Cooperative Game Development Models

A Thesis Submitted to the Faculty of the Interactive Design and Game Development in Partial Fulfillment of the Requirements for the Degree of Master of Fine Arts in Interactive Design and Game Development Department at Savannah College of Art and Design

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Abstract

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This study examined how cooperativism can be applied to game development in order to create a production model for game co-ops. The goal of this study was to develop a series of strategies and actions that could be implemented on a cooperative team to create an environment conducive to democratic decision-making and creative collaboration. The Canonical Action Research methodology was used to develop a game with a small group over the course of six weeks by applying the model. In accordance with the methodology, the model was iterated upon based upon the feedback of the participants and the researcher's direct involvement. This study found that the process of democratic decision-making is more heavily dependent on facilitating the communication, alignment and collaboration necessary for it than on identifying when those decisions should occur.

Keywords: Co-ops, cooperative, game development, cooperativism, model

Chapter 1

Introduction

1.1 Introduction to the Study

Game design and development can be a creative and collaborative process for teams of developers with diverse sets of skills and experiences. However, game studios' traditional structure has often been hierarchical where the ownership has the authority to make all the production decisions. Worker-owned co-ops, by contrast, share the aforementioned characteristics of game development in the structure of their enterprise by being jointly owned and democratically controlled by the people who work there. To help facilitate success game development under this production paradigm, a new model is needed that considers the problems unique to developing a game in groups that make decisions collectively through democratic methodologies such as one-member-one-vote.

This study seeks to understand cooperative game development challenges to create a model for game development co-ops that can facilitate consensus-building and creative collaboration within democratically-run teams. In order to simulate this type of group, a small team of students, alongside the researcher, applied this model to the development of their course project game for approximately six weeks. Their feedback, alongside the research contained within, was used to iterate upon the model to improve the processes and strategies for facilitating cooperative

development. Further implications for the model and the future of cooperative game development were also discussed.

1.2 Defining the Problem

The day-to-day operations of game development often present problems in which the resolution depends on the developers' social skills. For example, developers may need to educate each other on work traditionally reserved for their role within a production to align the team on parts of the pipeline such as source control or batch asset exportation. Additionally, the education of that work or other work developers may engage in depends on the ability of more experienced developers to communicate their tacit knowledge of that subject. Collaboration with machines can also often be a problem where developers may need to circumvent the limitations of their tools to achieve their goals. Solutions to these problems often require social problem-solving and interpersonal communication skills rather than technical expertise (Whitson, "What Can We Learn From Studio Studies Ethnographies?").

This study addresses the social problems within game development as they exist within cooperative teams using cooperativism as a framework for the solution. Developers engaging in democratic forms of production have to utilize similar social skills used to solve the aforementioned problems to share responsibility and foster an environment that facilitates collaboration and consensus-building. This is necessary to address the issues that arise from the interpersonal problems of collective management and game development. As such, there are opportunities for new models of game development that can address the social problems that arise from developing games in democratic teams.

1.3 Reasons for Study

The goal of this study is to create a viable game development model for cooperatively-owned game studios to benefit existing ones or to encourage the growth of new ones. In 2020, approximately 12% of the world population were cooperators at any of the roughly three million cooperatives worldwide (World Cooperative Monitor). Although they are not the predominant form of enterprise currently, cooperatives represent a sizable portion of the world economy. By developing a model for game development that could be implemented at a co-op, this study seeks to contribute to the expansion of that economic sector by providing a viable methodology for game developers to engage with this form of enterprise more effectively.

Another goal of this study is to introduce a viable form of democratic production to the game industry. Developers are often the people within a studio with the most experience and knowledge of game development as they are the ones engaging in its day-to-day production. However, decisions within a traditionally structured game studio are often made independently of these developers. By creating a model for cooperative game development, developers can be empowered to manage the production of the games and apply their experience and knowledge to the direction of the end product.

1.4 Context within Game Development

Cooperatives that currently exist in the game industry take a variety of forms. The most prominent form is a studio where the developers collectively create their own games to sell; examples of this include Motion-Twin and Studio Black Flag, both located in Bordeaux, France. Other studios, such as TESA Collective in the Massachusetts and Talespinners in South Wales, opt instead to work with clients to produce games or components of them. There are also cooperative incubators such as Dutch Game Garden in the Netherlands and GamePlus in Australia which provide resources for developers engaging in this form of production.

1.5 Hypothesis

Cooperativism can be applied to game development to create a viable production model for cooperatively-owned game studios by structuring the processes and procedures around democratic decision-making.

Chapter 2

Literature Review

2.1 Cooperativism and Co-ops

In order to define cooperativism, it may be best to start with what it is not. Cooperatives as a structure are not the same as the act of collaborating. In order for a collaboration to be cooperative in nature, that collaboration would need take place within a group that is democratically-run, typically practiced as one-member-one-vote, with the members collectively deciding how their resources will be used to benefit them (Ratner 54). In the case of game development, teams of developers can collaborate in order to produce a game but that collaboration would not be cooperative unless its results were jointed owned and managed collectively by all the members. As such, cooperativism can best be described as the organizational principle in which the results of a group's collaboration are jointly-owned and democratically-controlled by its members.

Co-ops are enterprises that are organized to practice cooperativism. These types of institutions are owned by the people who work there who then manage it democratically. This structure allows them to be run for member-benefit as each member of the co-op has the ability to directly participate in the decision-making process. The International Cooperative Alliance has adopted seven principles, based on the Rochdale Principles, by which cooperatives are to put the value of

cooperativism to practice: voluntary and open membership, democratic member control, member economic participation, autonomy and independence; education, training and information; cooperation among cooperatives, and concern for community .

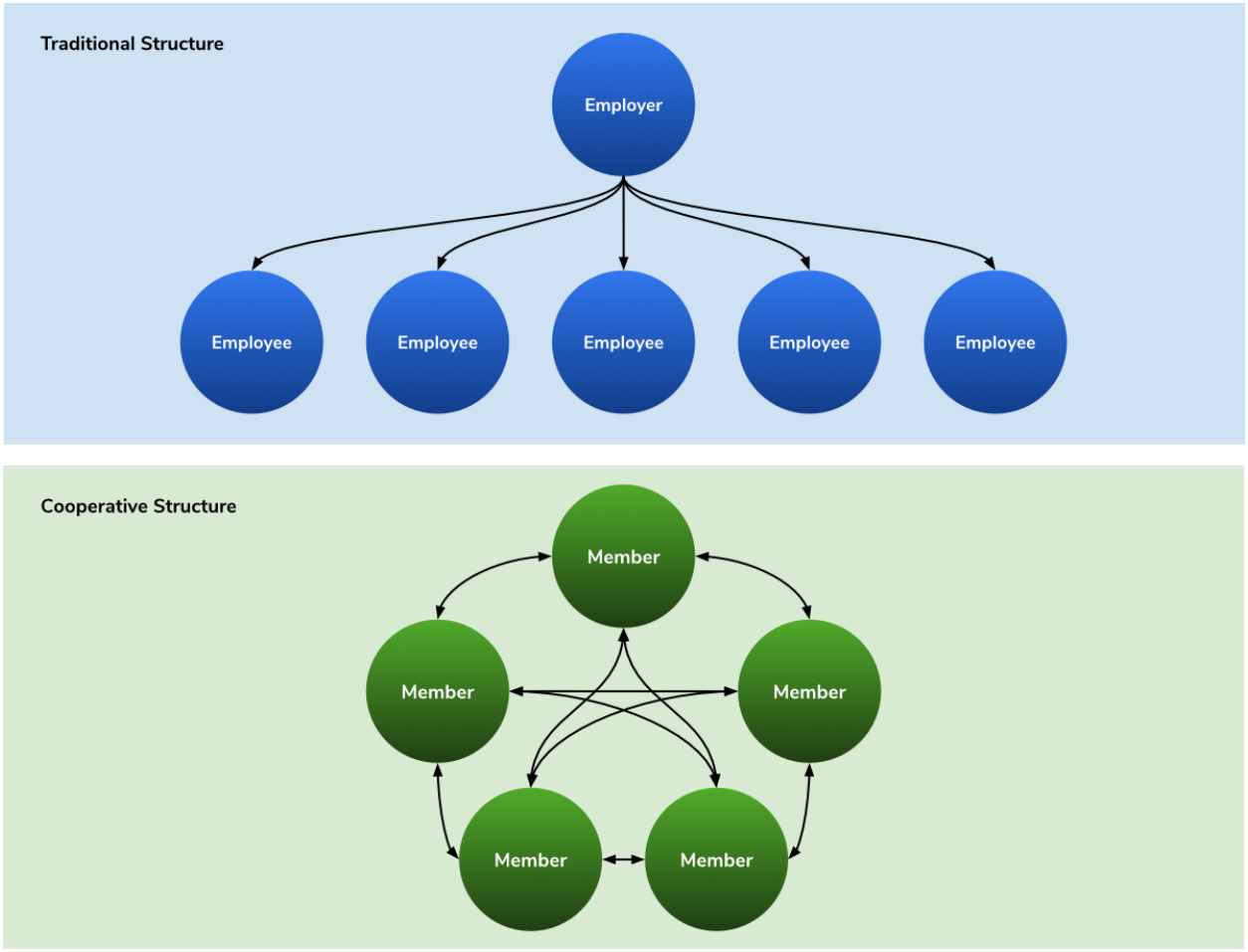

Figure 2.1: A comparison between traditional and cooperative enterprise structures.

Voluntary and Open Membership Cooperative teams are open to all persons interested and willing to accept the responsibilities of membership. Members of cooperatives voluntarily give their skills and resources to the team in order to contribute to a mutual goal. Membership of cooperative teams is available to all without gender, racial, political, religious or social

discrimination. Fraternal benefit societies are an exception to this as their membership often shares one of the previously mentioned characteristics (Boland 16).

Democratic Member Control This refers to both the practice of management through one-member-one-vote and the collective ownership of the results of the teamwork. Decisions within these types of teams require a consensus since each member has a vote; the validation for choices made comes from the majority of the voting team members to affirm them. The methods by which cooperative teams institute these paradigms vary based on their size, resources, and needs. Larger cooperative teams, for example, may elect their own management to manage any complexities or delegate some decision-making (Northcountry Cooperative Foundation 21).

Member Economic Participation Since cooperatives are collectively-owned, each member contributes equitably and democratically controls their co-op's capital. Members of co-ops often receive financial benefits such as payment for their contributions. They also control how the capital is spent. Common uses for capital at a co-op include development, building reserves, and support for external activities. Co-ops being operated for member benefit should not be misconstrued to mean they should not seek a profit; the distribution of the profit is part of the participation benefits (Boland 29).

Autonomy and Independence Co-ops are self-organized and controlled by their members; their decisions are the decisions of the co-op. When a co-op enters agreements, raises revenue from external sources, or engages in other external relations, they do so on their own accord and at the membership's consent. Relations with external groups should also help to maintain the autonomy of the co-op.

