Masaryk University
Faculty of Informatics

Game UI based on procedural techniques

Master's Thesis

Marek Bařinka

Brno, Spring 2021

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ZADÁNÍ DIPLOMOVÉ PRÁCE

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Katedra:	Katedra vizuální informatiky
Název práce:	Game UI based on procedural techniques
Název práce anglicky:	Game UI based on procedural techniques
Zadání:	Prostudujte a popište oblast procedurálního generování herního obsahu. Soustřeďte se na možnosti využitelné pro procedurální úpravy herního charakteru (např. změna geometrie, změny v materiálech, generování textur, procedurální animace) a využitelnost procedurálního obsahu pro uživatelské rozhraní. V rámci praktické části navrhněte a vytvořte herní charakter, na kterém budete demonstrovat popsané principy. Implementujte procedurální techniky tak, aby se vzhled charakteru měnil v reálném čase dle aktuálních hodnot vlastností charakteru (např. zdraví, výdrž, teplota, atd.) a tyto vlastnosti nebylo nutné zobrazovat pomocí běžného rozhraní typu HUD. Využijte alespoň: • změnu geometrie, • změnu materiálů pomocí shaderů. Vytvořte jednoduchou herní scénu, na které budete herní charakter změny v závislosti na podmínkách demonstrovat. V rámci práce proveďte také uživatelskou studii (např. formou dotazníkového šetření) zaměřující se na „čitelnost“ a pochopitelnost navrženého řešení v porovnání se zobrazování vlastností charakteru pomocí HUD.

Zadání bylo schváleno prostřednictvím IS MU.

Declaration

Hereby I declare that this paper is my original authorial work, which I have worked out on my own. All sources, references, and literature used or excerpted during elaboration of this work are properly cited and listed in complete reference to the due source.

Marek Bařinka

Advisor: Mgr. Jiří Chmelík, Ph.D.

Acknowledgements

I would like to thank my advisor Jiří Chmelík for guidance during creation of this work.

I would like to thank my friends which gave me some interesting ideas and feedback on some visuals of the implemented character.

Abstract

The graphic user interface in games is categorized into four categories. Most used is non-diegetic because it is easy to create, on the other side, diegetic is hard to implement properly.

Procedural Content Generation for games is well categorized and explored in a general way but not concerning diegetic UI. I made a definition of PCG for diegetic UI and did a subjective survey about implementation in games.

Then I proposed and implemented character with diegetic UI using only procedural techniques for a game in genre which normally doesn't use diegetic UI.

Lastly, I surveyed players what they think about implemented character in the prepared test scene and the results of the survey were rather positive.

Keywords

diegetic, user interface, UI, procedural techniques, procedural content generation, PCG

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Introduction

The user interface is an important part of the game. Fagerholt and Lorentzon [1] created the definition of four main categories - diegetic, meta, spatial, non-diegetic - and part of their work is still cited in different works and topics.

Procedural content generation in games is well documented and explored topic, Hendrix Et al. [2] created one big definition and categorization in this topic. The amount of procedural content generation in games is increasing for different reasons, mainly for improving replayability, getting a better ratio for quality, world size and size of the resulting game, and helping with development (world generation). But proposed techniques are not for creating diegetic UI.

Because lack of works on topic procedural diegetic UI I will do subjective analysis of different games which can contain diegetic UI elements.

I will propose and implement character with a game world which will work nicely with only diegetic elements and will use procedural mesh and materials.

Lastly, I will make a survey for players to get more opinions how good implemented solution is for future use, possibly making a whole game.

1 User Interface

In computing, an interface defines possible ways of communication and information transmission between two components, e.g. user code using a library, available parameters for calling shell command, etc.

Game User Interface (UI) describes how players can communicate with the game. We can split this communication into three main categories: Audio, Haptic, and Graphic.

Fagerholt and Lorenzon in their work [1, p. 4] use the next categories of the user interface.

Audio category contains mainly communication from the game to the player in form of voice-overs and audio effects, e.g. footsteps, gunshots, etc. Some games also allow for communication the other way. For example game In Verbis Victus where the player has to say the magic formula to cast spells, it had pretty much degree of freedom in regards of formula accuracy.

Haptic is mainly about feedback from games. As this category requires hardware to support it. Haptic is mainly used on consoles where controllers have different possibilities for haptic feedback. Sony in the current generation of their console Playstation 5 pushed haptic feedback to a new level of detail. An example in computer gaming is steering wheel setup. (Nintendo Switch and game One-Two-Switch, "marble balls")

1.1 Graphic user interface

One possible definition from [3]:

> A video game user interface is a system of visual components that allows players to interact with the game story (narrative) and break into the game space (the fourth wall). There are four classes of UI in video games: Non-diegetic, Diegetic, Meta, and Spatial.

If you interpret the part about breaking into game space as a possibility to get into game space then the whole game can be UI.

If you hide everything except things usually considered as UI, then the player is not able to properly interact with the game story and can't get into game space.

If you interpret it as breaking the fourth wall, then some things we usually consider as UI are not part of interface by definition, e.g. pip-boy from Fallout because it is part of the fictional world and would be there even if no game exists.

For this thesis, I will consider as UI items that are commonly expected as UI without any exact definition, because drawing a line between UI and game is probably impossible as you can find an example which will break the proposed definition.

Fagerholt and Lorentzon in 2009 Beyond the HUD: User Interfaces for Increased Player Immersion in FPS Games: Master of Science Thesis [1] defined four main types of the user interface based on the source of information and view location: Diegetic, Non-diegetic, Spatial and Meta. See table 1.1.

Their work is now commonly used in the works of others.[4, 5, 6, 7, 8, 9]

Table 1.1: Types of the user interface in the game industry.

		Is it part of the fictional world?	
		Yes	**No**
Is it in 3D game space?	**Yes**	Diegetic	Spatial
	No	Meta	Non-Diegetic

Figure 1.1: Dead Space - inventory [10]

Diegetic

Information presented using diegetic interface are part of the fictional world - characters are aware of this information - and in the world space - characters are aware of this information.

One of the most knowledgeable representatives is the game series Dead Space. They used a suit with a health bar on the spine and different items like a map or inventory use holographic projection in front of the character, see figure 1.1.

A badly designed or implemented interface can be distracting or frustrating for gamers which may make players unwilling to play.

Non-diegetic

The presented information is not part of the fictional world, characters don't know about them and they are in the 2D window space of the monitor, only the player knows about them.

This is the oldest and most commonly used user interface in the game industry, see figure 1.2, where you can see a strict division between game and UI elements. First It is mostly used for displaying different statistics and eliminates immersion the most, so some games

Figure 1.2: Wolfenstein 3D [11]

show parts of the interface only when they are needed to improve immersion, e.g. show ammunition information only when a gun is drawn.

Spatial

Information is part of the world scene but characters are unaware of this information. This interface is mostly used for highlighting important things in the world scene, e.g. items which could be collected or they are interact-able, or in sports game for showing help information, e.g. road guidelines or customization details which we can see in figure 1.3.

Meta

Game characters know about information, the source is in a fictional world but for displaying to the player they are transformed do 2D monitor space. Game characters are unaware of displaying transformed information, e.g. colored overlay representing damage in shooter games like Call of Duty or mobile phone from Grand Theft Auto V, see figure 1.4.

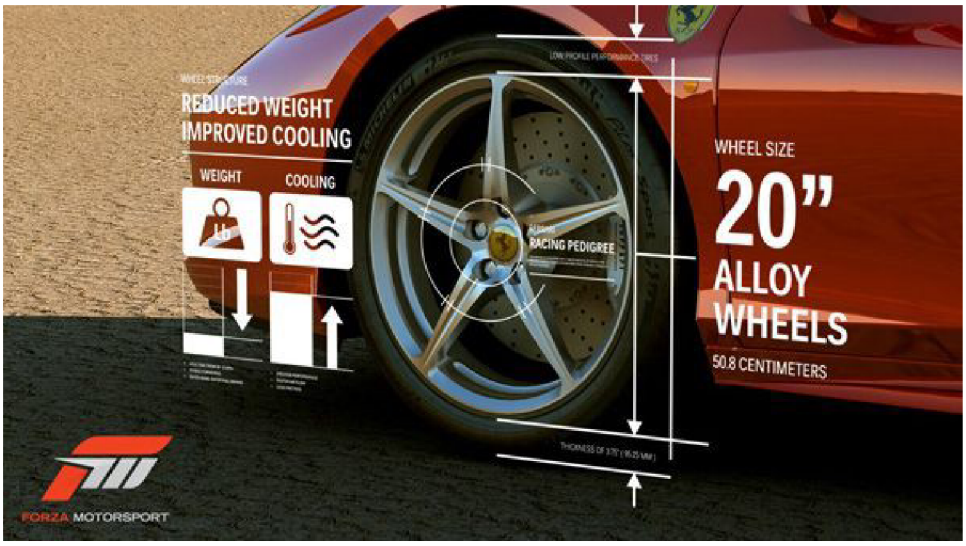

Figure 1.3: Forza Motorsport - virtual information about customization [4]

Figure 1.4: GTA V - accessing mobile phone [12]

2 Procedural Content Generation

In literature, we can find different definitions of procedural content generation. Few definitions follow.

Hendrikx et. al refers to PCG-G in this way: [2]

> Procedural Content Generation for Games (PCG-G) is the application of computers to generate game content, distinguish interesting instances among the ones generated, and select entertaining instances on behalf of the players.

Freiknecht and Effelsberg defines PCG as: [13]

> Procedural content generation is the automatic creation of digital assets for games, simulations or movies based on predefined algorithms and patterns that require a minimal user input.

Smith in his work says that it doesn't matter if the result is created by computer or human, the only required condition is, that created asset must be a result of following exact procedure: [14]

> Procedurally generated content can be created by a human, if that human is following a clearly defined procedure.

For purpose of this thesis, I will use the following definition of PCG: Procedural content generation for the game is any kind of automatically generated asset based on a limited set of user-defined input parameters.

