understanding of the lives they lived when this city was their home.

The core pillars for development on this project were storytelling across media, encouraging the player to use the past to understand present, as well as to evoke empathy by perceiving the world in a perspective outside of their own. This document stands as a recording of Hungry Turtle Studio's attempt at creating a polished proof-of-concept for *Through the Lens*, from the development of the experimental mechanics, to the creation of the narrative and aesthetic elements that weave the story together, to the solutions of problems as everything carefully progressed, and the juggled research in between.

The team's abilities were well-rounded enough that we felt taking on the task of a narrative-focused game, complete with satisfactory aesthetics, audio, and mechanics to support it would be doable, however our priorities were poorly placed early on and we achieved far less with the narrative's implementation than we set out for. We were able to learn from our failures and feel that the final product of our 9 month long work (beginning in August 2021 until now, May 2022) meets our anticipated minimum viable product in a polished manner that can demonstrate our overall growth.

The team's personal research choices touch on each of our personal interests within game development, and were meant to further prove our abilities within this project. Two were of different aspects of narrative work within games, one of creating assets for a dilapidated environment, one of creating supportive tools for technical development, and one of creating a solid audio asset pipeline that could help simplify the overall workflow. Our combined variation of interests and research focuses helped us create the proof-of-concept known as *Through the Lens*.

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1 Introduction

1.1 Tagline

Through the Lens is a 3D Narrative Exploration game that aims to bridge the past and the present through memory, media, and different perspectives.

1.2 Game Context

Players play as Stephanie, who has come to retrieve what her family lost. The apartment complex has been abandoned for 40 years, and all she has to navigate is an album of her grandfather's photos. The player is tasked with finding each spot where a photo was taken, and looking back at that captured moment. Doing so is how they navigate through the environmental barriers and progress both through the level, as well as progress their own understanding of the narrative. Their secondary goal is to find the sentimental relics Stephanie's family left behind by following the stories in the photos surrounding the moments they were taken. Through these, both the player and Stephanie may come to learn what it is her family left behind in the evacuation.

1.3 Learning Objectives

Through the Lens was conceived by two narrative-driven designers. While the team that formed around them might not have had the same passion for or experience with story-heavy games, this project proved to be an opportunity to both challenge personal limits and to explore vested interest in genre combinations and storytelling in games.

Wren's interests lie in creating a low-pressure game that can be cathartic to its players. Their overall goal is to one day make games that are frequently loved in children's hospitals, acting as an escape from the gloom that comes with being sick. With *Through the Lens* specifically, they wanted to translate an abandoned, apocalyptic setting into something that wasn't full of horror or gritty elements, but rather something that could be explored for curiosity's sake. Their drive for creating games that players can escape into is what led them to researching ways to create enjoyable adventure games with satisfying narrative, similar to how adventure movies can distract the viewer from real life for a few hours.

Gavriel believes that narrative is not just how we understand the world, but it's also how we understand each other. While each storytelling medium has its own nuances, games have always appealed to Gav because the interaction allows participation, not just observation. Answering the plea for empathy, games also allow players to walk a mile in someone's shoes more closely than we have ever been able to. This potential is what steered Gav's research towards narrative design patterns and devices that facilitate embodying perspectives outside your own, all in hopes to make the world a better place through compassion.

Abby wanted to shift her focus away from the programming discipline. After getting her bachelor's degree in computer science, she realized that she wanted to do something other than be a developer. Her main goal was to lean further into her passion for visual creations by creating an intriguing environment for players to enjoy. Creating the aged and decayed environment for *Through the Lens* offered an extra layer of challenges to overcome. The world in-game could not just be built using cookie-cutter assets, for most 3D artists do not create their works based on ruined and worn out objects. Realizing this is what steered Abby's research into the different techniques that could be used to edit existing 3D models and textures.

David wanted to make a game with tangible depth and specific parts that he could take ownership of. To meet those ends, David took on the role of lead sound designer for the team. Sound is an integral part of any game. It has the power to ground actions, establish the setting, create a mood, and more. David has a long-term goal of working as a technical sound designer in the games industry, so this position on the team provided a great opportunity to begin understanding the skills needed for the role.

Alfie wanted to challenge himself in building mechanics and systems that related to narrative games, since all prior experiences are all somehow combat related games. Shifting focus to something that he had never tried before is a perfect opportunity to build and design differently, from a narrative-focused perspective. Knowing the fact that designers are good communicators that work with people from multiple backgrounds and disciplines, he also wants to enhance his understanding of tool development, as tools play an important role in game development, but are usually neglected.

As individuals coming together, it was inevitable for our personal passions to coalesce into something new and different than what we expect. However, at its core, our expectations for Capstone were framed by what our Professors told us in our first week of capstone courses: *Amuse Bouche*. While we may have strived to do our best, we must internalize that the end product is going to be a prototype, and inevitably will be a flawed attempt at greatness. There will always be more to do, always more to improve on. But this grounding phrase, *Amuse Bouche*, acted as a shorthand reminder to focus on the core goals of the project. What we would make would not be a fully polished product ready for publishing. It would be a proof of concept with the primary purpose of being a rich learning experience for each of us. All of us hope to improve in areas of long-form game development, whether it's more experience planning in an agile environment, practice in synthesizing various areas of development, or becoming more comfortable with failing quickly. Ultimately, our Capstone should be an enriching experience where all of us become better because of it. That is what success looks like for us.

1.4 Resulting Approach

When we sought out to create a narratively strong puzzle game, we had established some expectations as to what the minimum end product could be that would still fulfill our goals in a proof of concept.

- 1) Part of the game's initial pitch was a mechanic where you lined up a photo with where it was taken, and it would restore that slice of the world to what was captured in that photo. As part of our MVP, we wanted at least one rich interaction, demonstrating this sense of turning back time and bridging the past to the present.
- 2) To deliver on our goal of using the past to understand the present, our next box on the checklist became one environmental puzzle that represented how the exposure to and the understanding of the past translated to progression through the present.
- 3) We had a lot of ambition at first—sprawling cities, and various media left behind to tell the stories of the people who had lived there. But, given our scope, we embraced a more personal focus, figuring that if we were only going to get to do one sequence, then we might as well make it emotionally compelling. That translated to at least one sentimental relic for the player to collect.
- 4) We had also initially pitched the game as a kind of investigation of circumstances, so we made it an aesthetic goal to have a level that felt lived in, almost still warmly intimate. And we also wanted our user interface to reflect whatever brought our players to this place.

The members of Hungry Turtle Studios embarked on individual research to support their own project focuses, informing the design and development processes of the project. Other research was conducted to support auxiliary areas, such as user research and cultural history (See [Section 3: Background Research](#)). All of this research supported a game design that made it part way along the trajectory to become a dynamic device for compassion and empathy. This also supported our technical design, which utilized multiple cameras and states within a Single Responsibility Principle to lay the framework for a scalable script-focused architecture. These were supported by a production process that reflected a strong connection to an interactive core derived from our game goals, allowing for flexibility of our scope and a strong connection to our original concept. Our playtesting focused on player experience with this experimental mechanic, and was largely focused on fine tuning our unique interaction.

At the end of our time on this project, we can identify a plethora of takeaways from each and every area of development: accomodating for scope changes; more rigorous communicating and sprint planning; earlier creative decisions driving concurrent technical and creative development; more substantive differences between public builds to capitalize on playtesting feedback; more internal QA among all members. However, our diligent and optimistic committee members and community have encouraged us to take pride in our mistakes, treasuring lessons learned as valuable tools to inform future work. This project may likely not be developed any further, even though the designs of this proof of concept were guided by the grandeur conceived through the creative side of individual research. But the project will live on through the valuable experience it has gifted its developers and the community which supported its growth.

This left us concluding through our postmortem that *[summarize the relevant section]*.

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2 Audience, Genre, and Influences

2.1 Audience

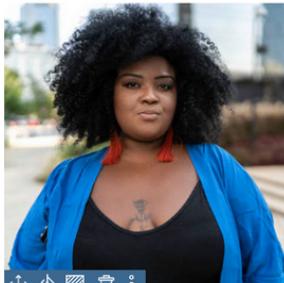
Our understanding of our audience began as relative to games in our intended genres and spaces, but developed into an understanding of different player archetypes.

Initial research left us with an understanding that players who liked slower-paced story games (see [Table 1](#)) would like ours. The lack of specificity was not a noticeable fault until we began our background research into player motivation (see [Player Motivation to Inform User Research](#)), where, in the practice of making Personas (see [Personas](#)) we realized that we did not know on what grounds to narrow down the demographic. Companies such as Quantic Foundry provide some free resources and look into their data to reflect their reports, but, even then, it is nearly impossible to access the player demographics for all of the games in our space. So, we took to Quantic Foundry's framework (see [A Motivational Model of Video Game Engagement](#)) to establish some basic archetypes for our types of players to then translate into sample users.

We concluded that of the 9 archetypes presented through Quantic Foundry's resources, the two whose values were most aligned with our game's design were *Gardeners* and *Slayers*. We matched the Gardener's preference for methodical task completion with the following tasks presented to the players: trace the location of where each photo was taken, and collect all relics. Additionally, the abandoned, empty air to the game's environment is compatible with their preference for a quiet, relaxing aesthetic. On the other hand, we matched the Slayer's desire for a strong creative vision and a curated narrative experience with our game's design, from more overt cinematic cutscenes to diegetic narrative folded into every layer of the game.

Jay Jacobs (Gardener)

Completion | Discovery | Story



"I like taking my sweet time turning over every stone, experiencing the game to its fullest."

Age: 29

Gender: Woman

Education: Masters

Work: Financial Manager, \$82k

Marital: Fiance, No Kids

Location: Boston, MA

Favorite Games



Criteria

- Compelling characters stories and designs
- Satisfying feedback for advancement
- Realistic mechanics and procedures

Frustrations

- One dimensional writing
- Pacing not in player's control
- Stagnant mechanics

Motivations

Jay plays PC games when she's in the mood to immerse herself in a compelling story, but not to deal with actual people. On nights when Jay has the patience for reading, she'll pick up a game off her backlog or wish list and give it a good try, seeing if the story draws her in enough to capture her interest. She enjoys uninterrupted stretches of playing because she enjoys exploring all the nooks and crannies, not wanting to miss any intentional details.

Jay's favorite game is *Fire Emblem: Three Houses*. She enjoys interacting with her friends and online community about the interesting characters and world lore. She finds enjoyment from being a completionist, but is not necessarily an optimizer. So long as something interests her, she's willing to be patient and thorough.

Phil Kirk (Slayer)

Fantasy | Story | Destruction



"I like games that make me forget how long I've been playing them. like I'm caught up in a good movie."

Age: 23

Gender: Man

Education: Bachelors in Progress

Work: Grocery Store Clerk, \$24k

Marital: Single

Location: Spokane, WA

Favorite Games



Criteria

- Immersive cinematic moments
- Rudimentary control scheme
- Tangible progression of understanding

Frustrations

- Overstimulating soundscape
- Dull or barren environments
- Too much suspension of belief

Motivations

Phil plays Switch games to decompress from work, after wishing time would pass by faster, and now he gets to enjoy peace and quiet. Phil doesn't like planning out his progression through the game, but prefers to follow where the game tells him to go. He lets his gut choose if a game piques his interest. He doesn't mind shorter spans of play, because when he gets back to the game it'll still encourage him of where to go or explore next.

Jay's favorite game is *NUTS*. He enjoys letting his curiosity naturally guide him, with more subtler nudging and guidance from the group, less heavy-handed than kids games. Phil doesn't like convincing himself to play games or even finish them, he wants the games themselves to do that.

Figure 1. Example Persona of the Gardener Archetype

Figure 2. Example Persona of the Slayer Archetype

While we have established that our game would most likely appeal to Slayers and Gardeners, it is still ambiguous as to which demographics these players likely belong to. We approached the challenge of identifying these players from a different angle: “Who is the story written for?” The answer to that is, unfortunately, also open ended. One answer may be primarily young adults (as is the protagonist), but, really, anyone who has dealt with complicated familial relationships and has had to cope with gray areas with loved ones. However, the game has the player looking 40 years into the past, which is longer than the aforementioned young adults have been alive. However, there is a fair case that a game design pattern such as this may also be received by older players. Conversely, while we could justify that the narrative content may be more appropriate for young adults, we observed children enjoying the gameplay loop (see [Section 8.2.8](#)).

While we have not found much success in narrowing down the demographic through market research and our user testing is not as broad as it ideally would be, we may more confidently speak to the types of players who the game caters to. *Through the Lens* is for anyone who likes the puzzle of matching up photos with where they were taken, and it’s also for people who want to practice compassion, empathy, and understanding for complex characters.

2.2 Genre

We concluded on the genres of *3D Exploration*, *Narrative*, and *Puzzle* because a product which embodied the values of all three would be conducive to each of our personal goals for a narrative-focused game. Choosing these genres did not come without an acknowledgement of risk and reward.

3D Exploration games may allow satisfaction for players who prefer to progress at their own pace in a manner complimentary with detail-heavy design. However, executing on these goals well is very resource-intensive, and the demands of dynamic narrative exploration are more complicated than a more linear experience.

The *Narrative* genre welcomes the game concept with open arms, as meaningful interaction and intentional narrative throughout many facets of gameplay is part of our game’s core identity. However, we understand that a heavy narrative focus was not for everyone. Additionally, from a design perspective, the easy way to “do” narrative is to just front-load the player with text and call that storytelling. It would require a coordinated effort to integrate narrative throughout the game to match design expectations.

The *Puzzle* genre is arguably the furthest away from our game’s core, but the team was inclined towards barriers as a mode to form parallels between the player character’s experience of using photographs to progress their mental understanding of the story and the player’s experience of photos tied to their progression. However, much like the previously mentioned pitfalls expressed, implementation of meaningful puzzles is difficult, and key-door type puzzles are often the default encountered. Furthermore, puzzles run the risk of frustrating players and interrupting immersion.

2.3 Market Influences

<u>PRIMARY INFLUENCES</u>		
NAME	SIMILARITIES	UNIQUE DIFFERENCES
Viewfinder ¹	3D; First Person POV; Photo Superimposition	Reasonably finite amount of toggleable options, rather than creating what was not already there; narrative design.
What Remains of Edith Finch ²	3D; First Person POV; Puzzles; Familial Themes; Protagonist Related to NPCs; Environmental Storytelling	Relics; Retaining original perspective as vignettes are observed.
Tacoma ³	3D; First Person POV; Time-Bridging Mechanics	Historical fiction instead of sci-fi; Family instead of unrelated crew members.
<u>SECONDARY INFLUENCES</u>		
Firewatch ⁴	3D; First Person POV; Handheld object is vessel for personal connections	Urban decay rather than full wilderness; No one alive around you.
Gone Home ⁵	3D; First Person POV; Familial Themes; Protagonist Related to NPCs; Environmental Storytelling	More abandon, less horror. Different ways to connect with past events at charged locations.
Dear Esther ⁶	3D; First Person POV; Interpersonal Relationships; Environmental Storytelling	More urban setting; bridge time
Return of the Obra Dinn ⁷	3D; First Person POV; Vignette-Style Narrative, Flashes of Memory	Web of characters limited to family; Tone & setting

¹ <https://twitter.com/mattstark256?s=09>

² <http://edithfinch.com/>

³ <https://tacoma.game/>

⁴ <https://www.firewatchgame.com/>

⁵ <https://gonehome.com/>

⁶ <https://www.thechineseroom.co.uk/games/dear-esther>

⁷ <https://obradinn.com/>

Everybody's Gone to the Rapture ⁸	3D; First Person POV; Reenact the Past; Abandon; Storytelling Media	American setting instead of English village; Different kind of mystery
Superliminal ⁹	3D; First Person POV; Surrealism; Liminal Spaces	Less free-form changes to the environment; More explicit narrativity
NUTS ¹⁰	3D; First Person POV; Use of Photographs, Observational, Liminal Spaces	Residential setting instead of wilderness; People instead of squirrels

Table 1. Primary and Secondary Influences

2.4 Conclusions

Within the genre space of 3D Narrative Exploration Puzzle games, there are a number of games that accomplish our design goals well. We took inspiration from many, but also aimed to innovate on the genre trends. Namely, we sought to combine the temporal manipulation and reenactment of *Tacoma* with the familial themes explored in *What Remains of Edith Finch* into a game about acknowledging and understanding nuances.

Our design pattern is distinguished by its degree of conscious choice. The location of the photo is significant. Who took the photo is significant. The content in the photo matters. The conversation surrounding the photo matters. The time in which it was taken relative to the evacuation matters. Every detail within the content plays to the symbolism, and compliments the game design and narrative design in order to make this experience uniquely cohesive.

A specific goal for innovating within this space was making the player character's perspective feel valuable and necessary to retain while looking through the lens of someone else's perspective. One trend we observed was for protagonists to be a blank slate, or their identity or stakes were not very relevant. So we decided our focal point to the story was going to be related, and that we would take a specific approach to our designs. We weren't going to have the player fully inhabit other characters' perspectives. Instead, to reflect Stephanie's own emotional struggles, our design approach reflects a more observational dynamic, where you watch, listen, practice compassion, and accept that things happened the way they did, for the reasons they did.

⁸ <https://www.thechineseroom.co.uk/games/everybodys-gone-to-the-rapture>

⁹ <http://www.pillowcastlegames.com/>

¹⁰ <https://nuts.game/>

3 Background Research

3.1 Player Motivation to Inform User Research

3.1.1 Mechanics, Dynamics, and Aesthetics¹¹

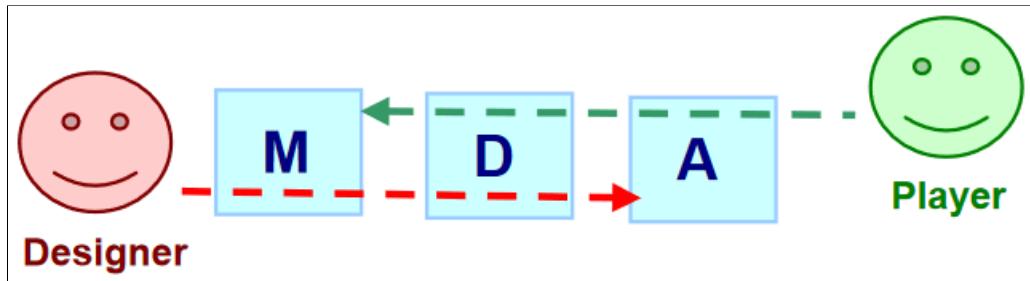


Figure 3. The designer and player each have a different perspective.

Hunicke et al. provide a lens through which we can view the relationship between components of the game (mechanics), the player’s interaction with the run-time behavior (dynamics), and the desirable emotional responses evoked within the player (aesthetics). This lens has proved useful in anticipating how changes affect the player experience. One such example is how a more or less forgiving radius for the photo alignment mechanic would likely correlate to a disruption to the immersion and realistic procedures (in the case of “too” forgiving), or a different kind of disruption to the immersion, where the requirement is too precise and steals the player’s attention away from the task at hand. This foresight compliments a formal, iterative approach very nicely for tuning’s sake, though also from a conception point of view. The practice of embodying players through aesthetic goals and working backwards to draw out dynamics via specific mechanics can be a very powerful tool when well versed in empathy. This framework effectively steers conscious design in support of player experience goals by keeping those goals at the crux of designs while mechanics are reverse engineered from intended experiences.

3.1.2 Intrinsic and Extrinsic Motivations¹²

Ryan and Deci provide a lens on general human motivation connected to learning that we can apply in creating appropriately paced content. A spectrum of motivations is established, with orientations encompassing a range of intrinsic and extrinsic varieties. Ryan and Deci found a connection between the fulfillment of core psychological needs (*competence*,

¹¹ Hunicke, Robin, Marc LeBlanc, and Robert Zubek. “MDA: A Formal Approach to Game Design and Game Research.” In *Proceedings of the AAAI Workshop on Challenges in Game AI*, 4:1722, 2004. <https://www.aaai.org/Papers/Workshops/2004/WS-04-04/WS04-04-001.pdf>.

¹² Ryan, R. M., and E. L. Deci. “Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions* 1.” *Contemporary Educational Psychology* 25, no. 1 (2000): 54–67.

autonomy, and *relatedness*) and internalizing extrinsic motivation. It was required that competence and autonomy be fulfilled in order to enhance intrinsic motivation. Conversely, unfavorable conditions may undermine the process of internalization. A sense of relatedness was pointed to as the impetus for performing extrinsically motivated behaviors, though did have the same effect on integration and internalization as the other two stated needs. This framework advocates for supporting players as they are exposed to new ideas and skills with opportunities to satisfy the needs for connectedness, effectiveness, and agency.

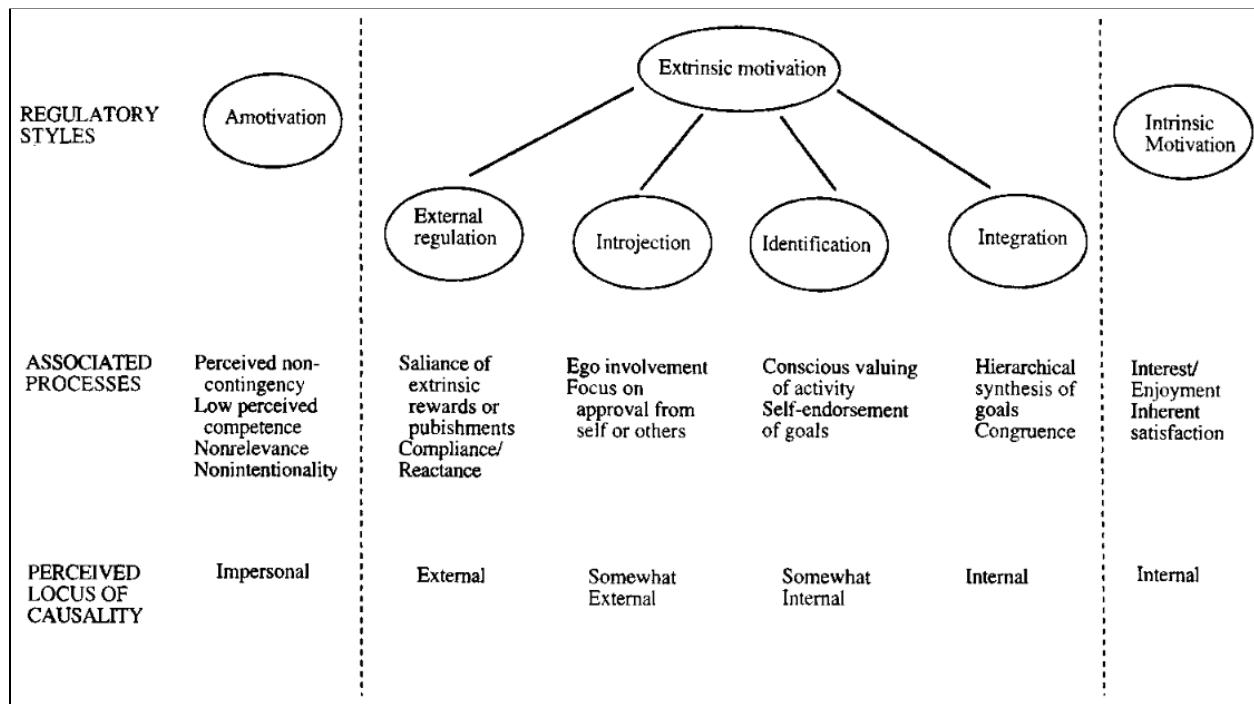


Figure 4. A taxonomy of human motivation.

3.1.3 A Motivational Model of Video Game Engagement¹³

The research of Przybylski et al. takes Ryan and Deci's understanding of motivational needs and behaviors, and explicitly applies them to the concept of games in a way that supports immersive conditions conduced psychological satisfaction. This research observes that the salient pressures for rewards, punishments, and self-esteem as related to video games fosters controlled forms of extrinsic motivation. More long term, this crossroads of having to play versus wanting to play results in a difference of game enjoyment and post-play mood, as well as higher engagement framed as obsession. Rehashing the psychological lens with a new application for immersion guides how to more specifically apply previous work in the field to gaming, which is the use of immersion as a key moderating value. With this example, we as

¹³ Przybylski, Andrew K., C. Scott Rigby, and Richard M. Ryan. "A Motivational Model of Video Game Engagement." *Review of General Psychology* 14, no. 2 (June 1, 2010): 154–66.
<https://doi.org/10.1037/a0019440>.

designers can work to create a product with high need satisfaction so as to create a game which gamers want to play not by obsession, but by choice and volition.

3.1.4 Gamer Motivation Model - 12 Motivations^{14,15}



Figure 5. Quantic Foundry's Model of 12 Motivations

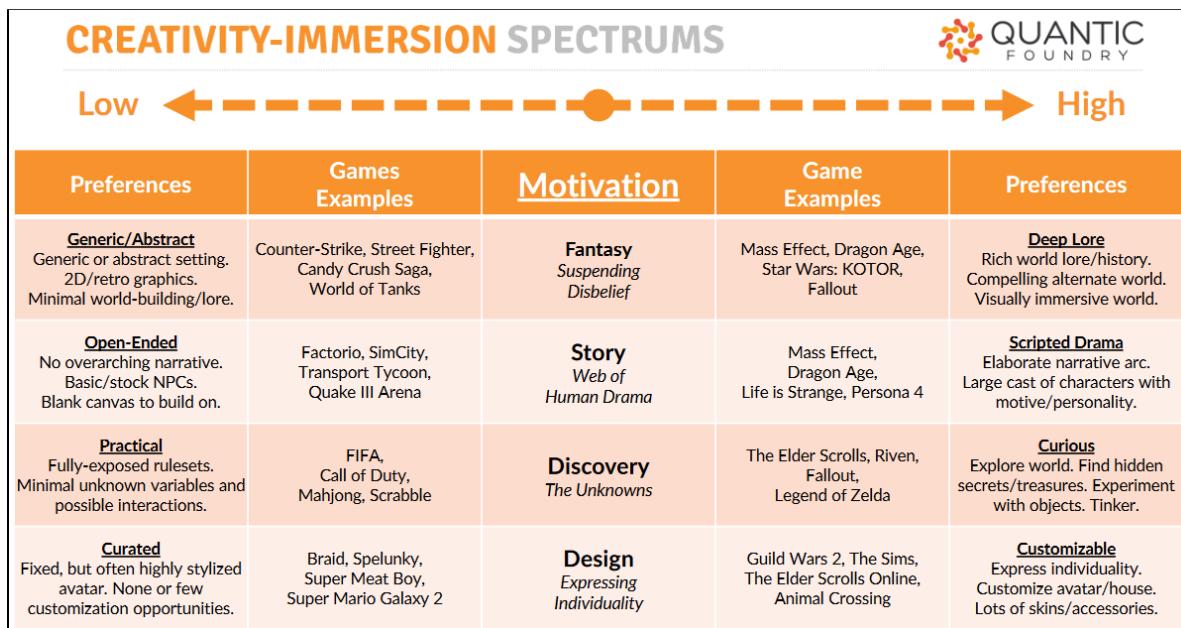


Figure 6. Focusing on the Creativity-Immersion Motivations.

¹⁴ [A Deep Dive into the 12 Motivations: Findings from 400,000+ Gamers](#)

¹⁵ [The 9 Quantic Gamer Types](#)

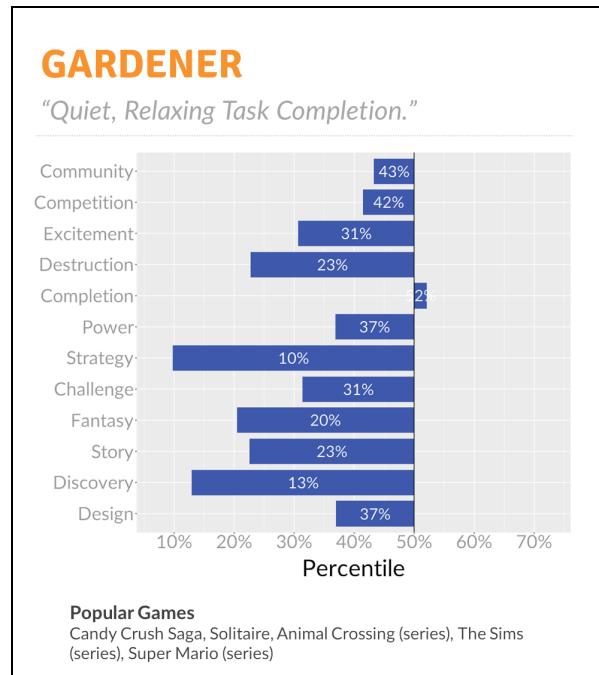


Figure 7. Gardener Archetype visualized by Quantic Foundry

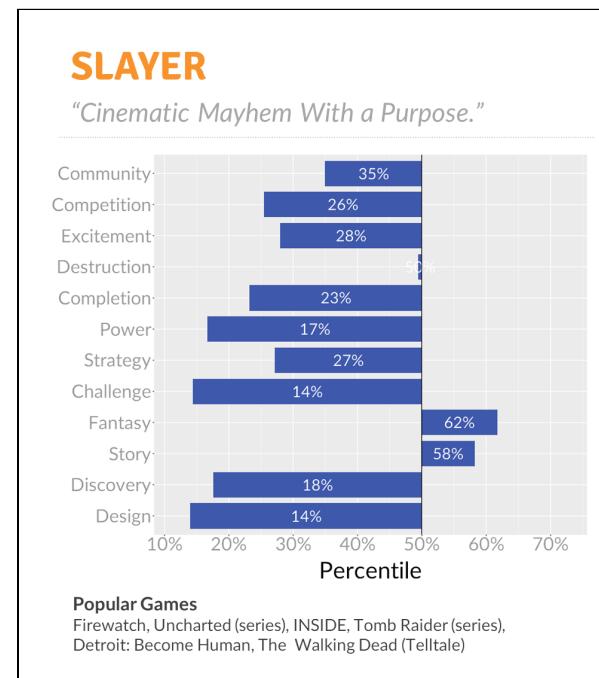


Figure 8. Slayer Archetype visualized by Quantic Foundry

Figures 7 and 8. Quantic Foundry’s Archetypes Compatible to Our Game

Through the Lens - Through the Lens of the 12 Motivation Types

Low	Medium	High
<p>Power (achievement)</p> <ul style="list-style-type: none"> • Only thing that changes is you. 	<p>Design (creativity)</p> <ul style="list-style-type: none"> • Freeform Order/Pace • Open to Interpretation 	<p>Fantasy (immersion)</p> <ul style="list-style-type: none"> • Historical Fiction • Deep Lore
<p>Challenge (mastery)</p> <ul style="list-style-type: none"> • Get used to the mechanic, that's it. 		<p>Story (immersion)</p> <ul style="list-style-type: none"> • Narrative Discovery • Scripted Drama
<p>Strategy (mastery)</p> <ul style="list-style-type: none"> • Minimal variation • No decision making 		<p>Discovery (creativity)</p> <ul style="list-style-type: none"> • What's Changed? • Explore Environment
<p>Competition (social)</p> <ul style="list-style-type: none"> • Puzzles not based on reflexes + Solo 	<p>Community (social)</p> <ul style="list-style-type: none"> • Discuss Story • Compare Order 	
<p>Destruction (action)</p> <ul style="list-style-type: none"> • Minimal Environmental Altering, only Toggle 		<p>Completion (achievement)</p> <ul style="list-style-type: none"> • Every Photo & Relic • Fill in the Blanks
<p>Excitement (action)</p> <ul style="list-style-type: none"> • Very Slow Paced • Not many Thrills 		

Table 2. Through the Lens through the lens of Quantic Foundry's Motivation Types

Determining the demographic information for any given game is impossible without the player data. Even for companies such as Quantic Foundry, it is only partially complete. Demographic data could have been gathered through playtesting surveys, but we did not capitalize on the opportunity to begin correlating enjoyment to specific demographics. However, this connects to our future work of intending to test with a broader audience of people during initial prototyping stages in order to inform our target audience conception. Ultimately, collective trends with player motivation types and games shown to be strong in those categories can be useful for determining player types with which our prototype would likely find success, which was an improvement to what our previous understanding was.

3.1.5 Personas^{16,17}

Nielsen's comprehensive framework on Personas offers a useful tool in optimizing designing around target audiences and types of players. Hindsight is 2020; this tool was researched only two months out from the defense date, so it proved useful in characterizing the game's target audience, but did not get to fulfill its purpose within the design process, which is largely the main appeal. Beyond allowing developers to focus on a sole user representative of many desired player experience goals as a form of shorthand, Personas also allow designers to evoke empathy throughout the design process for the user. Furthermore, the use of a Persona translates the rather generic "user story" into a framework that can be stepped through with narrative principles in order to develop problem solving lenses. While these characters who are reflective of our user research came late in the process, studying this framework allowed us to organize the priorities identified and distilled from our research. Future work will largely benefit from this practice.

3.2 Contextualizing the World Through History

3.2.1 Where Did Everyone Go?

When considering the context surrounding the concept of the game, we had to make a decision regarding the sudden abandonment of the city. Common causes that we knew about, such as natural disaster, war, or illness, would only push people away for so long before the citizens came back to search for their belongings and rebuild what was lost. We needed a reason for people to stay away, at least for a few decades, and have the resulting area be relatively safe to explore. When researching the causes for currently abandoned towns in the US, we found that a lot of them had simply run out of the desired resources that encouraged people to live there in the first place.