Education, Training and Information For member of a co-op to effectively contribute, they need to know how to do so and how to operate within a cooperative team. Additionally, co-ops also educate the general public about the benefits of cooperativism.

Cooperation Among Cooperatives To strengthen the cooperative community, co-ops seek to collaborate. By sharing resources and working together on projects, co-ops can build support networks that benefit all their members. This also includes forming federations of co-ops to facilitate this collaboration.

Concern for Community Co-ops work within their communities to engage in and promote sustainable policy. As with the other principles, community engagement is at the discretion of the membership.

Cooperative enterprises come in varying forms and serve varying purposes. Co-ops can be focused on a need within their community such as childcare or housing, an industry such as the arts or agriculture, or provide more general services such as utilities or financial assistance. What distinguishes them from conventional firms is their ownership and management by their members. Cooperatives also often form federations in order to cooperate among one another and share resources (Boland).

This study focuses on teams as they would exist in a worker-owned cooperative. These are co-ops in which workers combine their skills and resources in order to gain steady employment and income. This study focuses on this type of co-op because game studios that are cooperatively owned would be considered worker co-ops. Teams of developers in these types of studios use their skills, such as design, art, or programming, in order to create employment and income for themselves by producing games in a democratic workspace. Like conventional game studios, they can either produce and sell their own games or offer development as a service.

The literature consensus is that both cooperativism and co-ops are predicated on collective ownership and some form of democratic decision-making. Carl Ratner does not offer any explicit strategies for implementing these values in *Cooperativism: A Social, Economic, and Political Alternative to Capitalism* but rather describes the characteristics of various stages of cooperative

activity (54-60). By contrast, the Northcountry Cooperative Foundation's *Worker Co-op Toolbox* and Michael Boland's *An Introduction to Cooperation and Mutualism* discuss strategies for successfully starting a co-op, structuring co-ops and handling elected management. Both of the aforementioned texts refer to the International Cooperative Alliance's seven cooperative principles.

2.2 Historical Overview

Worker-owned cooperatives first came to public attention as part of the labor movement during the Industrial Revolution in Europe and the United States. The transitioning of the production towards manufacturing processes during this time led to a decline in various job sectors. This resulted in large sections of the workforce transitioning to wage labor which could be insecure especially during economic downturns. In response to these changes, workers started to organize their businesses and manage them democratically (Adams and Hansen). In 1844, the Rochdale Society of Equitable Pioneers established the Rochdale Principles which are the basis for the seven principles of the modern cooperative movement as defined by the International Cooperative Alliance (Thompson).

Co-ops continue to exist to this day and are part of the overall global economy. In 2018, five pilot co-ops were given a $1 million grant by Google to support economic development of cooperatives in the digital economy through critical analysis and designing of open source tools (The New School). Roughly 12% of the world population were cooperators at any of the roughly three million cooperatives worldwide in 2020 (World Cooperative Monitor). Examples of established co-ops today include the Mondragon Corporation in Spain, Suma Wholefoods in the United Kingdom, and Means LLC in the United States.

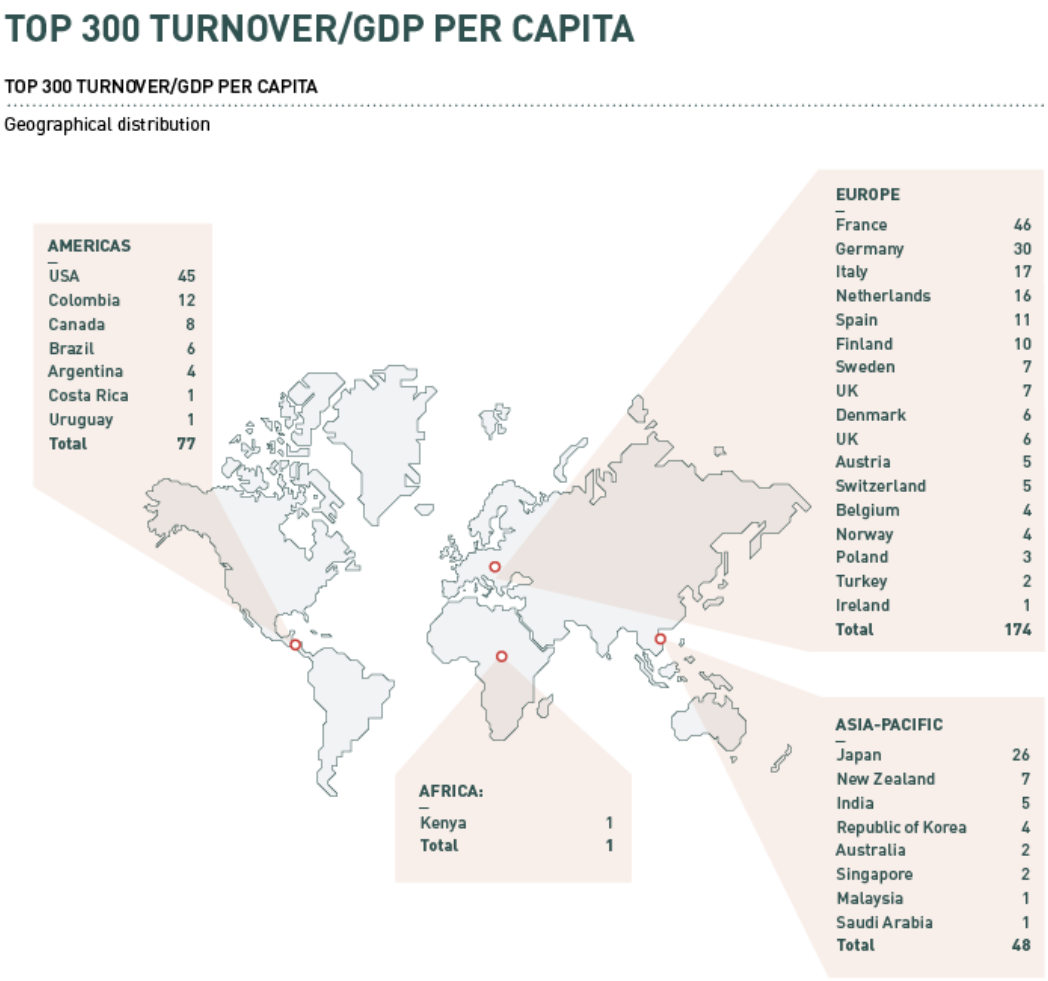

Figure 2.2: The 300 co-ops worldwide with the highest GDP per capital in 2018 according to the World Cooperative Monitor.

The longevity of the cooperative movement can be explained by the benefits their members receive; one of these is their resiliency. A study of three year survival rates of businesses in France from 2013 finding that worker co-ops had an 80% to 90% rate while the overall survival rate was 66% (Olsen). A survival analysis of co-ops in Uruguay from 1999 to 2008 found that they had a roughly 29% smaller chance of closing than traditional firms in similar industries (Burdín). This may be explained as a possible outcome of running an enterprise for member benefit; planning for longevity benefits each member by providing them the economic security

necessary to do their work.

Worker co-ops can also benefit each member's productivity and emotional well-being. A 1995 study of co-ops in the timber industry in the United States found that they were 6% - 14% more efficient (Craig and Pencavel). Members of co-ops also report being happier with their job with a study of home health aides in the United States finding higher satisfaction rates among those who were members of a co-op (Berry). Since members of co-ops are able to decide how their work takes place, they can facilitate working conditions that best fit their needs.

Cooperatives in the game industry are organizations of developers that pool their skills and resources together to produce games. One type of game co-op operates similarly to the conventional studio in that they create games they can use to generate enough revenue. However, the co-op seeks to do so in order to foster an equitable and sustainable environment for members to develop games collaboratively by offering their human capital in the form of their work and in some cases financial capital. Steve Filby of Motion-Twin shared the following thoughts with Game Workers Unite about why they chose to form a co-op:

> The guys started off as a bunch of friends hanging out making games, so there was naturally no boss. When they started to make money from games and needed to pay taxes they realised they needed a legal structure/business entity, but the traditional company structure meant you were pretty much obligated to have a boss and that the equity and gain that could be made on company shares without participation was not at all what they wanted to do (Game Workers Unite).

The structure of a worker co-ops best suited the needs of Motion-Twin by allowing them to set up a company structure that reflected the egalitarian essence of their team. They could have a legally recognized business entity while also keeping control of their projects to those who are

engaged in their production. On the topic of their decision-making process, Filby also added the following:

> Zero hierarchy, equal pay, equal say. There are two people who wear the "Co-CEO" hats who have the glorified role of signing for things, but all big decisions must be voted by the simple majority and unanimously if they're gong to change the rules that govern the co-op. Democracy is maintained through constant vigilance and ritual combat (also known as talking, A LOT). (Game Workers Unite).

Filby stresses the role of democratic decision-making at Motion-Twin by identifying that all major decisions are made through voting. He also notes the need for effective communication with the co-op to maintain this structure.

Another example of this type of co-op is The Glory Society based out of the United States. Scott Benson, one of the members of The Glory Society, was asked by Game Workers Unite about the benefits of organizing a co-op studio and answered the following:

> . . . We're all a lot more signed onto the project and personally invested because it belongs to all of us. Even if you're the coolest boss ever, you're still someone's boss, which means you're always wielding this power over someone even if you promise never to abuse it. Removing that does wonders for morale. I think we all work better creatively as well since we have to actually talk with one another in ways that if we were a top-down studio we wouldn't be as encouraged to do. And credit is naturally a bit more spread around, since it's such a group thing as opposed to some visionary person and their employees. Also it means our schedules aren't dictated from on high, and we can work around our lives if need be, vote for vacation time, etc.

> . . . There's lots of little things you don't even think about at first but are big changes from what we're all used to from previous jobs (Game Workers Unite).

Benson's list of the benefits of working at a co-op aligns with those identified in the previously mentioned studies on the productivity and happiness of co-op members. The ability for members to decide how they will work and what their schedule will allow them to shape the production to fit their needs.

Another type of game co-op is one in which developers offer their skills to clients to make games or components of them. A driving motivation behind their formation is to prevent the insecurity that can often come with contract work in the game industry. In a 2019 presentation at the Game Developers Conference, Ian Thomas of Talespinners, a game co-op in the United Kingdom that develops narratives for clients, described how one of the benefits of the co-op was the credibility that came with having a brand that encouraged more clients to work with them. Another benefit he discussed was the ability for the members to create a fund that could provide financial assistance to members when necessary (Game Developers Conference). Thomas is quoted by Game Workers United on the topic of how participating in a co-op has influenced his values as stating that:

> I think the key for me has been the realisation that the freelance economy is so precarious, and that anything we can do to alleviate that - and act as a template for others, to help them alleviate it - is incredibly valuable. The co-op has strengthened that belief. (Game Workers Unite).

The insecurity of contract work that each of the members would have taken on individually was prevented in the case of Talespinners by having the co-op there to offer work and support the members financially. The alleviation of the precariousness of freelance work is a reflection of the resiliency of co-ops as discussed previously.

