Production Documentation

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Summer 2023

Summary

In the first week of the Summer, I recognized a few glaring issues with the Changeling project: we hadn't had a clear sense of direction in our transition, we had no rigid process in place to support our team of 80, and we had no task management system in place for improved cross-team functionality.

What I sought to achieve as Production Lead through the few months we had on the project was to completely revamp the game development process to create better transparency and cross-team functionality, improve transition periods, and better support significantly larger teams.

All the while, I was also trying to support the team in the best possible way to work toward the original MVP pitched by Elouise Oyzon: getting the game shipped to early access. This priority informed the team formation, resource and risk analyses, and the planning and scope.

The newly implemented process improved the transparency within the project and enhanced the artifacts that came out of the work on the project. These improvements should provide future teams with a clear sense of direction, rigid structure, and functional task management, as they did for the Summer 2023 Team.

What remains to be solved is improving the playtesting methodology, improving the version control system, which would, in turn, streamline the workflow, standardizing more elements of the process, and learning to adjust and shift the process per findings from the retrospectives.

As you read through this document, you'll get a sense of how I structured the process, supported team formation, focused priorities to work toward the MVP, utilized the new process and task management system to improve functionality, and get a sense of the progress on the product throughout the Summer.

To review a stripped-down version of the process, see the Workflow Documentation in Appendix 3.5A, Reflections.

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1.1 Overview

Coming into the Changeling project at the beginning of Summer 2023 was turbulent; our team was now the largest team to have ever worked on Changeling at one time, with a team size of 80 people, more than double the previous largest team. This fact alone provided the primary constraint while considering production decisions for the project moving forward; other factors included a lack of pre-existing structure, previously low ceremony and low-artifact production processes, and poor documentation and organization.

These factors may not have been problematic for once smaller teams, some of which made up 1/16 of our team size, as when working in a team of five, they do not need all the overhead; however, the problem that comes with that is that it leaves the future teams in the dark about process decisions, standardized documentation, and many other issues that lead to poor project organization since future teams try to fit into the pre-existing structure without artifacts explaining what the system is. Ultimately, this lack of consistency from team to team also led to design inconsistencies and game hierarchy problems, and teams reiterated elements in the project for years.

The following sections seek to address these problems, from the organization of cross-functional teams to the "core" production team, how we managed resources and risks for a team this size, how we set priorities and scope, and the game development process that we took up to improve the flow of work from team to team. This higher artifact and ceremony process will improve the state of Changeling moving forward, and teams can better set future groups up for success by providing more structure for a project with a long life cycle.

1.2 Team Organization

1.2.1 Team Formation

The Summer 2023 Changeling team and sub-teams were primarily formed by Elouise Oyzon during the hiring process that took place during the Spring 2023 semester. The hiring process focused on recruiting individuals for specific positions, splitting the teams into the following categories: Audio, Art, Narrative, Technical Art, Development, and Web. In the recruiting period, the Audio and Art teams combined to form the Aesthetics team; these two teams worked together to structure the Aesthetics for the project. However, Art and Audio still had separate responsibilities and individual needs, and the distinctions between the two remained influential throughout the process. See Appendix 3.1A, Team Formation, for the initial formation of the team.

When the work began, the Development team split into a few groups: Under-The-Hood, Onboarding, Father's Level, Tween's Level, and Toddler's Level. This process occurred during the first week. Elouise Oyzon and I allowed and encouraged the development team in its entirety to explore the VR experience, the Unreal project, and what work was necessary for each level of the game. By the first Wednesday, May 24, 2023, Elouise Oyzon and I requested that each developer choose a portion of the game they were most interested in working on. Then, Elouise Oyzon and I went through each group and selected team leads for these groups to help break up the work; see the Core Team section for more information on team leads. See Appendix 3.1B, Team Formation, for the team subdivisions.

The Aesthetics team began to standardize the game's aesthetics and bring it all together; the Art team created new concept art, texture, and models to aid in this, while the Audio team created new compositions and sound effects. The Narrative team wrote dialog, performed some serious world and context-building, and worked on wrapping up the story. The Technical Art team significantly optimized the project using new pipelines, GPU instancing, polycount optimization, and lighting optimization, and also helped with 3D modeling and texturing. Under-The-Hood was responsible for general system requirements in the project and elements present throughout the game. Onboarding was accountable for creating a new onboarding level and Aurelia's apartment level. Father's Level team was responsible for trying to fix the previous mechanics in the Father's Level and introducing new puzzles and level designs to tie them together. The Tween and Toddler teams needed to create new experiences not previously ideated or developed in the project; this included creating new mechanics, finding the fun, designing levels, and collaborating with the aesthetic and narrative teams to bring the game to life. The Web Team needed to update the website to work on the family's experiences.

Between the 80 members in our Summer 2023 cohort, the team maintained all skills necessary to work on the Changeling project in all facets, which allowed us to take a fairly broad approach while setting the objectives for the Summer. The general objectives for the Summer, according to Elouise Oyzon in the opening meeting on Monday, May 22, 2023, involved getting a more precise onboarding process, creating a better Mind Palace, cleaning up the Mother's Level's technical art issues, and finishing the Father's Level for a demo release. Other goals included getting the Tween and Toddler levels started in some tangible way.

According to Elouise Oyzon, during that same opening meeting, game controls needed work, the Onboarding Level had to do a better job introducing the player to the game, the Intro Levels and Mind Palace only needed aesthetic work, Mother's Level only needed tech art help, Father's Level needed development and aesthetic work done, and the Tween and Toddler levels needed to be conceptualized and developed. This discussion informed the division of our teams: Under-The-Hood for game controls, Onboarding for the Onboarding Level, no dedicated development team for the Intro, Mind Palace, or Mother Levels, and a development team for each the Father, Tween, and Toddler Levels.

