How Game Developers Apply User Feedback into the Development Plan

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***Executive Summary*—The video game development industry is a fast paced and highly iterative atmosphere. Changes to design are inevitable and a necessity for mitigating risk of releasing a successful game. For developers to produce high quality content that matches the design vision, they need to be informed about changes. Applying user feedback from testing into the game can range from complex to simple. Figuring out ways of incorporating feedback smoothly and consistently can provide the best possible outcome for a development team.**

***Index Terms*—iteration, incorporating feedback, design methods, communication, planning, production, user research, decision making, applying feedback, user feedback**

I. Introduction

ITERATION is a core fundamental for development of video games. Developers must be conscious of iterations to be able to adjust designs and plans accordingly. A key portion of iteration is collecting feedback, which can come from many places. One of the most valuable sources of feedback comes from the target audience, the players of the game. The consumers are not biased by an existing knowledge of the game and they do not have any political side bets that a developer may have incurred over time.

Current research has gone into the ways of collecting data and the different types of data to collect from players. Yet, research of how to approach the incorporation of that feedback into a game is miniscule. With the large development teams that come with making more complex games, communicating the changes based upon iteration and collaborating with the team is extremely important. Team members need to be on the same page in order to make a great, cohesive, fun game. Incorporating feedback from any source into a game can get complex depending on how much is changing and what needs changing.

Change can be expensive, especially in the video games industry. Incorporating user feedback can help avoid costly mistakes. Changes can lead to both negative and positive outcomes. Not incorporating appropriate feedback however, can lead to a riskier outcome for when the game releases. Players may be unpleasantly surprised and might not buy the game. This research attempts to identify the methodologies and design practices different developers use to incorporate feedback into their games to learn how to iterate more efficiently.

II. Research Review

This review covers the importance of communication and ways of preparing a team for change. Communication is important for getting teams to be open and welcoming of user feedback. Incorporating feedback into a game requires change. Finding and using a framework to address change is important for a team to efficiently function. A framework facilitates communication by expressing how the team plans to apply user feedback data into their development. If a team responds to change positively, then the team can be in a better position to make a higher quality game. Having an efficient model of incorporating changes can enable teams to respond to change positively. Incorporating changes from user feedback data early, can lower the risk of failure for when the game is released. For this research, all sources were collected using journal databases such as WorldCat and Academic OneFile as well as Google searches, and video game development books.

Literature Review

Video games are usually made by teams, which can range from two people to hundreds of people. Large development teams require extensive communication and coordination in order to produce a high quality, fun game. Communicating the intended vision of a game to the entire team can be difficult, but it is extremely necessary and important. If team members do not understand the intended vision, they could be creating content that does not fit the game and in turn could have wasted effort.

Jesse Schell is a well-known name within the video games industry. His book, The Art of Game Design: A Book of Lenses, is a series of best practices and has many practical examples that relate to all the facets of video game development for aspiring developers to learn. Schell describes a successful team as a team that must love the game they are making [1]. He says that the most common problem is that team member fall in love with different visions of the game [1]. Each developer holds a different, often conflicting, idea of what the final game will look like. This can lead to a low quality game.

Schell discusses how a game improves through an iterative process [1]. He stresses that a game should go through many loops (iterations) using the “rule of the loop”, which says that the more times the game is tested and improved, the better the

game will be [1]. This is a well-known concept and developers have been practicing it for many years now.

Clinton Keith, author of *Agile Game Development with Scrum*, explains the difficulties of working on a large team. The dramatic increase in the amount of money games require and the short development cycles has caused the need for teams to have more developers [2]. Keith points to the concept of communication among teams as the main problem in teams. As team size increases, lines of communication increase exponentially [2]. Keith offers a solution to decrease the number of communication lines and encourage a more focused vision. This is to structure the team in a hierarchy of management and developers [2]. In doing this, teams have leads and leads have leads and so forth. This allows for more direction or vision to be coming from less people. Creating video games is a collaborative process, and a hierarchy will not fix all the problems that still exist with sharing a vision. The people at the top of the hierarchy still need to get on the same page for the games vision.

Kurt Lewin, a German-American psychologist during the 1930's, came up with a model known as the Lewin 3-step Change Management model. The first step is 'unfreeze', the second step is 'change', and the third step is 'refreeze' [3]. This a theory of change management to help people and teams make change successful. This can relate to the video games industry when a team uses iteration as part of their process. The 'unfreeze' step is collecting user feedback data and the development team preparing for possible changes. The 'change' step is then making any necessary decisions based upon the data. The 'refreeze' step is committing to the changes and then building or updating the game. Using and learning this model as a team can aid a team in preparing for the appropriate changes that may come with iterations.

These concepts of communication and preparing for change stress the need for an efficient method of incorporating user feedback into the game. Communicating the intended vision is incredibly important in order to achieve a high quality, fun game. Developers need to be prepared for changes and iteration on the game design so that they can continue to produce high quality content that matches the vision. The concepts are a foundation for this research. Communicating and being prepared are key elements for achieving a smooth process of incorporating feedback into the game.

III. Methodology

Introduction

While research has been conducted on ways of collecting user feedback with different types of playtesting and data collection methods, this research looks to discover how current studios are incorporating the data into their game. The research looks at which user feedback sources, such as usability testing, teams use as a basis for understanding how they actually incorporate the feedback. Specifically, the study looks to find out which people are making decisions, how the decisions are communicated, and how are they put into the plan. After researching how multiple studios incorporate feedback, this research gives insight into the commonalities and differences among them.

The research provides awareness and best practices for other developers to use when trying to figure out a process of incorporating feedback into their game. It also helps to show various ways of how to deal with those changes as a team for things like communication and decision making mechanisms.

Participants

The researchers chose 10 different team members that were a part of different teams of varying sizes. The teams were selected based upon availability and convenience. All teams interviewed had at least 1 game professionally shipped. For each team, the researchers interviewed either a Producer, Creative Director, or a dedicated User Researcher from the team. The researchers gathered the essential information on their processes of incorporating feedback into the game.

Table 1 describes some general details about each team. The team size is grouped into either the small (s<20), medium (20<s<100), or large (s>100) selections. The release types are either as a release, early access, or as a service. The last column is the main game type, either single-player (SP) or multi-player (MP). The research defines "As a release" as a game with a development cycle that has a harsh deadline to release the game with all of the features such as *Call of Duty*. "As a service", the research defines as a game with a development cycle that releases updates on a regular cadence such as *World of Warcraft*. Lastly, the research defines "Early Access" as a game that is released, considered not finished, and developers continue development, such as *ARK: Survival Evolved*.

Team	Team Size (s)	Platform	Release Type	SP/MP
A	Large (200+)	Console	As a release	SP
B	Medium (50+)	PC	Early Access	SP
C	Small (~20)	Mobile	As a release	SP
D	Medium (~90)	Console	As a release	SP
E	Medium (~40)	PC	As a release	SP
F	Large (100+)	PC	As a service	SP
G	Large (160+)	PC	Early Access	MP
H	Large (~120)	Console	As a release	SP
I	Medium (~75)	PC	As a service	MP
J	Large (100+)	Mobile	As a service	MP

Table 1: Team Details

Process

The researchers conducted a phone interview with each participant. The phone interview, on average, lasted between half an hour and an hour. The researchers recorded the team size, the platform of the product, the release type, and the main game type (see Table 1) for each teams' game. When some teams worked on multiple games simultaneously, the researchers directed and advised the interviewee to respond to one game for all questions. The phone interview consisted of mainly open-ended questions with guiding questions on the studio's development practices and process on a particular project. The essential information collected included: what are all the sources the team uses for user feedback and the value from each source, what does the team do next with that user feedback data, and how does that integrate into development. The set of guiding questions can be found in Appendix I.

After gathering answers and information from the interviews, the researchers organized the data into separate categories. The categories are: Sources of Feedback, Value of Each Source,

How Feedback Is Chosen, How to Prioritize, How is it Implemented, and Communication of Changes (see Appendix II-VII). The researchers categorized the data for each team. All teams and studio specific names were kept confidential. The results and implications discuss the findings from all of the data collected.

IV. Results

Introduction

The following sections outline the results of all the interviews. Processes and team member involvement for incorporating user feedback data into their respective games varied among teams. With many dependent situations and nuances that arise in the chaotic course of game development, the following explanations of how teams incorporate user feedback data represents a general guideline that the teams followed. There is no "silver bullet" or "gold standard" that teams follow like a rule book, but more of a fluid process.

The results summarize the types of sources teams collect data from, the general flow of data that all 10 participants use, and a flowchart for each team on how data goes from user feedback data (raw data) to an actual change integrated into the development plan.

Key Terms Defined

All of the teams interviewed used different terminology for the types of testing or data collection they performed for user feedback. This research does not focus on how the particular testing was performed, but emphasizes on the what teams do with the data that comes from the feedback. To categorize data and align data to a basis, all types of data that teams collected are defined below. The separate data types are separated by the purpose of collecting the data. This research defines the following:

Usability testing data (U) – information gathered to gauge the player's understanding of mechanics in the game, to see if player can progress in the game, or to measure ease of interaction with the game through playing the game.
Market testing data (M) – information gathered to see if the target audience shows interest in high concepts of the game.
Playtesting data (PT) – information gathered to learn which parts of the game are fun, engaging, or challenging through playing the game.
Forum data (F) – information gathered from players who post any thoughts or ideas to online forums.
Survey data (S) – information gathered through any type of developer created survey that players participate in.
Analytic data (A) – quantitative information gathered through in-game hooks automatically on player's behaviors or actions.
Customer support data (C) – information gathered through customer support department relating to bug reports or complaints.

Sources Used by Teams

Table 2 clarifies which sources each of the team's use for collecting user feedback data.