Hendrikx et. al [2] defines 6 types of game content that can be generated using procedural algorithms, see 2.1

These types are:

- **Game Bits** - elementary assets of the game, Hendrikx defines six types: **Textures**, **Sound**, **Vegetation**, **Buildings**, **Behavior** and **Fire, Water, Stone and Clouds**
- **Game Spaces** - is the game environment, contains three subclasses: Indoor maps, Outdoor maps, and Bodies of water

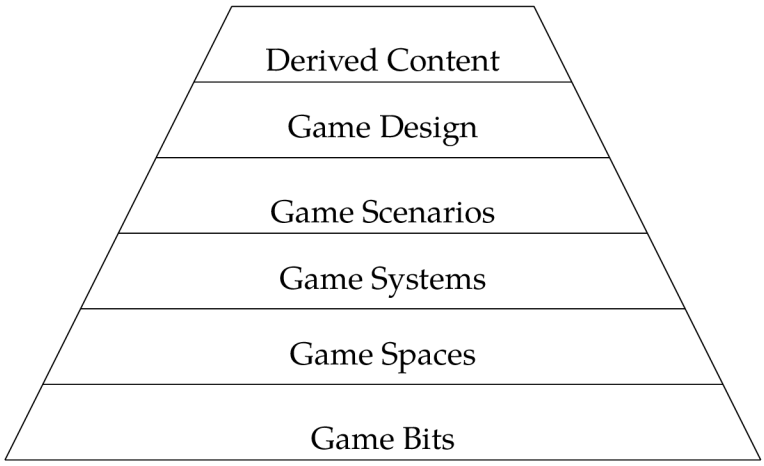

Figure 2.1: Types of game content that can be procedurally generated [2]

- **Game Systems** - makes the game more believable and immersive: Ecosystems, Road networks, Urban environments and Entity behavior
- **Game Scenarios** - describes the way order in which game events evolve, we recognize Puzzles, Storyboards, Story and Levels
- **Game Design** - rules (what can a player do?) and goals (what is a player supposed to achieve?) of game, consists of two parts: **System design** - mathematical background for game and rules, **World design** - game setting, story, and theme
- **Derived Content** - defined as "content that is created as a side-product of the game world"[2]. It includes News, Broadcasts and Leader boards

Hendrikx identifies six groups of fundamental methods usable in PCG-G:

1. **Pseudo-Random Number Generator**
2. **Generative Grammars** - Lindenmayer-systems, Split Grammars, Wall Grammars and Shape Grammars
3. **Image Filtering** - Binary Morphology, Convolution Filters

Handcrafted Assisted Not-assisted

Figure 2.2: Linear spectrum of game content creation

4. **Spatial Algorithms** - Tiling and Layering, Grid Subdivision, Fractals, Voronoi Diagrams

5. **Modeling and Simulation of Complex Systems** - Cellular Automata, Tensor Fields, Agent-based Simulation, Other Complex Systems and Theories

6. **Artificial Intelligence** - Genetic Algorithms, Artificial Neural Networks, Constraint Satisfaction and Planning

In regards to creating assets for the game, we can make a linear spectrum showing a proportional amount of user work on the asset. From pure manual work to not-assisted computer creation. Between them, we have assisted procedural techniques. 2.2

Current games with open-world are getting bigger and the whole world needs to be filled with nice-looking content and avoids repetitive patterns, unrealistic transitions between sections of the world, otherwise players will notice it and won't be happy.

Game companies have two main possibilities to solve these requirements:

1. Get more level designers to make the game in time but this is costly.

2. Find or create usable procedural generation tools, assisted or not-assisted which may not be of the same quality as manually created but close enough.

For procedurally generated worlds we can distinguish two main categories, **fully procedural** - landscape and surface is created by algorithm - and **procedural surface populating** where the landscape is created manually and only items like trees, water, road, etc. are generated procedurally.

Fully procedural worlds are mainly used in the Rogue-like genre which is built on a procedurally generated world but I will use a different example.

Minecraft (2009) is a sandbox game, where everything is built from different cubes with an edge size of 1 meter. The whole world is generated based on one input seed field, which is random if not supplied. In a later version, more options for world generation like allowed biomes in the generator were added. Based on this one seed game generates biomes, caves, ores, dungeons, villages, treasure places, etc.

As an example of procedural surface populating I chose **Horizon: Zero Dawn** (2017). They created a tool for populating the game world with vegetation, roads, stones, etc. The landscape is fixed and level designers using different brushes (hiding grass, trees, stones, road, small bushes, etc.) paints underlying data for world populator. Changes were applied in real-time and this system is used in the game. [15]

For procedural techniques in regards to diegetic UI we can define three categories based on used data:

- **Mesh** - Real-time modification of vertices locations
- **Material** - Procedural materials are probably the easiest and most used category because of easy usage in game engines, e. g. Unreal Engine.
- **Animation** - Procedural changes to rig (skeleton, rig) used for animating. A commonly used example is Inverse Kinematic.

3 Usage of procedural techniques within diegetic UI

Since I could not find publications or articles on the use of procedural techniques within the UI, I decided to subjectively analyse various games that somehow use procedural techniques within the UI, even indirectly.

Because I wasn't able to find any information about implementation details of presented examples, everything is my opinion how it could be created and work.

I will present only some example from the games, it is possible that game contains more procedural diegetic elements.

A list of games was created based on my personal experience, a list of games with interesting UI found online [16] and tips from friends.

From mentioned games, I found better examples listed below, the rest doesn't have good enough procedural diegetic elements or I wasn't able to find any example in them.

3.1 Morphie's Law

It is a team multiplayer shooter from the third person. The main difference from other games is a unique mechanic of transferring mass between players. The Game character is divided into sections, e. g. head, torso, hands, etc. On a successful hit, some amount of character mass from hitted section is transferred from the shooted character to shooters. It is working also in a team that allows creating interesting strategies because body size influences movement capabilities. With big legs, you can jump higher, with a small body you can squeeze in small places. Another benefit of this mechanic is some kind of balancing between skilled and new players. Skilled players are bigger and easier to hit and new players are small and harder to hit.[17]

Although this mechanic wasn't created to be diegetic UI it fulfills its definition and thus we can use this as an example of diegetic UI where the procedural mesh is used.

Figure 3.1: Morphie's Law

3.2 Dead Space

Dead Space is survival horror game series in the third person. The first game was released in 2008 and belongs to the first games with diegetic UI which is clear, legible, and immersive. From my research, it is the most cited example of well-designed diegetic UI.

In image 3.2 you can see the health bar on the character's spine, next to it is the "stasis" meter, which is similar to mana. The main part is inventory as holographic projection ahead of the player.

3.3 Metro

Metro series is a single-player shooter from the first person with stealth elements and survival horror. The First game was released in 2010 and is set in the post-apocalyptic Russian metro. Series combines diegetic and non-diegetic UI, a ratio of individual elements is based on game difficulty, on hardest non-diegetic elements are disabled and they are shown when opening inventory.

Diegetic elements are in all difficulties, they are used e.g. for showing tasks and help which direction to continue 3.3. Metro also uses

Figure 3.2: Dead space - inventory [10]

diegetic sound for presenting a state of the air filter which is mandatory for some parts of the game.

Some weapons like Bastard [18] has moving magazine which allows to see the remaining ammo count in the current magazine.

Lighter and tablet 3.3 was replaced with map in third game Metro: Exodus [19]

3.4 Star Wars: Republic Commando

Star Wars: Republic Commando is a tactical first-person shooter video game released in 2005. Example of mesh editing in procedural UI.

The player's primary weapon is the DC-17m Interchangeable Weapon System, which has rifle, sniper, and grenade launcher attachments.[21]

In 3.4 you can see a number representing total ammo count and the blue part under it is ammunition count in the current magazine.

Figure 3.3: Metro 2033 - lighter and tablet for help with navigation [20]

Figure 3.4: Star Wars: Republic Commando - DC-17m with a blaster rifle attachment [20]

Figure 3.5: Trespasser: Jurassic Park - health bar tattoo [20]

3.5 Trespasser: Jurassic Park

The action-adventure game was released in 1998 and is played in the first person. It has a diegetic health bar as a heart-shaped tattoo on the chest.

Some say that it is one of the best health bar in games[22, 23], but it can be caused by the main character being a woman[24].

From my point of view, it has a problem with execution that if the player wants to check health, he has to look down on the chest and in this time he can't see surrounding and the main time to check health is in combat where is little spare time to check it.

Based on the Trivia section of the wiki page[25] authors wanted to move the tattoo to the arm but didn't make it due to problems in development.

The heart in 3.5 has better graphics when a player took more damage. Full health is just a heart outline.

3.6 Far Cry

Far Cry is a franchise of shooter games from the first person, in later games co-op mode was added. I will focus on the second game because for the first part, I wasn't able to find good sources and later sequels

Figure 3.6: Far Cry 2 - Map and GPS [26]

changed the target audience and I wasn't able to find any examples of diegetic UI in them.

Far Cry 2 from 2008 uses a physical map and GPS for navigation which is held by the main character.

3.7 Minecraft

Minecraft (2009) is a sandbox game containing exploration, mining resources, crafting items, and building.

A player can create an empty map, when held in hand and used, a map is bind to the specific square of the world and starts to be procedurally generated around the player position. On 3.7 map is held in hand and partially generated.

Figure 3.7: Minecraft - map in different looking angles [26]

A map can be locked so it is no more actualized and it is also possible to add markers on the map. [27]

3.8 Fallout 4

Fallout 4 is an action role-playing game played from a third-person view.

To decrease the amount of non-diegetic and increase diegetic elements, the world of Fallout contains Personal Information Processor[28], in Fallout 4 main version is Pip-boy 3000 Mark IV[29]

Pip-boy is used for accessing statistics about character, inventory and upgrades, map, etc. 3.8

3.9 Keep Talking and Nobody Explodes

Keep Talking and Nobody Explodes (2015) is a co-op game for at least two players. One player is Defuser and his task is to defuse the bomb [30], rest of the players are Experts and they have to help Defuser defuse the bomb [31] using the Bomb Defusal Manual [32]. Defuser can't look into manual, Experts can't look on the bomb.