As the teams began work for the Summer, this team structure functioned as anticipated. However, the project needed some development work in the Mind Palace, Intro Level, and Mother's Level. The work in these levels necessary from a development standpoint was relatively minimal, so the solution was to take volunteers from larger teams experiencing blockers or needing more tasks. Technical Art or Aesthetics mostly requested the work for these levels on an "as-needed" basis where developers from any team may freelance themselves when necessary. This team structure, alongside supplemented internal freelancing, allowed the team to strive toward the objectives set for the Summer most efficiently.

Eventually, it reached the point where Mother's Level work was necessary beyond the help it received from volunteers. I decided to form a Mother Team for one Sprint to work out the bugs in the level and help provide it with more direction. We had five members work on this level throughout the Sprint, one of which was a co-lead on another team to help make the process more efficient. This team formed and worked together throughout Sprint Three, and it was necessary to work toward the MVP, which included a polished Mother's Level.

1.2.2 Core Team

The "Core Team" in the sense of production refers to those that help facilitate production efforts; this includes the Team Leads, Producer, and Elouise Oyzon. The expectations for the core team are to ensure the project's integrity in terms of Elouise Oyzon's vision and the integrity of each team member for the Summer beyond the Core Team.

The responsibilities and expectations for Team Leads were to provide structure and tasks for their teams, help give some direction for the objectives of their playtests, ensure their team members maintain work integrity and honesty, and facilitate collaboration between their team and other teams as needed. Team Leads were also responsible for running the daily standup for their team to receive updates from each member. Team Leads held team members accountable if they failed to meet their duties or were disingenuous about their work; if the problem persisted beyond their intervention, they would bring the Producer into it.

The responsibilities and expectations for the Producer were to attend each team's standup every day and help provide structure to the standup where needed, ensure the integrity of Elouise Oyzon's vision, confirm the work integrity of each group, provide direction where necessary, help establish objectives and methodology for playtests, facilitate collaboration between teams as needed, and establish and maintain a project management system. The Producer also ran the Leads and All-Hands meetings alongside Elouise Oyzon. The Producer was also the second line of defense against disingenuous team members once Team Leads brought problems to their attention; if the problem persisted beyond the Producer's intervention, they would get Elouise Oyzon involved.

Elouise Oyzon was the visionary to define the Changeling project; the Producer and Team Leads worked to assist in creating that vision and ensured all facets of the game fit. Elouise Oyzon was involved in most discussions regarding aesthetics and narrative that would significantly impact the game's direction or feel. Elouise Oyzon also ran the in-person playtests bi-weekly to get valuable feedback on criteria defined by the Producer and the Team Leads. She also worked with the Producer to define objectives for the project as needed. She also advised the Leads meetings and helped run the All-Hands meetings. Elouise Oyzon was also the final line of defense against disingenuous team members once the Producer brought problems to their attention. She would take disciplinary action at her discretion.

There would be a weekly Leads meeting to manage communications within the Core Team; these happened on Fridays at 3:30 pm to avoid conflict with other standups and to serve as a conclusion to the week. This time also lined up so that once the playtest would end bi-weekly on Fridays at 3 pm, the team could debrief before heading into the weekend. The other facet of the system that helped facilitate communications within the Core Team was the connection of the Producer regularly attending all standups and having occasional meetings with Elouise Oyzon as needed. This regular communication schedule, alongside the new project management system in ClickUp, helped keep transparency high and teams on the same page.

1.3 Resource & Risk Analysis

Elouise Oyzon determined the skills and roles necessary for the project's development ahead of time in the hiring process. The skills necessary include concept art, 3D modeling, texturing, music composition, SFX, narrative writing, technical art including lighting and post-processing, and programming. With these skills, the Changeling project could advance, thus leading to the creation of the Art, Audio, Narrative, Technical Art, and Development roles in the hiring process. Read more about how we organized team formation in the Team Formation section.

Elouise Oyzon outlined the hardware necessary for the duration of the Summer well ahead of time. The hardware required for the project includes personal computers that can handle people's work, whether in Unreal, website development, 3D modeling, or 2D art/texturing. Internet access with the ability to support Discord was also a requirement. It was also highly recommended that everyone working on the main project had access to VR to some degree, although it was not a requirement. While the computers were necessary and the VR equipment highly recommended, this was at no responsibility for Elouise Oyzon or other production channels but fell solely on the individuals.

The project's software was also defined well before the Summer 2023 team's involvement, although some new software found its way into the production pipeline. The software necessary depends on the position. For most of the team working directly on the main project, the essential software included Cisco Secure Client, P4V, and

Unreal Engine 4. On top of this software for the Technical Art and Art teams, the members individually choose between Blender and Maya for 3D modeling and Photopea and Photoshop for texturing software. The Audio team usually needed the first three software items mentioned and some audio-engineering software. The web team wasn't required to have access to any of these; still, they were required to have access to some file transfer services such as FileZilla or WinSCP, access to a text editor such as Visual Studio Code, access to GitHub and GitHub Desktop, and Unity for the experience development. All teams needed Discord, Google Drive, Zoom, and ClickUp access.

Regarding monetary costs for the project in Summer 2023, there is no extended budget beyond what Elouise Oyzon is paying out-of-pocket for the website hosting and is estimating spending on project release to Steam after the Summer 2023 semester. With that in mind, the project has no money to go toward hardware or software for team members; the only significant influence this had on the project throughout the Summer of 2023 was the selection of the new project management system, ClickUp, as it was the only system that could handle the number of users in the project and support each team with Kanban boards and other functional project management solutions for free.

Beyond these resources, there were also several risks when developing a project of this magnitude; those potential risks alongside risks that the Summer 2023 team experienced are in a table below, alongside theoretical or actual severity and how we mitigated it or planned to mitigate it if a situation arose.