Figure 9. Bodie, CA (left) and Centralia, PA (right) are prime examples of abandoned towns

¹⁶ [Personas – A Simple Introduction | Interaction Design Foundation \(IxDF\)](#)

¹⁷ [Personas | The Encyclopedia of Human-Computer Interaction, 2nd Ed.](#)

The more interesting ones were plagued with bad luck, such as Centralia, Pennsylvania and its underground coal mine that has been on fire since 1962, or Cahaba, Alabama that was struck with fierce flooding in 1900¹⁸. What stuck out from these, however, was that even in the emergent panic that the events would cause, people still had the ability to pack their belongings or return later to reclaim them. We desired a more rushed, drop-everything-and-run feeling to fully explain why such a semi-preserved time capsule was sitting without much human intervention.



Figure 10. Chernobyl apartment image, 20-year time difference

This is when we thought to look into how Chernobyl was handled, and the remains of those who left. A nuclear meltdown would be an emergency in which you would only grab the essentials, and the residual radiation would deter anyone from returning to the town for quite a while.¹⁹ Similarly, Chernobyl's exclusion zone is now safe enough to visit with minimal protective gear, and would allow us to explain why the player could return to the city and still be completely alone. Fukushima was another nuclear disaster that we considered as an influential source, however since it was only recently that the disaster occurred, there wasn't enough separation from the nuclear radiation to properly pull inspiration from.²⁰ We could examine how nature regrew over parts of the Exclusion Zone around Chernobyl, but the land in Fukushima is still very hazardous to all plant and animal life, and as a result would be far too eerie for our intentions.

¹⁸ Shoshi Parks and Sarah Medina, "12 Creepy Ghost Towns in the USA You Can Actually Visit," Time Out United States (Time Out, October 15, 2021), <https://www.timeout.com/usa/things-to-do/ghost-towns>.

¹⁹ "Chernobyl Accident 1986," Chernobyl | Chernobyl Accident | Chernobyl Disaster - World Nuclear Association, 2022, <https://world-nuclear.org/information-library/safety-and-security/safety-of-plants/chernobyl-accident.aspx>.

²⁰ "Fukushima Daiichi Accident," Fukushima Daiichi Accident - World Nuclear Association (World Nuclear Association, 2021), <https://world-nuclear.org/information-library/safety-and-security/safety-of-plants/fukushima-daiichi-accident.aspx>.

The next decision we had to make was the location. Our intentions for the family was to have a tight-knit family living together, so that we could explore the intricacies of a multigenerational home's dynamics. Culturally, this led us towards more latin-based settings, such as Italy's small streets or Mexico's family abodes. Placing us in the US would allow for a much easier understanding of the government's thought process, and so our final tally was within the US Southwest region. With a large Latine population and a large importance on cultural continuation, we could create a setting that encouraged family. Our insistence on New Mexico in particular is based on a specific geographic need with nuclear power plants: Water. Luckily, New Mexico has a river that runs straight down the middle, and could be used for the cooling systems in a power plant.²¹

This was all great for understanding why someone would leave a home so abruptly, and where they lived. But what is the importance of it?

3.2.2 What Led Up to the Fear?

With Chernobyl only 30 years ago and still somewhat radiated, we wanted to shoot for a reasonable time frame where the player could explore easily, and the grandfather would still be alive (even if on his deathbed). The 70s came up as a possible time frame, especially since nuclear power and reactors were still somewhat new around then, and information was scarce. We could understand how easy it would be for trusted figures, such as the government, to manipulate negative opinions of nuclear power, especially when fossil fuels were still extremely trusted. That fear mongering would only be heightened by the state of the world, as the US had demonstrated to everyone the power of a nuclear bomb and the Cold War was in full swing. People were already terrified of what nuclear power could do to them if handled incorrectly, how much work would a power-hungry capitalist have to put in to shift their focus back to fossil fuels? The only possible tastes of nuclear destruction were the bombs dropped in Japan and for some the information of testing around islands in the Pacific. Chernobyl wasn't for a few more years, and it felt right to have the end of this time capsule be around 1979, so there was no chance for any influence from Ukraine's catastrophe. Our intentions for the full game were to have prolific propaganda published by the mayor's office and the state department against the nuclear power plants, in the hopes of returning things to fossil fuels. This would bolster that fear even more, to the point where if the government said something along the lines of "The power plant is collapsing and can be a danger to your health, we recommend exiting our perceived exclusion zone with an x mile radius around the power plant (which just so happens to be the entire city)", then everyone would listen dutifully.

3.2.3 Who Was Your Grandfather?

We wanted him to be a reasonable age within the photo's time frame, while still having the "American Dream" plastered across his forehead. This meant marrying and starting a

²¹ "U.S. Energy Information Administration - EIA - Independent Statistics and Analysis," U.S. nuclear industry - U.S. Energy Information Administration (EIA) (U.S. Energy Information Administration, 2022), <https://www.eia.gov/energyexplained/nuclear/us-nuclear-industry.php>.

family as soon as he could, and having a job that positioned him well in the city. Given this, we estimated that he would be 32 years old in 1979 with a 14 year old as his oldest child and a 4 year old as his youngest. This would have made him 18 years old in 1965, during the Vietnam War draft. We recognized that his patriotism would have made him love his country and blindly follow his government, however we didn't want to broach the concept of PTSD when he returned home and interacted with his family. After a bit of research online and referencing family members who were also able to avoid the draft (along with stories of struggle and pain for their friends who were drafted), we found that the most common ways of avoiding the draft were college and being the sole breadwinner in a child-filled family. This led us to changing his priorities from his country to his government and to wanting to have the ability to make others believe in the government. As a result, he starts a family right away with Amanda and Ben is born shortly after their wedding. He balanced getting a business administration degree and part time work at the mayor's office, before being hired full time. His priorities for the government and his work only grew from there, and his family only became a priority later on in the 70s.

3.3 Houdini

Houdini is a powerful 3D modeling software that contains procedural art tools. These art tools are used to make Houdini Digital Assets (HDAs) that can be directly manipulated in game engines such as Unity and Unreal. There is also a toolset known as SideFX Labs that contains tools made to hasten the design process. Some of these tools include (but are certainly not limited to) the simple rope wrap tool, several tree generation tools, and a road generation tool.

While testing using HDAs within Unity, we learned that none of this was really translatable to Unity in a timely manner. However, it was helpful in understanding how Abby's research into editing 3D assets could grow.

3.4 FMOD

The team needed a method of integrating sound assets into Unity. FMOD, being a tool for doing just that, is the solution we chose for that problem. Several members of the team were already familiar with the software, further cementing its place in our audio pipeline. The non-commercial version of FMOD and its Unity integration plugin are free, so we could use them with no additional costs to the team.

The primary benefits of FMOD over Unity's own audio integration system is that it has tools for building adaptive and parameterized sounds that are easily accessible in the Unity engine. Sounds can be easily incorporated into scripts, and FMOD's parameterization lets us easily modulate factors such as volume or play rate whenever necessary. The popularity of FMOD also works in our favor. There is no shortage of online documentation and forum posts to draw knowledge from.

In our audio pipeline, FMOD will be the staging ground for edited sound assets moving into the engine. Once in the FMOD project, assets will be organized into events and timelines. Once built in the editor, they are directly transported into the engine through the FMOD for Unity plugin.

4 Production

4.1 Overview

We approached our overall design plan with scope and personal power in mind. The concept of a photo-focused puzzle game can be expanded or reduced as we could attempt, and so when deliberating our Minimum Viable Product we had to take a lot of who we are in mind.

There were a few things that constrained us from the get go: There were only 5 of us, all of us had other coursework and/or part time work to consider, we only had two semesters to work on everything in addition to our outside work and any personal complications that may arise (mental health, job searching, physical health), and we were limited already in communication due to the pandemic.

Thankfully, we recognized these constraints early on and this, plus the knowledge that each of us have focused on the different disciplines of game development, influenced the growth and limitations of the concept into the playable demo we wanted to end with. Our team is very creatively minded, and so a story-rich, narrative experience that remained short and sweet was formed from the simple “Multiple Medias and Time Fluctuation” concepts that drove us here.

The combination of who our team is, what we scoped ourselves down to for success, and how that all progressed over the course of the year were all keys to our success.

4.2 Team Organization

4.2.1 Team Formation

The week before classes started, overseeing faculty professors Elouise Oyzon and Erika Mesh facilitated capstone concept pitches in the spirit of wanting teams to be formed Day One. A majority of the students without teams attended the zoom call and expressed their concepts to see what their faculty and classmates thought.

Wren pitched a concept on exploration of an abandoned city, where the player has to uncover the secrets of who once lived there. The core mechanic idea for the concept was a photo/picture matching puzzle, where the player could reform landmarks/desired pathways by holding up images found among the remains of the city. They were inspired by this gif on Twitter from a game currently in development, Viewfinder: [Matt Stark on Twitter](#).

Professors Mesh and Oyzon liked the concept, but commented on the missing story aspect, as the narrative of the world would be very important within the scope of the concept.

Gavriel then pitched a concept, where the focus would be on switching from one medium to another through a game's mechanic, and such would help evolve the storytelling within the gameplay. They highlighted how different mediums take different views/key information on the same story, and that pushing the mechanics into a themed form following those mediums would display that more clearly to the player.

Again, the faculty liked the concept, but believed that the scope for it would be too large for the year allotted for capstone.

Professor Mesh suggested combining this concept with Wren's concept, as the medium switching had the potential to fit in well with the idea of personal belongings to represent the long-gone owners. This way, the media-related concepts that Gav wanted to hit could be explored and the photo matching mechanic would be used as a vehicle for the player's progression.

Wren then suggested inviting Abby, Alfie, and David to the team, as they had worked with all over the past year. Abby was known for her experience in modeling, level design, and UI knowledge, and was quick to join the team. David had previous experience in game audio and programming, and joined up soon enough. The day before classes started, Alfie, who was recommended for his strong programming skills, as well as level design and UI experience, joined the team to make the final count of 5 people.

Once the fall semester started, Wren then reached out to the head of the 3D Digital Design program at RIT in hopes of advertising the team's need for a couple modelers. Mitch Phillips emailed back shortly after, and gladly joined the team as the main prop/architecture modeler. In the spring semester, David realized that the team was in need of quality foley sounds. He brought on his high school friend, Maeve Dohner from Kutztown University, who began to record and deliver various sounds for interactables.

We were a well-rounded, design-heavy team, with each developer having relatively distinct domains of expertise that allows for healthy autonomy and not reaching the "too many cooks in the kitchen" points of contention. Additionally, we all had been able to establish supporting roles to organically integrate interdisciplinary awareness into our workflow, and better allow for the separate areas of our game's development to be informed by each other area.

4.2.2 Roles & Responsibilities

As mentioned previously, every team member had a discipline that they focused on personally, and this translated well into everyone's personal roles and responsibilities. By prioritizing our roles like this instead of a round-robin where everyone has to touch everything, we were able to successfully utilize our talents and improve on what we want to do in the industry.

Wren, who had a background in supporting teams with their organizational skills and general knowledge in many game development disciplines, took on the role of project manager with secondary responsibilities in basic UI implementation and world building assistance. They helped keep the team on track for the perceived deliverables and allowed for the other team members to focus on their given tasks for the sprint/deliverable. As a team, we were able to have a constant feeling of “always moving forward” even if there were things that felt like they were pulling us back.

Alfie, who had previous experience with tools and gameplay programming, took on the responsibilities of lead programmer for mechanics, UI, and tool development. He was able to focus heavily on the technical needs of the game’s concept as well as his own research towards creating intuitive tools for the rest of the team to use. His ability to learn and produce testable mechanics quickly allowed for the team to know what our full scope could reach as well as allowed for him to transition to focusing on player feedback for success within the game itself.

Abby, who preferred to work in 3D spaces visually rather than programmatically, took on the role of head level designer, with secondary responsibilities in communicating with our external prop artist and developing the general aesthetics for the world. With her focus on building the world purposefully and making decisions on how the player interacts with it, we were able to then supplement the world with narrative build up and keep everything mechanically on track without feeling like it was all out of sync with the level.

Gav, who built their entire academic career around their drive for producing the narrative structure of games, took on the main role of overall game design with a focus of weaving narrative into every aspect.. They crafted the underlying world building aspects, who the characters were and what their roles in the world were, and what those same characters would do given the events that we had laid out. With them focusing on all of this, Abby was able to bounce her level designs around and create a more lived in world, and the audio aspects of the environment grew.

David, whose own academic background has been built around the application of audio formatting and common software engineering practices in games, took on the responsibilities of audio production and integration for the environment within the game, and secondary responsibilities of auxiliary programming for the mechanics. He manufactured the basis for key mechanics in the game and created a strong foundation of organization with all of the scripts. This kept the programming side of things relatively on-track, and when the audio aspects needed to be implemented he had the rest of the team’s work to base his cues and environmental needs on.

Our external members each were called upon for their specific knowledge in their fields. Mitch Phillips, a 3D Digital Design major at RIT, had an education revolving around the development of 3D assets for games, and wanted to extend his work there. His responsibilities were to create environmental items that could help effectively set the time period and location for the player. This helped improve overall work efficiency as the core team could then spend less time thinking about where to find similar assets online. Similarly, Maeve Dohner had experience with foley production previously, and so her main responsibility was to produce

and provide accurate sounds that the team could integrate into the overall experience. This helped keep David from having to scour the internet for the same sounds, or produce them on his own while working on everything else for the game.

Despite keeping ourselves focused on our own individual disciplines, we were able to intertwine the knowledge and create a game that couldn't be done by any one member. It takes a village to raise a game.

4.3 Risk Analysis

Risk	Likelihood	Severity	Mitigation
Illness	Very High	High	Members should closely follow RIT Covid guidelines (mask wearing, hand washing, etc.).
Burn out	Very High	Low-medium	Take a day off when necessary. Communicate with the team to prevent losing time. Consider reasons for the burnout and brainstorm solutions with the team afterward.
Injury (hand/eyes/Brain)	Low-medium	Low-high	Take a day off when necessary. Communicate with the team to prevent losing time.
Other classes	High	Medium-High	Proper scheduling will help mitigate this. When unavoidable, communicate with the team.
Part time work	High	Medium	Communicate work schedules with the team to plan around.
Communication issues (delays, Internal/external member, committee)	Medium	Low	Don't allow external communication issues to be bottlenecks. Have other tasks lined up to do while waiting for responses.
Internet/power	Low	Medium	Case-by-case basis. Team communication will be necessary in these situations. Look to secondary workstations (i.e. grad lab) if able.
Job hunting **	High	High	Allocate time for job hunting early in the semester.
Losing resources (i.e. lost time to	High	Medium-High	Should shortcomings in development solutions be seen,

code, writing, art, or audio that did not work out)			communicate that to the team and the respective committee members in order to find better solutions.
Discovering unexpected requirements/needs	High	High	Reschedule tasks as needed. Should the needs be big enough, communicate with committee members and advisors to discuss possible changes to scope.
Writer's/Worker's block/Perfectionism getting in way	High	Medium-High	Step away from work as needed. Reach out to team members, committee members, or other students/professors for content review if needed.
Motivation drops/desperation	High	Medium	Convene with the team to discuss loss of interest and look for ways to find it again as a group.
Implementation blocks	High	Medium	Communicate problems early to the team and seek help from members or committee members as needed.
Version Control issues (merge, broken code, etc)	High	Medium	Outline proper version control procedures to the team and have information on-hand for referencing.

Table 3. Risks and Mitigation

4.4 Game Development Process

Our entire process was made with the team's abilities in mind, especially since most of our risks mentioned above were regarding the safety and wellbeing of the team. Every decision was determined under the consideration of previous knowledge, industry intentions, physical and mental limitations, and potentially unforeseeable events. We wanted to mitigate as many risks as possible when they occurred, and also have leeway surrounding them to reduce any anxieties that may arise in their presence.

Standups were held every week on Monday, Wednesday, and Friday to offset the scheduled class time held on Tuesday and Thursday. These were asynchronous in the fall semester due to conflicts with time zone differences and class schedules, synchronous in the spring semester when all members were in the same time zone. The core focus of the standups was to assess where people were on their intended tasks and whether they would be expecting any delays due to external or internal circumstances.

Communication throughout the entire year, including standups and any remote meetings, was conducted mainly through Discord for both the internal and external team

members. After a year of interacting as graduate students fully online, we were fully adapted to holding completely virtual meetings through Discord/Zoom. The team members had also all previously used Discord/Zoom for other grad school projects, and thus the decision to begin and continue communication there was simple. The trickier transition for communication was actually interacting in person once again after never seeing each other, but after a semester of being able to turn around in the lab to talk to each other, we adjusted.

Design-centered meetings were held regularly on the weekends in the fall semester, in order to extend the amount of synchronous meeting time the team had to work with. These meetings also encouraged bonding moments between the team members, as they usually lasted anywhere from 1 to 3 hours of brainstorming and decision making. During the spring semester, these meetings were reduced from lengthy weekend events to the synchronous class time on Tuesdays and Thursdays at 11am, allowing the team to have the weekend for any desired recharging or personal needs.

We defaulted to using Unity as it was the engine we were all the most comfortable using. This allowed us to expand on our current skill sets and debug any issues faster than if we had chosen a previously unlearned engine or made our own. As our team is also more design-focused, we recognized Unity's friendliness towards non-programmers as a positive aspect that everyone could work with, rather than leaving any minor changes up to the members who authored the code. In conjunction with Unity, we used GitHub for our source code control, and the companion app GitHub Desktop was the team's top choice of personal change management. All merge requests were handled during the synchronous class meetings for the increased communication abilities between members, so that any known conflicts could be dealt with before they arose and any unhandled conflicts could be taken care of immediately.

The intentions for the full year were to work on an Scrum-based sprint cycle, using Trello as the overall task management per sprint. These were poorly upheld in the fall semester as multiple members of the team were still very unfamiliar with the process, and the Trello card templates were too formal for our needs. When the spring semester began, an attempt was made to rectify the problems in both areas of management with a renewed understanding of sprints shared between members and a more casual format implemented for the Trello board. The rework to the Trello board was a minor success as the team used it more than they previously had, but by the end of the spring semester both the sprint setup and Trello board were traded away in favor of persistent work towards our final goals.

While the inconsistency of sprint management was an unfortunate failure that held us down in the overall process, the decisions for everything else led to a mostly smooth experience in terms of the game's progress.

4.5 Communication

4.5.1 Internal Team

Team Standups

All five core members were to meet synchronously five days each week for team standups. These were to be short, live updates from each member. Members would share what they have been working on, how that is going, and what their plans were until the next standup.

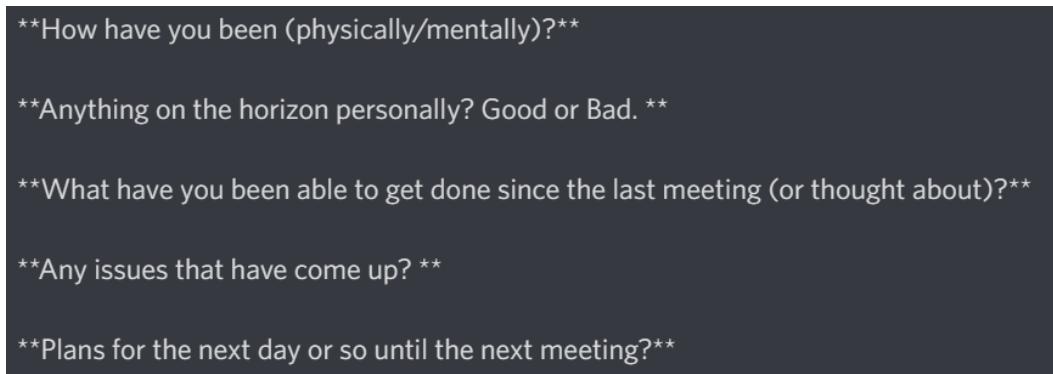


Figure 11. Template for Standup

Task Management

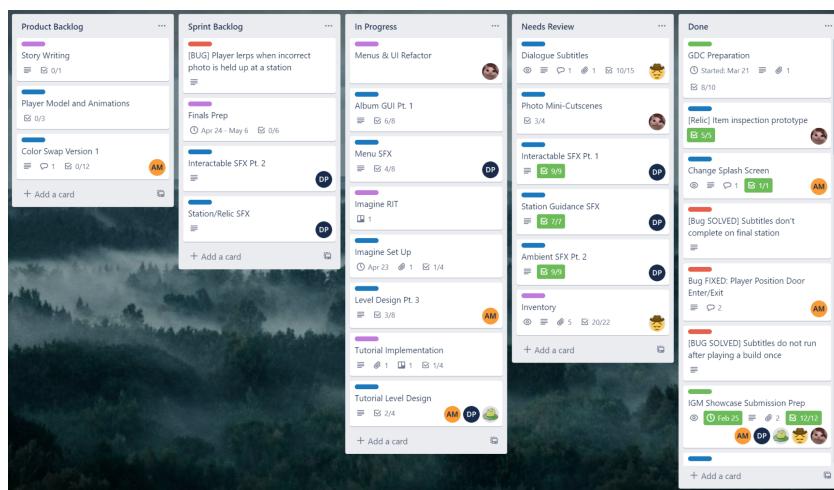


Figure 12. Trello Board

We used a single, simple Trello board to keep track of progress through sprints and update each other on what is going on. The main categories involved were (from left to right): Product Backlog, Sprint Backlog, In Progress, Needs Review, and Done. We also had categories for an archive and card templates. Notes during the standups were to be reflected within

everyone's intended Trello cards, and everyone was expected to update their own cards in a timely manner.

More can be seen in [4.6.3 Task Management](#)

Class Meetings

All five core members were expected to meet during class time on Tuesdays and Thursdays for in-person/online discussions and work time.

Team Discord

Discord was to be used as the primary method of communication between members. We chose Discord because it was already heavily used by every team member. It met the team's needs for both asynchronous and synchronous communication.

Physical Whiteboard

The team during design meetings would initially write up any relevant information on the team's dedicated white board in the graduate lab, and allow design-focused discussion to flow naturally based on that. All additions to the white board were potential ideas that could end up being the final design, however we separated them from the design document in case issues arose before we began testing anything.

Design Documentation

This document stands as the culmination of many design meetings held over both semesters, and was updated with the intent to further evolve the content as things progressed in the development of the game.

Pull Request Systems

Team members were encouraged to implement new code and mechanics in separate scenes within separate branches connected to the dev branch. Once the testing on that branch was complete and the code was stable, we would wait until class time to merge the branches. This allowed us very quick reaction-times to the event that something in the development branch broke (which happened at least twice). When such an event occurred, we would revert the branch back to a commit that was confirmed stable, and any changes that created conflict would either need to be stashed while the dev attempted a pull or made into a custom package that the developer with current scene control would import into the project.

4.5.2 Stakeholders

External Team Members

External team members would primarily be communicating through the dedicated team Discord and the shared Google Drive. They would also be included in the team's in-person or video meetings as necessary.

Capstone Advisors

Discord was to be the primary means of communication with email as a secondary. In-person or video meetings were held at a minimum once a week during the scheduled class times, but often were twice a week or more depending on the team's needs. Otherwise, capstone advisors may view this document to keep up to date on changes as they're recorded.

Committee

Discord would be the primary means of communication with email and Slack as alternatives. In-person or video meetings were held regularly, depending on the needs of the team and the availability of the committee member. For some committee members, this meant once every week, or every other week. During busier moments of the semester, meetings would be rescheduled to allow the committee members to address their own responsibilities. At their discretion, committee members could view this document to keep up to date on changes as they're recorded.

Playtesters

Playtests were held in multiple locations. The most frequent location was the IGM Grad Lab. Other locations included the lab for the RIT Brick City and Imagine playtesting events. Any playtesters that wished to try out our game who cannot make it to our in-person events were given either a web build or a zipped file containing our most recent Unity build. Testers were also given access to surveys during our playtests that would open when the game was completed by said testers.

4.6 Planning & Scope

4.6.1 Overall Priorities

Our highest priority was creating a single, content-packed level where the player could fully experience our core photo mechanic and unravel the narrative as they played.

We limited ourselves to a single level to reduce the amount of buildings, puzzles, and characters we would have to design. Limiting the level to one apartment building allowed us to hone in on a single extended family to build the narrative around.

Most of the content in the level was around the stations for our photo mechanic. Stations are the small scenes that the player swaps the contents of when using the photo mechanic. Our puzzles rely on stations and the player changing their states between past and present.

Because stations have two distinct states (past and present), another one of our priorities was to clearly communicate to the player when they change that state and which state the station is currently in.

Our broader goals for the overall project were to allow the player to engage with the puzzles as an outlet for the story. Each station would be catered to a specific beat, and through that the player could get a better understanding of who their family was in the past. Just like how every individual is different in their own way, we wanted to also incorporate a demonstration of how media types affect storytelling. One of the aunts might have an interest in radio work, while another has a fondness for plays, and so on. Stories are popularly told differently based on the medium they're in, and we felt that there might be something to explore there in general, as well as in conjunction with the family itself.

We really wanted to achieve the sensation of blending the past with the present, and foster a sense of empathy in the player. The context of who these characters were previously can help fill in holes regarding their current emotions towards the game's setting, and allow the player to understand everyone's personal growth during the unseen years. In order to fully realize this, we wanted to achieve a cohesive mix of surrealism alongside realism, just as the past and present would be cohesive. Our world was created aesthetically and visually with this intent in mind, and the influences (seen later in [Section 5. Game Design](#)) were filtered to create a broader vision that we wanted to meet.

4.6.2 Minimum Viable Product

Based on our desire to have a polished, narratively-strong puzzle game, we chose to narrow our scope for success down until it was simple, but impactful.

We planned ultimately for an enclosed level for the player to roam with at least a single apartment unit to promote an understanding of who the characters were on a personal level. We wanted the player to feel like someone (or an entire family) lived in that tiny apartment once upon a time, and that they had to leave before they were able to properly pack everything up.

After a few meetings of considering what the mechanic could feasibly do, we decided that a couple of story-rich stations to fully flesh out the photo-to-world matching mechanic were capable of demonstrating the current range. These would be completed for the player through the cumulative relic object associated with the small story beat the photos follow.

The ultimate goal from all of this was to tell the story of at least one family member through the combined photo puzzles, environmental puzzles, the relic, and dialogue. With the final build of the game, we learn a little about how the family treats the youngest of the family, Ryan.

4.6.3 Task Management

Trello was our primary tool for task management for project development in Unity. This included tasks on scripting, level design, sound design, architecture design, and asset integration. The layout for the board was essentially a standard scrum task board with lists for the product backlog, the sprint backlog, in progress, tasks that needed additional review, and completed. Cards were made as user stories, epics, spikes, and bugs using templates.

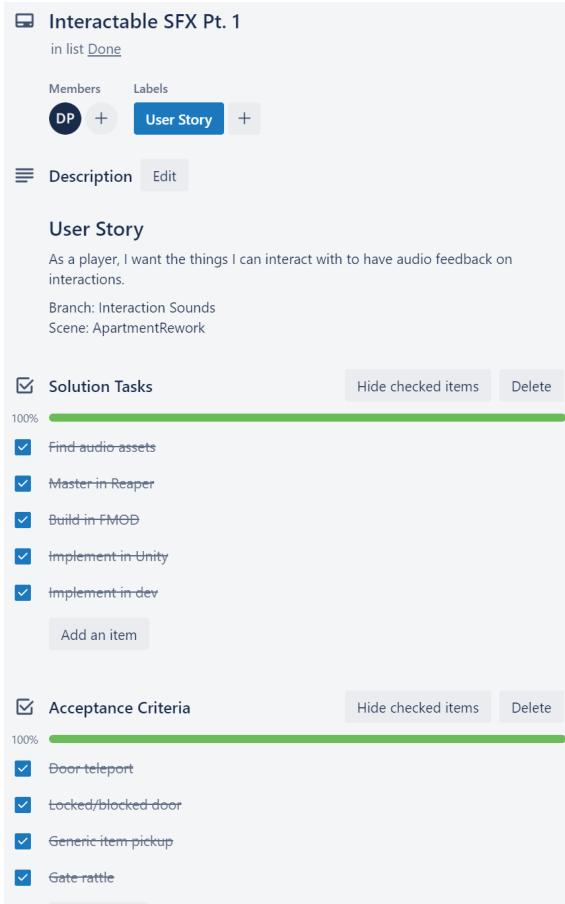


Figure 13. Example of a Trello Card, completed

In order to promote usage among the members who weren't nearly as familiar with Trello, we reduced the User stories to simple statements of what we hoped the player to achieve, and then created a relaxed standard for our tasks/acceptance criteria lists. This change improved how the team interacted with Trello and actually increased overall usage.

User stories, the most common Trello card, were meant to focus on a single concept for a much larger mechanic. "I want to hear this when I pick up the object" or "I want to see this when I press this button". The epics would then be a collection of those cards, or a list of similarly worded tasks that built up to the main mechanics.

We kept track of our art and audio tasks mainly through Google sheets. Our 3D modeler and foley artist would report on items that they were working on, those that were finished, and any new suggestions for items within the spreadsheets. More casual updates on their progress would be fielded in the team discord, seen below, along with questions or concerns for their respective tasks.

When it came to our narrative task management, this was largely handled in a freeform manner. We began world building early on, but all player information wasn't developed until fairly late in the project's overall process and didn't translate well into the Trello board. There

was room for improvement, but it was clouded by other priorities when it shouldn't have been and as a result remained freeform.

For (ideally) consistent communication, the team had a private Discord server with specialized channels for improved organization of thoughts and information. We separated different channels into fitting categories for general, development-specific, and art specific topics, with the dev channels being hidden from the art members solely because we felt bad when sharing links to external art assets to supplement what they gave us.

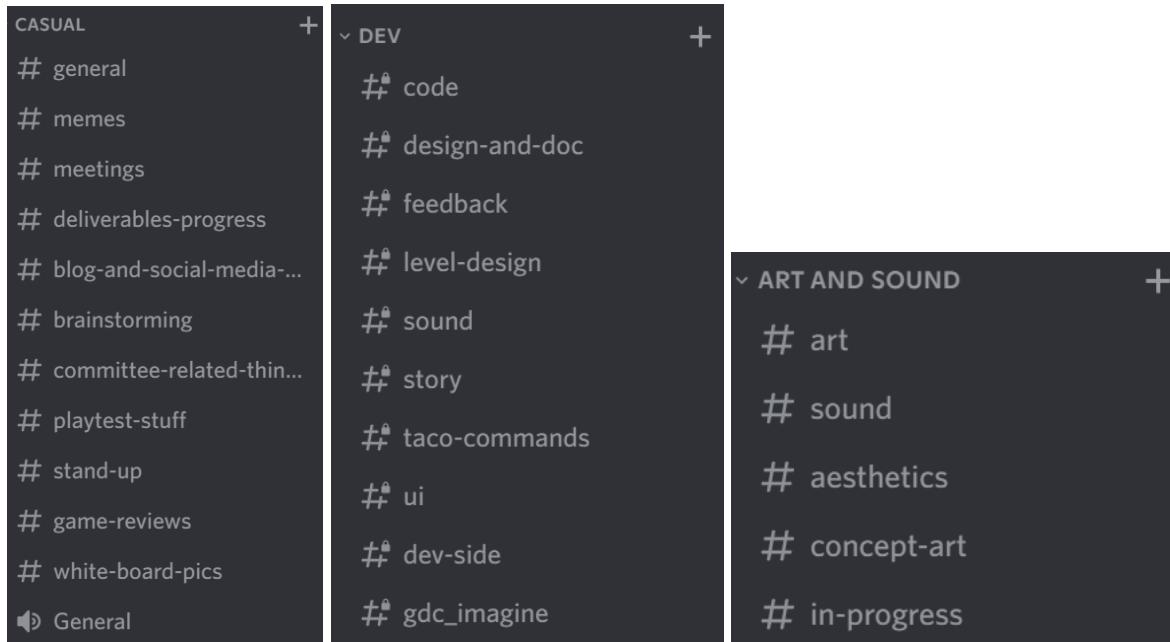


Figure 14. The organization of the team's discord server

The communication in this Discord server improved our overall workflow, as members of the team could be aware of when the main scene was being worked on or when other possible conflicts in the development could occur. Dependencies were communicated here as well, and members were expected to keep track of the conversations enough to understand what was going on.

The progress of a larger task (new mechanics, player experience additions, etc) was typically assessed during the synchronous class meetings through demonstration, and when the team believed that it met the game's overall intentions the branch was merged into the dev branch, and the developer was given time to integrate it into the main scene without any conflicts.

The progress of smaller tasks (tweaking range radii, adjusting audio mixing levels, placing unrelated environmental assets) was not nearly as ceremonious: The developer in charge of the change would have a different team member take a look at it, and if it felt/looked better than the game previously had it as, the developer could merge when the dev branch wasn't being worked on elsewhere.

4.7 Timeline

4.7.1 Milestone 0.5, Motivation Testing - Playtest 1, Late September

Before we had anything solidified for the pitched concept, we wanted to see how players would react to being given a package of photos and a similar environment. After a week of figuring out a small narrative to have displayed in the photos, as well as what types of clever takes we could test with the photo angles, we were ready to print and test. The playtesters were shocked by a paper prototype for a game that seemed to be heavily based on digital interactions, however they were quick to understand what we were observing from them. We used this test to learn more about how players can self-motivate (or in the case of a few tests, motivate each other) towards figuring out the solution to the photos. This in turn helped us with how we planned out the initial level design, and later on how success feedback was handled.

4.7.2 Milestone 1, Scene Swapping - Late September

The scene swapping milestone was when we knew that the concept was feasible for what we hoped to achieve. Alfie created a small testing level in which at the push of a button, he could make pieces appear and disappear, almost as though they were transitioning between the past and present states of the world. He had a stable demonstration of this in late September/early October. Up to this point, all of our work was merely concepting: What are the player intentions, why is the world the way it is, what is the possible scope for this game? Now, we had something to back those concepts and begin exploring the implementation of them.