The bomb 3.9 is composed of different modules, each module is procedurally generated based on some rules and for showing exact configuration of modules authors probably use several procedural materials.

Figure 3.8: Fallou 4 - Pip-boy [28]

Figure 3.9: Keep Talking and Nobody Explodes - Bomb [33]

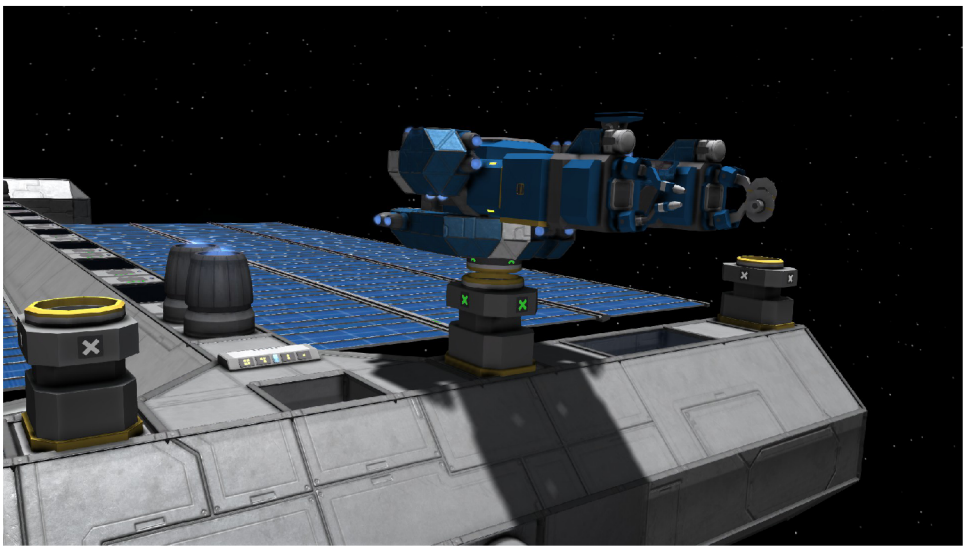

Figure 3.10: Space Engineers - Connector [34]

3.10 Space Engineers

Space Engineers (2013) is a sandbox game focused on mining and building. In earlier versions only space was available, in the current version also different planets are in the game. For unlocking everything a user has to build space ships to get materials not available on the planet.

A connector is the main way for automatic transport of resources between two separate structures, mostly station and vehicle/ship. The connector has several states [34] which are represented by the color code on the connector.

In 3.10 we can see three connectors, two white are ready for connection and middle green is locked and items can be transferred.

3.11 Halo 4

Halo 4 (2012) is a first-person shooter game set in a fictional future.

Some of the weapons have information about the weapon on an in-built display. In 3.11 we can see MA37 Individual Combat Weapon System [35]

Figure 3.11: Halo - MA37 [35]

3.12 Stranded Deep

Stranded deep (2015) is a survival from the first person. Games take place in the middle of the ocean with few tropic islands.

For viewing different statistics about character, a player uses smartwatches 3.12 where he can found health information (health, saturation, hydration, sleep), skill information (hunting, cooking, harvesting, ...), and effects (poisoning, broken bones, ...).[36]

3.13 Green Hell

Green Hell (2018) is survival in extreme conditions of the Amazon rainforest.

The player has a solar-powered smartwatch[37] which shows time information (hours, days, months, ...), GPS to help working with the map[38] and nutritional needs.

The game has complex health and disease system[39], most problems show icons in HUD, but for identifying the proper location and healing the disease, a player has to inspect the body.[40]

Figure 3.12: Stranded Deep - Smartwatches showing different statistics about player [36]

More detailed overview of different character statistics and list of diseases can be found at [41]

Example of different aspects can be seen in 3.13

3.14 A story about my Uncle

A story about my Uncle (2014) is a puzzle-platformer game played from first person.

A player is looking for his Uncle and during this task, he is using a slinging mechanic. On the glove 3.14 is a circular counter of available sling mid-air before depleting and requiring recharge near crystals.

3.15 Strategies

I checked different strategies - Banished, Stronghold, Foundation - and I found few common possibilities for procedurally generated diegetic UI elements.

You can find storage building which adjusts their visualization based on current content. In checked cases, it is not the primary way

Figure 3.13: Green Hell - Different health information and wounds [37, 42, 43]

Figure 3.14: A story about my Uncle - slinging [44]

Figure 3.15: Forza Horizon 4 - driver view [45]

to convey information about the number of different resources but it is possible to get some idea of available resources.

Different production buildings, mainly fields and orchards have a visual representation of their progress. Again it is not the primary way to transfer information but it is enough to have a rough approximation.

Because these items support different sizes and content, I think it uses procedural mesh.

3.16 Racing games

If a racing game has a view from the cockpit with a working tachometer then it has diegetic UI using procedural material.

In 3.15 we can see an example from Forza Horizon 4 (2018) with HUD tachometer on the right side, navigation on the left side, and diegetic tachometer in the middle.

3.17 Summary

Many games use more types of UI and it is hard to balance the immersion and readability of UI. More games than expected have some

elements which can be considered diegetic. The most common type uses procedural materials to create these elements.

More common diegetic elements in first-person shooters are weapon statistics on it.

Specific kind of survival games uses smartwatches to show information about player.

Strategies contain supportive diegetic elements for showing an approximation on some progress or available resources.

4 Implementation

In this chapter, I will first describe the design of the game for which I will make a character using diegetic UI. Then I will describe how I implemented individual mechanics.

Making a game without UI idea and after that try to create a diegetic UI is very hard because of limited possibilities in information transmission through diegetic UI.

For this reason, I created game design and possible mechanics with diegetic UI in mind.

I implemented it using Unreal Engine 4.26[46].

4.1 Main inspiration

I chose to use the souls-like or sometimes called soulsborne genre because I wanted to try if it is possible to create a game in this genre with diegetic UI. It doesn't have an exact definition [47, 48] but it contains games inspired by games Demon's Souls (2009, From Software), Dark Souls (2011, From Software), and Bloodborne (2015, From Software).

The main characteristics are:

- **Stamina** - many actions like attacking, rolling, defending, etc. requires stamina and its management is an important part of the game.
- **Healing** - in most games you can heal only using quantity limited item. You can replenish it on specific locations but it will also re-spawn all common enemies.
- **Status effect** - e.g. poisoning, bleeding which causes damage over time after the status bar is filled, or curse which instantly kills the player when the status bar is filled.
- **Skill-based combat** - Souls games are possible to finish without leveling or using any equipment if you are skilled enough.
- **Unlocked world** - Only locks you find in the mandatory part of the game are killing bosses.

Not all characteristics are implemented exactly in all games, e. g. Dark Souls II has also a slower healing item without limit.

4.2 Used mechanics and implementation

For easier integration to the game world and some mechanics I used a robot as the main protagonist, all characters in the game should be robotic.

The main inspiration for the player character was the robot Atlas from Boston Dynamics. [49, 50, 51, 52, 53, 54, 55]

Health and stamina

I decided to use common health and stamina system with just different placement. Instead of a common bar in the corner of the screen, I used tubes on the back of the character, red for health and green is stamina, see 4.1

Tube uses procedural **material** which transforms percentage value to respective color which was supplied to the material.

Energy

Main commodity of game, inspired by souls. Energy is meant to be used as a price for upgrading character, shooting from range weapons, and for boosting some statistics. When you die all your energy will be transferred to the closest living enemy.

I created the boosting mechanic to distinguish from other souls-like games and also to bring another strategic element into the game. In many souls games I know, souls are only used to buy upgrades or consumable items and from some point of the game, a player no more care about losing collected souls because a player doesn't need more upgrades and it doesn't have any disadvantage for the player.

In the presented demo only boosting attack damage is implemented. Boost multiplier is calculated based on the sigmoidal function with parameters to adjust the curve.

On 4.1 it is the third tube with blue color.

Heat

A game character has some default working heat value and heater/-cooler which is trying to get temperature to a default value. Heat is increasing/decreasing based on the environment which gives the possibility in the game to make soft locks for some location.

Because of problems with showing end values - overheat/freeze - I made heat similar to poison[56] or bleeding mechanic in souls-like games instead of instant kill.

For shape and location, I used transparent pipes around the character, for showing current value I used procedural **material** which transforms value from interval $< 0; 1 >$ to color representing heat. Neutral temperature maps to value 0.5.

In image 4.1 you can see heat pipes with slight red color.

Rust

Because this mechanic is shown as a change of texture on the majority of character it is easier to distinguish critical end value and thus I choose to make it similar to curse in Dark Souls[57].

Most complex **material** in the presented demo. It is using Perlin noise as the base for rust texturing. The range of noise texture is then scaled to get visually better rust coverage on interval $< 0; 1 >$. At 0 no rust, at 1 fully rusted, step from unrusted to some rust was near 0 and visually fully rusted become slightly under 1 to give the player a little bit of time before an instant kill.

Character is almost fully rusted in 4.1

Heal

Direct inspiration is Estus Flask from Dark Souls [58].

I decided to use procedural **mesh** in cylindrical shape and **material** for showing multiple information.

The count of vertices around the edge represents the strength of the healing item, in 4.1 you can see 4 vertices. Minimum is 3 and maximum doesn't exist in the presented version.

The color and position of the cylinder top define if the heal is still available or already used. In 4.1 you can see 2 available and 1 used heal item.

When using heal, the last available cylinder will start to retract using procedurally calculated change of vertices position, the top color goes from yellow to red color and health is slowly replenished.

The number of healing items in the presented version is from 1 to 15, in 4.1 you can see 3 healing items.

Animation

Most of the animations were done in 3D modelling software Blender [59] but one part is modified procedurally at run-time. Walking animation is created only in a forward way and I calculate movement direction and adjust legs rotation accordingly to move direction.

Figure 4.1: Created character

5 Readability survey

For reviewing usability of created diegetic UI character I made a survey focused on information readability because nice unreadable diegetic UI is useless.