RISK	LIKELI-HOOD	SEVERITY	MITIGATION
Illnesses / Injuries / Absences	High	Low	Absences happen for any number of reasons, and with an 80-person team, there's a good chance that at least one person is absent at one point or another throughout the day. Realistically, since the team is as large as it is, absences should have a relatively low severity associated with them, but only if we apply the following mitigations. To mitigate the severity of absences, each team should use cross-training, skill sharing, comprehensive documentation, clear communication channels, resource allocation, and contingency planning.
Perforce Issues (Non-User Error)	Low	Catastrophic	Perforce issues originating with Perforce or RIT's VPN are out of our control; fortunately, those issues are few and far between. The severity of

			these issues can be high or catastrophic, depending on the issue. Temporary downtimes are moderate disruptions, but issues with lost progress can be much more detrimental. To mitigate the severity of these problems, users should keep their P4V up-to-date, use the RIT VPN to ensure security, and at least one user should update their local copy of the project with that in the Perforce at the beginning and end of every day; I recommend that the Producer is that user.
Perforce Issues (Submitting Broken Project)	Medium / High	Medium / High / Catastrophic	Perforce and project issues that originate with users submitting broken code or levels are disruptive to the work environment and likely occur at some point. The range of severity depends on what the user pushed to the depot; it may just be that a mechanic doesn't work for one level, it may be that a mechanic doesn't work for several levels, or it may be that the whole game has errors and can't run. I cannot emphasize the necessity of mitigating these issues enough. To help mitigate these issues, users should playtest their changes and any interrelated systems, participate in code reviews with peers, and communicate clearly with others whose mechanics may be affected by the change. As a last resort, Perforce has built-in rollback mechanics; however, this will affect almost every project user. If you (the Producer) have to perform a rollback, communicate clearly to stop working on the project, and clearly define what work was lost once you roll back.
Perforce Issues	High	Low /	Perforce issues originating with users

(Checked-Out Items)		Medium	checking out files can be disruptive, but it's also a natural part of the process. To mitigate these issues, I recommend that users regularly check what files they have checked out and ensure it's only the files they're working on. However, even with this seemingly simple mitigation, there will likely be times when users don't realize they have files checked out; it's crucial for users who are looking to check out a file to communicate immediately with whoever has that file checked out to ensure that they intentionally have it checked out. This vigilance and communication are the only ways to mitigate severe hold-ups in the project, as checking out files is a part of the development process with Perforce.
Requesting Assets Too Early	High	Low / Medium / High	It's common for development teams to be naturally eager to implement visual elements; however, ensuring the mechanics or level layout work in their gray-boxed versions with mostly positive reception and a Producer's approval is essential. The severity may be non-existent or result in wasting time and resources, depending on whether or not the asset gets used or scrapped. Mitigation tactics include detailed objective planning for each team and Sprint, following the sequential workflow of gray-boxing and testing before submitting asset requests, and communicating about the asset with the requester to ensure it's ready for production.
Receiving Negative Playtest Results	High	Medium	There's always a chance of some "negative" playtest results; however, your team's approach to pivoting on the feedback is the most critical element. If your team can accept

			feedback and make informed decisions, there is very little severity; however, if your team doesn't consider all feedback, or disregards feedback without any basis, then it could affect the quality of the game moving forward, wasting time and effort. It's essential to mitigate needless negative results by having preliminary internal testing before organized playtests, setting clear objectives for the organized playtests, analyzing feedback results as a team, and effectively communicating with one another. It's also essential to take good playtest notes that focus heavily on observation rather than simply what the playtester says.
Member Cannot Attend Meeting	High	Low	Throughout the Summer, at least one person will likely miss a meeting. Generally, this isn't a big deal as long as this doesn't begin to fall in the "Absence" category. To mitigate this issue, plan and schedule the meeting well before the meeting time, set the agenda, record meeting minutes, clearly communicate with the absent member following the meeting, and reschedule if possible.
Member Not Doing / Faking Work	Low / Medium	High	Since many people take part in Changeling as a required co-op, portfolio builder, or passion project, it's relatively uncommon for people to fall out of line permanently; however, there is a good chance that someone experiences burnout and their work needs to improve. It's essential to take care of this issue immediately as it can severely impact the project, including missed deadlines, poor quality of deliverables, and decline and team morale. Mitigation tactics

			include setting clear roles and responsibilities, clearly defining your team's work backlog, regularly checking in during standups, transparent communication, peer review, and collaboration. If the problem still appears beyond these mitigation steps, the team leader must talk to the individual and notify the Producer. If the problem persists, the team lead should reach out to the Producer, and the Producer should talk to the individual. If the problem persists, the team lead and Producer should speak with Elouise Oyzon for disciplinary action.
Technical Challenges (Performance & Limitations)	High	High	There is a high chance that a project that has been in development as long as Changeling as of Summer 2023 has performance issues, and these are of extreme importance since this needs to be functional on most VR sets. The mitigation tactics include conducting a thorough technical feasibility analysis and benchmarking performance before starting work on the project, allocating time for testing and bug fixing, implementing a robust quality assurance process, and creating rigid tech art specs to reduce performance hits from poorly optimized models or textures.
Scope Creep	High	High / Catastrophic	It seemed initially that scope creep would be a medium likelihood and medium severity; however, as we started the project for the Summer, things quickly began to get out of scope. Teams wanted to redo some aspects of the game for different reasons; this added much work to the backlog, drastically changing the anticipated amount of work from the

			beginning of the Summer. To mitigate scope creep, it's essential to clearly define the scope and deliverables, establish a change control process to manage scope changes, regularly communicate with stakeholders (Producer and Elouise Oyzon) to ensure alignment and manage expectations, and clearly define the definition of done and what I like to refer to as the "good enough" state that all game studios have to decide on at one point or another.
Collaboration & Communication Issues	High	Low / Medium / High	Given that 80 people are on this semester's team, there may be a communication breakdown at some point; the severity of this breakdown may be minor or more severe. Mitigation tactics include fostering a culture of open communication and collaboration cross-team, utilizing project management tools like ClickUp, conducting regular team meetings, and having the Producer attend standups to catch various miscommunications.
Unrealistic Timelines	High	High	Given that we (Summer 2023 Team) came into the project this Summer expecting to finalize three levels and polish the game for an early access release of gameplay up to the end of the father's level, there's always the chance for unrealistic timelines. Through analysis of the project in the first couple of weeks, the likelihood of unrealistic timelines skyrocketed. Much work was necessary to reach the goal of an early access release to the early game, where Elouise Oyzon initially believed to be little work remaining, alongside the other goals set out for the Summer; this would