4.7.3 Milestone 2, Interaction in the 3D space, Early October

Shortly after the scene swapping milestone was achieved, we reached the ability to interact with multiple things in the 3D world. Keys could be used to unlock doors, and photo objects could be picked up to signal a scene swapping action was unlocked. This was also around when the initial level design for our first playtest was started, and we began to do inner-team testing for the two main mechanics that we had created. With this milestone, we now had the ability to engage in the world, and then change it to open new doorways, both literally and figuratively, for the player's progression.

4.7.4 Milestone 3, Prototype with integration of previous development - Playtest 2, 3, Mid October

This was the first demonstration of our concept in playable form to our audiences, and the first time we got feedback. Up to this point, we had a few presentations regarding the overall game concept and our progress, however by mid October we had something to share. While they liked the concept, our lack of responsive feedback within the game confused a lot of people. They also desired more UI to learn what their objectives were, and where to go. We took all of this into consideration and made a few new milestones shortly after.

4.7.5 Milestone 4, Player Assistance Guides begin: Vignette effect - Late October

Quite a few milestones happened in quick succession. The first of which was the result of the previous playtests: People wanted the puzzles to be easier to solve. Our first attempt at assisting the player was a vignette effect that grew as the player's camera view got closer to the correct position and angle combination to solve the puzzle. This was meant to simulate focusing on something familiar for the player, and when we tested the impact of this effect the feedback was a bit more positive this time around. Players still struggled to figure out where to go, but once they noticed the vignette they were able to understand what needed to be done. It wasn't enough, however, to fix all of the concerns that had been raised. We needed more for the players to understand how to progress and when they succeeded.

4.7.6 Milestone 5, Beginning of UI and Onboarding - Early November

Around the same time, we started working more on a friendly, instructional UI system that didn't linger longer than the player needed it to. With this, we also changed how the player interacted with the world a bit, so as to further teach them each step before they entered the small playing field. It was in essence the beginning of understanding some kind of onboarding system for the game. Unfortunately, despite players appreciating this addition in future playtests, we did not translate much of this onboarding into the new level design (Milestone 7) until much later than we should have. Perhaps losing our progression from this milestone set us back a little bit on properly onboarding the players, and we learned very quickly in the spring semester that it was necessary to do that.

4.7.7 Milestone 6, Beginning of VFX for player success - Mid November

The last biggest piece of feedback we received from playtest 2 was about, well, feedback, and we wanted to rectify that. Players didn't understand when they were succeeding in solving the puzzles, as the photos silently and subtly swapped between the states without any fanfare or other noteworthy tells. To mitigate the confusion, we introduced the first of many VFX additions to the swapping of scenes, as well as slowed down how quickly the scenes swapped behind the photo. When tested in the 4th playtest, this addition brought out the "wow" impact we had hoped to achieve on the scene swapping. Players liked the VFX and the change they could make in the world.

4.7.8 Milestone 7, New Level designed - Playtest 4, Early December

By the end of the semester, we had an entirely new world for people to test! The initial research into apartment complexes and the different community styles that exist within them was translated into the game space, and with it a couple of new stations for players to test. This milestone and relevant playtest held the culmination of everything we had worked on up to this point: VFX, Player Assistance, and basic UI.

The player feedback for all of this was mixed. They loved the VFX upon player success, but the Player Assistance VFX fell very short of the mark. The UI had also regressed to a less-desirable version and not our preferred onboarding version, and thus players were still confused about where to go. The overall level design was taken very well, however, so aesthetically we were on the right track. We just had to start re-discussing what to improve upon so that our players weren't nearly as confused.

4.7.9 Milestone 8, Beginning of audio inclusion - Playtest 5,

The beginning of the spring semester came with confusion for us: We misinterpreted what needed to be worked on from the last build. A majority of the team focused on how to assist the player further with solving the puzzles, rather than extending the solving radius to make it easier for the player to succeed. The playtest did see a couple new additions to the overall experience: We had new debris and vegetation to make the world seem more abandoned, and a first run of audio testing began for the environment. Players appreciated the new additions, even if the crickets were chirping a little louder than they needed to be. This was the first audio integrated into the game, however, so of course we were learning about how the sound mixing needs to be changed for a more realistic experience. With this test, the audio could begin to be fully fleshed out and every test after could have changes to the audible scenery.

4.7.10 Milestone 9, Beginning of internal databases, Relic system -

It took two professors after playtest 5 to sternly say "This is not the right path" before we pivoted our process and began to focus on new technologies. That pivot resulted in the further development of our audio systems, more level design, narrative build-up, and the beginning of underlying database systems for the player's inventory system. We had previously pitched our concepts for Relics, which are sentimental items left behind when the family evacuated, but these were still not implemented in the game. Our biggest intended narrative item needed a place to be accessed by the player upon collection, and so research began for creating an inventory system and how the player might otherwise like to interact with relics.

Within a few weeks, the inventory was stable enough to begin testing and the first playtest it made was playtest 6. It was considered then to be our weakest link, and unfortunately due to our priorities being more on the relics than the collection system, it has continued to be the weakest link in the game. We evolved it to having a proper background and sharing narrative information with the player, but the player experience overall is not improved nearly as much by having it and so it was simply made to be stable.

4.7.11 Milestone 10, Beginning of narrative inclusion through relics, dialogue, improved level design concepting - Playtest 6,

Playtest 6 saw a large integration of narrative development in the game. The relics were examinable, the players could read "dialogue from the past" on their screens, and the world

itself was growing more into that of a previously lived-in community. Some highlights for this milestone were a fleshed out interior of an apartment that was stable enough for players to explore, more audio improvements, and most notably narrative exposition given in the form of “dialogue” subtitles on the screen. Now, the player could experience the true intents of the game, even if it was missing some of the more big-budget aspects that our influences had. Playtest 6’s focus was on a somewhat complete game loop, however the key prize for the player was the information that they could collect, both physically through the stable relics and mentally through intaking the dialogue on the screen. From our feedback, we understood that players wanted a lot more than what we gave them and needed to fix up how things worked so that they could truly enjoy the experience.

4.7.12 Milestone 11, Tutorial inclusion and polish - Playtest 7, 8,

Our final concern was met late in the spring semester: Onboarding. While we had touched on it previously in the fall semester, it was brushed aside in favor of other priorities and was only brought back in March 2022. Our goal was to have a tutorial area that led the player through the motions of the puzzle solving skills, and then introduce them to the apartment complex where they would interact with more story beats and matching stations. The latter wasn’t realized fully due to time constraints, however we were able to make a more intuitive guide for players to follow leading up to the complex. Beginning with a cutscene that introduces them to the world and places them right in front of the first station, they are given some of the necessary information without holding their hand through the entire process. Did it work? When we tested it initially in playtest 7, the audience was mixed on whether it worked well or not. Players who had touched the game before knew what was going on already and could understand what we were getting at, but for players that had never playtested with us before the tutorial was hit or miss. Adding onto that, Rockstar previewed the tutorial scene in our pitch to them, and contributed information that helped guide us on improving the level design for the game. We reintroduced the tutorial section, now with a few additions that would assist the player’s direction within the game, during Imagine RIT (our 8th and final playtest, now late April). Again, it was hit or miss for the players, but once they were able to figure out their goals the rest of the level fell happily into place for them. The tutorial still needs some specific guidance, notably towards getting the player to understand that they’re looking for where the photo was taken and not just the pictured object, and a bit more exposition that helps build the motivation of the player, but the overall combination of our previous milestones works cohesively enough that getting beyond those learning curves leads to a smooth and interesting experience.

4.7.13 Final Deliverable

Our intentions for the game were to have

- *a working photo mechanic that didn’t frustrate the player too much, and actually encouraged them to continue hunting for more stations given the photos that they have,*

- *a fleshed out UI system that the player could recognize as part of the experience (inventory, album) while also providing necessary information to the player (start/options/pause menus),*
- *a realized level consisting of a few photo matching stations with an environmental feel that balances realism with surrealism,*
- *a “complete” narrative arc in which the player understands a bit about their perceived family, delivered mainly through a combination of the photos, relics, and environmental design,*
- *and a helpful user experience that guides the player through what to do, how to do it, and where they can go.*

We met quite a few of these intentions over the course of the year, and fell just short on a couple of them. The photo mechanic is indeed fleshed out, but still frustrates some of our players as the onboarding system needs some reworking in order to successfully teach our players. The UI system is in place but several aspects of it, namely the inventory and album, confuse the players on how to interact with what they've been given and the significance of each bit. Our level is full of interesting environmental components, along with the intended background audio, however there is still so much that we wished to get in before claiming it as “done”. The narrative work behind the scenes was creative and full of emotion, however we didn't have the time or space to integrate everything we wanted into the game and do not feel it is complete enough for our standards. With all of this, the user experience is lacking compared to what we had hoped it would be back in September, and wish it was more engaging in a way that would allow players to keep coming back for more.

Despite all of the shortcomings, however, we are rather proud of what we were able to achieve. The year was long and full of obstacles that prevented us often from fully realizing some of our intentions, and that's ok! Our game plays without issue, and the players that understand what's going on and play the game as intended (no skipping dialogue and taking in whatever they can) come out wanting so much more. That is the highest compliment we could have hoped for and with those reviews alone we are happy.

4.7.14 Stretch Goals

As is with any year-long project, some things that we initially planned to have fell to the wayside and got lost in the progress for higher priority items. Our mechanics have a good foundation, the narrative structure for our intended plan is there, and the overall environment fits in well with the desired feel for the game. There is room for improvement for sure, but we achieved what we could in the time allotted for the capstone project.

Everything else that was considered, planned, or thought of, then gets put into the concept of stretch goals.

We'd like to one day increase the size of the playfield, as our playtesters have consistently told us that they desire more to do in the playspace: Their curiosity is piqued enough that they would be happy to have an entire world. This would include more apartment interiors, perhaps a few personal spaces beyond just kitchens such as bathrooms, bedrooms,

offices, and the like. Within this extended play field would be more narrative inclusions: Relics, story beats, and an increased understanding of the characters. Along with those would need to be matching photo stations to push the player to explore specific locations more.

We'd also love to have an improved audio experience: voice acting for the dialogue, personalized soundscapes for the various relics, music in the background that fits in well with both the curious nature of the game and the 70s time capsule that you're walking through, and more intuitive audio cues that can help guide the player to the right spot.

The main mechanic of the game, the photo-to-world matching puzzles, has a lot that could also be improved upon. We've considered enhancing it with changing the angle at which photos are taken so that they aren't just level with the ground, the height at which they were taken to match whoever took the photos, and a distortion effect to the world when the player finally swaps the present to the past, as a way of signaling that what's there in-game isn't the same as what once was there.

It is unfortunate that we could not realize all of these things in the time that we were given, and perhaps one day they will be fully fleshed out and playable.

4.8 Version Control

Our main method of managing the source code was through GitHub, and the companion app GitHub Desktop. Only the most stable code was allowed to be merged onto the main branch of the repository, and as such a majority of the team's work has remained on the dev branch just beneath it. When team members wished to make a new mechanic or untested integration to the project, they were encouraged to create a new branch off of the dev branch, and to create their own scene within that branch to prevent conflicts if the branches were to be merged.

So as to prevent merge conflicts or running into seemingly unknown bugs, communication between the team members was key. Team members working on the Dev branch should highlight any bugs that they know about within the commit's general notes section, so that anyone who continues their work is already aware of the issue.

All other artifacts were handled through Google Drive storage and Discord's file sharing system. Any new assets (3D models and UI images) were uploaded to their respective folders within the Drive for this capstone project. For example, any models created by our external 3D artist were uploaded to the Art-Assets folder within our Drive. These assets would then be downloaded and imported into Unity. Once imported, the assets would then be moved to a different folder (ImportedToProject) to signal that they had already been imported to the project.

We commonly received sound files from our external foley artist through Discord due to the small file sizes. The Discord server has its own dedicated channel for storing sound files, so there was no threat of them getting lost in a deluge of messages. These files would be

downloaded by our sound artist, and they would then be edited in Reaper or FMOD before being integrated into *Through the Lens*.

4.9 Asset Pipeline

4.9.1 Models

Any new 3D models that were not downloaded from internet sources were created in both Maya and Blender. After creation, they were usually exported as FBX files. The FBX file format is more often used with files that contain heavy data and animations. Therefore, this format is usually lossless during reconstruction. Texturing of the models was done in either the 3D modeling software of choice or in Substance Painter. These were techniques that our artist was the most familiar with at the time.

After exporting a finished model, the next step in the pipeline was to upload them to Google Drive so they could be imported into the Unity project. Any meshes and texture maps would then need to be renamed using their appropriate naming convention. Mesh names started with RB_ to reference the fact that they were rigid body models. Any texture maps would be named according to what type of texture map they were. For example, a normal map would be titled T_Test_N while an OSM map would be titled T_Test_OSM.

Communication with our external 3D artist was kept within the confines of our Discord server. There was a channel dedicated to his work, and he would leave any updates he had for us outside of scheduled meeting times in said channel. If he had uploaded any new assets to our drive outside of meeting hours, he would let all of us know in that channel. During the fall semester, our 3D artist was invited to all of our weekend meetings so he could be kept in our design loop. When the semester started to get busier, we would hold virtual meetings with our artist at least once a week to keep up to date on his progress. During the spring semester, classwork for other courses got the best of us, but we still tried to keep in contact through Discord with our 3D artist as much as we could. All in all, our 3D artist mainly kept in touch with us on Discord while also attending some of our in-person meetings.

4.9.2 Audio Assets

All sounds considered and used are documented in the [audio assets](#) spreadsheet in the team's shared drive. Each sound's name, category, description, source, license, and current implementation status are noted in their respective columns. Most assets were found on [freesound.org](#), and the rest were recorded in-house by our external foley artist Maeve Dohner.

Reaper was used as the digital audio workspace (DAW) for editing sound files. Raw and edited audio assets are kept on a separate git repository along with the Reaper projects housing them. This second repository was used to reduce the size of the primary repository by keeping the raw sound files and reaper projects separate. Most of the editing in Reaper consisted of cutting up the sound files and applying various effects to them, such as equalizers, compressors, and reverb generators.

After editing in Reaper, audio assets were imported into the FMOD project on the team's main git repository. Once in FMOD, assets were built into events that could be accessed from the Unity Editor via the FMOD for Unity plugin.

Coordination with our external foley artist was done through the aforementioned audio assets spreadsheet and Discord. The spreadsheet served as a checklist for sounds to create. Discord was used to share the sound files, go over any additional details regarding the desired sound effects, and provide updates on work done.

5 Game Design

5.1 Game Overview

Through the Lens was started with three pillars in mind:

1. Storytelling across media
2. Using the past to understand the present
3. Evoking empathy by inhabiting perspectives outside of your own

These pillars steered our design towards a photo superimposition and swap mechanic that made the goal of looking into the past in order to understand (progress through) the present into the core of the game dynamic. We staked that this would appeal to the lovers of cinematic narrative in games. Additionally, our design steered us towards relics both sentimental and symbolic of the layers of what was left behind in the evacuation. Surrealist game mechanics and aesthetics transform this southwestern city block into a dynamic metaphor of understanding the past in order to progress in the present. Our User Interface takes the form of a photo album and backpack to thematically support Stephanie, the player character's journey. Equipped with your grandfather's photos, can you and Stephanie recover what was left behind?

5.2 Objectives

In *Through the Lens*, you play as Stephanie from a first-person perspective.

From her observations, players may infer that Stephanie's motivations come from a place of conflict resolution and healing. The open endedness of what was "left behind" teases that it may not have just been physical objects, but perhaps something more intangible that the family lost. The player's motivations are established early on in the game from the first instance they hold up a photo and align it with where it was taken. Through this interaction, character dialogue and Stephanie's own commentary advance the player's understanding of the context. Their goal, much like Stephanie's, soon becomes to piece together the big picture with these little pictures

The two core motivations are as follows:

1. Trace where each photo from the album was taken using environmental clues, and look at that spot through the lens of that moment captured by photo.
2. Retrieve any items of sentimental value left behind by Stephanie's family.

The player explores at their own pace, retaining full agency after an initial cutscene. Though they may encounter barriers, those are all overcome as part of matching up the photos and advancing through the narrative.

5.3 Theme

Through the Lens is set in a Southwestern U.S. city, taking inspiration from New Mexico and Arizona. The player character explores a residential neighborhood that has been abandoned for upwards of 50 years. The story is present in many layers of the game, however in this prototype of the project the players do not learn much tangible information about the circumstances or characters. Our main focal point is the player character, Stephanie.

The family tree is as follows. Hector and Amanda married, and had four children: Benjamin, Candace, Phoebe, and Ryan. Benjamin eventually married, and had Stephanie.

Through Stephanie's musings, the player learns about where they are and why they are here. They first learn that this residential area has been unoccupied for 40 years, and that this is where her father and the rest of her family were raised. They then learn that the album she holds is filled with photos taken by her grandfather. Stephanie's observations on the past convey that Benjamin harbors negative feelings of sorts regarding his upbringing here. It is later said that the abandonment is due to an evacuation, contextualizing all the objects left behind. Stephanie's closing lines imply a broader conflict and tension between family members, hinting at both the physical leaving of things, but perhaps also something intangible that was lost or left behind in the sudden departure.

Each photograph has people drawn on it, and the tints of their shade correspond to the color of the subtitles for the ensuing conversation. Stephanie's grandfather Hector (red) is characterized by his urging of family togetherness at the faire, though later impresses subordination to his work demands at the Mayor's office. Stephanie's grandmother Amanda (purple) is characterized as appreciative of her husband's efforts, implying that this dynamic may not be taken often between them. She is also disapproving of her grumpy son's negative attitude, and shocked at Hector's interruption of their family time. Benjamin (blue), as was just stated, is characterized by his expressed disinterest in attending out of obligation to winning prizes for his younger brother, Ryan. Ryan (orange), meanwhile, is characterized by his one-track mind on the prizes. Candace (green), in contrast, is characterized by having the most enthusiastic mood to be there, and comes to her father's defense when her brother slanders him. Phoebe (pink), the meekest of the lot, is characterized by her lines of dialogue

mirroring her older sister's, though siding more towards neutral on both parts enthusiasm and defending her father / getting back her brother.

Much story content was conceived as part of the background for this game to inform all of the design decisions. However, given the nature of scope and the team's commitment to an experience that did not just "lore dump", not much more is communicated through the prototype itself. If you would like to read more, see Section 12.2 - Gav's Narrative Design.

5.4 Gameplay

The player's standard movement is controlled by the W, A, S, and D keys. Moving their cursor controls the direction in which Stephanie looks. If the cursor intersects with an interactable object, such as a key or relic, then the reticle located at the center of the screen will change into a hand. When this is the case, the player can use the left mouse button to interact with the interactable object, putting it into their inventory.

The player's inventory is accessed using Q. Appearing in front of the player as an interface in the shape of a backpack, denoted by the opening, the flap, and the two shoulder straps. When there is an object in the inventory, it will be displayed in this interface. Otherwise, the interface will appear empty. On the screen the mouse no longer affects where the player is looking. If the player clicks on an item in the inventory, it pulls up an Inspection interface.

Within the inspection interface, the player may use F to toggle between "aged" and "new," reflecting the different states that the player could look at the object through: present, or past. The player's mouse here can also be used to rotate the object through holding down and dragging. To reset the object to present day state and center, the player must press R. To exit this interface, they must press C. Some objects may have descriptive text to accompany them, which is visible when they are being Inspected.

The player's photo album is accessed through pressing TAB. Once again, when in this interface the player's mouse movements no longer affect where Stephanie is looking. The album holds a number of photos, which the Player can choose to hold in their "hand" by clicking on them with the left mouse. Photos in Stephanie's hand are denoted with the icon of the open hand reticle over them. The player can flip between the pages by left clicking on the arrows. There must be one photo in the hand at all times. THe player may exit this interface by clicking TAB once more.

The player has the ability to hold up a photo in their hand. This is done by holding down the right mouse button. When the button is released, the photo returns to its previous size. This has a special interaction when you are standing in the spot in which that given photo was taken. The contents in the photo appear to swap with the contents that are there in the present day, almost as if the past is brought to the present. The photo you had of the "past" is replaced with a photo of the "present," and the interaction may be repeated to toggle things back to just

the present day's contents. Toggling the environment this way has an effect on Stephanie's physical progression, i.e. rocks can be removed in order to allow her to continue exploring.

This is the “*what*”. For the “*why*”, see [Gavriel Miles' Individual Research](#).

5.5 Aesthetics

5.5.1 Inspirations

Inspiration: Real-World



Figure 15. Aesthetics Mood Board images

The feel of *Through the Lens* aims to be reminiscent of the taste you would get after biting into a burnt marshmallow or the sound of birds cawing in the distance. Some images from our [aesthetics mood board](#) (Figure 15) can further portray these feelings. The world is meant to feel abandoned and empty. Buildings and roads are left to chip away, and items left behind by people that once lived in the area are now gathering dust and mold. Most of the real-world inspirations for the aesthetics are old buildings with peeling paint and rotting ceilings. The initial [style mood board](#) for *Through the Lens* shows buildings with cracked walls, overgrown foliage, and shattered windows. While some of those inspiration images portray places that were abandoned a longer time ago than what is intended for the game, they still assisted in guiding the initial visuals and aesthetics.

Inspiration: Games



Viewfinder²²



Superliminal²³



What Remains of Edith Finch²⁴



NUTS²⁵



The Medium²⁶

Table 4. Game Inspirations

Each of the above games has had their own influence on the aesthetic design of *Through the Lens*. *Viewfinder* was the original inspiration for our main game mechanic. What would a

²² [Viewfinder clips June 2021](#)

²³ [Eye of the beholder – Superliminal review](#)

²⁴ [What Remains of Edith Finch review](#)

²⁵ [NUTS review](#)

²⁶ [Hardware Zone The Medium Review](#)

dilapidated building look like if you were to hold up an old picture and make said building look whole again? *Superliminal* contains loads of inspiration for level design that involves puzzle mechanics using spatial perception. *What Remains of Edith Finch* serves as an example towards the concept of finding memories left behind by different people in diverse forms of media. *NUTS* has unique and eye-catching graphics to it, and the way that this game highlights interactive objects proved useful in inspiring the glow and burn effects on our photos and interactable objects. *The Medium* has a similar mechanic of accessing the past through items you collect in the present, but it also beautifully captures that environmental element of neglect after some decades (specifically where people used to live).

5.5.2 Surrealism



Photo Swap Burn Effect

While the environment of *Through the Lens* may look realistic, the team wanted to add a hint of surrealism to the game. Surrealist undertones are used to tell the player that what is happening in front of them is not real at all; rather, the past is bleeding into the present only in the main character's mind. While the team had a few ideas for how surrealism could be used, one major aspect was able to make it into the game. Figure 16 demonstrates the overall look of the current iteration of our photo swap burning effect. Whenever the photo is held up in the correct place, the image burns away and reveals that what was in the photo from the past has been swapped out with items from the present. The past has come to life in the main character's mind, and the burning effect is a visual cue for this revelation.

5.5.3 Aging and Overgrowth

Another piece of the game's aesthetics is its emphasis on aging and overgrowth. The team believed that this would help drive home the feeling of abandonment. When an environment in the real world looks run down and is covered in plant growth, one can immediately infer that the area has not been inhabited or taken care of for quite some time.



Figure 17. Overgrown apartment courtyard, in-engine

Figure 17 shows an example of what the inner courtyard looks like for the main apartment building in the game. Wild grasses have taken over the pathways, vines are climbing the sides of buildings, and trees are standing in once empty spaces. The aging and overgrowth aesthetic helps players understand more of the story as well. They can infer even before being explicitly told through dialogue that the area must have been abandoned decades prior to the main character arriving there.

5.6 User Interface

For the onboarding UIs, instead of a non-diegetic UI that pops up in the middle of the screen, the game has a persistent UI that displays essential keybinds at the bottom left corner. The UI could be turned off in the setting if the player feels they have familiarized with the control scheme.

We also have an inventory UI which will display upon pressing the key Q. The current inventory system is a simple visual system that turns certain UI elements on or off depending on if the player has the corresponding world item. The items in the world space are visible within the inventory UI once the items are picked up. For instance, if a blue key is picked up by the player, that same blue key will then appear in the inventory UI. We used hand drawn sprites for the background and other buttons as an alternative to the true diegetic UI using models and world space UI.

Same as the inventory UI, the album panel visualizes the player's photo collection. The panel has six buttons consisting of four photos and two arrow buttons, the photos themselves are buttons that are used to toggle whether the player is holding it or not, and the arrow

buttons are used to navigate between pages. Once a photo button is clicked, a hand icon will appear on it indicating that the player is holding it. The player can currently hold 3 photos at once, however the album UI right now doesn't display that information anywhere.

The photos themselves will appear on-screen once selected, and players will then be able to line them up with their corresponding trigger areas to switch between the past and the present.

Our intention of design is to not be traditionally overt and break the immersion with our audio cues, but to make the audio cues relatively seamless and timed with the player's understanding; siding on subtle confirmation, or nudging if the player is a little behind. Given that the pacing of our game is effectively and entirely set by the player, we are not concerned necessarily with making our interface classically game-y or hand-holding in a straight-forward manner.

A square shaped rectile is placed in the middle of the screen as an aid during aiming and object interactions. To further support the player's exploration experience, the rectile will dynamically change its appearance according to the type of interaction the player is going to execute.

Menus within the game will be typical of what is seen in other games. There will be a main menu, a pause menu, and several options available in the settings menu.

Many of the 3D elements that the player will have access to will be part of the user interface. For instance, the photos that they hold will be rendered on the UI layer rather than in 3D space. This helps fix the issue of the player's child objects clipping or phasing through the wall/floor when the player gets too close.

6 Assets

6.1 Audio

The sounds of *Through the Lens* were primarily sourced from freesound.org. This website provides a large bank of free sound files, many of which are either completely dedicated to the public domain or only require attribution to use. Examples of sounds sourced from freesound.org include the game's ambient background noises, player footsteps, and polaroid camera sounds (used in the core photo mechanic and menu button clicks).

When we were unable to find sounds to meet specific needs on freesound, we had them made in-house by our external foley artist. These included opening and closing the player's bag and album, as well as various item pickups.

All of the sounds considered and used were documented in the [asset list](#) spreadsheet on the team's shared drive, as described in section [4.9.2 Audio Assets](#). In both this spreadsheet and FMOD, the assets were separated into the following categories: environment SFX, interactable SFX, menu SFX, and player character SFX.

The sounds we chose to use reflect the realistic visuals and setting of the game. We aimed to ground the player in a real-world environment. As such, the process for creating sounds was reactionary; player actions or objects in the environment would be determined, then sounds would be created to mirror them. Audio assets were used to give additional weight to player actions and better immerse them in the world.

Certain sounds also assisted in providing valuable information to the player. One sound, the station guidance hum, was used to help players find the correct location for a photo swap by scaling its volume with proximity to that correct spot. A recording of an industrial fan was used here because it meshed well with the existing ambience in the game. The fan put off audible low frequencies, which filled a space left mostly vacant by the higher-frequency sounds of birds and crickets in the ambience. This ensured that it was audible even at very low decibels, which played well into the volume-scaling effect.

6.2 Environment

For the environment of *Through the Lens*, the team partnered with an external 3D artist to create the objects that needed to be specific to the project. These assets were modeled in the style of both the 1970s and hacienda style architecture. All of the assets provided by the external artist were uploaded to the Art-Assets folder where they were then sorted into their own sections. This process is described in [Version Control](#).

Any aspects of the environment that our external artist did not have time to create were found on sites such as [Sketchfab](#), [Turbosquid](#), and [CGTrader](#). These sites have powerful and easy-to-search databases that are full of assets to use (so long as they are properly credited).

Searching through these sites yielded many useful assets, most of which are listed in the [Asset Details](#) appendices section.

As described in many sections of this document, the environment of *Through the Lens* needed to be old and dingy as well as reminiscent of the midwest (namely New Mexico). It also needed to look realistic. The team wanted to make a game focused on narrative, so it was unnecessary to have any fancy stylizations for our environment visuals.

Some of the assets that were used to make the environment look aged are as follows: creeping vines, cracked sidewalks, and chipped roads. Other assets, such as the cracks and chips on the apartment walls and hanging vines on the railings, are flat decals that can be used anywhere in the game. These decals are further described in Abby's research document titled [Editing Assets to Fit Aged Aesthetics](#). Further insight into the environment of the game can be found in our [art direction](#) appendix document.

6.3 User Interface

2D assets used in the user interface of Through The Lens were produced by Wren and Alfie, with Wren's hand drawing background, and Alfie's icons created in Adobe Photoshop and Adobe Illustrator. For text assets, we used Unity's built-in text solution - TextMeshPro (TMP). TMP allows us to import fonts from free online fonts such as google fonts with no difficulties. Unlike Unity's default UI text objects, TMP renders with pixel-perfect clarity and also has better performance, so we did not hesitate to import and use TMP as our text holder.

6.3.1 Feedback Animations

All needed animations are implemented through scripting using a free tweening library called DoTween. Since we do not have an animator and we lack experience in dealing with animations, animating objects through tweening animations using scripts is a viable choice for us. The animations we need are not complicated, a simple tween could achieve what we really needed. In addition, the timeline animation is simple and is created using Unity's built in editor.

7 Technical Design

7.1 Overview & Approach

We began the technical design of *Through the Lens* by creating a domain model, mapping the player's relationships to other objects and systems that would be in the game. This would provide a high-level overview of what systems we would need, what they would do, and how they might interact with each other.

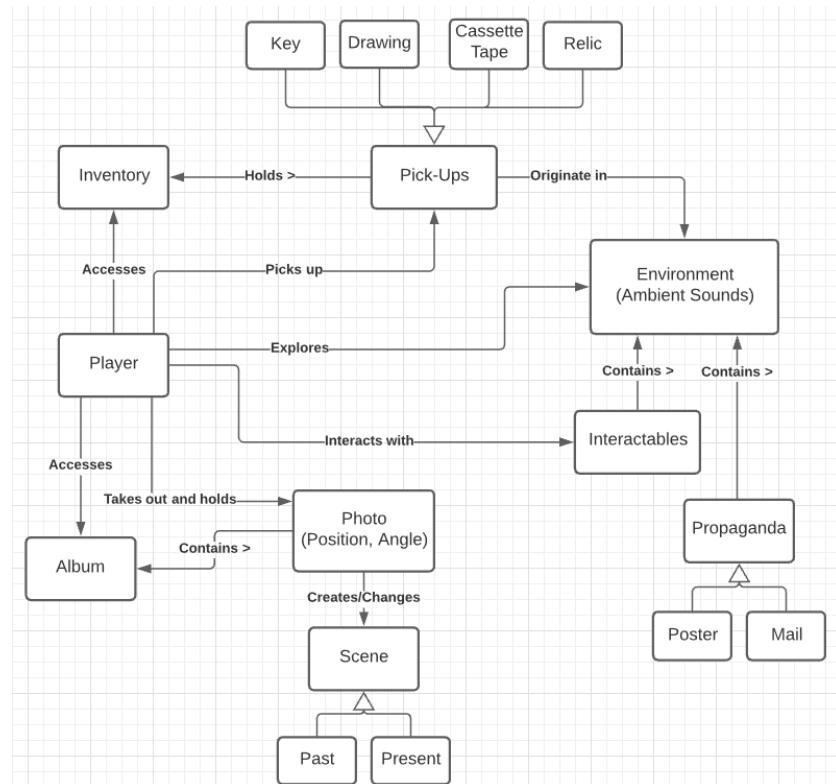


Figure 18. Main Mechanic Chart

We then used the decisions made for the domain model and created a class structure diagram for our first prototype. This diagram specified what each class (or script, in the case of Unity) would be responsible for and how they interfaced with other objects.