Team	U	M	PT	F	S	A	C
A	x	x	x				
B			x	x	x		
C	x		x			x	
D	x		x				
E			x				
F			x	x			
G		x	x	x			
H	x		x	x			
I	x		x			x	
J	x			x	x	x	x

Table 2: Sources Used Per Team
U – Usability, M – Market, PT – Playtesting, F – Forum, S – Survey, A – Analytic, C – Customer Support

Flow Chart Example

To more easily understand the flow of user feedback data, Figure 1 presents a flowchart for Team A. The flow chart expresses the people involved, setting, and outcomes for each step. It tracks how user feedback transforms into actual development plans within Team A. Flow charts representing the 9 other teams in Appendix VIII-XVI.

Team A

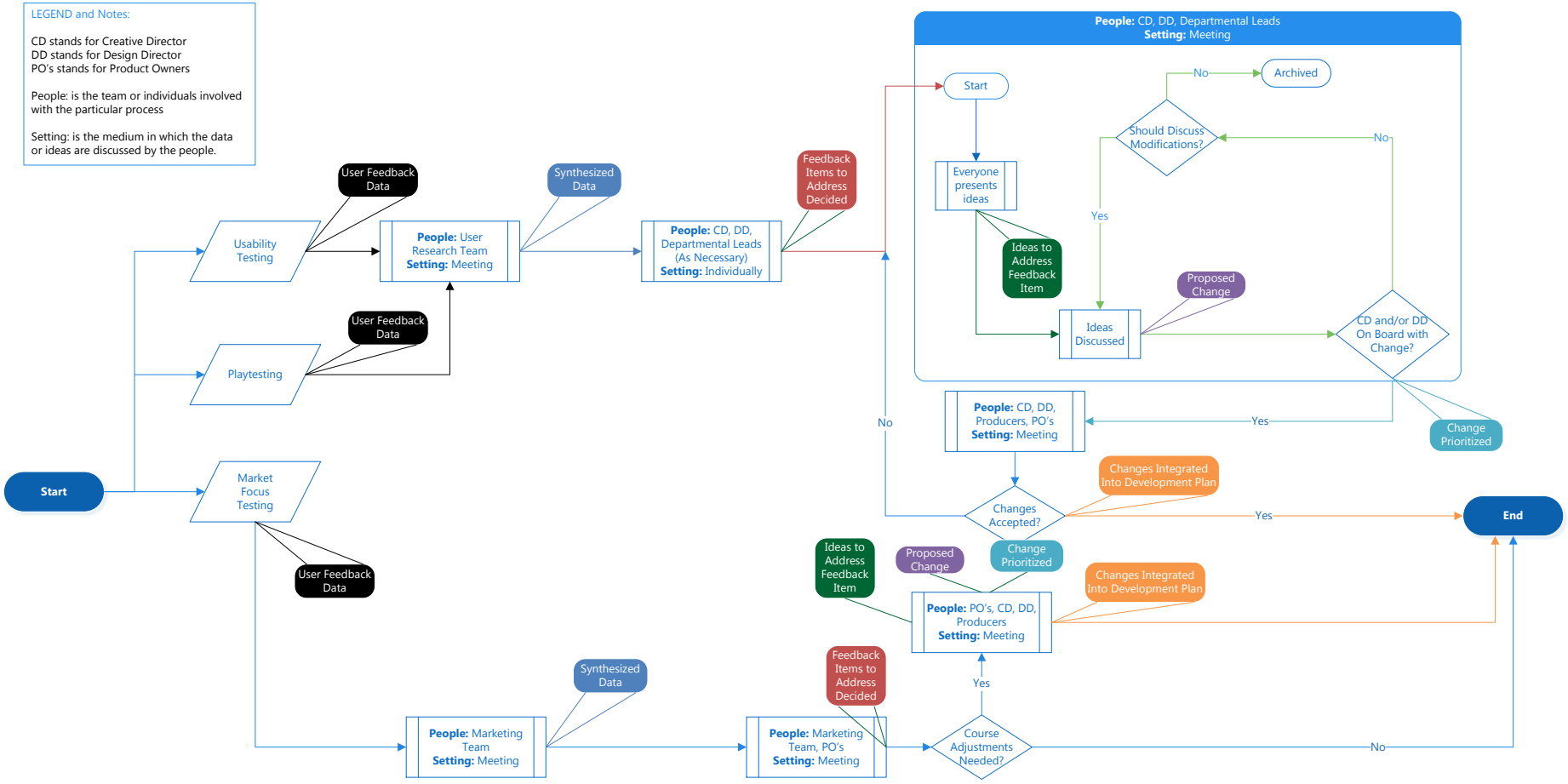

Figure 1: Team A Flowchart with callouts on the stages of data flow.

V. Conclusions

User Feedback Data Flow

When teams apply user feedback data, the data must transform from information into a decision. In other words, when user feedback is collected, the team must determine whether to address some of the feedback or ignore some of the feedback, either way it is a decision. Figure 2 illustrates stages of user feedback data transforming into an actual change integrated into the development plan. The stages represented are all outcomes from some particular action that is unique to the team. All 10 teams use these stages in some manner. Some teams may do multiple stages in one step.

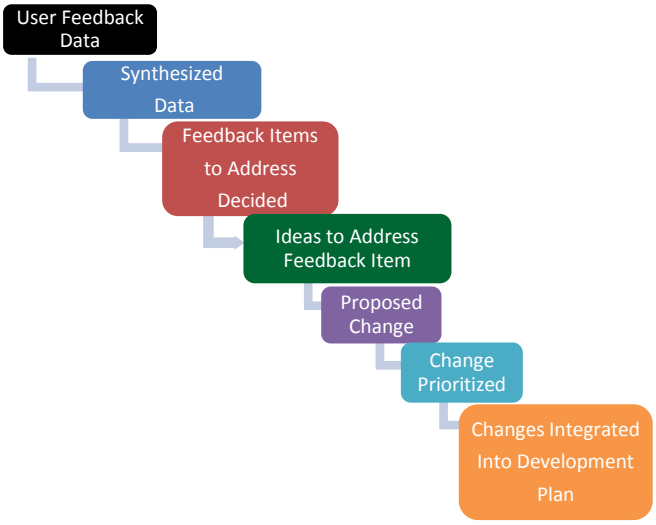

Figure 2: Stages of Data Transformation

Stages Explained

Before any data is collected, teams either have specific goals on what they are wanting to find out, or they are unsure of what their specific goals are and are just looking to see what someone thinks of the game. Once user feedback data is collected, that becomes the starting point for every team in choosing what to do with the data.

Teams must then synthesize the data, or make sense of the data. The type of data and how the data is collected determines how it is synthesized. For instance, if it is usability data, it is observational notes on what people did and did not do correctly, as well as their explanations of how things work or why they did things a certain way. Someone or some group must read through the data to make sense of the answers and glean out any outlier data. The process of synthesizing data can be thought of as coming up with a summary on what was most significant in the data that the team might use to make an adjustment to or just confirm the design. Using the same example of collecting usability data, the team can find out if something in the game seemed to be completely understood.

Next, the synthesized data goes through the stage of deciding which feedback item to address. Addressing feedback mean that the team will make an effort to iterate upon the game in order to improve the experience. Each new concept in the synthesized data is a feedback item. An example of this for usability data might look like the following:

1. 4 of 10 players said they could not figure out what the score was meant for.
2. All players figured out how to score.

For this example, the team then needs to decide whether to address feedback item 1 or feedback item 2. Depending on the game, since feedback item 2 seems to show understanding of a mechanic, the team will likely decide to not address this feedback (it is possible that the team might want no players to understand how to score or only a few players to understand, which would mean they might want to address the feedback). Whereas for feedback item 1, the team might not feel satisfied that only 4 of 10 players understood what the score was meant for and the team would then choose to address that item. Once the feedback items to address have been decided upon, those items are prioritized. Teams prioritize the feedback items based off of many different factors such as the team's goals, the game's intended vision, or the development schedule.

The team now knows what feedback items to address and must find ways to address the data. At this stage, the team comes up with ideas to directly address the feedback item. These ideas may involve changing the current game in some way, adding mechanics or content to the game, removing mechanics or content from the game, or a combination of the previous three ways. For the score example, an idea could be: add a tooltip that highlights and has text describing what the score is for, change the score font to a larger size in the user interface, and remove the icon next to the score. Another idea could be as simple as animating the score when it increases. There are endless ideas on ways to address a feedback item.

The next stage is deciding on which ideas (solutions) to implement. The team proposes which changes to make. The proposed change may be a combination or some derivation of the ideas in the very end. The team does not further discuss any of the ideas not chosen. The proposed changes then go through another prioritization stage.

At this stage, the team prioritizes the proposed changes. Some changes might not be possible. Changes are generally highly variable in the amounts of time to implement. Some changes may be prioritized over another due to risk associated with implementation. After the proposed changes are prioritized, the team finds a way to integrate those changes into their development plan.

Lastly, the team figures out how to integrate and implement the prioritized changes. When the prioritized changes are combined into the development plan, the team can now continue development and they have successfully attempted to respond to user feedback data.

Possible Factors that May Affect Applying User Feedback

A reason for gathering user feedback data is because at some point a question arises: When do we need someone else besides the developer to play this and see if it is good? When do we need those outside eyes and fresh mind to play and evaluate the game or portion of the game? There is no silver bullet answer, that is for certain. Every single game is different and players aren't even sure what they like a majority of the time.

All of the team members involved in looking at the user feedback data or interacting with the user feedback data affect the next iterations of the game. The way a developer responds and addresses user feedback data is different among each developer. A designer's priority of feedback needing to be addressed could be much different than a producer's priority of work that needs to occur over the milestone.

There is also a time when all the players are saying something is not good, but the developer still thinks it is good and players will like it. The developer is not willing to accept the opinions of the sampled users to account for the entire target market. This is why recruiting lots of players that are part of the target market throughout development is so important for testing the game. The question is how do we, as a development team, make a decision on how to progress with conflicting opinions from the play testers and developers? It could come down to developer expertise, trusting the user feedback data, trusting the game designer, trusting the game design itself, trusting the creative director, trusting the producer, trusting the product owner, etc. There are many influences the decision makers have and they must balance and choose wisely.