			require unrealistic timelines set for each Sprint to hit the goal in five Sprints. Instead, we practice mitigation strategies, including conducting planning phases with each team lead, Producer, and Elouise Oyzon, breaking down tasks into Sprints, monitoring the project scope, and regularly monitoring the progress against the timeline and adjusting as needed.
Burnout	High	High	Some members of the Changeling project have never worked a full-time job related to their area of study; combined with the high workload, tight deadlines, and demanding nature of VR projects in Unreal, burnout will likely be a problem that some members face. The severity of burnout can be high; it can lead to poor productivity and quality, members not doing work or faking it, or members being absent more often. It's essential to mitigate these issues by having team leads ensure that members work no more than 40 hours per week, take scheduled vacation days as vacation days, spread the workload evenly, set clear expectations, have open communication, support a work-life balance, allow time for research and training, regularly check in at standups, recognize and appreciate hard work, and encourage breaks and time off.
Build Errors	High	High / Catastrophic	Builds errors can be frequent and annoying; sometimes, errors only appear once the build completes. To nip this problem in the bud, a member of the Changeling team should build daily to ensure nothing crashes. There are likely going to be some bugs as

			teams work up until the dedicated build time; these daily builds are not meant to find bugs but only errors that cause the game to crash to prevent crunch time, where a group may have to problem-solve the build for hours on end on the day of the official build.
Lack of Documentation	High	High	Documentation was either non-existent or incredibly sparse coming into the project. Throughout the Summer 2023 Team's experience, certain teams took it upon themselves to document their work well, while others pushed it to the wayside. Even those who had documented their work well ran into problems while trying to read others' documentation, as there was no agreed-upon template format. To combat this, Kevin Insinna devised a template for documentation, and I began to include it as a required checklist item in the ClickUp tasks to improve clarity within the project for future teams.

1.4 Planning & Scope

1.4.1 Overall Priorities

The overall priority that guided the development priorities for the Summer 2023 team was the original goal of getting the game out to early access on Steam by the end of the Summer. To release early access, we needed a new onboarding level, some minor updates to the apartment, street, family, and mother levels, and some intensive work on the father level; this is what was initially stated by Elouise Oyzon before the Summer 2023 team started on the project. This ultimate priority needed the game to be functional performance-wise and bug-free. Considering that, we structured the team around the necessary work and got to work. Through playtests, we realized much more work was left to reach this goal than we initially believed. We reorganized the teams as needed to help provide the structure for the work remaining to reach the polished goal on these levels.

While we focused heavily on polishing the bugs and mechanics in these levels, we also focused on optimizing the game. The Tech Art team led the way in optimizing art assets, files, and post-processing effects; however, much code still needed optimization, which the development team picked up. There were also pivots throughout the Summer 2023 experience that shaped these first few levels, introducing new mechanical elements, which significantly impacted our ability to reach the early access release goal, but led to a better overall experience and product.

The secondary yet equally important priority was to prototype the tween and toddler levels, which focused heavily on getting the mechanics and the level flow ironed out for future teams to finish polishing and implementing assets. Wrapping up the narrative for the story was also a part of this priority, alongside updating the website to reflect the growth of the game and prototyping the experiences for the Changeling website.

1.4.2 Minimum Viable Product

The initial target MVP was to have a completed onboarding experience that teaches the player how to use VR in the game, a completed apartment level that onboards the player into the story, a completed street level that further integrates the player into the story, a completed family level that introduces the player to the family and their interests, a completed mind palace level that clearly shows we are in Aurelia's head indicating her haven and how she moves from there to other imagined ways of organizing memories and feelings and shows her relationship to Nyx and communicate that this mind palace is also a transitory space to the magical realm, a completed mother level with engaging gameplay that communicates a fear of loss as well as how the mother is expressing that, and a completed father level with engaging gameplay that communicates how he forces order on the world that ultimately is beyond his control. The initial MVP also included prototypes of the tween and toddler levels with engaging gameplay demonstrating the tween's escapism and the toddler's real-world power of animation objects via touch.

The target MVP shifted slightly to include optimization after initial tests concluded that the game greatly needed it; this affected the focus, potentially altering the course of the result of the Summer, shifting the goal to work as best toward the original MVP and set up the Fall 2023 Team for success to get the early access title released.

1.4.3 Stretch Goals

Ultimately, the MVP boiled down to one sentence: we needed to polish and implement the game from the Onboarding Level up through the Father Level with

proof-of-concept work on the Tween and Toddler Levels; anything beyond that became stretch goals. Based on that original MVP, the stretch goals for the Summer included bringing the street level to life with more characters, beginning asset production for the Tween and Toddler Levels, implementing the narrative in the new levels, and recording new dialogue.

While working on the narrative through the table read from Sprint Two, a new stretch goal arose: the need for mechanics during the final discussion between Nyx and Aurelia. This goal effectively added a new level to the backlog; however, Elouise Oyzon and I deemed it necessary as the ending dialogue was too long to have the player sit still throughout the discussion.

Teams placed any other work that came to their attention that didn't directly work toward the MVP in their respective product backlogs in ClickUp to help establish necessary work for future development teams in the Changeling project. This process also helped teams focus on the top priorities while still noting stretch features that future teams could implement to improve the quality of the project beyond the original MVP goal of early access release for the Summer 2023 Team.