I focused on the general readability of each element and for some also more specific parts. A full survey is available in appendix B

The survey was repeatedly posted to bigger Czech Discord servers focused on games (upper hundreds to thousands online users) - Indiantvcz and Sterakdaryho Šupáci - some smaller servers (up to lower hundreds of users), mainly Patrik Kořenář, for about one month.

Even I shared it many times only 15 people answered it. I think that combination of longer time required, PC with Windows and the requirement to download an application from the Internet with a combination of other communication on these servers caused it.

5.1 Results

Despite a small number of participants, we can find some trends. All responses can be found in appendix C

Information about participant

The first section of the questions was about getting participant information.

The first question was about information, how wide range of games participant plays and for how long in hours they play on average during the week.

In this question two, participants didn't read the task properly and choose one answer in each category. One fault answer contained 25+ in each category, the other one was 0-5, 5-10, 0-5. Even with these two fault answers, we can get some idea about participants.

From the results in chart 5.1, we can see that participants were mostly average players in a played portfolio and above average in term of time spent playing games.

The second question was about the knowledge of souls genre.

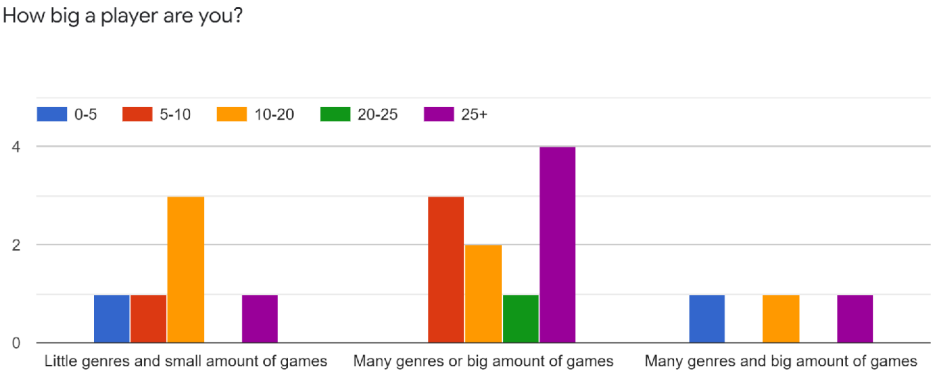

Figure 5.1: How big a player are you?

All participants at least heard about the genre, more than half tried some game from the genre, one-third of participants were fans of this genre and played several games from souls genre, see chart 5.2

Health and stamina

This section of the survey was about health and stamina.

Chart 5.3 shows how readable is the health and stamina from **Bad** to **Good**. We can see that most participants found it over average.

Chart 5.4 shows participant opinion if common HUD bar or presented way is better, from **Common HUD bar is much better** to **Presented variation is much better**. One-third thinks that the presented version is slightly better than the common HUD bar, almost a third thinks it is the same.

Selected additional feedback responses.

> *I have no idea which bar does what*

This problem should be solved by a proper in-game tutorial.

Rust

This section of the survey was about the rusting mechanic.

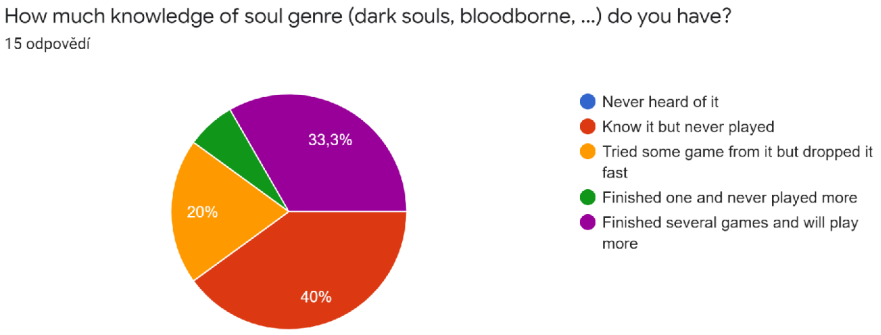

Figure 5.2: How much knowledge of souls genre do you have?

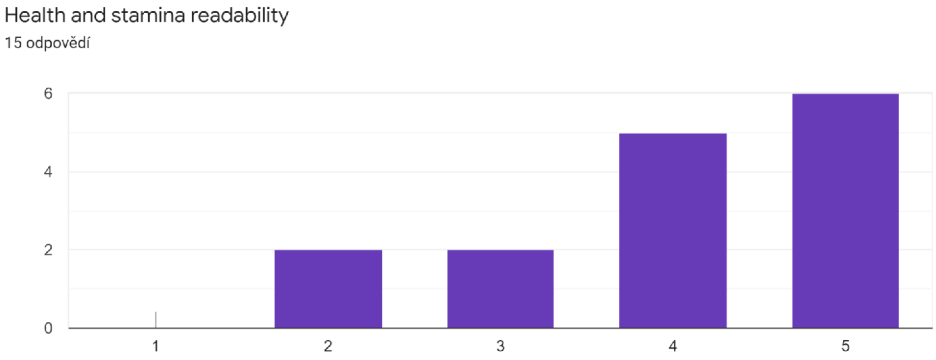

Figure 5.3: Health and stamina - readability

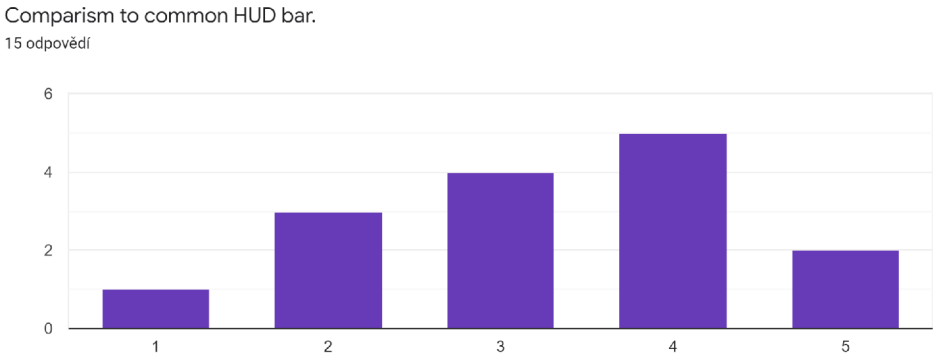

Figure 5.4: Health and stamina - compare to common HUD bar

Chart 5.5 shows how readable is the amount of rust from **Bad** to **Good**. We can see that most participants found it over average.

Chart 5.6 shows how hard for participants was recognizing edge values - the time when a player is fully rusted and die. Chart goes from **Very hard** to **Very easy**. We can see that one-third of participants have small problems with identifying edge cases which could cause unnecessary deaths. Only for one-fifth of participants, it was really easy to know when they will die.

Chart 5.7 shows participant opinion if common HUD bar or presented way is better, from **Common HUD bar is much better** to **Presented variation is much better**. Slightly over half of participants think that it is better than the common HUD bar, one-fifth think that it is on the same level, for rest it was slightly worse the common HUD bar.

Selected additional feedback responses.

> *Does not feel like knowing exactly how much more can take.*

Some tweaking about rust progress and noise texture configuration should improve this problem.

> *Small spots are hard to see*

Same as previous.

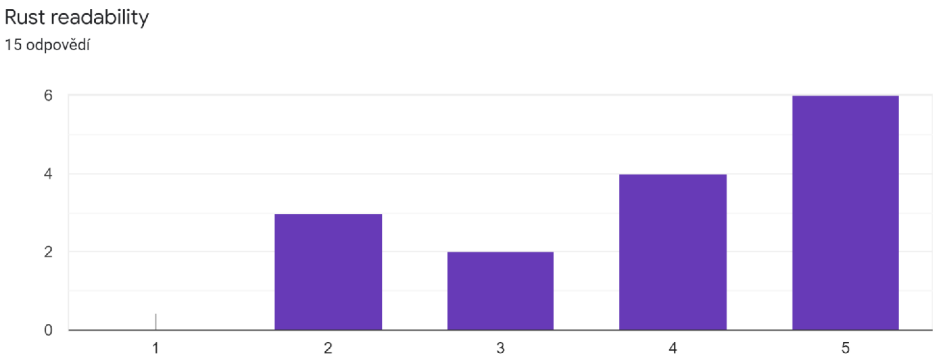

Figure 5.5: Rust - readability

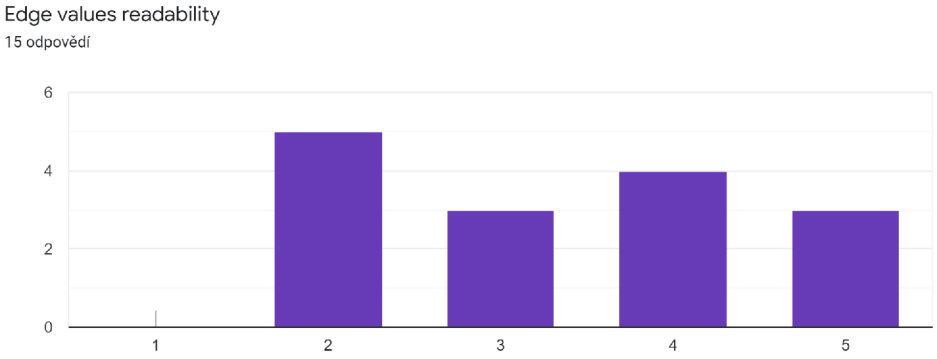

Figure 5.6: Rust - edge values readability

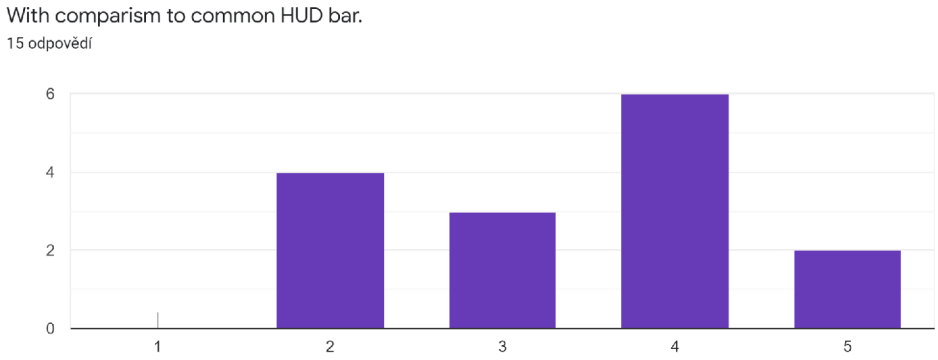

Figure 5.7: Rust - compare to common HUD bar

> *I haven't noticed some big changes in movement or anything when I was rusty.*

Move modification when rusted was not in the plan but could be an interesting test for the future.

