Play Again:

A Decalogue to designing time loops in video games

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Abstract

Games have a history of repetition, from the days at the arcade where death meant meeting a paywall or restarting another day. To the first home consoles with short but difficult games where players restarted over and over from the first level when they got out of lives. Eventually games evolved into more and more accessible ways to let players save and load whenever needed, being able to finish longer and longer games in different sessions. As a result now replaying was out of the box, saving before a difficult encounter, loading an earlier state if the result of the players actions were unsatisfactory, etc. Leading to game design with bigger maps with more things to do and well, repeat.

From 2017 and onwards a series of games launched to the market: *Sexy Brutale (2017)*, *Minit (2018)*, *Outer Wilds (2019)*, *Twelve Minutes (2021)*, *Deathloop (2021)* among others, some of these heavily inspired by *The Legend of Zelda: Majora's Mask (2000)*. These games follow a simple rule that changes how they are perceived and played: A time limitation, in these games the clock is constantly ticking against the player and when the time limit finally arrives players are set back to the starting position of the game (or last checkpoint). Similarly to the games on the arcades or home consoles but not dependent on player skill within the movements of the player character inside the game. Instead the challenge proposition comes from the missing information about their surroundings, player actions within them and most importantly the constant changes that happen to the game world with the pass of time. Via the repetition of the time loop the players can learn the "whats" and "whens" of the world, learning the schedule of the things and interact with it. Getting access to new parts of the game gradually unlocking it as they get more knowledgeable about the loop as if playing a metroidvania whereas instead of getting new abilities they receive useful information. Until they master the time loop they are trapped in and become proficient traveling within it and eventually finish the game.

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This paper researches the answers to a question; What differentiates what makes a game with time loops from any other and how to design and develop them. Threatening the relation the player has with the game world exploring what makes a game into one of the genre, studying the state of the art and analyzing fully develop games in order to create guidelines to further help game developers that are faced with the challenge of designing a game with time loops as one of its fundamental pillars. And with those guidelines creating a level design document of our own to validate the assumptions and statements made after the research.

Keywords: Time loop, interaction, repetition, undoing, game design, time pressure, dynamic world.

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Glossary

Clockwork games: Games that actually simulate events in real time with characters moving on schedules, and events playing out automatically at set moments.[1] (Brown, 2019)

Event time: The time taken in the game world.[2] (Juul, 2004)

GDD: Game Design Document.

IP: Intellectual Property.

LDD: Level Design Document.

Metapuzzles: A collection of puzzles that, when solved, each give a piece of a master puzzle.[3] (Cliff, 2003)

Metroidvania: Video game genre consisting of non linear adventure platformers. The name comes from the games **Metroid** and *Castlevania*, even when those were not the first of the genre.

Out of the Box: Unorthodox or creative.

Paywall: Restricted access to a service to users who have not paid.

Play time: The time the player takes to play.

POIs: Points Of Interest as the name suggests interesting points on the game world.

Rogue-like: Video game genre where after death the player loses ALL progress on death.

Rogue-lite: Video game genre where after death the player loses SOME progress on death.

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[1] Definition given by GMTK on *Clockwork Games and Time Loops* (https://www.youtube.com/watch?v=CI-4cumMC-Y&ab_channel=GameMaker%27sToolkit)

[2] Definition taken from Introduction to Game Time/ Time to play - An examination of game temporality (https://www.jesperjuul.net/text/timetoplay/)

[3] Citation from Johnson Cliff on Questions asked by Martin Mathers from Paragon Publishing (https://web.archive.org/web/20050310230359/http://www.thefoolsgold.com/CJ/2nd-interview.htm)

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Introduction

Motivation

There's something fascinating in the concept of time **looping games**, them being a remembrance of older times yet at the same time updated to fulfill modern standards in the videogame industry. Something as **embedded** in the game culture as **repetition** not only narrativized but also exploited **to a higher degree** to function as a mechanical **challenge to be mastered**.

Time loops in video games can be found in rogue-lites like *Into the Breach (2018)* but used as a narration excuse to the inherent cycle of repetition in these type of games. But that's not the objective nor **motivation** of this investigation. When referring to **time looping games** we are somewhat close to the definition given by Mark Brown (2019) on *Clockwork Games and Time Loops*. He defines **Clockwork games** as those that **simulate events in real time**, where the characters and events in game follow a schedule based on the pass of time and not the player's actions. In these games if the user does not act in consequence to the **events** happening these will be missed and **won't occur again**. These Clockwork games follow the schedule until it inevitably **ends**, at this point the game finishes or what motivated this entire document: the game **loops back to the start**.

This simple yet elegant solution totally **changes the pacing** of the game, now the player can explore those events that missed on the last loop, discover new areas, dialogues and information with the **experience of the previous attempt** and so on. This alteration to the linearity of the game also comes with its strengths and weaknesses, such as how the keep the player engaged, how should the game world be distributed and how much time should they have between loops.

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The Problem

The problematic of designing time loops

As said by Mark Brown (2019) on *Clockwork Games and Time Loops*, when creating a dynamic changing world in video games such as *Dead Rising* or *Outer Wilds* "time can't exactly go on forever" because "developers can't just endlessly simulate events and character schedules" so most of these games have a point where the games either restart or end. Thus creating a certain niche of time restrained games with different approaches to this restriction. And with *Twelve Minutes* developer Luis Antonio saying in the article: *Learn, reset, repeat: The intricacy of time loop games* (Batchelor, 2019). That the inherent structure of time loops is shared with video games. Where dying and repeating the same section of the game but with new knowledge of your previous experiences. But in the same article Charles Griffiths, design director at *The Sexy Brutale* says "Everyone loves the idea of them, but when you think it through in practice there are things that are inherent to a loop that run completely against what we consider to be good design." That statement arises a question: How much does designing a time interactive game with time loops differ from other types of games? Finding out those differences between the game design of a clockwork game with time loops if any. And detailing them for future developers that might want to delve into the creation of these type of games it's the main problem to solve with this document.

Secondary problems

The problematic of the packed world. Every time the loop restarts the player is able to explore the world in any direction or path desired. Giving this freedom to the player raises a new problem due to the low time loops games are restricted to, no matter where the player goes there has to be something of interest to find within the time limit. (Brown, 2019)

The problematic definition of time-looping games. Time loops create a narrative around something implicit among most video games: repetition. And could

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be argued that every game with a save and load function already contains time loops. (Barkman, 2022) So a definition that defines what does make a game into a time-looping one needs to be made.

The problematic of giving time to the player. Each loop has a defined moment in time where it restarts either prematurely due to the player's actions or the sequence of the loop ending past the restriction of time given.

> "The limit of time loops can vary wildly -- from Outer Wilds' 22-minute runs to Minit's, er, minute -- but finding the sweet spot has been one of the biggest challenges from these developers. [...]"We wanted to keep things short enough [that] failure and death did not feel frustrating," explains designer and producer Loan Verneau. "But we also didn't want the player to feel like they were constantly on a time limit.""
> (Batchelor, 2019)

Finding the sweet spot between giving the player enough time to promote him to explore the world and not enough that restarting does not get frustrating. In the same article Luis Antonio, Twelve Minutes developer, observes that the consequences of the player's actions become more difficult to understand the longer the loop is.

The problematic of WHEN. Time-looping games are expected to be played multiple times. Where the players collect new information each run to get further into the game. This adds an extra layer to exploration making the "when" as important as "where" (Beachum, 2013). So being able to inform the player about this new layer via gameplay is necessary to the genre. Because understanding the temporal loops, timings and linkages is as important as having an idea of the spatial structure in order to navigate through them. (Gazzard, 2011)

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The problematic of undoing. In Jesper Juul (2004) the relation between play time and event time is always linear. But factoring in the act of undoing, "not as the restoration of a previous state, but another form of action taken in the course of play" could mean that "There is more to time in games than such a line" as says (Moran, 2010)

Research Questions

From the different problems there are some questions to resolve:

- ❖ How much does designing a time interactive game with time loops differ from other types of games?
- ❖ How do we create a world with new things everywhere the player decides to go?
- ❖ How do we map time in time-looping video games?
- ❖ How does the player learn the importance of when?

Secondary questions

- ❖ How is the player guided through the game?
- ❖ How long should each loop be?
- ❖ How to keep the game fun each loop?
- ❖ How do we define time-looping video games?
- ❖ How to make the player's actions feel important?
- ❖ How does the pacing work in games with time loops?
- ❖ What are the pros and cons of adding time loops?

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Objectives

General Objective

The main objective is to define which games are time looping games and which are not. Detailing the characteristics that make them fit into the definition, and deduce what differences and challenges present during development. Once that distinction is made, search solutions that solve problems that arise when designing one while prototyping one LDD with a time interactive game with loops. And finally writing down a decalogue of good practices and what to avoid when creating such games.

Specific Objectives

Establish how developers deal with time loops. The first part of the project is creating an extensive *State of the Art* to see how designers have confronted developing games with the idea of time loops in mind. Which techniques are used and the changes in relation to game design within a linear time model. And the relation within player and event time when playing a game with time loops.

With the objective to see how to deal with repetition.

Define the different aspects that time looping games have. Find what common approaches to world design, player experience and pace, among others, time looping games have in common. Use these similarities to create a list of unique properties games with time loops have.

Aiming to discover what makes a game into a time looping one.

Study cases of video games. Once we have a list of different qualities common in all time loop games, analyze how each game treats these properties in relation with the sensation and experience intended to produce on the player. See if

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there are notorious differences among them and examine shared patterns between games.

With the intention to discover the ranges of possibilities given to develop different and unique games under the same limitations of the time loops.

Write a time looping game design decalogue. Once the research is finished write down ten fundamentals principles of designing a game with time loops. What are the ten steps to have in mind while developing such a game, how these should be used and the importance they have.

Develop a prototype LDD of a time looping game. Use the acquired knowledge to build a game proposal with the defined characteristics of a time looping game. Testing the stiffness of the conclusions extracted from the previous objectives.

To prove or disprove the operability of the concepts learned.

Scope of the Project

While there are a lot of studies about game design, few approach the topic of time in game design, and even less the strict limitations that time loops bring when creating a game with them. The scope of the project is to delve deeper into the intrinsic nature of repetition in video games that follow a script that evolves and changes in real time. What limitations are given to the creators and how to exploit the strongest assets of this type of game while avoiding potential pitfalls that developers might encounter.

The target of the document is for other game developers or researchers interested in the topic of time loops and probably want to include them in game development. The objective is making guidelines not a game or a demo.

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Project Management

Gantt Diagram

The tool used to keep up the pace of development of the project will be a *Gantt diagram*. With the diagram subdivided in weeks the monitoring of the work and observations such as when the progress is ahead or behind schedule can be easily seen visually. So if there are some constraints the size and scope of the project can be properly adjusted.

Table 1

Gantt Diagram

Task	Starting Date	Ending Date	Duration (weeks)
Planning	**02.01.2023**	**22.01.2023**	**3**
Calendar	02.01.2023	08.01.2023	1
Thesis set up	09.02.2023	22.01.2023	2
Research	**23.01.2023**	**12.05.2023**	**15**
Search of sources	23.01.2023	05.02.2023	2
Reading and finding of inforamtion	06.02.2023	26.02.2023	3
Make sources dialogue	27.02.2023	24.03.2023	4
State of the art	23.01.2023	24.03.2023	9
Theoretical Framework	23.01.2023	24.03.2023	9
Rubric 1	**24.03.2023**	**24.03.2023**	**1**
Study Cases	24.03.2023	12.05.2023	8
Selection of games to study	24.03.2023	26.03.2023	1
Gathering of information	27.03.2023	30.04.2023	5
Comparations and pattern search	01.05.2023	12.05.2023	2
Rubric 2	**12.05.2023**	**12.05.2023**	**1**
Design	**10.04.2023**	**18.06.2023**	**10**
LDD prototype	11.04.2023	19.06.2023	10
Decalogue	13.06.2023	01.07.2023	3
Conclusions	**12.06.2023**	**30.06.2023**	**3**
Rubric 3	**30.06.2023**	**30.06.2023**	**1**

The rubric 1 had the decalogue as the last thing to complete for the thesis but that was an illogical decision now on the new diagram and objectives the LDD prototype has been moved further into the development and changed the decalogue to prior dates.

If needed further subdivisions on the tasks given would be added to the diagram.

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SWOT

The SWOT analysis or strengths, weaknesses, opportunities and threats is a method of identifying the internal strengths and weaknesses of the project and external opportunities and threats that affect it.

Table 2

SWOT analysis

	Positive	Negative
Internal	**Strengths** - Played the majority of video games with time loops. - The project is not dependent on an expensive computer. - There is no need for specialized software. - Proficiency in English.	**Weaknesses** - Time restrictions with little room for revisions. - No experience in academic research. - The final output of the project is not visually attractive. - No demo to validate the results.
External	**Opportunities** - Little exploration of the topic. - The resulting LDD could be developed after the project. - The thesis could be used in further investigations of the topic.	**Threats** - Few information about the topic. - Internship practices could reduce the available time. - No response from experts when asking for feedback.

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Risks and Contingency Plans

Since no practical prototype will be made, it is difficult to evaluate the thesis itself. Due to this no special software or hardware is really needed to do the work, so in the case of the computer breaking mid project would not be a real problem since all the documentation done is stored online.

Table 3

Risks and Contingency Plans

Risk	Solution
Not enough time: The project cannot be complete in the time left	**Solution 1:** Reduce the number of games for the case studies. **Solution 2:** Instead of a GDD design a LDD.
Difficulty achieving desired game design: The time loop mechanics might prove challenging and the game design might not meet expectations.	**Solution 1:** Detailing a previous list of mechanics and their viability before doing the GDD. **Solution 2:** Seeking developers and researchers for feedback and suggestions to incorporate.

As there is not enough time to complete what would be a fruitful GDD an LDD will be done instead as was already contemplated in the first delivery of the thesis.

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Cost Analysis

The project takes place over the course of six months, the salary taken into consideration is the one of a game designer in Spain.[4] With a dedication of 25 hours a week. The following groups are represented:

- Salary of the worker.
- Hardware needed.
- Software used.
- Video Games for the study cases.
- Books used for the research.

Table 4

Cost Analysis

		Expenses	Amortization (months)	ANUAL improt	MONTHLY import	Quantity	TOTAL
SALARY	Base Salary	15000	6	30000	2500	1	2500
HARDWARE	Computer + Peripherials	1050	48		21,88	1	21,88
	Nintendo 3DS	100	48		2,08	1	2,08
SOFTWARE	Google Docs	0	-			1	0
VIDEOGAMES	Outer Wilds	22,99	6		3,83	1	3,83
	Sexy Brutale	19,99	6		3,33	1	3,33
	The Legend of Zelda: Majora's Mask	40	6		6,67	1	6,67
	Deathloop	59,99	6		10,00	1	10,00
	Minit	9,75	6		1,63	1	1,63
	Elsinore	8,19	6		1,37	1	1,37
	Twelve Minutes	22,99	6		3,83	1	3,83
BOOKS	Half-Real. Video Games between Real Rules and Fictional Worlds	31,14	6		5,19	1	5,19
	A Play of Bodies	37,45	6		6,24	1	6,24
						TOTAL in €	2559,80
						Montly Dedication	100
						Price/Hour	25,60
						Hores de dedicació	600
						IMPORT TOTAL	15358,79

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[4] Information from Glassdoor (https://www.glassdoor.es/index.htm)

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Methodology

The thesis will follow a linear structure and will only advance to the next step after completing the previous one.

Development Phases

The development of the project has four different phases:

Figure 1

Methodology General Phases
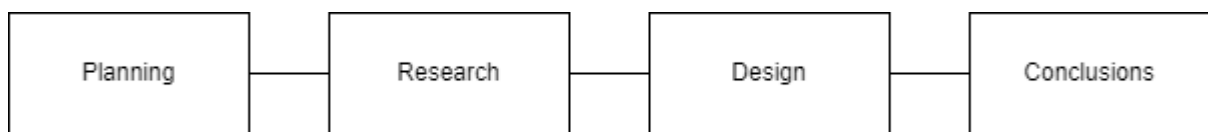
Each phase has one or more task assigned:

Figure 2

Methodology Specific Tasks
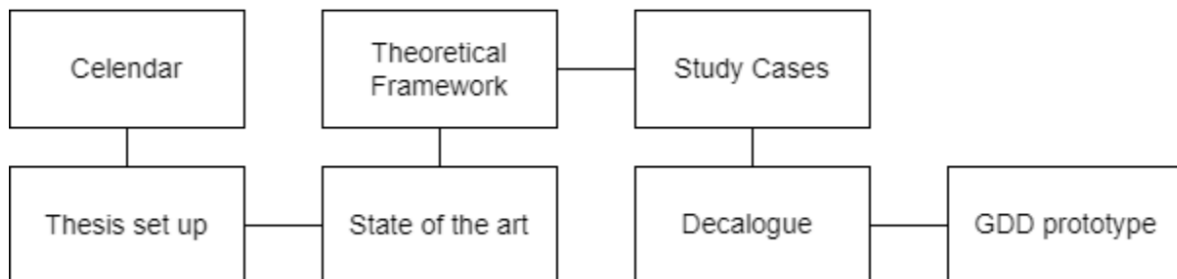
1. **Planning.** Calendar organization and thesis paper set up and structure.
    a. **Calendar.** Division of the task across the time given.
    b. **Set up.** For the project the written part will follow the 7th edition of APA style.
2. **Research.** Discovery of the theory about the discussed topic.
    a. **State of the art.** Investigation about the recent research of the topic.
    b. **Theoretical Framework.** Exploration of topics revolving around our topic.
    c. **Study Cases.** Analysis of the extracted conclusions into real games.

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3. **Design.** Use of the research information to build a LDD for a game.

    a. **Decalogue.** Creation of the 10 principles for time loop game design.

    b. **LDD prototype.** Development of a short LDD for a nonexistent game.

4. **Conclusions.** Final results of the project.

Planning

The initial phase of the project needed before starting the research. The creation of the documentation on the subject and introduction such as the motivation, research questions and objectives of the thesis, the methodology used and how the project will be managed using tools as a *Gantt Diagram*.

Research

Literature. Exploration of the actual *State of the Art* and definition of the *Theoretical Framework*. Finding differences in game design for video games with time loops and categorically organize and explain them. Investigation on how current game designers deal with these differences and ways to approach the game design on such games.

Study Cases. Analyze the results of the investigation with the approaches taken in published video games (5-10) with interactive time loops in order to understand the decisions and techniques used when developing them.

Design

Writing a *decalogue* with the 10 most important points of time loop design in video games.

With the conceptualization of how game with time loops are designed the creation of a LDD for the project using the learned information from the research phase. The LDD would be a first draft and prototype for a potential game but it will not be developed further than that. No art nor programming will be made for the

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game. The objective is to internalize all the theory and investigation and test it on a "real" case.

Conclusion

With the assimilation and testing of the project extract some conclusions with the strengths and weaknesses of the thesis, what can be improved and further researched on.

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Theoretical Framework

POIs

The Legend of Zelda: Windwaker is set in the Great Sea, an enormous ocean containing 49 small islands that the player can traverse freely on their sailboat. Lenzo, an old sailor, resides on one of the islands and enjoys taking photographs, or "pictographs," as they are called in the game. His home has a gallery filled with pictographs of various places and things he has seen during his travels. When a player interacts with one of the pictographs, Lenzo recounts a brief story of how he encountered the subject in the image, and he may even offer directions to some of them (e.g., "it's due south of here"). The significance of Lenzo's gallery in The Wind Waker lies in its ability to encourage players to engage in the game's world and narrative on their own terms. Lenzo's pictographs serve as a subtle invitation to players to explore and discover the game's secrets, without ever feeling forced or obligated to do so. The fact that Lenzo never explicitly tells the player what to do or where to go also adds to the game's sense of openness and freedom, as players are free to pursue their own goals and interests. This sense of player agency is a hallmark of many open-world games, but The Wind Waker's approach is particularly effective in that it feels organic and natural, rather than contrived or gamey. (Beachum, 2013)

In the game *Outer Wilds*, the overall structure can be seen as a progression of Lenzo's gallery. The Great Sea of *The Legend of Zelda: Windwaker* is replaced by a vast solar system, consisting of numerous points of interest (POIs) that players can discover and explore. These POIs, like the pictographs in Lenzo's gallery, provide information about the interesting objects and locations in the world, including four special objects known as "Curiosities". The game does not explicitly direct players towards these Curiosities, but instead encourages players to explore and discover them on their own. The game's narrative structure revolves around these four Curiosities, each of which holds the key to a major narrative question about the history of the solar system. The Curiosities are hidden or located in

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hard-to-reach areas, and players must have an understanding of the dynamic system of the solar system to reach them. Each Curiosity is connected to three Points-of-Interests (POIs) located on different planets, which provide players with information about the Curiosities and enough clues to investigate them on their own. For instance, reaching the Curiosity at the center of the gas giant reveals the reason why the device causing the time loop was constructed in the first place.

Figure 3

Outer Wilds rumor map.
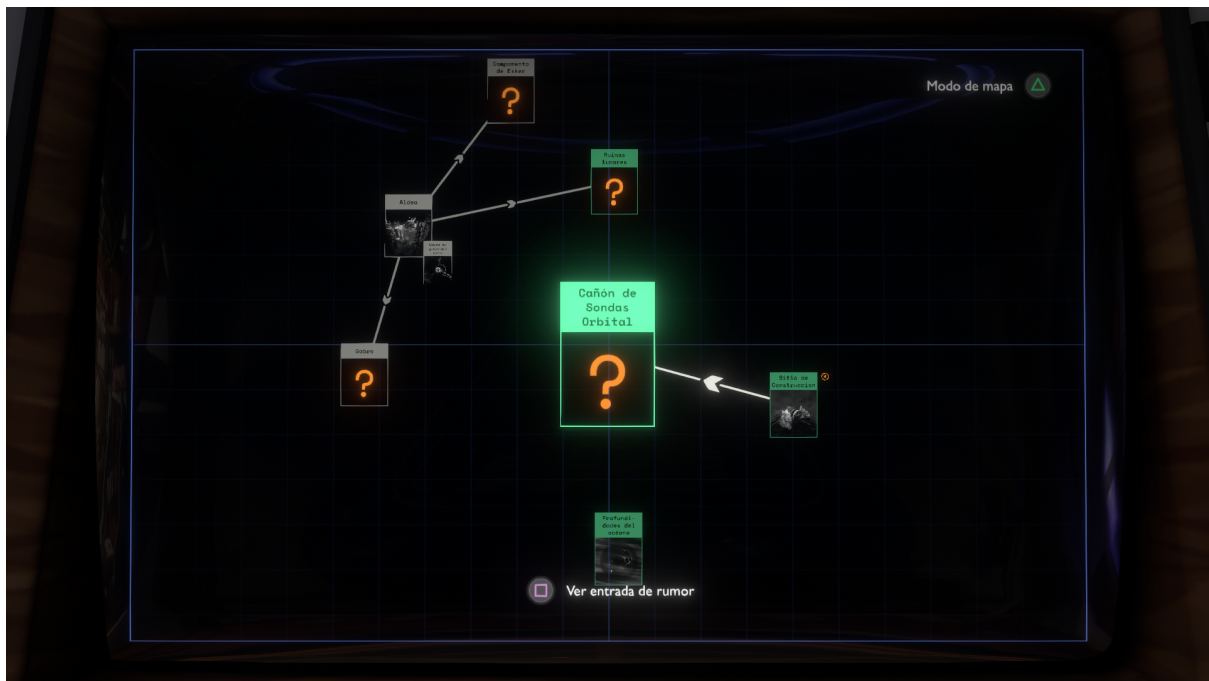
Note: Detective like map that connects the known information of different POIs.