1.5 Game Development Process

1.5.1 Overview

The general strategic model of the development process is an agile process informed by Scrum. The production pipeline follows a continuous cycle of Sprint planning, Sprint execution, playtest, feedback review, and Sprint retrospectives from week six until the end of the semester. The process featured a code freeze on the Wednesday of the second week of the Sprint, followed by a build session the next morning; this helped ensure that everything in the game was functional for the build and the playtest on the last day of the Sprint. There were a few issues that popped up in Build #4, spurring the addition of daily builds to our process via the Under The Hood Team. For the retrospective following each Sprint, I encouraged teams to utilize the Retrospective Starfish approach, outlined in the ClickUp References. The team implemented this model halfway through the Summer once I set up the new project management system in ClickUp; however, before that pipeline, we had a similar process, but it had fewer artifacts involved, including a lack of Sprint planning, Sprint retrospectives, and Sprint boards and backlogs. I developed the new process to help increase transparency while working on the project, help improve communication, reduce lulls in development so that there is constantly work to pull from in the backlogs, emphasize prioritization of elements in the project, and help set up future teams to know what's still left to work on. This process, in particular, helps with these issues. Still, it is also beginner-friendly for those unfamiliar with agile development, and future

Producers could get help from one of the Changeling consultants, Erika Mesh, as she is well-versed in this exact form of agile development.

The tactical model of the development process focused on using ClickUp as the task management system where teams could fill their product backlogs, organize Sprints, and assign tasks throughout the Summer. Implementing ClickUp helped spur better Sprint planning, product backlog tracking, and Sprint retrospectives, thus leading to better task management and prioritization. I left each team to decide how to keep their ClickUp up to date; some teams updated it regularly without much need for structure, others only had the Team Lead update the Sprint Boards, and others used dedicated time after their standups to have brief “ClickUpdate” meetings. Having seen each, I encourage future teams to use the “ClickUpdate” meeting method as it had the most success for clear and concise Sprint Boards.

Before I implemented ClickUp, teams were using Trello boards or Google Sheets with no product backlogs; this inconsistent manner of tracking task management made it difficult for other teams to identify what others were working on and, most importantly, slowed down development as there was no product backlog for employees to get new tasks.

Between the updated strategic and tactical perspectives of the game development processes, the Summer 2023 team was able to provide clarity in the tasks they were working on, reduce lulls in development, set up future teams for success, improve task management strategies, and improved the prioritization of work items in the project. With the new process in mind, the impact was that the Summer 2023 team made a decent dent in the MVP goal and, although unable to completely wrap everything up to ship early access, theoretically set up the Fall 2023 team to be able to get early access shipped to Steam.

1.5.2 Task Management

To track the work that needs to get done on the project, the Summer 2023 team started using a new project management system, ClickUp, that I implemented. Initially, coming into the project, the Changeling team used to use some shared Trello boards; however, unfortunately, the suite couldn’t house enough boards for the number of sub-teams in the Summer 2023 team, so there had to be another solution to keep all of our task management in one place. I sought out many different task management systems, including Azure DevOps, Jira, and AppFlowy, among many others; however, most of these systems couldn’t handle the number of people we had for free, and budget was something that production had to dance around. ClickUp was the only task management software to sustain the many different sub-teams and provide us and future teams with the structure necessary for team-wide task management.

ClickUp helps cross-functional teams track what's left to get done through Product Backlogs and Sprints. Members on each team can track what they're doing and see what their teammates are working on; even better, they can see what other cross-functional teams are working on by visiting their Sprint boards, which helps iron out dependencies between different cross-functional teams. ClickUp allows teams to mark other items as dependencies on tasks, which notifies other teams when items are marked dependent. Progress on tasks in ClickUp get denoted as many Kanban board systems, where items move from the Product Backlog into the Sprint Backlog and then progress through the In Progress, Under Review, and Complete categories; individuals working on those work items are responsible for updating their item cards as they complete work. The ClickUp boards get reviewed during standups to ensure the Sprint progresses appropriately.

The strategic perspective aligns with that defined in the Game Development Process Overview, populating the Product Backlog whenever new work items come up and updating as needed, moving work items from the Product Backlog to the Sprint Backlog for the respective Sprint during the Sprint planning meetings, reviewing the work done during the Sprint at the end of the two weeks, filling out the Sprint Report in ClickUp for the respective Sprint, moving unfinished work from the Sprint to the next Sprint board, and continuing the process loop through the end of the semester.

The tactical perspective through the use of ClickUp via Sprint Folders, separate Sprint boards, Product Backlogs, and Sprint retrospectives in tandem with the strategic perspective helped provide the structure necessary to perform effective task management for the larger Summer 2023 team. Keeping everything related to task management in one place, such as ClickUp, helps to keep everything organized without excessively needing to refer to external documentation.

When putting together both perspectives, alongside the work to improve communication within the task management system, the new system helped clarify tasks, help people pick up the next available task quicker than before, and improve the prioritization of tasks necessary to achieve the MVP. A lack of centralized task management for the project and the desire to work toward the MVP spurred the move to ClickUp to help improve efficiency in completing the tasks and setting task priorities.

1.5.3 Version Control

1.5.3.1 Perforce (Unreal Project)

The Changeling team manages version control for the Unreal VR project through Perforce and the P4V interface; see Appendix 3.2A, Version Control, to learn more about Perforce. Since Perforce is a centralized version control system, it's specifically helpful for Unreal projects where most files are binary; using the checkout system helps prevent merge conflicts, reducing the need for pull requests and branching. While working in Unreal, Perforce affords our team a lot of flexibility; however, plenty of risks come with it, as explored earlier. Having to undo submissions is an integral part of managing the

version control from a production standpoint if things are submitted broken, so we must familiarize ourselves with undoing change lists.

1.5.3.2 GitHub (Web Project)

The web division of the Changeling project uses GitHub for version control. Previous web teams defined how they manage the artifacts for the project; see Appendix 3.2B, Version Control, to learn more about GitHub management.

There are two version controllers to work with the Changeling website; files are stored in a GitHub repository for editing and testing, while the live server displays the content publicly. Access to the GitHub repo requires permission from the owner, and cloning allows individual work on files. Visual Studio Code with the Live Server extension enables real-time previews. Pushing changes to the main repo may cause merge conflicts, so working on different files or creating branches for each person helps mitigate conflicts.

1.5.3.3 Live Server (Web Project)

The web division of the Changeling project uses the Live Server for hosting source code. Previous web teams defined how they manage the artifacts for the project; see Appendix 3.2B, Version Control, to learn more about Live Server management.