In addition to the two previous types of co-ops in the game industry, there are also incubators that either serve co-ops or offer cooperative workspaces. For example, Dutch Game Garden in the Netherlands offers incubation, matchmaking and economic development services to the Dutch games industry (Dutch Game Garden). Another example of this type of co-op is Games Plus in Australia which provides hubs for game developers and other technology-related start-ups to co-locate and share their knowledge and resources (Game Plus).

This study focuses on the development of games as it would take place in a democratic and cooperative group of developers. This would exclude the type of cooperative development that would take place in a firm that relies on only completing parts of a game or only serve to share resources. Examples of game co-ops that the model would apply to are Motion-Twin and Studio Black Flag, both located in Bordeaux, France as well as Pixel Pushers Union 512 in the United States because they produce a complete game from start-to-finish on democratic teams for the purpose sustaining each member's ability to work on games. This model could also be applied at co-ops that work with clients to produce full games with teams of developers such as the TESA Collective in the United States.

2.3 Social Problems in Game Development

Studying game development from an ethnographic approach reveals that problems that arise in its routine practice are often social rather than technical or theoretical. Ethnographic methods of research provide a means of understanding the connections between practices and objects in relation to the lived experiences of those who act them out (Apperley and Jayemane). In terms of game development, ethnographic studies examine developers, tools, and their interactions to better understand the realities of day-to-day operations (Whitson, "What Can We Learn From Studio Studies Ethnographies?"). This study focuses on social problems in game development because developing games in cooperative teams is a social experience that impacts the connections between developers and their tools.

One example of a problem that arises when using this approach to examine game development practices involves the circumvention of a tool's limitations by developers to accomplish their goals. The tools developers use to make games act as the boundary objects in which development is confined. As developers identify what they can achieve with their tools, the production becomes shaped around those possibilities; this results in interactions between the developer and the tool become a form of negotiation. Jennifer Whitson describes this as "voodoo software" where the personification of a tool appears to exert agency that developers accommodate. It is the diplomatic engagement between the developer and the tool that requires social problem-solving skills ("Voodoo software and boundary objects in game development").

Another example is that developers may need to educate each other on work traditionally reserved for their role within a production to align the team on parts of the pipeline. These types of processes typically require cross-education to synchronize or integrate the production. An example of this would be cross-training a team on source control to synchronize and maintains versions of the project. This exposes the trainee developers to aspects of the pipeline they may not have been previously and the learning curve for each developer will vary. This knowledge sharing may require social skills to effectively teach those who may not share the same mental model ("What Can We Learn From Studio Studies Ethnographies?").

The success of the previously mentioned form of knowledge sharing is also dependent on the educating developers' abilities to communicate their knowledge of the subject. Tacit knowledge is built from practice; it is the accumulation of understanding through application. Explicit knowledge, by contrast, focuses on understanding what something is. These types of knowledge are not opposites but rather components of understanding through action which is not easily transferable from person-to-person because that action is where one's knowledge may be altered. The translation of that knowledge into information that can be understood and applied also requires a building of understanding through action and as such one's ability to educate effectively is dependent on that (Orlikowski).

The aforementioned social problems require "soft" skills to resolve; these skills, in conjunction with the material work, are necessary to organize people and tools into a final output. This organization is referred to as heterogeneous engineering. While these arrangements are made to facilitate the creation of an artifact, they can be unstable and may fail to achieve that. This is applied alongside social coordination to recruit and align people and narrow down the potential options to get the team to agree on the scope and shape of the artifact. Failure of social unification within a team can result in problematic approaches to cooperation including coercion, division, and silencing (Law).

When teams of developers create a game, they need to engage in heterogeneous engineering. The creation of digital spaces and interactivity can require a wide range of skills and require aligning the developers with those skills who may have differing interests. Designing a game involves applying production skills like storytelling, programming, and art with social skills such as analysis and calculation; these require synchronization among the team to maintain development. Additionally, the tools used for development act as a boundary object that impacts this calibration by framing the production possibilities around the team's ability to engage with them. Heterogeneous engineering in game development aligns the developers and tools together to successfully complete a game (Whitson, "What Can We Learn From Studio Studies Ethnographies?").

Professional game development postmortems offer a mixed amount of analysis on the social dynamics that existed during production. Companies may be reluctant to share stories of these types of issues because these documents also serve as public relations tools that act as a testimony to the company's practices. The fear that a company may expose proprietary secrets often results in postmortems containing few details about the production short of issues with scope and planning. More personalized accounts of game development in postmortems can also be conflated with gossip where it is perceived as being potentially damaging to one's career to be critical of other people. This emphasis on technical problems paints only part of a broader

picture; the heterogeneous engineering that goes into development is often disregarded (O'Donnell).

Game development within cooperative teams is also exposed to the aforementioned social problems and those unique to that structure. Members of co-op teams must still negotiate with their technology, align each other on vital pipeline procedures and educate each other on production and workflow techniques. These all take place in conjunction with the facilitation of joint management. While defining production around the limitations of the interactions between developers and their tools is an important component of cooperative game development, problems of alignment are especially important because a lack of synchronization among members makes decision-making more difficult. Effective communication is a vital step in preventing these problems from arising (Game Developers Conference).

2.4 Analysis

This study focuses on the applying cooperativism to game development to create a viable model for cooperative teams. While the literature reviewed on cooperativism offered extended conversations on elected management structures in co-ops, such as boards of directors, this topic was not discussed in the review as they are primarily relevant to larger cooperatives and simulating these structures in the experiment would require additional research participants. As a result, the scope of this study is limited to a cooperative team with no elected management which is similar to the structure found at small game development co-ops like Motion-Twin and The Glory Society. This study examined social problems in game development because the practice of cooperation introduces problems resulting from interactions between developers and their tools.

Cooperativism and game development are social practices requiring participants to interact with one another and their tools to achieve their goals. The efficacy of cooperative ownership and management can depend upon the ability of members within a team to foster an environment for

open communication and consensus building. Similarly, game development as heterogeneous engineering requires developers arrange themselves and their tools into a production that can create the intended output. Both of these factors are present in cooperative game development. A lack of heterogeneous engineering among developers can undermine the cohesion necessary to make jointly make decisions about its production.

The research opportunity for this study lies in developing a model that can facilitate heterogeneous engineering within cooperative game development teams. The model's focus is fostering an environment that can produce the social interactions necessary for joint decision-making and production within these types of groups. The approach to the research and development of this model focuses on social problems because the problems previously mentioned are those of the connections between the developers and their tools in relation to the experience of cooperative management.

Chapter 3

Methodology

3.1 Canonical Action Research (CAR)

For this study, Canonical Action Research (CAR) was the research methodology used to examine the implications of practicing a cooperative game development model and to facilitate improvement and iteration. CAR is a cyclical model of study on the application and practical consequences of enabled action through iteration and collaboration to facilitate change. The researcher works directly with the participants to plan and execute an action, collect their feedback on it and iterate upon that action; this action is centered around a researched and applied theory. The CAR process model consists of exploring the problem, diagnosing that problem, planning the action, executing that action, evaluating its successes and failures, and improving that action through reflection and analysis (Davison, Martinsons, and Kock).

CAR is an extension of the Action Research methodology first described by Kurt Lewin in 1944. Lewin's Action Research studies the effects of various forms of social action through collaboration with participants to understand how organizational change can be facilitated. This methodology uses a repetitive process of strategizing, implementing an action, and fact-finding through the analysis of that action to achieve those ends. The goal of Action Research is to encourage some form of change; the methodology uses the action to study the effects of the

change and what could be done to further improve its facilitation. This methodology is primarily considered with the study of the relation between possible conditions and results in relation to the diagnosis of a particular situation (Lewin).

CAR builds upon Lewin's methodology by emphasizing rigor through iteration as a form of intervention, and continuous problem diagnosis through participation. By cyclically improving the action, the researcher is repeatedly engaged in the analysis necessary for knowledge-building to take place. CAR differentiates itself from Lewin's Action Research in that the interventions must be more adaptable because the repetition of engagement constantly reshapes the circumstances. This lack of complete control requires the researcher be flexible in their approach to action which may not be necessary for other types of Action Research methodologies.(Davison, Martinsons, and Kock).

CAR is applicable to the study of cooperative game development because of its emphasis on change through action. This study seeks to examine how cooperativism can be applied to game development by creating a viable production model for cooperative teams that can facilitate consensus-building and creative collaboration. Game development as heterogeneous engineering produces an artifact as an output and as such the processes by which that artifact is created can be studied. CAR is appropriate for the study because it allows the researcher to directly observe and engage with the participants developing games using the actionable model. The researcher can intervene and iterate to improve the model such that it may encourage teams of game developers to pursue cooperative forms of production.

CAR consists of seven processes, five of which are part of the iterative cycle. The start and end of the study are defined by an entrance and exit. During the entrance, the researcher identifies the problems studies the theory being applied and previous attempts to solve the problem. In CAR, applying the theory to the action is essential for knowledge-building as it offers potential solutions. At the end of the iterative cycle, the researcher exits by analyzing their work and

considering further implications. These are the only two CAR processes not subject to iteration as they mark the beginning and end of the study (Davison, Martinsons, and Kock).

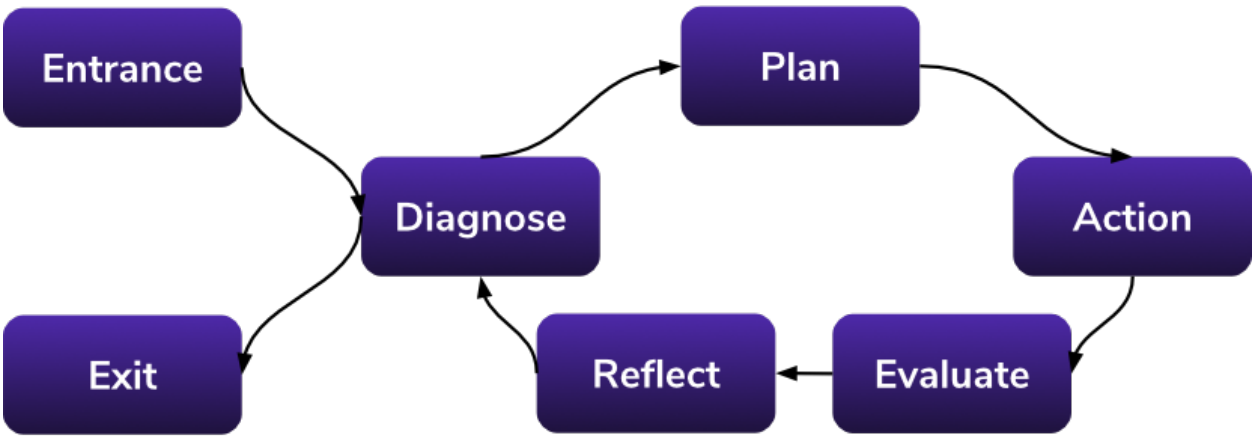

Figure 3.1: The seven processes of the cyclical model of CAR.