The culture of the team making the game has an "un-measurable" influence as to how teams choose to integrate changes from user feedback data. Some teams may encourage an open willingness to take feedback from "outsiders", the user feedback data. While other teams may prefer to be more assertive in the choices they make; therefore, the team is less willing to listen to the feedback or respond to the feedback.

The size of a team also influences how user feedback is processed and used. Larger teams tend to give more responsibility to leads, directors, and PO's. The larger teams generally have more specialized departments to deal with specific feedback. Many times, the larger team will have a department dedicated to synthesizing user feedback before developers even see the data. Smaller teams have more flexibility and are able to have more team members discussing feedback together. The smaller teams generally analyze all feedback as a whole, rather than categorizing. This means that all of the departments of a small team discuss feedback together. Lastly, many times the developers see the raw user feedback data and must make sense of the data themselves; there is no department dedicated to synthesizing the user feedback data.

Change Model

The conceptual model for change that Lewin presents have core fundamentals that the 10 teams utilize. The general flow of how data transforms among the 10 teams can be thought of as a subset of the change models. In other words, the core ideas that the change models suggest are used in the transformation of user feedback data transforming into integrated changes. The stages expressed in Figure 2 are specific to responding to user feedback data in video game development.

For the Lewin model, the 1st step of "unfreezing" can correlate to the stages of gathering user feedback data, synthesizing the data, and deciding which feedback items to address. This step involves prepping for change as a team to realize its necessity. Following this step requires a team to accept change, therefore "unfreezing". The 2nd step correlates to the stages of coming up with ideas to address the feedback items, proposing changes, and prioritizing changes. This section of stages gets a team to figure out how to change or transition. Lastly, the 3rd step, "refreeze" correlates to the stage of integrating the changes into the development plan. When the change is recorded and planned on the schedule, the team is now "frozen". The team may remain "frozen" until the next set of user feedback data, although a change may be requested or needed that does not spur from user feedback data. The change could come from the developers or publishers.

Although the change models are based on the concept of an organization changing, the model is appropriate to use for preparing for product changes.

VI. Future Research

For future research on this topic, the researchers would analyze the frequency of responding to user feedback data. The cadence that development teams have in collecting and reacting to user feedback data can have a major effect on the reception of the final release.

If the researchers could perform the study again, they would try to increase the number of participants. The researchers would also interview more diverse teams in terms of the team size, the platform, and the main game type of a game in production. The researchers would like to focus on interviewing teams who are releasing games as a release, as opposed to a live service or early access game. Games as a release has different production challenges than live service games. Games as a release have more of a hard deadline and require different prioritization of features throughout development due to the hard set deadline.

The researchers would also like to try to define and figure out a common understanding of team member roles or positions across different studios. Essentially, the researchers would define specific roles for a development team and if a company brings up a new role "name" of a developer for who does something, the researchers would ask questions to fit them into the pre-defined roles created by the researchers.

Further research on measuring qualitative success based on how teams apply user feedback is a possibility. If success could be defined objectively and anonymously, this research could be continued to analyze how successful teams apply user feedback data. The research would then address qualitative success of how teams iterate in addition to the efficiency of how teams iterate that this study focused on.

Lastly, supplementary research on how organizational power structures and team dynamics affect applying user feedback would be interesting. Observing ways in which teams make decisions, whether it be expertise, experience, or some other factor, would give insight into how teams make decisions. Establishing and finding out who is responsible for making specific decisions within the process of applying user feedback could provide more understanding as to why teams apply user feedback a particular way. There are times when team members working together develop a "give and take" type relationship and have varying levels of trust on a project. Further research into how relationships and trust affect how a team makes decisions would be valuable.

VII. Closing

A good feedback cycle can dramatically increase the quality of a game because the game has more data and intentional iterations to attempt. There are many sources of user feedback ranging from usability testing, playtesting, market research, analytics, etc. Teams can mitigate risk by making the necessary iterations as a product progresses in order to ensure the target audience enjoys the game. Setting up a development environment where teams can find successful ways of responding to user feedback is crucial to make collecting user feedback data actually useful. Finding a process to incorporate feedback smoothly creates a common language so developers can accurately discuss elements of their discipline and make the game better for the players.

VIII. References

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Appendix I

Guiding Questions

General Broad Questions = ○
Specific questions (as needed) = ▪

- **What sources do you use and why**
  - What sources of feedback do you use to iterate upon your game?
    - Community feedback through forums, playtesting, usability testing, development team testing?
    - Do you value particular feedback from one source over another source?
    - What do you value in each?
      - Why do you not value those sources?
  - Why do you choose to use that source(s)?
- **How do you choose the feedback to address**
  - How do you decide which feedback to incorporate from each source?
    - Who makes the decisions to address feedback?
    - Based on severity? Frequency?
    - How long do you keep the feedback? Or when does it become irrelevant/obsolete? Who makes those decisions?
    - Is particular feedback handled by designated people?
    - Who distributes that feedback?
  - How do you prioritize feedback into the plan?
    - Who makes those decisions?
    - How do they come to that decision?
    - How is it communicated?
    - How are plans adjusted?
    - What are the implications for the actual working build?
- **What happens next, how does it make it into the game**
  - What is your process for incorporating any feedback into the game?
    - Do you have more of a process approach? Or more reliance on personnel expertise for choosing feedback?
    - How do you adjust the plans?
  - How do you communicate the changes?
  - How do the changes affect the goals of future testing?

Appendix II

Team	Sources
A	Team A performs five different sources of feedback testing during different phases of development to collect data. They perform usability testing, focus tests, marketing focus tests, beta tests, and internal tests. Some tests may be performed more often than others, all of them occur at different frequencies and it mainly depends on the results and development schedule. For most of the testing, they try and incorporate both quantitative and qualitative questions to get thorough data.
B	Team B mainly has 4 different sources of feedback during development and post alpha launch. They heavily monitor forums and have voting on the community forums. For the most active players, each week they release a playable version of a game mechanic and have them fill out a survey on the mechanic. Every week a general community survey is posted on the forums on whatever the development team is looking to gather information from. Lastly, Team B requires that each team member playtest at least once a week. After playtesting the team member writes up any notes they want to express and send them to the creative director.
C	Team C uses 4 different sources of feedback during development. They perform internal playtesting, as a team, 3 times per week, playing for around 30 minutes. As part of that playtesting, once a week, after one of the internal playtests, they have a team meeting for 30 minutes afterwards. They perform what they call a "FTUE" (first time user experience) with friends and family, alongside usability testing. Closed alpha and beta testing comes towards the end of development. Lastly, they perform a soft launch with a closed audience.
D	Team D gathers feedback from 3 different sources. They perform what they call internal focus testing where they have a designer actually present the game before it is play tested. The studio has a friends and family formal playtesting source of feedback. Lastly, they do external playtesting with a studio they cooperate with on the game. All playtesting is performed with testers that know about the project and are under NDA. They perform all 3 of these types of tests throughout development.
E	Team E collects feedback from 3 different sources, internal playtesting, forums, and external playtesting. For internal playtesting, there is no formal schedule or requirements for them to play the game. Sometimes they will schedule for the entire team to play the game, but it is very ad-hoc. The studio monitors forums for any valuable pieces of feedback. External playtesting is consistently scheduled and for this testing they bring in a few testers.
F	Team F has 3 different sources of feedback during development. They have internal playtesting that is required of each team member once a week. They also have an internal playtest team who is dedicated to making adjustments and talking with the design team. Lastly, they gather data from online forums.
G	Team G uses 4 different sources of feedback during development. All 4 sources are at very different frequencies in development. Internal testing happens on an ad-hoc basis. The studio has a dedicated developer QA team of 4-5 testers that gives some design feedback as well as reporting bugs, which is a full-time testing. The publisher for the game performs focus tests about 1 time every 1-2 months. Lastly, developers interact and read community forums on an ad-hoc basis.
H	Team H makes use of 4 main sources of feedback during development. These include external playtesting, internal playtesting, usability testing, and forums. Each is done or gathered in different frequencies and time in development.
I	Team I uses 3 sources of feedback during development. Usability and external playtesting are 2 types of testing they perform. Analytics is another source they use in order to validate the other 2 tests. No testing was performed until open beta of game.
J	Team J essentially has 5 sources of feedback that all gets deduced into 1 coherent story for developers to use as a basis for making decisions. The 5 sources are usability testing, surveys, analytics, forums, and customer support. These are all basically performed at the same frequency, with the exception of customer support, during development.

Appendix III

Team	Value in Each Source
A	• **Usability** More towards early development, the studio conducts usability tests for feedback. There are few participants needed for the usability testing as it is more of a 1 on 1 with the tester and developer. They value this source for feedback in order to learn whether or not the player understands what to do. This studio uses the test to figure out if the player gets confused, if they struggle with controls, to identify expectations, and to gauge difficulty. They choose to use participants that have never seen or played the game before, so they can provide first time experience data. • **Focus tests (External Playtesting)** Team A also performs focus tests with 20-30 people. These tests also occur earlier in development and they value the data for gauging the more of the fun of the game. They capture footage of each of the player's game and store them for later access. They also have participants take surveys to self-report on whatever the development team wanted to figure out. The development team may want to know how fun a particular area was, or how challenging it was. They may want to know if the player thought a particular cut scene was awesome, or how interesting the story is. After these tests, the participants generally have some sort of lunch and at times, some developers will try to listen into what the participants are talking about from the game. This gives their developers more of a raw analysis from the players rather than having any sort of structure or pressure of answering a question or being put on the spot. They choose to use any type of participants besides the developers themselves. So they may use other developers at times. These participants can provide relevant data since they don't know everything about the game like the developers do. • **Marketing focus test** The marketing focus test is very similar to the other focus test. Main goal of the marketing focus tests is to see if the games high concept is interesting to players. They choose participants that fit into the target consumer of the game. They value this testing to try and determine if the game will actually sell to the target market. • **Beta tests (combined with external playtesting)** Beta tests come after a build has actually been sent to a closed or open audience to play a version of the game. This testing comes towards the end of development. They value this testing to determine if there are any minor tweaks that can be made to better balance the game, to find and fix bugs, and to mitigate any confusing aspects of the game. • **Formal internal playtesting (Internal Playtesting)** Lastly, formal internal playtesting for the studio happens once every 1-2 weeks throughout the entire development cycle. They gather people from different divisions of the studio, that have not worked on the game, each time and have them sit and play the game while some developers listen in to any feedback the person may have. This is more of a chance to get an objective eye from a person who has experience with making great games.
B	• **Forums** Team B tries to glean any heavily repeated or "loud" feedback to address. They value this source for finding the large items that players either want or dislike. They value the source because if they are posting in the forum about the game they play, it generally means they really care about the game since they went out of way to post their thoughts. Additionally, the developers have active polls for players to vote between gameplay items and whichever one gets voted, gets implemented. • **Released playable mechanic survey (Surveys)** They value this source for finding out if something is fun. Only the most active players have access to the mechanic and fill out the survey. This means that the core of the community is helping guide the game. Team B values this source for testing fresher ideas and mechanics for fun level. • **Community survey (combined with above survey for data)** They value the community survey source as a way of finding more micro level feedback from players. Since the survey is released to a broader audience of players,