There are two version controllers to work with the Changeling website; files are stored in a GitHub repository for editing and testing, while the live server displays the content publicly. The live server, accessed via SFTP, should only be modified after testing changes on the repo. They recommended copying and pasting code and placing new files in the appropriate folders. Developers must implement all necessary changes, consider minor file modifications, and conduct thorough testing before disconnecting from the live server.

1.5.3.4 Google Drive (Assets)

The base files for 3D models, textures, web assets, audio files, and other assets get stored in Google Drive in their respective folders in art and audio. Base file storage here helps future teams edit the files if the assets in the website or game need editing. Files that are no longer relevant get archived. See Appendix 3.2C, Version Control, to learn more about the archiving process.

1.5.4 Asset Pipeline

Since this was the first time the Changeling project had large, dedicated Art and Technical Art teams, the Summer 2023 team had to develop the first take at a pipeline. The Tech Art Lead < Holly Allen > and Art Lead < Thevanamacha Conde > did an excellent job working together to form a pipeline to improve the workflow to produce assets for the game. The workflow was as follows: 2D Concept development, 3D Modeling, Technical Art Check ensuring the item meets limitations, UV Mapping and Texture Work, LOD Creation, submission to Google Drive, and Final Import to the Game. Assets that received prioritization fell in line with the MVP goals, and new asset requests ended up on the Product Backlogs. See Appendix 3.3A, Asset Pipeline, for more details about the workflow.

1.6 Build Summary

Each build's discussion of what was completed, the learning points, and the influences on the game got pretty lengthy. To keep this document slightly more concise, each Playtest Write-up associated with the build contains a "Summary" section that describes the findings from these builds rather than trying to fit each build's results into this document.

1.6.1 Build #1/Mechanics Playtest - 16 June 2023

This build was for the first playtest session of the Summer 2023 session. The project featured a new onboarding gray box with rough instructions, a new concept for Aurelia's apartment, some new static 3D NPCs on the street level, no changes to the family apartment, no changes to the mind palace, no changes to the mother's level, new gray boxed puzzle interactions in the father's level, and new mechanic interactions in the tween and toddler levels.

Overall, the build and its associated playtest provided valuable information for each team to improve and prioritize their objectives for the next Sprint. See Appendix 3.4A, Build Playtests, for the associated playtest write-up with this build.

1.6.2 Build #2/Refined Mechanics & Flow Playtest - 30 June 2023

This build was for the second playtest session of the Summer 2023 session. The project featured a new onboarding gray box with better instructions, a new concept for Aurelia's apartment, some more new static 3D NPCs and audio on the street level, a

more open concept layout applied to the family apartment, some small cue changes to the mind palace, some small optimization changes to the mother's level, new gray boxed puzzle interactions and level flow implementation in the father's level, and new interaction flows in the tween and toddler levels.

Overall, the build and its associated playtest provided valuable information for each team to improve and prioritize their objectives for the next Sprint. See Appendix 3.4B, Build Playtests, for the associated playtest write-up with this build.

1.6.3 Build #3/Level Refinement Playtest - 14 July 2023

This build was for the third playtest session of the Summer 2023 session. The project featured a new onboarding gray box closer to Elouise Oyzon 's vision for the level, a solidified concept for Aurelia's apartment, some more new static 3D NPCs and audio on the street level, a more open concept layout applied to the family apartment, some small cue changes to the mind palace, some more significant design changes and optimization for the mother's level, level flow implementation in the father's level, and stronger interaction flows in the tween and toddler levels with more fleshed out level design.

Overall, the build and its associated playtest provided valuable information for each team to improve and prioritize their objectives for the next Sprint. See Appendix 3.4C, Build Playtests, for the associated playtest write-up with this build.

1.6.4 Build #4/Build Fiasco Playtest - 28 July 2023

This build was for the fourth playtest session of the Summer 2023 session. The project featured an updated onboarding gray box with tablet onboarding, reduced scale for Aurelia's apartment, some minor bug fixes to the family apartment, the updated mind palace layout, some minor visual and collision changes to the mother's level, an entirely new level flow implementation and level design in the father's level, and stronger interaction flows in the tween and toddler levels with more fleshed out level design.

The fundamental change from this build was adding a new step to the development pipeline. We ran into several strange build issues while trying to build for the playtest. Four members spent 12 hours getting the build to function correctly, doing everything they could to preserve the completed work. To prevent these issues moving forward, the Under The Hood Team planned daily builds to pinpoint these problems in advance in case a rollback is necessary. Fortunately, we didn't need to roll back for this build, but had we needed to, we may have lost a week's worth of work. I strongly encourage the following Changeling teams to do the same.

Overall, the build and its associated playtest provided valuable information for

each team to improve and prioritize their objectives for the next Sprint. See Appendix 3.4D, Build Playtests, for the associated playtest write-up with this build.

1.6.5 Build #5/Final Build - 11 August 2023

This build was for the fifth playtest session and the final build of the Summer 2023 session. The project features updated instructions and bugfixes in the onboarding level, collision fixes in Aurelia's apartment, post-processing fixes to the street and family levels, a family level layout redesign, some minor VFX changes to the mother's level, bugfixes and design refinement in the father's level, and some bugfixes in the tween and toddler levels. The teams worked on these changes for roughly the first half of this build before switching to documentation to prepare the Fall 2023 Team to pick up where they left off.

Overall, the build and its associated playtest provided valuable information for each team to improve and prioritize their objectives for the next Sprint. See Appendix 3.4E, Build Playtests, for the associated playtest write-up with this build.

2 Postmortem

2.1 Overview

During the hiring process, Elouise Oyzon outlined that the goal for the game for Summer 2023 Team was to release to early access. The resulting product fell short, but it did achieve a lot of optimization work and mechanic improvements, such that the Fall 2023 Team should be able to accomplish that goal with the proper resources. During the project's first week, though, I recognized this and shifted to our plan to set up the next team for success better than we, and previous teams before us, were. This shift set my goal for the team to be a substantial shift in the process that improved the transparency and work trail for our team and future teams, thus, leading to the establishment of a new task management system and game development process.