The first two processes of the iterative cycle of CAR are diagnosis and planning. During the diagnosis phase, the researcher examines the nature of the problems being addressed and the situational needs of the study based on the previous iteration if applicable. This take place independently of any diagnostics by the participants such that the researcher can determine an appropriate intervention. The assessments that result from that inform the planning of how the action will take place. This plan should reflect the refinements made to understand the applied theory (Davison, Martinsons, and Kock).

The essence of all forms of Action Research is the execution of the planned action with the study participants (Lewin). The rigor of CAR is derived from the direct engagement of the researcher with the participants through the repeated implementation and iteration on the action. The researcher through participation can observe and experience the action as it is taking place;

this acts as a form of data collection for the analysis of the actions or its implications. This might require an agent who can help facilitate the intervention but is not always necessary. (Davison, Martinsons, and Kock).

The final two processes of CAR are the collection and analysis of data surrounding the executed action. In addition to the observational and experiential data derived from the researcher participating in the action, they may also collect qualitative or quantitative data to inform decisions surrounding the next iteration. In addition, the theory should also inform the analysis as the study of the action is centered around it. By reflecting and analyzing the data, the researcher decides which aspects of the action worked and which are to be discarded. After this, the CAR cycle repeats until the research exits the study (Davison, Martinsons, and Kock).

CAR also consists of five principles, the first which is the Principle of Researcher-Client Agreement; this criteria establishes internal validity among shareholders through reciprocal assurances of behavior, and agreed-upon data-collection methodologies. The second principle, the Principle of the Cyclical Process Model, is embodied through the repeated iterations of diagnosis, planning, action, assessment and reflection. The application of the theory to the enabled action is the Principle of the Theory as described by CAR and defines the goals of the project and subsequently the shape of the action. The Principle of Change through Action reflects the essence of CAR as it seeks to change the current situation, a lack of which makes the action taking place meaningless. Finally, the analysis of the data, consideration of implications, and the improvement of the action from that analysis comprise the Principle of Learning through Reflection that enables the knowledge-building aspects of CAR (Davison, Martinsons, and Kock)

When synthesized together, these processes and principles are applied to analyze implementing a game development model for cooperative teams to form this study. The study started by examining problems in cooperative game development and researching the underlying theory behind cooperative organizations. The cyclical model of iteration was applied to using a

cooperative game development model and feedback was collected from participants to improve it. The feedback analysis was subsequently reflected in the incremental changes to the model and its implications later discussed.

The study consisted of the researcher working with a group of four undergraduate students over approximately six weeks to create a game using a cooperative production model that would be improved by the researcher after collecting feedback from the participating students. The group consists of students creating a game for a final project of an undergraduate game design course with each having their own unique skill set. In addition to developing and facilitating the model, the researcher also provided technical assistance in tutoring and guidance to help the team of students fix issues that might arise during development. As a member of the team as permitted by CAR, the researcher also contributed to the decisions alongside the participating student developers.

Feedback was collected from the cooperative team through interviews, observations and anonymous surveys. One-on-one interviews were conducted with each member to get their prospective on the model, working in a cooperative team and their thoughts for improving the action. Anonymous surveys were used to offer additional insights that might not be exposed during the interviews due to the researcher being personally engaged with the participants. The researcher also observed the application of the model as a direct participant in the study.

3.2 Design Component

The design component of this study is a game development model for cooperative teams of developers. The term "model" refers to the description of steps and strategies that apply cooperativism to facilitate game development on democratic teams. This model uses principles of cooperativism as a framework for fostering collective decision-making in the game development process. When applied, these principles also serve as a means of mitigating or solving social

issues that often present themselves among teams of developers making games. The goal of designing this model is to study how cooperativism can be applied to game development to create a viable production model for cooperative teams developing games. In accordance with the research framework used for the study, CAR, the model was developed iteratively over the course of six weeks with a group of undergraduate university students, alongside the researcher, working on a game for the final project of a course.

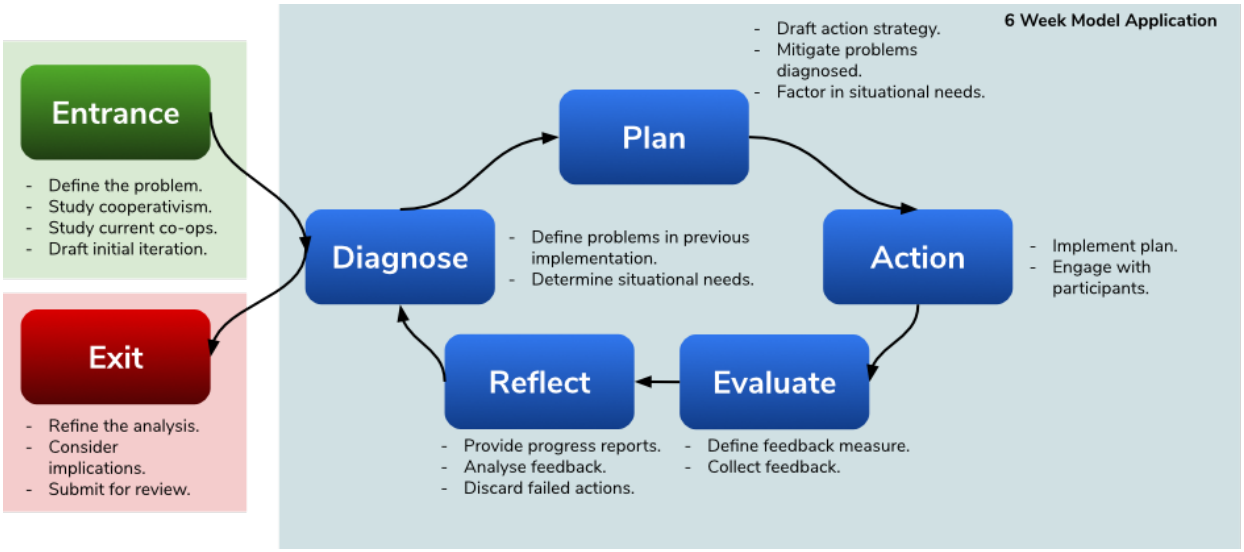

Figure 3.2: The seven processes of CAR as applied to this study.

The model uses the tenets of cooperativism to address the social problems that arise in game development. Cooperativism is able to address issues of alignment on teams by facilitating cross-education between members. Additionally, the consensus necessary for decisions to be made in a cooperative teams act as another form of alignment. Participation and personal investment among the team are encouraged through cooperativism because developers are owners and managers of the game. The model implements these tenets through actionable steps cooperative teams can take when developing a game.

The first iteration of the model emphasized the facilitation of democratic decision-making through explicit synchronization on goals and tasks. It focused on alignment of members through laying out the game's goals, members' needs, desired featured, and tasks before executing on production. Consensus was central to this iteration of the model as it served as the basis for aligning each developer. Although not explicitly accentuated, communication among members was a vital attribute to solidifying synchronicity with frequent contact encouraged.

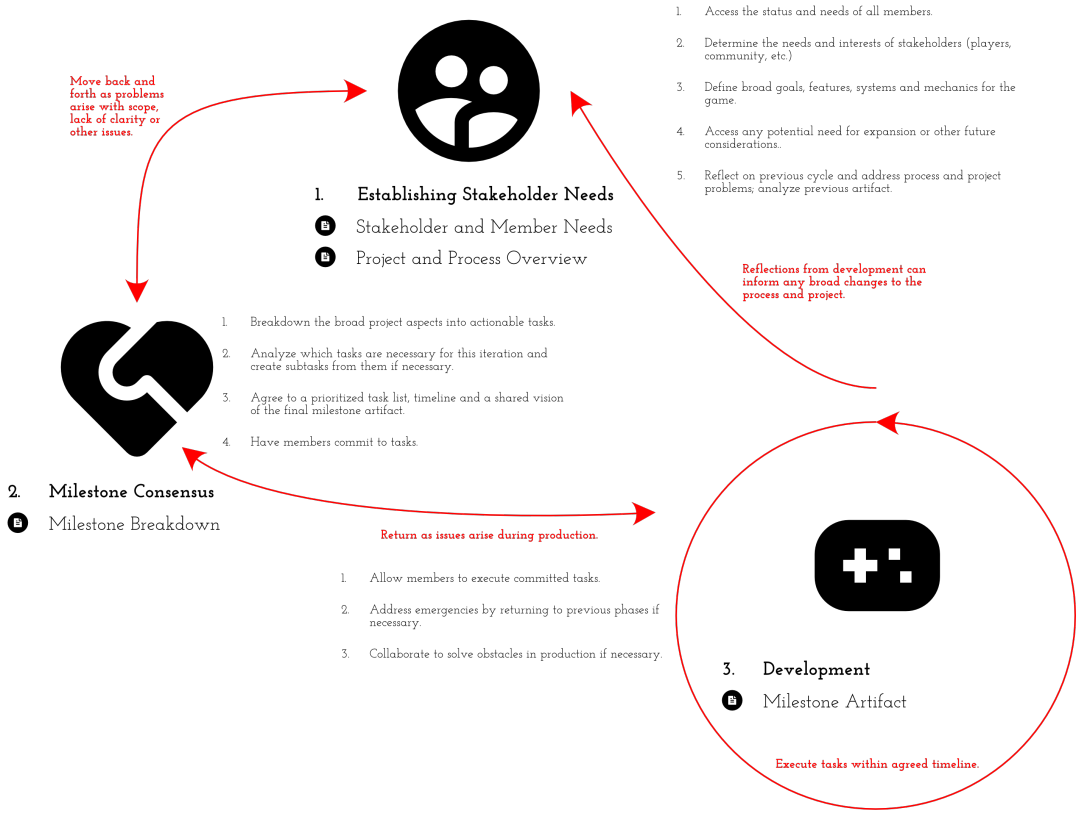

Figure 3.3: The first iteration of the model.

This iteration of the model was significantly changed as a result of the research for this study. It was created to explicitly denote when alignment needed to occur within the game development process; however, data from the participants and additional research into cooperative game

development exposed the flaws in this approach. One of such flaws was that the model was based on developers needing to know when a vote or alignment was necessary. In the case of the cooperative group apart of the study, this was more intuitive for them than the model accounted for. Additional research on cooperative game studios also contributed to this insight with members of co-ops noting that more issues persisted with communication than when to vote.

Another flaw of the first model was that it failed to leverage a vital tenet of cooperativism: education and information-sharing among members. While the facilitation of democratic decision-making was present, the model did not take into account how interpersonal relations between developers and their tools impacts the process by which decisions are made. The model made clear when collective decision-making needed to occur but it did not consider the circumstances that shape how those decisions occur. This insight was exposed by comparing the research done on the social problems of game development, the principles of cooperativism, the experiences of game co-op developers and the model as it was currently constituted; communication and cross-education were vital to both cooperative management and game development but the model did not address either.