> *I think haveing an option for an HUD would be nice, but it's pretty good to see these changes on the character*

Participant prefers common HUD but can work with this system.

Heat

This section of the survey was about heat mechanic.

Chart 5.8 shows how readable is the amount of rust from **Bad** to **Good**. We can see that most participants found it over average and nobody found it really bad.

Chart 5.9 shows how hard for participants was recognizing change. Chart goes from **Very hard** to **Very easy**. We can see that half of the participants found it easy, approximately one-fifth has a neutral opinion.

Chart 5.10 shows how hard for participants was recognizing edge values - the time when a player starts getting damage from overheating

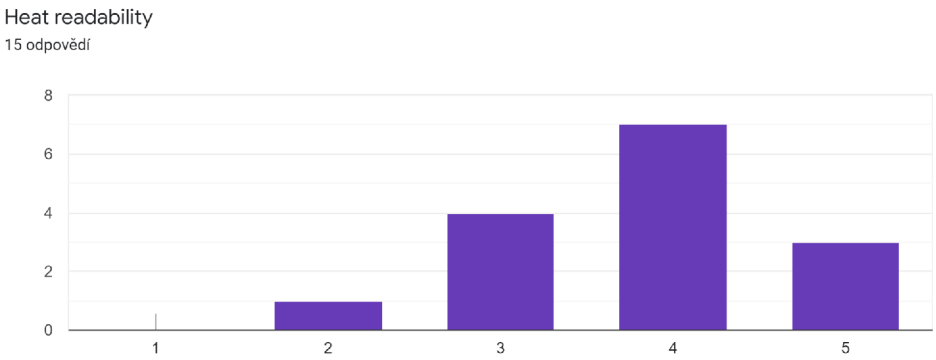

Figure 5.8: Heat - readability

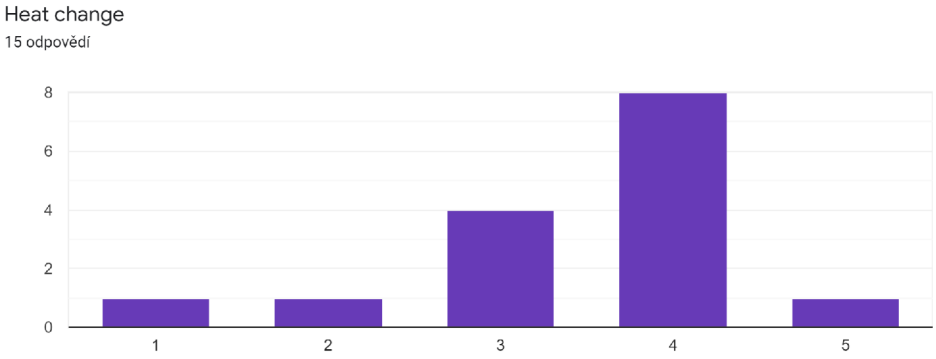

Figure 5.9: Heat - change readability

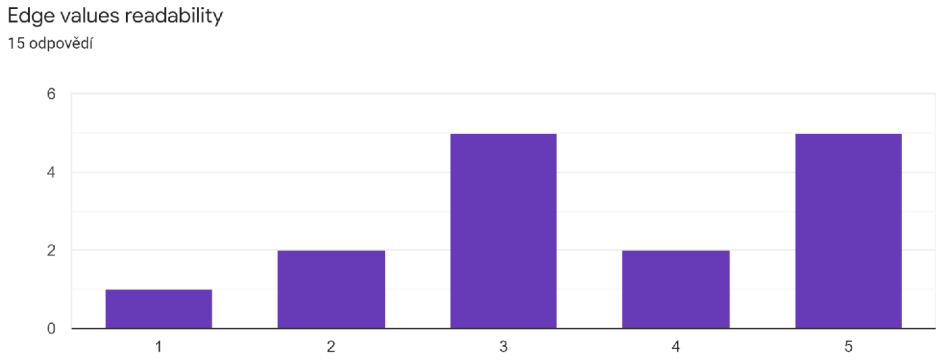

Figure 5.10: Heat - edge values readability

or freezing. Chart goes from **Very hard** to **Very easy**. For one-third it was average in difficulty, one-third found it very easy.

Chart 5.11 shows participant opinion if common HUD bar or presented way is better, from **Common HUD bar is much better** to **Presented variation is much better**. Almost half of the participants think that it is the same as the common HUD bar, one-third think that the common HUD bar is better.

Selected additional feedback responses.

> *Pulsing near and at the edges would make it much more clear.*

A combination of pulse strength and speed when reaching edge values could improve the readability of edge cases.

> *its hard to read it*

Because the only worse value was in question about edge cases, I will assume that it is problem regarding this. Other solutions would probably solve it.

> *A bloom effect for emissive edge cases could help draw attention to the change in heat values.*

Did some small experiment with emission near edge cases but wasn't with the result so I removed it. Based on these answer, more testing with emission should be done.

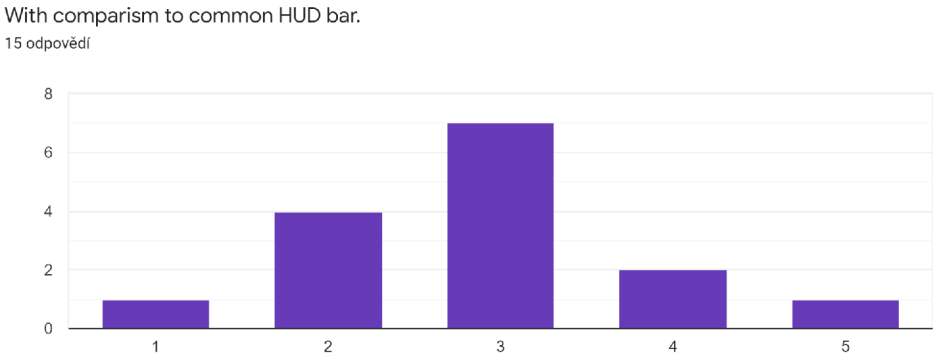

Figure 5.11: Heat - compare to common HUD bar

It is very hard to discern changes in amall amounts of heat

The main idea is to show the player that he is outside of the temperature range which upgrades can negate. When is outside of the range, then the player needs to recognize edge cases. Recognizing small changes could be problematic with an approximation of remaining time, but this could be solved by previous ideas.

Heal

This section of the survey was about healing.

Chart 5.12 shows how readable is the amount of heal from **Bad** to **Good**. We can see that almost half of the participants found it good, only one-fifth was under average.

Chart 5.13 shows how readable is the strength of healing item from **Bad** to **Good**. Slightly over one-fifth of participants found it under average, slightly over one-third found it over average.

Chart 5.14 shows how readable is the amount of used and remaining healing from **Bad** to **Good**. Slightly over half of participants found it better than average, for one-fifth it was really good.

Selected additional feedback responses.

> *Pentagon or hexagon should be maximum. Anything more is really hard to distinguish.*

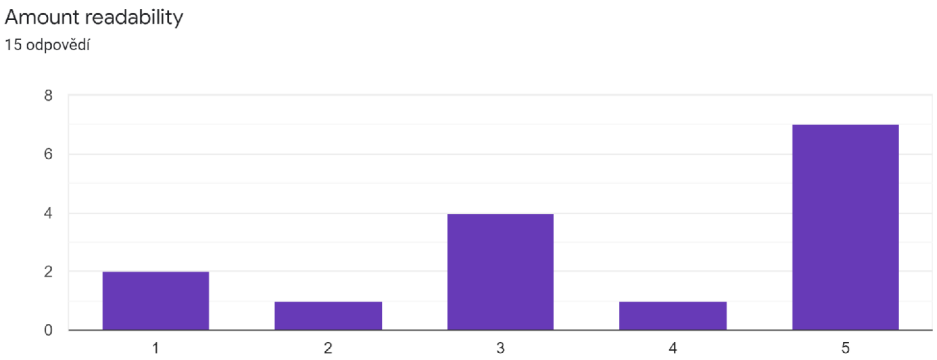

Figure 5.12: Heal - amount readability

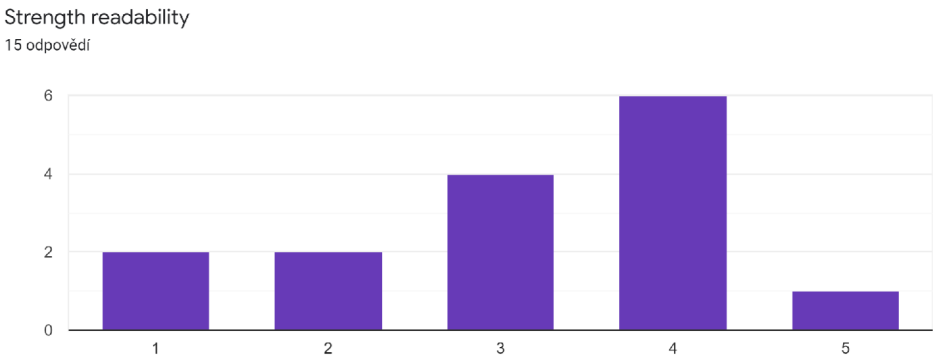

Figure 5.13: Heal - strength readability

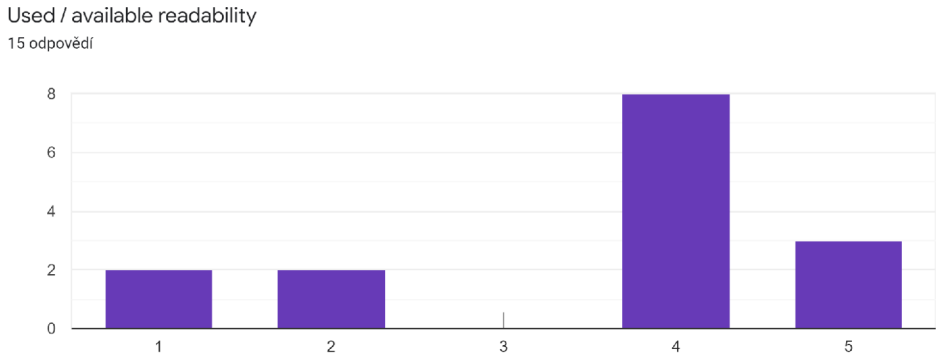

Figure 5.14: Heal - used amount readability

For purpose of the game, it would be nice to have more than two upgrades. This problem requires improvement of this part.