The Summer 2023 Team smashed the goals for optimization and next-team preparation out of the park. The game featured robust content up through the toddler level with significantly improved performance and organization. The process goals were also met, setting up a more rigid system for clear documentation and cross-team functionality. The initial issues with poor transitionary periods from team to team were at the forefront of our minds throughout the semester. We ensured that we would set up the following teams with better sets of next steps to ensure smoother transitions than we received. With these improvements to the final status of the game, the process, clear next steps, and suggested improvements to the playtesting methodology and process, the Fall 2023 Team should be able to achieve the goal of releasing early access, assuming they have the appropriate resources.

2.2 Final Status

The Changeling Summer 2023 Team has accomplished a lot since its start date. From a design and development perspective, we've pushed the envelope to prepare the Fall 2023 Team to finish our original MVP since the game was not in a state close to being ready to publish, even as early access. The Narrative Team effectively finished the script for the entirety of the project, alongside a lot of other content, likely proving that Changeling will not need dedicated narrative teams moving forward. The Art Team did a lot of modeling, texturing, and illustration to prepare the next group for implementation up through the requirements for the MVP, including NPCs, apartment items, family home redesign, and many other artifacts. The Audio Team completed many voice actor recordings, new audio tracks, and sound effects through the MVP requirements. The Technical Art Team drastically improved the game's performance, created new post-processing effects, worked on project organization, and created and implemented 3D assets. The Onboarding Team made new onboarding and apartment levels to better onboard players into the game and the world. The street level and family home received

much care from tech art and other lent developers to improve the performance and quality. The mind palace was entirely redesigned by the Art Team and implemented by the Tech Art Team. Although only organized for one sprint, the Mother's Team improved the onboarding of the level, VFX, and performance and addressed several bugs. The Father's Team redesigned the level multiple times and created new mechanics while staying true to original ideas from previous teams. The Tween and Toddler Teams made entirely new experiences from scratch, leaving behind fantastic mechanics and level design for future teams to build upon. The final boss fight ideation received design support from the Narrative Team, a level not previously planned. Lastly, the Web Team redesigned and refactored the website to function and appear better, alongside cleaning up and creating new character experiences.

What's in the final build is a more robust onboarding level, a new apartment layout, an performance enhanced street level awaiting NPC memory implementation, a started redesign of the family home, a new mind palace, a mostly completed mother's level, a robust design for the father's level, a new tween level that features *Portal*-esque puzzle solving, and a new toddler level that features fun animating components. The web build features a fresh design with refactored code and an improved team page, alongside improved character experiences. These features, approved by Elouise Oyzon, encapsulate the vision she had in mind for the whole of Changeling, setting up the following teams for success to continue running with the design of these levels. The work up through the mother's level is especially significant since it will allow the Fall 2023 Team to wrap up the vision and get the game shipped to early access.

The reception in playtesting was largely positive, only creating small shifts as we progressed through the semester. See the Build Summary for details. As I'll reflect in the following Playtesting Reflections, much work is left to improve playtesting methodology, but the findings through the summer supported the design initiatives and pivots. The "next steps" documents for each team also support the conclusions from playtesting and should be evaluated closely by the following groups.

2.3 Reflections

2.3.1 Production

From a production side of things, we found our groove after implementing the new production process. Previous teams had yet to have an artifact-heavy process, leaving us with very little to go on for development and process initiation at the beginning of the Summer. Establishing the new task management system improved the clarity of the work, reduced the number of people accidentally working on the same task, and improved project prioritization. Establishing the new process created a smoother workflow, reducing lulls in the development, improving clarity, and improving cross-team functionality. Thanks to Toddler Team Lead Kevin Insinna, we also began standardizing development documentation, improving the readability across teams. For

the most part, the new workflow improved the process for the project substantially, not experiencing many speed bumps, especially with integrated sprint retrospectives that helped adjust the process as the Summer progressed. The initial onboarding of the new process was a little painful since there had been two sprints that hadn't used it; establishing the new task management system and integrating it into the process took time, and it was ready to roll out in the third sprint. However, the updated process proved to help scale up to a team size of 80, where artifact-heavy techniques improve the workflow, especially while passing off work to future teams. I strongly encourage maintaining this process since teams regularly rotate through the Changeling project; consistency will improve readability over time.

However, what's next for the process is yet to be seen. To start specifically, I recommend adding branching to the Perforce Version Control to improve the workflow and hopefully remove the need for code freezes moving forward. Generally, though, I allowed some flexibility within teams to adjust their approach to accommodate their work styles while fitting into the overall process; it may be more beneficial to begin to make these more standardized, i.e., enforcing the use of the retrospective starfish or meetings designed around updating the task boards. These two examples are tools I encouraged teams to use, but not every team used them and achieved similar results. This process worked well for our group of 80, but it was also established by me and instructed by me; future teams may have difficulty with this process, and adjustments should be made as needed in an ever-growing attempt to find the process that best fits the ever-changing team sizes of Changeling. While this is the case, I still strongly encourage future Production Leads to contact me with questions rather than scrapping large portions of the process, hopefully creating an idea meritocracy from Production Lead to Production Lead.

No significant issues with team dynamics arose that weren't considered in the Risk Analysis, and the mitigation plans worked well without needing to involve the product owner, Elouise Oyzon, apart from notifying her that we were handling these issues; refer to the aforementioned Risk Analysis for the tactics used to manage team dynamic issues. See Appendix 3.5A, Reflections, for a clean organization of the latest iteration of the workflow and Appendix 3.5B, Reflections, for a short list of suggestions for the following Production Lead that align with this reflection.

2.3.2 Playtesting

Unfortunately, I didn't get the opportunity to run the in-person playtests as I worked remotely. However, I did attempt to preach a largely observational methodology, utilizing talk-aloud playtesting procedures. I suggested that organizers avoid answering the playtester's questions until after the playtest, avoid asking playtesters for thoughts on improvement, limit talking to the playtester during the playtest in general, utilize talk-aloud procedures to encapsulate ideas at the moment, take everything at face value, record a lot of observational notes, and to not ignore data without having a clear explanation as to why. These suggestions reflect observational notetaking, a strong

method for capturing the little details; however, this is a learned skill, just as the "talk-aloud" procedure is for the playtester themselves. It's not easy to understand this, especially if those running the sessions have never seen it done this way. As such, this methodology never truly took hold, leaving us with mediocre notes from most sections of the playtests.