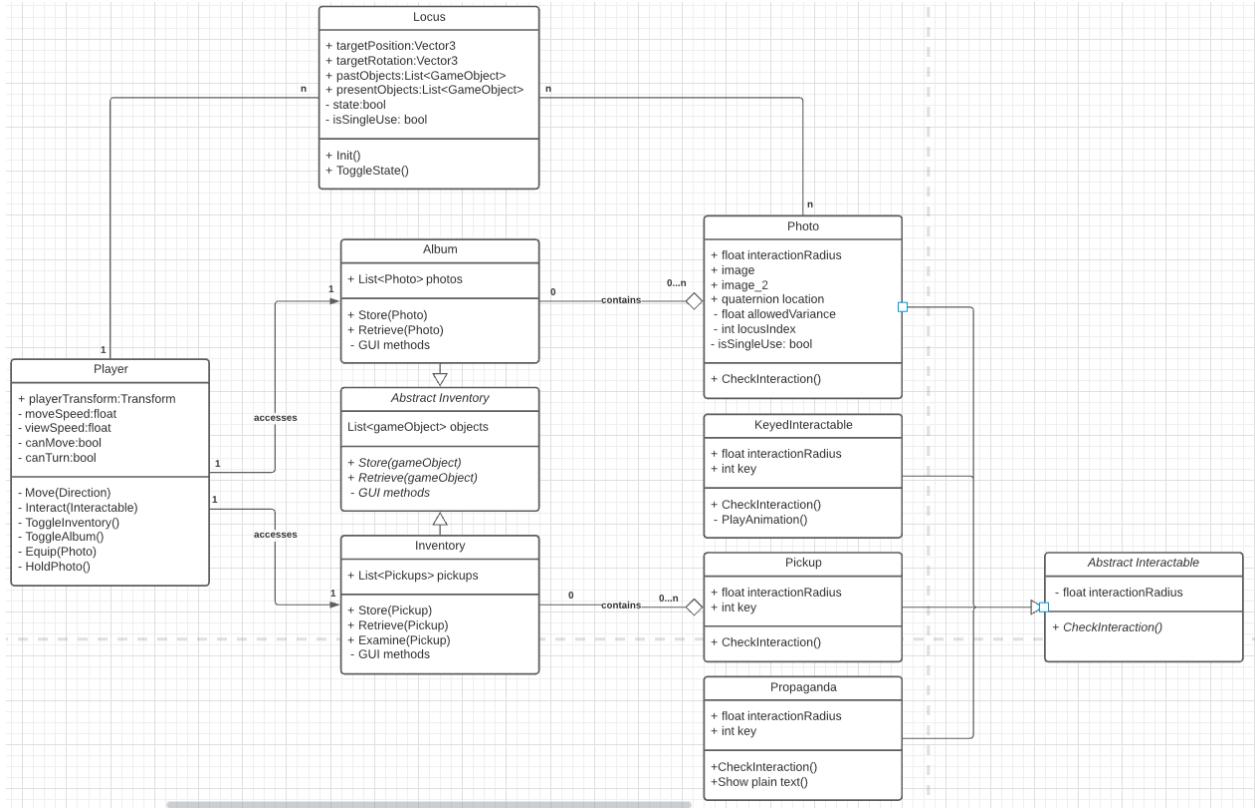


Figure 19. System For Photo/Locus Integration

This class diagram was not closely followed for our first prototype. Development in Unity changes as new problems arise and new solutions match those problems. We have also since changed the name of locus to station for ease of use. Moving forward, we were less granular with design because of the unpredictability of development.

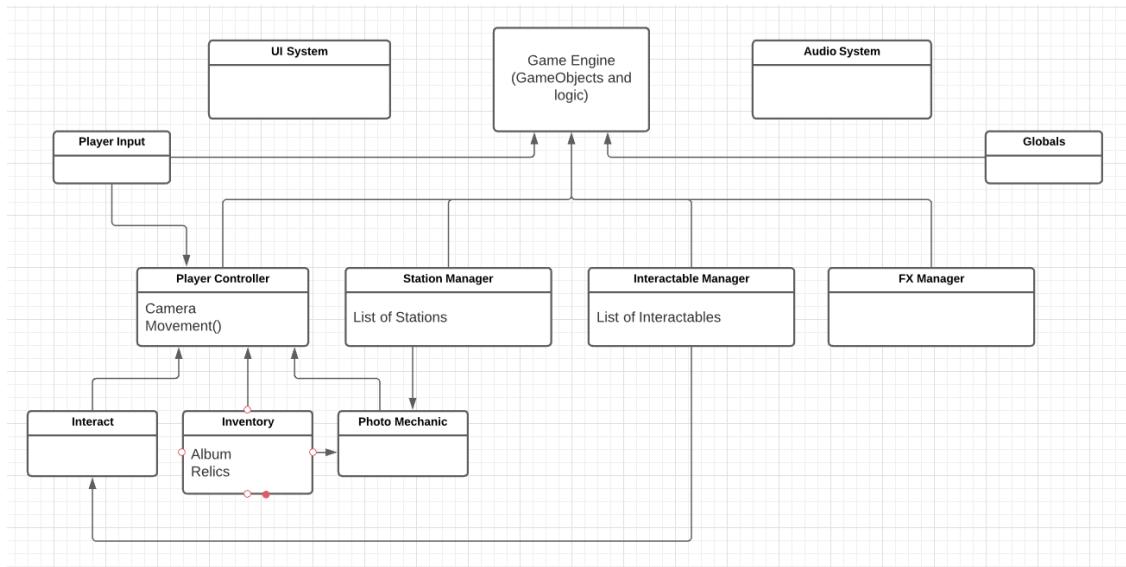


Figure 20. Overview of Systems

Above is our second iteration of the class structure diagram. Our focus shifted to the game's subsystems and their corresponding manager scripts as a way to organize and manage the code base. We decided to begin utilizing the [Single Responsibility Principle](#) for our scripts. This meant that a given script would have sole responsibility for a single part of a given subsystem's functionality, and that this functionality would be encapsulated within that script. While this did lead to an increased number of scripts written, it did make scripts easier to understand individually and make bug fixing less tedious.

7.1.1 Overall Game Structure

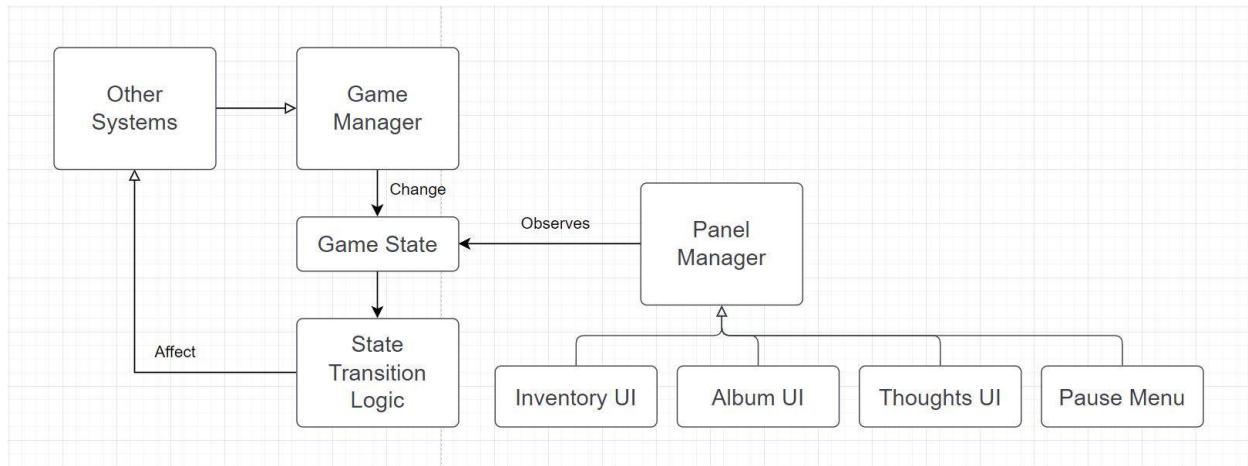


Figure 21. Overall Game Structure

The overall game flow is divided into multiple states. Other systems will inform the game manager to transition to another game state when needed. When the game state changes, the panel manager will react to this event and adjust the UI panel accordingly, the game manager will then handle the transition logic according to the target state, the transition logic affects all other major systems which will be covered below.

Our game has a variety of subsystems that each has their own responsibilities, we need something defined to organize and control all of these subsystems. States is a prominent concept used in game development and we also want to apply the concept of states to our game flow as it is very easy to understand, define and implement.

7.1.2 Render Structure

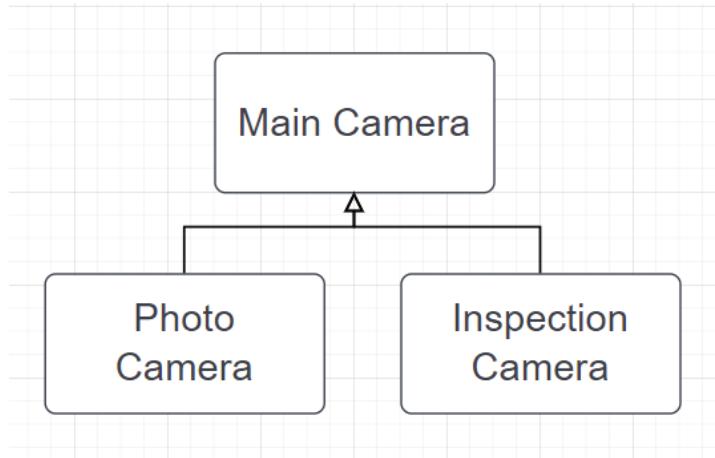


Figure 22. Render Structure

Like other games with a first-person view, our game used camera stacking technique in our render pipeline. We used three layers of camera. The main camera, the photo camera and the inspection camera. A new camera for UI elements could potentially be added too since the overlay UI in Unity is tedious to deal with and it would also make debugging easier since removing UI is easier. A UI camera could also make it easier for us to remove all UI on the runtime.

Main Camera: The main camera used to render the environment, has the main layer of post-processing.

Photo Camera: Used to render the held photo to prevent wall clipping, it also has its own layer of post-processing, since photo has glow effects.

Inspection Camera: This camera is used to render the item that the player is currently inspecting, the inspected items are teleported to where the camera is located and the graphics of this camera will turn on afterwards.

7.1.3 UI Structure

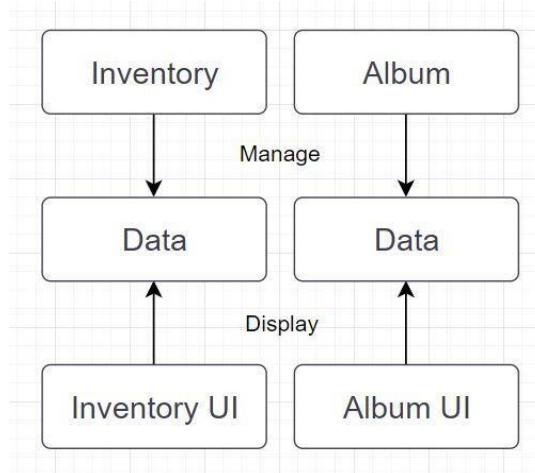


Figure 23. UI Structure

Our UI structure is simple, the UI component is only in charge of taking data and updating UI. The component that stores the data will handle all modifications of this data. Taking inspiration from the control-view-model designer pattern, this structure made our code easier to manage and comprehend.

7.1.4 Single Responsibility Principle

Our complex systems used the single responsibility principle, where every module only handles a single part of the overall functionality.

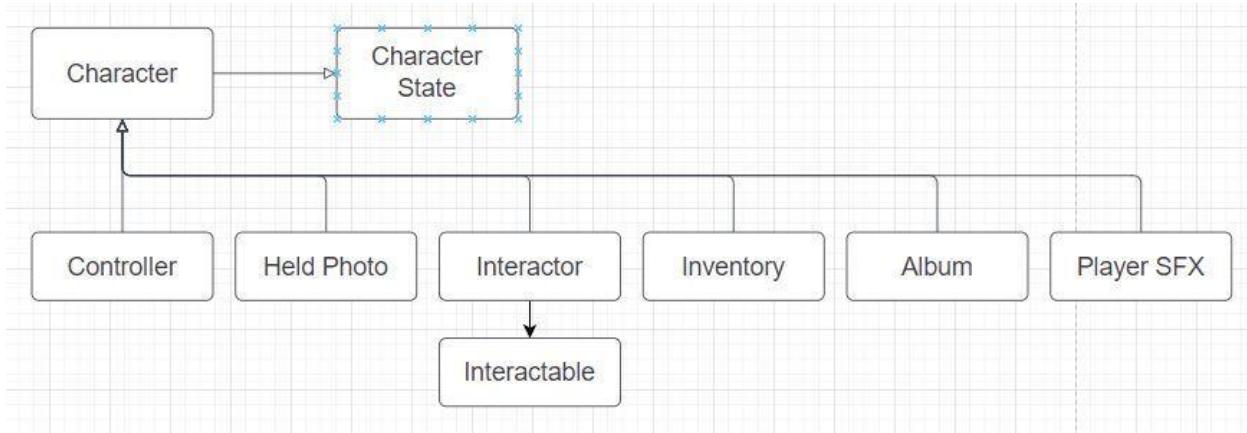


Figure 24. Single Responsibility Principle

First of all, the complex object has a main script, which is a singleton, that has a reference to all modules, this allows us to get needed references easily in other scripts. All of these modules are distinct functionalities of the main object.

For example, our player character has multiple modules as shown in the graph above. The controller module handles the player's movement and view, the interactor handles the player's interaction with the environment, etc. Breaking down a complex object into smaller pieces of code helped us a lot with code management. However, there is an issue with this design, with too many modules on a single prefab, the Unity inspector gets overwhelmed very quickly especially when every module has multiple editable properties. But still a longer inspector is way much easier to work with than a thousand-line script.

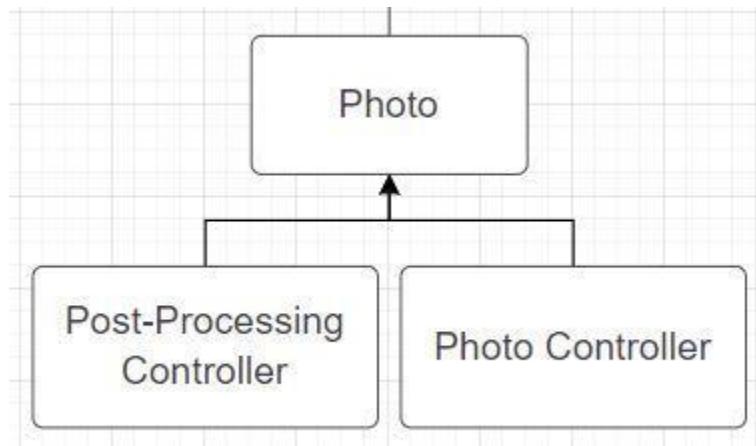


Figure 25. Photo Creation Structure

Another advantage of using this principle is that the complex systems are easily expandable since each module's duty is separated, if there are new features that need to be added, we can easily just add another module under the main script. For instance, if we want to add a new tilt and rotation photo feature, we could just add a photo mover script under the photo object.

7.1.5 Observer Pattern

Other than the singleton pattern, the observer pattern²⁷ is also used in some scripts. Observer pattern is used mainly to reduce dependencies, although it could not remove all dependencies, it really does make scripts much easier to work with and understand.

Since we did not have much experience using events in the Unity environment, I only started implementing observer patterns to systems that we later developed during the semester when we feel confident about it. Some earlier systems were also refactored into using observer patterns during code cleanup.

So far the systems that used the observer pattern are the game manager and the item inspection system.

²⁷ “Observer Pattern.” In Wikipedia, February 6, 2022.

https://en.wikipedia.org/w/index.php?title=Observer_pattern&oldid=1070267312.

7.1.6 External Tools & Libraries

DOTween: DOTween is used to tween various objects without needing to have animations. It is also used to help tween values smoothly, such as for intensity of post-processing.

7.2 Subsystems

7.2.1 Character Component

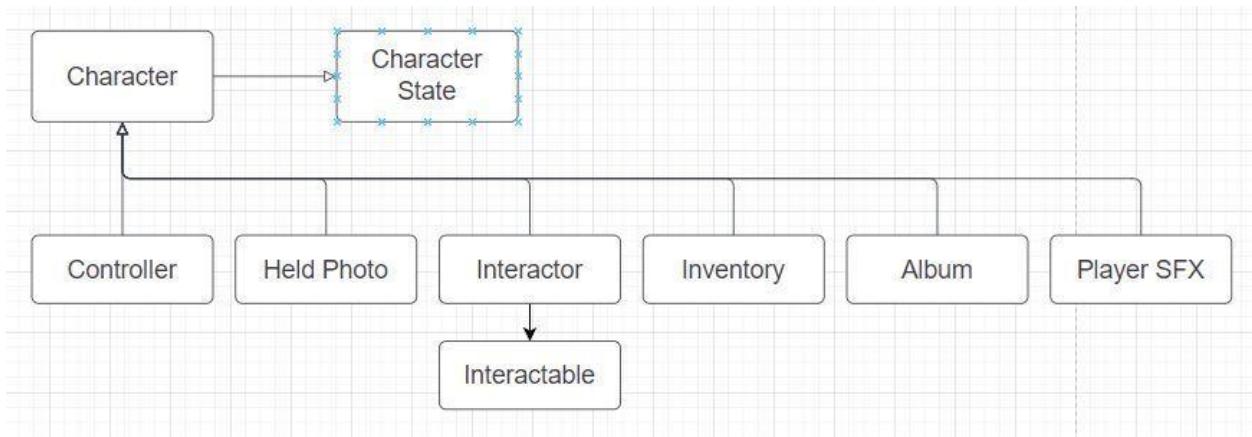


Figure 26. Character Component

Character component is a singleton that consists of every functionalities of the player character.

Controller: Takes player input and controls player movement.

Held Photo: Takes player input and controls the held photo.

Interactor: Allows the player to interact with the environment - other interactables.

Inventory: Stores and modify inventory data.

Album: Stores and modify album data.

Player SFX: Controls SFXs related to the player.

7.2.2 Inventory & Album

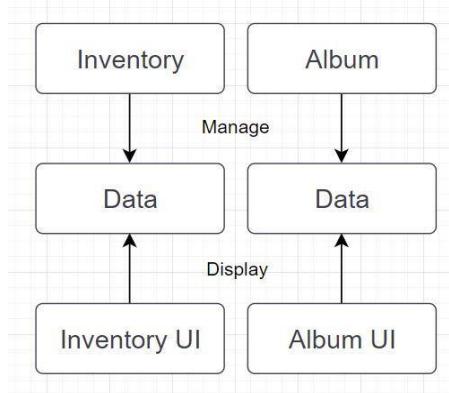


Figure 27. Inventory/Album Structures

Inventory and album are two custom containers that store data of respective data types. Those data are modified based on player interactions with the environment, like collecting items and photos, and using keys.

7.2.3 Interactable

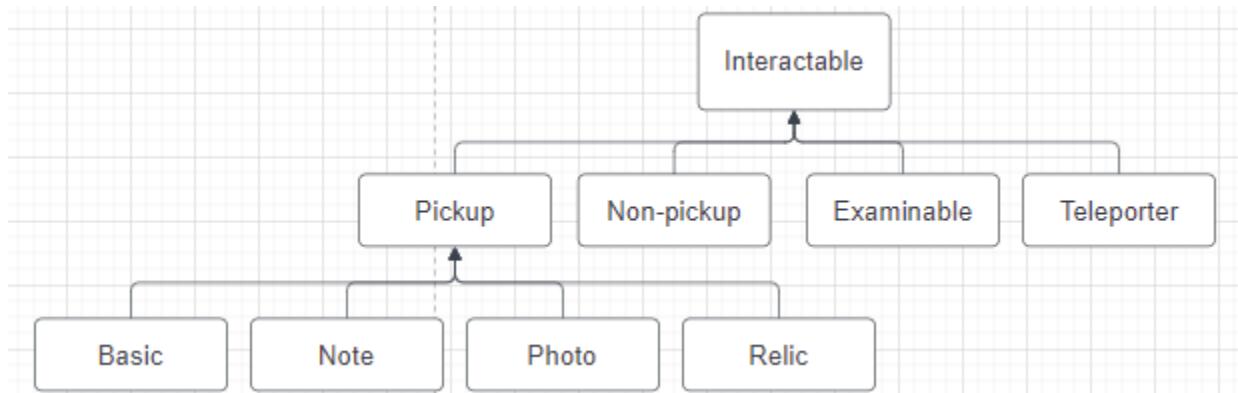


Figure 28. Interactable Structure

Interactables are entities that the player can interact with, things such as keys to pick up and doors that could be unlocked and opened. The base class is currently broken down into four categories, pickup, non-pickup, examinable and teleporter.

A pickup is an item that could be collected and examined closely by the player. The pickup class has four more child classes, basic, note, photo and relic. Each of these pickup types has unique features besides their basic usage as an item.

The decision being made here is to have more well-defined classes instead of having a single multifunctional script that is generic enough to create every type of interactables

possible. Smaller scale scripts make script management easier, and it also simplifies the setup procedures for game designers.

7.2.4 Item Inspection System

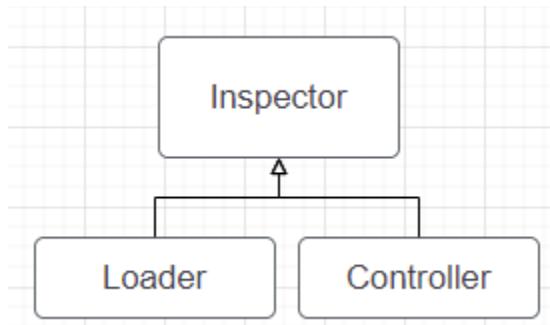


Figure 29. Item Inspector System

Inspector is another singleton using the single responsibility principle like our character components. It consists of a loader and a controller module. The loader can take a prefab or an object and load it into the inspection zone, and the controller handles all player input during the inspection state.

7.2.5 Photo & Stations

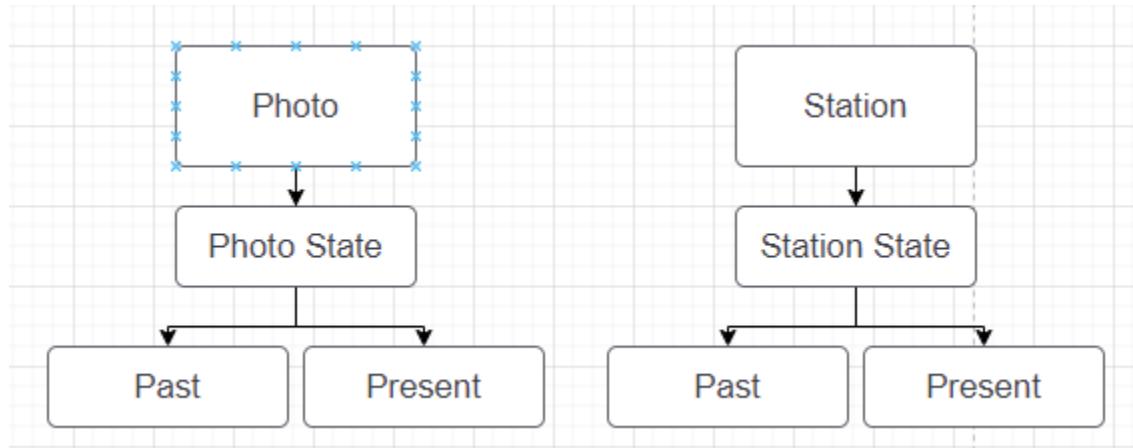


Figure 30. Comparison of Photo and Station Systems

Stations and photos are two core components of our core mechanic. They have past and present states used to control their displayed content. The photo class acts more like a data container, whereas the station only contains its data, it's also in charge of doing all the checks including player position, rotation and photo content and returning the check results to the station manager.

In terms of consistency, station class should be a data container like photo class, but since all data needed for the checks are located in the station class and this does not affect anything front-end, for the sake of development priority, this issue remains untouched. This issue could be solved by migrating the checking functionality to the station manager which could be done in a future code cleanup.

7.2.6 Station Manager

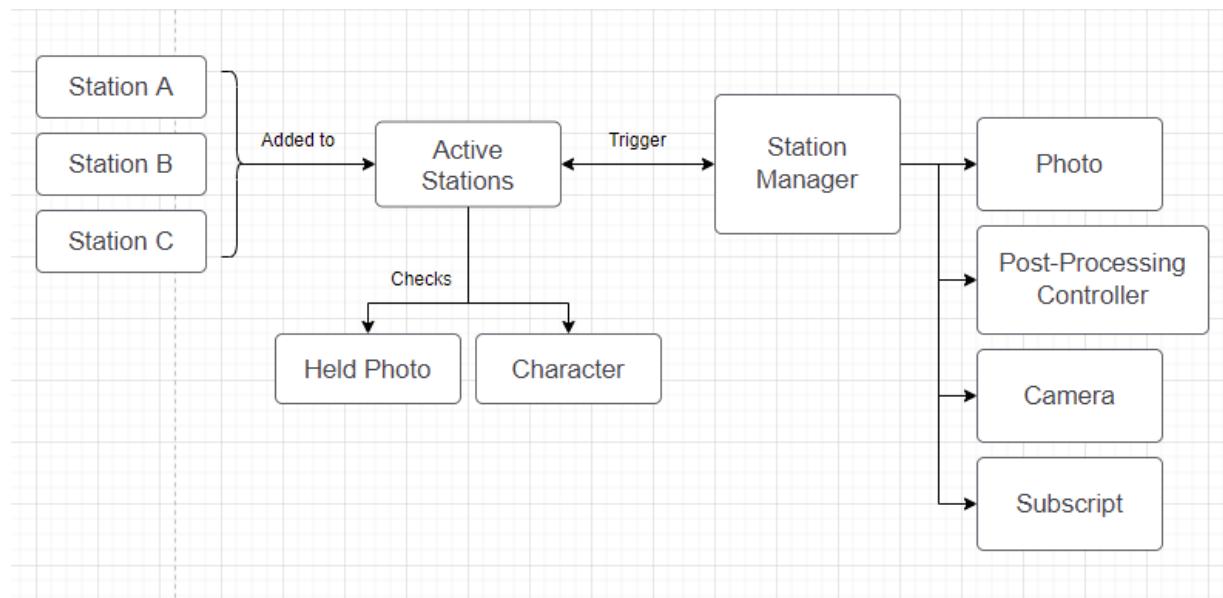


Figure 31. Station Manager Graph

The station manager is a singleton that acts as a bridge between all stations and other major systems. This is to reduce dependencies and to ensure that only a single instance is doing all the communication between the stations and other systems, with multiple instances being able to communicate with major components will likely cause conflicts and increase difficulties during debugging.

It is important to take note that not all stations are stored in the station manager, instead, the station manager has a dynamic list that contains all the active stations. If the list is not empty, the manager will start doing checks and signal other systems based on the results.

Usually manager classes should have references to all instances that they manage, but in our case, at least until the end of the semester, we did not see the need of doing that, since we are not dynamically loading and destroying stations, each station is a group of objects that build up parts of the scene.

7.2.7 Photo Controller

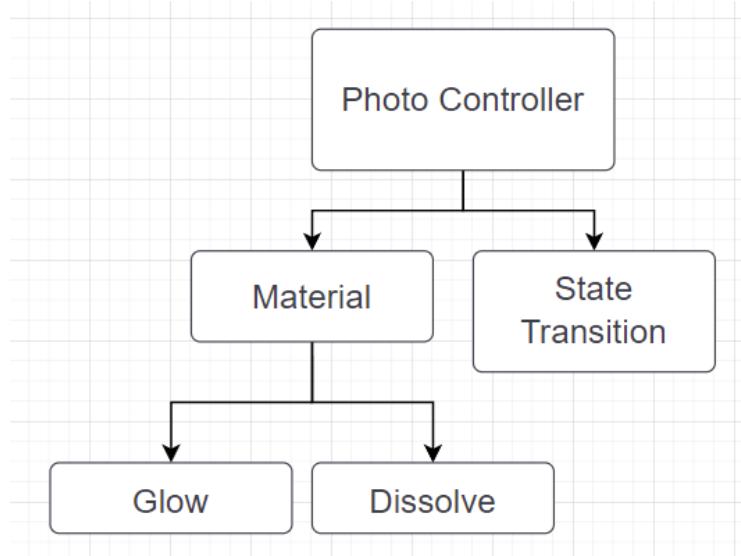


Figure 32. Photo Controller Graph

Photo controller is used to control the material of the photo object, since the photo object is the most important and complicated part of this project, its glow and dissolve effect are used as assisting visuals of our core photo mechanic.

The class right now is structured in a way that it only takes values from other classes and changes its material's parameter accordingly. The actual values were calculated outside of the class, which are mainly located in the station manager. One issue is that the lerping of these values that controls the material is happening inside the station manager. The usability of this script could be improved by adding tweens that modify these values internally, instead of taking tweened values from other classes, however, the need of this modification needs more consideration.

7.2.8 Post-processing Controller

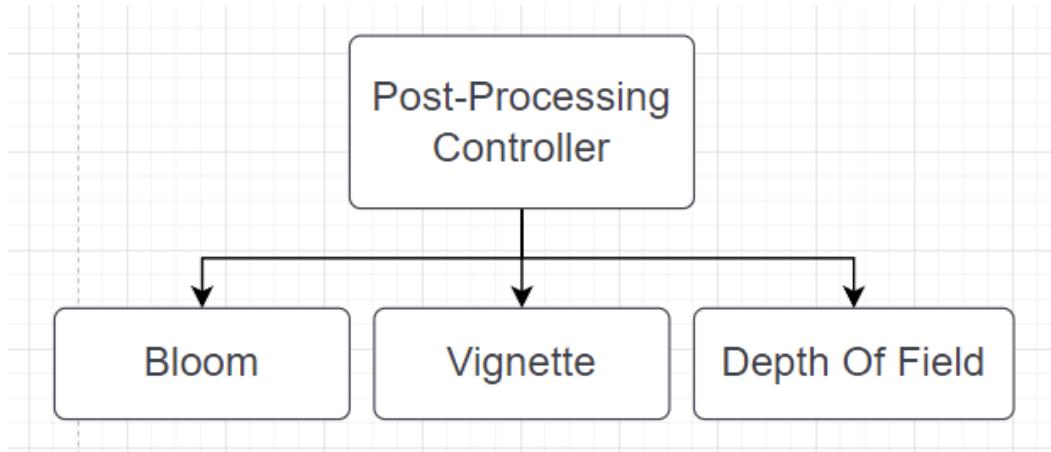


Figure 33. Post Processing Graph

Post-processing controller is similar to the photo controller, it takes a value and changes the assigned post-processing volume's parameter accordingly. So far, the post-processing effects that we used are bloom, vignette and depth of field. Bloom and vignette were used by the photo object, and depth of field is used to blur the background for item inspection and pause menu. It could potentially be expanded to be used in the photo mechanic.

8 Playtesting

8.1 Overview & Approach

When approaching playtesting, our common questions revolved around the player's experience: How do they approach things, what can be done to encourage them more, what aspects of engagement are enticing to them vs not at all, and in what ways can we improve on our core pieces to better improve the overall experience. Since we were working with an experimental mechanic, these things were key to figuring out the most enjoyment for the game; because of that, we need to constantly be assessing and reassessing the interaction between player and mechanic.

Our path of playtests emulated this; Playtest 1 was a paper prototype revolving around the player's interaction with photos in a narrative environment, Playtests 2 and 3 were expanding on that in a digital field, and Playtest 4 goes even further into improving the experience with new feedback that the player can use/react to.

From Playtest 5 on, we focused more on specific aspects of our development: mechanic changes, UI elements, player interaction and engagement, etc. because this then allowed us to feel more certain in what we had and where we wanted to go. Our biggest need for testing was always "Is it fun to play our game?" and in the results we can see the rise and fall of how players responded to this line of questioning as we introduced and tweaked aspects of the game to fit our ideas while also taking into consideration the players' feedback.

A combination of the pandemic and our own struggles to stay on track made our progression difficult, and sometimes not everything that we wanted to test made it into that week's build. We also lacked a demographic that we could have used feedback from: children. With what we could work with, however, we were able to figure out a path to take for the next sprints.

8.2 Playtest Notes

All playtests, barring Playtest 5, have a link to a document in which the team took notes and recognized patterns for the specific playtests. These are very informal, and the team notes should be taken lightly. The spreadsheets for each playtest, bar the first one, are listed down below in [11.4 Playtest Spreadsheets](#).

8.2.1 [Playtest 1](#) -- 9/21/21, Testing Player Motivation given only Photos

This playtest featured a paper prototype, as our development wasn't far enough to demonstrate any features for our game. Instead, we challenged participants to follow a series

of photographs relating to a small narrative and observed how they motivated themselves when given only a few photos and some “relics”.

Overall Goal: *Understanding Player Self-Guided Motivation*

Questions we asked ourselves while observing:

How do players react to photos?

What do they do with the photos upon acquisition (into the photo album, abandon them, etc)?

Does the player understand how the photos connect?

Are the players motivated to follow the “steps”?

Notes (From 8 playtests):



There was a common trend that players needed more than just “Take this picture and find the scene that’s featured in it” in order to understand the cycle of “Get a photo, explore the area, find the scene and watch it become the past, interact with the new scene and uncover the key to the next scene”. Some needed to be encouraged to touch the items, others thought it was a “Spot the difference” minigame, all were eventually able to uncover the next photo and continue the playtest with relative ease. The

second common trend found was that players could get stumped when faced with an image that contained common items found in the area (such as the desk chairs), and would need a minute to properly move themselves around until they ruled out the other two possible areas. No cues were needed for this step, as they had limited options and could motivate themselves to figuring out this surprise puzzle. Players were also unable to completely determine what was “different” when that scene was “recreated” by our time wizard, Abby. The presence of a backpack on the ground was either too mundane or an invasion of personal space.

When we answered our own questions, we found a couple common threads:

How do players react to photos?

Players were quick to understand that the photographs were of the space around them and that they needed to find the camera person’s angle in order to proceed. It was more interaction with common objects in front of them that they seemed to struggle with

What do they do with the photos upon acquisition (into the photo album, abandon them, etc)?



Several people abandoned the photo “album” while investigating other items, or held onto the little folder but never put the pictures back into it once they were done. One group even asked if the photos were “Single Use” and needed to be taken back after they matched the scene.

Does the player understand how the photos connect?

Only one or two tests had people connect the photos together, which means the players were more focused on the spatial element than what was featured in the images. Some did make comments on the featured people in the photos (Adi says Gav’s a handsome devil) but they didn’t see a connection between the events beyond that. They were more seen as individual events.

Are the players motivated to follow the “steps”?

Once they figured out what they were doing, players didn’t need much encouragement to continue following the path of photographs. Maybe it’s an innate need to follow “breadcrumbs”, and there should be further investigation if those same breadcrumbs would be followed if alternative items were included in the mix, or if the breadcrumbs would be prioritized over exploration.