> *I dont know what I was doing*

Hopefully slower unlocking during a game would improve this problem.

> *The difference in shapes of the healing tubes may not be very noticeable on smaller screens or lower resolutions (had to double check for changes on 15.6" screen at 1080p)*

Same as the first response.

> *Very confusing as to what it does*

Same as the second response.

Boost

This section of the survey was about boosting mechanic.

Chart 5.15 shows how readable is the strength of boost from **Bad** to **Good**. Slightly over half of the participants found in good, only one-fifth chose below average.

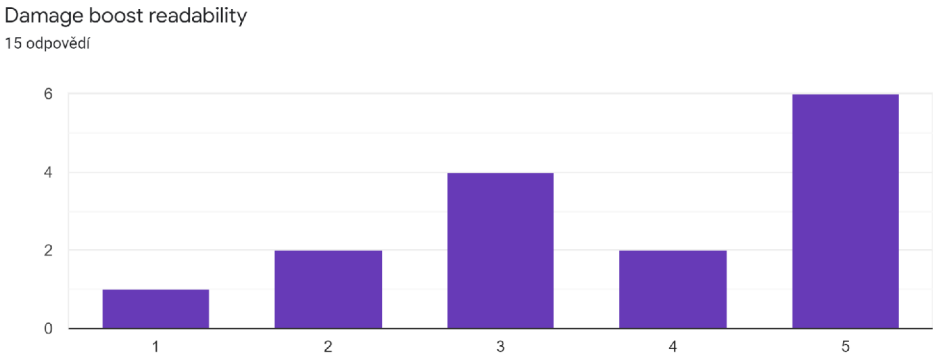

Figure 5.15: Boost - readability

Chart 5.16 shows participant opinion if common HUD bar or presented way is better, from **Common HUD bar is much better** to **Presented variation is much better**. Almost one-quarter of participants didn't find any difference between presented and common HUD, the same amount found the presented version slightly better than common HUD. One-fifth would prefer a common HUD bar.

Selected additional feedback responses.

I dont know what that was suppose to do

Probably lack of my explanation and missing example of underlying mathematics caused this problem.

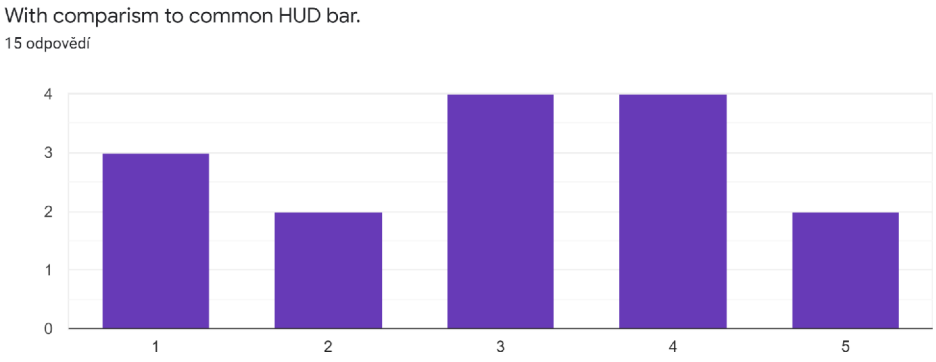

Figure 5.16: Boost - compare to common HUD bar

6 Conclusion

I described different definitions of UI and made another definition for purpose of this thesis, then I described commonly used categories in user interface for games.

I provided an overview of Procedural Content Generation for the game industry, give some examples for clarification. I made a definition of PCG for this thesis and created categories usable for generating UI with a focus on the diegetic category.

I made subjective analysis of several games across different genres, settings, and mechanics analysing possible approach of authors to creating procedurally generated diegetic UI elements.

Based on previous experience I design game mechanics and main character using only procedural diegetic UI, mainly materials and mesh. I implemented it using Unreal Engine 4 and created a small testing area for the user survey.

I created a survey to test the readability and usability of implemented character and shared it in different Czech gaming communities. Despite posting the survey several times for about a month I was able to get only 15 answers, but I tried to conclude them. The limited amount of answers give me mostly positive feedback so created combination of the game world, character, and diegetic UI looks plausible.

Before making a better conclusion it is needed to get more answers.

For future, it is possible to implement improvements suggested by participants of the survey and make another round of user testing with more participants or use properly prepared eye-tracking laboratory and prepare implementation with pure non-diegetic UI and make timed comparison of tasks in both approaches.

I improved my knowledge of game UI, learned broad definitions of PCG and their categories with some statistics about their usage, learned how Unreal Engine handles parallelism.

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A Appendix - List of attachments

1. Character.zip - Blender projects from different stages of development with reference pictures and animation exports
2. Source.zip - Unreal Engine project containing all assets I created and few from project template
3. Build.zip - Runnable build for Windows operating system. The game is meant to be played based on information in survey.

B Appendix - Full survey

Readability of diegetic UI

This form is part of diploma thesis at FI MU Brno on topic Game UI based on procedural techniques. All gathered data are anonymized and will be used only in the thesis and won't be available anywhere else.

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Questionaire aims on players, you should have some experience with games.

Character should be used in game inspired by souls genre.

Works only on Windows.
Demo download:
https://drive.google.com/file/d/1AX8eVOKwpy79Uq5NZ1Jtcn5dBObA9MN6/view?usp=sharing

*Povinné pole

1. How big a player are you?

Select exactly one in whole grid which represents most suitable combination for you. Time is average count of hours per week.

Označte jen jednu elipsu na každém řádku.

	0-5	5-10	10-20	20-25	25+
Little genres and small amount of games	◯	◯	◯	◯	◯
Many genres or big amount of games	◯	◯	◯	◯	◯
Many genres and big amount of games	◯	◯	◯	◯	◯

2. How much knowledge of soul genre (dark souls, bloodborne, ...) do you have? *

Označte jen jednu elipsu.

- ◯ Never heard of it
- ◯ Know it but never played
- ◯ Tried some game from it but dropped it fast
- ◯ Finished one and never played more
- ◯ Finished several games and will play more

General

WASD to move, SHIFT to sprint, SPACE to roll, jump when sprinting. Try different movement situation.

3. Health and stamina readability *

Označte jen jednu elipsu.

	1	2	3	4	5	
Bad	◯	◯	◯	◯	◯	Good

4. Comparism to common HUD bar. *

When you imagine common HUD bar in the corner of the screen.

Označte jen jednu elipsu.

	1	2	3	4	5	
Common HUD bar is much better	◯	◯	◯	◯	◯	Presented variation is much better

5. Additional feedback

Rust

Brownish plate will increase amount of rust, white will decrease.

6. Rust readability *

Focus on regnognizing that something is happening.

Označte jen jednu elipsu.

	1	2	3	4	5	
Bad	◯	◯	◯	◯	◯	Good

7. Edge values readability *

How complicated is to identifying edge value - absolute rust

Označte jen jednu elipsu.

	1	2	3	4	5	
Very hard	◯	◯	◯	◯	◯	Very easy

8. With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

Označte jen jednu elipsu.

	1	2	3	4	5	
Common HUD bar is much better	◯	◯	◯	◯	◯	Presented variation is much better

9. Additional feedback

Heat

Red plate will increase heat, blue will decrease.

10. Heat readability *

How bad or good is recognizing current heat.

Označte jen jednu elipsu.

	1	2	3	4	5	
Bad	◯	◯	◯	◯	◯	Good

11. Heat change *

How easy is to recognize change in heat.

Označte jen jednu elipsu.

	1	2	3	4	5	
Very hard	◯	◯	◯	◯	◯	Very easy

12. Edge values readability *

How complicated is identifying edge values - "freezing" and "overheating"

Označte jen jednu elipsu.

	1	2	3	4	5	
Very hard	◯	◯	◯	◯	◯	Very easy

13. With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

Označte jen jednu elipsu.

	1	2	3	4	5	
Common HUD bar is much better	◯	◯	◯	◯	◯	Presented variation is much better

14. Additional feedback

Healing

E to use heal, I and J to change strength, P and L to change amount

15. Amount readability *

Označte jen jednu elipsu.

	1	2	3	4	5	
Bad	◯	◯	◯	◯	◯	Good

16. Strength readability *

Označte jen jednu elipsu.

	1	2	3	4	5	
Bad	◯	◯	◯	◯	◯	Good

17. Used / available readability *

Označte jen jednu elipsu.

	1	2	3	4	5	
Bad	◯	◯	◯	◯	◯	Good

18. Additional feedback

Damage boost

Try attacking the monolit with left mouse button. The boost curve is not linear so you need to wait few seconds on start to see difference.

19. Damage boost readability *

Označte jen jednu elipsu.

	1	2	3	4	5	
Bad	◯	◯	◯	◯	◯	Good

20. With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

Označte jen jednu elipsu.

	1	2	3	4	5	
Common HUD bar is much better	◯	◯	◯	◯	◯	Presented variation is much better

21. Additional feedback

Obsah není vytvořen ani schválen Googlem.