Thus from this a second model was created, the core of which persisted throughout the remainder of the study. Rather than defining clear points in the game development process where decisions needed to be made, this iteration of the model deviated towards building the type of game development environment necessary for cooperative teams to be aligned and participatory. The goal of the model transitioned away from simply being about cooperation through the ability to vote to being about cooperation through being empowered with the conditions necessary to make meaningful decisions with the team. This led to the restructuring the model around three key components necessary for cooperative decision-making: communication, synchronization, and collaboration.

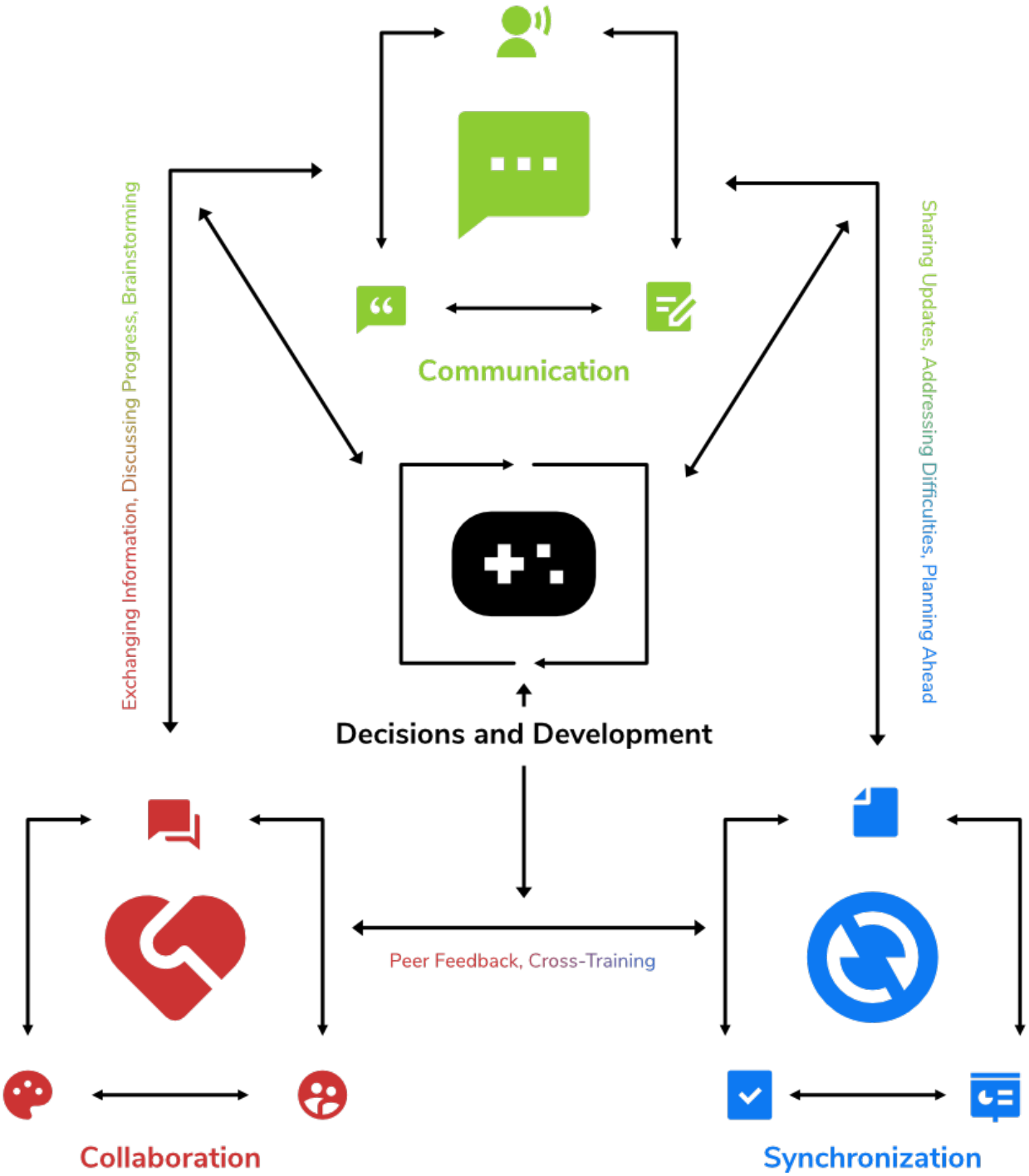

Figure 3.4: The final iteration of the model; the structure was introduced in the second iteration.

One of the three core components of the model is communication. The facilitation of joint ownership requires those owners be able to share information with one another effectively and efficiently. Dialogue is essential for aligning the goals of the team and forming a consensus

around decisions effecting the production; this was emphasized by the game co-op members who spoke at GDC 2019 (Game Developers Conference). Each member's degree of participation in conversation may depend on their sociality. This also includes conversations that should need to take place among individual members who may need to collaborate or share information. Communication in cooperative game development teams can be accomplished through meetings, frequent progress updates, and brake-out sessions.

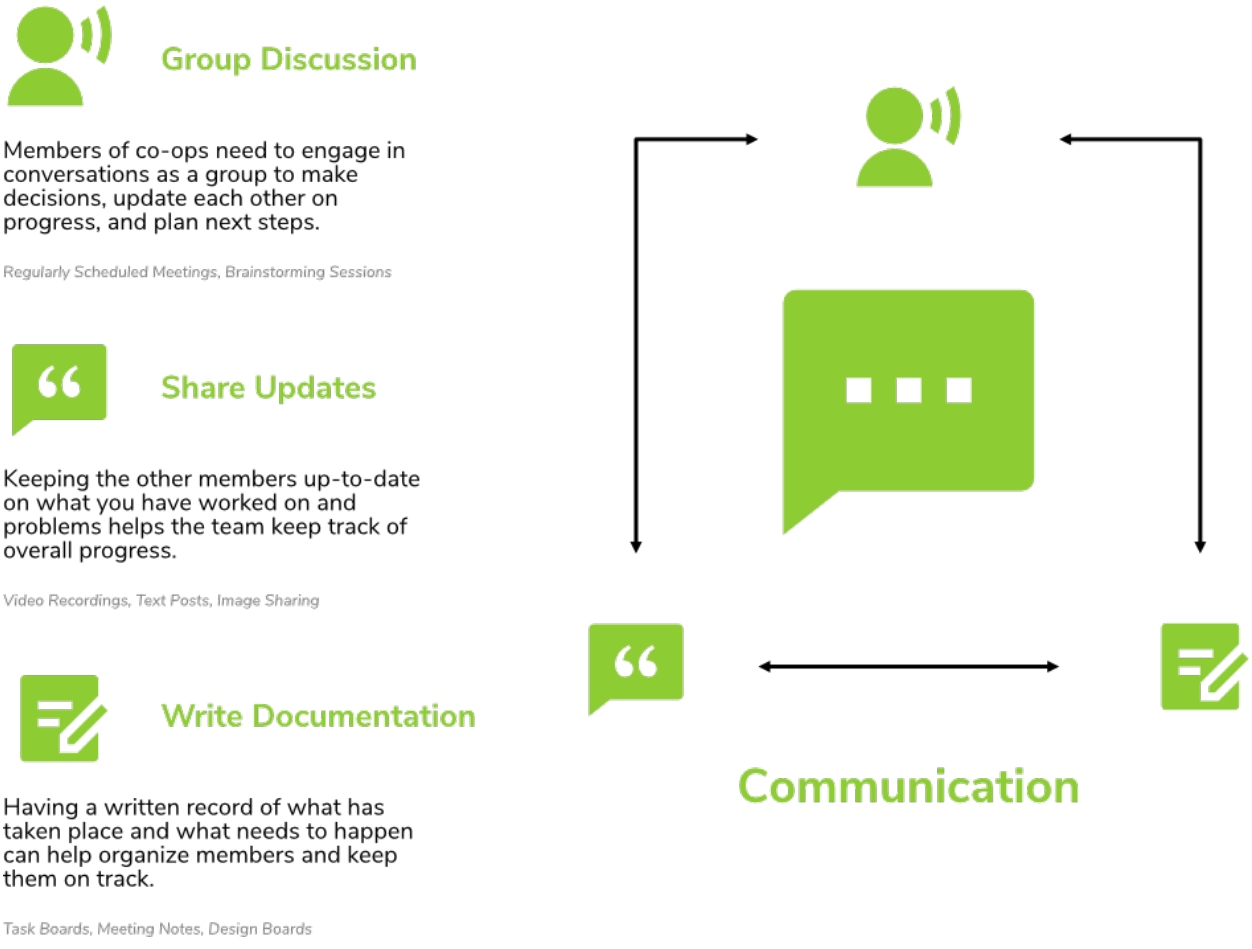

Figure 3.5: The model's strategies for communicating first introduced in the third iteration.

The team for this study used a voice-and-chat app to schedule meetings, update one another on their work, and collaborate in order to communicate with one another. The team had at least two

or more groups voice meetings per week in which everyone attend. During those meetings, the team would discuss design decisions in regards to the game's mechanics and art style in addition to alignment on next steps. Voice meetings among smaller subgroups of members also took place where members collaborated or shared knowledge. Screenshots, videos and text-based updates were shared in chat channels so each member could keep each other up-to-date on the progress of their work.

Communication is vital to cooperative game development teams because it facilitates the exchanging of information necessary for members to make decisions and contribute to production. Open dialogue between members of cooperative teams fosters synchronicity by allowing members to ask questions and give their thoughts as equals. Additionally, it also allows members to express concerns, make proposals or share resources. Frequent communication also helps the developers to form a shared mental model of the tasks and vision of each step of the production process through opportunities to address alignment. These are essential to cooperative game development teams because they define how decisions can be made; it brings each member into the process by giving them the information and voice to empower them to be effective members.

In addition to communication, synchronization is also a core component of the model. Synchronization consists of aligning each member on the status of the project and sharing information with one another; this is an extension of communication as it focuses on the outcome of knowledge-sharing and establishing shared goals rather than the acts of dialogue that go into it. This component was designed to reflect the educational principle of cooperativism by turning knowledge-sharing into an active goal as part of the game development process. Recommended steps to synchronize members includes creating task boards, cross-training on tools and techniques, and frequently engaging in communication.