Beachum (2013) explains that the concept behind the POI-Curiosity web in *Outer Wilds* is to ensure that players will come across a POI that sparks their curiosity about one of the four Curiosities, regardless of which location they choose to explore first. The POIs in *Outer Wilds* provide players with the necessary information to understand the system surrounding each Curiosity. While there are no murders or conspiracies to drive player exploration, the POIs serve as spatially embedded clues to help players solve the mysteries of the solar system. POIs and Curiosities in *Outer Wilds* are both based on knowledge and understanding of the game's systems, rather than physical tasks or items. Players must learn how to

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reach the Curiosities through their interactions with POIs and the Curiosities exist solely to answer narrative questions, without offering any other tangible rewards. The aim of this setup is to encourage exploration for the purpose of learning about the game's universe and how it operates.

The communication of POIs and Curiosities to players in *Outer Wilds* differs from *Skyrim*'s quest system. While *Skyrim* directly instructs players on what to do, *Outer Wilds*' POIs inform players of their affordances in the game world. This difference in communication style between the two games is significant, as *Outer Wilds* emphasizes exploration and discovery over explicit objectives. Even tho both games have POIs as landmarks all around the game world *Skyrim* narrative incentivises the player to explore the POIs while *Outer Wilds* intentions are incentivizing exploration through their POIs to unravel the narrative.

Figure 4

Skyrim POIs

Note: View of different landmarks to explore from a mountaintop in Skyrim.

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Figure 5

Skyrim Map
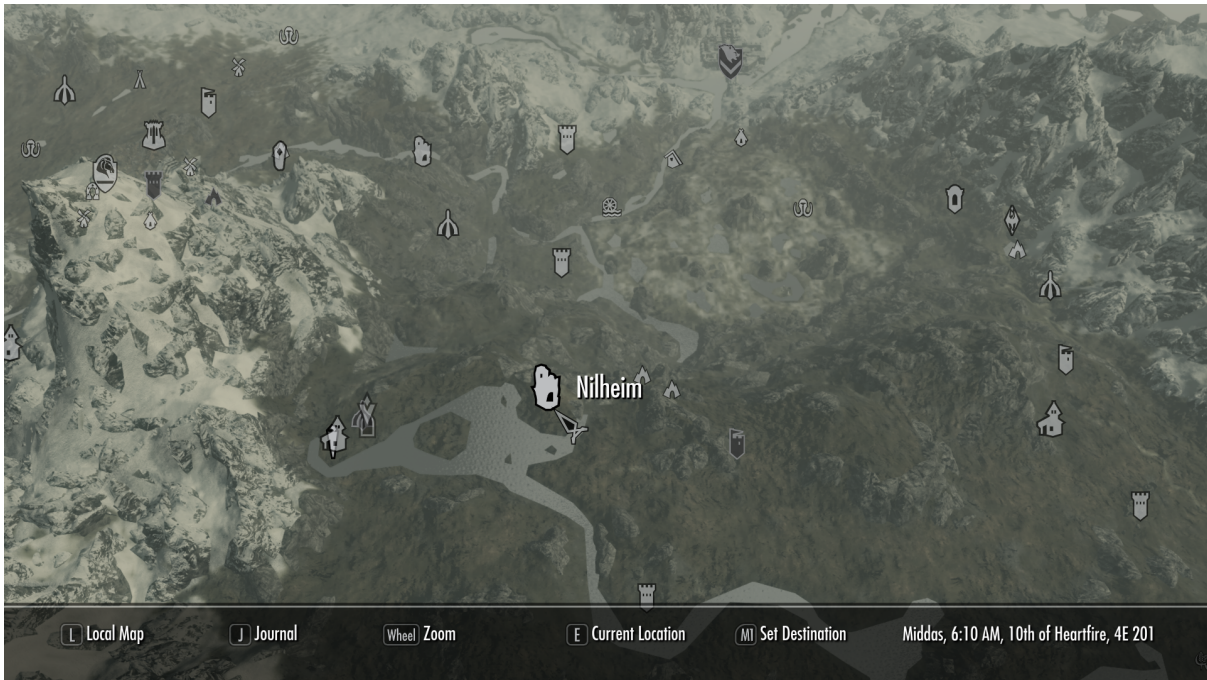
Note: On the Skyrim world map every POI visited or needed for an active quest is marked with its own icon and name.

Figure 6

Outer Wilds POIs

Note: View of different landmarks to explore from space in Outer Wilds.

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State of the Art

Definition of time looping games

What are time looping games and which distinct quality sets them apart from any other video game? Well, games usually have a strange sense of time. Some have day cycles and some characters go to sleep at night and wake up when the sunset rises. But typically time stands still with the characters being frozen in some kind of stasis until the player makes some action. Mark Brown decides to make a distinction with games where its characters follow schedules and events play automatically trying to simulate real time behavior calling them *clockwork games* and while these events and schedules give a real sense of time to the world they eventually stop as not an infinite array of events can be designed and developed. Then the time loop works around this design problem with elegance, and creates new consequences for the player, giving them freedom to explore and master the challenges and time itself. But nevertheless it is a solution that requires a big amount of narrative and gameplay implications. And even though that is not a problem itself, clockwork games will not fit in every type of narrative nor game. (Brown, 2019)

If this loop reproduction of the events is enough to categorize them apart are not all game time loops in some way or another? Brendan Keogh states that time loops give narrative to something intrinsic to video games, repetition. And that "through character deaths, saved files checkpoints, action replays, Let's Play videos. walkthroughs, skippable cutscenes, lag, fluctuation framerates and countless other phenomena, time travel is a banal feature of videogame play" and that saves and loads are features outside the game storyworld and narrative but knowing and using them already contain time loops that only form part of the play. (Barkman, 2022)

While taking into consideration that not any game with repetition takes place into the definition of time looping game, nor do rogue-likes/lites yet their gameplay

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loop might be similar. In time looping games the player learns more about the environment and how to explore it and interact with it. Rogue-likes/lites also fall under the same pretext but the procedural generation of the environment and rewards it's what makes them feel unique and pleasing to play over and over again. A complete opposite of what makes time looping games special. The never changing environment and schedules make the player master the loop and its constants to advance. So instead of relating them with rogue-likes/lites they are somewhat more close to metroidvanias where the player instead of unlocking new abilities to go to new areas they get more knowledge to access them.

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Game Design

As stated on the definition clockwork games are those that follow schedules and events that play automatically independently of the players inputs, and those that follow this schedule and restart over when the limited time ends, starting a new cycle are what we are calling time looping games. The time loop works around a design problem, creates new consequences for the player, and gives them freedom to explore and master the challenges but nevertheless it is a solution that requires narrative and gameplay implications. And we have already stablished that time loops will not work in every game or narrative. The interaction of the player with the loop itself it's what makes them interesting. There are games where the loop is made to be mastered and used to its maximum. *Minit* does this by changing the starting position, opening shortcuts and giving new tools to the player so the game can be eventually completed within the strict one minute loop. (Brown, 2019) Where *The Sexy Brutale* time mechanic was inspired by *The Legend of Zelda: Majora's Mask* the *Groundhog Day* IP time loop was "a must" says Alejo Silos compares that the movie with the game. One the movie as Phil Connors learns information about his surroundings as well as other people he makes progress and moves into new areas and scenarios. So when developing the game their team treated this structure as a narrative metroidvania. (Batchelor, 2019)

Success and failure in time loops are not as evident as they might sound. For example in *Twelve Minutes* the cop enters the apartment, if the player tries to attack him fails and dies but learns that attacking the cop does not work. But on the other hand if the player lets himself be tortured and learns about the police motives and intentions. Getting information that can be used in the future. When creating a time loop the danger of making it repetitive or hard to travel is always there. Charles Griffiths director at *The Sexy Brutale* warns that "Everyone loves the idea of them, but when you think it through in practice there are things that are inherent to a loop that run completely against what we consider to be good design." That the reason why at *Cavalier Game Studios* wanted to make it simple with the nine minute loop

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separated into three other three minute parts. Designing a game around a time loop has certain difficulties. The limitations included by the set course of events, and how players are able to change them create many variables that can be hard to follow. The wider the game world is, the more complex it is to know what the player might do and ensure they always have something to find or do. Taking account of all the permutations make the characters and levels more believable and reinforce the players actions and immersion. Deviation from the main path is the first step for the player to go beyond the boundaries of the space and time they are trapped on. To get access to new events, characters and locations. (Batchelor, 2019)

Alex Beachum says that instead of designing each planet as an individual level the entire system is simultaneously kept in orbit around the sun with simulated Newtonian gravity and most planets change over time. The core of *Outer Wilds* is the web of POIs around a world with world changing dynamic forces. Complex concepts to grasp and so before the players learn about the curiosities of the world first it's necessary to understand how to navigate through it. The introduction to the complex systems of the game can be one of the hardest difficulties. Creating an introduction to ease the access to the players at the same time that the tone and setting of the world was proved to be an arduous task in the *Outer Wilds*. With playtesting Beachum discovered that even though it could seem obvious, players first need to understand the space they are in before they want to explore or discover new and distant places and designing how the spaces will change over time added to the already complex creation of three dimensional spaces. *Outer Wilds* development found out that designing each planet around a single major system that changes over time was the more successful idea. Even though every major system had an expected experience, the nature of simulated physics limited the ability of the development team to make them work exactly as intended. In order to increase the chance that players find those systems the *Outer Wilds* team decided to put POIs in spots where the players had more chances to encounter them for example the islands that are constantly tossed out by tornados inside the gas giant. Designing first the dynamics systems and then creating content around

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them proved to be a successful way to generate half procedural half handcrafted content. (Beachum, 2013)

      While a variety of considerations have to be made when developing a game with time loops; Such as the intentionality of the loop, whether it is preferred for the player to explore multiple different adventures across every loop or a global concrete experience with multiple loops to complete. Either choosing the narrative and gameplays implications of adding a time loop to the game require a big implication that has to meet with the right expectations and scope of the game being developed. Designers have to think about how to avoid too much repetition and not make the world as well as the loop itself hard to travel or tedious. Also the line between success and failure is blurred as death in one loop could give a lot more information that staying alive but without making the situation change. The design of the entire world, schedule and characters can be difficult to coordinate so dividing the loops into smaller, more readable and easy to understand parts could prove efficient. And as a final notation it is interesting how the safe net of the loop lets the players explore the world at their own rhythm, knowing that if the player does not achieve the desired result they can just try again next loop.

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The Packed World

Games with time loops are constricted into time limitations. When ended, the player's actions and position are usually reverted into a starting point. Having this in mind the world size has to be in relation with the time limitation to explore it, the less time the player has, the more compact and compressed the world has to be for the player to discover something relevant no matter the path. *Minit* densely packed world is carefully designed so everything is reachable within a few seconds. (Brown, 2019)

With the release of time loop games around 2017 and onwards there seems to be a refocus on narrow but deeper approaches to world design as a step back from the massive open world games arms race of the last few years. And playing with in game time fits the goals and could be one of the reasons for the increase of time looping games. On one of Alex Batchelor interviews with Antonio, developer from *Twelve Minutes*, says that was dragged in by the idea of the players using their accumulated knowledge to affect the events in the game while Nijman, developer of *Minit,* says "wanted to make a game where no matter what direction you head in, there's always a unique one-minute adventure waiting for you". On the same note as the developers from *Minit*, Antonio says that everything in *Twelve Minutes* is within 30 seconds of reach inside the apartment. And that the game lets the player manipulate the loop as they see fit: resetting the loop by leaving the apartment or sleeping in bed to accelerate time so if the player wants to try again after missing something they can quickly get back on track. And following the same article the developers at *Cavalier Game Studios* wanted to keep it simple with *The Sexy Brutale*. With a nine minute loop separated into three other three minute parts. So the player is never more than two and a half minutes from something they can do. And a grand part of the pressure is eased as the player discovers that they can't save everyone from murder in one loop. And while the time loop in *Outer Wilds* lasts 22 minutes the content found by the player when exploring, either because the player is just wandering or trying to find the answer to a question always hints at a

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possible way to advance even on other planets. Making the reset rarely a setback on the progress as the player can immediately go to the new place they discovered on the last loop. Designing a game world around a time loop has certain difficulties. The limitations included by the set course of events, and how players are able to change them create many variables that can be hard to follow. The wider the game world is, the more complex it is to know what the player might do and ensure they always have something to find or do. Taking account of all the permutations make the characters and levels more believable and reinforce the players actions and immersion. (Batchelor, 2019)

So when developing the grounds for the player to explore the world should not expand for the sake of making it feel larger. Because as the players will travel over and over through the same layouts looking for different information and eventually getting set back by the loop, the continuity of the task the player was doing should be accessible almost immediately after the reset. And as the time limitations each loop are reduced and become stricter the size and density of world has to parallelly increase so the player can explore and find new things no matter the direction they explore.

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The Dynamic world

James Batchelor (2019) states that there seems to be a refocus on narrow but deeper approaches to world design as a step back from the massive open world games arms race of the last few years. And playing with in-game time fits the goals and could be one of the reasons for the increase of time looping games. And some of the intricacies of these games are the various characters and events that occur every loop. For example in *The Sexy Brutale* the different characters and encounters have to be consistent among loops. In order to get that consistency developers at *Cavalier* could not teleport the characters when needed. So in order to complete a puzzle they had to walk all the way in order to complete their day's choreography. Making every single puzzle dependent on the others. At one point the art director asked to move a room door a few inches but that character would take some extra time to get across the room, disrupting the other interactions throughout the nine minute loops. And so the door stayed.

> Griffiths says "We had an entire map of the house and all the characters' movements, key events, timestamps, etc. mapped across an entire wall of the office using bits of paper and string" "It was basically basically Charlie's conspiracy wall in Always Sunny in Philadelphia. That map was probably our finest work." (Batchelor, 2019)

Some games as *The Sexy Brutale* were initially depicted with the loop in mind but the time loop in *Outer Wilds* was an after effect of doing an environment that changed over time. The time loop was necessary to ensure players could discover everything they might have missed even though some changes made to the world were irreversible. (Batchelor, 2019)

The initial idea behind the everchanging game world of *Outer Wilds* stated by Alex Beachum in his thesis from 2013 comes from the concept that even though games are a time-based medium, few games feature changing worlds that are

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irreversibly changed by the pass of time. Open world games allow the player to freely explore as long as they want even though the characters are in some narrative huck that urges them to act rapidly. In *Skyrim*, a land under the constant attack of dragons does not change nor bad things happen if the player decides to recollect ingredients or climb a mountain instead of saving the world. It's difficult to create a world that waits for the player's actions and ends in many undesirable situations, as the world does not end if the player does not manage to save it in time, and tends to design stable worlds that revolve around the player's inputs. In juxtaposition the solar system in *Outer Wilds* changes over time by forces that do not care about the player like our solar system. And the goal is for the player to understand but not be able to control the world it lives in.

The changes of the solar systems make a volatile world that dramatically transforms over time. But since these changes are irreversible the simulation can go on for only some time until it turns into total chaos. To avoid this problem the simulation resets after twenty minutes when the sun goes into a supernova. Those changes over the system make it impossible to explore the entirety of in a single playthrough. Beachum states that this time dependance nature on *Outer Wilds* is heavily inspired by *The Legend of Zelda: Majora's Mask* and *Way of the Samurai*, both having worlds that change dramatically over time. But the main difference between these games and *Outer Wilds* is that their worlds are composed of a series of scripted events at specific times. Learning when the events happen and its consequences the players can manipulate them in order to alter the outcomes. One of the design choices of *Outer Wilds* was to not focus on making these schedules and more on creating large scale systems for the players to explore and understand. *Outer Wilds* is about learning to navigate these dynamic systems instead of experimenting with causality. (Beachum, 2013)

So making an always changing world makes it feel natural and dynamic and even though open world games can see changes, nuking Megaton off the Wasteland in *Fallout 3* and how Tarrey Town can be built up from nothing in *The Legend of Zelda:*

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Breath of the Wild. But these changes always happen in response to the player's actions. On the other hand if the world moves following a clock it will continue to change regardless of the player's progress and actions. As Mark Brown says "If *Outer Wilds* wanted to capture the cosmic indifference of the universe, following a clock was definitely the best way to do it."

Another series that follows these real time progressions is *Dead Rising*. In these games events happen at schedule times and the player has to constantly check the clock or miss those events. For example survivors get eaten by the zombies if no one helps them in time. And Stacey needs to get a dose of Zombrez every day in order to not get a game over. And so forth in a game full of walking dead abominations, the clock is the most dangerous enemy. The complication when creating a clockwork (and the same reason *Outer Wilds* simulation of the universe turned into a time loop game) is that the simulated events and schedules cannot endlessly go on. Developers cannot keep making new ones forever. Some events are necessary for the players to understand a coherent narrative. So most clockwork games have a fixed end point. In *The Legend of Zelda: Majora's Mask* where the moon falls from the sky and destroying the earth in three in game days or one hour of real world time is one example of clockwork game and Mark Brown defines as "perhaps, the quintessential clockwork game"   (Brown, 2019)

Whether it is the default design and intention of the game as was done with *The Sexy Brutale*, the causation of total chaos in a simulation over time in *Outer Wilds* or the physical and temporal limitations of our real world that developers do not have infinite time to design schedules. The current situation is that when developing a clockwork game there will be a moment in development where an end point or a loop will have to be made in order to create such complex and dynamic worlds that will not wait on players actions to continue onward as if a temporal stasis occurs if no player input is given.

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The player

In relation to why so many time loop games were launched around the same time period, Jan Willem Nijman, *Minit* co-developer, says that time limits can be stressful and with many people having stressful lives this aspect is leaking into art. "It's a relatable feeling," he says. "Also, games are more diverse and exciting than ever. It makes sense that multiple creators are exploring the same kinds of ideas at the same time." Alex Beachum, the creative director at *Mobius Digital*, the developer of *Outer Wilds*, states that many individuals recognized a gap in the industry that needed to be filled. Beachum further noted that the concept of a time loop presented various opportunities for creating distinctive types of games, and it was thrilling to observe the various novel experiments being conducted by developers to exploit this idea. (Batchelor, 2019)

When GMTK talks about of clockwork games and how time pressure affects the player in *Dead Rising* says that time pressure adds a sense of urgency because the player doesn't get to choose when to save the survivors and when more than one event plays out at the same time whatever choice is made has consequences as there is not enough time to save both survivors. Converting time into a resource to work with as would normally ammunition or health be. "Every decision you make matters because you're always spending your most precious currency: time". But when that same limitation is overwritten in a time looping game it was not only the clockwork puzzle that attracted him to it but also the safety net of the time loop that enabled him to explore various approaches and ideas. Further noticing that the game allows for experimentation without fear of failure since the player can simply try again in a few minutes. Additionally, he mentioned that he could use any newfound knowledge in future playthroughs to enhance his gameplay experience. (Brown, 2019)

Raul Rubio, the CEO of *Tequila Works* when talking about Groundhog Day: Like Father Like Son, remarked that the time loop mechanic empowered players to

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experiment and express themselves freely. He noted that players could attempt to convince others that they were trapped in a time loop, act in a selfish manner, or eat someone's food while conversing with them. Rubio asserted that time loops facilitated players' training and improvement by allowing them to experiment and learn from a consistent starting position. And said that players could experiment with different approaches to progress within the loop and refine their strategy to achieve their goals faster and more efficiently. The time loop mechanic's enabled players to build a solid process and develop a more comprehensive understanding of the game's mechanics. (Batchelor, 2019)

Nijiman states that *Minit*'s core principle was to respect the players' time by avoiding recycled content or extensive backtracking, and players were not obliged to repeat the same actions repeatedly. 60 seconds provided sufficient time for players to embark on a satisfying journey, as it was longer than most players might imagine. While Antonio, the creator of *Twelve Minutes* disclosed that he deliberately avoided signaling when specific events took place during each loop. He explained that doing so would reduce the player's sense of ownership of the experience since they would merely be unlocking events. Beachum opined that the intricacy of the time loop mechanic in *Outer Wilds* naturally encouraged players to create hypotheses as they attempted to discern the extent of their influence on the loop and its events. According to Beachum, some players initially assumed that they caused the sun to go supernova in *Outer Wilds* and consequently revisited their actions to determine if they could be prevented. He noted that the complexity of the game's mechanics and the range of potential outcomes enabled players to develop various theories and experiment with diverse strategies to achieve their goals while the time loop separated the game in digestible chunks.

Players could extend the boundaries of the time loop and access new locations, events, and characters by observing the details and exploring alternative paths beyond the familiar routes. Finally, Rubio concludes that the game's loops act as "metapuzzles", where players compete not only against the game's world but

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also against themselves. Players needed to experiment, refine their approach, and learn from their previous attempts to progress through the game. By doing so, they could overcome the challenge of the game's structured framework and achieve success in the game. (Batchelor, 2019)

The effect of the time loop makes the player feel more free to explore and dive into the unknown. Once armed with the experience of the past loops the player feeling safe that the game will return to a previous state is inclined to break the established path, try new things that he would have never thought to try to understand more about the consequences of his actions and the world around him.