	the studio values finding out what most people think about specific gameplay items. The survey is not as "open forum" for players to express stream-of-thought, but a more structured feedback source. • **Formal internal playtesting (Internal Playtesting)** For this testing, they value this source for a more expert opinion on what the development team thinks of the game. They value this source because the developers are more in-tune with how things are working on the game and can analyze things that a player would not see. The studio uses it more for daily feedback to make micro adjustments if necessary. Or if something seems completely off-track they will call a meeting to discuss the gameplay item.
C	• **Internal playtesting** For this testing, they value this source for a more expert opinion on how fun the game is and what gameplay elements they think are fun or not fun. They value this testing to make decisions on how to progress as well. For example, if they don't think the game is fun, they will keep prototyping ideas. Allows them to make large shifts early in development, rather than later. • **FTUE/Usability (Usability Testing)** The team uses friends and family to perform usability testing. They separate the play testers who have never seen the game before into the FTUE group for looking at feedback. They value this feedback for usability issues. These include: does the player know what to do, can they perform the task without developer help, is it easy/ergonomic to play, do things make sense. They value the FTUE group specifically for how they interact with the game to view how the game is approached. They also value it to identify player expectations. • **Closed alpha and beta (Analytics)** They value this source mainly for finding technical issues. They also use this source for collecting data on user acquisition. They also collect metrics to see how many times the user performs a specific action. They value this to get a sense of what the player is actually doing in hopes of finding something that seems like an oddity. • **Soft launch** They value this source of feedback for assessing player retention, the number of day 1 installs, and metrics tracking. They can then use that data collected to better optimize the balance for the full release. They value this source for balancing any gameplay elements.
D	• **Internal focus playtesting (Internal Playtesting)** For this testing, they have the main designer on the gameplay being tested present the gameplay before any testing occurs. They get different people each week, around 20 people from either the art or programming departments, to test after the informal presentation. They value this for finding the common sense type fun. It is a way for them to self-validate their decisions and see if the game is what they call "sticky". Stickiness meaning that the testers want to keep playing. It is also valued for understanding, but usability is not the main focus. • **Formal friends and family (Usability testing)** They have about 10 people come in, who are not working on the same game, to test the game. The testing is led by a moderator but the moderator is only there to guide players on how to start the game up or if they get stuck. A panel of mainly designers watch the testing from a location where the testers do not see them to see how the players are playing and watching their reactions. After the testing is done, the designers come in to talk with the testers. They value this source for getting a 1st blush about how the game is to an external audience. Seeing how engaged and how much fun they are having is the value in this testing. • **External studio (External Playtesting)** This testing is mainly performed mid to late production. They have about 6 groups of about 10 play on scheduled days every 2-3 weeks. The testers play the game and talk with moderator and others afterwards. The studio also has the testers fill out a survey for this testing. They livestream all of the play to a stream that only the developers can watch. They value this feedback for finding small adjustments they can make. Team D

	uses it for the last validation of stickiness being maintained, but they do not make any radical changes on gameplay or aesthetics.
E	• **Internal playtesting** They value this feedback for analyzing how good the game is from a qualitative standpoint. It is valued for finding out how much "over the shoulder" fun the player is having. The value the testing to see if the player is getting stuck and to see how the player approaches the game. • **Forums (taken out -used on different project)** They value the forum for finding out what the majority are most engaged with. Although the community only sees some of the work and has not played the actual game, they value the thoughts of what it might play like. The studio gauges the interest of what the community wants most. • **External playtesting** The team values this testing for a more objective opinion on how the game is to someone who has never played the game before. They look to gather information on the players understanding of the game and their engagement level.
F	• **Internal playtesting** They value this feedback for finding out what is fun and to see if there is any confusion or inconsistencies with the game. A designer moderates each team member who playtests the game to gain a better perspective as to what the tester is experiencing. • **Playtest team (combined with internal playtesting)** The studio values this source for finding more detailed inconsistencies or finding things that could use improvement. They are a dedicated team to find out ways of making the game better and communicating with the designers on how to improve elements. • **Forums** They value this feedback for finding out what the trends of players are and finding out what is most liked or disliked. They get more of a fresh perspective of what someone who does not develop the game thinks of the product.
G	• **Internal playtesting** This testing is ad-hoc by team members on the team. Only leads can add feedback to a form which is reviewed by the creative director once every 1-2 weeks. They value this source for finding things that they consider to "not fit" into the game. Meaning, if they deem something does not match the intentions of the goals of the game from a design perspective, they use this source to find those inconsistencies. • **Developer QA team (combined with internal playtesting)** This is a group of 4-5 testers that look for bugs as well as provide design feedback. This group is testing the game every single day, all day to find things to fix or change. They value this source for finding detail inconsistencies in balance and design. The group is trained to try and guess at what the creative director would want changed or removed. The testers are concerned with whether or not the game plays "right". • **Publisher focus tests (Market focus testing)** This is a monitored playtest consisting of players, not developers. The publisher runs these tests to get a sense of how they like the game. They value finding out if the overall game is fun and attractive to the consumers. It is not a focused test on whether or not a specific part is fun, more of a general analysis and broad perspective. The value is in finding out what the players feel like they are missing. • **Forums** Developers interact and read community forums on ad-hoc basis. They use this to get insight as to how players respond to the game and hear what players are talking about. This are for minor changes, usually just changes in the developer's thinking. No real process for addressing this source.
H	• **External playtesting** This data provides objective data for how fun the game is to the target player. They look to gather information on the player's engagement level from different perspectives and through specific areas of the game. These tests will sometimes be conducted in a hybrid approach by utilizing a part of testing to focus on usability as well as engagement/fun levels, depending on stage of development and circumstances.

	• **Internal playtesting** Random developers will sometimes be selected to play the game for getting data on how hard the "harder" settings are in the game. Since the developers have experience with the game, they are more attune to test harder modes of the game to balance difficulty. This is the main purpose of internal playtesting. Ad-hoc testing occurs on a daily basis for own development practices. • **Usability testing** The value of this source is to learn whether or not the player understands what to do. The user research team uses the test to figure out if the players are getting confused, lost, or keep failing. Participants have never seen or played the game before. • **Forums** Community management teams monitor forums to gain information on what players are experiencing or expecting. These are usually the hardcore fans into the game that post to the forums and are valuable for Team H to pay attention to.
I	• **Usability** The testing is led by a moderator to bring in players to have them think aloud and take surveys. They value this source for getting functional problems taken care of such as players understanding of the mechanics and players knowing what to do. This is also used as a guide for understanding KPI's in their game. • **External playtesting** Seeing how engaged and how much fun they are having is the value in this testing. Team I does track overall fun. This was not performed as much, as analytics did the heavy lifting for understanding what was fun. • **Analytics** This was used as a major source for understanding the audience and what they wanted. Things to keep track of exactly what the player is doing, when they are doing it, and ideas as to why they were doing it by looking at various stats/items.
J	• **Usability** Participants come in for an hour to play the game and perform "think aloud". Some questions may be asked of the player by the moderator. The participants are then sent home with the game to play (or not play) in normal setting/circumstances. The participants are then brought back and a moderator talks about their experience with the game. • **Surveys** Pop-up surveys appear in the game at random to gauge player engagement and interest for particular content. Surveys basically provide a replacement for the usual playtesting. • **Analytics** This is used as a major source for verifying the other data sources and drawing insightful conclusions. Things to keep track of exactly what the player is doing, when they are doing it, ideas as to why they were doing an action, and even how much they are spending on the game. It provides a way to categorize players and/or spenders in many different ways. • **Forums** They value this feedback for finding out what the trends of players are and finding out what is most liked or disliked. They get a perspective of more hardcore player's thoughts on the game. • **Customer support** Players will contact customer support for any bug tickets and/or complaints they may have about the game. They use this as a source to intertwine with all of the other data in hopes of solving any of those issues brought up by players.