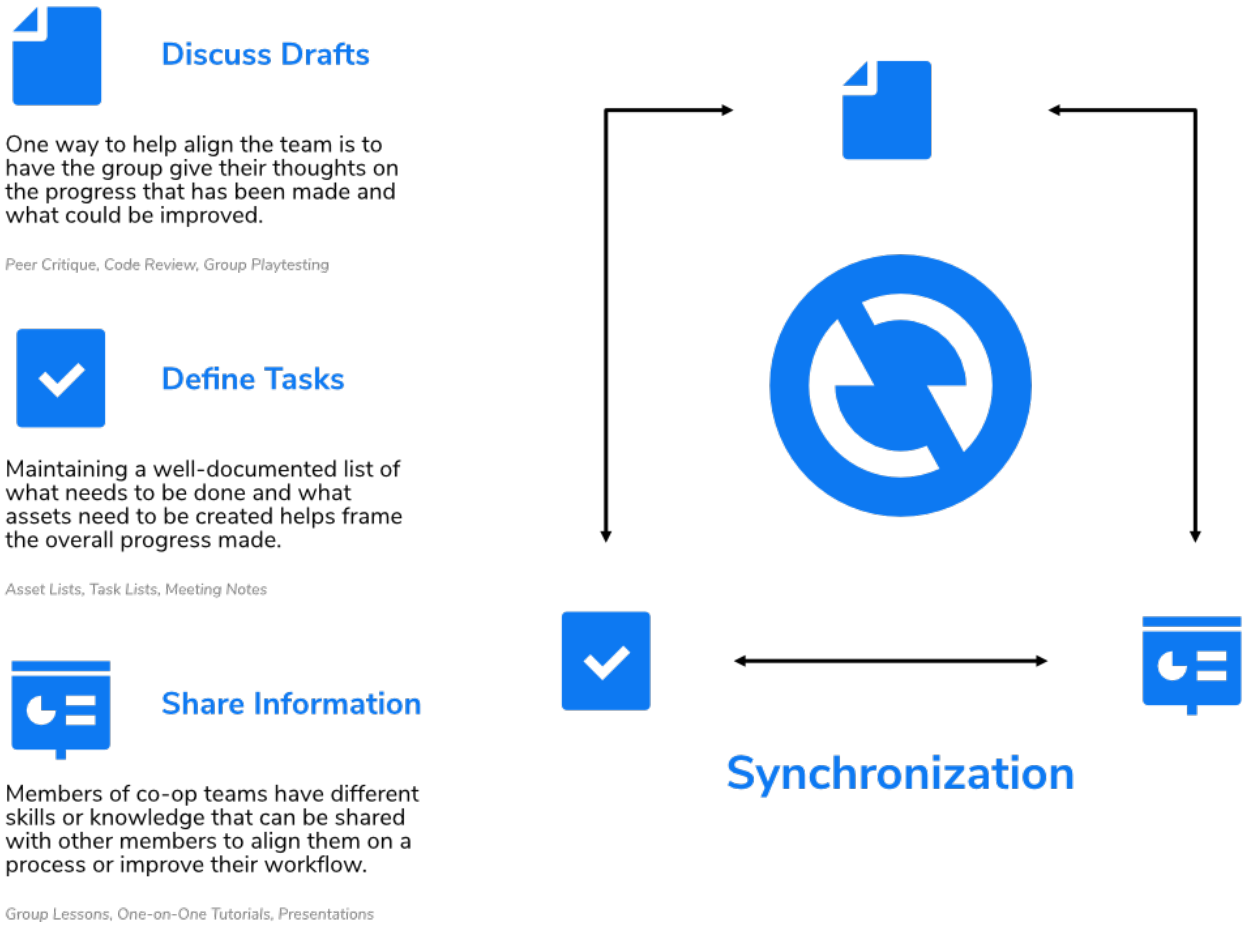

Figure 3.6: The model's strategies for synchronization first introduced in the third iteration.

This was executed as part of the study team through organizational methods such as a voice-and-chat server and a digital task board in addition to interpersonal methods such as one-on-one assistance and resource sharing. The primary means by which the team stayed aligned on tasks and progress was through frequent communication on the voice-and-chat server through meetings and text updates. In terms of education and resource-sharing, the team found that one of the primary places these were most needed was on technical tasks within the game engine. The researcher and two participants primarily responsible for programming and other technical tasks met at least once a week to align on the use of the engine, teach anyone who needed to know how to complete those tasks, and to assist each other with problems that presented themselves as tasks were being completed.

Synchronization is important for a cooperative game development model to succeed because it informs the possibilities of the collaboration taking place. In the case of the study, the dissection and analysis of the engine and its capabilities helped the members of the team define which features could reasonably be implemented within the timeline and milestones of their course project. This also had the additional benefit of allowing multiple members to be able to reframe those technical limitations in different ways when explaining them to the other members. By achieving alignment, members can make more informed decisions surrounding the game.

The third core component of the model is collaboration. One of the unique features of cooperative teams are that they are structurally participatory; decisions are facilitated by collective input and engagement. This collectivism can also be channeled into problem-solving or creative activities through joint work. Members with differing mental models can benefit the work one another by offering a different prospective on engaging with the problem or task. Some strategies for facilitating collaboration among developers in a cooperative group include group design and peer work sessions.

Collaboration on cooperative teams is unique in that the participatory aspects of the management structure can be used as an asset during creative planning in game development. All the members of these teams are engaged in the decision-making process and as such participation in that can be leveraged to design elements of the game itself. Since game development is multidisciplinary in practice, developers of cooperative teams often have different skills and mental models that can help shape the end result through their contribution. Members of similar skills can also leverage their shared knowledge to collectively solve technical problems that could arise during development.

These types of sessions were implemented in the study as weekly events where the team got together and ideated on mechanics and created designs for the game in addition into breaking off into smaller groups to work together. The group took advantage of the participation required

from cooperative teams by including everyone in the designing of levels and mechanics. This provided different perspectives that were applied to create a designs that all the members were invested in because they contributed to it. These perspectives were also applied in small subgroups of the team where individual members met to solve specific problems with tasks such as unifying the art style or implementing a feature.

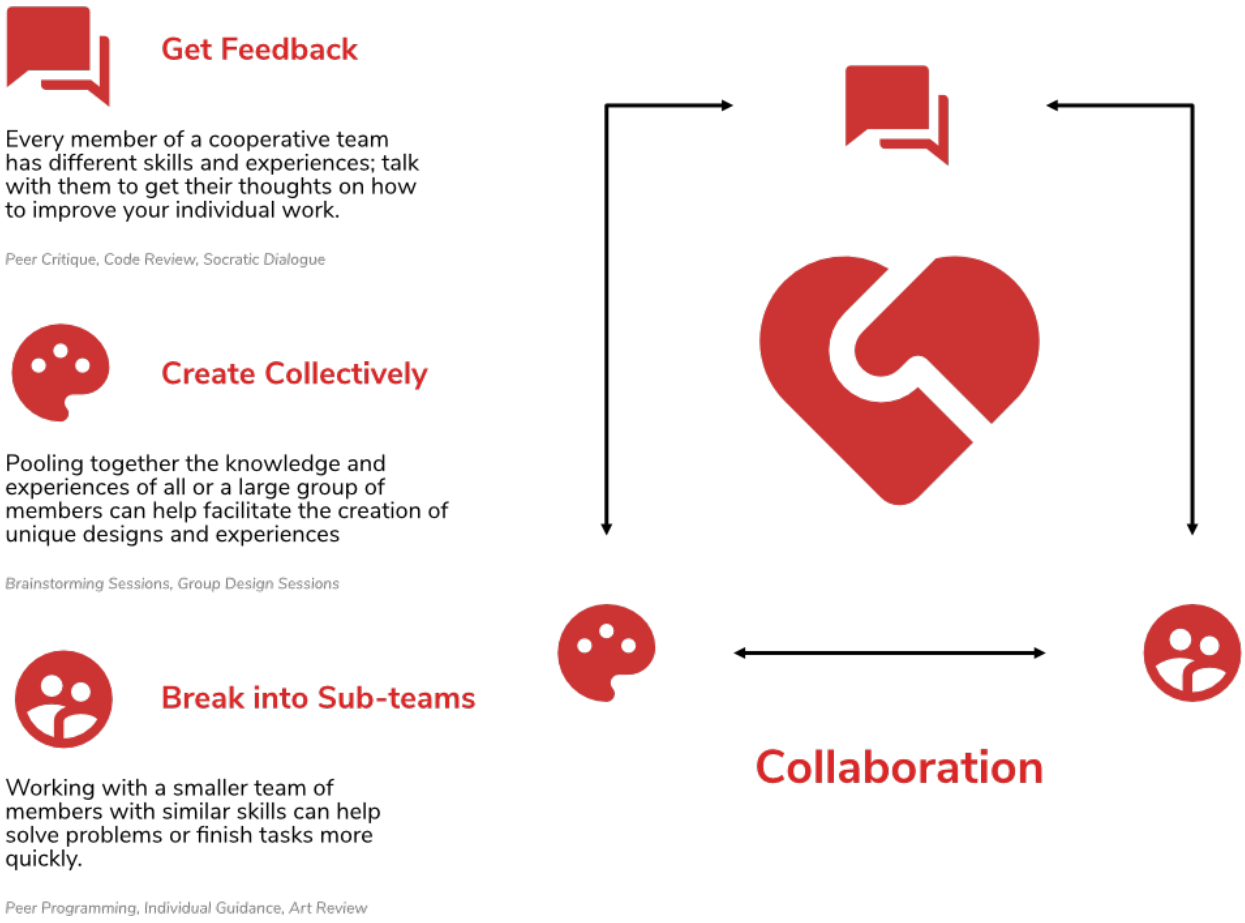

Figure 3.7: The model's strategies for collaboration first introduced in the third iteration.

These three core components synthesize cooperative principles with game development strategies in order to create an environment where democratic teams of developers are empowered to facilitate decision-making and creative collaboration. The communication component is reflective of the principles of member participation and control as exchanging information helps to align members on the status of development. Synchronization is the

outcome of educating, training and exchanging of information which are core principles of cooperativism. The member participation and control principles of cooperativism are also applied through the collaboration component where the inclusion of the developers in the decision-making process is used to encourage further participation in creative, technical or other types of problem-solving activities.

As the second model proved much more successful at applying cooperativism to game development than the first, the third iteration kept the structure of its predecessor and added additional strategies to help members better exercise each component. This was derived from the feedback received; the participants noted that cooperativism empowered them to engage with each component of the model but that a lack of clear strategy sometimes made it difficult to full realize them. The researcher also observed this where members would sometimes lose track of deadlines, miss meetings, or fail to communicate regularly. The third iteration introduced strategies in the form of actionable items that could be implemented as part of each component to help exercise them.

Chapter 4

Findings

4.1 Overview

Data used for analysis and iteration as required by CAR for this study was collected from the cooperative team through interviews, observations and anonymous surveys. The individual interviews were designed to get each member's prospective on the action and how it could be improved. The participating members also filled out anonymous surveys to provide additional feedback that might not have been exposed during the interviews due to the personal involvement of the researcher in the study. Observations from the researcher directly in regards to the implementation of the model also contributed to the findings of the study as they were also a direct participant. Insights and findings from the interviews and surveys were derived from their codification.

The first overall finding of note was the eagerness and willingness of the participants to engage in cooperative game development. The researcher noted that at the beginning of the study, the participants expressed excitement about developing games on a team where no one individual had complete creative control. This was further reflected in the researcher's observations on the increased participation of the team members; all of the members frequently attended meetings, contributed to the design, and updated one another on progress. This was also validated by the

interviews and surveys in which the participants stated they felt more willing to participate as a result of the team being cooperative.