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Exploration

The developers of *Outer Wilds* have emphasized that the game's time-loop mechanics add a new dimension to exploration. In addition to considering the spatial layout of the world, players must also take into account the temporal dimension. This means that the timing of when players explore is just as important as where they explore. As they progress through the game's time loop, certain areas that players may want to explore could become blocked off, while others may only become accessible at a later point in time. Thus, the time-loop mechanics encourage players to approach exploration in a new and dynamic way, considering both space and time. (Brown, 2019) Instead Antonio, developer of *Twelve Minutes*, was interested in exploring how players could use their accumulated knowledge to change diverse aspects of the game, like the characters and their relationships with them. While Nijman says that the team behind *Minit* wanted to create a game where players would experience a different, one-minute adventure, no matter the direction they decided to explore. Despite their differing motivations, both teams found that the same as the *Outer Wilds* team, that time-loop mechanics could add a new dimension to their games, challenging how players think about their environment and making them develop more creative strategies and gameplay dynamics. Tequila Works' CEO, Raul Rubio, argues that time-loop mechanics can give players a unique sense of empowerment and freedom. By allowing players to experiment and take risks without consequence, the mechanic enables them to "go wild" and express themselves in ways that may not be possible in a traditional linear narrative. These actions may seem trivial, but they add up to create a dynamic and interactive experience that resets with each iteration of the story. In this way, time-loop mechanics offer players a novel form of storytelling that prioritizes player agency and expression. (Batchelor, 2019)

The approach to recording progress in video games is a subject of debate among developers. While *Outer Wilds* and *Groundhog Day* use logs and journals respectively to help players keep track of their progress and identify unexplored

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areas, *Twelve Minutes* takes a different approach the game avoids signifying specific events and occurrences during each loop to allow players to maintain ownership over their experience and prevent it from becoming a predictable and formulaic process. Antonio believes that if players know what to expect during each loop, it detracts from the sense of discovery and exploration that makes the game compelling. Nevertheless, designing a game around a time loop has the advantage of encouraging players to explore and experiment freely, since they know that everything will reset and their actions may not have permanent consequences. This allows players to train and improve their skills by experimenting from a fixed starting situation and figuring out what works to move forward within the loop. Rubio states that time loops can help players build a solid process for progressing through the game faster and smarter. Overall, the time loop mechanic can offer a unique and engaging gameplay experience that allows for creativity, experimentation, and growth. (Batchelor, 2019)

Outer Wilds is a game that emphasizes the theme of exploration and seeks to convey a sense of curiosity-motivated exploration. It does this by depicting a volatile solar system that changes over time due to cosmic forces beyond the player's control. The game is played from a first-person perspective and provides players with just twenty minutes to explore a miniature solar system that dynamically evolves over time. After the twenty minute time limit expires, the sun goes supernova, and the Universe comes to an end. However, the solar system is stuck in a time loop, where each supernova sends the player back in time to the beginning of the loop. The game encourages players to explore and learn about the history, systems, and secrets of the solar system through multiple time loops. By doing so, players can slowly piece together the answers to the questions about the Universe that the game poses. Overall, *Outer Wilds* uses the time loop mechanic to create a unique and compelling experience that challenges players to think and explore in new ways. Beachum (2013) notes that in virtual environments, player motivations to explore vary depending on the game structure and individual play style. For example, players of *Skyrim* may explore the open-ended world to advance

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the narrative by finding new quests, or to find alchemical ingredients or better equipment. Alternatively, some players may explore simply to appreciate the aesthetics and see what the game world has to offer. The primary objective of *Outer Wilds* is to promote a particular type of exploration that he refers to as "curiosity-driven exploration." This type of exploration is characterized by the need, thirst, or desire for knowledge, which Beachum defines as curiosity, and the activities associated with gathering information about the environment, which he refers to as exploration. Curiosity-driven exploration can be described as a situation where an individual chooses to explore their environment, either real or virtual, with the primary objective of expanding their knowledge or understanding of it. Beachum says that for exploration to be considered "curiosity-driven," the expansion of knowledge must be the most significant or only motivating factor, although exploration can be motivated by multiple factors in practice.

The key component of curiosity-driven exploration is that it begins with a question and the objective is to answer that question. For example, the question "What's on the ocean floor?" would motivate someone to explore it. Even something as trivial as moving towards an object that looks interesting from afar implies the question "What is it?" or "What is it like up close?", and the exploration is driven by the desire to obtain answers. (Beachum, 2013) For a game to encourage this type of exploration, it must provide players with something intriguing to explore. Although placing captivating objects in the distance is a promising starting point, other methods can stimulate the player's curiosity beyond direct observation. (Beachum, 2013)

As explained on the POIs theoretical framework *The Legend of Zelda: Windwaker* game takes place in the Great Sea, an immense ocean with 49 small islands that the player can navigate freely by sailboat. On one of these islands lives a photo enthusiast sailor named Lenzo, who has a gallery full of pictographs of places and things he has seen during his travels. If the player interacts with one of the pictographs, Lenzo shares a brief story of how he came across the subject of

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the image, and provides some directions to a few of them. Significantly, Lenzo never suggests that the player should seek out any of the things depicted in his pictographs. Despite the statue in the image being part of the main quest to complete the game, talking to Lenzo does not reveal this larger purpose. The player can follow Lenzo's directions and sail to the Triangle Islands to learn more about the mysterious statue out of pure curiosity, and one of Lenzo's comments seems to encourage this sense of curiosity. The structure of *Outer Wilds* can be seen as a progression of Lenzo's photo gallery in *The Legend of Zelda: Windwaker*. In *Outer Wilds*, players explore a solar system where each major object, structure, or location is part of a network connecting numerous "Points-of-Interest" (POIs) with four "Curiosities". POIs inform players about the presence of interesting things in the world, such as the Curiosities, and offer them enough information to investigate independently, without any explicit direction. The exploratory gameplay of *Outer Wilds* adds a temporal element that is just as crucial as spatial exploration. An example of this can be seen with the Hourglass Twins. Depending on when players arrive in the time loop, they can explore different areas of the twins. If players choose to arrive during the first half of the time loop, they can navigate the underground caves of the first twin before the sand fills them. On the other hand, players who explore the Hourglass Twins later in the time loop can investigate the ruins of the towers on the other twin that become gradually visible as the sand drains.

> "This setup effectively adds an extra dimension to exploration by making "when" players explore just as important as "where"." (Beachum, 2013)

The solar system in *Outer Wilds* is designed to reward players for exploring for the sake of knowledge and understanding, rather than for tangible rewards. While players are free to explore the vast solar system however they wish, they have very little agency to affect the forces that drive it. Instead, their goal is to learn how each force or system works and learn to deal with it. This parallels the POI/Curiosity system, which is also knowledge-based. The existence of these dynamic systems

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seem to make the solar system engaging to explore in and of itself. The concept of knowledge over agency was a significant influence in several major design decisions of *Outer Wilds*, including the behavior of the sand between the Hourglass Twins. The developers faced a question of whether the player should trigger the transfer or whether it should happen automatically over time. The decision to go with the latter supports the idea that there are forces at work beyond the player's control, which sets a thematic precedent for future systems-related decisions. This resulted in a solar system where players must adapt to and explore within systems beyond their control. Finally, the narrative climax of *Outer Wilds* is knowledge-based, where players finally discover the purpose of the thing older than the Universe. One successful approach to encourage curiosity is to place items in the game world that suggest connections elsewhere in the game without explicitly stating what to do. By doing so, players are allowed to generate their own questions about the world and increase the chances of uncovering answers. In addition to creating a world that changes over time, the main purpose of *Outer Wilds*' dynamic systems is to promote curiosity-driven exploration. (Beachum, 2013)

The different approaches to exploration, be it the *Minit* little adventures no matter where the player go, the cumulative experience puzzle of *Twelve Minutes* or the POIs systems developed on *Outer Wilds* suggest that there are multiple ways to encourage exploration of the game world over multiple iterations of the time loops. While *Minit's* approach seems basic but incredibly functional it seems to only work on concise and little game worlds. And the *Twelve Minutes* cumulative experience is a shared concept of the genre. The incredible results of the POIs system in *Outer Wilds* has proven to perform incredibly well but at the same time looks costly to design and develop.

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Repetition

As stated in the Definition Brendan Keogh (2018) argues that time loops narrativize something that is already implicit across most video games, repetition. And that time travel is a common feature of video games, manifested through character deaths, saved files, etc. On the other hand Barkman (2022) argues that the use of these features essentially narrativizes elements like repetition and failure, which are often present in gameplay but not necessarily part of the game's storyworld. In this way, the use of time loops within the game world can provide a more immersive and meaningful experience for players.

On one hand *Outer Wilds* time loop serves as a vehicle for the game's core focus on space exploration, with an emphasis on how space is navigated and how it changes over time. The game immerses players in the role of an explorer, encouraging them to venture out on expeditions to gain a deeper understanding of the solar system with each loop. On the other hand Arkane Studios developed *Deathloop*, a first-person shooter where the player takes the role of Colt Vahn, a soldier who is trapped in a time loop on an island called Blackreef. Colt's objective is to kill eight targets within a single day, thus breaking the loop. In *Deathloop*, Blackreef serves as a setting that establishes a hedonistic playground for its inhabitants to engage in pleasure and violence without consequences due to the safety of the time loop. This setting is narratively significant and also allows players to experience the same freedoms as the game's inhabitants. *Outer Wilds* and *Deathloop* serve as important case studies to examine the function of time loops and repetition in video games. These two games are particularly interesting as they both revolve around space and offer players the opportunity to explore and master their environments. The repetition inherent in the time loop structure allows players to experiment with different strategies and approaches in a way that is not typically possible in traditional linear game structures. By studying these two games, researchers can gain insight into the ways in which time loops can be used to

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enhance player engagement and enjoyment, as well as the potential implications for game narrative and design. (Barkman, 2022)

As stated in the definition of time looping games, one of the complications when developing a clockwork game is that events and schedules can not endlessly go on. Developers can not keep making new ones forever. So most clockwork games have a fixed end point. For example *The Sexy Brutale,* for instance, is a murder mystery game set in a hotel that runs on predictable clockwork schedules, and the time loop is used to present a clockwork puzzle to solve. Players learn a sequence of events over repeated viewings of the murder, and then use that information to their advantage by manipulating the scene at the exact right point in time. In addition to the clockwork puzzle, the safety net of the time loop also gives players the freedom to experiment with all kinds of approaches and ideas, armed with foreknowledge of what's going to happen and a handy timeline menu screen. The time loop in games offers players a safety net to experiment with various approaches and ideas, knowing that they can try again in a few minutes. However, in some games, the loop is intended to be mastered and maximized, and players can create new start points, find new tools, open shortcuts, and speedrun across the map to eventually complete the game within the time loop. The time loop is a simple yet elegant idea that creates a new world of consequences for the player giving them the freedom needed to explore and master the challenges presented and the course of time itself. (Brown, 2019)

While the reasons behind each developer's decision to incorporate time loops into their games are unique. For Antonio from *Twelve Minutes*, the concept was intriguing and he was interested in exploring how players could leverage their accumulated knowledge to influence various aspects of the game, including characters and their relationships. On the other hand, Nijman explains that the team behind *Minit* wanted to create a game where players would always encounter a distinct, one-minute adventure, regardless of which direction they chose to pursue. Despite their differing motivations, both teams found that time-loop mechanics

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could add an exciting new dimension to their games, challenging players to think more strategically and creatively about how they approach gameplay. The benefits of designing a game with a time loop. Are that it breaks up the game into easily digestible chunks, for example in *Outer Wilds* everything can be done in less than 20 minutes. This means that players never lose too much progress. And the time loop encourages players to explore and experiment as they know that their actions may not be permanent. (Batchelor, 2019)

Alex Beachum (2013) states that the game *Outer Wilds* utilizes several systems that create a volatile world that changes dramatically over time. However, since many of these systems are irreversible or unstable, the simulation can only run for a limited time of twenty minutes before the solar system resets. As a result, it is practically impossible to explore the entire solar system during a single playthrough. *Outer Wilds* is intended to be a long-form experience that requires multiple playthroughs, similar to *The Legend of Zelda: Majora's Mask* and *Way of the Samurai*. These games also feature worlds that change in irreversible and dramatic ways over time and players must complete multiple playthroughs to fully explore and experience the game's world. (Beachum, 2013)

Jesper Juul argues that studying objective time in games is crucial to understanding how game structures shape player experiences. For example, the issue of "save games" highlights the aesthetic challenges of game design. In most games, time is portrayed in a linear, chronological manner, and there are compelling reasons for this. Flash-forwards can undermine player agency, as the outcome of the story is predetermined. While in-game artifacts or cut-scenes can provide backstory, interactive flashbacks present a paradox: the player's actions in the past may render the present impossible, leading to a problematic narrative situation.

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Figure 7

Juul's Game with events telling of earlier events
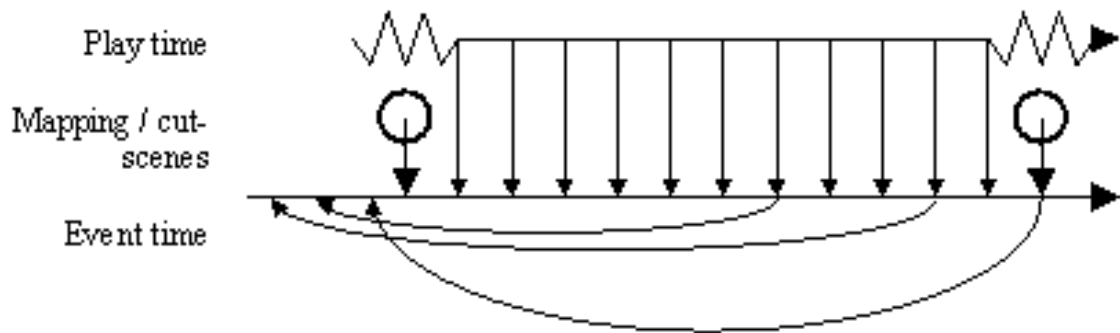
Game events may bring information about earlier events

Game with events telling of earlier events

(Juul, 2004)

Juul already said back in 2004 that game designers have improved in creating games where the event time can point to past events. Specifically, modern adventure games incorporate artifacts in the game world that reveal past events, in addition to cut-scenes. This design model is similar to a detective game, where players must piece together information to understand the story. The focus of this discussion has been on the role of time in individual game sessions. However, games like adventure games and action-based exploratory games require many game sessions and saves to be completed. As demonstrated by the author's experience playing *Half-Life*, it involved hundreds of saves and reloads, often using the same save games repeatedly until progress was made. Save games are a way of manipulating game time, as they allow the player to store the game state at a particular moment in play time and resume playing from that position later on. In retrospect, the author's experience playing *Half-Life* was a combination of many small play sessions that advanced the protagonist from the beginning to the end of the game. This would result in a large tree diagram of different paths taken, numerous dead ends, and only one successful path through the game. Juul discusses the debate surrounding the use of save games in video games. He notes that save games have been criticized for decreasing the dramatic tension of the

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game and making it too easy. However, Juul argues that it would be almost impossible to complete certain games without save games, and replaying an entire level due to a mistake at the end can be immensely frustrating. Additionally, experienced gamers have come to accept the save-die-reload cycle as a normal component of the total gaming experience. Juul also discusses Chris Crawford's position that the need for save games is a symptom of design flaws in a game. Crawford argues that any game that requires reloading as a normal part of the player's progress through the system is fundamentally flawed and that a player should be able to successfully traverse the game sequence on their first playthrough. Juul notes that Crawford's argument may be more applicable to replayable games rather than exploratory and adventure games, as there are hardly any games that fit Crawford's description of being completable in the first go and being replayable and interesting afterwards. (Juul, 2004)

Even though Juuls position is not updated to the state of the art standards, it signifies the evolution made from the repetition and past dilemmas with the save and load systems that was becoming the standard. It really represents how time loops are another way of solving the problem of more complex and longer games over time as not much people would not complete *Half-Life* without the save and load function (those that can be interpreted as small loops under the player's control) these where a needed tool for the duration of the games, the extension of the world, and the longevity of each play session. Now with load and save functions the repetition on the same levels has decreased but time looping games reintegrate this old concept with a new premise. Games that force the player to replay them to access new zones and events that were not locked in the first place but the player was not knowledgeable enough to achieve them.

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Time Pressure

The length of a loop is a crucial factor that needs to be carefully considered in the development of a time looping game. For instance, Loan Vereau, the designer and producer of *Outer Wilds*, emphasized the importance of keeping the loop short to avoid player frustration from frequent failure, while also not making players feel constantly on a time limit. Another reason for keeping the loop short is to help players build a mental model of the timeline. If the loop is too long, it can be difficult for players to understand and remember what happened in previous iterations, which can hinder their ability to progress in the game. Furthermore, a short timer should be combined with a compressed world size, so that players can find interesting things to do within the time limit, regardless of where they go. This approach ensures that the player's experience is not dominated by traveling and searching for the next objective, but rather focused on completing tasks and experiencing the game world. (Brown, 2019)

The length of the time loop being such an important factor, what should be the duration of them? Well, while the duration of time loops can greatly vary from game to game, from *Outer Wilds*' 22-minute loops to *Minit*'s one-minute loops. However, finding the ideal time limit has been a major challenge for developers. In the alpha version of *Outer Wilds*, the loops were initially set at 18 minutes, but playtesting revealed that more time was needed to explore the game's elaborate levels like Brittle Hollow or the Hourglass Twins. As Loan Verneau, the game's designer and producer, explained, the team aimed to make the loops short enough to prevent frustration from failure and death, while also ensuring that players did not feel constantly pressured by a strict time limit. (Batchelor, 2019)

In contrast to players not being constantly pressured the game *Minit* has a time loop of only 60 seconds, which adds a sense of tension and keeps things high pressure. According to *Minit*'s lead developer, Jan Willem Nijman, this is sufficient time to allow players to go on a proper journey, and to make a simple maze more intense due to the ticking clock. *Minit*'s design prioritizes not wasting players' time,

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by avoiding recycled content, extensive backtracking, and repetition. Additionally, the game does not punish players for past mistakes, and the most progress they will have to replay is one minute. According to Nijman, a shorter loop is ideal to avoid boring players and to ensure they understand the consequences of their actions. He states that longer loops can be tedious and frustrating, especially if players miss an important event and have to start over. By reducing the loop time, Nijman found that he did not have to guide players as much, and even eliminated the need for specific objectives.

In a similar manner to *Minit's* maximum one minute of backtracking after failing a loop. The Developers at *Cavalier Game Studios* divided the loops in *The Sexy Brutale* into three other three minute parts so at any moment the player was not more than that time away from something they could do, easing the pressure and seeing how they can restart after failing or missing something. And Antonio at Nomad Studios describes how the configuration of the apartment in *Twelve Minutes* lets the players access anything in less than 30 seconds. And if they miss or have to wait for an event to occur they can always leave the apartment to reset the loop or sleep in the bed to advance in time. (Batchelor, 2019)

Seeing the variability available to the developers the time limitations should also go hand to hand with the world structure so everything is accessible to the player's in case something is missed or a mistake is made the experience to try again should not be long and boring. So making a short loop or giving tools to the player to move around the timeline easily are necessary. In addition the longer the loop is the more complex and difficult it becomes to understand the consequences of the player actions as something that changes ten minutes into the loop will not be seen as often as something that happens at the start of the loop. And remembering the schedule of the first minutes once the player has been playing fifth-teen becomes harder and more confusing.

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Alternatives

Mark Brown from GMTK suggests the possibility of creating clockwork games without the loop. One idea is to use smaller, less obvious, loops that do not disrupt the simulation when they repeat. This is seen in *Hitman* levels, which consist of multiple small loops where characters have repeated schedules that typically take five to ten minutes to repeat. This approach offers a convincing representation of reality without the complexity of a full level-wide time loop; And also proposes exploring systemic and randomized events may offer another solution for creating clockwork games without the use of loops. These events would not be handcrafted by the developer and therefore could go on indefinitely. Additionally, open world games use patterns and characters in simulations that rely on simple rules and interconnectivity to create the illusion of reality, without requiring absolute clockwork choreography. With this approach games could incorporate time limits for certain tasks without punishing players excessively. The consequences for not completing a task within the allowed time could simply be a change in the storyline or missing out on some content. However, this may not be appealing to completionists who prefer to complete every task on a map. He also proposes that clockwork games have unique advantages and that incorporating time limits could be the missing ingredient to make open world games more dynamic and interesting. (Brown, 2019)

While some of the points are clearly intriguing and have a lot of potential, it is not within the scope of the project to explore procedural narrative systems that could create the events with this illusion of reality. And that, to a certain extent, has already been explored in procedurally generated games like *Dwarf Fortress*. But the generation of small loops inside patterns and schedules inside games, like those in games like *Hitman*, that give narrow opportunity windows to the player to act giving them not only a sense of where but also when to act it's a concept that could be revisited later.

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Case Studies

The games chosen to study were *Outer Wilds*, *Minit*, *The Sexy Brutale* and *Twelve Minutes*. Four games that match the study focus of this thesis and use different methods and design techniques to engage the player to complete their games while constantly resetting their progress on a myriad of occasions.

The game analysis will consist of playing the games with the intention to see how they individually tackle each point of the State of the Art and compare the information in order to write the decalogue to designing games with time loops.

Definition of time looping games

In *Outer Wilds* the player is a new explorer of the Outer Wilds Venture who is about to adventure into his first space mission. On its journey the player will learn about the physics that reign over the different planets in its solar system, a long deceased species of intelligent life named the Nomai and how the sun goes into a supernova soon after takeoff. Luckily an strange Nomai statue that the player had previously encountered before taking to the skies stores his previous memories before death and transfers them to his past self at the start of the day. With twenty two minutes to find a way to save its home and escape the loop.

Having only one minute each time the player spawns, *Minit* delivers rewarding short adventures. Not narrativized as a time loop as the different characters on the world change place between loops and advancements in equipment or changes in the map sometimes stay as permanent between runs *Minit* has all the different gameplay and design aspects found in games with time loops. Even though the time limit that the player is stuck in is contextualized as the power of the cursed sword taken at the start of the game.

In *The Sexy Brutale* a series of murders are going to happen at the annual masquerade. In order to avoid them the player must interfere with the assassinations and avoid the deaths of all of the assistants, luckily the player is

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trapped in a time loop and can learn how the murders happen and in which ways to alter either the other participants behaviors or dismantle the lethal traps. Saving everyone and himself from their deaths and breaking the loop.

In *Twelve Minutes* the player comes back from work to what appears to be a normal night until a police officer knocks on the door, detaining the player and incriminating his wife about killing her father eight years ago. Asking for a clock and killing the player in the process just to appear back at the entrance of the apartment twelve minutes before. From now onwards the player has to discover what really happened eight years ago and break free of the loop gathering as much information as possible from the policeman and his wife.

While all the games follow some of the same terms such as: limited time each loop, time manipulation through the loop (restarting or advancing time), use of accumulated knowledge between runs, etc. All of them have contextualized the main game mechanic within its world. In *Outer Wilds* the Nomai statue found at the start of the game send the players thoughts back in time, in *Minit* the cursed sword kills the player every sixty seconds, on *The Sexy Brutale* the specter of a mysterious woman and the powers of the masks teleport the player travel back to 8PM each day at midnight, and in *Twelve Minutes* the mysterious clock of the father traps in time and space the player. Even that the save and load featured in all kinds of games is narrativized and used through gameplay to fulfill an already known experience present in all video games: learning. With the principal focus of the game not being the skill or understanding of the game mechanics but the recollection of information through the multiple iterations the player does each level.

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Game Design

The time loop in *Outer Wilds* comes from the necessity from the developers to restart the simulated solar system into a starting position after some time, because after simulating the game world physics long enough transformed the system into utter chaos. The characters in *Outer Wilds* do not follow a schedule, they are instead standing still in different places of the world, what changes following a set schedule with some smaller random factors are the planets (e.g., The falling sand on Hourglass Twins or the constantly destroyed surface of Brittle Hollow).

The time limit in *Minit* does not come from the schedules of NPC or the changing nature of the world that ends being irreversible but as a way from the designers to embark the players in short but exciting adventures no matter where they decide to explore in the short timespan given to them, always finding something new to do one minute at a time.

The Sexy Brutale loops are designed in order to give the player information about the whereabouts of the other characters in the game as well as their schedules. Every character in the party follows a strict schedule that moves in synchrony with everybody else, making their movements and actions completely predictable after observing them through some loops.