Google Formuláře

C Appendix - All survey answers

Readability of diegetic UI

This form is part of diploma thesis at FI MU Brno on topic Game UI based on procedural techniques. All gathered data are anonymized and will be used only in the thesis and won't be available anywhere else.

Your task will be to play short demo, try possibilities and fill the questionaire. Based on your speed this will take you aproximatelly 15 - 30 minutes.

Questionaire aims on players, you should have some experience with games.

Character should be used in game inspired by souls genre.

Works only on Windows.
Demo download: https://drive.google.com/file/d/1AX8eVOKwpy79Uq5NZ1Jtcn5dBObA9MN6/view?usp=sharing

How big a player are you?

Select exactly one in whole grid which represents most suitable combination for you. Time is average count of hours per week.

	0-5	5-10	10-20	20-25	25+
Little genres and small amount of games	○	○	○	○	○
Many genres or big amount of games	○	◉	○	○	○
Many genres and big amount of games	○	○	○	○	○

How much knowledge of soul genre (dark souls, bloodborne, ...) do you have? *

- ○ Never heard of it
- ◉ Know it but never played
- ○ Tried some game from it but dropped it fast
- ○ Finished one and never played more
- ○ Finished several games and will play more

General
WASD to move, SHIFT to sprint, SPACE to roll, jump when sprinting. Try different movement situation.

Health and stamina readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Comparism to common HUD bar. *
When you imagine common HUD bar in the corner of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	○	◉	○	Presented variation is much better

Additional feedback

Rust
Brownish plate will increase amount of rust, white will decrease.

Rust readability *
Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	◉	○	○	○	Good

Edge values readability *
How complicated is to identifying edge value - absolute rust

	1	2	3	4	5	
Very hard	○	○	◉	○	○	Very easy

With comparism to common HUD bar. *
When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	◉	○	○	○	Presented variation is much better

Additional feedback

Does not feel like knowing exactly how much more can take.

Heat
Red plate will increase heat, blue will decrease.

Heat readability *

How bad or good is recognizing current heat.

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

Heat change *

How easy is to recognize change in heat.

	1	2	3	4	5	
Very hard	○	◉	○	○	○	Very easy

Edge values readability *

How complicated is identifying edge values - "freezing" and "overheating"

	1	2	3	4	5	
Very hard	◉	○	○	○	○	Very easy

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	◉	○	○	Presented variation is much better

Additional feedback

Pulsing near and at the edges would make it much more clear.

Healing
E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Strength readability *

	1	2	3	4	5	
Bad	○	◉	○	○	○	Good

Used / available readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Additional feedback

Pentagon or hexagon should be maximum. Anything more is really hard to distinguish.

Damage boost
Try attacking the monolit with left mouse button. The boost curve is not linear so you need to wait few seconds on start to see difference.

Damage boost readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	○	◉	○	Presented variation is much better

Additional feedback

Obsah není vytvořen ani schválen Googlem.

Google Formuláře

Readability of diegetic UI

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Character should be used in game inspired by souls genre.

Works only on Windows.
Demo download: https://drive.google.com/file/d/1AX8eVOKwpy79Uq5NZ1Jtcn5dBObA9MN6/view?usp=sharing

How big a player are you?

Select exactly one in whole grid which represents most suitable combination for you. Time is average count of hours per week.

	0-5	5-10	10-20	20-25	25+
Little genres and small amount of games	○	○	○	○	○
Many genres or big amount of games	○	○	○	○	◉
Many genres and big amount of games	○	○	○	○	○

How much knowledge of soul genre (dark souls, bloodborne, ...) do you have? *

- ○ Never heard of it
- ○ Know it but never played
- ○ Tried some game from it but dropped it fast
- ◉ Finished one and never played more
- ○ Finished several games and will play more

General

WASD to move, SHIFT to sprint, SPACE to roll, jump when sprinting. Try different movement situation.

Health and stamina readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Comparism to common HUD bar. *

When you imagine common HUD bar in the corner of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	○	○	◉	Presented variation is much better

Additional feedback

Its nice to see original way to show HUD

Rust
Brownish plate will increase amount of rust, white will decrease.

Rust readability *
Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

Edge values readability *
How complicated is to identifying edge value - absolute rust

	1	2	3	4	5	
Very hard	○	◉	○	○	○	Very easy

With comparism to common HUD bar. *
When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	◉	○	○	○	Presented variation is much better

Additional feedback

It was hard to read

Heat
Red plate will increase heat, blue will decrease.

Heat readability *

How bad or good is recognizing current heat.

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Heat change *

How easy is to recognize change in heat.

	1	2	3	4	5	
Very hard	○	○	○	◉	○	Very easy

Edge values readability *

How complicated is identifying edge values - "freezing" and "overheating"

	1	2	3	4	5	
Very hard	○	◉	○	○	○	Very easy

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	◉	○	○	Presented variation is much better

Additional feedback

its hard to read it

Healing
E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	◉	○	○	○	○	Good

Strength readability *

	1	2	3	4	5	
Bad	◉	○	○	○	○	Good

Used / available readability *

	1	2	3	4	5	
Bad	◉	○	○	○	○	Good

Additional feedback

I dont know what I was doing

Damage boost
Try attacking the monolit with left mouse button. The boost curve is not linear so you need to wait few seconds on start to see difference.

Damage boost readability *

	1	2	3	4	5	
Bad	◉	○	○	○	○	Good

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	◉	○	○	○	○	Presented variation is much better

Additional feedback

I dont know what that was suppose to do

Obsah není vytvořen ani schválen Googlem.

Google Formuláře

Readability of diegetic UI

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Works only on Windows.
Demo download: https://drive.google.com/file/d/1AX8eVOKwpy79Uq5NZ1Jtcn5dBObA9MN6/view?usp=sharing

How big a player are you?

Select exactly one in whole grid which represents most suitable combination for you. Time is average count of hours per week.

	0-5	5-10	10-20	20-25	25+
Little genres and small amount of games	○	○	◉	○	○
Many genres or big amount of games	○	○	○	○	○
Many genres and big amount of games	○	○	○	○	○

How much knowledge of soul genre (dark souls, bloodborne, ...) do you have? *

- ○ Never heard of it
- ◉ Know it but never played
- ○ Tried some game from it but dropped it fast
- ○ Finished one and never played more
- ○ Finished several games and will play more

General

WASD to move, SHIFT to sprint, SPACE to roll, jump when sprinting. Try different movement situation.

Health and stamina readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Comparism to common HUD bar. *

When you imagine common HUD bar in the corner of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	◉	○	○	Presented variation is much better

Additional feedback

Rust
Brownish plate will increase amount of rust, white will decrease.

Rust readability *
Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Edge values readability *
How complicated is to identifying edge value - absolute rust

	1	2	3	4	5	
Very hard	○	○	○	○	◉	Very easy

With comparism to common HUD bar. *
When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	○	◉	○	Presented variation is much better

Additional feedback

Heat
Red plate will increase heat, blue will decrease.

Heat readability *

How bad or good is recognizing current heat.

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Heat change *

How easy is to recognize change in heat.

	1	2	3	4	5	
Very hard	○	○	◉	○	○	Very easy

Edge values readability *

How complicated is identifying edge values - "freezing" and "overheating"

	1	2	3	4	5	
Very hard	○	○	○	○	◉	Very easy

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	◉	○	○	Presented variation is much better

Additional feedback

A bloom effect for emissive edge cases could help draw attention to the change in heat values.

Healing
E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Strength readability *

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

Used / available readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Additional feedback

The difference in shapes of the healing tubes may not be very noticeable on smaller screens or lower resolutions (had to double check for changes on 15.6" screen at 1080p)

Damage boost
Try attacking the monolit with left mouse button. The boost curve is not linear so you need to wait few seconds on start to see difference.

Damage boost readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	◉	○	○	Presented variation is much better

Additional feedback

Obsah není vytvořen ani schválen Googlem.

Google Formuláře

Readability of diegetic UI

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How big a player are you?

Select exactly one in whole grid which represents most suitable combination for you. Time is average count of hours per week.

	0-5	5-10	10-20	20-25	25+
Little genres and small amount of games	○	○	○	○	○
Many genres or big amount of games	○	○	○	○	◉
Many genres and big amount of games	○	○	○	○	○

How much knowledge of soul genre (dark souls, bloodborne, ...) do you have? *

- ○ Never heard of it
- ○ Know it but never played
- ○ Tried some game from it but dropped it fast
- ○ Finished one and never played more
- ◉ Finished several games and will play more

General

WASD to move, SHIFT to sprint, SPACE to roll, jump when sprinting. Try different movement situation.

Health and stamina readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Comparism to common HUD bar. *

When you imagine common HUD bar in the corner of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	○	◉	○	Presented variation is much better

Additional feedback

Rust
Brownish plate will increase amount of rust, white will decrease.

Rust readability *
Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Edge values readability *
How complicated is to identifying edge value - absolute rust

	1	2	3	4	5	
Very hard	○	○	◉	○	○	Very easy

With comparism to common HUD bar. *
When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	○	◉	○	Presented variation is much better

Additional feedback

Heat
Red plate will increase heat, blue will decrease.

Heat readability *

How bad or good is recognizing current heat.

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Heat change *

How easy is to recognize change in heat.

	1	2	3	4	5	
Very hard	○	○	○	◉	○	Very easy

Edge values readability *

How complicated is identifying edge values - "freezing" and "overheating"

	1	2	3	4	5	
Very hard	○	○	◉	○	○	Very easy

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	◉	○	○	Presented variation is much better

Additional feedback

Healing
E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Strength readability *

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

Used / available readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Additional feedback

Damage boost
Try attacking the monolit with left mouse button. The boost curve is not linear so you need to wait few seconds on start to see difference.

Damage boost readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	○	◉	○	Presented variation is much better

Additional feedback

.....

Obsah není vytvořen ani schválen Googlem.

Google Formuláře

Readability of diegetic UI

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Character should be used in game inspired by souls genre.