Themes	Subthemes	Examples
Communication	Frequent discussions	"Having multiple lines of communication helped us keep each other up-to-date."
	Progress updates	"I was happy to share my progress and get feedback from my peers even when I fell behind or made mistakes."
	Open discussions	"I felt like I could be more honest because my ideas would be considered equally with everyone else's."
Collaboration	Unique designs	"It was really cool having everyone contribute to decisions; it made our designs more interesting."
	Problem-solving	"I like that the democratic team made everyone participate and brought out ideas I would have never thought of."
		"Working on a democratic team made me feel more respected and made it easier to work with the others."
		"The game never felt like it was one person's idea; we all chipped in and it showed."
Synchronization	Notetaking	"We were able to get everyone on the same page by writing everything down."
	Task lists	"Coming up with tasks together made it easier to figure out what we needed to do."
	Teaching	"We were able to show each other how did we things and I learned a lot because of it."
		"When I was struggling on my tasks, I came to other members of the team to show me how they would do them."
Participation	Empowerment	"I'm a shy person but the democratic team made me feel more confident and willing to share my thoughts."
	Respected	"Everyone was respectful of one another because everyone was involved in making decisions."
	Investment	"This type of team made me feel more invested in participating because I was more involved in decisions."
Creativity	Synthesis	"Being able to bounce ideas off of my peers as equals helped make my work better."
	Brainstorming	"Having everyone involved in brainstorming let us take pieces of ideas and combine them into something original."
	Peer feedback	"When I got critique, it never felt like I was being 'talked down to' because we were all bosses."

Table 4.1: The codification of the final set of surveys and interviews.

Another finding from this study was that the participants reported better communication as a result of using a cooperative model of production. The participants commented in interviews and surveys that they were more willing to share ideas and contribute to conversations because there was no singular authority deciding on the game. This was also observed by the researcher who noted that each member did frequently update one another on their progress and share their thoughts during meetings. Additionally, the participants also described feeling more respected and included because the production was jointly managed; this made them more inclined to communicate openly as a result. They also reported that they were less afraid to fail, be wrong or disagreed with because the structure of the team did not punish them for those things but rather sought to address them for the benefit of all the members.

This study also found that the cooperative team was able to effectively leverage the collaborative aspects of cooperativism to benefit the project. The participants noted in interview and surveys that the designs for the game were a synthesis of everyone's ideas rather than the

work of individual designers. They attributed this to their increased willingness to participate as a result of the inclusively reported previously by being apart of the management. The researcher also observed this during the meetings in which design was discussed as all the participants, including the researcher, all worked together to produce a unique level which took advantage of mechanics ideated by everyone on the team.

An unexpected situation that occurred during the study was the ease of transitioning the study team to a democratic structure. The first iteration of the model was designed around when decisions needed to be made and when to align members. However, as the study began, the team quickly picked up on working cooperatively and making decisions democratic. This insight demonstrated that the problem was not when to be democratic during game development but how to effectively practice democratic game development effectively. This was further supported by the research done on problems experienced by modern game co-ops which emphasized issues of communication over voting. The researcher observed this towards the beginning of the study and it was subsequently confirmed through the surveys and interviews.

The data and subsequent analysis are reliable and valid as they used CAR's rigorous methodology to collect data directly from participants. The members of the cooperative team provided their feedback on the model through interviews and anonymous surveys. This data was then used to inform the iterations of the model they then applied. The researcher was also a direct participant and their observations were used as data as well. The validity and reliability of this study are derived from the researcher's direct involvement in the action taking place and the subsequent data collected from those who made a game using the model.

4.2 Analysis

Based on the data from the study, the model was successfully able to apply the principles of cooperativism to game development to make it viable for production. Although the first iteration

of the model did not fully reflect the values of the theory and only addressed when decisions on a cooperative game development team should take place, the iterations that came after were effective at leveraging the advantages that come with this structure of team. This was validated by the feedback from the participants who expressed how cooperativism benefited their work. The benefits reported by the participants, such as increased willingness to engage and more fruitful collaboration, reflected the research done on the benefits members of game development co-ops also experienced.

Communication was one of the primary social problems in cooperative game development that the model was able to successfully address. The research found that the ability to make decisions and align members on a democratic team is often predicated on the team's ability to quickly share information and engage in fruitful discussion. The model was able to facilitate this because the cooperative aspect of the team's management encouraged the members to be more active with one another. This was channeled into the creation of artifacts that could communicate progress, such as text updates and progress boards, as well as into physical actions of communication such as meetings and small group sessions.

The model was also successfully able to align members on the status of the game and facilitate the sharing of information. Participants were successfully able to build a shared understanding of the game and the goals of production as reflected in the data from the study because they were frequently in communication with one another. As previously stated, this communication itself was successful because cooperativism empowered the developers to do so effectively and productively. They were also able to effectively educate and share information with one another because, as the participants noted, having a lack of information or needing to be educated did not reflect negatively on the member but rather was a considered component of the model. The model instantiated this through open and inclusive communication and collaboration.

The success of the communication and synchronization aspects of the model also fueled the success of the its collaboration aspect. This is due to the inclusive nature of the cooperative team; the environment of mutual understanding through open communication created the conditions necessary for the members to engage in work together productively. This allowed the developers to design aspects of the game together and create systems that were a synthesis of ideas. This was encouraged by the synchronicity of the team because alignment allowed the members to operate on the same mental model was they were working together.

This study concludes that although the claim in the hypothesis was validated, the centering of production around democratic decision-making involves a more in-depth understanding of the conditions necessary to make meaningful decisions than when those decisions need to be made. As noted in the research, cooperative game development teams do not often have issues determining when key decisions needed to be made because it was clear during production when those needed to take place such as on what tools to use, which mechanics to add, and what changes needed to be made before specified deadlines. What was necessary for cooperativism to succeed in game development was creating an underlying apparatus that could facilitate the communication, alignment and collaboration needed to make those decisions. This was accomplished by using the principles of cooperativism to create an environment where members were empowered with implementable actions.

This study has implications that should be considered for future cooperative game development and related research. The reported increase in willingness to participate as well as feelings of mutual respect and inclusiveness demonstrates not only the viability of cooperative game development broadly but also shows that it can benefit the production of games. Further research into long-term cooperative game development should be considered in order to investigate how these benefits can be translated into a larger scale production. This study, due to its limitations, could only focus on cooperative teams that did not have elected management; this is an area that could be explored with further research.

Chapter 5

Conclusion

5.1 Summary of the Study

This study examined the implications of applying the principles of cooperativism to game development in order to create a production model viable for game co-ops or other cooperative teams. This was accomplished by creating, implementing and iterating upon the model with a group of students working on a game for their course project over the course of six weeks using the Canonical Action Research (CAR) methodology. The study began with a broad examination of cooperativism as a theory, the history of the cooperative economy and game development, and an examination of the social problems that underpin traditional and cooperative game development. The study was then exited with an analysis of the results and the implications of them.

The study found that cooperativism could not only be successfully applied to game development but that it could also benefit the developers engaging in it. The participants reported being more willing to engage with the team because of the respect and inclusiveness they experienced as part of the cooperative structure. They also reported having more fruitful collaborations sessions because members were able to openly express their thoughts and communicate issues they were having. This communication was also benefited because of that

same openness; the developers could share their progress or thoughts with one another in an environment where they were doing so as equal contributors working towards the same goals.

5.2 Summary of the Literature Review

Cooperativism can best be described as the organizational principle in which the results of a group's collaboration are jointly-owned and democratically-controlled by its members. Every member of a co-op has the ability to contribute to the decision-making process because they are an owner and a participant. Cooperativism is based upon seven principles that seek to establish an environment conducive for co-ops to under their operations for member benefit. Co-ops may come in a variety of different forms and may exist to address different needs but all of them are based upon the previously mentioned seven principles.

Co-ops as institutions have been apart of the world economy since the Industrial Revolution. They continue to be part of the economy today in the form of businesses, utilities and other types of enterprises. The longevity of the cooperative movement can be attributed to their demonstrated resiliency during economic hardship as well as the increased levels of happiness and productivity reported by studies on the members. Co-ops in the game industry are worker-owned cooperatives which means the studios in which the developers work at are also owned by them. Members of game co-ops confirmed the aforementioned benefits of cooperativism in addition to noting the necessity of communication for this type of structure to succeed.

The most common problems experienced by game developers when creating games on teams tend to be social in nature rather than technical. Developers may need to find ways to work within the limitations of the tools which requires a degree of negotiation between it and the developer. Additionally, developers may also have to share knowledge with one another which can be dependent on both the ability of the educator to communicate their tacit knowledge and the mental model of the educatee. The heterogeneous engineering necessary for successful game

development can as a result be dependent on the social skills of the developers. These problems hold true for cooperative game development teams as well where socialization is a vital component to the successful implementation of democratic management.

5.3 Summary of the Implications of the Study

The game development model created and iterated upon was able to address the previously mentioned social problems through the use of the principles of cooperativism. The involvement of all the members in the decision-making process allowed them to identify the limitations of their tools and decide as a group how to address them. Members were also able to better share and learn from the knowledge of others because cooperativism created an environment that supported it through the mutual respect assured by joint-management. When the issues were addressed, the model allowed the heterogeneous engineering necessary for the successful production of a game on a cooperative team to occur.

The model itself also represented a successful implementation of cooperative principles to game development. Exchanging information to align members on the status of development through communication reflects the principles of member participation and control. The outcome of educating, training and exchanging of information which are core principles of cooperativism and are embodied through synchronization. The collaboration component was reflective of member participation and control principles of cooperativism as the inclusion of the developers in the decision-making process is used to encourage further participation in creative, technical or other types of problem-solving activities.

Future cooperative game development and related research may want to consider the implications of this study. The benefits of cooperativism described by the research and the feedback of the participants could be further explored as a tool for facilitating creativity in other domains. This study was unable to take into account long-term cooperative game development

processes and as such there is opportunity for further exploration there. This is also true for researching the role elected management can play in continuing to facilitate cooperative game development. While not the conventional mode of production in the present time, working democratic and cooperatively could be a reasonable path forward for future game developers with tangible benefits to their productions.

Appendix A - Survey Questions

1. Has working within the model given you a say in the decision-making process? If so, how have you contributed to it?

2. In what ways has this model affected your willingness to participate and personal investment in the project?

3. How would you describe the model's effect on the collaboration among your teammates? How can this be improved?

4. How would you describe the model's effect on the communication among your teammates? How can this be improved?

5. What obstacles or difficulties have you experienced while working with this model and how have they affected your team's work? How do you think they can be addressed?

Appendix B - Interview Questions

1. Has working within this model allowed you to contribute to the decisions of your team? If so, how?
2. How has working with this model affected your willingness to participate and personal investment in the project?
3. In what ways has the model affected the collaboration among your teammates?
4. In what ways has the model affected the communication among your teammates?
5. What obstacles or difficulties have you experienced while working with this model and how have they affected your team's work? How do you think they can be addressed?