Appendix IV

Team	How they choose feedback to address
A	At Team A, they follow a loosely based chain of command to make decision as to what feedback they plan to address. The creative director has the most say when it comes to choosing feedback. They also have leads for each department that become heavily involved with selecting feedback that the department would like to address. The creative director and the leads maintain a close relationship to keep the vison of the game intact while also iterating the game as feedback comes in. In choosing feedback to address, they look for patterns in the feedback, essentially frequency. The more frequent a particular part of the game is brought up, the more closely the creative director and leads pay attention to the feedback and are more willing to address. The team does rely heavily upon the expertise of the creative director and leads more so than what the feedback says. They also look into the severity of the feedback item to make decisions on how or if it will be addressed. For example, if they notice something is being called out as the most boring thing by quite a few testers, the director and leads take more notice.
B	At Team B, the design director and the creative director are the main vision holders. They are the ones who are collecting and analyzing most of the feedback in order to make decisions. Both of them share the results with the team to have discussions about them during development. In choosing the feedback to address, they are looking for anything that speaks "loudly", essentially whatever is most frequent. When choosing the feedback to address, they focus on creating minor adjustments for getting a positive outlook. If they see feedback that can be addressed with micro-shifts, then they usually put it on the list of feedback items to address.
C	For the most part, 2-3 people make the decisions that trickle down to the rest of the team at Team C. For any completely new game mechanics, that decision comes from the president of the company. The entire studio has the scheduled and ad-hoc meeting to discuss the feedback to address. The decisions and discussion is a very transparent process with the 2-3 main people making the final decision. To choose the feedback to address, they do not have much of a standard. If it requires a major change, they are less likely to address the feedback if the game is past the prototype phase. Sometimes they will set goals for gameplay elements that can be measured with metrics, for a quantitative observation. Otherwise, the way they choose feedback is ad-hoc.
D	Any major changes that need to happen is determined by the creative director. They will test, play, and talk about feedback and let the data marinate in their minds for a bit before making a decision. For smaller changes, the department lead who the feedback applies to decides what feedback will be addressed. There are leads for many departments including: animation, creative concept, art, programming, design, etc. For earlier playtesting sessions during development, they are more willing to make radical changes to gameplay and aesthetics. The frequency of issues being brought to light are usually chosen. Each playtest and survey aligns with making a decision on something. If something does not align with a decision the studio is trying to make, then they consider its frequency before choosing to address the feedback.
E	At the studio, they have strike teams of around 10 or so and each team has a director and a producer. The director is in charge of holding the vision for the particular piece of the game that the strike team is responsible for. The director generally makes the ultimate decision in which feedback is addressed, which then trickles down to the rest of the strike team. In choosing the feedback to address, they focus on what the players want or need most, essentially what speaks loudest.
F	The team has leads for each department working on the game who make decisions on which feedback is addressed. Leads meet and discuss together about possible feedback that they are wanting to address.

	They make decisions on what to address based on their expertise and their feeling of what is the best feedback to address. They communicate with producers to come up with a viable option to proceed with a change.
G	The creative director is the ultimate decision maker on the game. That person decides what changes will be made and which feedback items to address. If enough high level executives think something needs to change, then they will decide to address an item. Leads can provide feedback on the game and suggest items to address. The creative director sits down once every 1-2 weeks to review all of the feedback from all sources to make any decisions. The creative director makes decisions based on their expertise and their feeling of what the game needs. The creative director really thinks about what the game "cannot ship without". Meaning, what is absolutely necessary for the game to meet the goals set for the game.
H	The production team and design leads choose and figure out how to react to feedback. Feedback items come in every 1-2 weeks during mid-production for the team to figure out how to address. Development team and User Research team will meet occasionally to get more information on interpretation of data. The team makes decisions based on frequency of issues, resources on sprint, state of game, experience/expertise, and overarching game systems. The team evaluates designer intent in all situations to better understand problem space.
I	The Head of Business Unit (HBU) is responsible for entire product and drives general direction of development studio. The HBU and development studio producers regularly meet to have an open dialogue on most recent feedback and then come to design decisions. Studio producers very open to feedback and want as much as they can get. Decisions are based on what could increase player retention. Make whatever changes necessary to make game a success.
J	After each big update to the game, all 5 sources are analyzed together to come up with entire coherent story of results of what is happening in the game and this is brought to the studio where producers will make decisions as to what feedback to address. The studio producers look at the design goals and compare the results. They also look at the impact of addressing particular feedback items.

Appendix V

Team	How they prioritize chosen feedback back into the plan
A	To prioritize feedback, the studio looks at the feedback from a smaller perspective. They make items that require a smaller amount of effort that can make a large impact a high priority. So small tweaks that can have a large impact are prioritized over big changes that require multiple departments. After feedback has been prioritized in isolation, the feedback is then woven into the overall production plan priority. The creative director and department leads are highly involved with this process. The studio relies on the expertise of the creative director for feedback to be appropriately prioritized.
B	For prioritization, the team focuses on feedback that only requires a small adjustment of a gameplay item. Team B also sets goals for their future development and they look at these to see if they are addressing these goals when prioritizing feedback into the plan. An example of a goal might be getting a certain gameplay item into the game by a certain deadline. Or it could be having specific set of parameters to meet for a gameplay item.
C	At Team C, the top 2-3 people, the co-founders, make decisions as to what gets prioritized into the plan. It is an ad-hoc process as things are changing so rapidly and there are many dependencies that can't be accounted for.
D	They look at what is coming up most frequent and place a higher priority on those items. The studio places a higher priority on items that require multiple departments to work on the change. They analyze how the feedback lines up with what they want their core experience of the game to be. If they think the feedback necessitates a change that matches or enhances the core experience, it is a higher prioirity.
E	To prioritize feedback, the producer and director of each strike team consult with what they call the studio chiefs every 2 weeks. Any major changes will be discussed between those two parties. They decide what is most needed for the game and make that the highest priority.
F	To prioritize feedback, the leads must focus on what is extremely urgent to the game. Since they generally come out with an update every month, they must usually push any feedback needing to be addressed to the next release. It is more of a reliance on expertise of the leads and producer to decide which is the higher priority.
G	The creative director gives their own priority order and then the producers find ways of working into the schedule. The priority is based on the creative director's expertise in deciding what the game most needs at the time. The creative director looks at what the next milestone features releasing and if those feedback items include one of those, they are given higher priority.
H	The production team prioritizes all feedback following production and design meetings. Priorities are based on the state of the game, the next milestone, and risks associated with changes.
I	Producers and HBU prioritize core experience feedback over secondary experience feedback. The core gameplay is what is most important. Also, monetization adds a factor in determining priorities, depending on the circumstances.
J	Studio producers prioritize items based on state of game relative to the future release. They also observe the impact of addressing feedback and design goals.