An additional question now that we’ve seen the playtesters go through the process blindly:



What kinds of cues were successful and which only confused the player more?

We noticed that cues that encourage the player to interact with certain things were highly effective, as the players were able to then figure out the rest of the puzzle, and then continue that pattern for the rest of the puzzles. When not encouraged to interact with objects, players seemed to get a little frustrated/confused on how to proceed. General cues such as “Keep looking” or other general encouragement to continue fell flat and only seemed to make the player more desperate. Desperation can lead to the same result, however there is less

satisfaction to the player when they solve the puzzle.

After considering all of these answers, we ran a final playtest that included more purposeful cues from the playtest runners (Abby and Wren). The inclusion of cues guiding the player to what they can touch was helpful in progressing through the first scene, even if the playtester was more polite than previous players. With consistent use of this type of cue, the playtester was able to get through the various scenes and eventually find the final image.

These results will help guide our UI design in such a way that we can signal to the player what they can interact with, on top of the general photo mechanic onboarding. Our next playtest will

ideally be digital and include early designs for such cues, and we will be observing what else might aid in player motivation towards exploring in our game.

8.2.2 [Playtest 2](#) -- 10/14/21, Intro to Digital Photo Matching

This playtest was the first run of our digital prototype, in which we featured a small linear path of puzzles that related to 3 in-game photographs. The team observed how our players adapted to the mechanic, how interested they found the mechanic (and resulting world impact of such), and how intuitive the instructional UI was when introduced to the player for the first time. No narrative was included in this prototype as of yet.



Overall Goals: Demonstrating the Main Mechanic, Gauging Onboarding Needs and Necessary UI Information

Questions we used to monitor this information:
How do players react to the digital mechanic?
When introduced to a semi-open world and vague puzzle instructions, how do players guide themselves?
How well do players figure out what to do with the puzzles given only the instructions?
What do players express a need for when they get lost/confused?

Notes (from ~31 playtests):

A very large standout of something players expressed was feedback. Our UI was very limited to just visual control instructions, and feedback was limited to the pictures quietly changing into the swapped format. This left quite a few players confused about what they did and sometimes didn't teach the player what they specifically did, so when they approached the other two puzzles they were guessing more than analyzing and tripping into the solutions. Our decisions for future prototypes will be heavily influenced by this, particularly with a suggested "Hot and Cold" method of guiding the player to the specific locations they need (at least in onboarding)



The instructions and controls were clunky for a lot of players, especially since the instructional pop ups were triggerbox-based and thus easy to skip or speed through. This led to us as playtest runners having to help tell the player what controls they had, because otherwise they wouldn't be able to test the spatial aspect of the player. In the future playtest and prototypes after that, we're going to be adapting how the instructions are demonstrated to the player based on their actions and potentially play with control layout to see what can be more immersive for players.

Players relied on what was physically given to them to direct themselves around the level (ie. the photos), instead of what surrounded them. As there wasn't any purposeful lighting/reactive feedback/level design, this makes sense. For the future, we want to try and encourage players to explore more with the world around them and that may include more interactive environmental items and purposeful placement of things.

We implemented a few hotfixes on the instructions so that our Homecoming playtest event can focus more on the mechanic and less on learning the controls. We've also gotten a much stronger idea of what feedback/cues the players will need while playing the game, and our next full prototype will definitely include much more to help the player as they traverse the world

8.2.3 [Playtest 3](#) -- 10/15/21, Brick City Homecoming

This playtest was a rerun of the previous prototype, with added in hotfixes to some of the instructional UI that players found confusing the day before. It still followed the same linear puzzle path, and observations were geared now more towards just how players interacted with the mechanics. This playtest was run with a majority of the players unused to games on a PC, and we were able to also get notes on the difference between “new gamers” and “experienced gamers”.



Notes (from ~10 playtests)



A majority of the playtesters were not usually gamers, contrasting to our 1st and 2nd playtests, and as such we learned more about how controls/visuals might be confusing for those who are otherwise not familiar. This detracted quite a bit from our initial investigation of the mechanic's amusement but did provide insight on accessibility options for future prototypes.

The survey responses mainly solidified what we already knew based on the previous day's playtest: More feedback, more leeway, easier to understand UI. Several players were outside of our intended target audience based on age/interest; however they were also able to assist in key pieces of accessibility planning and feedback notes.

8.2.4 [Playtest 4](#) -- 12/02/21, Feedback to Players

This playtest featured a new level design concept (using some of our cool art assets from our artist), refactored code for better scalability, and improved player feedback so that the puzzle aspects are easier to understand. We were also able to observe how players guide themselves

around a level when not given an explicit goal, and how they observe what's given to them for the first time.

We forgot to take pictures, so this section is a bit more text-heavy than the previous ones.

Overall Goals: *Gauging a first run of Feedback Updates, Mechanic Adaptability with refactored code*

Questions we used to monitor the players reactions were:

Now given the new feedback, how understandable is the main mechanic?

What changes should we implement for the UI to improve understanding?

What do the players absolutely love about the game, and how can we get more of that love elsewhere?

Internal Notes (from ~28 playtests):

Overall, people really liked what they saw. Feedback on the vfx feedback was very positive, and the mechanic is still very intriguing to a lot of people. The environment + colors/lighting were also positively commented on both in person and on the survey, which means our aesthetics are developing well and has cohesion with the mechanics. The dissolve effect, when seen, was appreciated and appeared to be people's biggest "wow" moment of the prototype.

Our other updates from the previous playtest fell flatly. Jumping felt wrong to a lot of players because it's not a platformer, and therefore had no reason to jump around the level. The hot-n-cold effects didn't have the punch that we wanted them to have, unlike the dissolve. The vignette effect, intended to guide the player to the correct angle, wasn't noticed due to the delay of its activation and the speed at which players left the stations. The glow effect, intended to guide the player to the right distance from the perceived objects, was overshadowed (or in this case over-lit) by the exaggerated lighting. Players would either assume the lighting's impact on the photos was the glow or the glow was part of the lighting, rendering the effect unhelpful. Our UI reverted to an original template, and thus provided limited assistance to our players.

We now understand more of what players look for in larger play areas with less to do, and hope that by changing our visual effects, environment interactions, and improved guidance (both in the form of UI and level design), we'll be able to improve the overall experience of the game. This is guiding us towards more polish on what we currently have, but also changing how we approach UI, VFX, and station creation going forwards.

8.2.5 Playtest 5 -- 01/27/22, Photo Matching Assistance Testing

This playtest was built to be very focused on specific testing towards adjustments towards the player's movement and how they can be assisted in aligning the photograph up correctly. Alfie came up with



a grid system movement style that snaps the player to the closest square in the grid. After demonstrating it in a meeting with committee member Chris Cascioli, he took Chris's suggestion of having the camera lerp subtly into the grid spot only when the player is focusing the image. Both options are easy to implement into our current game, and so we decided to use this playtest to see what players think about each.

Other playtest additions that we'll be getting feedback include general ambience audio and how it enhances (or detracts from) the experience, and a decal system that makes the environment look a bit more aged than the current existing models that we have.

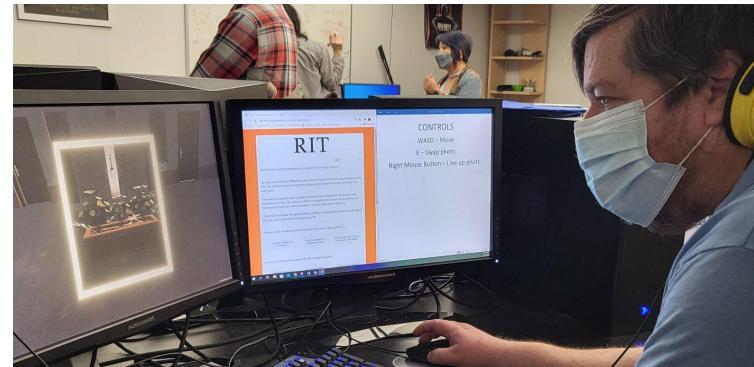
Overall Goals: *Player and Dev Preference towards Movement Assists, Aesthetic Upgrades: Good or Bad?*

Questions we used to monitor the players' expressive thoughts were:

Do they express any reactions to either of our photo assist styles?

Do they accept the assistance willingly, or do they find it obtrusive to their attempt in aligning the photos?

Do they remark on the audio given to them (if they got it) in a positive or negative way?



This is of course in addition to the survey we had them fill out, which asked their preference on the assistance style, their thoughts on the surrounding visuals, and how the audio came across to them. They were allowed to answer the survey at any time and retrace their steps in the game if desired.

Notes (from ~22 playtests):

When faced with the two assistance styles, players seemed to really like the constant grid version more. This specific information is particularly useless in terms of comparison against one another, as they were demonstrated in 2 very different puzzles and could not be directly compared. We can still use the players' expressed opinions towards each individual station, but comparison between the two would be unfair.

When asked about their individual thoughts towards specifically the lerping station, the players expressed a lack of interest, much to our surprise. This might be



because the lerping radius was large enough that it became jarring for players when they got pulled, coupled with the lack of understanding as to *why* they were being pulled into a specific location. Once they understood, it seems more people liked the ease of accuracy when lining up the photo, but the limited range of movement when the photo was primed, and the sudden unexplained pull were only to the assist's detriment. The lerping version certainly has the most potential but needs a bit of balancing and feedback added to help the player feel more comfortable with being dragged around.

Our players were also still frustrated with the precision of our matching, and as a team we discussed fixes that we can test, including balancing our visual (and eventually audible) feedback cues to guide the player closer to where we want them to be or possibly larger radii for the angle and distance required for the matching to be complete.

We also looked at a couple new things for our aesthetics, and overall, it seems that players think we're on the right track.

Only some of them understood the concept of Southwestern US, so additions and adjustments to current items might need to be made, but overall, they enjoyed the new decals that Abby was able to figure out for the aging of the general location. In fact, people wanted more of the decals that she included in this playtest to really grasp the lack of maintenance in the area. Our first run of audio was included in this playtest as well to gauge how on-track we could get there. A good number of players deemed it on track and an improvement to their experience overall but mentioned the repetitiveness of the foremost sounds was a little much. It also didn't read as Southwestern US so much as Generic Forest-y vibes, so adjustments to the featured sounds and possible inclusions of local wildlife might help create an even more specific scene for the players.



The overall aesthetics nailed a few concepts that we wanted to hit; namely, nostalgia of a place you've never been, catharsis, and a curiosity for what's caused this place to be this way.

Our plans for fixing up the complaints that we had while still recognizing the benefits

can be boiled down to "lots of Balancing". We have a good start, and it seems that in order to create the experience that we're going for it's going to take some playing around with numbers and adjusting things that we thought would be set.

8.2.6 [Playtest 6 -- 02/17/22, Full Game Loop preview](#)

Our intended focus for this playtest was to combine everything that we've been working on so far and create a prototype of the overall game loop. We kept it relatively simple with 4 photo stations, including one to allow for the players to get used to the system. This newest build also

included some sound effects such as footsteps and effects to accompany the transition of past to present and vice versa.

We forgot to take pictures during this playtest, and so this section will be more text-focused and less broken up

When the build was made in the labs for the internal playtest portion, the subtitles system was unwilling to comply and so didn't make it into the features tested synchronously. The asynch playtest will hopefully have more notes on the subtitles as the build was updated on a personal computer.

Overall Goals: *Initial Game Loop Testing, New Sound Testing, Initial UI Updates*

Our survey focused more on the player's experience with the overall game loop, and included places for them to express thoughts on the current ambience of the game.

Notes (from ~14 synchronous playtests):

Playtests confirmed that we're still doing strong with enticing the player's curiosity, as many testers chose such from a list of emotions that they felt while playing the game. This means our aesthetics are strong enough to entice the player for more information, and once we have a more full narrative inclusion we should be able to softly guide the player around while they explore on their own. Players also appreciated the updates to the achievement visuals, and cited that they felt somewhat accomplished when getting the puzzles figured out.

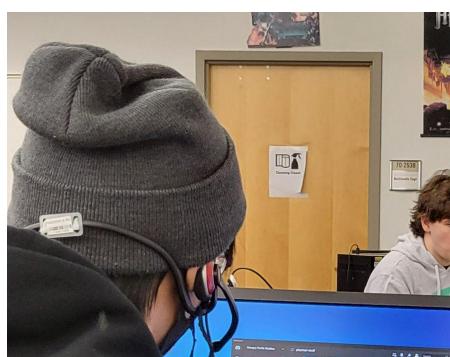
When observing the timing of things, players felt it was all very slow. They wanted to sprint through the world, skip the transitions between past and present, and have a faster time finding the precise location of the puzzles. We took this into consideration and created a broader range for the players to solve the puzzles, as well as reintroduced the sprint toggle so that players can move more freely, even if it's just a fast walk speed.

We lacked complete integration of the inventory system, and so some players were able to sneak into the locked room without the key, as we didn't have anything to prevent that. The inventory itself felt a bit off from the player's experience; there wasn't a natural way to introduce them to it or allow them to examine things closely. Our new plans for fixing this include incorporating the examination view into the inventory's select item view, and introducing the inventory forcefully in the tutorial portion of the game by popping it up when the player picks up their first relic.

Overall, players understood what the game asked of them and at the very least left the playtest knowing what they liked and didn't like, as opposed to having previous confusion over everything going on in the game.

8.2.7 [Playtest 7 -- 04/15/22, Tutorial Introduction](#)

With this playtest, we wanted to finally get some kind of onboarding experience in, with photo puzzles that are simpler than what we had in previous builds. This was kept to just a couple photos that highlight the "whispers



of the past” that the intended new stations would have, as well as incorporated a new visual style of people posing for the photograph. This was also a new introduction to more stylized subtitles than what was previously introduced, and major UI overhaul changes that would hopefully allow the player to feel more immersed in the experience regardless of how tedious it may be.

Once again, we forgot to take pictures during the actual tests, so please enjoy a photo of Alfie setting things up for his station.

Our overall goals this time were: *Tutorial Integration, Onboarding Intro Video testing (similar to a silent cutscene), UI Integration, Guidance Audio Integration*

Our survey was the same as the last playtest, so that we could compare how the new additions would change how our players perceived the game.

Notes (from ~22 synchronous playtests):

Overall, players liked the improvements made to the game this time around. They felt more in control of their progression, like the puzzles were less frustrating to solve, and that the aesthetics were more in line with the overall abandonment of the game. The overall impression is still a game of 3D I Spy.

Some things remained the same for a good number of players, however, including the key item being generally elusive to the player’s knowledge until they got to the locked door, and then the location of which is still unknown. The lighting issues in the game still confused players in certain areas but were also used as assists in others for aligning the alleyway image to the world. The subtitles were still clunky to people, the inventory and album systems were unfamiliar even to people who have played games in general before, there was still a level of tedium that people didn’t like in matching the photos up to the environment.

We have plans to adjust the key so that it’s more visible to the players rather than blending in with the chair, and to move the subtitles around a bit to see if the placement of them was what intruded on the player’s experience (along with slight rewrites to improve the player knowledge)

The latter topics, being that of the album, inventory, and tedium of the photo interactions, are currently out of scope and out of mind as we work towards a final build for Imagine.

New additions were taken in with mixed reviews: The intro sequence helped some people, was an intrusion to others, and just a confusing lack of knowledge to many. The new puzzles were easier for players to miss when wandering the area, and because their photos start on the second page of photographs they get lost even more. They reported feeling clever when they figured it out, which meant the payoff was well worth the struggle. The issue seems to be just guiding them to those spots, and that could hopefully be achieved by precise placement of items and dialogue prompts that direct the player to the album for another image.

As for the intro sequence, there's not a whole lot that can be changed as we can't guarantee that the player will look down and see toy blocks and think "ah that means a button" and not "I should press T (versus TAB)" for instance.

These intended changes and more will hopefully be present in the playtest next week..

8.2.8 [Playtest 8](#) -- 04/23/22, Imagine RIT

Being our final playtest, our build features a culmination of everything we've worked on this past year: the photo mechanic, the relic system, the audio sfx, the narrative build up, and the aesthetics that make the world around the player. The intended "demo" for the players is simply the tutorial section, however they will be able to explore previous photo stations and the world once they finish their official objectives. Over the past week, we've updated the intro sequence to be more interesting to the player, added additional exposition for the player to engage with, and improved guidance for the more challenging station.

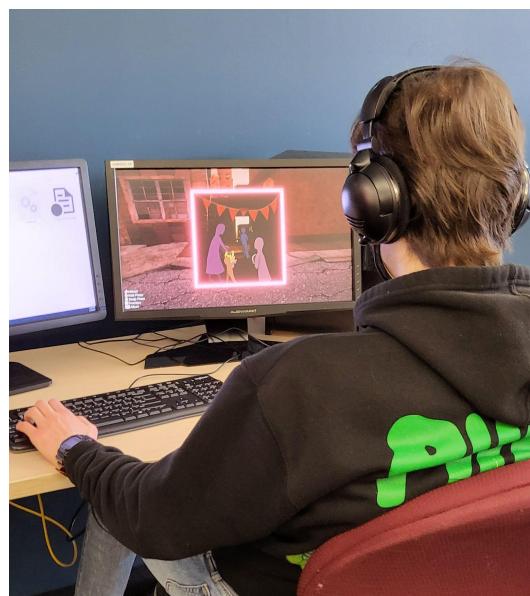
Due to the nature of Imagine (being that of people wandering around and hoping to see everything that they can), we did not prioritize the survey at all and thus do not know how many people we were able to get to play.



Our final playtest goals are: *Does the player take away what we want them to?*

And do they? Based on the curiosity that kept multiple kids playing the game long after their parents or siblings said "Let's go, we have other stuff to see", I think the answer is yes but not in the way we anticipated. Children seemed to adore our game, and for good reason: They learn by matching imagery to what they already know, and so a game with that as the key driver was familiar enough for them to quickly understand. The adult audience, on the other hand, seemed to almost overthink it. Many people remarked that because this scene or that wasn't identical to the image, that it couldn't possibly be the correct answer. Others were too impatient to let dialogue play out, and missed vital information of what they were meant to do.

Were there things that we can improve on? Of course! The onboarding process needs a makeover so that players of all ages understand what's going on, as we had to help prompt a few players into the correct direction. The diegetic control information scattered throughout the level was often overlooked, and the players relied on the corner instructions to learn about what they could do. The audio cues seemed to



help those that understood what was going on, and were unrecognizable to those that didn't. Those that took the survey had a consistent pattern of feeling frustrated with the lack of information, which we want to help mitigate through improving the onboarding process.

Many people took a business card that links them to the itch page, and so perhaps we'll get more information to consider in the future.

8.3 Future Work

Based on what we've seen in all of our playtests, we think a huge focus for future ones would be onboarding changes. The players are still confused about their presence in this location and how to interact properly with the environment, and properly dedicating a few playtests to developing that necessary exposition and diegetic onboarding process.

During those same playtests, there is merit to also implementing more of the narrative work that we have built up over the semester and seeing how players would respond to that. A lot wasn't able to make it into the current build of the game, and unfortunately that means we haven't demonstrated the full range of emotions that we intended. Testing how players feel from that information, along with any new information that helps bridge some beats, would improve the overall experience and allow us to fully realize the game's potential.

And of course, a big thing that we'd need to test more is the accessibility changes needed for the game. The photos themselves and the dialogue both rely on colors for the player to recognize where in the world the image is (photos) and who is speaking (dialogue), and while voice acting can change the latter, the former will need additional, purposeful testing and changes to improve the experience for all players.

9 Postmortem

9.1 Overview

The biggest challenges when facing a year-long development process were communication, planning, and the resulting changes to the main design. When communication waned, things diverged from their original path and cuts had to be made to the final product. The game design lost its content, the technical design lost its accessibility between developers, and the overall team morale fluctuated. With proper planning that took into account interruptions to the flow and communication before those interruptions occurred, perhaps the end result would have been clearer early on in the process.

9.2 Reflections

9.2.1 Game Design

Scope changes to the overall design can be a very disheartening thing. As the year progressed and the perceived timeline shortened, our priorities had to shift. We lost out on content that we wanted to bring to the experience, on changes to the mechanic that would elevate the narrative and challenge the player, and on fully fleshed out audio that would add a sense of connection to the past. Those things would have truly added a level of personalization to the game which would help place the player into the characters' shoes and allow them to view the world through their lens'. We mourn the loss of what we had initially considered as ideal for the game, but we also recognize the beauty that came from those cuts. With our prioritization on the team's wellbeing over the amount featured in the game, we were able to create something to be proud of, something that we can boldly say is our small attempt at greatness.

There were many things that we wanted to include in the game. We confidently talked in the fall about concepts for overlapping time periods within a single scene to depict how the past changed in its own time, and how the characters were growing as the years passed. At one point, we boasted about the feasibility of altering the angles and heights of the stations' solutions, to challenge the player and provide insight on who took that image. These would have helped subtly progress our narrative for the player, but when faced with the limitations of time and health they had to be given far less priority than we intended. While they were very possible for the design and world that we imagined, we still had a lot to achieve on improving the main mechanics of the game and couldn't simply push those off. We had to simplify the concept: The only axis that we could play with angle-wise for now was the Y axis, and players would instead be able to solve the puzzles with less frustration than before. We even removed the ability to swap the stations between the past and present as we lacked a need to access anything in the present form of those stations. It was simply a distraction that would pull players away from their main objectives. We were able to achieve that simplified concept, at least, through listening to the playtest results and creating an improved balance of leniency,

player assistance, audio cues, and level design to help the player understand where to go. The game mechanically is now in a state that we're content with.

The design of the environment was similarly changed as deadlines and stressors arose. An experimental concept that we had tossed around previously was cut: We wanted to change the color scheme of the items, background textures, and everything in between that were swapped from the past. It would look as though those items had come from the photographs, complete with any color fading or water marks that were featured on the images, and with the new color players would know that they had changed the world in some surreal way. We did not prioritize this very highly and all considerations for it were dropped early on, even if we were still mentioning it as a possibility to each other. Other environmental areas grew, as we were originally just planning on having the apartment be the main focus; now there is an entire city skyline and matching street fair for the player to experience as they explore the world. It's quite quaint and fitting for the theme and wouldn't have been achieved if the color swapping development had continued as it was.

There were some regrets with the audio design, as much of it was more reactionary than intended. Often the sounds were made to match the currently implemented features rather than planned out, and this meant that some of the more involved designs weren't implemented how we wanted them to be. There was talk of personalized soundscapes for each individual relic that would grow as the player solved each of the relevant puzzle stations, however this was cut when the relics had to be cut. Ultimately, the audio's focus could have been improved upon by a lot of better planning.

Our narrative, being one made to fit the scope enough for the player to get a story that felt "complete", was constantly being changed to match what we could do. This meant a lot of actual development for it was pushed back to later in the process, which it shouldn't have been, and we will go over more thoroughly in the production post mortem. We ended up having more story beats designed than we had the time to fully realize, and much more behind the scenes worldbuilding than was able to fit in the final deliverable. Our lofty goals from the fall semester, the ideas of multiple forms of media for relics (cassette tapes, letters, films) and propaganda props to depict the underlying governmental conflicts in the world, were cut as things were transitioned to a far smaller cause of conflict: Family issues. While we could relate to propaganda causing heavy unrest for otherwise benevolent facets of society (in the game's case, nuclear energy. In our reality's case, vaccines/war), we felt more comfortable dealing with the internal conflicts that come up in a disconnected family. We may no longer have our central antagonist as a dystopian government set on trading wellbeing for personal power, but that does not mean that we lost out on everything we hoped to achieve.

The key focuses of the game were to allow the player to connect the past with the present, unravel the narrative themes of family secrets and the gray areas of your loved ones, and explore a detailed environment that speaks to the decay of memory over time. What we ended up with as of May 2022 has those focuses as the central determinant for all decisions made. The designs that made it into the game don't feel "unfinished", and instead are polished to a level that we are happy with. If we had been given more time, we would have considered stricter deadlines for our designs and improvements to how the planned sprints were laid out,

but with what we were given, *Through the Lens* was realized as the amuse bouche it was intended to be.

9.2.2 Technical Design

When it came to our technical design, we tried our best to foster adaptability and keep to proper coding standards. When school, life, and a pandemic stood in our way, unfortunately those standards were not held on as strongly as they could have been. This did not deter us, though, from constantly improving on the structure of the codebase and from finding information online that could make the process easier for everyone. It was constantly a learning experience for all of us as bugs and conflicting issues arose.

Early on, we implemented set design patterns to keep things organized. As RIT teaches singleton²⁸ in the game development courses and we were eager to begin testing our main features early on, we quickly defaulted to those for our major systems until the dependencies became too complicated within the scripts. A major refactor of the code brought in the observer pattern, which helped reduce the number of dependencies present, but in the future, it might be more ideal to transition some of the scripts to a mediator pattern²⁹ which could relieve several areas of even more dependencies. Our manager scripts continued to utilize the singleton pattern through the code refactor, as they worked without issue. Also, in our haste to produce the beginning key mechanics, we relied heavily on hard-coded variables that ended up being impossible to change without breaking all of our hard work. These features continually had to be reworked as the progress of the mechanics grew, and in hindsight it would be ideal to limit such hardcodeding for important systems.

Things that we did not initially consider popped up as problems: Cameras cannot be stacked without disturbing the post-processing layers in the game, FMOD had seemingly easy to understand integration for Unity projects but ended up far more complicated than what was portrayed, and simple animations in the game were interesting to have for various spots of the experience but we didn't have access to any animators or cinematic artists. These things ended up halting progress momentarily as we considered our options, but as any learning experience would prove we were able to overcome the issues through our helpful committee members' guidance and the power of the internet. A friendly and free tweening library online helped us avoid losing out on animations, and numerous forum posts from equally confused FMOD users helped guide the way.

The biggest challenge was keeping the team together on our scripts' major standards: A commenting format to assist in understanding each other's work, and the Single Responsibility Principle to keep things easily accessible for debugging. Several members had no prior experience with the Single Responsibility Principle, and therefore did not fully understand what they were looking for when debugging issues prior to playtests, getting lost in the large number of scripts. This led to a lot of confusion and distracting communication

²⁸ "Singleton Pattern - Wikipedia." https://en.wikipedia.org/wiki/Singleton_pattern.

²⁹ "Mediator Pattern." In Wikipedia, May 1, 2022.

https://en.wikipedia.org/w/index.php?title=Mediator_pattern&oldid=1085586829.

between themselves and the person who authored that script. The commenting standards were also long—since abandoned by the spring semester and furthered the confusion for the members that didn't touch those scripts. If we had more time on the project, these communication moments wouldn't have interrupted the workflow nearly as much as they did. Within our specific capstone context, the best way to mitigate it might have been to have a formal meeting that brought everyone on the same page regarding the standards held in the code.

9.2.3 Production

It's no surprise that there were bumps in the road for our overall process. None of us had ever been tasked with a year-long, team-based game project before, and so everything from the design to the development and communication all around had to be translated from previous, shorter projects from our first year in the program. On top of that, a pandemic that kept one of our team members remote for a full semester and kept everyone on edge when outside our homes caused more than enough stress along with every other responsibility we had. The odds weren't in our favor for most of the year, but we made it out on the other side as a full team with our game.

We had to relearn how to interact with each other both online and in person, especially since none of us had seen each other physically before save for a few brief experiences. The majority of our interactions leading up to Capstone Design were fully remote, and this meant we could understand each other in text form but not through body language, perceived tones, and generally didn't have the previous habits of interacting outside of a work setting. This meant Discord was our main outlet for communication with a conscious inclusion of more relaxed channels helping us become familiar with each other, and occasional team trips to get food helped us connect more. Our expectations for each other were also dependent on ourselves: Some of us valued punctuality for meetings more than others, while others valued formality in task management instead of leniency. The latter had to be dealt with when even the team member who set the standards for the Trello cards began to stop using them, and this change sparked a bit of an improvement in the management process.

Something we all agreed on, however, was the priority of our wellbeing over the success of the game; this included mental, emotional, professional, and physical states of everyone, and as such we incorporated such discussions within the standup format. This caused quite a few scope cuts towards our design sections for the game (which we go more in-depth about above), but the team understood that the cuts were so that we as human beings could in turn improve ourselves and as a result could improve the work that we introduced to the game. This mutual understanding kept our workflows cohesive with the central pillars of the game, however we definitely could have used a regular meeting once a week to reiterate those pillars and the intentions for the sprint and made the implicit understandings explicit to mitigate any deviancy from our goals.

As mentioned previously in [Section 4.4](#), our sprint management was inconsistent at best and disregarded at worst. While we tried to maintain a structured dynamic with a beginning, middle, and end to all sprints, a combination of our own personal workflows and

improper planning regarding longer sprint-specific meetings meant the structure felt more like an interruption to our work than an assistance to the process. The beginning of sprints stayed consistent through both semesters with members discussing our overall design and creating/accepting tasks based on those plans, however we never stepped back to review the process and make any desired changes that might improve our process overall. That latter failure is reflected in the breakdowns of communication and process handling mentioned below. We did not realize or handle this during the year, but are now very aware of the need for improved sprint planning to create a proper workflow that would catch other process problems early on, before they snowball into disappointing failures elsewhere

When it came to our team's overall dynamic and interactions, we started the year in two distinct groupings: design and development. Mentioned in [section 4.2.2](#), we wanted to allow everyone the chance to grow in their respective interests for the field, and this resulted in a divide of two members focusing on the programming and development of mechanics, and the other three focusing on the overall design and development of narrative. This worked well early on when we were trying to design what the game looked, played, and felt like while also trying to figure out both the design and feasible development for our planned mechanics; we were able to progress on both aspects and keep the overall flows cohesive with each other. Once the core was finished, however, we did not recombine the groupings into a whole team right away, and this was partially where the team's communication began to slip. Due to habits, bugs were only reported within the development side of the team, and any work done to the main scene wasn't communicated until after the fact, even when it was well known that the design team was changing things in the main scene concurrently to the new pushes. Better practices and strategies regarding version control and branching could have been explored to try and alleviate these problems. On the design side, intentions weren't communicated fully for how the mechanics interacted with the players and led to a decline in the onboarding process that persisted the entire year. The divide only strengthened, instead of the groups rejoining. We noticed it briefly during the first code refactor, but it wasn't until our pivot at the beginning of the spring semester that we began to recognize the divide and try to rebuild the team into one unit again.

We emphasized the Trello board more, along with major card template changes that allowed some of the design team to function on the board and made sure stand ups included more discussion around both personal and technical issues. This certainly boosted communication and general cohesive within the team, but there were still gaps due to the separation of tasks. We certainly learned more about creating time to understand the entire project individually and as a group, rather than just our own pieces, and that on a small team like this it would be better for everyone to be involved in each discipline, instead of designating the distinct areas of work that only kept us within our small knowledge silos for too long.

The biggest challenge we faced was the process surrounding narrative. Within the undergrad section of RIT's Game Design major, there are no opportunities to create a stable workflow habit revolving around a long-term intricate narrative; most projects end up relying solely on interesting mechanics and in best case scenarios some audio accompanying it. With our solely Master's track student having come from a computer science bachelor's program,

none of us went into this knowing how to properly plan for a narrative-heavy game. This is very evident in all of the scope cuts surrounding narrative, as well as the delayed start to overall development and changing deadlines for said narrative when it didn't come to fruition like we wanted it to. To the untrained eye, our game has zero narrative inclusion in it, and that is the result of the poor prioritization we had for the entire narrative process. We should have started far earlier in the year than we had, and certainly had many chances to reprioritize it but did not recognize that until it was too late. We took what we had learned in our previous graduate classes and utilized it towards our more mechanical aspects of the game but failed to realize that the same should have been used with our narrative.

This isn't to say that there is no narrative in the game; in fact, all our decisions for the features, aesthetics, level design, audio, and even UI were made with the narrative as the main focus of the concepts. If the player looks for it, they will find the entire narrative blended in everything else that the game offers. We learned how to make a game that leaks narrative build up from its cracks, and the failures that came from trying to implement a more explicit narrative taught us to recognize our own processes failures and readjust priorities to improve the narrative's development, including beginning testing on narrative story beats far earlier in the process and developing the supporting technical systems necessary sooner to demonstrate those beats.

9.2.4 Playtesting/Quality Assurance

Playtesting throughout the semester was both a blessing and a curse. We understood the merit of listening to how our players interacted with the world we created, but our own failures within the overall process would result in limitations to the feedback we would receive from playtesters. There would be moments of panic within the team after uncovering a potentially disastrous bug due to a lack of testing prior to the event, or shock when realizing exactly what was able to be implemented and what had been pushed to the following sprint. These gaps came from a variance in our communication's strengths and an underestimation of how long the development process overall would take.

When planning out our sprints, we lacked the proper recognition for how long certain aspects would take to be implemented into the game. This meant that a lot of development continued past deadlines that we intended, and severely limited us on following up with quality assurance testing prior to the day of playtests. This underestimation of time might have been avoided through simplifying tasks to their core features and redistributing tasks when interruptions came up, but we did not recognize the patterns until far later in the semesters than we should have. Planning for increased communication regarding progress and partnering up for quality assurance testing would be a huge change that we would try to implement if tasked with this project again.

On a more playtest-specific level, there were a couple hiccups in the process that were actually the result of a hiccup in communication. A disparity in communication within the standups and playtest review meeting resulted in varying expectations towards the following sprints, and the lack of centralizing meetings mentioned above meant that it wasn't until deep in the sprint's development cycle that the team realized our expectations were different. These

hicups resulted in a couple playtests that were nearly identical to each other, as the underlying code organization was the sprint's resulting change. We ended up with very similar feedback on the surveys, and players that attended both playtest sessions remarked on the lack of changes to the game. This could have been avoided easily with improved communication on the part of all parties, and perhaps an aforementioned weekly design meeting to re-center everyone on the defining pillars of the game would have mitigated the divergency in the first place.