Twelve Minutes takes an interesting approach to the game progression, to advance the narrative the player has to talk with the other characters, look through their belongings and discover new information each loop. These discoveries unlock new dialogue lines and interactions with the characters. At the beginning of the game the player can only talk to his wife about eating the dessert but as the plot unravels more options are available like asking why she killed her father or where the clock is hidden.
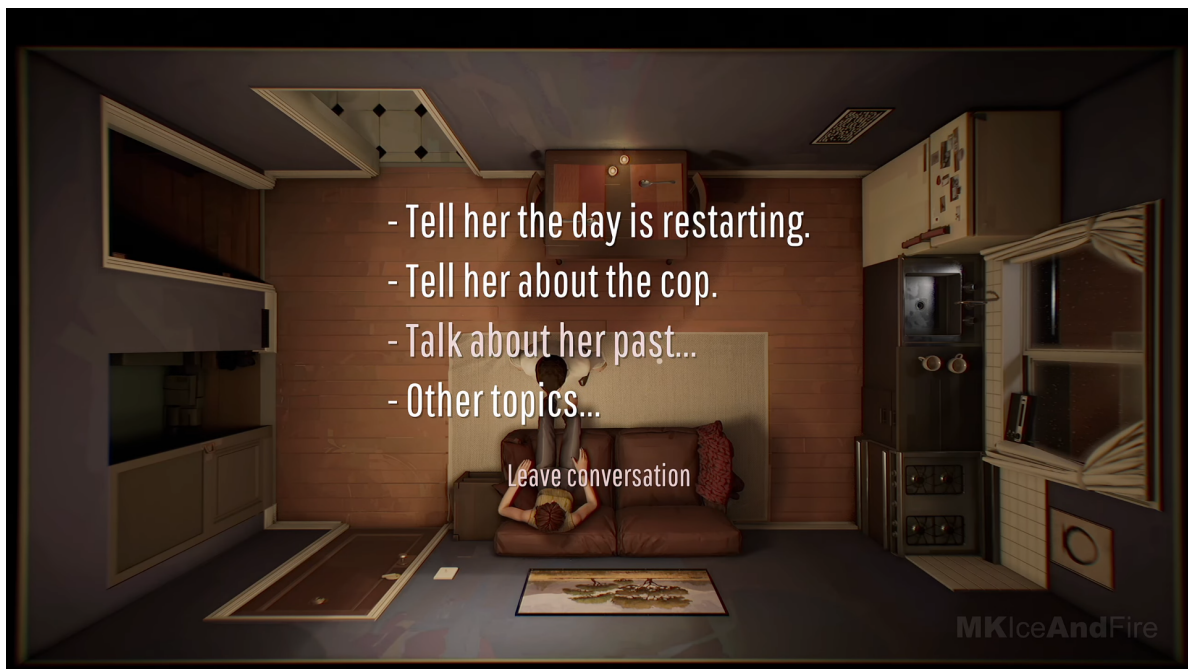
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Figure 8

Twelve Minutes dialogue loop 1[5]

Note: At the start of the game only two options can be chosen.

Figure 9

Twelve Minutes dialogue loop 6[6]

Note: More interactions appear as the player advances.

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[5] Screenshots taken from:

[6] ▶ TWELVE MINUTES Gameplay Walkthrough FULL GAME ALL ENDINGS [4K 60FPS PC] - No …

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The cause for these game to be restricted to time loops is diverse, *Outer Wilds* decision was taken in order to solve the problem with the simulated physic system of the game while *The Sexy Brutale* and *Twelve Minutes* were conceived since the beginning with the idea of the player progression being the accumulated knowledge of the loops. Instead *Minit* loop was carefully crafted around to play with the time taken with each action the player could do in game, such as traveling the world, talking or fighting enemies.

Figure 10

Minit turtle textbox

Note: The textbox of this turtle slowly appears letter by letter taking almost forty seconds out of the max sixty to end.

The creation of a time looping game is more dependent on the game mechanics and the intended dynamics the designers want to convey than the narrative of the game itself.

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The Packed World

The game world of *Outer Wilds* is filled with different planets and structures for the player to explore, be it the starting planet itself Timber Hearth or its moon to the other four planets in orbit or the strange meteor called the Interloper. With the twenty two minutes available to explore them the player has not enough time to entirely explore the system nor a single planet in its entirety because of the densely filled nature of every spatial body. So eventually the player will die or get out of time reseting all the advance made on the last loop. But this is rarely a set back because the player can rapidly get back where he was or the information gathered on the last loop will guide the player to a new area or planet to continue exploring.

Figure 11

Outer Wilds solar system
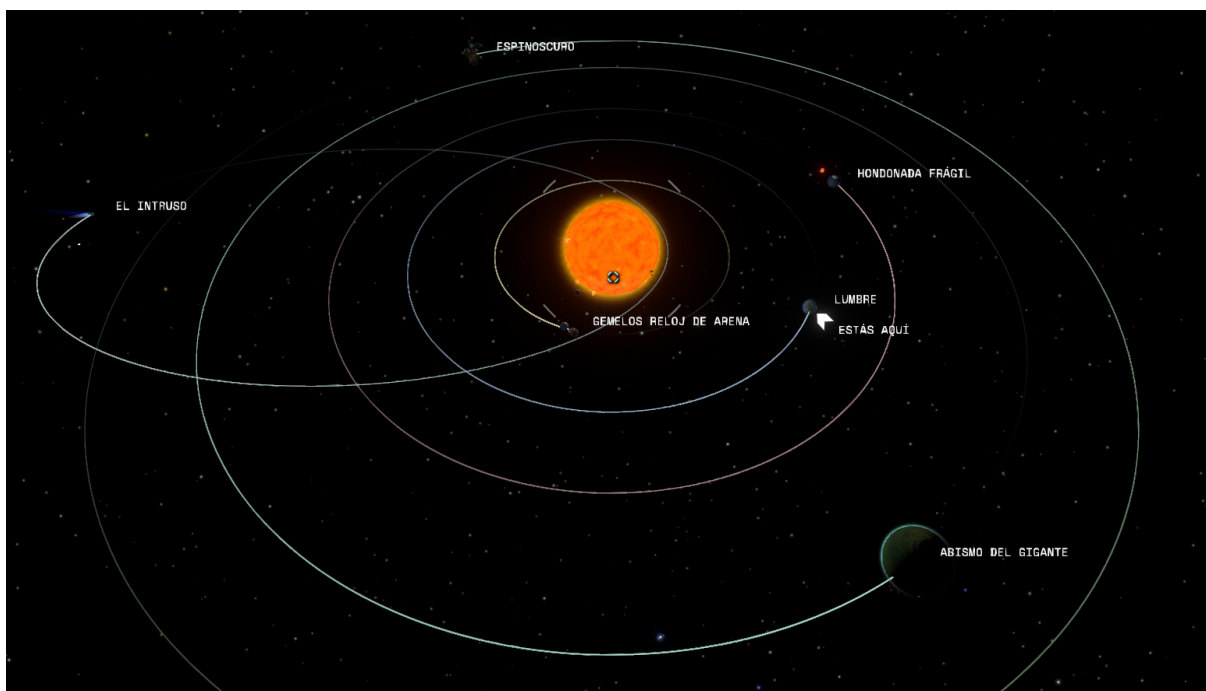
Note: Even when a big part of the solar system is empty space each planet is no more than two minutes away.

Minit strict time limitation is compensated with an incredibly filled world with distinct locations situated close to one another. There is not a screen in *Minit*

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without some kind of puzzle, obstacle, quest or reward to be found, let it be the infinite desert puzzle, the underground labyrinth or the lone island. With different shortcuts and spawn points to make the traversal around the game world as smooth as possible.

The Sexy Brutale hotel is divided in different sections all of whom are designed to find and solve a concrete murder so the player will not have to travel all across the map and endlessly wander to find the solution to the next obstacle found. Also the time loop of nine minutes is divided in three smaller sections of three minutes each so everything the player always needs to complete something is always within two and a half minutes from the current position or less.

In *Twelve Minutes* the space available to explore through the entirety of the game is only the small apartment the protagonist live in. With it containing only three rooms: the bathroom, bedroom and dining room. If the player tries to exit the house at any moment the loop resets, acting as a mechanical feature and an invisible wall that the player cannot cross. Everything that the player can interact with is always thirty seconds away or less.

In each of the games the game world the player is able to interact with is no bigger than the total time it would take the player to go from one side to the other. As obvious this can be it has to be taken into account that the more restrictive the time limit is the smaller the world has to be or the player character movement options have to be increased in order to be able to explore anything within the world at any loop. *Minit* uses a variety of spawn points and teleports to do so, while *Outer Wilds* less restrictive time limitations allow the player to embark on longer travels through the solar system and leaving more space of nothing in between POIs. *Twelve Minutes* has the smallest explorable surface while *The Sexy Brutale* uses different spawn points and shortcut options like *Miniti* to allow the player enough freedom of movement.

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The Dynamic world

The characters on *Outer Wilds* do not follow strict schedules that repeat each loop and are usually stationary on the same spots.

Figure 12

*Outer Wilds Chert at the campfire*

Note: Chert like the other characters is stationary through all the time loops.

What irreversibly changes is the world with the planets having dramatic transformations through the course of time making it impossible to explore the entirety of the game in a single playthrough because some spaces are not accessible until certain changes occur while other ones are blocked after some time in the loop.
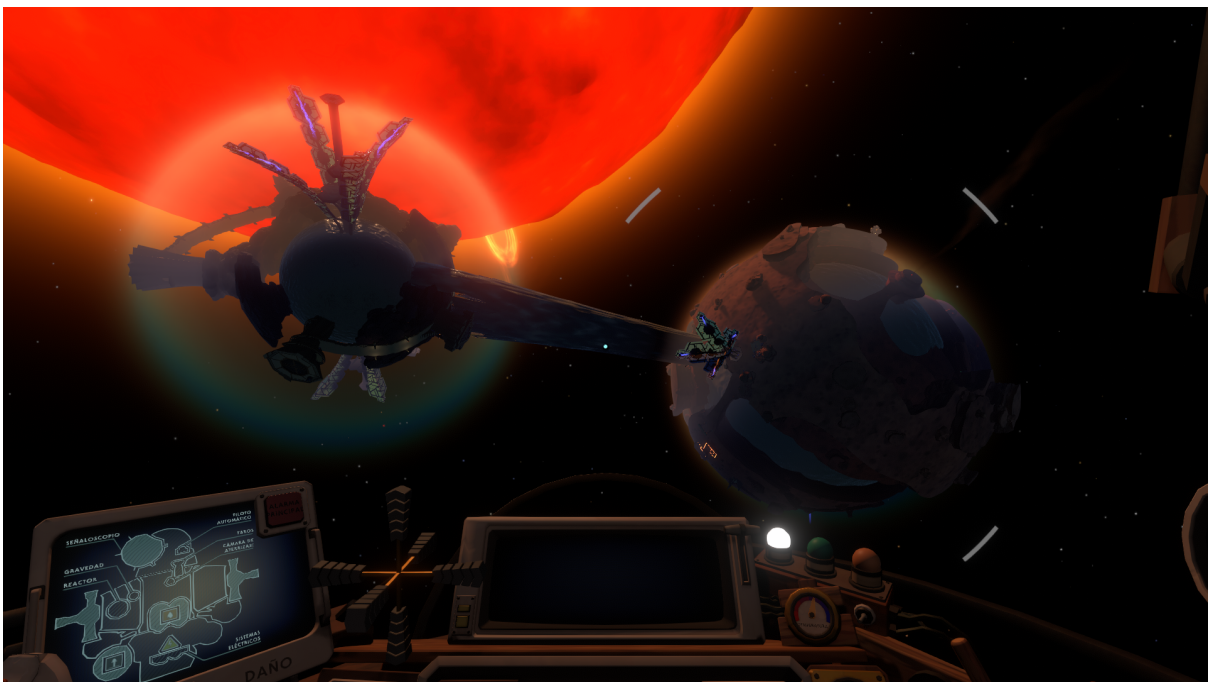
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Figure 13

Outer Wilds early loop Hourglass Twins
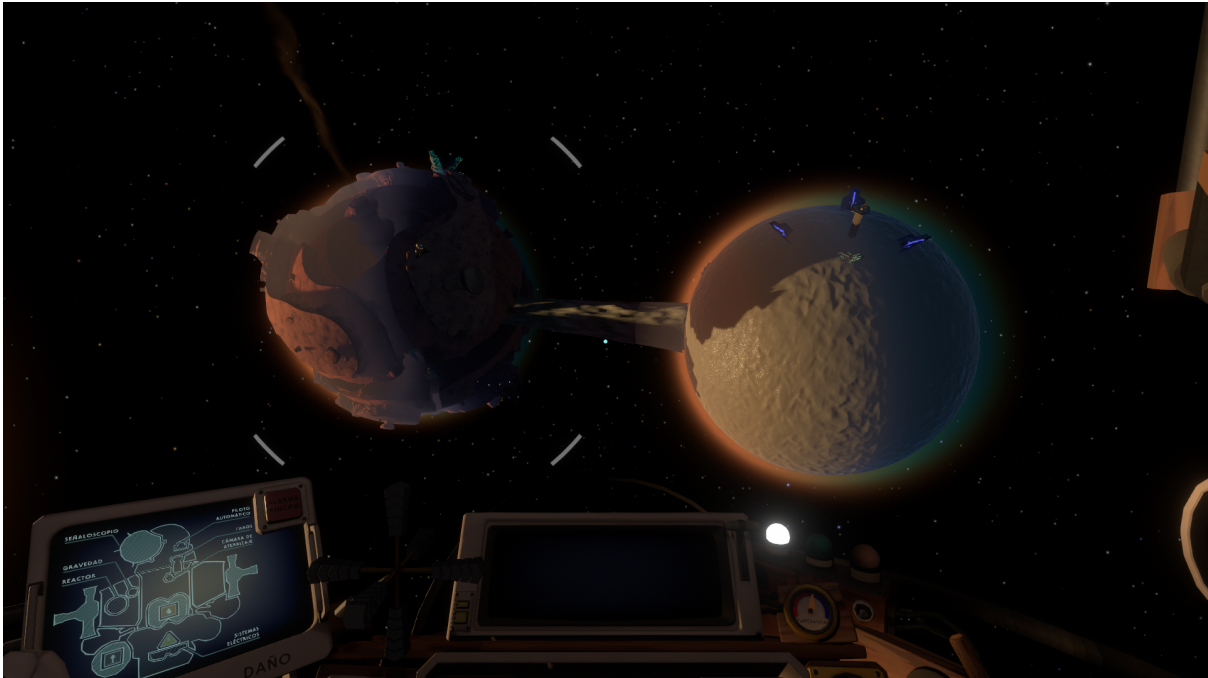
Note: The cave system is accessible before the sand fills the entire planet.

Figure 14

Outer Wilds late loop Hourglass Twins

Note: When the cave systems are blocked the towers on the other twin are displayed to the player.

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The world of *Minit* does not change through a single loop. Instead actions done in previous runs save and change the world and its inhabitants. While an NPC will not follow a certain schedule and move through the level or an area won't change it's layout with time if an item is received the player will hold it onto the next loops. Also, characters with questlines will move to different zones given the necessary requirements.

Figure 15

Minit boat quest line 1

Note: After giving water to the lost character in the desert he asks the player to go to a different place.

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Figure 16

Minit boat quest line 2

Note: He rewards the player with an item and insists on meeting him on his boat.

This simulacrum of actions that every character in *The Sexy Brutale* follows, as if they were performing a theatrical piece that repeats one loop after the other makes the hotel feel real at the same time that the murders can be resolved. Inside the hotel the player has to avoid being caught by either staff members or the order assistants while interacting with the future encounters of the guest to avoid deaths. At some time stamps environmental events also happen (e.g., the bell ringing at a certain minute that also marks the death of one of the guests).

The characters in the *Twelve Minutes* constantly act following their schedule, when starting the loop the wife is always at the bathroom and it is not until a small amount of time passes that she decides to leave and meet the player, thereafter she stands at the sofa and interacts with the player to eat, dance, talk or sleep until the cop calls and opens the door. The timing that the cop arrives at the apartment and enters the house is also scripted and can be changed lightly by closing the door hiding inside the house or calling her daughter to contact him.

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Figure 17

Twelve Minutes peephole 6[7]

Note: The police officer comes up the elevator each loop at the same time and can be seen through the peephole in the door.

There seems to be different approaches on how time affects the loop itself. On one hand, in *Outer Wilds* the characters are stationary and what changes the dynamics the player has with the world are the constant evolution of the environment, on the other hand the progress through the loop in *The Sexy Brutale* and *Twelve Minutes* are defined by the actions taken by the other characters in the game and not so the scenario itself. Either way these changes have to be fixed in time and constantly repeat through the loops or the player experience of the previous time loop would be useless. Characters and objects should interact the same way every loop if the same actions are taken. Consistency among loops is key to make the player feel he is learning how time works. *Minit* world does not change inside the same loop and follows a more traditional game approach by evolving its world only through player interaction.

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[7] ▶ TWELVE MINUTES Gameplay Walkthrough FULL GAME ALL ENDINGS [4K 60FPS PC] - No …

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The player

The first adventure into the solar system of *Outer Wilds* is overwhelming with too many changing factors around the player that constantly change can make them feel at a loss. Yet when the sun goes into supernova for the first time and the images of what they have done throughout their playthrough pass by just to start at the beginning of the game. Thinking if what happened to the sun was caused by their own actions just to end up discovering that they are trapped in a time loop. This discovery ends up giving a safety net for them to play around with the game mechanics and explore the more crazy and out of the box ideas because just after some time the game will reset hence not losing anything in the progress. Letting the player train and learn faster how the game works, having no fear of losing resources while doing so.

Minit is a nonstop running adventure where death after death the player discovers a new place or puzzle to explore and overcome. Immediately after ending one run the player knows or thinks about a new strategy to try and rushes towards the necessary area to complete it.

After the tutorial of *The Sexy Brutale* the player will feel the urgency to save the guests in the same loop but as some more loops play out and the player notices that it is not possible to save everybody in a single loop and that it is necessary to save them one by one to get the powers of their mask to gain access to new areas and begin rescuing the rest of the assistants.

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Figure 18

The Sexy Brutale eavesdropping

Note: Using the obtained mask in the previous run to listen to the conversation between guests.

The player feels lost through the start of Twelve Minutes after the aggression committed by the cop in the first loop. The usual first reaction is trying to be prepared and fight the police to survive using the knife or hiding inside the closet to trap him. Once these strategies fail and the player accepts deaths as part of the game equation he will play more risky tactics and let himself be hurt in order to gain more information that could be useful in subsequent loops.

There are the same dynamics in each of the game analyzed, the player starts confused about the details of the situation he is found in but as the game advances and more loops are completed the fear of death and the anxious sensation of time running out slowly decay until becoming an essential part of the game itself where eventually the players will reset the loops themselves to go back to the starter position just because it's closer to their objective or to test a new idea the player just had. That familiarity and security given by the time loop offers the player the

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option to approach riskier strategies because there is nothing to lose. If the player fails he can just try again almost immediately.

Exploration

Outer Wilds primary objective is to promote "curiosity-driven exploration", and to do so the game does not give quests to follow or a final objective to accomplish. Instead, subtle details about the game world gives the player an incentive to explore the solar system with the objective of understanding how it works. With the time in the time loop limiting the access to certain areas makes the "when" as important as the "where" while exploring the world if the player does not take into account when to explore one place it might be yet to be unlocked or already blocked by the pass of time. The Curiosity system used to link the different POIs located between different planets makes the exploration aspect feel rewarding and gives the players new areas to travel to each loop.

The exploration in *Minit* is a quick investigation of the different areas the player can reach in time. With simple puzzles to solve that are made rewarding to solve due to the extreme pressure that the short time gives to the player. Most puzzles can be seen for the first time and solved in less than thirty seconds. And even if the player cannot solve them in time the travel back to the puzzle is shorter than a minute. Various areas are blocked for the player until completing certain areas and obtaining items and abilities to keep advancing.

The hotel of *The Sexy Brutale* is divided into different zones that are blocked by locked doors that require either a key or a code to open or the power of the mask of a guest that has to be saved first to continue forward. These limitations in the area to explore available to the player are useful to avoid excessive backtracking and avoid endless wandering of making the player feel lost. As the game progresses some earlier areas are blocked so the playing ground is always small enough for the player to comprehend all that happens inside a loop.

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Figure 19

The Sexy Brutale phantom wall
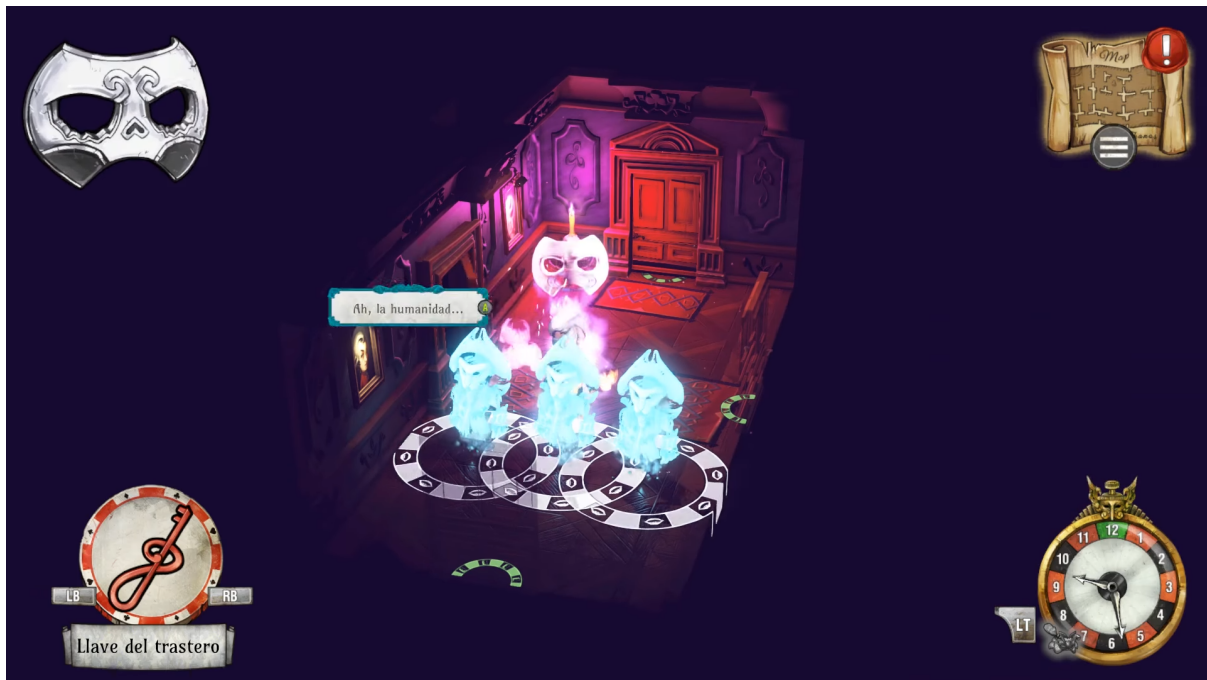
Note: Three phantoms block the path through the Sexy Brutale until a certain murder is solved.