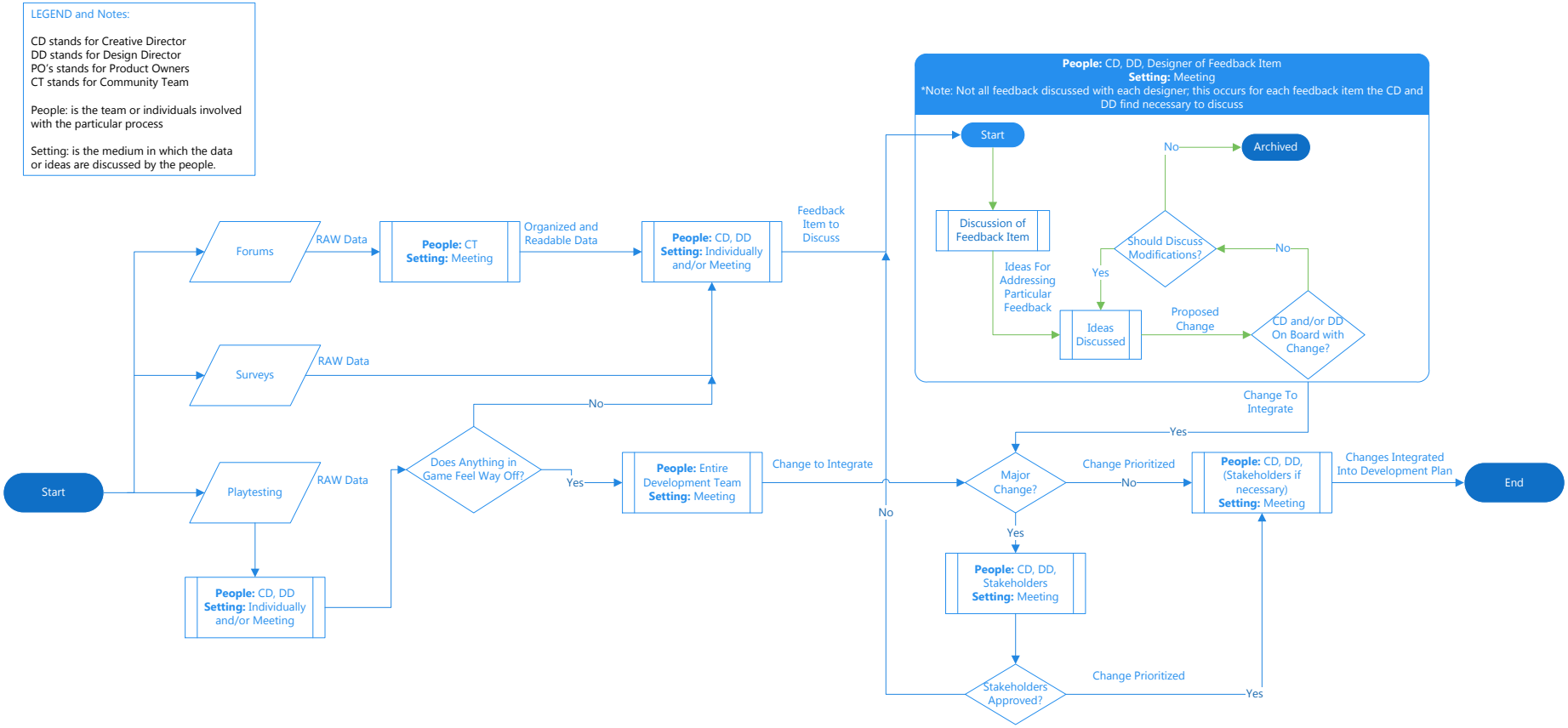
Appendix VI

Team	How they implement and keep the feedback
A	When changes are made for a particular feedback item, the studio will follow up with another test on the same item to compare results. They do not do this for every piece of feedback. The studio mainly uses this sort of process for balancing numbers and minor tweaking. They would not use it to make any major game changes. For Team A, a major game change generally means any change requiring multiple departments. When a feedback item gets addressed and the studio is satisfied with results, the feedback becomes obsolete. Although obsolete, it is archived in case anyone may want to bring it back up at a later date. There are no formal or specific goals set by the studio for the pieces of feedback being addressed. They decide if results are satisfactory based on expertise and the experts' internalized goals in their mind.
B	When they decide on implementing something to address a feedback item, they set a target to reach for the mechanic. For example, if they change a mechanic and set a target for it to be more fun or more engaging than the last version of the mechanics, then they might consider that gameplay item done (or not needing to be immediately addressed if not in the plan). They do a basic form of A-B testing for comparing gameplay elements that are being tested.
C	For changes made to a feedback item that can be measured with metrics, they measure the new results and compare the old results with the new. If they do not see a change in the feedback, they continue to work on addressing it. If they see a positive change, they generally mark the feedback as obsolete and archive the information. However, the feedback could be brought back up again to be addressed at a later time, but it rarely happens because the game is usually in a much different state.
D	Production looks at the deadlines and see what is possible to make changes to. The relevant changes are based on an assessment of risk and time. Production is in extremely tight communication with directors and creatives. The whole team is brought to a halt to discuss how changes will get implemented. All feedback is archived and tracked over time to see if the feedback was addressed or needs to be addressed at a later time.
E	After a change has been made to address a specific feedback item, they test again to see if the change swayed the feedback into a more positive position. If it does, they sometimes call the feedback done and it becomes obsolete, or if they do not feel satisfied, they continue to make changes until they feel comfortable. To get the change implemented, there is a discussion between the producer and director to see what is viable.
F	When feedback is addressed with a change in a patch, the team looks at how the new implementation affected the game and compare the feedback. It is an ongoing process since there is a release almost every month, therefore feedback is archived and looked at across a wide range of time. To get the change implemented, the producer is ultimately responsible for determining if it is doable.
G	At Team G, the producers bring up the milestone chart to see what changes can be fit into development. Feedback items that can be addressed, time-wise, in that milestone are added. The things that do not fit into the schedule are pushed to what they call the "roadmap". This has the next 5 or so milestones scheduled from a high level perspective with vaguer requirements. The producers coordinate with the creative director to prioritize the items into the roadmap.
H	Team H have producers and developers task out all major development changes into JIRA. For minor changes, producers go directly to developer who will/needs to implement the change.
I	-
J	-

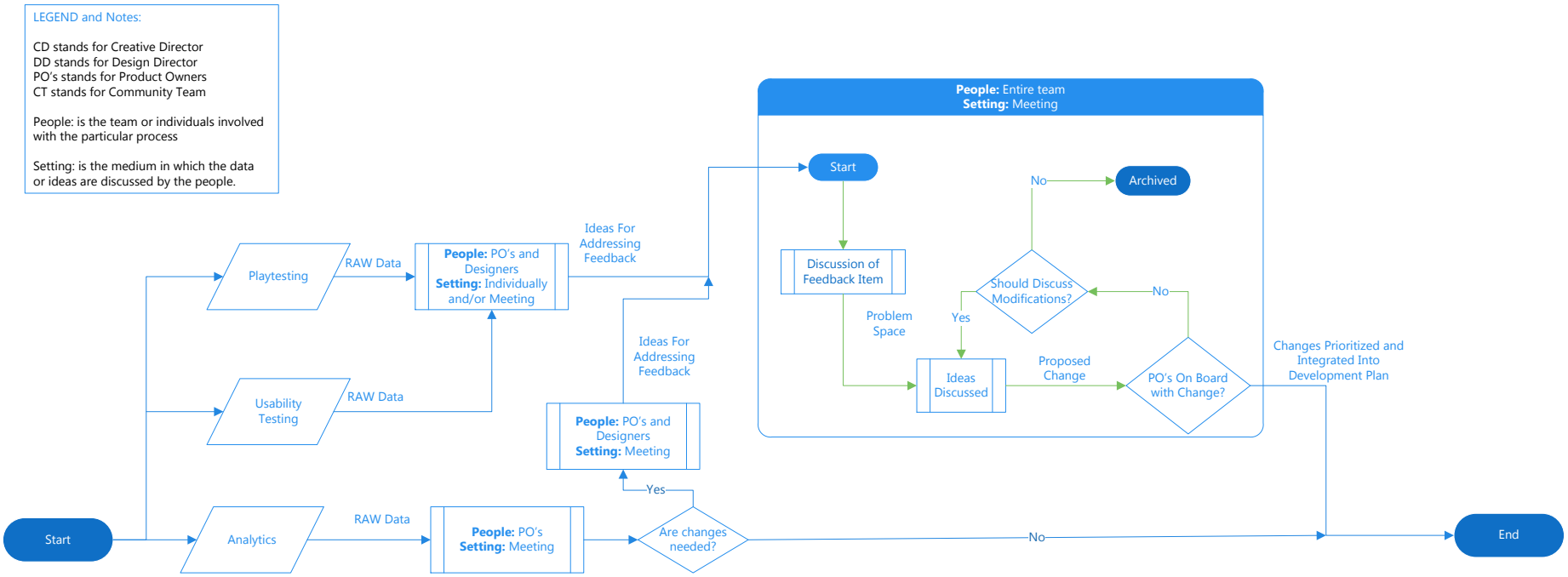
Appendix VII

Team	How changes are communicated across the team
A	At Team A, the entire development team has many opportunities to stay in constant communication about any changes coming from feedback. The studio has large team meetings monthly, small team meetings weekly, and day to day meetings on an as needed basis. For some meetings, they actually stream meetings to a television or monitor that any developer can access to listen into if they wish. It is not a requirement for the developers, but if they want to listen or watch, they can.
B	For Team B, the entire development team meets once a week for at least 30 minutes, no more than 60 minutes. Other forms of communicating changes come from the design director and creative director communicating with team members on a daily basis. Essentially the job of the creative director and design director is to communicate any changes or feedback that needs addressing to the necessary personnel. For major changes to the game, there are update emails that go out to the entire team. Lastly, they actively update design documents that are readily available for team members to view.
C	Team C communicates in a couple of basic ways. They have at least one meeting once a week right after a team-wide playtest to discuss changes. They have ad-hoc meetings for discussing and informing big changes. Lastly, due to having a smaller studio size, they constantly individually communicate throughout the work day on an as needed basis.
D	Team D has numerous ways of communicating changes to the game. They email relevant personnel for the smaller changes that are needed. The entire studio has a meeting at the end of the month to review what changes were made and to see what is coming. Lastly, they have daily stand up meetings where some smaller changes may be communicated.
E	Team E mainly has ad-hoc meetings for discussing changes. To keep from having meetings all the time, they block 2 days out of the week where no meetings can be called. The director's job on the strike team is to float around and communicate the vision and any changes. Lastly, the teams use a chat service that is available on all their devices and have specific channels for certain topics.
F	For Team F, they have a meeting every single Friday to discuss any changes that were made or to discuss making any new possible changes. They also actively use online documentation for team members to access at any time. Lastly, the leads generally have meetings during the week and they are in charge of communicating to their teams of any changes.
G	Team G mainly uses JIRA to track and communicate all changes going into the game. They have developer and publisher meetings every week to discuss the status of the game, where changes are sometimes communicated. The developers mainly look to JIRA to see how the game has changed. The creative director is also in frequent communication with the leads to communicate changes down.
H	Team H has team meetings every week or two to discuss changes and get on the same page. The meetings are organic in nature and what is currently most important is discussed. The team also uses "living" design documents to stay up to date. Lastly, changes affecting certain groups or individuals will be emailed or get a phone call as necessary.
I	-
J	-