A similar hiccup in communication resulted in survey questions that not every member was content with and did not provide them with the opinions they were looking for. Again, a reinforcement of good communication during these times would have allowed all members to look over the surveys and provide helpful feedback regarding their sections of the playtest.

9.3 Conclusions

After 9 months of living and breathing this capstone game, we've come to understand the true birth of it as a learning experience. We certainly learned a lot, not just about the overall process but about ourselves as game developers. We now know how to adjust our personal expectations for the project and our contributions, and to not take cuts personally. The scope cuts are often from reconsiderations towards deadlines, feasibility, the team's strengths, work imbalance, and areas where the process was inefficient for the team, and are never a personal attack towards any one discipline.

Should the project continue, communication between members will always be the biggest focal point of the process. Knowing who is doing what is important, but also how is that person doing so that timelines can be changed accordingly, or responsibilities redirected to a different member, and everyone can have an unstressful, creative chance to produce their best work. Regular meetings that revolve around specific needs (Quality Assurance testing, pair programming, recentering the core focal points of the design) would do wonders for keeping the team's morale high and on track to succeed within the timeframe.

If we were to do the entire year again and could change anything, we would desire a focus on having a build by a certain time, rather than a playtest later that week. This would ensure that the team is focused on producing stable results rather than assuming they could use the week to make adjustments and would also encourage more quality assurance testing both within the team and within the cohort as a whole.

9.4 Future Work



Outside of Post-Processing Orb

Inside of Post-Processing Orb

Table 5. Color Distortion test for changing the present to the past

While we believe that the current state of the game and all its documentation would transition well into a full production environment, the team has decided to not continue working on *Through the Lens*. We recognize that the passion that we want to put into this game will burn us out beyond what can be replenished, and anything we do that isn't up to our standards will disappoint us. This decision was not made lightly but was still one that everyone eventually agreed on. There were so many things that we hoped to one day see in this game, from voice acting and the world color distortion, to enhanced photo swapping situations and diverse narrative interaction.

Were we to continue with the project, our priorities would remain the same. The team's wellbeing would come before the expansion of the game's intentions, and everything would be planned with keeping us alive in mind. Our measure of success would have the same in mind and would focus on the quality of what the team produces rather than the quantity or ingenuity. Any milestones, intended scope, and long-term goals would be contingent on how the team is progressing, and would be reconsidered on a regular basis to make sure that what's attainable is planned out, and what can be stretched to is conditional. Even with this, however, deadlines for the sprints would become a little stricter to encourage team members to address concerns rather than letting them sit unattended. This would help encourage communication on personal issues and help reduce unseen problems before they snowball into a challenging mess.

Our biggest reasoning for not continuing the project stems from that priority: The amount of burn out from these past years has become too much for us to handle. To continue with the project would be to keep ourselves in that same stagnant mental place with not much hope for recovering. We all feel a change of pace in the form of other projects and new occupations would alleviate some of that burn out that has held us back this past semester.

The team had a lot of big ideas for the game, and these would assuredly be the priorities for any milestones. We thought of having more ways for the players to interact with the environment, including increased interactions with objects, expansions to the photo-world swapping mechanic such as angle changing or reverse swapping for physical progression, a distortion of the world's appearance when the photos are swapped to convey the presence of

the past (Figure x), and in general more content to engage with. Audibly, we imagined having unique soundscapes with each photo to further explore the history of those story beats, and voice acting to accompany the subtitles for a more immersive experience all around.

Our big goals for this project were never realized, but we are content with how the year progressed and the resulting game that we have created from it.

10 Appendices

10.1 Unity Scripts

This section provides fine-grained design details for all of the scripts in the design by means of CRC (Class-Responsibilities-Collaborators) cards.

10.2 Presentation Q&A Notes

This section contains notes on all of the questions asked during the pitches and various other presentations for Through The Lens.

10.3 Asset Details

This section contains references and links to all of the external assets used within *Through the Lens*.

- Aesthetics Board: [link](#)
- Mood board: [link](#)
- Mitch's asset import guide: [link](#)
- Mitch's asset list: [link](#)
- LINKS to external/internet assets (that I remembered to save)
 - [Tileable grass texture](#) - used for terrain painting in Unity
 - [Dumpster](#) - used in very first test build, might have been used in most recent
 - [Hanging Vine png](#) - used in a decal
 - [Crack png](#) - used in a decal
 - [Birthday Cake](#) - as seen inside apartment
 - [Ceramic Plate](#) - plate left behind from the birthday cake
 - [Streamers](#) - streamers hanging on wall/on floor inside apartment
 - [Balloons](#) - balloons found in past version of apartment scene
 - [Stove](#) - rusted stove seen in apartment kitchen
 - [Cabinets](#) - cabinets seen in apartment kitchen
 - [Billboard](#) - the street fair billboard
 - [Archway](#) - used for the side entrance
 - [Roads](#) - used for all roadways in the game
 - [Asphalt](#) - texture used as new material for roads above
 - [Sidewalks](#) - used for all sidewalks in the game
 - [Patio Chair](#) - Grandpa's "rocking chair"
 - [GAZ-24 Volga](#) - car player uses to get to the apartment (beginning cinematic)
 - [Vines](#) - 3D vines placed on buildings
 - [Rabbit Toy](#) - relic found in onboarding sequence

- [Rotting Branch](#) - Blocking the apartment doorway
- [AMONGUS](#) - Alfie's test amogus
- [Oak Trees](#) - scattered throughout the game
- [Beach Tent](#) - used for the street fair
- [Wooden Lean-to](#) - used for the street fair
- [Wooden Stall](#) - used for the street fair
- [Metal Shelf](#) - used for the street fair
- [Sandy Rock](#) - Used for broken/collapsed side entrance
- [Long Rock](#) - used for broken/collapsed side entrance
- [Simple Rock](#) - used in courtyard
- [Mouse Toy](#) - used in cinematic for showing controls in environment
- Rest in peace to the old brick building that is seen everywhere in our game. It no longer exists, but it was located on Sketchfab at one time. Also RIP to the Mexican feather grass model. That has disappeared from CGTrader.
- Godspeed to all of the other assets that I have lost to the ether.
- Audio asset list: [link](#)

10.4 Playtest Results

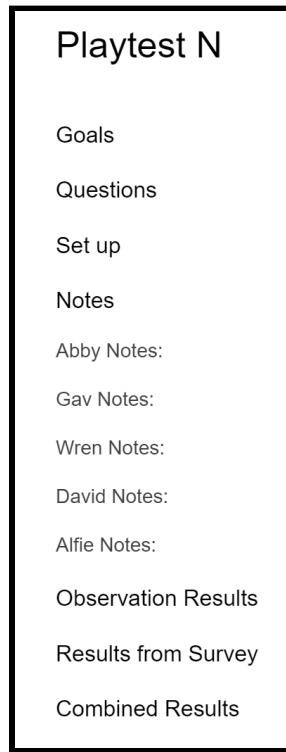


Figure 37. Template of the Playtest Notes

- Playtest 1 [notes](#)

- Playtest 2 [notes](#), [survey](#)
- Playtest 3 [notes](#), [survey](#)
- Playtest 4 [notes](#), [survey](#)
- Playtest 5 [survey](#)
- Playtest 6 [notes](#), [survey](#)
- Playtest 7 [notes](#), [survey](#)
- Playtest 8 [notes](#), [survey](#)

11 Individual Research

11.1 Symbolic Signaling in the Game Space: How Can We Make Story in a 3D Game More Engaging for the Intended Target Audiences? -- Wren Bernstein

11.1.1 Abstract

Games with unskippable narratives are often criticized for being too cinematic heavy, or for lacking subtlety when delivering plot. They resort more to information-heavy dialogue, overt actions in cutscenes, and lots of reading collectables' related text. This can result in players feeling diverted from their gameplay, and in the specific case of 3D action/adventure games that gameplay can be fast, combo-focused, or stressful. Action/Adventure movies, on the other hand, are praised for their complicated characters, intriguing dialogue, and properly timed moments of cooldown before a fight. So, what can help games of the same genre to convey their stories in a similarly welcomed way? By looking at subtle symbolic cues in movies, such as lighting, color schemes, camera angles, and specific object embodiment, we can examine new ways to direct cinematic scenes in games that feel cohesive to the experience and relay only as much spoken information as needed. Would these changes detract from the overall experience, or would players find more improvement from them if used properly?

11.1.2 Problem Statement

Games as a digital medium have been popularized since the mid-late 20th century and have since had 40+ years to evolve as a source of entertainment for the general public. Throughout that time, developers have learned how to improve on mechanical implementation, technical improvements for memory and graphics, and in general how to make a game "fun".

Depending on the designers' intents, other aspects have also had vast improvements, such as atmospheric games creating beautiful vistas full of amazing assets, or higher quality audio supports in games that look to engage all of the senses, or strong narrative beats in games that hold equally strong interest in sharing stories with the player. A genre that has seen many well-needed improvements has been the action/adventure genre, one often tied to games that players recommend to their friends, such as Legend of Zelda, God of War, or Horizon Zero Dawn. There is one aspect within this genre that players often will argue over the importance of its inclusion, however, and that is the narrative story that the players ultimately follow. Some will argue that the bigger AAA studios cannot be trusted even now with producing an intriguing story, and that is why they skip it. Others believe that the narrative means nothing in the face of good gameplay, and that they would prefer to not have any interruption to their flow. These opinions are often associated with the plethora of cutscenes and similar interrupting breaks in the fast-paced gameplay.

This is unfortunate, as games have the unique feature of giving the player an interactive narrative experience, and in the case of adventure games allows the player to take that adventure for themselves instead of being a passive bystander as they would be watching a movie or reading a book. So, what can be done to improve the experience? What can narrative designers, level designers, and every other team member in the game's development do to create that interactive experience that brings together gameplay and storytelling without interrupting either?

11.1.3 Significance

After years of exploring the internet and witnessing so many opinions on game popularity or lack thereof, I've seen two growing trends: 1) That people do not care about story when they could just be beating things up and 2) The story within games aren't often that good. Often this translates into a lot of players defaulting to skipping entire chunks of the game's story, and then questioning later why certain characters are now bad or claiming that the writers were going for shock value over quality to the story. This disparity between the intentions the writers have for the game and what the players get from playing the game is disheartening, especially since both sides can prevent this disparity from happening. My research focuses on what the writers and the rest of their team can do to make sure players pick up the story as they progress through the game, without giving them something to complain about.

Currently, the reliance on cutscenes, dialogue during gameplay, and (sometimes optional) collectables that spark interest in the story is so heavy that players are giving up on paying attention. *Through the Lens* ended up in a similar way with our information delivery: Lots of dialogue that the player must follow while wandering the map. And just like how dialogue in 3D action/adventure games gets handled, the player can ignore all of it and end up skipping half of the necessary information that pertains to why they're there, who they are, etc. This is clearly not a genre specific problem but is instead one that is highlighted within the player community more so than other genres.



Masako: And family.

Figure 34. Cutscene from *Ghost of Tsushima* (2020) in which characters stand in a circle and talk at each other

11.1.4 Background

My personal stake within this research was fairly simple: I recognized that my interests in the production and direction of movies could be translated into games but hasn't been on a broader scale. This is notable in the lack of AAA games being produced that fully resonate within the community as having both good gameplay and good digestible story. Often, one is overshadowed by the other and when the gameplay is interrupted too many times, the players give up. The decision to focus on third person games was due to the prevalence of third person movies; I wasn't going to focus my entire research on *Hardcore Henry* (2016), a first person action movie.

The research choice was also based on [previous research](#) that I conducted at RIT: I spent a semester studying the ways that someone can handle lighting and similar aesthetic changes in a game space. How could changes to this affect the narrative storytelling? I questioned this before recognizing that there is little done within big-name games to create any subtle storytelling in general; the aesthetic changes would do nothing in the face of being explicitly told how I should be feeling towards the plot or certain characters. This led me to change how I perceived my research both then and now, from "What does changing some things do?" to "What can be done to improve the experience for players while still telling the story the developers want?"

This led me into a rabbit hole of understanding where both sides were coming from.

The games industry, with their natural draw to cutscenes throughout the gameplay, has reasons for why they do what they do. Reading through the internet, it seems the biggest reason for cutscenes is for information sharing, with emotional connection as a runner up. Developers use cutscenes as a way to get a lot of information to the player without risking a

loss of communication through gameplay. By staging cutscenes in a certain way, they can manipulate the overall mood of the scene and raise (or lower) a player's tension as needed. Cutscene implementation also helps control the player's pacing, so that they aren't speeding past key areas of note and ignoring their own thought process that the game could be encouraging.³⁰ In his article, Hancock recognizes that cutscenes are an interruption to the player's progress, and that a function of them is to annoy the player. If he made these assessments in 2002, why have things not changed since then?

The answer to that may be in the prioritization of teams. Deadlines in the industry can be detrimental to the creative process, and often bigger studios are kept to crunch-worthy deadlines for their shareholders. Even *Through the Lens* saw an oncoming crunch for our narrative integration and opted to go with a small cutscene to introduce the player over rushing to get an interactive segment filled out. It's understandable, as it's a quick and simple solution to sharing information.

Unfortunately, the shareholders that determine a studio's success aren't the ones setting the deadlines, but instead the communities that play the games. On an online forum in November 2019, a member of the PlayStation community asked the innocuous question "Why are games with terrible stories getting high reviews, but games with great stories are said to not be fun?" This kickstarted a lengthy discussion about what makes a game "fun" and how the story works into that. Many complained about the misuse of cutscenes interrupting their flow, and that a game can be totally without story so long as the gameplay is good. An overall opinion was that games shouldn't be expected to have any level of good story, and that those who are looking for it should instead try books or movies.³¹ In a way, they're right. Games are focused on having impressive interactive experiences, and if you want a more story-focused experience then you can search out the mediums that have built up a good reputation for them. At the same time however, games have the unique ability to produce an interactive story for the player to feel connected to, and while that has been explored quite a few times in the past it hasn't become the normal path for big-budget games. While there's definitely a limitation on how much information the interactive portions of a game can get across, the improvement of environmental storytelling and symbolism in the character development throughout the story can aid a lot towards creating a well-rounded, less interrupted game.

11.1.5 Methodology

When approaching the topic of narrative development in games, players usually think of cinematic moments (cutscenes, intro title sequences, and in-game text both visually and audibly) as the core facilitators of the information. Opinions within the gaming community are strong, and the opinions for or against a heavily cinematized game are prevalent everywhere.

³⁰ Hugh Hancock, "Better Game Design Through Cutscenes," GameDeveloper.com (Informa, April 2, 2002),

<https://www.gamedeveloper.com/design/better-game-design-through-cutscenes>.

³¹ Ratchetrockon (original poster), "Do Gamers Not Care about Story?," Do gamers not care about story? - PlayStation 4, 2019,

<https://gamefaqs.gamespot.com/boards/691087-playstation-4/78127080>.

It's too much, it's too little, I skipped it because I was bored, or I skipped it because I could easily avoid it are common comments seen on adventure games that hold narrative as a core pillar. My interests lie in figuring out a balance between interrupting the player to deliver some much-needed narrative, and exploring the symbolism in purposefully placed lighting, camerawork, colors, and items to create an underlying understanding in the player's mind. Are there things that could be easily worked into typical gameplay that movies already achieve during their non-interactive experiences?

Games as popular as Last of Us and the Yakuza series are praised for the adventures they take players on and the experiences provided, but also criticized for their overuse of cutscene content. Similarly, we have previously seen other AAA studios almost dismissed on their narrative storytelling due to either too many cutscenes or uninteresting storylines that the players ignore in order to continue their action-packed gameplay. The community's interests lie away from a push for narrative enforcement, and thus might benefit from an improvement on the overall delivery.

My first steps were to examine multiple examples from a source of entertainment medium similar to games but that which does subtle narrative in a better way: Movies. Over the course of the semester, I organized a small list of movies to watch, each with different styles of conflict (Internal, interpersonal, external) to see how each type can be handled within the limited time frame and resources available. They varied in publisher, styles, and genre, but their age was all relatively similar (2019–2022).

My following steps were to similarly examine how games of the 3rd Person Action/Adventure genres handle their own storylines, and what aspects are good versus poor facilitators of the narrative's delivery. By recognizing what it is that they do well (or the lack thereof), I can understand possible pieces that can be adjusted to better serve the experience as a whole. To do this and still progress through other responsibilities, I alternated between playing the games myself and watching someone else play on popular streaming apps.

My hope was to see if there were similarities in the games that inform the player well and movies that felt narratively whole, or what differences there were and how they changed the information delivered. Ideally, I would then continue on to making storyboard concepts that could alter how a cinematic moment plays out in a way that informs the player on necessary information without relying on the characters info dumping at each other.

11.1.6 In Progress Notes (Informal)

[Movie Notes](#)

[Game Notes](#)

11.1.7 Results

As the semester progressed, I kept notes on games that I played or watched, and movies that I saw and could link back to this research. Some were very good and I enjoyed my experience, while others made me immediately think of why I am doing this research in the first place.

In order to fully know what I wanted to be looking for, I watched movies.

Some movies were more notable for their all-around contribution to the plot, while others held keys to the characters themselves. I watched more than three movies, however these three stood out to me the most for their build-up to the central conflicts.

Passing (2021)³² is a 1920s period drama focused on the concept of passing as a white woman in a racist world. Starring Tessa Thompson and Ruth Negga, the story follows Irene (Thompson) after seeing an old friend Clare (Negga) again, and the internal conflicts she feels letting her friend back into her life. Both of the main characters are light-skinned black women, and the consistent black/white color scheme highlights the ease at which they can blend into white society and enjoy such luxuries, while their darker counterparts were treated very poorly. This is especially noticeable when Irene interacts with Clare's husband, an outwardly racist white man who does not realize that his wife is black, when their skin tones are all fairly similar to each other when perceived in this Black versus White dichotomy. While this conflict is already very explicit for the audience, the color scheme helps offer greater insight into how the world was viewed in that time period.

As the movie progressed, a secondary conflict arose and further highlighted the internal struggles of Irene: She believed her friend and husband were having an emotional affair. There are many moments in which her spats with her husband are compared to his friendliness with , and many of these spats relate back to the overarching theme of racism. Irene is depicted as having moments to herself where she silently reflects on her dynamic with her husband compared to Clare's dynamic. This change showed her mental state on such matters, that she feels small when faced with being compared to others and witnessing the pain her sons endure for being dark-skinned.

³² *Passing* (Netflix and Film4 Productions, 2021), <https://www.netflix.com/title/81424320>.



Figure 35. A shot of Thompson's character Irene contemplating her current problems.
Passing (2021), Directed by Rebecca Hall

Figure 35 depicts her as very small compared to her Christmas tree and the large present next to her. She had just held a Christmas party with all of her friends, but Clare had quite a few moments of familiarity with Irene's husband. When Irene's face lifts to face her husband as he arrives home from picking up their boys, it is filled with sadness and confusion: was their relationship going to be stable? Or was he thinking of Clare instead?



Figure 36. Tender scene in which Clare expresses her fears and Irene consoles her. Both are small due to their fears

Another shot later, Figure 36, in the film depicts Clare and her struggles with feeling small in the world. She doesn't feel safe or happy with her husband, the racist that he is. Her fears of giving birth to a dark-skinned child were expressed earlier in the film, but it is in this scene that she fully shows the fear and grief that comes with losing her ties to her community. Irene comforts her crying friend, in a moment of sympathy for what her friend is feeling. They both feel small to the world, but they are at least together, and in this shot are mirrored by the trees: One reaching out towards the other.

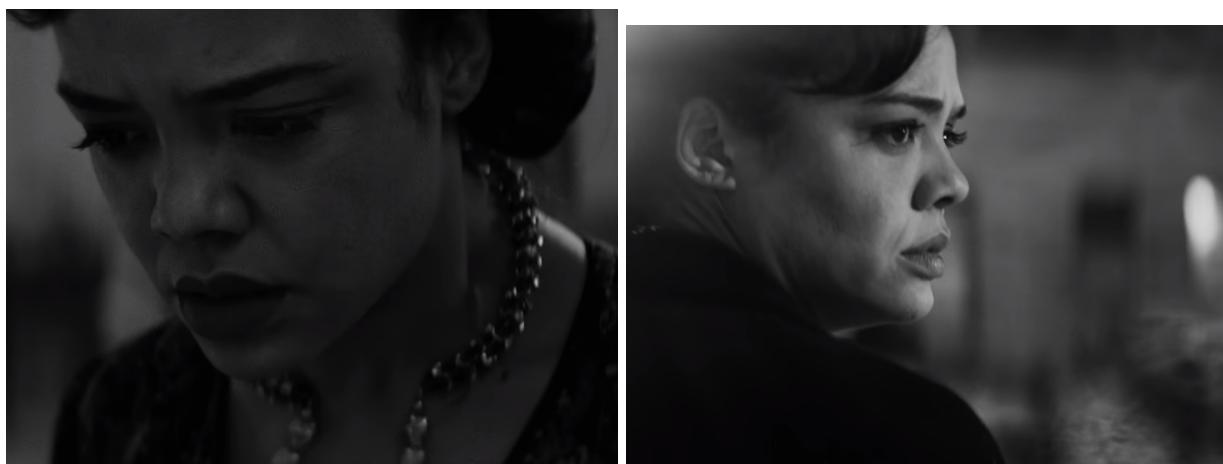


Figure 37. Irene now takes up the whole frame, matching her inner thoughts of feeling large and powerful, as she thinks she is the reason her friend fell

The usage of color schemes and camera work helps pass on the hidden conflict of the main character, a combination of which games do not usually go for; often, it is one or the other that is featured in games with the preference being towards color schemes. By changing how a game depicts certain characters through color and camera work, the player can learn more about their hidden attributes: motivations, mental state, emotions, and more.

Another movie, *Paradise Hills* (2019)³³ utilized a lot of symbolic imagery with each of their characters. A thriller centered around classism and beauty standards within the higher class, *Paradise Hills* grows a story that blooms into a shocking plot twist. It's only shocking if you don't notice the symbolism weaved throughout the dialogue and environment. From smaller choices such as the "deviant" character holding a cigarette in the bathroom to the foreground information that the audience would tune out, this movie says a lot without words.



Figure 38. A delinquent character is introduced with a cigarette to prepare the viewers for her deviancy

Let's start simple: the cigarette. Tobacco products have existed for centuries, but it was only in the 20th century that women were encouraged by corporations to smoke. As a result, this was co-opted by the feminist movement as an act of rebellion, and later taken back by society as a sign of a delinquent. But there is also another point of view to this rebellion. Within high society, being queer is seen as a rebellion; "you must marry who society dictates is right or you will bring shame to our family's reputation!" To have a young woman smoking such a cigarette in a hidden cave while she avoids the strict schedule of a rehabilitation center? This signals to the audience that she'll be trouble for someone, the audience just hasn't learned for who yet. Spoilers for those who wish to watch the movie, but she does end up being just a little queerer than society would like her to be, a little bit of trouble for the main character's

³³ *Paradise Hills* (Nostromo Pictures, 2019), <https://www.netflix.com/title/80223140>.

emotional state, and a lot of trouble for the care facilities known as Paradise Hills. That is just one small prop that a character holds, but the second the audience meets her, it is clear what her path during this story will entail.



Figure 39. The Duchess is seen with her symbol, a rose

Amarna is not the only character to be given a symbol of her underlying nature. A character who appears to be on the sidelines but is revealed as a very important person holds a lot of symbolism around her: The Duchess. A woman who has had a lot of interest in the physical and mental beauty within each girl that comes along, the Duchess is always reaching out to offer manipulative advice or gentle encouragement for her many wards. She's constantly surrounded by flowers and nature, to give her a feeling of maternal love, however there is one flower that is prevalent in every scene she's in. A rose, in the media, has many different meanings and those who mistake it as solely a symbol of love would be betrayed rather quickly. Roses are known well for their bountiful petals, their strong aroma, and most importantly their sharp thorns just behind the flower. To have a symbol of a rose hidden in the other flowers at all times means to hide your true intentions behind performative displays of beauty.



*Figure 40. The Duchess (Jovovich) meets with Uma (Roberts), surrounded by white roses
Paradise Hills (2019), Directed by Alice Waddington*



Figure 41. The Duchess, surrounded by rose imagery, acts out in anger, and causes the mirror to crack



Figure 42. The Duchess reacts extremely to a slap, prior to shocking the main character

This translates well into who The Duchess's character really is: the underlying antagonist. Her presence as a mentor and caretaker of all the young ladies on the island is one that is initially recognized as a source of relief for the main character; after the scene in Figure 41 where her thorns come out momentarily, her entire tone shifts for both the character and the audience. She only gets thornier as the movie progresses from there, even when the audience hits a point of “that’s got to be all there is to it, but what about...?”

With just a couple props and reoccurring symbols throughout the movie, the audience can understand the intentions behind the relevant characters. I have seen some games do this with sentimental items or with collectables within those characters’ dwellings, but games that require tensions to be high usually do not stop to consider the simpler props that could still tell entire narratives.

Knives Out (2019)³⁴ used a combination of foreshadowing and lighting, along with a little accidental camera work, to create an engaging, suspenseful film. As a love letter to the “whodunnit” murder mystery genre, it features a balance between internal and external conflicts as guilt within the main character, Marta, comes to question.

(Due to how Amazon Prime handles copyrights in movies, I could not secure all of the relevant imagery to match these points)

Dialogue and well-chosen scenes were used to highlight the true culprit’s identity (spoilers!). At one point, Detective Benoit Blanc makes an offhand comment about a hidden aspect of dogs: They can easily tell a person’s nature. This was following Marta sharing a small moment with the family’s two German shepherds and tells the audience that she is a good person without

³⁴ *Knives Out* (Lionsgate MRC, 2019),
<https://www.amazon.com/Knives-Out-Ana-Armas/dp/B081W4C5YR>.

directly stating such. Later, we are introduced to the killer, Ransom, as he steps out of his car for the will reading. He is immediately greeted by both dogs barking and jumping on him, not necessarily aggressively but certainly noisily. This is important because the night of the murder, it is said that one of the other family members was woken by the dogs barking at something for a short while. We are only later told that this was because Ransom had tried to sneak back into the house to remove all evidence of his involvement in the planned murder of his grandfather. The dogs were present throughout the film and interacted with many characters but were a symbol specifically for Ransom as someone for the audience to pay attention to.



*Figure 43. Ransom (Evans) confidently smirks while half-lit.
Knives Out (2019), Directed by Rian Johnson*

The lighting in this movie is not often used to signify anything, however it is used a couple of times when characters are hiding true intentions. Take Figure 43 for example. In this scene, the family is finding out that Marta was to inherit all of Harlan Thrombey's assets. To the unknowing audience, he seems happy that he was not the only one left out of the will. His face is only half-lit however, which means that he knows more than he is letting on. We later find out that everything is going according to his plan: Marta will get everything from the newly written will and when it comes out that she "killed" Harlan, the inheritance will revert back to a previous version in which he has not yet been removed.



*Figure 44. Meg's (Langford) face is hidden, save for her eyes
In media, the eyes are considered a pathway to the soul*

In a different scene shortly after the one mentioned above, one of the family members, Meg, calls Marta to see how she's doing. Their conversation eventually leads to the topic of what Marta should do with the inheritance, and the scene switches from viewing Marta to viewing Meg. Her face is fully lit as she tells Marta that the family should get the money and they would make sure she is taken care of. These are her surface feelings on the matter, regardless of how close she is to Marta. Meg then steps forward and shadows cover everything but her eyes, and she tells Marta that she won't be able to afford college. Eyes in narrative often tell a story based on the concept that they're a "window to the soul". By showing us just her eyes, we are seeing her true personal reason for calling: not just because her family put her up to it but because she has a selfish interest in the inheritance.

The will reading leads to one more interesting scene (and my personal favorite): Marta is emotionally dealing with the loss of her close friend Harlan, and now she has been willed everything he owned. With the family yelling at the lawyer in a chaotic state, she tries to flee and take a moment for herself. She does not leave unnoticed however, and the family follows her to the car. It is when she leaves the house that the camera, which had been steady for the entire movie thus far, becomes a shaky handheld cam (see footnote for scene)³⁵. This helps show the audience more of the uncertainty and confusion that Marta is dealing with internally, all while the family accosts her externally. The chaos is wrapped in a beautiful proverbial bow with the camera's transition. While it wasn't a purposeful choice initially (Director Johnson accidentally broke the camera while trying to film that scene), the decision to keep it in added so much to the scene and to the audience's understanding of Marta as a person.

³⁵ KBN Next Media, ““KNIVES OUT” FROM STEADICAM TO HANDHELD,” YouTube Video, 0:27, December 22, 2020, https://www.youtube.com/watch?v=LZNbNJOWB6s&ab_channel=KBNNextMedia

By utilizing intentional design of aspects other than just the characters and set design, the underlying intricacies of the respective narratives were represented well and added more to the explicit story as a whole. The color schemes, lighting, camera work, and props created subtle foreshadowing and hints to internal conflicts in a fantastic way; they were real “Show, don’t Tell” examples that writers hope to achieve.

Several games that I looked at featured varying levels of care in their narrative inclusions. While some of them have incorporated what I brought up in the movies’ results, not all were able to achieve a proper balance of narrative during gameplay and cutscenes. This seemed more common in the AAA games that I witnessed while the indie games were able to balance their gameplay and storytelling more.

A popular game that I looked at was *Horizon Forbidden West*³⁶, the sequel game to *Horizon Zero Dawn*. I had watched a streamer play through the original game and was curious to see how the developers improved the story delivery as it wasn’t very polished in the first game. Just like before, the default for most information in the game was delivered by unskippable cutscenes. The character animation during these were at least interesting to watch, however it still created an interruption in the survival-themed gameplay of the game. While playing, especially early on in the game, it feels more like you’re playing a cameraman simulator that moves to different movie points, rather than a fully fleshed action game.

There was an interesting auxiliary design for the story, however, that I wish extended to the rest of the game. Side quests held a lot of subtle information in both their descriptions, how the player acquired them, and in the progression points demonstrated through personal dialogue cues. Characters seemed to become more alive in these quests, unlike the characters meant solely to train your skills or harvest specific collections for experience. In fact, a lot of the characters felt more alive in this game than its predecessor, and it makes sense. The animation systems are far more advanced now than they were when *Zero Dawn* first came out in 2017. Each character was given their own little quirks and the attention to detail in their props was incredible with delivering aspects of their personal narrative.

A similarly styled game from the same publisher, *Ghost of Tsushima*³⁷, wasn’t nearly as effective at interesting delivery for their narrative. Some of the side missions for improving your relationships with friends included pieces of personal story, however the game kept emotions short and cutscenes were fairly lacking in intrigue. Figure 34 above actually depicts an entire cutscene without being a gif: The characters stand around in a circle talking with minimal animations beyond the camera sweeping around them. They had just cleared out an entire Mongol stronghold together, and would be expected to show such through their body language, dialogue, and any following interactions in the gameplay. It was a large stronghold with many of the companion characters being beaten to near-death, however there is no expression of this in favor of another moment of information dumping: Where are our new goals going to lead us.

³⁶ Guerrilla Games. *Horizon Forbidden West*. Sony Interactive Entertainment. Playstation 4. 2022

³⁷ Sucker Punch Productions. *Ghost of Tsushima*. Sony Interactive Entertainment. Playstation 4. 2020.

Unfortunately, this handling of the story is prevalent across the entire game, and greatly separates the narrative from the gameplay. The onboarding scenes were handled fairly well, with lead-in cutscenes to give a sense of your character's background, and then interaction that follows those interests. The team was capable of emitting a direct correlation between how the gameplay can carry the narrative and deliver it well, but that was lost deeper into the game when the player begins to simply follow markers to accomplish the goal.

I also looked at a couple of independently developed games, due to their general reputation for having a good balance between interesting gameplay and well-written story. Surely if the players are enjoying the story, they must be properly delivering the narrative in a way that is engaging and non-disruptive.

In *Kena: Bridge of Spirits*³⁸ there is a very healthy balance of the gameplay and narrative aspects. The cutscenes are timed well throughout the levels and add to the pacing of the player's progression. When preceding a large boss fight, the camera angles and overall tone of the colors are jarred to create a heightened sense of adrenaline in the player to properly prepare them for what is to come. Afterwards, a conclusionary cutscene shows Kena relaxing from the experience, and helps the player similarly wind down from the rush of boss combat. With the three biggest bosses, the player receives a collected view of the narrative that led to the character's demise and builds from what the player collected through locations of relevance to the character's story. It creates a well-rounded, complete narrative feel that ties up questions pertaining to that specific character. I would have liked to see a bit more cohesion in how the objects were presented, rather than being told by an elder spirit that I needed to collect certain items in order to save the spirit. This could have been presented in the character's home in the town, with glimpses of their life before death, or in alternative design within the environment. This would create a more subtle entrance into understanding the character rather than being briefed beforehand, and might add to Kena's curious, helpful nature.

Throughout all of this, the player also learns about Kena's personality and her reasons for why she acts as a spirit guide. Her care when dealing with the young children spirits and the cute companion forest spirits known as Rot shows her gentle nature towards life and nature. The player can even directly interact with the rot, choosing to dance with them, kiss them, or react to their small sneezes. It's a very gentle feature that can be called at any time, and truly shows who Kena is in her heart. The presence of her staff as an extension of her interactions with the large spirits (combat, environmental exploration, restoring nature) is representative of her father's guidance and support for her, and is also the symbol of what drives her for the answers she seeks from the mountain spirit.