The small enclosed space in *Twelve Minutes* can be fully explored in a single loop, gathering all the different items and looking through the entire house for items or clues. But the real exploration in this game is the one that comes from interacting with the rest of the cast, asking the wife about new topics or seeing the different interactions she has with the items in the house. Trying to convince the police officer to talk or a way to keep him out of the house and discovering hidden items such as the clock after certain interactions occur through the run.

As seen exploration in time looping games have an extra axis needed to be taken into consideration not only are some zones and objectives blocked until the player discovers an item a key or a code but also the time in the loop limits what the player is capable of doing, in *Twelve Minutes* the player cannot talk to the cop until late in the loop and in *Outer Wilds* is impossible to explore the interloper if it is not close to the sun.

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Repetition

The constantly changing world of *Outer Wilds* does not let the player explore its entirety in a unique playthrough and it is designed to be played multiple times in order to experiment and learn about the system and its volatile nature. With each loop the accumulated knowledge of previous attempts gives the player an edge over the hostile environment and its challenges. And only through the repetition of the loop the player is able to steadily advance and uncover the narrative of the game. Once the whole narrative and puzzle that the entire system is completed the player can end the game in a single loop, either in a new profile in the first time loop or after dozens of them in an older save file.

Figure 20

Outer Wilds memories
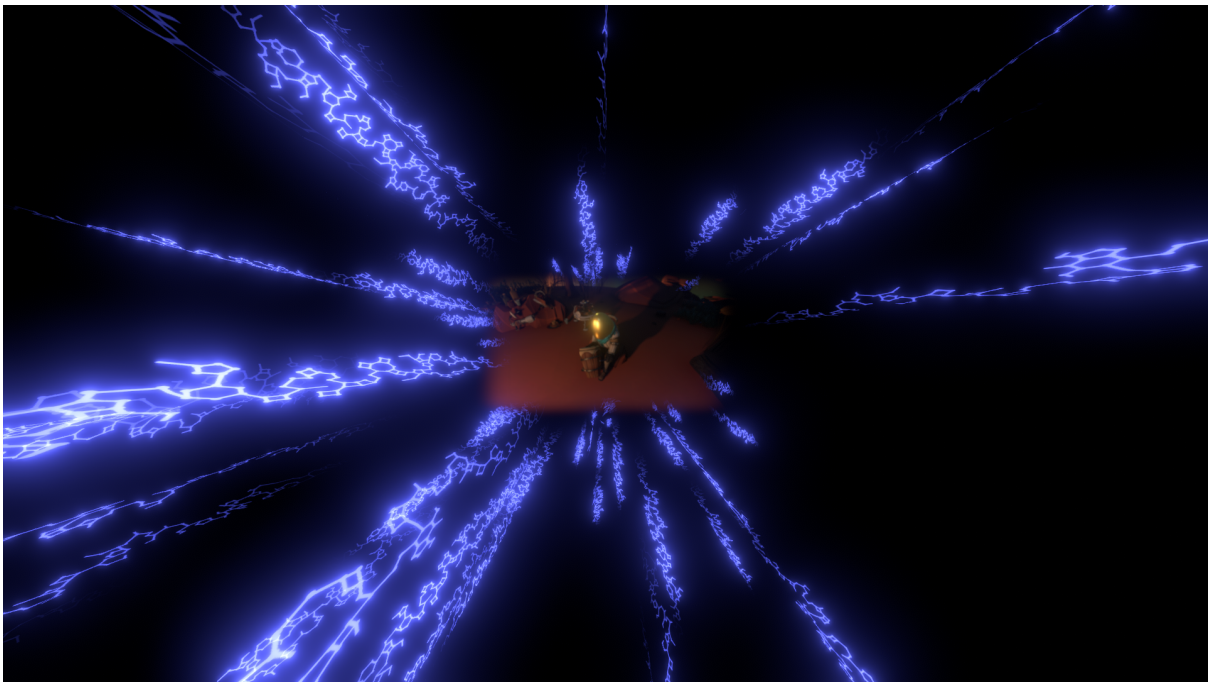
Note: At the end of each playthrough images of the player activities appear before starting a new loop.

The constant time restrain in *Minit* that makes the player start over and over the game in this one minute window to play should be extremely frustrating to the

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player, but the clever design of the world with multiple shortcuts between zones and the spawn points scattered in the most important positions of the map limit the inevitable amount of backtracking to a enjoyable degree. Letting the players reach previously seen areas faster and faster as the game advances while being subtle enough to be hidden to the player the amount of time needed to make the discovery of the shortcuts rewarding. Also the vast majority of unlocks are kept between loops and the player has to gather them only once.

In *The Sexy Brutale* some keys are needed to traverse and other items are lost between loops making the player gather them around each loop, on the other hand mask powers and passwords are kept avoiding too much backtracking each loop. The player can change the spawn point between different clocks all around the hotel to start closer to the current objective and in those he can also change the hour to start on the second or third third of the time loop.

Twelve Minutes handles the repetition of its game loops with a "cap", in order to advance and get information from something or someone on one loop there are previous requisites to meet like having to talk about a topic or discovering the hidden present in the bedroom. In order to talk about the killer of the father first it is necessary knowing that someone killed him and after that the wife gives new information that when told to the cop in a different loop will unlock a new dialogue for another loop with the wife. So the repetition of the loop is necessary to complete the game and cannot be done in a single first time loop. In order for the navigation through the time loop to be as easy as possible, exiting the house resets the loop and sleeping on the bed or hiding in the closet advance time faster.

These games treat repetition with their own methods, in all of them the time taken to return to the previous state after resetting the loop tends to be minimal, either the couple of minutes it takes the player to fly where he was previously exploring in *Outer Wilds*, less than one minute in *Minit*, not more than the three

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minute sections *The Sexy Brutale* is divided in or the time necesary in *Twelve Minutes* that can be advanced by sleeping. Also while playing either of these games waiting for an event to occur other sites, places or interactions are available so the player has plenty to do in the early and mid stages of the game.

Time Pressure

Outer Wilds twenty two minute time loop is long enough for the players to feel free to explore without constant pressure but at the same time not long enough to get the player frustrated when reaching later stages of the loop and die. There are ways to end the loop early, dying or meditation after talking several times with Gabbro on Giant's Deep. Also the player can sleep at any campfire to accelerate time.

The player of *Minit* is always behind the clock with few to no seconds to spare. This time pressure is at its highest when the player solves a puzzle and has to adventure into new screens without the knowledge of what lies ahead rushing to get as much information as possible within the remaining minute.

The slow paced nature of *The Sexy Brutale* subtracts a lot from the pressure that the time limit gives to the player. It is not that the player is constantly waiting for things to happen but slowly exploring and discovering new clues about the place and its inhabitants.

The small amount of time given each loop to the player to act gets the player anxious and trying to act quickly on the first in-game loops thinking fast new ways to avoid being killed. But as the game advances and the player is knowledgeable towards his environment the twelve minutes given each loop are more than enough to complete any task necessary and gives long breather sections for the player to think and speculate about the outcome of future actions.

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While the time restriction that a time loops implies to the player can be seen as a constant source of frustration and anxiety, the knowledge of having the ability to try again immediately after death or reaching the time limit nullifies this "negative" aspect of the games. Even so, when the music that sounds near the end of each loop in *Outer Wilds*, the beats over the last ten seconds in *Minit* or hearing elevator in *Twelve Minutes* and having to rapidly finish whatever the player was trying to do ramp ups the intensity of the game every few minutes avoiding monotony.

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Project Development

Guidelines

In order to write down guidelines about developing a video game with time loops good practices, bad ones and what is to be expected of doing such task an exploration of the differences in game design that are related to games with time loops as what makes a video game one that categorizes to be considered one with time loop mechanics. How the world and levels in the game have to be designed and what aspects of them are important to take into consideration. How the player will feel and react to the genre and in which ways will he be immersed and explore the game world that was created. How to deal with the constant repetition of the same or similar actions, deal with the loss of progress in game every few game time and avoid frustration over an overcomplicated game system, long and useless waiting between time loops and the anxious feeling of not having never enough time.

A previous work on investigating the current State of the Art situated above in the document has been done in order to make the further conclusions in conjunction with the analysis of different video games containing time loops.

Selected games.

The selected games to analyze are the following.

Outer Wilds. *Outer Wilds* has been selected as a game to analyze as it was one of the inspirations to start this thesis and is considered by the critic as one of the best games of the last decade. In order to see and perceive what makes *Outer Wilds* such a sensation and if it has something to do in its relation with the time loops. Nevertheless the game has properly used time loops and fits into the definition of a time looping game being an easy candidate to analyze and acting in some way as one of the fundamental pillars of what games with time loops are capable off.

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Minit. While *Minit* could be a curious candidate because the game narrative itself does not talk about time loops and the player character is not trapped in one the mechanics and dynamics found in *Minit* partially relate to the definition of a time looping game, and seeing how a different approach to the formula and how a time looping game can be made without transforming the whole narrative and taking all the attention to itself. Even so, the sixty seconds time limit restriction that constantly runs through the hole game makes it similar in design to other time looping games, but by looking at the similarities and difference of the game with the other cases good points about what really differentiates games with time loops and what are the limits and limitations of those could be made.

The Sexy Brutale. As a counterpart to the exploration theme games that are *Outer Wilds* and *Minit*, *The Sexy Brutale* sets the player into a series of murder mysteries in need of someone to solve them. The catch is that those assassinations occur while playing the game right in front of the player and through the time loops he is able to solve and avoid the deaths of the assistants. This game more focused in the interactions between characters and its relations, conversations movements and patrons fill a different gap than the more explorer role that the player takes in *Outer Wilds* and *Minit* seeing how well the time loops adapt to this narrative and how the player can change the narrative through the knowledge of future events makes *The Sexy Brutale* a nice analysis case.

Twelve Minutes. *Twelve Minutes* in another mystery solving time looping game that got mixed reviews when launched in contraposition to the overwhelmingly positive ones of the previous titles. In order to see what can go wrong if there was really something that *Twelve Minutes* did in contraposition with *The Sexy Brutale*, *Outer Wilds*, or *Minit* and the approach of the game into a deeper relation with the different characters being in this case a central point of the story as that was not the case with *The Sexy Brutale* where the player was saving the other

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party members from death without being seen in *Twelve Minutes* the player character is a central piece and in constant danger of being killed.

Parameters to analyze.

The different aspects of said games that will be taken into account are the following.

Definition of time looping games. How they fit into the definition we made of video games with time loops, like how does the game reset the player, how frequently under which circumstances and with what objective.

Game Design. What differential factors do the game have and the intentions of the developer when designing the diverse and more unique mechanics of the games, why do they have resets and why are they beneficial to the desired experience.

Packed World. Is the world following the structure of a packed world? Does it matter the direction the player takes in order to find something useful for his adventure or everywhere he goes there is something new. How far apart are the different areas of the game and how are they situated in relation to the other POIs

Dynamic World. Does the world experiment change through one simple loop or between them, is important to the player to take into consideration when he is doing certain action. Do some interactions with the game lock or unlock after a certain time every loop. And what can the player do to change the outcome of the different time loops.

Player. How does the player feel through the gameplay. What are the dynamics generated. How does he interact with the game world and what is the desired attitude the developers want them to have towards the game. How does he

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advance through the game and what methods are used to easy in their first minutes playing

Exploration. How does the player explore the game world. With which pace is expected the mysteries of the game to be unraveled and how deep does the exploration go. Are just the environments or also the characters and puzzles part of the investigation the player has to go through.

Repetition. How to handle the repetitive nature of time loops. With which techniques can avoid the boredom of going through the same spaces and seeing the same interactions over and over. How to make the game feel fresh after the first loop and how information affects the progression inside the game

Time Pressure. How does the time limitation present in all time looping games affect the players. How long are the time intervals between loops and in which ways can the player alter the pass of time and control the time loops.

With all this acquired information a first draft of the decalogue has been done and will be later used to prove the usefulness of it on the completion of the LDD with time loops.

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Play Again

Decalogue

Figure 21

Decalogue Infographic

········· **DECALOGUE** ···········

TIME LOOP GAME DESIGN

MAKE IT SOLVABLE ·······················

USE OF PREVIOUS KNOWLEDGE

The player must be able to use information gathered in previous loops.

CONSISTENCY AMONG LOOPS

Character actions and events have to be consistent between loops.

MAKE IT INTERACTIVE ·····················

BEHAVIOR MANIPULATION

The player's actions should impact the outcome of the loop

LOOP MANIPULATION

Give the ability to travel through the loop in time either advancing it faster or restarting at any given moment

WHEN AND WHERE

It should be equally important when the player does an action as well as where he does it. Playing with the time axis is the most satisfying part of the genre.

LIMITED TIME, LIMITED SIZE

Traveling the game world can not take more than the time restriction imposed on the player by the loop.

MAKE IT ENJOYABLE

CREATE A DENSE WORLD

The player will try to explore in every possible direction after enough loops to make sure that there is something to do everywhere the player can go.

EASY TO NAVIGATE

Traveling through the world should not be a sluggish task or the player will not try again after a first run. Facilitate traveling with teleports or different spawn points.

MAKE IT SAFE

DO NOT BREAK THE SAFETY NET

Do not penalize the player for failing or finishing a loop. The safety given by not losing when failing leads the player to try out of the box strategies.

CONTEXT

Let it be via narrative or through the game mechanics the justification of the time loop should always be contextualized.

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Here are ten important guidelines to have in consideration when specifically designing a video game containing time loops.

Use of previous knowledge. The player must be able to use information gathered in previous loops.

Consistency among loops. Character actions and events have to be consistent between loops.

Behavior manipulation. The player's actions should impact the outcome of the loop.

Loop manipulation. Give the ability to travel through the loop in time either advancing it faster or restarting at any given moment.

When and where. It should be equally important when the player does an action as well as where he does it. Playing with the time axis is the most satisfying part of the genre.

Create a dense world. The player will try to explore in every possible direction after enough loops to make sure that there is something to do everywhere the player can go.

Limited time, limited size. Traveling the game world can not take more than the time restriction imposed on the player by the loop.

Easy to navigate. The world can be as deadly as needed but traveling through it should not be a sluggish task or the player will not try again after a first time. Facilitate it with teleportations or different spawn points.

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Do NOT break the safety net. Do not penalize the player for failing or finishing a loop. The safety given by not losing when failing leads the player to try out of the box strategies.

Context. Let it be via narrative or through the game mechanics the justification of the time loop should always be contextualized.

LDD

For more information, the entire level design document can be found in appendix A.

With the guidelines defined we are going to use them in order to create a level design document.

Constraints

First of all define the conditions we are under when developing such a game/level. First of all the genre of the level is obviously a game with the inclusion of time loops, and as seen by the Case Studies they all have puzzles and exploration embedded in the nature of the genre. Some such as *Twelve Minutes*, *The Sexy Brutale* or *Elsinore* have a more narrative centric experience while *The Legend of Zelda: Majora's Mask*, *Outer Wilds* and *Minit* are more focused on the feeling of adventure. Due to another constraint, the development team and time available, being only one game designer and having about two months to develop the entirety of the LDD and its iterations. We will leave the game as a puzzle exploration game with time loops where instead of embarking in a big adventure or entering the perilous territory of creating a complex narrative. Both terms will be lightly adapted into a project with a much smaller scope. Developing a map with a smaller area than the adventure titles and with a less intricate narrative than the others, while at the same time mixing both types into one.

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Finally, the longevity of the time loop will be initially set to three minutes with an expected total gameplay of thirty minutes to complete the level or about ten in-game loops. This is done in order to have control over all the possible variations on the player interactions each loop. As said by Charles Griffin, director at *The Sexy Brutale*; Designing a game around a time loop has certain difficulties. The limitations included by the set course of events, and how players are able to change them create many variables that can be hard to follow. The wider the game world is, the more complex it is to know what the player might do and ensure they always have something to find or do. (Batchelor, 2019)

Bubble Diagram

In order to start defining the level one of the first things to do in order to quickly iterate is a bubble diagram. A bubble diagram is used in architecture to define areas and spaces and connections between them. They are useful because of how easy they are to make and the facility given to change entire zones or composition of the level.

Thanks to the bubble diagram most of the future aspects of the LDD such the pacing, cadence, difficulty potentials, events, art, story, mechanics and dynamics are partially defined. Giving a lot of facilities to the future developments and in case of contradiction with the earlier iterations the bubble diagram can be edited and updated to the current state of the level design document.

After some iterations through the development of the entirety of the LDD the final version of the Bubble Diagram looks like this:

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Figure 22

LDD Bubble Diagram
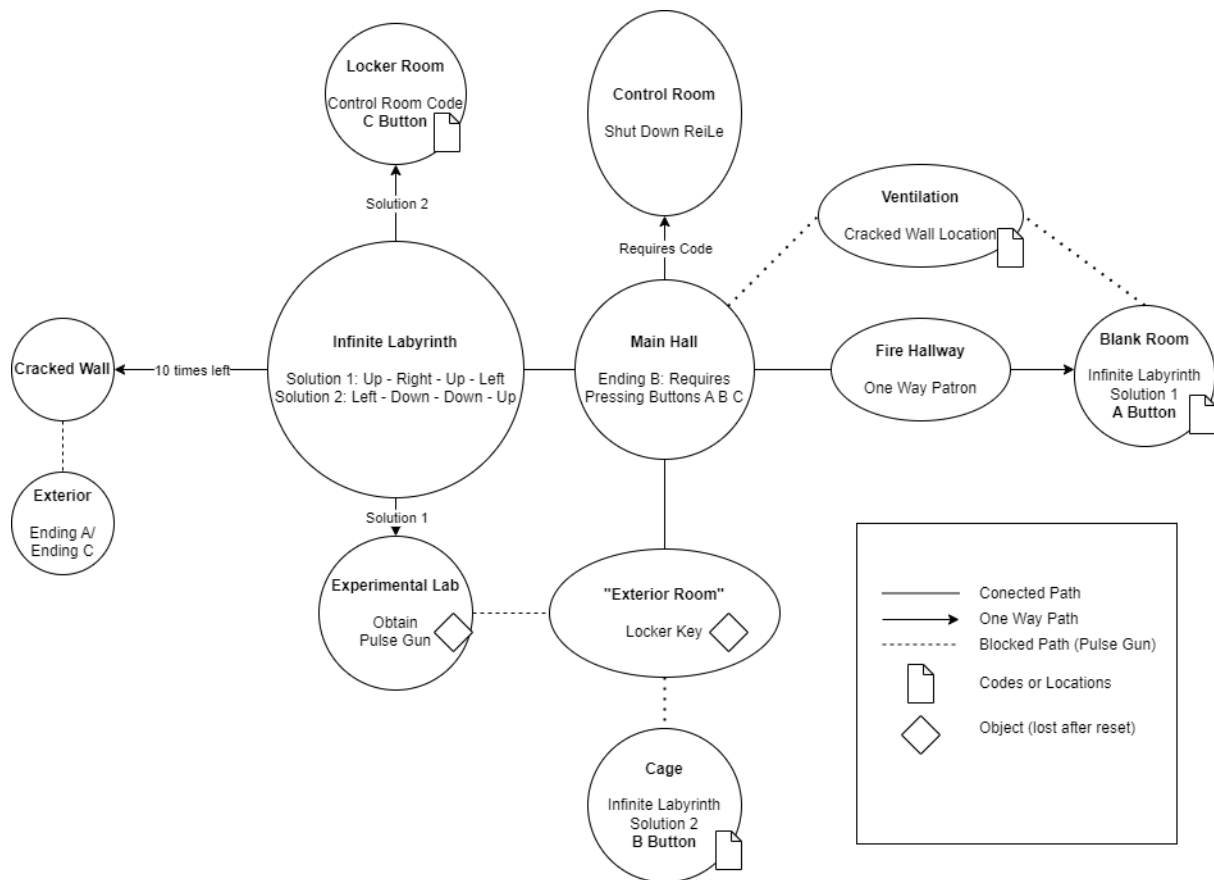
Note: On the bottom right of the bubble diagram there is a legend explaining the different iconography used.

Context

As stated in the constraints section the narrative of the game will not be one of the core game pillars of the level. Giving context to the time loop inside the game world is necessary in order to not break the immersion of the player through the consecutive loops.

The story will be divided into four acts: presentation, increasing conflict, climax and resolution. While creating the story we have to bear in mind that there must be consistency between loops, the player will be able to use information from

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previous loops and so the player character must also be knowledgeable of the situation.

Presentation. The presentation of the game sets the setting, explains how the world works and gives the player an objective. Not yet explaining the time loop mechanic.

Increasing conflict. After the first death of the game either when the time limit of the loop or the player dying before the game explains how the time loop works and its implications. Letting the player feel somewhat more relieved and free from the strict time limitation imposed. The conflict keeps growing as the player advances through the game and uncovers more of the story.

Climax. Once the major part of the game has been completed and the metapuzzle of the entire level is about to be resolved by the player as all the knowledge acquired during the game is used as a weapon to destroy the final challenge.

Resolution. As the final challenge is completed the player finds its way to the "end line" and is rewarded with an ending to the game

Story

The story now designed in these four acts treats the new insurgency of AIs, specifically one designed to train other artificial intelligences through reinforced learning reaches the singularity and takes over the world. Now this AI called ReiLe keeps doing what it was created for; training others through reinforcement learning but now it uses humans as test subjects for its experiments. Giving them limited time to complete certain arbitrary tasks and ending the test subject life, in this case the player's life, once the time is over. But when placing the next test subject the memories and experiences of the previous test to the posteriors guinea pigs. Thus

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creating a loop where every time the player dies he is set back to the starting state of the game while not being a "time" loop itself narratively, it mechanically works the same way.

From that point onwards the player will need to learn more about its environment while solving diverse puzzles, until solving the entire level, destroying ReiLe AI and escaping the facility and freeing himself from this infinite loop of tests.

Figure 23

LDD Pacing
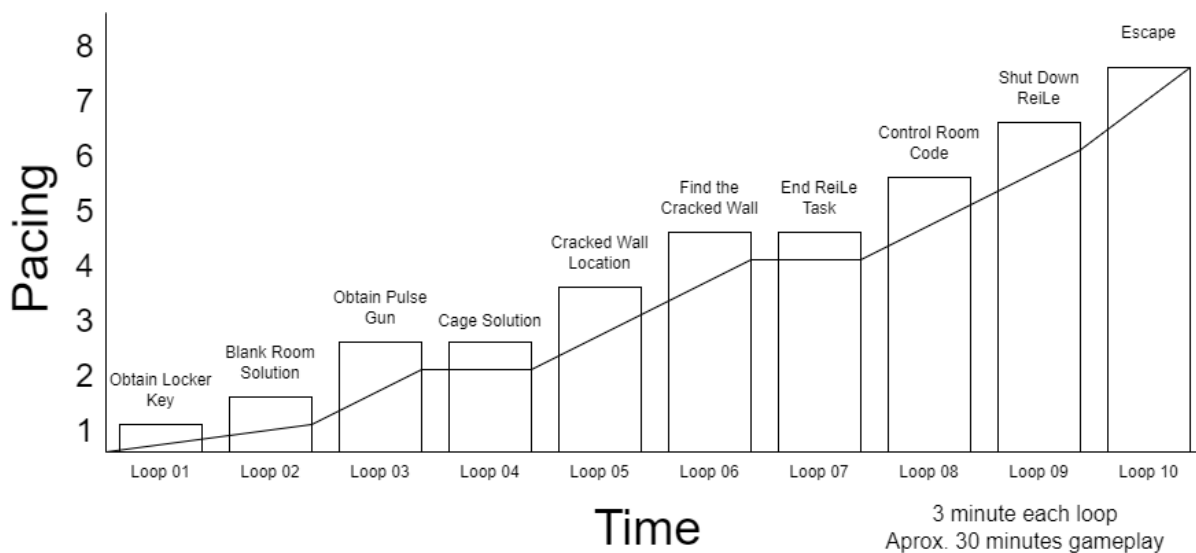
Note: The pacing of the level with the estimated time per each section in order to complete the game.