Appendix C - Process

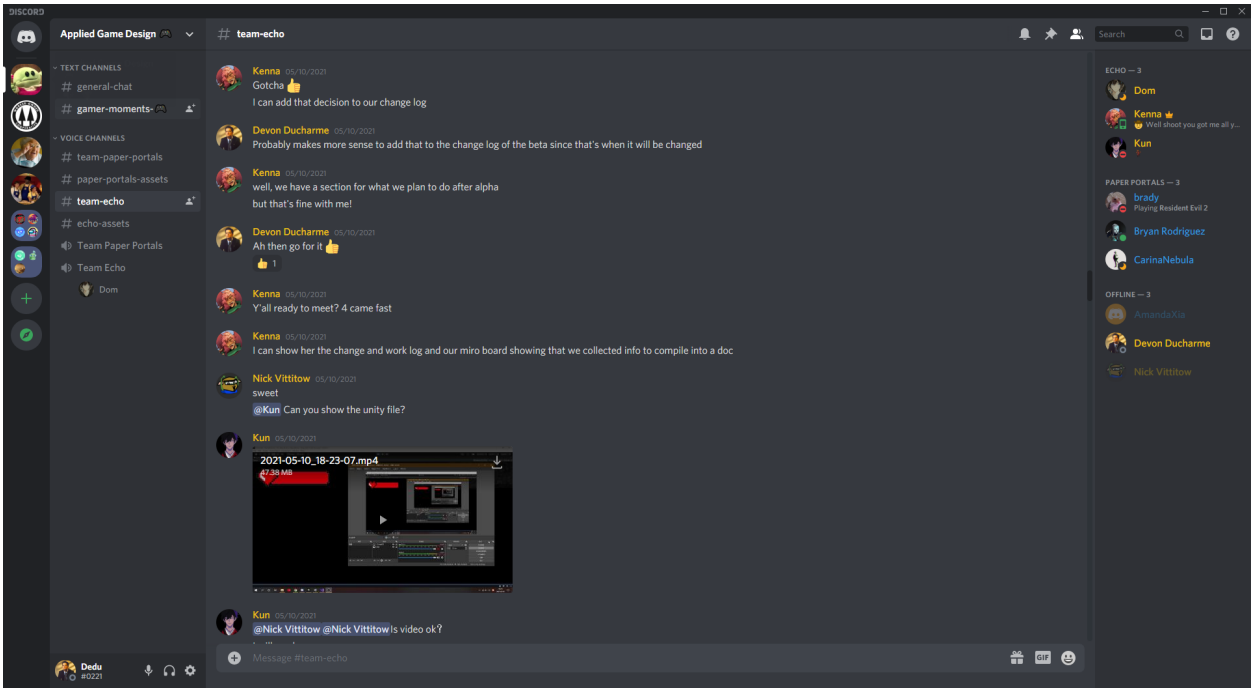

Figure 5.1: Communication tools like Discord kept the team in contact with one another.

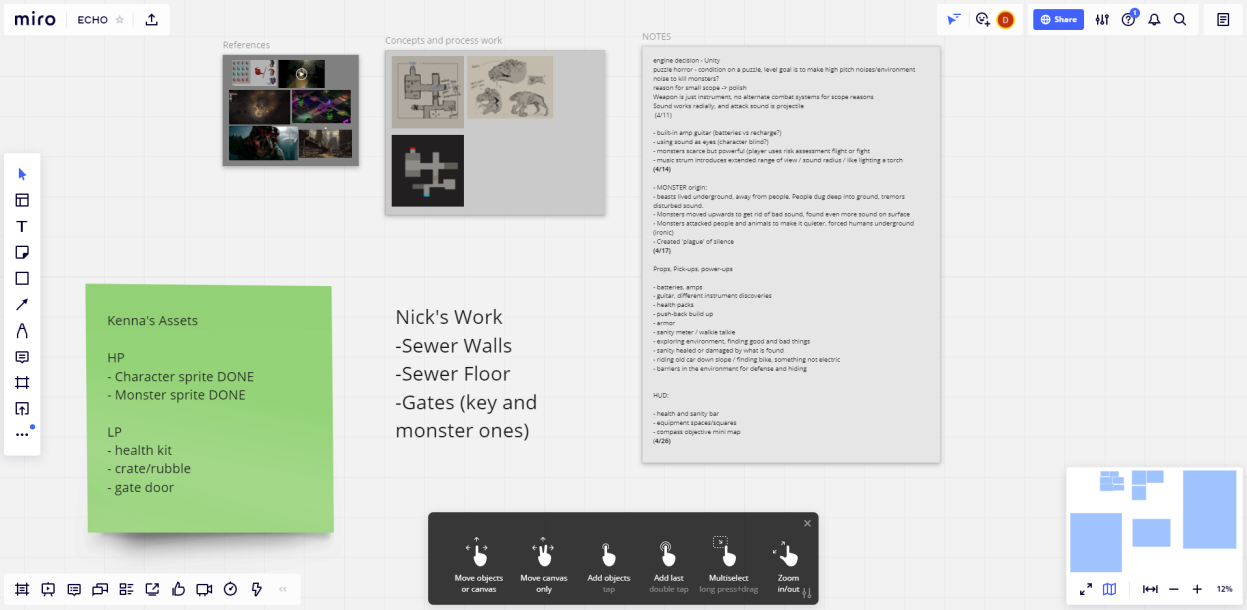

Figure 5.2: Using organizational tools like Miro help synchronize members on tasks.

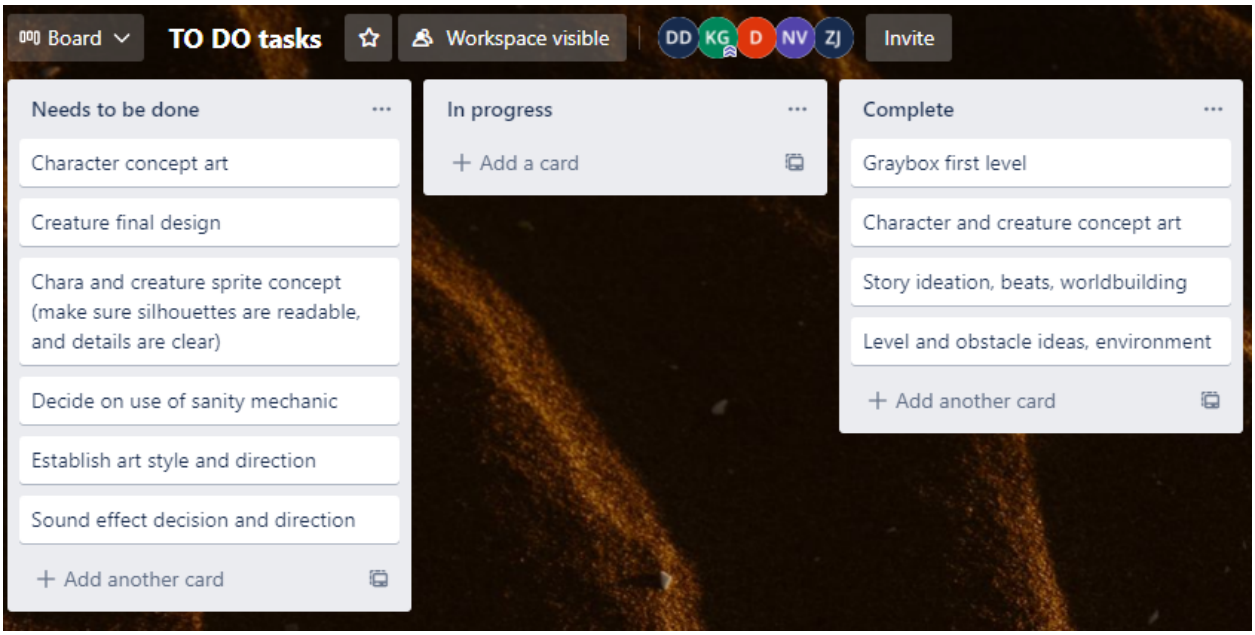

Figure 5.3: Tools like Trello were used to make lists of tasks that could be referenced by each member.

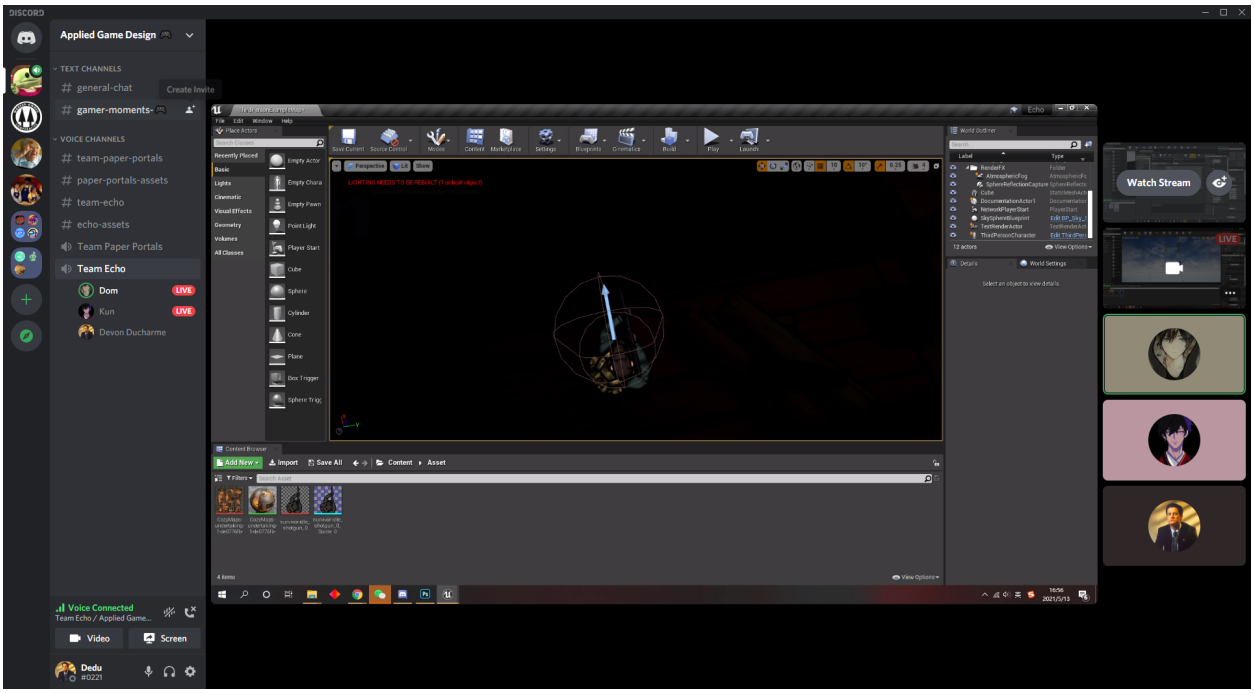

Figure 5.4: Collaboration on in-engine tasks helped resolve technical issues during development.

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