*It Takes Two*³⁹ is also very balanced with the interesting story and gameplay, hiding symbolism in a lot of the various challenges that players face. The two main characters, Cody and May, are given specific tools throughout the game to help them work together to achieve their goals. Typically, May's tools and abilities revolve around technology and mechanical items. This

³⁸ Ember Lab. *Kena: Bridge of Spirits*. Ember Lab. Playstation 4, Microsoft Windows. 2021.

³⁹ Hazelight Studios. *It Takes Two*. Electronic Arts. Xbox One, Playstation 4, Microsoft Windows. 2021.

makes sense because she is verbally an engineer and the breadwinner of the family, but it also adds to a more subtle part of who May is. She loves STEM subjects, and logic is what drives her decision making process. Even when turned into a small wooden doll in a larger-than-life world, she tries to rationalize everything around her when she doesn't understand it.

Her counterpart, Cody, is given more supportive roles and typically has abilities related to nature. He is the stay-at-home parent of the relationship, but through his dialogue you learn that he's also very attuned to gardening, make believe, and the arts. His basis for decision making is emotions, and only turns to logic when his emotions are too extreme to rely on, such as confusion or anger. Their decision to divorce is explained through a combination of both of these processes but is separated between them through their props. This attention to detail is helpful in further communicating to the player who it is that they're playing, rather than feeling like the characters lack personality beyond the game's world.

The game's persistent banter between the two characters is also great for the delivery. It's informing the player without interrupting the overall experience and allows for the players to go at their own pace. There is reinforcement in the information outside of a single blip of dialogue, so speedrunners can still catch bits and piece the information together themselves. It's a clever way to flesh out the characters.

11.1.8 Discussion & Conclusions

After analyzing the different movies and games, I recognized that these kinds of additions can be extremely useful with delivering the narrative, and was actually prolific in both *Kena: Bridge of Spirits* and *It Takes Two*. A prop can be used to push the importance of a character's aspect, or a color scheme can help demonstrate their emotional strife or further emphasize the themes of the game. A player's understanding can only improve from these changes, if they are used well.

While there are differences in first person and third person games, the findings from research like this benefit both genres and as such *Through the Lens*'s own storytelling was given a lot of priority on proper environmental storytelling as a key piece of the narrative design. Our relics system was intended to highlight this type of symbolism for each of the individual characters, as a way to demonstrate to our own players the intricacies of their relationships with their father, and their default reliance on their mother as a result.

There are ways for games to incorporate storytelling in every aspect of their game and tell the story that they want to get across, without interrupting the overall experience that the players seek to have, we as an industry just have to recognize them ourselves and learn to incorporate them in our narrative workflow.

11.1.9 Future Work

Given the limitations I had regarding this research (time limit, other priorities, lack of resources, and lack of funds), the most I could feasibly do was compare everything based on a surface-level glance. If I were to continue the research based on my current findings, I'd desire at least some spreadsheets from within the studios regarding their production. Knowing what the budgets for both the movies and games, as well as where the money was directed, would

allow me to have a better understanding of how each game's different delivery styles came to be. Talking with members of the various teams would assist in that, but that would complicate how I view the overall success or failure of the deliveries.

With that information, I could then explore the conceiving states of storyboarding new pieces of the game: How a location could be interacted with by the players to add more information indirectly, for instance. By taking what I've seen into consideration and using my understanding of level design, I could create a dynamic situation where the player sees who a character really is without being told such, or understand why something is happening diegetically. With the use of level editors, I could also feasibly test these storyboards out and see just how different they would make a scenario for the player, or if the players who typically hate story would even understand what's going on around them as they progress through that level. The possibility that they never catch on is there, and that would be an important aspect I'd look for in the results.

It would also be interesting to incorporate theme park attractions into the comparisons list, as they are a semi-interactive experience that tries to deliver a narrative across to the park visitors using mostly environmental design. Combining this mastery with the more digital aspects of camera and gameplay would possibly expand the abilities that games could reach. If I had considered these attractions earlier, I might have used them as a baseline instead of movies, but that is all in hindsight now and thus is a consideration for the future.

11.1.10 Compassionate Design Promoting the Acceptance of Personal Truths – Gavriel Miles

11.1.11 Abstract

The Surrealist themes perpetuated throughout *Through the Lens* called for a unique design pattern. Mechanics simultaneously must explore the integrity of memory and media in an endeavor of supporting personal truths, and foster empathy through implicit and explicit narrative. To address these needs, research was done within the 3D Narrative Exploration Puzzle design sphere and related spaces. A larger trajectory of symbolically rich mechanics was optimistically created inspired by continuing a dynamic metaphor of using the past to understand and progress through the present, as dictated by the project goals. The team fulfilled their baseline expectations for narrative needs, concluding in a short proof of concept mechanics that perpetuated the themes established by the games and as guided by the individual research, with the only qualm being not enough content in the game to fully capitalize on the background work done. Through trial and error, it was understood that the narrative design and development process employed throughout this project was not effective, and future work is expected to reflect the same optimism and ambition with the tried and tested experience to back it up.

11.1.12 Problem Statement

Memory is an inherently dynamic device. It distorts with emotion⁴⁰ and naturally fades over time. Media, on the other hand, is relatively static. As memory fails, media may be relied upon to compensate. Each medium has its own strengths and nuances in how it preserves story through sensory feedback; audio, visuals, etc. Media is inherently imperfect as a mnemonic device by virtue of being limited to only capturing what is framed through its lens. This partially complete story is parallel to our human experience of having only partially complete perspectives on experiences.

Games answer the age old plea for empathy, virtually allowing players to walk a mile in someone else's shoes⁴¹. However, sometimes achieving this within a game comes at the price of sacrificing your player character's perspective in order to inhabit another's. This is not an entirely realistic procedure, obviously. While empathy asks for imagination, we may never be able to fully inhabit their perspective because we may not fully disengage our own.

⁴⁰ Levine, Linda J., and David A. Pizarro. "Emotion and Memory Research: A Grumpy Overview." *Social Cognition*, vol. 22, no. 5, Oct. 2004, pp. 530–54,
<https://doi.org/10.1521/soco.22.5.530.50767>.

⁴¹ "Walk a Mile in Someone Else's Shoes," December 23, 2015.
<https://grammarist.com/phrase/walk-a-mile-in-someone-elses-shoes/>.

While we may never truly walk a mile in their shoes, being willing observers offers the opportunity to practice listening, compassion, understanding, and acceptance. Stephanie's perspective of her family changes substantially between the surrealistic blend of past and present and inherently incomplete capturings of media and memory. How can a character practice empathy while retaining their own perspective?

11.1.13 Significance

Objectivity begs the question, "What really happened?" I pose that true objectivity can be portrayed as a collection of truths, reflecting the coexistence of personal narratives. This portrayal supports decisions falling with a gray area, capable of both positive and negative ramifications. Not every decision can be so black and white. It is a principle concept within script writing that conflict is not about good and evil, but about intersecting needs⁴². We as people and a society are often driven by individualistic needs and the requirement to be "selfish" (or more accurately, prioritize ourselves) out of necessity. There may be no "bad guy," but just someone with positive intentions who caused harm⁴³.

With so much nuance, it is important to understand the perspectives of those around you. In general, being understood is an important need, and often drives modes of personal expression. Storytelling is a way that we can make these sorts of connections. I wanted to experiment with a design pattern that intentionally kept perspectives separate so as to practice realistic models of compassion within games shown through a player.

11.1.14 Background

Prior to attempting the invention of a unique design pattern, I looked to media examples and scholastic sources for inspiration.

⁴² McKee, Robert. *Story: Substance, Structure, Style, and the Principles of Screenwriting*. 1st ed. New York: ReganBooks, 1997.

⁴³ Braithwaite, Dawn O., and Paul Schrotz. *Engaging Theories in Interpersonal Communication: Multiple Perspectives*. Routledge, 2021.



Figure: Still from Disney's *Encanto*.



Figure: Still from Pixar's *Turning Red*.

Table 6. Figures of Movie Media Examples

Two stories that captured my attention were *Encanto* and *Turning Red*. Both movies feature prevalent themes and plot points with generational trauma at their cores. Conflict arises from resentment and a lack of fulfilled needs, which influenced my approach towards creating nuanced stories featuring well-meaning characters who unintentionally cause harm.



Figure: Logo for Fullbright Studio's
Gone Home

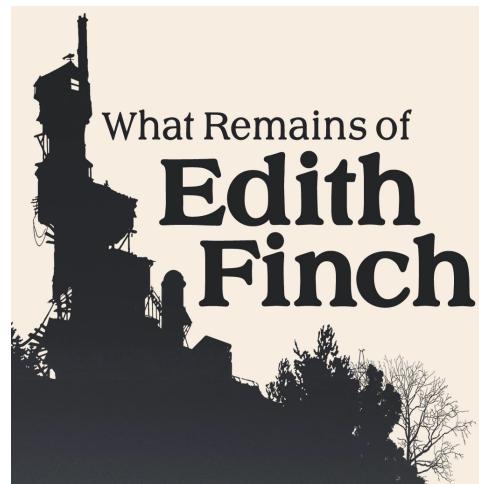


Figure: Logo for Giant Sparrow's
What Remains of Edith Finch

Table 7. Examples of Game Media Examples

In line with familial themes, two prominent examples within our target genre space were *Gone Home* and *What Remains of Edith Finch*. Notably different approaches are taken to learning more about your estranged family. The stories here are mystery-coded, but lack an express conflict or tension beyond curiosity. *What Remains of Edith Finch* characterizes their cast extremely effectively through the environmental design, as well as the abstract mini games through which the players embody each of the Finches. The most prominent one to me is the mindless

cutting of the fish leading to getting lost within one's own mind. Whereas *Gone Home* sticks strictly to nonfiction and realistic procedures, *Edith Finch* leans into the imagery, fiction, and creative storytelling and interaction design to communicate human experiences beyond literal modes. When approaching a design pattern within aesthetics established early on to be Surrealist, these two games were influential for informing which parts we wanted to emulate a dynamic metaphor, and which we wanted modeled after specific processes.



Figure: Chris Ware's print collection, *Building Stories*

Table 8. Chris Ware's print collection, *Building Stories*

A non-game example of emulating this outsider's view can be found in *Building Stories*, a print collection of media from the perspective of an apartment watching its tenets. Stories extend generations, reflecting on societal and interpersonal trends. Our original concept imagined many characters and families coexisting within the same space, so it was enlightening to see the common trend between them all playing the role of fly on the wall.



Figure: Logo for Lucas Pope's
Return of the Obra Dinn

Figure: Logo for Fullbright Studio's
Tacoma

Table 9. More Game Examples

Continuing with the theme of observation, *Tacoma* and *Obra Dinn* were some of the most notable influences from the game space with regards to making excellent use of their 3D space. Their temporal precision paired with the dimensionality to their narrative made for seriously engaging play, striking a fine balance between completionist appeal and cinematic narrative experience appeal. In *Tacoma* you can scrub through what is effectively a VR video, while in *Obra Dinn* you effectively step through VR freeze frames. Both games made strong use of the inherent design of stepping through the scene in their barrier designs. In *Tacoma*, specifically, players find themselves paying close attention to characters unlocking lockers, entering passcodes on keys, and sifting through archives to find clues, amidst an environment with a lot of narrative content in the form of worldbuilding. *Obra Dinn*, on the other hand, embraced a more classic deductive pace with their design, as less moving parts meant more attention to small, scattered details. While our project has nowhere near the scope to capitalize on the use of 3D game space like these games do, it is inspiring nonetheless, and encourages us to design for our constraints, not against. These two games also have their own brand of distortion to apply to memories, whether it is blurry faces or hologram technology blurring body language and expression. This is encouraging for us to apply our own twist of surrealism as we blur the line between past and present.

Beyond media inspiration, scholarly research was conducted in order to inform the process of attempting a new design pattern for this Capstone's specific methodology. Namely, Jesse Schell's *The Art of Game Design*⁴⁴ has been informative. Beyond thematic resonance with the concept of lenses with our project, the practice of framing design challenges with questions relevant to our goals was found to be useful in the design process in distilling ideas rich with symbolism and scale.

11.1.15 Methodology

The early concept of *Through the Lens* aims to use an understanding of the past as a way to progress through the present. The early concept also asks for storytelling across media to occur in a way that evokes empathy. What I intend to do is play the roles of *Game Designer*, *Story Vision Holder*, *Narrative Designer*, and *Lead Writer* on this project to ultimately synthesize a narrative-focused gameplay design that accomplishes these stated goals.

As a *Game Designer*, I expect to brainstorm and polish the baseline design pattern that I believe would accomplish the goals within this hypothesis. As a *Narrative Designer*, I will be applying a storytelling lens to the mechanical ideas in order to create cohesion between player and player character experience, as well as cohesion between progression of narrative and progression of mechanics. As a *Story Vision Holder*, I will function as a liaison to all other areas of development, ensuring a narrative design perspective is present and approving of the progress

⁴⁴ Schell, Jesse. *The Art of Game Design: A Book of Lenses*. CRC press, 2008.

made so long as it is in some way contributing towards the game goals⁴⁵. As a *Lead Writer* I am going to plan and write content for the narrative and game needs. With my Individual Research responsibilities on top of these, I hope to steer the designs towards an experimental place that can challenge designs featuring memory, media, and empathy.

My limitations primarily extend to Experience and Scope. This will be my first time working on Narrative for a project of this scale. I have deferred to relevant faculty for models of narrative design processes to follow. While developer task flow is relatively understood in conjunction with tools such as Trello, with a likely volatile scope on top of new ground, the expectations are being set such that this will largely be a learning experience. The goals within the Minimum Viable Product (see [Section 4.6.2](#)) are relatively open-ended in what form they take and are mostly focused on the player experience and feedback because of the inherent uncertainty to this process.

11.1.16 Results

The research and attempts resulted in two key narrative design devices within the game: Photos and Relics.

Consider	Loop
Is the point a minigame, or is the point the significance in the action?	<ul style="list-style-type: none"> - Player exists - Player views photo they are holding - Player identifies a destination - Player moves - Player moves within range of station, and glow begins at lowest value <ul style="list-style-type: none"> -- If player is facing in the direction of the station, they pulse glows -- If the player is not facing towards the station, the glow is flat -- If the player gets closer to the station, the glow grows in an exponential manner - Player reaches the station, with photo at maximum glow, pulsing, and particle effects coming off of the photo with music relative to the photo. - Player raises the photo, with slight lerp, and rotate themselves to align with where it matches -- As the player is close to the intended alignment, the vignette effect begins to close in - Player's alignment reaches a certain distance away from the "right" spot - Control is usurped from the Player
Advancements	<ul style="list-style-type: none"> - More Forgiving Mouse Tolerance - Mouse Assistance - Base Glow Amount Raised - Glow Pulses with Direction - Particle Effects at Right Spot - Shorter Radius for Lerp Yank - Music Around the Right Spot - Subtitles for Dialogue - Photo Swap Color Print
Feedback	<ul style="list-style-type: none"> - Tangible+ - Sets Tone+ - Tasks+ - Tools Already+ - New: Cutscene Sequence
Sprint Planning --> Scope & MVI	<ul style="list-style-type: none"> - The Player's frame is slowly moved to the "right" spot -- The Vignette effect deepens proportionately - The first line of text from the associated storyboard plays. - The dissolve effect begins as the vignette deepens further. - The second line of text plays as the dissolve is nearly done and the vignette effect has pulled back. - The photo swap is 'completed', full switch & color print. -- The vignette effect is full gone at this point. - The photo is automatically lowered. - The text continues to play across the screen. - The player regains control. - The photo associated with the next story beat is now there.
Questions	<p>Can we still go back and forth between past and present states? Does this ceremony happen every time we go from present to past? Or can we make it only the first time? Is the text spoken by the player? Is it good to add text during the dissolve effect? A principle in filmmaking states to let the viewer focus on one thing at a time. Consider after the ceremony. Are the subtitles time-based (like subtitles usually are) or can we skip through them with button presses?</p>

Figure: Game Loop Planning Spreadsheet

Table 10. Game Loop Planning Spreadsheet

⁴⁵ Jenkins, Henry. "Game Design As Narrative Architecture." Accessed January 31, 2022. <https://web.mit.edu/~21fms/People/henry3/games&narrative.html>.

Photos and the mechanic of swapping photos are a process with narrative implicitly and explicitly provided to the player. It is inherently a replicable procedure⁴⁶, which may provide a layer of connection and immersion to the player character⁴⁷.

Some of the photos have members of Stephanie's family. These such photos have conversations attached to them from the scene surrounding the moment the photo was taken. The dialogue offers characterization for each of the family members present, as well as characterization through their posture and body language in the photo itself.



Figure: Stephanie's family characterized by body language.

Table 11. Stephanie's family characterized by body language.

The difference in the content of the photos is a significant factor as well. One of the goals for the Minimum Viable Product was to implement a tangible barrier in the present day level that could be overcome by looking into the past for answers. This was accomplished through the implementation of the ability to swap the contents of the photo from the past with the contents from the present. In the picture above, swapping those contents with present day explicitly directs the player of where to go next. In the following photo, the act of looking into

⁴⁶ Bogost, Ian. *The Rhetoric of Video Games*. MacArthur Foundation Digital Media and Learning Initiative, 2008.

⁴⁷ Bogost, Ian. *Persuasive Games: The Expressive Power of Videogames*. Mit Press, 2010.

the past provides access to an entrance of the apartment complex, which was initially gated up and restricted. Not only did this deliver on a project goal, but continued the dynamic metaphor of this mechanic.

The existence of the photos themselves are, in a way, characterizing. Hector, Stephanie's Grandfather, was insisting on spending time together at this fair, which ended up being dated for a day before an evacuation. The act of taking photos conveys a want to hold onto a moment, which encounters the irony of relying on media because of the failings of memory. As a *Lead Writer*, this characterization is expected to become much more poignant when more content of the game is implemented.

The dynamic metaphor extends throughout all facets of design within *Through the Lens*, even starting at its name. *Through the Lens* is, at face value, a play on the photography lens. However, the mechanics have the player character looking through a lens of life that was not originally their own. Additionally, the name is akin to *Through the Looking Glass*, which ties into the surreal themes present throughout the game having to do with an uncanny experience of the past.

Relics are the other primary narrative device within *Through the Lens*, serving as the tangible and symbolic representation of what Stephanie's family left behind in their sudden departure from their home. This specific object was left behind as a conscious choice reflecting a change between living here and leaving here. This is the design template with which the design of each relic was approached.

Questions	Intention	Questions	Reception	Questions	Implementation	
What is a relic?	An old, left-behind item for the player to pick up.	What feelings should interacting with the relics evoke?	Relics are visually identifiable and are meant to be sought out, like a reward / prize.	When do players obtain relics?	Relics are obtained at the end of a sequence, representing the completion of a narrative arc and a bridge back to present day.	Relics are stored in the inventory. Intention is to differentiate relics from standard items in the inventory.
Why are relics significant to the player?	Relics communicate dimensions of the story otherwise not available to the player currently. Relics are highly charged, and provide symbolism and anchors to the game's progression.	Are relics different from regular collectable items?	Relics are different from normal collectable objects, and are unique in pieces of importance. Relics should elicit curiosity, providing enough hooks to stimulate the player without answering all of their questions. Relics should be emotionally evocative, poignant with the narrative they provide.	Why is the relic in the photo?	Relics are shown in the photo to give the Player a Destination. Each photo in the sequence should feel like a step closer to the Destination, with apparent narrative relevance.	Players can access relics through their inventory. When inspecting the relic, the next sequence will begin. The Player will be able to rotate the object's dimensions to match the photo with its sound effects to match. There will also be descriptive text about the item itself, along with the dialogue being accessible once again.
How do relics further the story?	Relics and their adjacent interface will establish a certain tone and intention within a scene. Relics now have a new gameplay loop. Relics also ground dates and are relevant to actions and interactions that occurred there.	Are the relics all from different people?	Relics will be from various family members, with Hector, the player character's grandfather, serving as the focal point through which to view the relics and associated history.	What do relics look like in the overworld?	After the photo containing the relic is used to swap past and present, the relic will have <u>apparent visual effects</u> . Depending on the approaches, these will diminish to the extent of allowing the player to recognize the object as the refurbished version of what was before.	Are all relics the same objects?
How do relics help achieve our goal to blend time?	Relics characterize the cast of characters, including the protagonist. They also emphasize the significance of choice and consequence. Relics will serve as structures within which story beats exist.			What do relics sound like in the overworld?	Each relic will have a unique soundscape audible as you approach them, reminiscent of their sentiment, role, and place.	No, relics will all be different objects.
How do relics help achieve our goal to blend time?	Relics provide a bridge to the past by virtue of having been left there 40 years ago with a story summary there, allowing players to access the past to contextualize modern day circumstances.			What happens when you pick up the relic?	Upon picking up the relic, the relic takes up the bulk of the screen as the Player "inspects" it. The relevant story beat dialogue begins to play. As the player continues to interact with the relic, eventually aging to what it is meant to look like in the story presented 40 years ago. Once the relic finishes weathering, the Player can then advance, putting the relic in their inventory.	Yes. While the individual details will change from relic to relic, their architectural functionality will remain the same.
					How does the relic being in the photo not contradict the mechanic's logic?	In our game, Photos let you change your perspective, and to inhabit the perspective of someone else. Change is not actually changing that the photo itself. Just Players are changing. So when the Photo Mechanic inspects the relic, it is to say that they're seeing the relic through the lens of the photo, from decades ago. Players then go bridge time by watching the relic weather in front of it grounding them back into the present, where the relic is holding actually exists.
						We also believe this design decision will support distinction of relic vs. figurative because the two are collectible items as separate from relics. That is to say items you obtain from the past to circumvent obstacles present do not actually exist, they are just the physical extension of the mechanic that the relic allows you to understand the present. These items are not the same relics that remained.

Figure: Relic Design Guide

Table 12. Relic Design Guide

Relics also carry with them descriptive text from Stephanie's perspective. This design choice reflects the goal to retain a perspective not only with personal stakes related to the content with which they are interacting, but also to bring attention to what details stand out to Stephanie, who knows more about her family than the player does. In the case of the bunny toy, she muses how it seems like her father was not too eager to win this, and that it was a shame it was left behind.

The ability for relics to weather furthers the consistent surrealist theme of the lines between past and present blurring, though also play to the themes of lenses throughout the game. The player has the option to look at the object how it was in the photo 40 years ago, or to see it for what it is today. This is parallel to the larger symbolism of how players can approach their surrounding world, using the past to contextualize the present.



Figure: Ryan's bunny toy prize in the middle of “weathering”

Table 13. Ryan's Toy Bunny when Weathered

11.1.17 Discussion

While the game's baseline expectations were met through the narrative devices that were implemented, we were demoralized and disappointed in the lack of the grand designs present in the final proof of concept. I believe this is compounded with the lack of narrative content delivered within the game, with regards to the amount of photos and relics. While much was written in support of character design, defining intentions, and worldbuilding, not very much explicitly came through. More stations to find and relics to retrieve would have provided more opportunity to ramp up the context and convey the plot twist of the game, which was that *the father knew about the evacuation*.

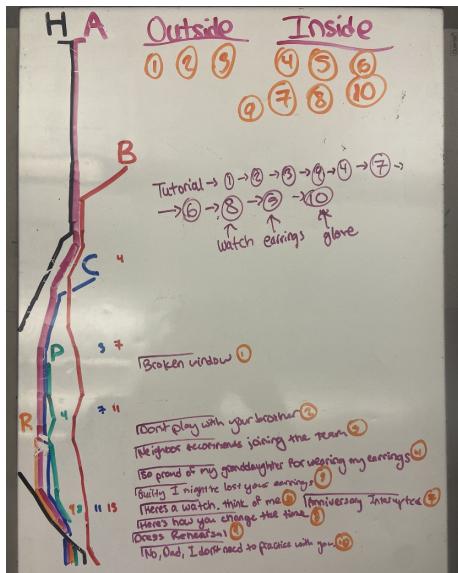


Figure: Stations order in “critical path” in collaboration with Level Designer

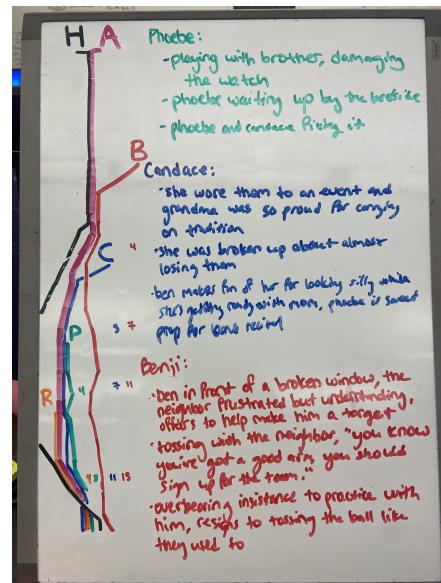


Figure: Relic-driven narrative beats

Table 14. Whiteboard notes for the Critical Path and its content

It was a primary goal to have the protagonist’s emotional struggle with forming empathy for nuanced situations to come through, but the proof of concept was not developed enough to reach that point. While Stephanie’s observations do frame the player’s expectations as they initially explore the residential area surrounding the apartment complex, she is not as strong of a presence as we would have liked, and feel that she is a bit of a blank slate.

Furthermore, the design choice to have a character who did not have any personal experiences here prior to coming with the intent of conflict resolution rather than someone who had formed memories here was a questionable choice, seeing as that arguably was a missed opportunity to more directly incorporate the surrealism tied to memory and media mismatching. That was an initial part of this individual research that did not see much exploration.

The relics were a watered down version of what they were intended to be, and ultimately did not deliver on the original intention of exploring the dimensions of multiple storytelling media as they were used to anchor the protagonist’s emotions to the people who had lived there previously.

The photo mechanic had lots of room to grow, but not enough time to do so. This had the most ideas surrounding it as part of the design pattern conception.

- Extensions of the movement patterns were envisioned in order to be able to physically embody a child by crawling and twisting the photo to physically put your character in their perspective.
- Footprints were meant to replace the generic glow effect that was used to guide players towards the location at which the photo was taken. This change would have provided a

less ambiguous indicator as to where the “right” spot is, as well as a physical impression that someone stood there. That has the layer of stepping into someone’s shoes, standing where they stood as yourself.

- Overlapping perspectives were a mechanic we had pitched at the end of the Fall semester that had not gotten as much attention as the crawling, but the team still enjoyed it as a direct mechanical metaphor for looking at how two or more people viewed a shared space. My favorite example I would always return to would be the Parents looking at their bed from opposite sides - Hector with a picture from their wedding day, and Amanda with a picture of the first time she went to bed without Hector because he was working late.
- Getting another album or more photos was an idea we humored to compliment the change from an ambiguous glow to specific footprints standing at the noted location. This would have been an opportunity to physically show that it was a different person and perspective associated with the captured moment. This could have segued with a progression in the mechanics reflecting Stephanie gaining a new dimension to her insight.

11.1.18 Conclusions

Conducting a literature review across many forms of media garnered a lens of symbolism and writing for me to connect as a common thread. One could call that a sense for narrative continuity. The two films I referenced caused quite a stir within the communities because of generational trauma being a relatively untouched topic in mainstream media. This imparts to me that maybe as I get older I will see more media explicitly about the stories I would like to tell, which is both reassuring and inspiring because I want to be on those teams telling those stories about how kindness and compassion can save the world.

Ultimately, the process we employed did not work for us. I personally struggled switching my hats between all of my responsibilities, which stung on top of a method of determining scope that was ill fitting for our goals and strengths. Unfortunately, that method had me working on worldbuilding and narrative reactively, working backwards from what information was needed to pitch the game sufficiently through the preproduction phase. Given that I’ve now gone through that experience, I would aim to commit towards more decisiveness earlier on in the process, as well as more low ceremony prototyping and ideation. The exercises where I quickly generated a lot of ideas from scratch and developed the ones that appealed the most to me appealed well. A full preservation of energy and resources does not seem so feasible as to bottleneck other areas of development, so that is an important indicator for me to be more willing to get work out on paper and in front of people.

Ultimately, I feel as though we came up with many novel ideas, but, as our professors kept reminding us, our concept was too big to gracefully execute within the scope of this class. While I wish we had more time to implement the mechanics and make everyone say “Wow!” at my cool, symbolic designs, I can accept that we put our best foot forward here, made some mistakes, and learned a lot. I at least hope other people see the merit in my work, too.

11.1.19 Future Work

This project, as I mentioned, did not really get a chance to explore different media and the nuance of storytelling devices. I would love to explore that more in future work, perhaps not just with a presence of those storytelling media in the game but perhaps have mechanics be centered around how the different sensory information each provides is valuable in their own way.

I am undecided as to if I want to pursue exploring the nuance of truths in empathy. While I am quite passionate about my Problem Statement and Significance, those philosophical truths may have a difficult time having a unique design pattern invented around them. I must admit that while those prompts were on my mind, I did believe that I was making games that made better people. That is a life goal of mine.

Ultimately, I think this process had its strong points and its flaws definitely leveled me up with respect to willingness to trust the process and fail forward. I will definitely be looking into longform narrative development processes. I will pry open the clammy hands holding those secrets if I have to.

11.2 Editing Assets to Fit Aged Aesthetics - Abigail Markish

11.2.1 Abstract

Through The Lens is a game with specific needs when it comes to any art assets. The visual design of the assets is dependent upon the look and feel of being abandoned and left to decay for decades. Therefore, any assets used that were not already specifically made to look like they were decaying had to be edited in a 3D modeling or image editing software. This paper aims to analyze the techniques used for the aging process along with deciding which technique was the most effective. After testing several techniques for aging assets, it was found that use of a decal system was the most extensible method, but the other methods presented were useful in their own ways.

11.2.2 Problem Statement

Through The Lens depends heavily on the separation of aged and clean asset textures. The main mechanic, here on out referred to as the photo mechanic, allows players to swap between how things look in the present versus how things looked in the past. Any assets based in the present would need to look aged and dirty while any assets based in the past would need to look new and clean. The biggest issue here was deciding which techniques would work best in achieving this aged aesthetic. From prior experience and further research, there were several options to choose from: editing models in Blender, repainting texture files in GIMP, and using a decal system in Unity. Which way would be most efficient, and which way would fit most of the project's needs?

11.2.3 Significance

Through The Lens centers around using our photo mechanic to create a connection between the current time period and the 1970s. This made creating an aged look for the present day version of our game's environment imperative to getting our aesthetic just right. While our team's 3D artist was able to create some of those aged assets for us, time crunches and other projects got in the way of creating every asset that was needed. This meant that we needed to find a way to edit any basic assets that were found on sites such as Sketchfab or TurboSquid.

Before this research was started, the team knew that we needed a quick way to edit any assets that our artist did not explicitly create. Upon researching the topic, several ways were discovered to support editing asset details to fit with the aged aesthetic. The significance of the issue fits within the realm of working quickly and accurately. Which technique would let us change our assets without significantly derailing our project timeline?

11.2.4 Background

Before creating the environment for *Through The Lens*, it was important to analyze how other narrative-heavy games with emphasis on aging and dilapidated structures accomplished this task aesthetically. When thinking about games that place a heavy emphasis on exploring abandoned areas, a few examples immediately come to mind: *Horizon: Forbidden West* and *Fallout 4*. While *Forbidden West* and *Fallout 4* take place in the 31st century and 2287 respectively, they can still be used as good references for how I could create the aged aesthetic that we were going for in our project.



Figure 45. Image of a rundown relic location in *Horizon: Forbidden West*⁴⁸

The team knew from the beginning that we wanted to tell a story using the environment of *Through the Lens*. We wanted to let players know what life may have been like for the fictional people that lived there before they had to abandon the area in the late 1970s. This same sentiment can be seen in the environment creation of *Horizon: Forbidden West*. As displayed in figure 45, the team at Guerilla Games created a completely dilapidated version of the Zion Lodge located in Zion National Park (ElAnalistaDeBits 2022⁴⁹). While our game may not need to portray real-world locations in the post-apocalyptic 31st century, there is still a need to make sure the 3D assets used in *Through the Lens* have the ability to depict a story. One can easily infer their own narrative about what occurred in the past just by looking at the above image. Games Radar writer Heather Wald describes *Forbidden West*'s ruins as being the only things left

⁴⁸ <https://www.newgamenetwork.com/media/30699/horizon-forbidden-west/>

⁴⁹ ElAnalistaDeBits, "Horizon Forbidden West VS Reality | Real World Locations Comparison," YouTube Video, 16:33, February 18, 2022, <https://youtu.be/-fzqLBqzYX8?t=513>.

that are still able to tell the stories of the past (Wald 2022⁵⁰). Our game needed to have the same feel to it. By taking inspiration from *Horizon: Forbidden West*, we were able to get well on our way to making a game that let players take their own guesses about what happened and why people left all those years ago.



Figure 46. Image of Red Rocket Truck Stop from Fallout 4⁵¹

Another game where inspiration was found for our project's aesthetics was *Fallout 4*. This game has a specific nuclear wasteland visual style, and the designers stuck with it from beginning to end. While the rusted and collapsed environments present in *Fallout 4* were still too drastic for what our game needed to look like, it did give a slightly more approachable example of dilapidation compared to *Forbidden West*. Compared to the aforementioned far-future title, *Fallout 4* still had visible infrastructure and structurally sound buildings. As shown in figure 46, objects such as the overgrown vegetation and the cracked roadways matched better with what we wanted to achieve. Through the Lens also used a bit of *Fallout 4*'s inexplicit environmental storytelling as inspiration for our 3D assets. We wanted to let players figure out parts of the story on their own without having to be told directly. Aaron Rackham of CBR makes mention that finding hidden clues to side stories in *Fallout* may be more challenging, but this challenge also makes the outcome "a lot more rewarding (Rackham 2022⁵²)."⁵² This is what we wanted our players to feel by exploring and looking at the assets in the game's environment.