Appendix VIII
Team B

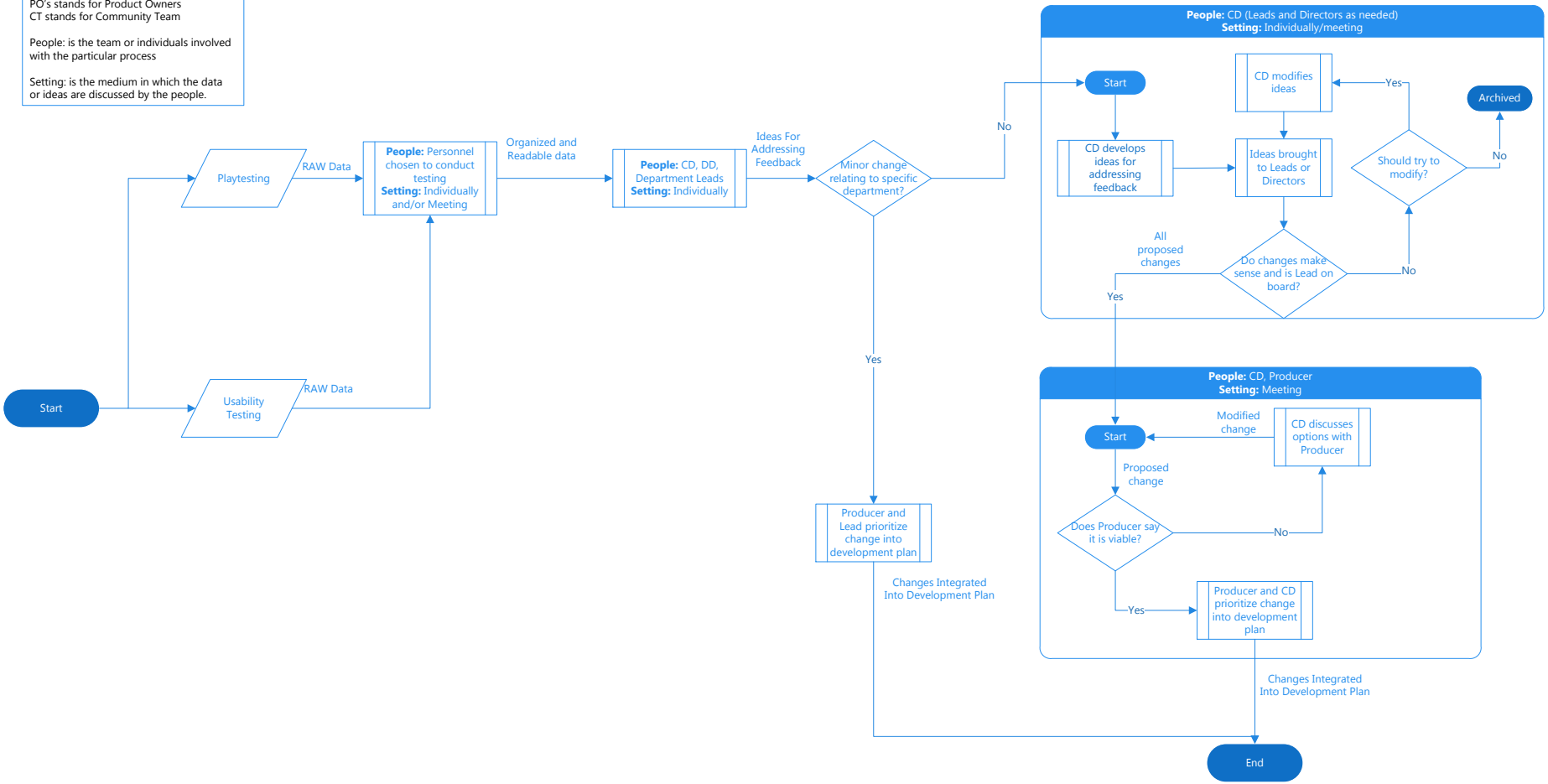


Appendix IX
Team C

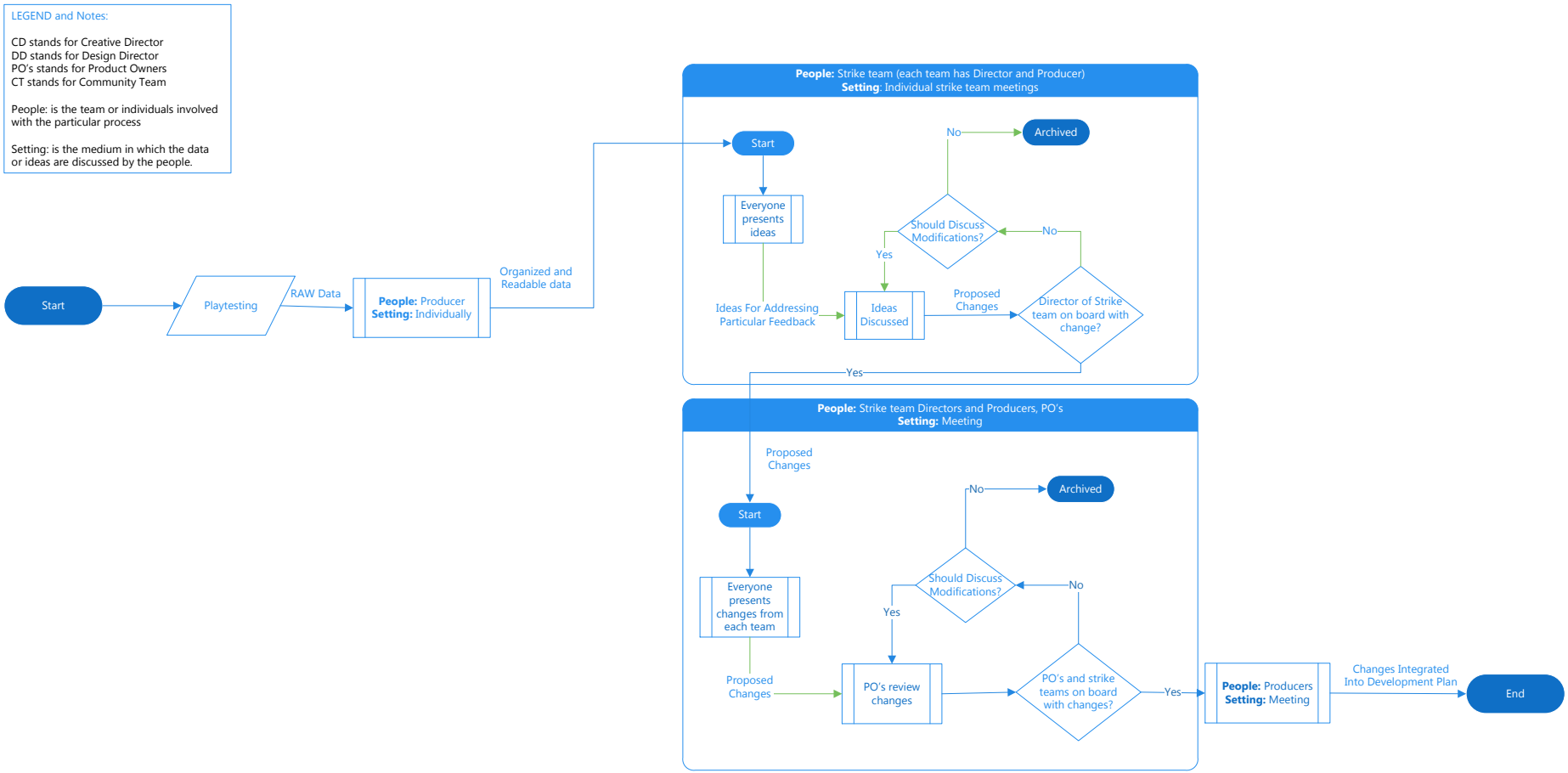


Appendix X

Team D

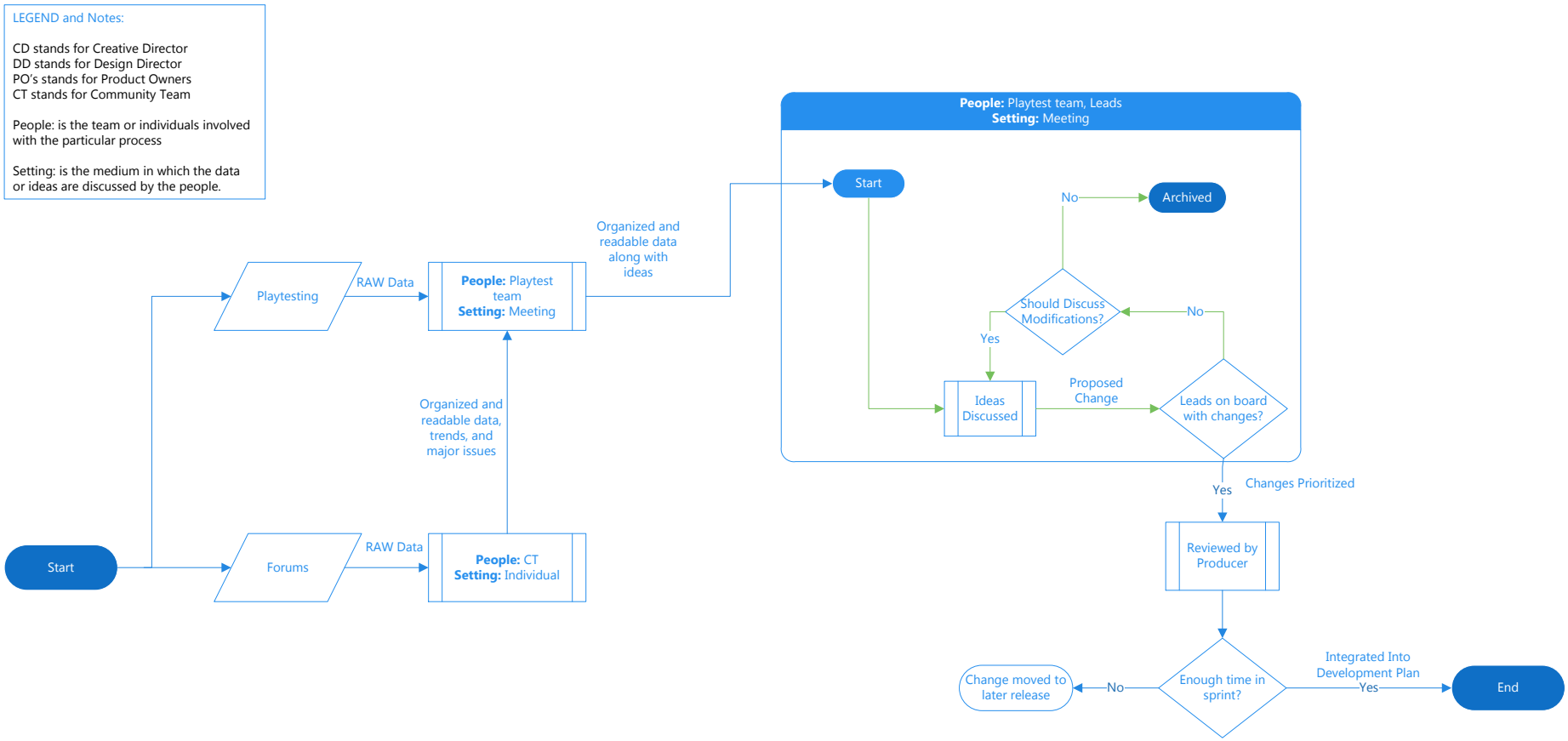


Appendix XI
Team E



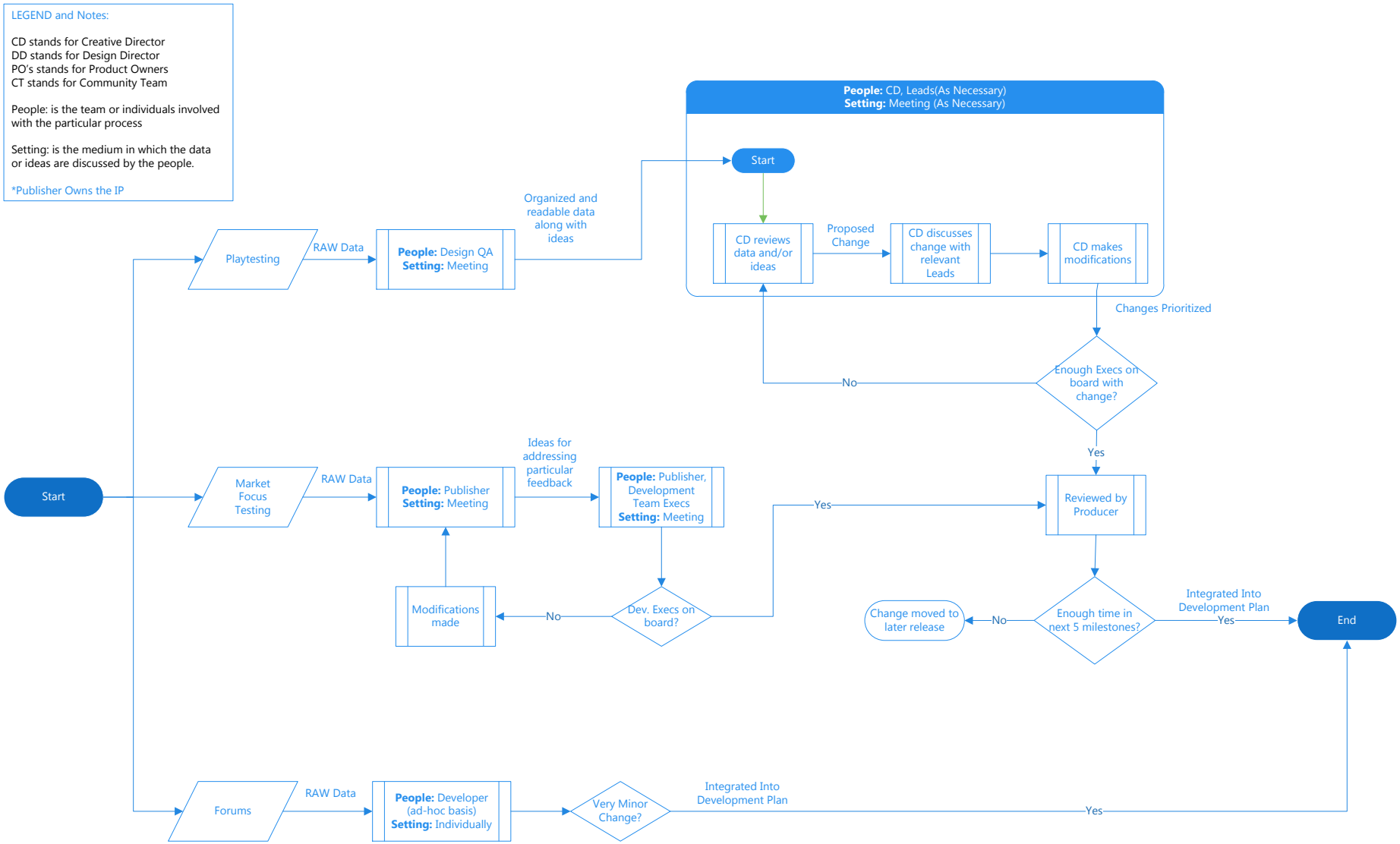
Appendix XII

Team F

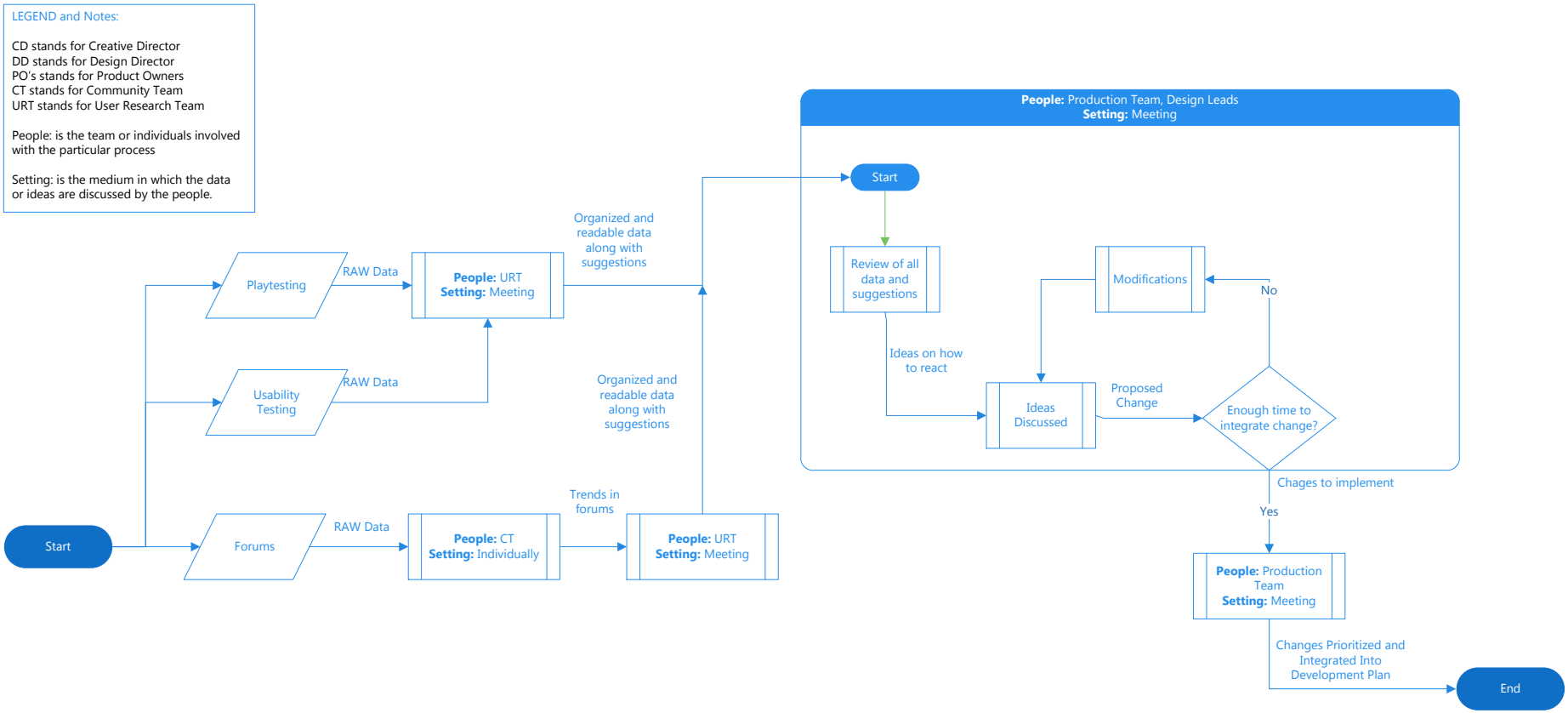


Appendix XIII

Team G

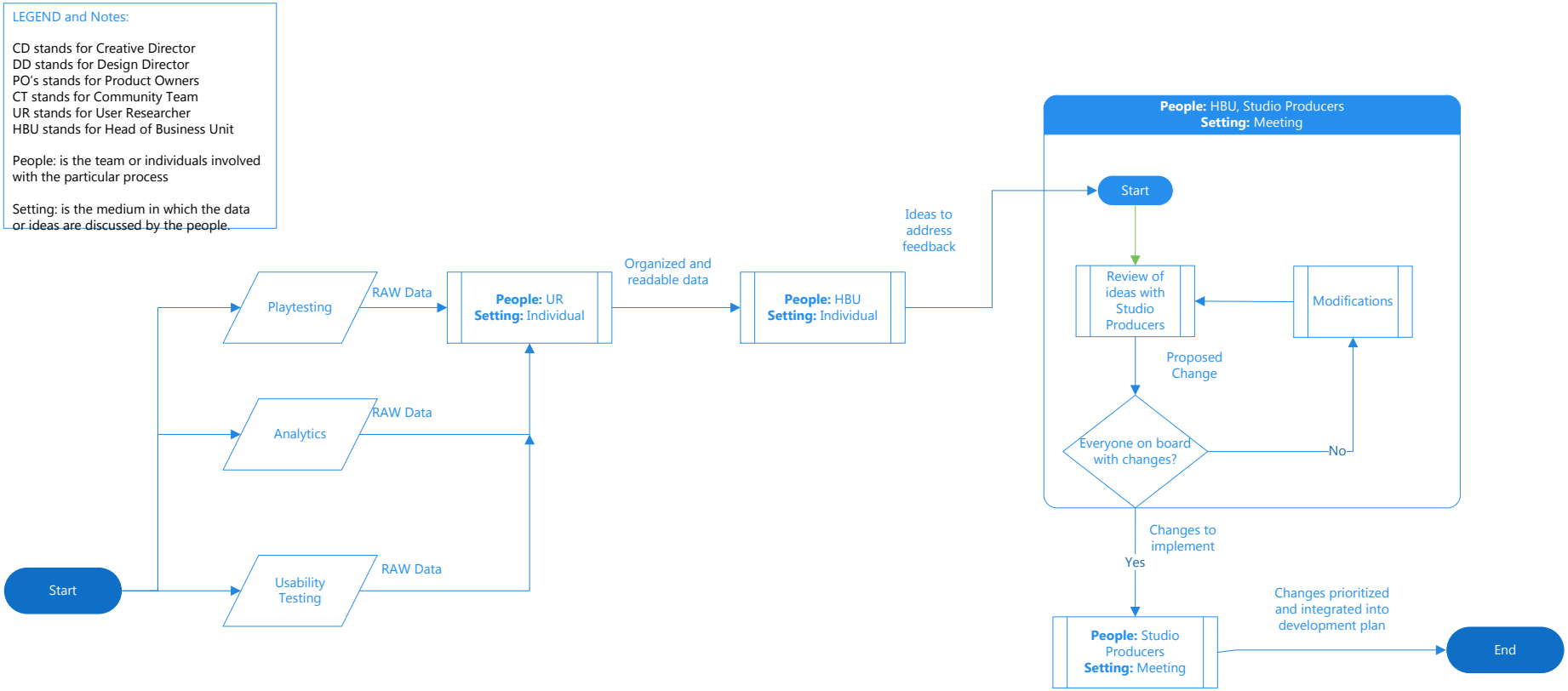


Appendix XIV
Team H



Appendix XV

Team I



Appendix XVI

Team J

LEGEND and Notes:

CD stands for Creative Director
DD stands for Design Director
PO's stands for Product Owners
CT stands for Community Team
URT stands for User Research Team
HBU stands for Head of Business Unit
CS stands for Customer support

People: is the team or individuals involved with the particular process

Setting: is the medium in which the data or ideas are discussed by the people.