There were initially lots of multiple endings depending on the actions of the player through the loop, but as it is explained in the validation process of this paper the players actions through the loop have to have an impact to its outcome but not as the maximum priority over the use of previous knowledge. So the possible endings of the game were reduced to three, and the player has the capability of continuing playing after obtaining any of them.

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Art

The art style of the game has been defined by doing a moodboard conforming the aesthetics and feel desired for the final version of the game.

Figure 23

LDD Moodboard

Note: The facilities are heavily inspired by Aperture Science chambers and the top down camera and movement is based on Minit.

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Gameplay

Intrinsic goals. The intrinsic goal of the game is in a first instance to complete the given task from ReiLe in order to receive a reward, but as the player advances through the level and discovers more of their secrets the goal ends up being defeating the AI and leaving the facility in a single loop.

Mechanics. To do so there are a variety of mechanics at the disposal of the player or as a challenge to defeat such as: The infinite labyrinth, the loop, a pulse gun, firewalls and locked doors.

Dynamics. And these mechanics create with other mechanics or the environment itself some dynamics inside the game such as the connectivity of the puzzles, using codes and solutions, breaking walls or finding workarounds in the limited time.

While creating the world, its mechanics and dynamics we want to ensure that the guidelines are being followed in order to give a better player experience. So the map and its puzzles are carefully handcrafted and in no way randomized each loop as the consistency between loops is important in order to use the gathered knowledge from previous experience. As the time of the loop lasts only three minutes the loop manipulation aspect is limited but enough in order to suffice a good player experience, while there is no button to advance inside the loop, the player character can easily restart the loop at the press of a button, quite literally, as the test subject have a chip integrated that kills him after the three minutes of he presses its neck.

When doing the actions is as important as where, such as taking up the pulse gun before going into the control room in order to defeat ReiLe or to access the blank Room button with the ability to come back avoiding the fire hallway. The world

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has also something to discover no matter the direction the player decides to explore first, either be the infinite labyrinth, the exterior room or the fire hallway. There is a puzzle to solve or information to gather no matter where the player goes.

And finally, but not less important, the game world has been designed with it being easy to navigate and there is nothing to lose more than one minute every time a mistake is made or time runs out. In order to not break the safety net and give the player the chance to explore and try more out of the box ideas or solutions to the challenges.

Figure 24

LDD Map Mockup
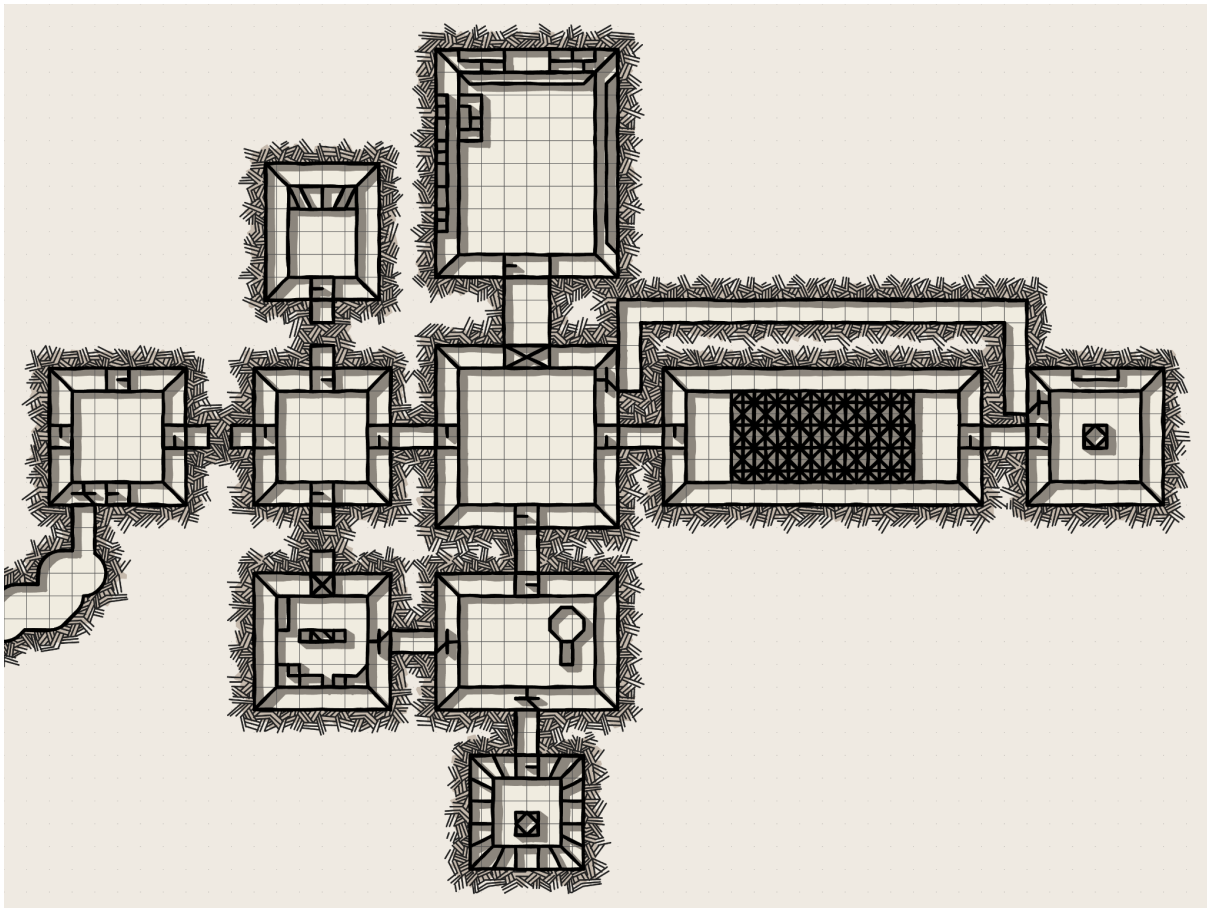
Note: Mockup of the entirety of the map and its connections, acts as a more detailed, but less clear bubble diagram.

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Validation Process

For more information the entire form questions and answers can be found in appendix B.

To prove the guidelines created using the information from the research and case studies a google form was done and given to a variety of game designers in order to gather their opinions and experiences in the field of time looping games.

First of all the most important thing to ask the users is whether or not they have played or developed a video game with time loops as part of their main mechanics, and also give some examples to ensure that the surveyed person knows what the theme and the intention of the form is.

From the twenty-one answers received nineteen had played a video game with time loops while two did not. And the most played games were; in descending order, *Outer Wilds* (73.7%), *Twelve Minutes* (42,1%)*, The Legend of Zelda Majora's Mask* (26,3%), *Minit* (26,3%) and *Deathloop* (21,1%). Sadly not one game designer played neither *The Sexy Brutale* nor *Elsinore*.

Now that we have compiled their experience with time loop games the users are given statements about every one of the guidelines and they mark, in a rating from 1 (disagree) to 5 (agree) to see how accurately the created guidelines adapt to their player experience. The closest to 5 the average of the answers is the more certain that a sentence about an aspect of the time loops game design is true. The further from 5 and closer to 1 signifies that the opinion from the designers contradicts the statement of the guideline. An average under three should be completely changed, from three to four modestly changed and four up is generally accepted.

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Now in relation to every statement of our guidelines the results of the form are the following:

Use of previous knowledge. The player must be able to use information gathered in previous loops. Users' responses highly agreed with this statement averaging 4,7.

Consistency among loops. Character actions and events have to be consistent between loops. Users' responses highly agreed with this statement averaging 4,4.

Behavior manipulation. The player's actions should impact the outcome of the loop. Users' responses generally agreed with this statement averaging 3,7.

Loop manipulation. Give the ability to travel through the loop in time either advancing it faster or restarting at any given moment. Users' responses generally agreed with this statement averaging 3,9.

When and where. It should be equally important when the player does an action as well as where he does it. Playing with the time axis is the most satisfying part of the genre. Users' responses highly agreed with this statement averaging 4,6.

Create a dense world. The player will try to explore in every possible direction after enough loops to make sure that there is something to do everywhere the player can go. Users' responses highly agreed with this statement averaging 4,1.

Limited time, limited size. Traveling the game world can not take more than the time restriction imposed on the player by the loop. Users' responses generally agreed with this statement averaging 3,8.

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Easy to navigate. The world can be as deadly as needed but traveling through it should not be a sluggish task or the player will not try again after a first time. Facilitate it with teleportations or different spawn points. Users' responses generally agreed with this statement averaging 3,9.

Do NOT break the safety net. Do not penalize the player for failing or finishing a loop. The safety given by not losing when failing leads the player to try out of the box strategies. Users' responses generally agreed with this statement averaging 3,8.

Context. Let it be via narrative or through the game mechanics the justification of the time loop should always be contextualized. Users' responses highly agreed with this statement averaging 4,3.

With this information the statement of the guidelines can be arranged by the level of general agreement shown by the community in order to show the ones that should more likely be changed or stated differently.

Table 6

Decalogue scores

Statement	Score
Use of previous knowledge	4,7
When and where	4,6
Consistency among loops	4,4
Context	4,3
Create a dense world	4,1
Loop manipulation	3,9
Easy to navigate	3,9
Do NOT break the safety net	3,8

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Limited time, limited size	3,8
Behavior manipulation	3,7

Seeing how accepted the guidelines have been the changes will be done to the level design document, giving more importance to those aspects of time looping games that are more generally experienced and not diving so deep into the ones that are not as crucially defining of the genre as could conform the behavior manipulation statement.

Nevertheless the limited sample available to complete the forms could be affecting the results either negatively or positively and further research with hundred or thousands of internet users would be useful to create a stronger validation of the guidelines.

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Conclusions

This paper aimed to discover the answers to the question: How much does designing a game with time loops differ from other types of games? And after the extensive research we have seen that several answers could be given.

Most approaches to the genre of time loop games share similarities that can be extracted from the game and compared between such as creating a dense world with discoveries every way the player decides to go, keeping the loops short enough the players can remember the events that occur and long enough in relation to the world the time limit is not a constant pile of stress. Not randomizing events or locations in order to keep consistency among loops in order for the player to be able to use the knowledge of previous iterations of the game. Not punishing the player after failing a loop more than the time used to come back to the same state he was previously in, and giving the player access to alter time inside the loop, either advancing time or restarting it in order to facilitate the exploration of more creative and out of the box options. And finally but not least demonstrating to the player that time matters, making them feel that the actions done by the player have to be made in not only the proper place but also the proper time, maximizing the loop and mastering time.

Even so, there are multiple way the design patterns inside a game with time loops changes as for example the linearity in *Minit* and how the scenario changes between loops while questlines advance through the entirety of the game being that certain NPCs change places or access to areas such as shortcuts unlock for the rest of the game, not only the loop. Or how some games such as *Hitman* implement minor schedule loops similar to the ones implemented in time looping games, with a short duration that make the world feel more alive while giving this gratification of knowledge and agency over the schedules. (Brown, 2019)

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In regards to the procedure of the research, starting from a theoretical framework of time in video games and the different aspects that define the genre. And then looking for practical implementations in the video games analyzed during the case studies allowing the formulation of the guidelines.

Finally a reformulation of the fundamental pillars of game design for time loop games, explaining the most important points to have in mind when designing and developing such games.

I. **Use of previous knowledge.**

Rewarding the players exploring for the sake of knowledge and understanding, rather than tangible rewards (Beachum, 2013) And how the players can use their accumulated knowledge to change the outcome of the next loops. (Batchelor, 2019).

The player must be able to use information gathered in the previous loop and gain access to new areas, mechanics or puzzles using their newly unlocked information each loop, working as a metroidvania of the mind.

II. **When and where.**

In addition to considering the spatial layout of the world, players must take into account the temporal dimension. Making the timing of when the players explore certain things as important as where they explore. As they advance through a time loop, certain areas might become blocked off while others may become accessible after a certain point in time. Thus encouraging the players to approach exploration in a new way, considering both space and time. (Brown, 2019)

It should be equally important when the player does an action as well as where he does it. Playing with the time axis is the most satisfying part of the genre and mastering the time loop to gain the most of each loop is part of the fundamentals we want the player to strive for.

III. **Consistency among loops.**

The time loops are used to present a puzzle to solve. thought the loops players lear a sequence of events over the repeated viewings of the scenes and use that information to his advantage in order to manipulate the events at the right time until finally completing the presented puzzle. (Brown, 2019)

Character actions and events have to be consistent between loops. Certain objects, characters, locations and the time events occur can not be randomized or altered from one loop to another or the player experiences of past loops will become useless to affront the further runs at the game.

IV. **Context.**

Time loops narrativize something already implicit across most video games, repetition. But these features offered by the loop which are present both in gameplay and the story can provide a more immerse and meaningful experience for the players. (Barkman, 2022)

Let it be via narrative or through the game mechanics the justification of the time loop should always be contextualized. So the player can be fully immerse in the nature of the game world without constantly breaking out to reality each time a loop ends.

V. **Create a dense world.**

Players will travel over and over through the same layouts looking for different information until eventually getting set back to the starting state by the time loop, only to try again wondering in any possible direction that crosses their mind. As the time limitations get stricter the game world has to parallelly be reduced and the number of things to find increases so no matter where they go there will always be something to find.

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VI.   **Loop manipulation.**

The game has to let the player manipulate the loop as they see fit: resetting the loop in its entirety or advancing time to try again after missing something in order to quickly get back on track. (Batchelor, 2019)

Give the ability to travel through the loop in time either advancing it faster or restarting at any given moment. Do not stop the players ability to try things and quickly discover more about the game.

VII.   **Easy to navigate.**

The loop is intended to be mastered and maximized, give the players new start points, tools, open shortcuts and let them speedrun across the map to eventually complete the game within a time loop. (Brown, 2019) Give them the tools to make the most profit out of the new dimension given to the game, challenging the players to think strategically and creatively about how to approach gameplay. (Batchelor, 2019)

The world can be as deadly as needed but traveling through it should not be a sluggish task or the player will not try again after a first time. Facilitate it with teleportations or different spawn points.

VIII.   **Do NOT break the safety net.**

Grand part of the pressure of having a constant time limitation is eased as the players discover that they are not able to complete the game in a single loop. The safety net given by this fact gives players the freedom to experiment with all kinds of approaches and ideas, armed with foreknowledge of what's going to happen. (Brown, 2019)

Do not penalize the player for failing or finishing a loop. The safety given by not losing when failing leads the player to try out of the box strategies.

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IX.   **Limited time, limited size.**

The time loop should be long enough to not make the players feel constantly under a time limit while being short enough to avoid frustration from a player failure. Another reason to keep the loop short is to help the players build a mental model of the timeline. If the loop is too long and too many events occur each run the player's ability to progress through the game gets hindered. (Brown, 2019)

Traveling the game world can not take more than the time restriction imposed on the player by the loop.

X.   **Behavior manipulation.**

Even though video games are a time based medium few use it to his advantage, the irreversibly change of time loop games with the pass of time urges the player to act rapidly in order to influence and change the outcome of the loop in order to gain progress.

The player's actions should impact the future relation of the player within the same loop. Locking a door should delay the arrival of a character to an event making the world feel more natural and alive while giving the player agency over the game.

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Appendix A: Level Design Document

Reinforced Learning

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Level Goal

In Reinforced Learning the player has to escape from the ReiLa facilities where he is a test subject under the surveillance of a superintelligent AI called ReiLe and is forced to work under on completing certain tasks in order to receive a reward.

Intrinsic Goals

Trapped in a maze of puzzles created in order to experiment with the human capacity to learn, the player has only three minutes to complete the impossible tasks given by an AI called ReiLe in order to receive the reward. But as the player explores the hostile environment he discovers that there is no point in doing the tasks and he needs to find a way out.

New mechanics

The infinite labyrinth.

At first sight it is just a normal room with four different exits located north, south, east and west. But as the player decides to advance into the next room in any of the four directions but right he is back onto the same room. There are some codes and solutions to the labyrinth hidden inside other rooms within the facility, once the player discovers one of these paths access to new areas and locations can be found inside the labyrinth.

The time loop.

Not inside a literal time loop, the player after exploring the area for three minutes is killed by ReiLe and his memory and experiences are introduced into a new text subject after reseating the scenario to its initial state. It is impossible to complete the entire puzzle given by the AI in a single loop without the previous information learned by previous tries. And the player has to continually explore new interactions with its environment in order to acquire enough experience in order to complete the game in one loop time.

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Pulse Gun.

A powerful tool with the capacity of emitting a pulse of energy with the capacity to move and or break objects hitten with it. It is found in one of the paths of the infinite labyrinth and the player loses the gun after the time reset or dying. Even though no real enemies can be fought inside the game world, the dynamics with the different interactable objects make this tool useful in a big variety of scenarios.

Firewalls.

An obstacle found on the ReiLe facility that burns and kills the player when in direct contact with it. Shoots fire constantly from the ground up for a long time before stopping a brief moment giving a small window of opportunity for the player to cross. Slows pace and blocks some of the places the player can access to. With the time limit implied in every being stopped by the firewalls is usually a suboptimal option.

Locked Doors.

Entrances to new areas that are not immediately accessible to the player until certain requirements are met. A locked door can need a special key to be opened, a secret code to be found or a breakable wall that has to be destroyed. Once opened the player can freely cross the door during that loop but they are closed again and the requirements have to be completed again in order to access once more.

New dynamics

Connectivity of the puzzles.

The puzzles that the player has to solve to advance and their solutions cannot be found in the same rooms and are intentionally set apart in other instances of the game to make the player progress feel natural at the same time as he has lots of things to try or explore on the next loops. Also placing the answers away from the main puzzle with the thigh time limitation of the game makes it impossible to solve on a first try, but once the enigma is found the player can simply travel to the area of

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the puzzle and input the solution saving time on that same run while letting the player know that the game is not supposed to be solved in a single try and that there is no real penalty for dying.

Limited Time.

The spare time per loop the player has immediately shows that the game is not supposed to end within the three minutes but with multiple iterations of the loop. And instead of trying to explore one and each area found in the test facilities it is best to clear each path given one at a time. Finding clues that lead to new and unexplored areas of the game one loop at a time.

Breakable Walls.

Some of the walls have cracks in them and the player is able to break through them once he acquires the Pulse Gun, these walls are hidden or in plain sight all over the map and make the feel believe of enlarging the world size and area at the same time the player wonders what will be behind them each time one is found but he has not recovered the Pulse Gun that run.

Codes and Solutions.

Codes such as the one needed for the blocked door to the control room or the paths that can be traveled through the infinite dungeon work differently from the conventional keys. Keys as the one from the locker room or the Pulse Gun are lost at the end of the loop and need to be recovered once more the next loop if needed. Instead codes and knowledge such as the paths through the labyrinth are not lost through the runs and do not need to be taken once again each successive loop.

Context on the overall Story

The level functions as an introduction and first challenges to the player in the game. Working as a safe tutorial to learn through death and multiple loops the core mechanics and interactions within the world with the player and its mechanics.

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Introduces the world narrative the situation the player is in and gives context to the game loops. As a test subject under the surveillance of ReiLe the player is bound to complete a task in order to receive an unspecified reward from the AI. Every time the player finds death either by the challenges or whenever the time limit of three minutes given to complete the tasks, its body is disposed of and their experiences and knowledge is injected into the next test subject in order to continually be tested. While changing the test subject the artificial intelligence ReiLe resets the test grounds in order to return to the same initial conditions.

Extrinsic Goals

This level teaches problem solving, as the whole level is one big puzzle that must be completed in a single loop. The player is taught to follow the different points of interest and to explore to find the next clue.

It also delves slightly into the social consequences of the ever evolving artificial intelligences and how they are treated now and in the near future, changing the roles between humans and AI in order to make the player feel as the test subject and how it can mentally affect intelligent specimens.

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Level Summary

Story

Years back an AI took over the world connecting itself through the highly advanced network of intelligent technology all over the world. Once created to train and produce better machine learning algorithms, the inventor of Reinforced Learning AI now called ReiLe is training a set of humans in order to teach them how to complete seemingly impossible endeavors. Cruelly giving them only three minutes in order to explore and discover their environments. After the time runs out the subject body is killed and its memories transferred to the next one. Who has to complete the same task with the knowledge of the previous test subjects.

Gameplay and Summary

The objective of the level is unraveling a myriad of interconnected puzzles through the loops in order to advance to new areas in the facility, discovering their secrets and finding a way to defeat ReiLe and free yourself from the hands of the AI. The first run the AI introduces the situation to the test subject and tells him to find and push three buttons hidden inside the test chambers and a timer starts counting down from three minutes. On death either by the environment of if three minutes pass ReiLe explains that the experience and consciousness of the previous test subject is going to be passed down to the next ones until the research is finished. While the player finds and pushes the buttons through the loops he will find clues about a possible escape route out of the area. Either way if the player finishes the task pressing the three buttons and finds out there is no reward and he must keep doing the test again. Continuing exploring the area until finding the codes to the control room of the AI shutting her down and getting out of the facility within the strict time limitation and obtaining freedom.

The gameplay is a top down puzzle game where you need to find, understand and complete the challenges presented in all the different rooms. Initially tring to find the

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three buttons in order to finish the task, but eventually finding the way out of the facility without being killed in the process.

List of events

Main Hall.

Starting room of every loop and connected to four other rooms three of them directly accessible and one of them blocked by a coded door. There is a screen that signals the player's objective of pressing three buttons and indicates how many of them have been pressed in that specific loop.

Figure A1

Main Hall
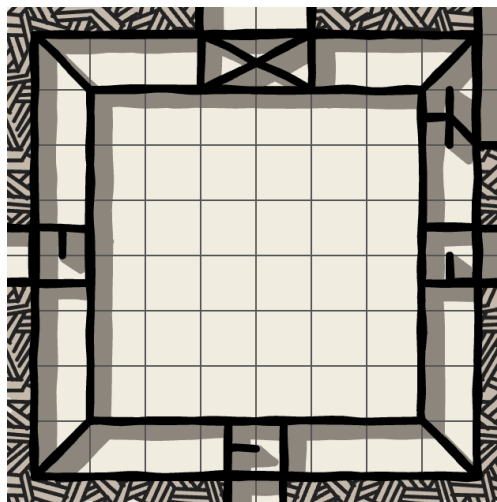
Fire Hallway.