⁵⁰ Wald, Heather. "How the Remnants of the Old World in *Horizon Forbidden West* Awakens a Sense of Wonder." GamesRadar+, March 2, 2022. [Article Link](#).

⁵¹ https://fallout.fandom.com/wiki/Red_Rocket_truck_stop

⁵² Rackham, Aaron. "Horizon Zero Dawn Masters a Storytelling Style That Started with *Fallout*." CBR, January 8, 2022. [Article Link](#).

11.2.5 Methodology

The main purpose of this research was finding out what directions could be taken to make *Through The Lens'* 3D assets look more aged and abandoned. I had a working familiarity with creating game-ready assets at the time, but I knew that there had to be more techniques out there that I had not yet heard of or tried. Upon further research and experimentation, three techniques were found that would be feasible for editing 3D assets to make them look more shabby and decayed: editing models directly in Blender, editing texture files in GIMP, and creating a decal system to be used within Unity.

Some of the assets found in asset stores such as Sketchfab looked great for our game visually, but the shape of their meshes had a few shortcomings. One route of experimentation that I took was to import the objects into Blender, edit their meshes directly, and then export them back for use in Unity. This technique allowed me to directly manipulate the faces, edges, and vertices of the meshes. In turn, any 3D assets that were used in our game could be made to look more rundown physically (not just visually by editing textures). However, there is a major limitation to this method that will be further discussed in the discussion section of this paper.

Another technique was the use of GIMP (GNU Image Manipulation Program) to edit texture files that would be used to create object materials in Unity. GIMP was used for image editing instead of Photoshop because it is free and open-source. Editing texture files to create aged versions of object materials was the goal for this technique. An albedo map (or the base material colors) would be opened inside of GIMP. This map would then be edited to look dirty or decayed. The map would then be imported into Unity to be used as the new base for an object's material.

The final technique (and likely the most technical to achieve) was the use of a decal system within Unity. A decal system would allow us to overlay images on top of objects to make them look old without having to edit said objects in other software. Due to our project being on an older and more stable version of Unity, a decal system had to be created from scratch. A built-in decal system with Unity's URP (Universal Render Pipeline) was only made available in the 12.0.0 version (Decal Renderer Feature⁵³). After performing an extensive internet search, it was found that this same issue had been approached by a developer named Daniel Ilett (Daniel Ilett 2021⁵⁴). By following his approach to creating decals using shader graphs in older versions of URP, the concept of overlaying textures onto 3D objects to make them look aged was able to be tested.

There are several factors that limit the possible scope of this research paper: time, motivation, and available resources. Time and motivation can be tied together when discussing these limitations. Most of the available time and motivation are being spent on creating a playable, satisfying, and undeniably strong prototype for *Through The Lens*. This leaves little room for

⁵³ "Decal Renderer Feature: Universal RP: 12.0.0." Unity3D Docs. Unity, n.d. [Document Link](#).

⁵⁴ Daniel Ilett, "Decals & Stickers in Unity Shader Graph and URP," YouTube Video, 9:14, September 26, 2021, <https://youtu.be/f7i0gernEmM>.

research outside of immediate areas of study and expertise. Another limiting factor was finding resources whose creation techniques were easy to understand and replicate. Not every 3D artist uses the same techniques to create their assets, so it was difficult at times to find objects that followed approaches that I already knew how to manipulate. Learning how all of the different artists' techniques worked was nigh impossible. All of these things led to severe scope limitations while driving forward with this research.

11.2.6 Results

Throughout the course of this project, I was able to use the techniques described above to make some assets look more aged and neglected. The following images are the results of all of the aforementioned techniques.

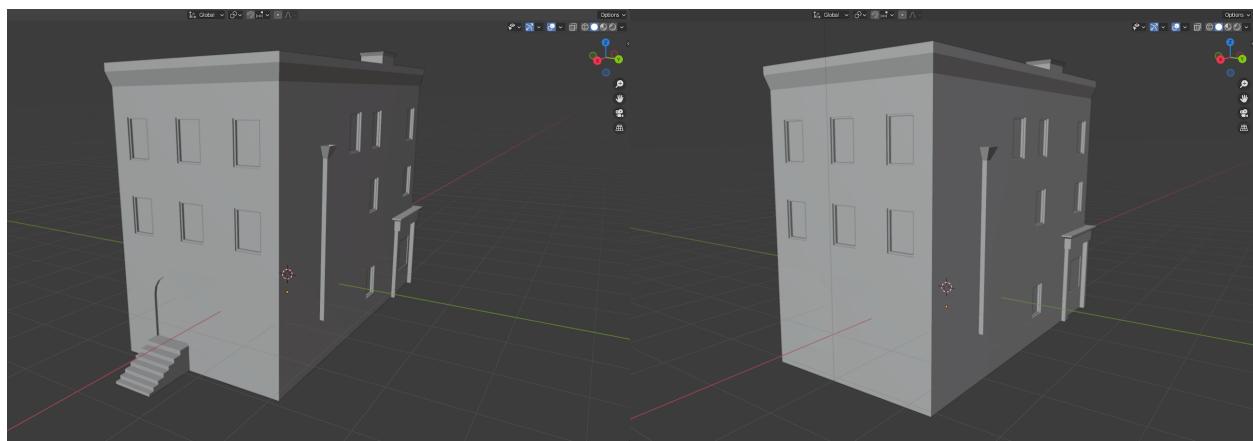


Figure 47. Building model with no textures before and after Blender editing

Figure 47 shows the basic building model that appears throughout the onboarding section of *Through the Lens*. The edited version of the model gets rid of the back stairs and entryway. They simply did not fit what we were looking for aesthetically for the city in our game, so the mesh editing technique was used in Blender. After getting rid of those specific pieces, the building was much easier to resize and manipulate within Unity itself.

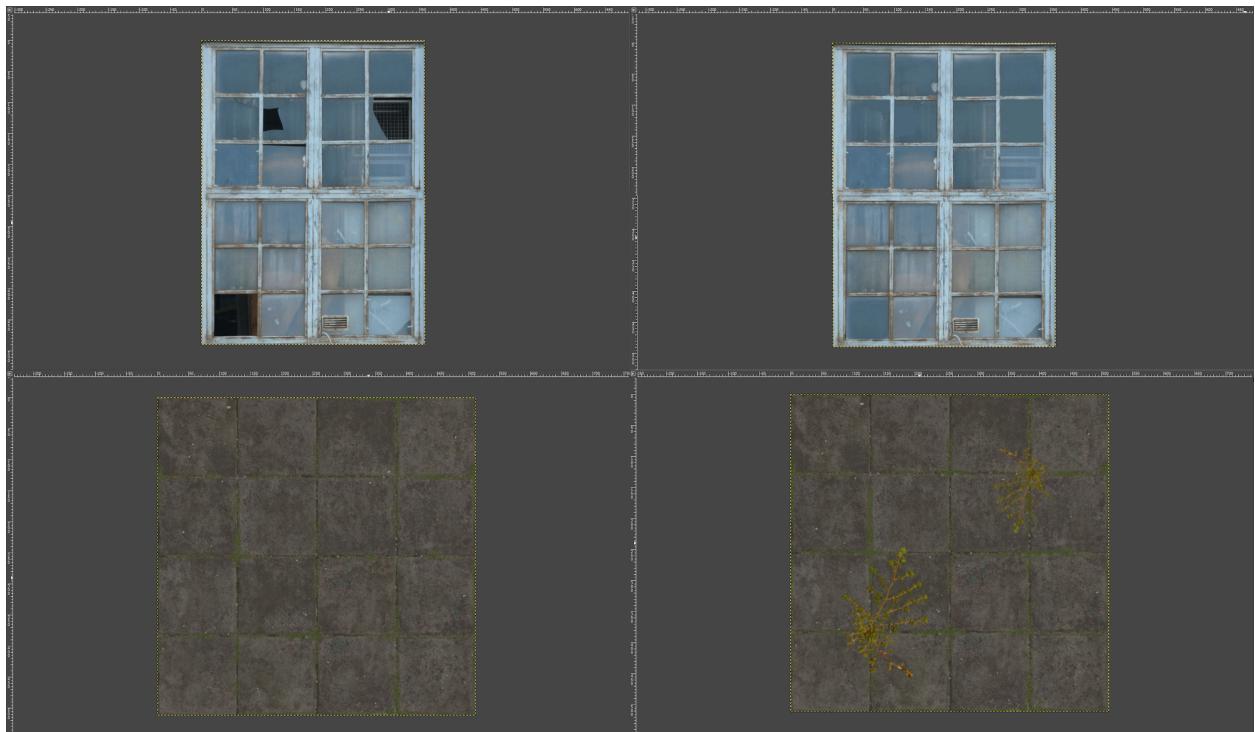


Figure 48. Two textures edited in GIMP – before and after views

The images shown in figure 48 show the original and edited versions of two different textures that were used in the game. These textures were edited in GIMP to further show the effects of time on the abandoned surfaces. The first texture is of broken and fixed windows, while the second texture is of new and old/overgrown pathway tiles.



Figure 49. Decals Represented in-engine (road surface marks, hanging vines, wall cracks)

Lastly, the results of the decal system are shown in figure 49. Each kind of decal (i.e. vines, wall chips, etcetera) consists of a very thin cube that has been set up with a material that corresponds to the decal that needs to be seen. These materials are set to use the decal shader that was created for this technique. As seen above, any png image can be turned into a decal. For best results, everything but the main part of the image was made to be transparent. This decal system easily adds much more age and levels of ruin to any object within Unity without having to edit said object in outside software.

11.2.7 Discussion

After using all three of these techniques to try and age 3D assets, it can be said that the decal system was the most extendable. Any object within the game can be changed at any time by adding a thin cube to layer a decal over the mesh. It was also the only technique that consistently yielded results in a timely manner. Creating a new material that uses a shader graph takes a few minutes whereas editing assets in Blender or textures in GIMP could take quite a while depending on the depth of the changes. One major downside to this decal system is how messy it makes the scene editor in Unity. Multiple instances of the same decal must still be on separate cubes. This leads to having a large amount of decals shown in the editor.

The other two techniques also have their own strengths. Even though it might take longer to edit textures and meshes in external software, it would all be more efficient for the engine in the long run. In a large-scale game, rendering hundreds, possibly even thousands of separate decals in the way they were created for this research can become costly. Creating a handful of materials with edited textures or a few versions of a model with an edited mesh is far less taxing. However, editing meshes in Blender does have one major downside. As described by the creator of One Wheel Studio in one of his tutorial videos, adding or deleting faces on a mesh in Blender can lead to the UVs for that specific object losing their connections with the texture maps ([Video tutorial⁵⁵](#)). From prior personal experience, it is very easy for UV unwrapping on a mesh to go wrong once pieces are moved around on a mesh. One must always be wary of this when editing 3D assets for any project, not just one where the assets have to look old and dingy.

11.2.8 Conclusions

Performing this research allowed me to learn that all of the aforementioned software have their own strengths and weaknesses. Their usefulness depends on what the individual project is looking to accomplish. For the case of *Through the Lens*, the decal system worked wonders in helping to achieve an aged look quickly. However, other games may need to make use of the other techniques described to achieve their goals.

If somebody is not familiar with Blender or GIMP, they can always use Maya or Photoshop to achieve the same things. However, during this research it was found that Blender and GIMP can do many of the same things their respective counterparts can do for free. A change that

⁵⁵ TODO Blender UV mess ups

could be made to the methodology could be to add in the editing pipelines for Maya and Photoshop to see if they are any different than Blender and Gimp respectively.

Time crunches and uncontrollable outside forces stopped this research from going as far as it could. There was certainly much more that could have been done to make the 3D models found in *Through the Lens* look more aged. It is disappointing that I was not able to do more editing with some of the assets within the game, but what was accomplished was still valuable.

11.2.9 Future Work

The version of Unity's Universal Render Pipeline (URP) that *Through The Lens* is currently using does not have a decal system built in to it. Instead, we use the decal system that was described earlier on in this paper. Something to be done in the future would be to port this project to the newest stable version of Unity that contains a pre-existing decal renderer. According to Unity's documentation, this was introduced in URP 12.0.0 (or Unity version 2021.2.0b14) ("Decal Renderer Feature⁵⁶"). This way the project could use pre-built technology with more capabilities available to it.

One main technique discussed for creating aged assets was editing existing textures to fit our intended design. Another bit of future work that could be done is creating 3D assets and their textures from scratch to fit the project. I am a very visual person, so sitting down to make something in Blender when I have the time has always been relaxing. Without the looming threat of degree deadlines, creating 3D assets and their textures for this specific project within a software such as Blender would be great practice. It would also make the game less reliant on outside and independent asset sources. Sometimes these independent sources can have problems (such as copyright claims) that pop up at some point down the road. In fact, they can sometimes disappear from the internet altogether. By creating our own assets for this project, we could hopefully preemptively stop any of these issues.

⁵⁶ "Decal Renderer Feature: Universal RP: 12.0.0." Unity3D Docs. Unity, n.d. [Document Link](#).

11.3 Custom Tool Development: Identify, Assess and Implement -- Yuan Luo (Alfie)

11.3.1 Abstract

Public game engines like Unreal and Unity are designed to be generic to be used in the most possible ways, such as in movies, simulations, digital experiences, and video games. When developing specific genres of games or even one particular project, game developers need tool sets that deal with certain content creation processes or issues related to that game. Triple-A game studios usually have their own in-house engine and various customized tools. Proper tool sets can improve the overall efficiency of content creation and reduce the risk of making mistakes. This research focuses on three aspects of tool development, process analysis, identifying needs, tool development and implementation. The tools being built and analyzed in this research are for a first-person storytelling game called Through The Lens.

11.3.2 Problem Statement

11.3.3 Significance

11.3.4 Background

11.3.5 Methodology

11.3.6 Discussion

11.3.7 Conclusions

11.3.8 Future Work

11.4 Sound Design and Technical Implementation for a Small Team -- David Patch

11.4.1 Abstract

The goal of this paper is to reinforce the importance of good sound design and how to achieve it on a small team. While all aspects of sound design are important, this paper will specifically focus on contextual and ambient sounds. Methods for intra-team communication, workflow, and asset management will also be explored.

Context will be given through the explanation of why sound is important to our capstone project, *Through the Lens*, and how it can be designed to improve the player experience. Additionally, this paper seeks to inform on meeting the needs of good sound design as a small team. The topics of tool use, audio asset management, the audio asset pipeline, and good practices for sound-forward design will be discussed.

11.4.2 Problem Statement

Being the sole sound designer for a team comes with numerous challenges that must be overcome in order to achieve greatness in any capacity. There exists a bias in the games industry that audio always comes last in development⁵⁷. Sound design can easily fall into a reactionary position, where sounds are designed around existing visuals and actions⁵⁸. Relegating sound design in this way limits how much great audio can be done. Promoting sound-forward design as early as pre-production is then the responsibility of the sound designer. Sound is integral in grounding the player in the game's environment, and the entire design team should be aware of that from the get-go⁵⁹.

Choosing which tools to use, organizing assets, and creating an effective pipeline for sounds are also common problems faced by individual sound designers⁶⁰. Assets are useless if they get lost in folders, misnamed, or never integrated into the engine. Effective organization and integration strategies must be put in place to avoid pitfalls like these.

In the context of contextual and ambient sounds, the sound designer must mirror what is happening on the screen. Actions or animations with disconnected or inappropriate sound effects risk pulling the player out of their suspension of disbelief. Ambient sounds assist in grounding the setting and must fit reasonably within the visual environment. Player actions,

⁵⁷ Bonnie Bogovich, "Party of One: How to Be 'The Audio Department,'" Game Developers Conference (March 2017), <https://www.gdcvault.com/play/1024326/Audio-Bootcamp-XVI-Party-of>.

⁵⁸ Matthew Lee Johnston, "Great Audio Design: By Any Means Necessary," Game Developers Conference (March 2017), <https://www.gdcvault.com/play/1024321/Audio-Bootcamp-XVI-Great-Audio>.

⁵⁹ Elliot Callighan, "Eight Essential Ways to Use Sound in Video Games," GamesIndustry.biz, January 20, 2020, <https://www.gamesindustry.biz/articles/2019-10-08-eight-ways-to-use-sound-in-video-games>.

⁶⁰ Richard Ludlow, "Audio Asset Management Tips and Tricks," Game Developers Conference (March 2018), <https://www.gdcvault.com/play/1025055/Audio-Asset-Management-Tips-and>.

animations, and the environment are all subject to change, and the sounds linked to those visual assets will have to change with them.

11.4.3 Significance

I am the lead sound designer for Hungry Turtle Studios. While others on the team have sound design experience, I will be responsible for most of the design work (obtaining, creating, and editing individual sound files) and all of the technical integration (hooking up sounds to scripts in the game engine). Good asset management and a defined pipeline will benefit me in my work by providing stability and consistency to my workflow.

Being one of a team of five, I am also in the position to keep sound off of the backburner and at the front of our design decisions. It will be my responsibility to ensure sound is always considered when new features are designed and when existing features are changed.

Contextual sounds will be a vital component of *Through the Lens*. The game has no NPCs to tell you when you have solved a puzzle, which room to investigate, or how close you are to lining up a photograph with its station. Players will need feedback on those things, and not all of that can be done visually. If the feedback for going in the right direction or moving to the right spot for a photo is too obvious, players may feel less accomplished after “figuring it out.” Audio feedback can serve to be a less obvious push in the right direction as well as confirmation that the player succeeded in a puzzle. Designing sounds like these and integrating them in the engine are primary objectives for myself, as the sound designer for the team.

11.4.4 Background

Before getting to work on sound for *Through the Lens*, I needed to determine how audio assets were going to be managed. I had past experience working on sound for previous projects, but none of them were of the same scale as this capstone. Learning what sound designers in the industry do and mimicking that was the obvious route to take in order to make up for that lack of experience.

A Game Developers Conference (GDC) talk given by Richard Ludlow of Hexany Audio titled “Audio Asset Management Tips and Tricks” outlines the strategies his company uses for managing audio assets from creation to engine integration. Much of the talk is dedicated to his company’s use of an asset list spreadsheet as their primary tool for asset management. While much more complex than what would be necessary for this capstone project, Ludlow’s talk was used as the reference for the asset list created for it.

Drawing from the aforementioned GDC talk and my own prior experience, I decided that the audio asset pipeline for this capstone project would consist of three tools: one for mastering sounds, one for building those sounds into adaptive and parameterized events, and the game engine itself. A digital audio workstation (DAW) would be used for mastering sounds. The three DAWs I considered were REAPER, Pro Tools, and Ableton Live. I had prior experience with both REAPER and Pro Tools, meaning I would need less time learning the software. Ableton Live also advertises its focus on music creation and production, which was considered out of scope for this capstone project. In the end, REAPER was chosen over Pro Tools due to the stark difference in cost. For building sounds into events, FMOD and WWise were considered. Both advertise engine integration and provide solutions for adaptive and interactive audio. Due to

the similarities in these tools, FMOD was chosen due to my familiarity with it. The final step of the pipeline would be hooking up sounds to scripts and objects in the Unity editor.

To find solutions for how to keep sound relevant during the development life of Through the Lens, I looked to two GDC talks. The first was given by Bonnie Bogovich, who had previously been the Audio Lead at Schell Games for five years. In her talk “Party of One: How to Be ‘The Audio Department’”, she discussed methods for breaking the pattern of audio always coming last. Of these, pre-production work and early tool/engine decisions were emphasized. During pre-production, the audio lead should be present in design meetings to offer their unique viewpoint and ensure that the team is designing with sound in mind. They should also look to be a part of the quality assurance process so that their work is also being adequately tested. The second talk “Great Audio Design: By Any Means Necessary” was given by Matthew Lee Johnston of Microsoft. In it, Johnston highlights the importance of leadership who are knowledgeable in the audio discipline and strategies for getting non-audio people on board. Mock-ups were discussed as a great tool for communicating concepts and getting feedback from the design team early in the sound design and creation process.

11.4.5 Methodology

Sound-Forward Design and Considerations

Attending design meetings, especially during pre-production, will be made a high priority. Ideally, sound will be discussed when relevant, such as during talks of mood or player actions and mechanics. Mock-ups will be made in response to such design decisions in order to communicate and receive feedback on my intentions and future work. Daily standup meetings will be utilized to keep the team up to date on sound design work and the implementation statuses of sounds. The asset list spreadsheet will be actively updated and publicly available to the team.

Given the size of our team, I will hold primary responsibility for the quality assurance testing of sounds. Sound integration tasks will not be considered “done” until the sound has been tested to work as intended in at least the Unity editor and ideally a build of the game. Once sound effects are in a stable build of the game, I will ensure that playtesters are given the proper accommodations needed to hear those sounds, such as speakers or headphones. If surveys are used for gathering feedback, I will also ensure that appropriate questions relevant to the implemented sounds are present.

Audio Asset Management

A Google Sheets spreadsheet will be created to track the use and status of audio assets. Assets will be categorized into one of four types of sounds based on source: environmental SFX (sound effects), interactable SFX, menu SFX, and character SFX. Each of these categories will be represented as individual pages within the spreadsheet. Each page will have these six columns for audio assets to populate: sound, category, description, assets used (link), license, and status. The sound column will be the name for the asset. Category is to be used as a one-to-two-word description of a sound’s source. The description column is self-explanatory. Links to the assets used will be provided in the fourth column with their respective licenses in the fifth. The final column, status, will be used to denote a given audio asset’s current state

within the audio pipeline. Five statuses will be used for this column: blank for no asset found, “pending” for asset obtained, “mastered” for edited in REAPER, “built” for build in FMOD, and “implemented” for implemented in Unity. Each status notes where in the pipeline (described in the following section) a given audio asset is.

Most assets (if not all) will be sourced from free sound-sharing websites such as Freesound. All unedited and edited assets will be stored on a Github repository with the REAPER projects used to master them. This is separate from the main project repository so as to not inflate it with unnecessary files.

Audio Asset Pipeline

Audio assets will flow from REAPER to FMOD to Unity. Once an asset is acquired, it will be imported into one of four REAPER projects (one for each page on the audio asset list spreadsheet) on the audio repository. Here, it will be mastered to meet any design requirements. After rendering the new sound file, it will be imported into the FMOD project on the main repository. In FMOD, the asset will be attached to the relevant event(s) and further edited to meet any needs for responsiveness or interactivity, such as footstep sounds changing based on a surface parameter. The sound will then be built in FMOD and automatically updated in Unity, since the FMOD for Unity plugin reads straight from the linked FMOD project. Once in Unity, the asset (now an FMOD event or timeline) can be freely integrated into any scripts or scene objects.

Should a mock-up be requested or the feedback from one deemed necessary, the mastered sound can be shared with the team (and others) before work begins in FMOD.

Making Responsive Sound

After sourcing and mastering the right sounds for the player’s actions in the game, FMOD’s toolset will be leveraged to help make the sounds responsive to various parameters. All of the player’s actions should be accompanied by sound effects. To meet this end, any Unity scripts written for player actions will need to address solutions for playing FMOD events or changing FMOD parameters.

The core mechanic of our game will need a unique and identifiable sound to serve as a confirmation of success for the player. The “Aha!” moment of lining up a photograph and having its contents swap with those in the environment is a significant part of the intended gameplay, so it will need a significant and intentional sound to match it.

11.4.6 Results

Sound-Forward Design

An initial mock-up for the ambient background sounds of the game was created and used for the final Fall semester presentation. This included chirping insects, songbirds and crow calls, wind, the creaking of old wood, and water dripping. The mock-up matched the mood set by our aesthetic design and narrative intentions, and a similar set of sounds was used in the final

version of the project. The environmental effects of creaking wood and dripping water had their priority lowered after the ambient bird and insect sounds were implemented, and they were consequently pushed out of scope.

For the pre-production phase of the Fall semester, this ambient sound mock-up was unfortunately the extent of the sound design work done. As the secondary gameplay programmer on the team, my time was instead spent writing scripts for our initial prototypes and assisting with designing the code architecture for the project.

During the development phase of the Spring semester, sound design and technical integration began in earnest. Updates on sound were consistently delivered during our daily stand-ups, ensuring that the team was well-informed about the progress of sound effects. All relevant design meetings were also attended in both semesters. As a result, every action the player can perform in our game had sound effects designed for them. Due to bottlenecks in engine integration however, some actions (e.g. picking up items) remain silent in the final build of the game.

Mock-ups of the photo mechanic sound effect and the effectiveness of the audio asset pipeline allowed for quick iterations to be made after feedback from the team and committee members. The burn effect on the player's held photo during the mechanic's transition was initially designed with sound in mind as well.

Audio Assets

Sound	Category	Description	Assets used / required	License	Status
bird taking off	ambient 3D	A single bird taking off from the ground.	https://freesound.org/people/mcmikai/soun	CC0 1.0	mastered
urban birds chirping	ambient 2D	Urban birds chirping with a slight echo in Tasmania.	https://freesound.org/people/crk365/sound	CC BY 3.0	pending
low wind gust	ambient 2D	Single, long, eerie gust of wind at a low pitch.	https://freesound.org/people/florianreichelt	CC0 1.0	built
dripping water	ambient 3D	Sounds of water (quickly) dripping into water.	https://freesound.org/people/InspectorJ/sound	CC BY 3.0	pending
crows cawing	ambient 3D	Multiple crows talking to each other with no background noise. Some single caws included.	https://freesound.org/people/blimp66/soun	CC0 1.0	implemented
creaking wood	ambient 3D	Low wooden creaks with limited background noise and no reverb.	https://freesound.org/people/laft2k/sounds/	CC0 1.0	pending
creaking wood 2	ambient 3D	Low wooden creaks with limited background noise and no rever.	https://freesound.org/people/l_cafDV/sound	CC0 1.0	pending
desert at night	ambient 2D	The Australian desert at night. Wind, crickets, and birds.	https://freesound.org/people/kangaroovind	CC BY 3.0	implemented
room tone	ambient 2D	Blanket 40-60 seconds of empty room sounds, no AC or light buzzing.	in-house	CC BY 3.0	built
		A running car shifting into park, being turned off, and exited. Ends with the driver's door shutting. Player is the driver, so should be recorded from inside the car. Plays over a black screen/text.			
exiting a car	environment		https://freesound.org/people/benwerner/sound	CC0 1.0	pending
station proximity noise	station	Bassy fan that scales intensity with player proximity. Used as an audio guide to a station's swap hubbox.	https://freesound.org/people/unfa/sounds/	CC0 1.0	implemented
desert ambience	ambient 2D	Ambient drone with intermittent insect chirps. Crickets in the background. Subtle wind present.	https://freesound.org/people/kyles/sounds/	CC0 1.0	implemented
telephone ringing	station	1970s telephone ringing.	https://freesound.org/people/Hockinfinger/sound	CC0 1.0	pending

Figure 50. Audio Asset List - Environmental SFX

The audio asset list spreadsheet was successful in tracking the progress of sounds for the project. It was heavily utilized throughout the development semester as I transitioned to primarily working on audio. It was referenced and updated as sounds made their way through the pipeline. Figure 50 above shows the environment SFX page of the asset list. The status column on the far right shows where in the pipeline the sounds are. Not every sound designed made it through implementation. As work on the project progressed, different sounds were placed at different levels of priority. Due to time constraints, only the highest priority sounds were implemented in Unity.



Figure 51. REAPER Sound Hierarchy

Two REAPER projects were used to master raw sound files rather than the intended four. Environmental sound effects were mastered in one, and all other sounds (menu SFX, character SFX, and interactable SFX) were mastered in the second. Figure 62 above showcases the hierarchy and organization of sounds in the second REAPER project. Both of these projects were stored in a secondary GitHub repository, so as to not clog up the main project repository with unnecessary files. The names of each sound in the REAPER project either closely or completely matched the names used in the asset list. After mastering, sounds would be exported as .wav files and brought over to the main repository and into the FMOD project there.

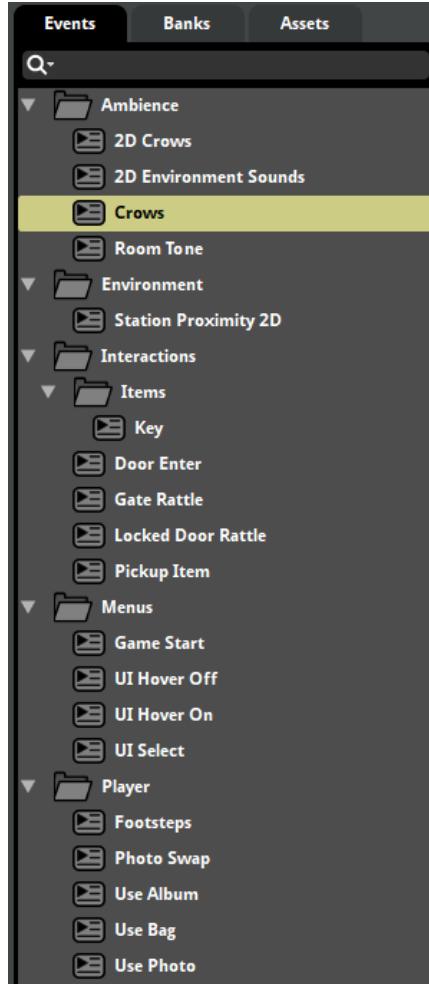


Figure 52. FMOD Event Hierarchy

Above, in figure 52, is the hierarchy of sound events in the FMOD project for *Through the Lens*. FMOD was used to get every sound into the Unity project. While not every sound required further editing in FMOD, it was still used to standardize the methods for playing sounds in Unity through both the editor and scripts. All events in this FMOD project were built into a single sound bank that was accessible in Unity, much as it appears here. Naming conventions were not enforced, so several of the events here are named differently than the audio assets they use. Some events using multiple assets was another reason for names differing.

11.4.7 Discussion

Clear communication with the team ensured sound was always being considered in the development phase. It was however sidelined and put on lower priority during pre-production due to my efforts being put toward gameplay programming and project architecture. The daily updates on sound in our team stand-ups proved helpful for keeping the team current on the implementation statuses of various sound effects. It must be noted that of our team of five, two

members besides myself had prior experience with sound design. This made communication about sound easier than it otherwise might have been.

Mock-ups were well-received and allowed for constructive feedback from the whole team. They were utilized for high-priority sounds like those for the core photo mechanic and background ambience. While more sounds certainly could have been mocked-up and shared for feedback before implementation, I do believe that having a clear cutoff for what should and should not be mocked up is necessary. Requesting feedback from team members or committee members takes their time. Sounds of lower importance should be left to the judgment of the sound designer, who should have confidence in their ability to create appropriate sounds. The pipeline in place allows for quick iteration regardless, so changing sounds post-implementation is not terribly time-consuming.

The audio asset list provided a clear view of each sound's implementation status. Due to myself being the sole sound designer for a relatively small project (compared to full games by professional studios), there was no need for automation or algorithms in the spreadsheet. Color coding, however, could have been utilized to better communicate statuses. Should work continue on *Through the Lens*, I would also add an additional column to the asset list for priority. Naming conventions would also be enforced moving forward, as they were not used throughout the pipeline. This would have caused confusion had I not been the only sound designer. Naming conventions with intent and meaning should be utilized for better asset tracking.

Unity implementation proved to be the bottleneck of the audio asset pipeline. Specifically, our scripts for handling the player's "interact" action did not allow for duplicate interaction method calls. The original implementation of sound events playing on interactions used the inherited interaction method, which meant that any object with another script using that method would cause only one of the two instances of the method to fire. Problems like this led to fewer sounds being implemented than desired.

11.4.8 Conclusions

The process was overall a success. The audio asset pipeline worked and allowed for easy iteration, largely thanks to FMOD's seamless Unity integration. The audio asset list spreadsheet worked for our small team despite its shortcomings, but it would have needed more ceremony if we had a larger sound design team.

Wiring sound events to player actions in Unity proved to be the biggest bottleneck in the pipeline. Calling the sounds in scripts was not difficult, thanks to FMOD. The logic for when and where to call these, all while trying to maintain the Single Responsibility Principle in our scripts, proved challenging to determine. Additional planning during pre-production could have been done to address the issues I faced.

Outside of the process, I learned a lot about the functions sound can and should serve in games. Specifically, I only just touched the surface of how sound can be used to draw attention and guide a player. Somewhat late into development, a low hum was added to our core photo

mechanic that grows louder as the player approaches the correct position for the photo in their hand. Additional adaptive sounds like this could be leveraged to better lead players along the intended path of *Through the Lens*, which was something we struggled with throughout development.

11.4.9 Future Work

Dialogue and music are two large facets of sound design that were deemed out of scope for *Through the Lens*. The team recognized that both would be greatly beneficial for the game's experience and that they would be necessary components of the game should work continue on it. To meet the increased complexity these two categories of sound would bring to the project, the audio asset list spreadsheet would also have to be improved. More automation, additional pages, and codified naming conventions are some of the improvements that would need to be made. Additionally, some rework would have to be done to clean up the current asset pipeline. The aforementioned naming conventions would need to be codified and all current files changed to match them.

With a revamped pipeline and asset list in place, the final challenge would be creating a solution to our interaction stacking problem in Unity. Should that be solved, More contextual sounds could be implemented to match every action the player makes. More adaptive ambience could also be implemented such that it changes based on the player's location in the game world.