I added new playtest write-up documentation to help teams through reflecting on the notes, but since the notes were lackluster, it didn't help as much as it could have. Moving forward, I encourage the Production Lead to find ways to instill this methodology in team members better and utilize the playtest write-up documentation template to see if they achieve better findings that shape the design and development. Again, as stated earlier, the reception in playtesting was largely positive, only creating small shifts as we progressed through the semester. See the Build Summary for details.

2.4 Conclusions

Overall, the Summer 2023 Team significantly improved the overall state of the project, the infrastructure surrounding it, and the development process. While we revisited some elements of the game per the request of Elouise Oyzon, we primarily hit goals that should set up the Fall 2023 Team for success in hitting the MVP for early access. Instead of rattling off all the work that should be done to improve the game's state, I will link the "next steps" documents for each level in Appendix 3.6, Future Work; each level's document at least up through the required levels to hit the MVP will feature a "definition of done" for the level, according to the Summer 2023 subteam that worked on it. These documents will better outline the work for their levels following Elouise Oyzon's approved game design in more detail than I could summarize in this document. However, the game's improvement for the Fall 2023 Team should focus on the onboarding, apartment, street, taxi transition, family intro, mind palace part one, mother's level, and mind palace part two. Any other improvement would be categorized as a stretch goal and should be avoided until the game is ready to ship in early access for those levels.

Regarding the process, my thoughts on what's next are in the Reflection section between the Production and Playtesting subsections. To quickly recap: add Perforce branching, potentially find a way to remove the necessity for code freezes, potentially standardize more process elements, and, most importantly, learn to adjust and shift the process per findings from the retrospectives. See Appendix 3.5B, Reflections, for a short list of suggestions for the following Production Lead that align with this reflection.

Overall, the work on the project throughout the Summer was handled impressively well, and the project is now ready for steady growth rather than needing to refactor and organize as much as the Summer 2023 Team had to. I'm confident we're leaving the project in a state for the next team to thrive, arguably setting it up for one of the smoothest transitions in Changeling's history.

2.5 Future Work

I've briefly covered the future work in the Conclusion above, and the same will remain here in that I will provide an appendix for the future work for each level that will better outline the work for the entire game that I could summarize in this subsection. I've also briefly covered the next steps for the Production Lead above and below in Appendix 3.5B, Reflections that will better outline the future work in more detail that I could summarize here. See Appendix 3.6, Future Work, for a reference list of all future work documents from Summer 2023.

Apart from those next steps for each subteam from Summer 2023, there are a few other discussion points for future work.

To start, I'd like to review some of the risks associated with the project moving forward and how we attempted to mitigate those risks. Apart from those risks outlined in the Risks Analysis, the most significant risks as the work shifts from one semester to the next are losing valuable insight, losing sight of the original design, and rehashing work. For the Summer 2023 Team, we felt that we came in with minimal direction, so we were largely directionless; this caused us to have little insight into the work that's left and almost no clue as to the design intentions for certain levels or mechanics. Ultimately, this lack of direction led us to rehash a lot of work at the beginning of the summer that had been done over a few years that may not have been necessary. The other risk we had to deal with was the lack of a formal structure. We worked hard to reduce these risks and problems for future teams; we focused on standardizing documentation, cleaning up the project, commenting code, and leaving clear next steps for future teams. I also worked hard to implement a (hopefully) long-lasting structure for the process moving forward to avoid issues like this.

Next, let's review the resources Changeling needs moving forward; I will focus solely on Fall 2023 to help achieve the MVP. For Fall 2023, I recommend a strong core of developers, technical artists, 3D artists, and audio engineers. Up through the MVP, there are a few bugs to work out and levels to hook up, the need to continue to optimize lighting and clean up post-processing, 3D assets to populate space, and audio to implement, including new dialog and sound effects. For hardware, it would also be wise to test in a broader array of VR sets for compatibility. From the software perspective, we should be set up for success, although, as mentioned in the Production reflection, it may be wise to introduce Perforce branching formally.

Assuming access to these resources, I believe it is possible to release Changeling to early access in Fall 2023. This milestone would be significant for the project. It should establish a timeline to wrap up the development of the other levels for a release in 2026 by the latest, by rough estimation.

Regarding distribution, the game should be on Steam by the end of Fall 2023 under their Early Access program. For marketing, the work on the game could be presented at GDC, Imagine RIT, and other public events. There will need to be more work done to consider the plan for distribution and marketing with Elouise Oyzon as the date nears.

3 Appendices

3.1 Team Formation

A. !Team Members and Roles SUMMER 2023
B. Summer 2023 Team List Spreadsheet

3.2 Version Control

A. 2. Using Perforce
B. How to Work With a GitHub Repo and the Live Server
C. !Archive Note

3.3 Asset Pipeline

A. Asset/Art Pipeline

3.4 Build Playtests

A. !Playtest Write-up - 6/16/2023
B. !Playtest Write-up - 6/30/2023
C. !Playtest Write-up - 7/14/2023
D. !Playtest Write-up - 7/28/2023
E. !Playtest Write-up - 8/11/2023

3.5 Reflections

A. Workflow Documentation
B. Production Next Steps - From Summer 2023

3.6 Future Work

A. Narrative Next Steps
B. Aesthetics Next Steps

C. Audio Next Steps
D. Technical Art Next Steps
E. Under The Hood Next Steps
F. Onboarding Next Steps (also holds information for the apartment level)
G. Introduction Next Steps (street, taxi transition, and family level)
H. Mind Palace Next Steps (all instances of mind palace)
I. Mother Next Steps
J. Father Next Steps
K. Tween Next Steps
L. Toddler Next Steps
M. “Boss Fight” Next Steps (no development started yet, but there are design notes)