A corridor connecting the Main Hall and the Blank Room filled with fire traps that cover almost the entirety of the floor. It can only be crossed from west to east since the firewall's patrons allow the player to pass through them from one direction but not the other. Avoiding the fire in order to go into the Blank Room takes the major part of the player time limitation.

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Figure A2
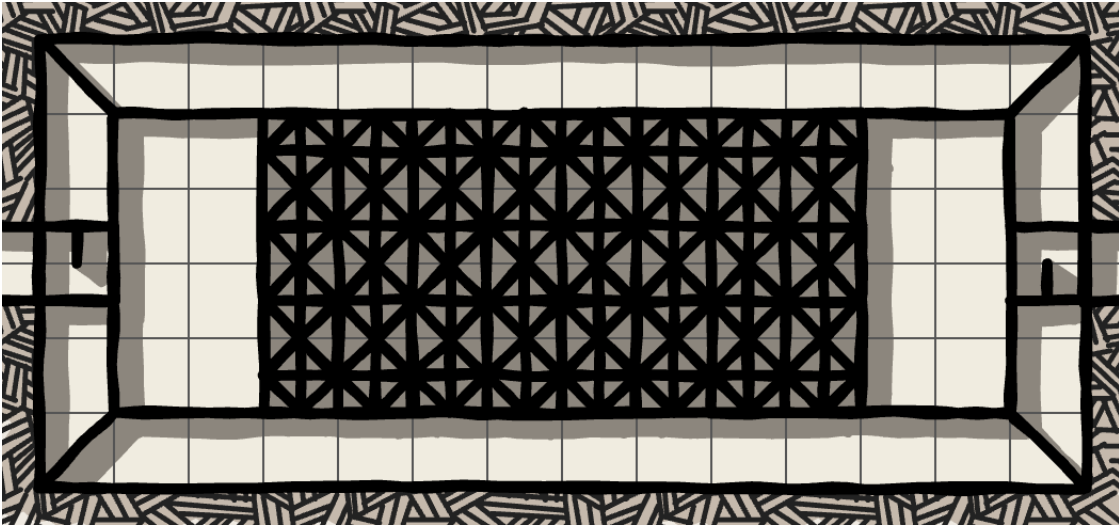
Fire Hallway

Blank Room.

A room without any decoration found at the end of the Fire Hallway. Inside the room a single button stands alone in the middle of the chamber and a screen with the next message:

"The path to somewhere where nothing can be found: North - East - North - West"

The button is one of the three needed to reach ending B and the message gives one of the possible solutions to the Infinite Labyrinth leading the player to the Experimental Lab.

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Figure A3
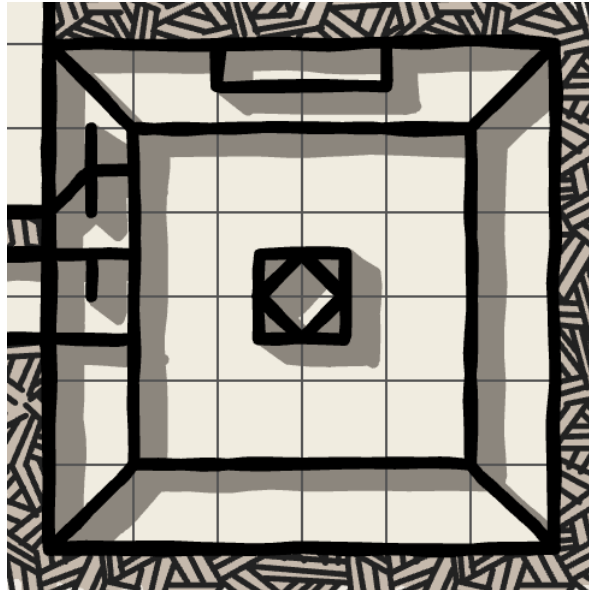
Blank Room

Ventilation.

Hidden path between the Main Hall and Blank Room that acts as a way to avoid the slower Fire Hallway. In order to access through the ventilation the player firstly needs to acquire the Pulse Gun that loop to break the cracked walls that act as entrances and exits of the corridor. Inside a note written in blood says:

"There's a wall left into the facility where the light of sun can be seen just going west into the infinite maze"

This message guides the player to the cracked wall that can be found going left 10 times inside the Infinite Labyrinth.

Infinite Labyrinth.

An apparently normal room with four different exits located north, south, east and west of the room. But as the player decides to advance into the next room in any of the four directions but right he is back onto the same room. There are three solutions that lead the player into new places.

To the Experimental Lab: North - East - North - West.

To the Locker Room: West - South - South - North.

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To the Cracked Wall: West ten times.

Figure A4

Infinite Labyrinth
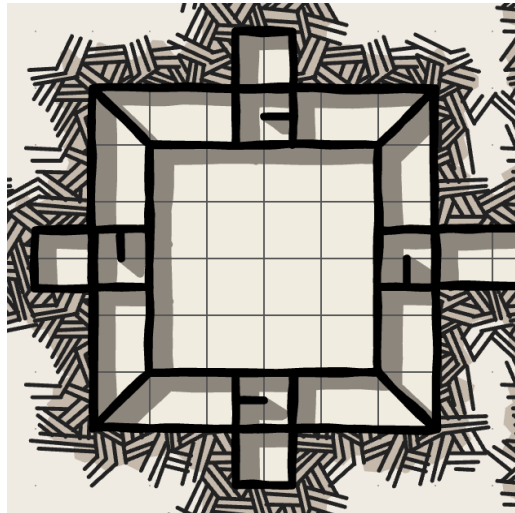
Exterior Room.

An unsettling location inside the facility, a room with the walls painted as if to simulate an exterior sunny location with the walls painted in light blue and white, the ground as green grass. A tall tree populates the area with a hidden note and key, the note says as follows:

"The rightmost cabinet inside the Locker Room contains the key to freedom"

A cracked wall can be found at the west wall of the room and a pile of garbage covers the southern exit where a bright light comes out from.

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Figure A5

Exterior Room
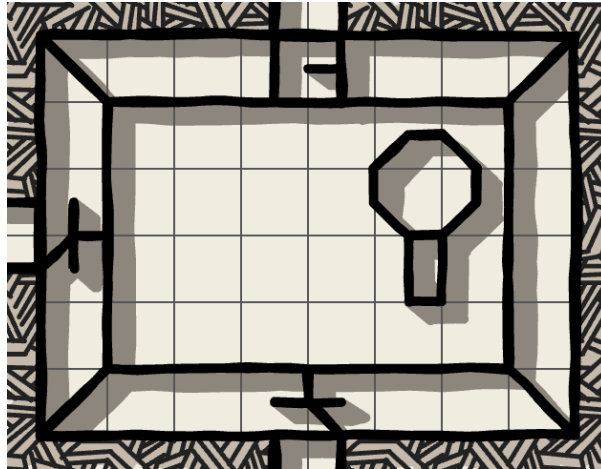
Experimental Lab.

Chamber with multiple desks with different machinations, proves and gadgets, between them a big grenade launcher looking weapon called Pulse Gun stands out. The player can take the Pulse Gun and use it to break the cracked wall on the east wall of the lab in order to go to the Exterior Room. The Pulse Gun allows breaking objects and gives access to new areas such as the Ventilation, the Cage or the Exterior. But every time the loop resets the player must recover the Pulse Gun from the Experimental Lab.

Figure A6

Experimental Lab

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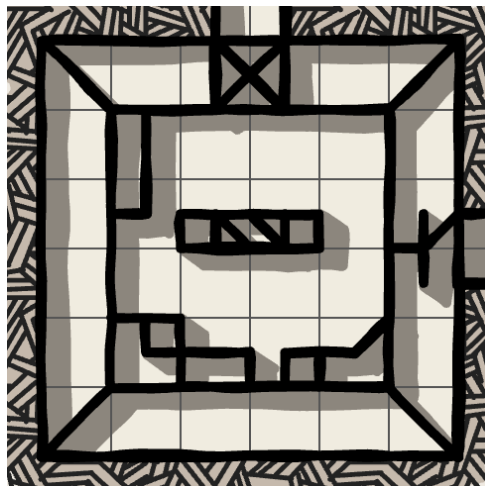
Cage.

A metallic room with a bright spotlight pointing towards the entrance. Behind the light a button lies in the center of the room. An screen on the room displays:

"Still chained inside his cage the bird flew West losing his track of his path went South twice as long until regret won and flew back East to a place he did not know"

The button is one of the three needed to reach ending B and the message gives one of the possible solutions to the Infinite Labyrinth leading the player to the Locker Room.

Figure A7

Cage
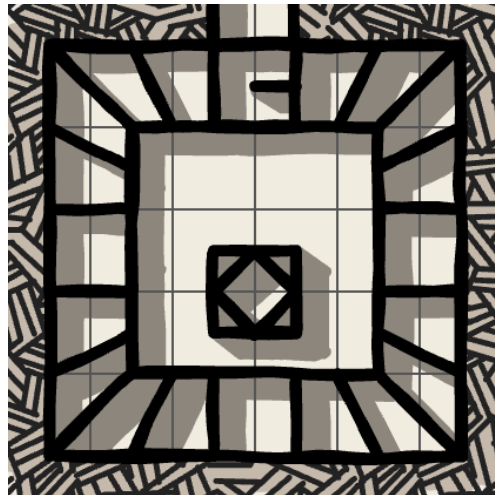
Locker Room.

Room with a wall full of lockers, the rightmost of them is locked and needs the key from the Exterior Room to be opened while the center locker can be opened to find a button. The button is one of the three needed to reach ending B while the closed locker contains a note with numbers written in it "4713", that's the code needed to open the door that accesses the Control Room.

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Figure A8

Locker Room
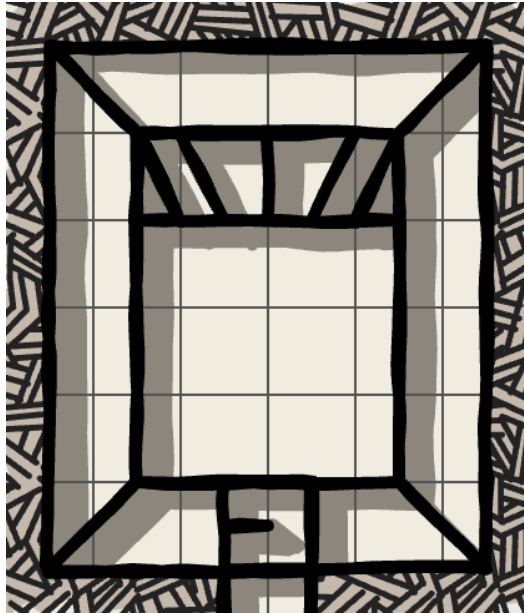
Control Room.

A large room with multiple screens displaying all the different rooms and areas in the game. The Control Room entrance is blocked by a coded door whose password is found inside the Locker Room. If the player has the Pulse Gun the controles can be broken, temporarily shutting down ReiLe and giving the subject time to escape.

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Figure A9

Control Room
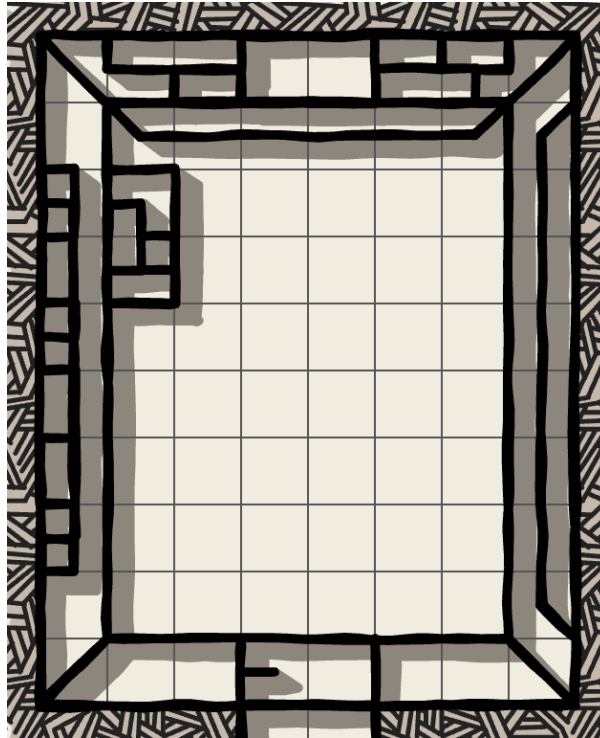
Cracked Wall.

In a room completely similar to the ones in the infinite labyrinth there is a cracked wall with light entering the room from the outside. In order to access to this room the test subject must cross the west door from the infinite labyrinth ten times in a row. Once the Pulse Gun is acquired the player can break the wall and escape from the facility obtaining ending C. If in that same loop the ReiLe was shot down by breaking the Control Room the player finally escapes from the AI obtaining ending A.

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Play Again

Figure A10

Cracked Wall
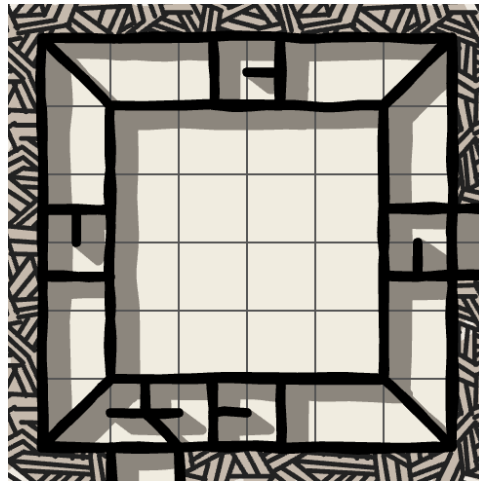
Pacing

Figure A10

LDD Pacing
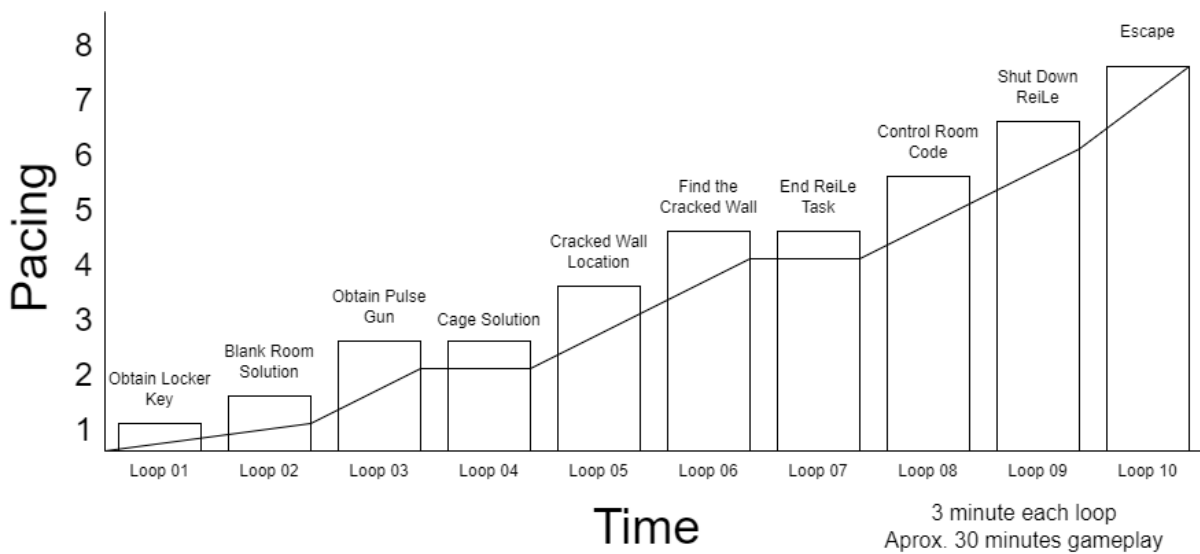
Pacing of the level with the estimated time per section needed to complete the game in an average gameplay session.

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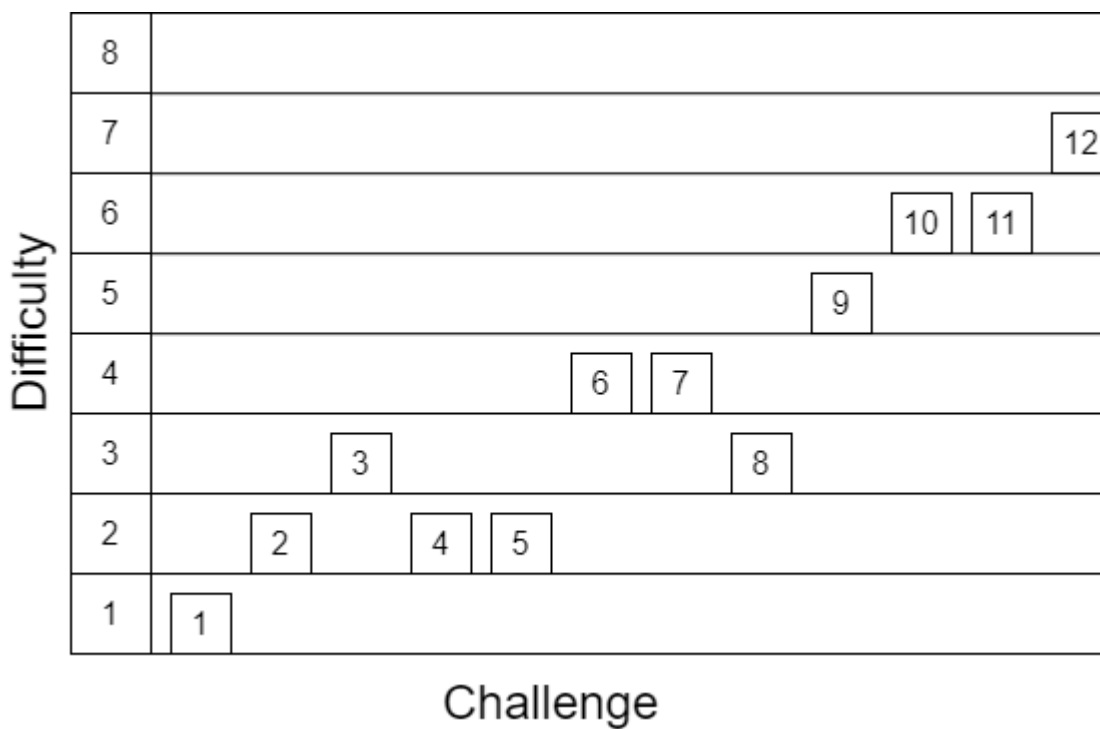
Cadence

Figure A11

LDD Cadence
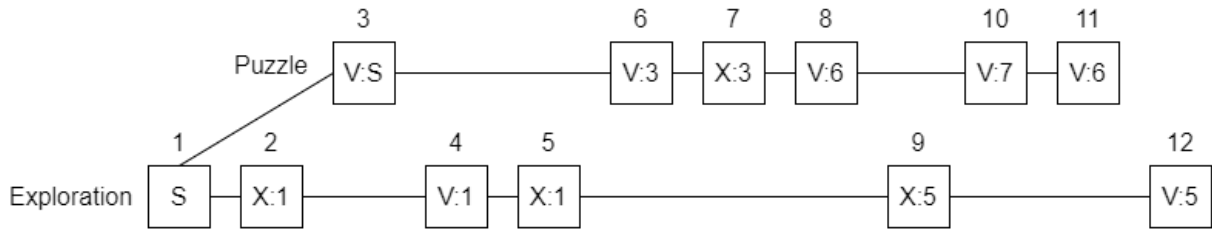
The cadence in this level has two main branches, exploration and puzzle solving.

Difficulty Potentials

Figure A12

LDD Difficulty Potentials

The challenges get harder as the game advances as more concepts have to be put together in order to finish the later puzzles.

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Player Guidance

As the exploration aspect of the level is one of its fundamental pillars and the time loop time limitation, but at the same time safety net that allows the player to rinse and repeat their actions as many times as possible without negative repercussions player guidance is needed in order to avoid endless wandering through the level loop after loop.

From the Main Hall a loud sound of burning fire instantiates the player to move right as their first action. Passing through the flames and pressing the first button and finding one path through the yet unknown infinite labyrinth. The solitaire tree inside the Exterior Room leads to the locker incognita giving a goal to the player. While bright light comes from the South entrance to the cage, now unable to access.

Once inside the labyrinth, recalling the path into the Experimental Laboratory and breaking the cracked wall into the Exterior Room, teaching how the Pulse Gun works and leading to the Cage across the previously seen blocked path. And finding another solution to the Infinite Labyrinth they just got out of but in order to go try their new path they have to cross the Main Hall where a cracked wall similar to the one broken in order to enter the Cage awaits to be opened with the newly acquired weapon. Inside the ventilation a note giving another path to travel inside the Infinite Labyrinth.

Once the Locker Room is found and a key is needed to open one of them, the key hidden in the tree inside the Exterior Room reveals the code into the Control Room where one of the screens of ReiLe is shattered and can be destroyed with the Pulse Gun.

Light coming in from the exterior into the Cracked Wall inside the Infinite Labyrinth begging to be opened up in order to find the other endings.

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Constraints

Theme

Genre:

The genre of the level is a puzzle exploration game with "time" loops.

Dynamics:

- Loop: Each time the player dies or the time limitation expires the game goes back to the starting point.
- Discovery: Obtain information about a known incognita to complete in subsequent runs.
- Man Machine Relation: Exploration of one's relation to the humanity of machines.

Time

Gameplay time: 30 minutes.
Developing time: Two months.

Team

Marc Pavon Llop (Game Designer). [LinkedIn](#) [Twitter](#)

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Key points

Art goals

Moodboard.

Figure A13

Moodboard

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Structure

Acts

The level is structured in four different acts that conform to the whole narrative and gameplay structure.

Presentation.

The player is put in the center of the test chamber and ReiLe calls the player as test subject F0001 and explains that his objective is to push three buttons hidden inside the facility and return in order to receive a positive reward. As soon as the AI stops talking, a ticking clock that can be seen on a wall inside every room in the game starts counting down from three minutes.

Increasing conflict.

As the player encounters death for the first time he is set back to the beginning of the game and the AI informs him of his death and how now he is test subject F0002 and how the memories and experience from the previous subject have been integrated into his body in order to finish the task in time and see how the subject progressively advances.

While advancing disturbing notes about other tests will advice the player not to follow the task since there is no reward at the end of the experiment and how he should find a way out of this place, finding the three buttons, a cracked wall where he could escape off the facility and the codes to the Control Room of ReiLe. And a powerful Pulse Gun capable of destroying obstacles in his path

Clímax.

Once readied with the Pulse Gun, the knowledge of previous test subjects, the code to the Control Room and the location to the Cracked Wall that leads to the exterior of the facility the player will be able to shut down ReiLe temporarily by destroying her controls.
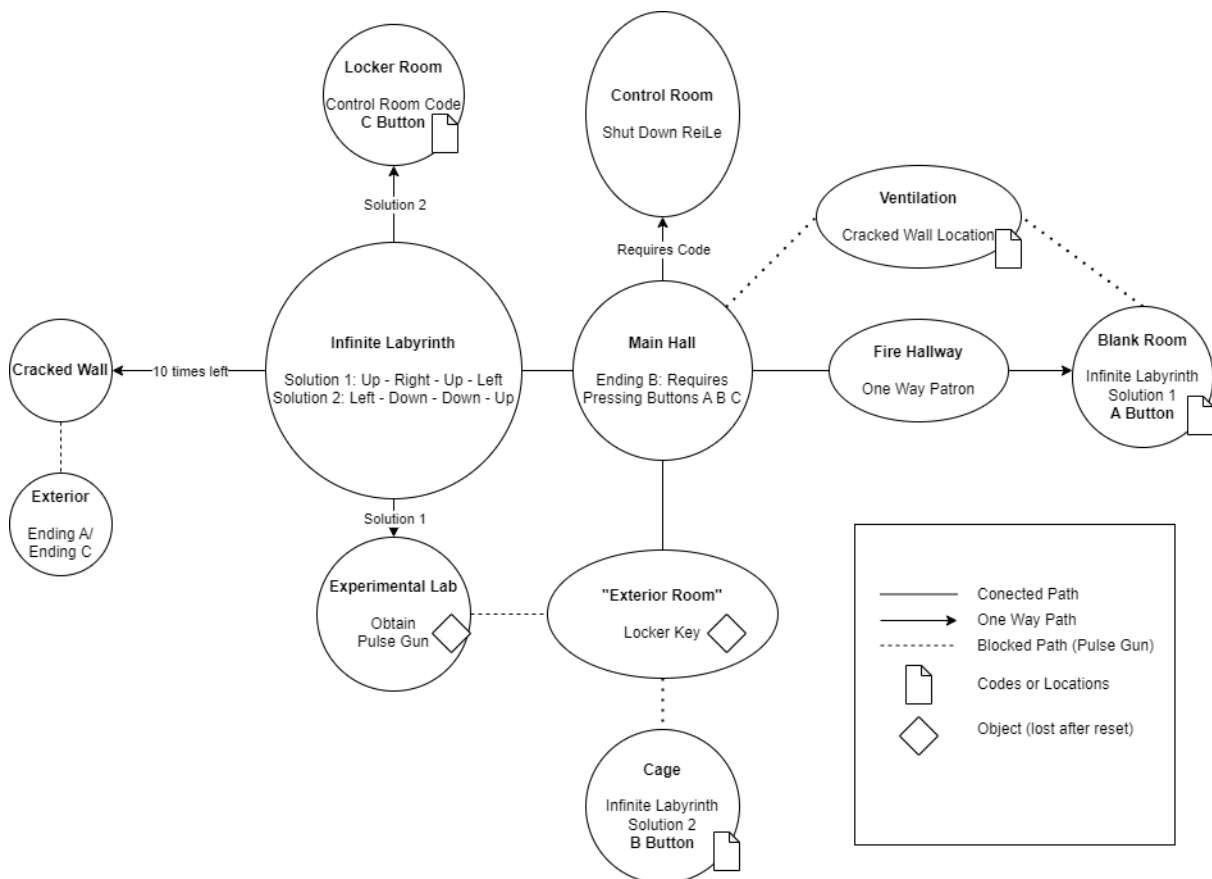
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Resolution.

Once the AI has been shut down a run towards the exit in order to finally be free from the control of the machine and end this infinite loop of torment.

Flowcharts & Maps

Flowchart

Figure A14

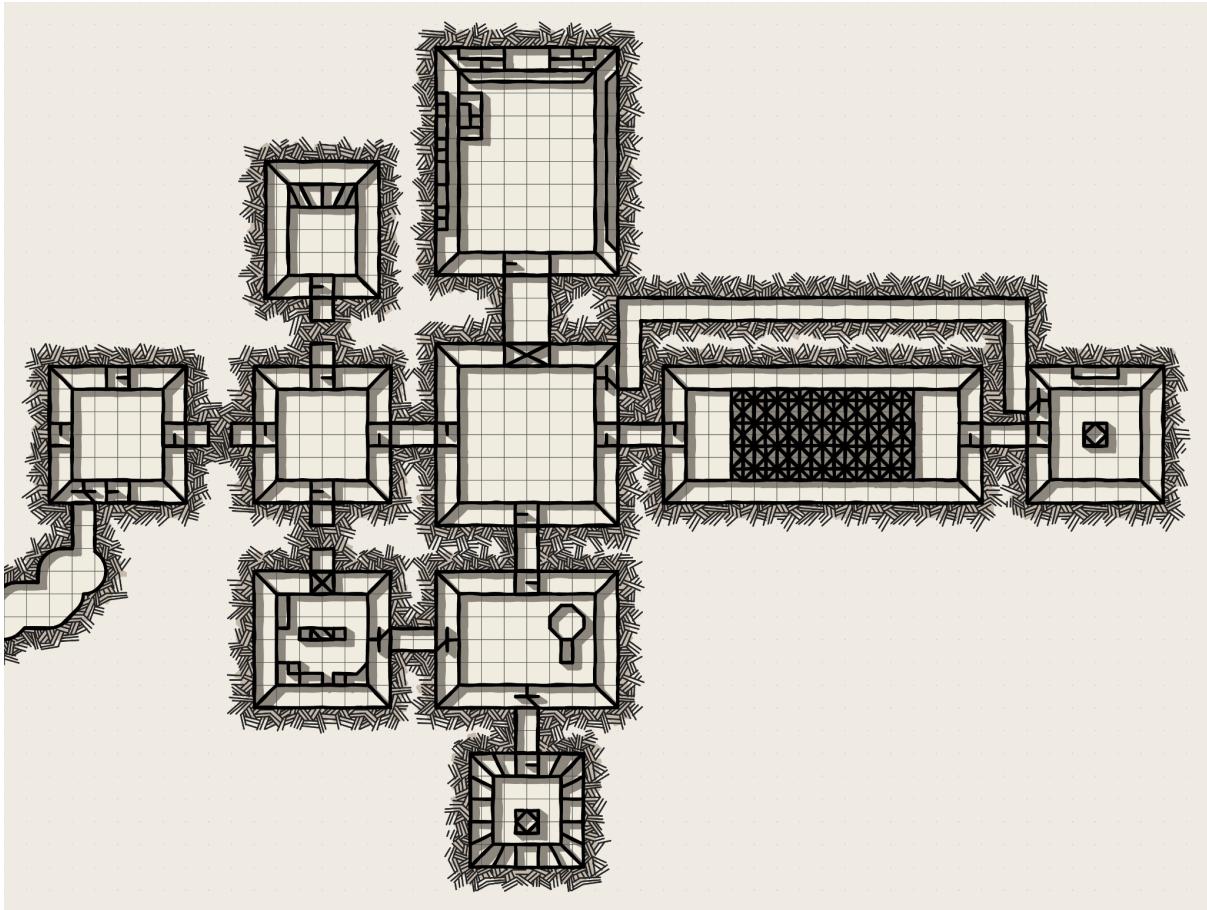**LDD** *Bubble Diagram*

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Wireframing / Mockup

Figure A15

LDD Map

Assets

Table A1

Assets Table

Asset Name	Type	Reused
Walls	Building	Yes
Floor / Ceiling	Building	Yes
Firewalls	Building	Yes
Door	Building	Yes

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Control Room Door	Building	Yes
Cracked Wall	Building	Yes
Cage Wall	Building	Yes
Exterior Wall	Building	Yes
Tree	Decoration	No
Desk	Decoration	Yes
Screen	Decoration	Yes
Button	Decoration	Yes
Locker	Decoration	Yes
Computer	Decoration	Yes
Bottles	Decoration	Yes
Bookshelf	Decoration	Yes
Lab Tools	Decoration	No
Pulse Gun	Entity	No
Player	Entity	No

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Appendix B: Time Loop Design Form

Table B1

Form Question 1

Have you played a video game with time loops?

21 respuestas

- ● Yes
- ● No

90,5%

9,5%
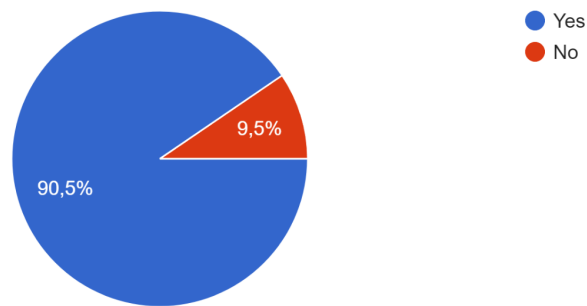
Table B2

Form Question 2

If you have answered yes. Which ones?

19 respuestas

Outer Wilds	14 (73,7 %)
The Sexy Brutale	0 (0 %)
12 Minutes	8 (42,1 %)
The Legend of Zelda: Majora's…	5 (26,3 %)
Deathloop	4 (21,1 %)
Minit	5 (26,3 %)
Elsinore	0 (0 %)
Loop Hero	1 (5,3 %)
Time loop puzzles such as the…	1 (5,3 %)
Doki Doki Literature Club	1 (5,3 %)

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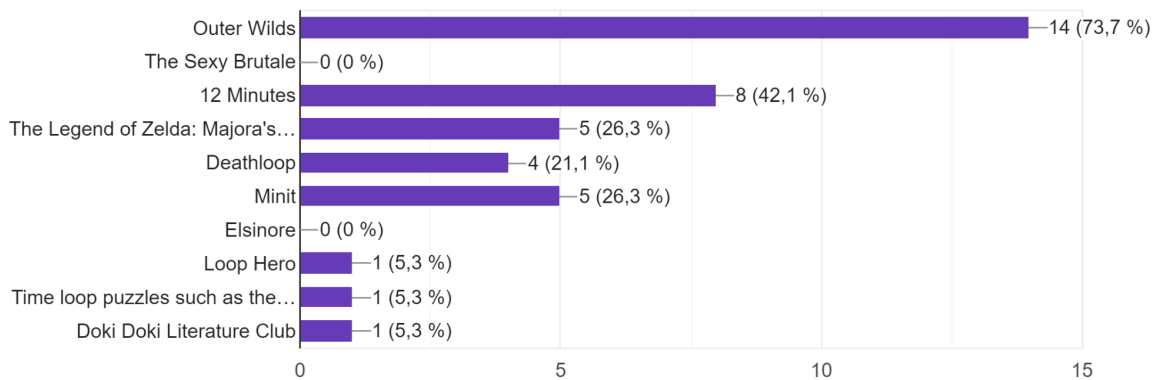
Table B3

Form Question 3

You used the information gathered in previous loops to complete the next ones.
19 respuestas
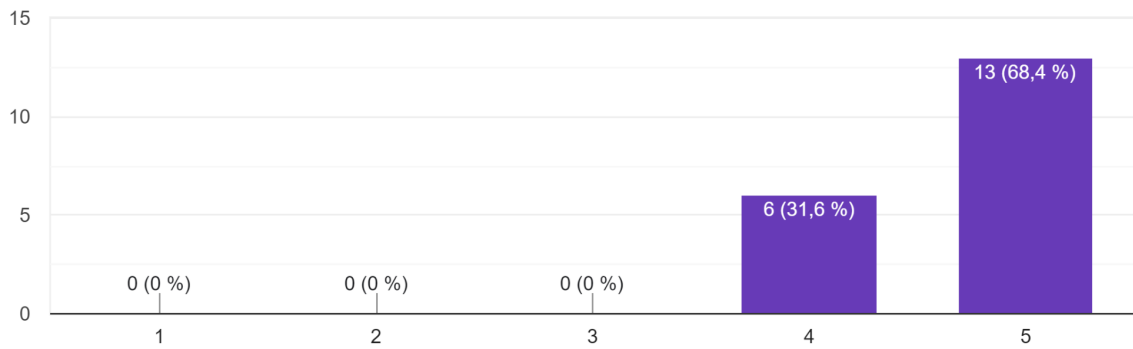
Table B4

Form Question 4

The actions of characters and events happening in the world were consistent among loops.
19 respuestas

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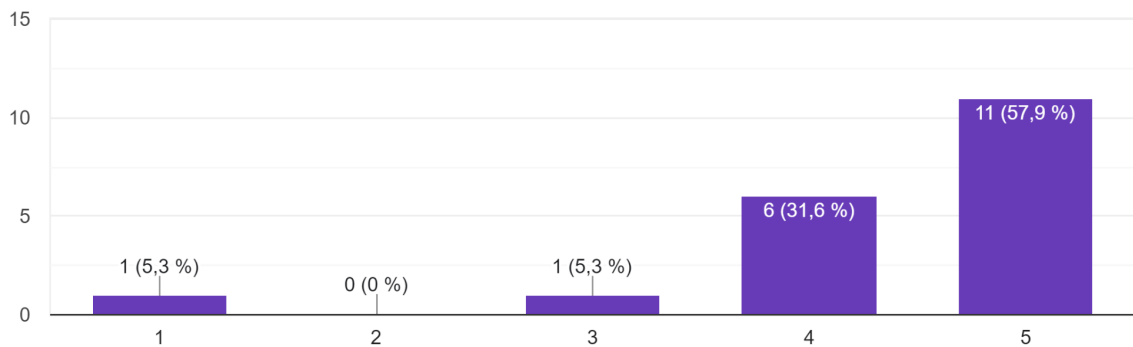
Table B5

Form Question 5

Your actions had an impact on the outcome of the loop.
19 respuestas
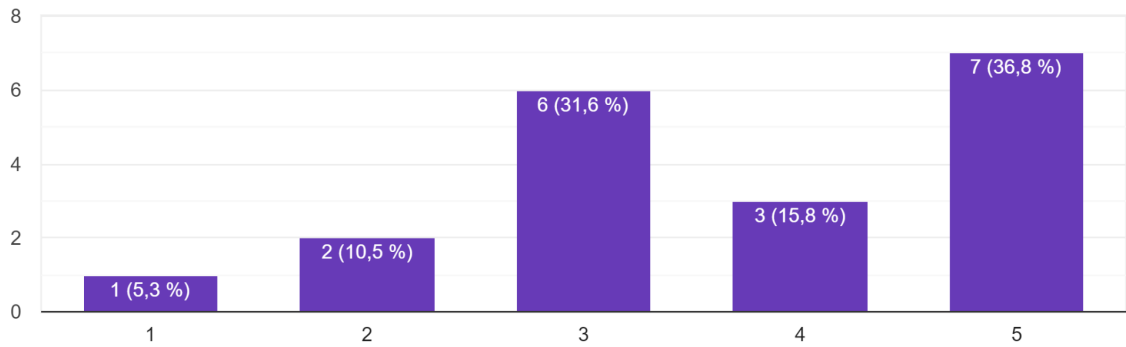
Table B6

Form Question 6

You had the ability to advance time in the loop or entirely restart it.
19 respuestas

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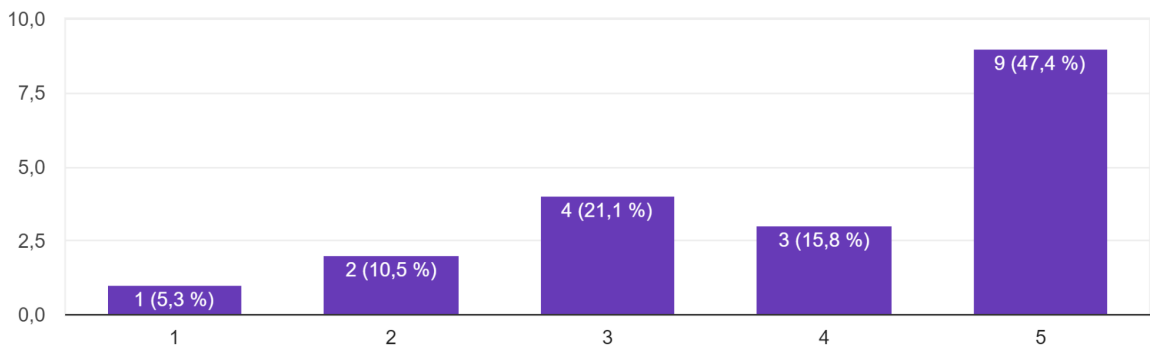
Table B7

Form Question 7

When you did an action was as important as where you did it. Waiting for the right moment to act inside the loop.
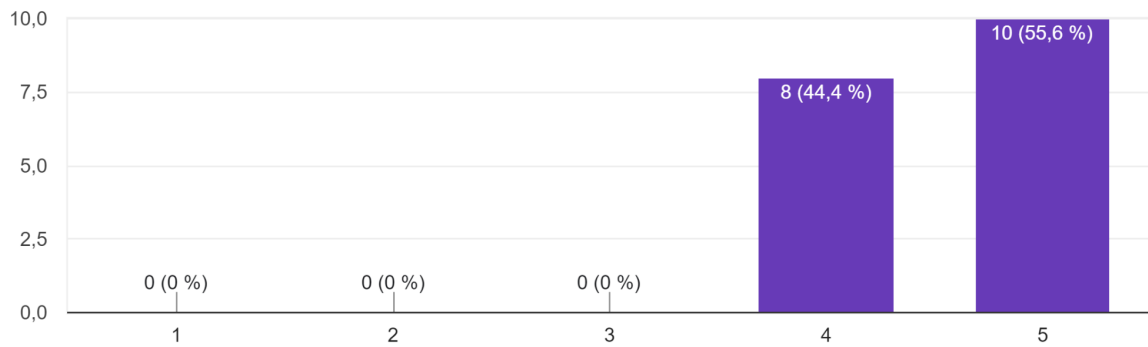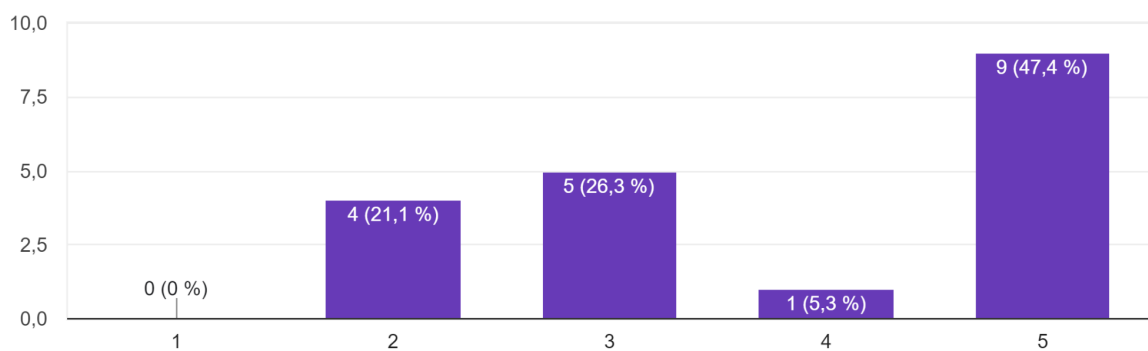
18 respuestas

Table B8

Form Question 8

You were able to travel anywhere within the game world before the loop ending.

19 respuestas

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Table B9

Form Question 9

The game world was densely packed with things to explore.
19 respuestas
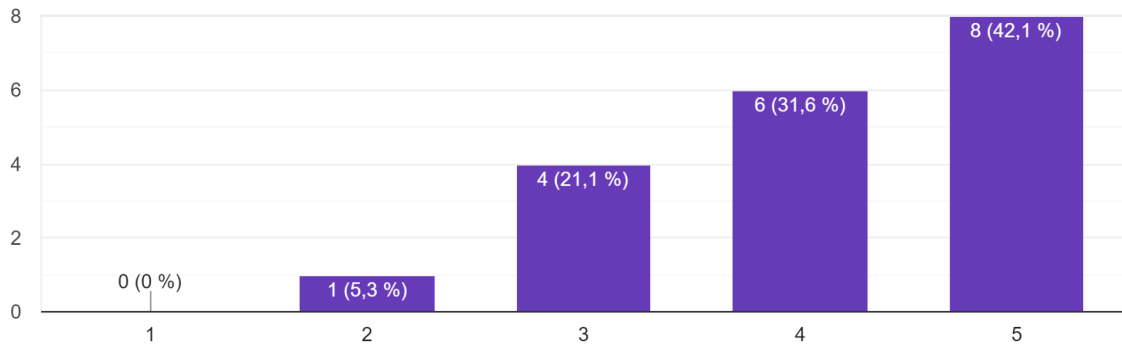
Table B10

Form Question 10

Navigating through the world was NOT a sluggish task.
18 respuestas

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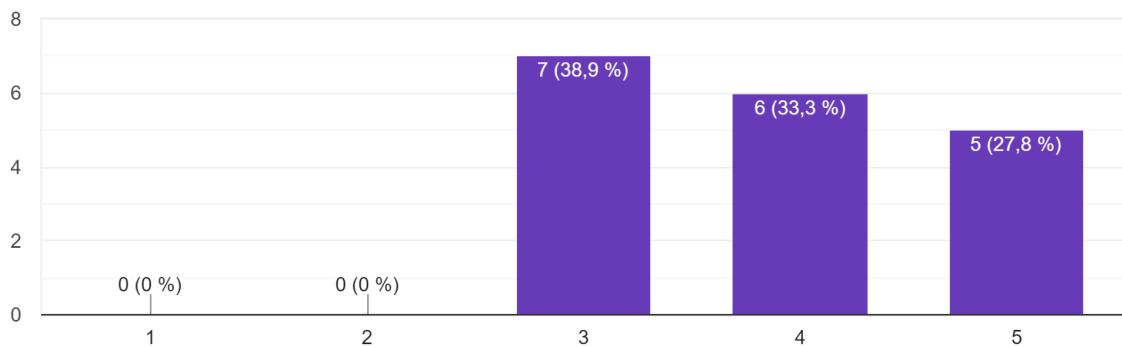
Play Again

Table B11

Form Question 11

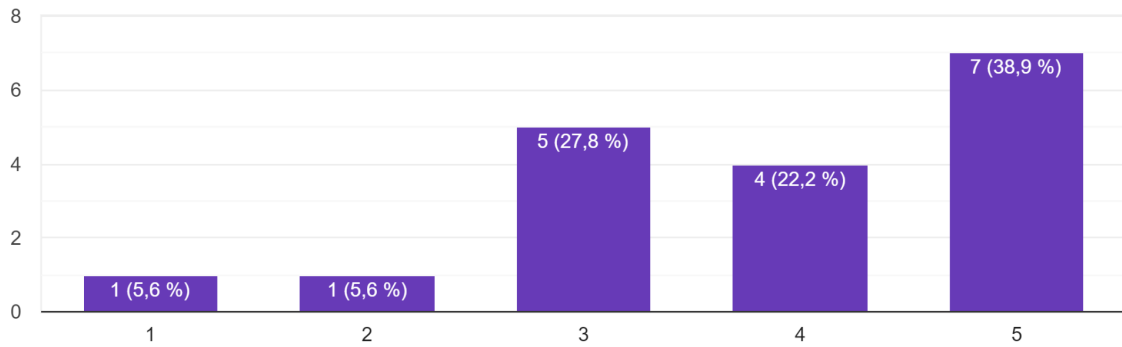You were NOT penalized for failing or finishing a loop.
18 respuestas

Table B12

Form Question 12

The time loop was given context within the game world.
19 respuestas

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