Works only on Windows.
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How big a player are you?

Select exactly one in whole grid which represents most suitable combination for you. Time is average count of hours per week.

	0-5	5-10	10-20	20-25	25+
Little genres and small amount of games	○	○	○	○	○
Many genres or big amount of games	○	○	◉	○	○
Many genres and big amount of games	○	○	○	○	○

How much knowledge of soul genre (dark souls, bloodborne, ...) do you have? *

- ○ Never heard of it
- ◉ Know it but never played
- ○ Tried some game from it but dropped it fast
- ○ Finished one and never played more
- ○ Finished several games and will play more

General

WASD to move, SHIFT to sprint, SPACE to roll, jump when sprinting. Try different movement situation.

Health and stamina readability *

	1	2	3	4	5	
Bad	○	◉	○	○	○	Good

Comparism to common HUD bar. *

When you imagine common HUD bar in the corner of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	◉	○	○	○	Presented variation is much better

Additional feedback

I have no idea which bar does what

Rust

Brownish plate will increase amount of rust, white will decrease.

Rust readability *

Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Edge values readability *

How complicated is to identifying edge value - absolute rust

	1	2	3	4	5	
Very hard	○	◉	○	○	○	Very easy

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	○	◉	○	Presented variation is much better

Additional feedback

Small spots are hard to see

Heat

Red plate will increase heat, blue will decrease.

Heat readability *

How bad or good is recognizing current heat.

	1	2	3	4	5	
Bad	○	◉	○	○	○	Good

Heat change *

How easy is to recognize change in heat.

	1	2	3	4	5	
Very hard	◉	○	○	○	○	Very easy

Edge values readability *

How complicated is identifying edge values - "freezing" and "overheating"

	1	2	3	4	5	
Very hard	○	○	◉	○	○	Very easy

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	◉	○	○	○	Presented variation is much better

Additional feedback

It is very hard to discern changes in amall amounts of heat

Healing
E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	◉	○	○	○	○	Good

Strength readability *

	1	2	3	4	5	
Bad	◉	○	○	○	○	Good

Used / available readability *

	1	2	3	4	5	
Bad	◉	○	○	○	○	Good

Additional feedback

Very confusing as to what it does

Damage boost
Try attacking the monolit with left mouse button. The boost curve is not linear so you need to wait few seconds on start to see difference.

Damage boost readability *

	1	2	3	4	5	
Bad	○	◉	○	○	○	Good

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	◉	○	○	○	○	Presented variation is much better

Additional feedback

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Health and stamina readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Comparism to common HUD bar. *

When you imagine common HUD bar in the corner of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	◉	○	○	Presented variation is much better

Additional feedback

Rust
Brownish plate will increase amount of rust, white will decrease.

Rust readability *
Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Edge values readability *
How complicated is to identifying edge value - absolute rust

	1	2	3	4	5	
Very hard	○	○	○	◉	○	Very easy

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When you imagine common HUD bar in the edge of the screen.

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Additional feedback

Heat
Red plate will increase heat, blue will decrease.

Heat readability *

How bad or good is recognizing current heat.

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Heat change *

How easy is to recognize change in heat.

	1	2	3	4	5	
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How complicated is identifying edge values - "freezing" and "overheating"

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Additional feedback

Healing
E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Strength readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Used / available readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Additional feedback

Damage boost
Try attacking the monolit with left mouse button. The boost curve is not linear so you need to wait few seconds on start to see difference.

Damage boost readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

With comparism to common HUD bar. *

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Health and stamina readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

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Common HUD bar is much better	○	○	○	○	◉	Presented variation is much better

Additional feedback

Rust
Brownish plate will increase amount of rust, white will decrease.

Rust readability *
Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

Edge values readability *
How complicated is to identifying edge value - absolute rust

	1	2	3	4	5	
Very hard	○	○	◉	○	○	Very easy

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	1	2	3	4	5	
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	1	2	3	4	5	
Very hard	○	○	◉	○	○	Very easy

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Common HUD bar is much better	◉	○	○	○	○	Presented variation is much better

Additional feedback

Healing
E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Strength readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Used / available readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Additional feedback

Damage boost
Try attacking the monolit with left mouse button. The boost curve is not linear so you need to wait few seconds on start to see difference.

Damage boost readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

With comparism to common HUD bar. *

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Little genres and small amount of games	○	○	○	○	○
Many genres or big amount of games	○	○	○	◉	○
Many genres and big amount of games	○	○	○	○	○

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General

WASD to move, SHIFT to sprint, SPACE to roll, jump when sprinting. Try different movement situation.

Health and stamina readability *

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

Comparism to common HUD bar. *

When you imagine common HUD bar in the corner of the screen.

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Common HUD bar is much better	○	◉	○	○	○	Presented variation is much better

Additional feedback

Rust
Brownish plate will increase amount of rust, white will decrease.

Rust readability *
Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Edge values readability *
How complicated is to identifying edge value - absolute rust

	1	2	3	4	5	
Very hard	○	○	○	○	◉	Very easy

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Common HUD bar is much better	○	○	◉	○	○	Presented variation is much better

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Red plate will increase heat, blue will decrease.

Heat readability *

How bad or good is recognizing current heat.

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

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When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	◉	○	○	○	Presented variation is much better

Additional feedback

Healing
E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

Strength readability *

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

Used / available readability *

	1	2	3	4	5	
Bad	○	◉	○	○	○	Good

Additional feedback

Damage boost
Try attacking the monolit with left mouse button. The boost curve is not linear so you need to wait few seconds on start to see difference.

Damage boost readability *

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

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	1	2	3	4	5	
Common HUD bar is much better	○	◉	○	○	○	Presented variation is much better

Additional feedback

.....

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Many genres or big amount of games	○	○	○	○	○
Many genres and big amount of games	○	○	○	○	○

How much knowledge of soul genre (dark souls, bloodborne, ...) do you have? *

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General

WASD to move, SHIFT to sprint, SPACE to roll, jump when sprinting. Try different movement situation.

Health and stamina readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Comparism to common HUD bar. *

When you imagine common HUD bar in the corner of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	○	◉	○	Presented variation is much better

Additional feedback

Rust

Brownish plate will increase amount of rust, white will decrease.

Rust readability *

Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	◉	○	○	○	Good

Edge values readability *

How complicated is to identifying edge value - absolute rust

	1	2	3	4	5	
Very hard	○	○	○	◉	○	Very easy

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	1	2	3	4	5	
Common HUD bar is much better	○	○	○	◉	○	Presented variation is much better

Additional feedback

I haven't noticed some big changes in movement or anything when I was rusty.

Heat

Red plate will increase heat, blue will decrease.

Heat readability *

How bad or good is recognizing current heat.

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Heat change *

How easy is to recognize change in heat.

	1	2	3	4	5	
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Common HUD bar is much better	○	○	○	○	◉	Presented variation is much better

Additional feedback

Healing
E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Strength readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Used / available readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Additional feedback

Damage boost
Try attacking the monolit with left mouse button. The boost curve is not linear so you need to wait few seconds on start to see difference.

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	1	2	3	4	5	
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Many genres or big amount of games	○	◉	○	○	○
Many genres and big amount of games	◉	○	○	○	○

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Health and stamina readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Comparism to common HUD bar. *

When you imagine common HUD bar in the corner of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	○	◉	○	Presented variation is much better

Additional feedback

I frickin love that Dark Fantasy and Lovecraftian Feel

Rust
Brownish plate will increase amount of rust, white will decrease.

Rust readability *
Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	◉	○	○	○	Good

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Very hard	○	◉	○	○	○	Very easy

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Red plate will increase heat, blue will decrease.

Heat readability *

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	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

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How easy is to recognize change in heat.

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Common HUD bar is much better	○	○	◉	○	○	Presented variation is much better

Additional feedback

Healing
E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

Strength readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Used / available readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

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How big a player are you?

Select exactly one in whole grid which represents most suitable combination for you. Time is average count of hours per week.

	0-5	5-10	10-20	20-25	25+
Little genres and small amount of games	○	○	○	○	○
Many genres or big amount of games	○	○	○	○	◉
Many genres and big amount of games	○	○	○	○	○

How much knowledge of soul genre (dark souls, bloodborne, ...) do you have? *

- ○ Never heard of it
- ○ Know it but never played
- ◉ Tried some game from it but dropped it fast
- ○ Finished one and never played more
- ○ Finished several games and will play more

General

WASD to move, SHIFT to sprint, SPACE to roll, jump when sprinting. Try different movement situation.

Health and stamina readability *

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

Comparism to common HUD bar. *

When you imagine common HUD bar in the corner of the screen.

	1	2	3	4	5	
Common HUD bar is much better	◉	○	○	○	○	Presented variation is much better

Additional feedback

When I want to really immerse myself into a game, I'd rather have no HUD at all and know my stamina just from lets say heavy breathing of my character or blood on screen like in RE7 for example. If I want to know exactly how much health/stamina or let's say mana I have common HUD is much better imo.

Rust
Brownish plate will increase amount of rust, white will decrease.

Rust readability *
Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Edge values readability *
How complicated is to identifying edge value - absolute rust

	1	2	3	4	5	
Very hard	○	◉	○	○	○	Very easy

With comparism to common HUD bar. *
When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	◉	○	○	○	Presented variation is much better

Additional feedback

Heat
Red plate will increase heat, blue will decrease.

Heat readability *

How bad or good is recognizing current heat.

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Heat change *

How easy is to recognize change in heat.

	1	2	3	4	5	
Very hard	○	○	○	◉	○	Very easy

Edge values readability *

How complicated is identifying edge values - "freezing" and "overheating"

	1	2	3	4	5	
Very hard	○	○	○	◉	○	Very easy

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	◉	○	○	○	Presented variation is much better

Additional feedback

Healing
E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Strength readability *

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

Used / available readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Additional feedback

Damage boost
Try attacking the monolit with left mouse button. The boost curve is not linear so you need to wait few seconds on start to see difference.

Damage boost readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	◉	○	○	○	○	Presented variation is much better

Additional feedback

Obsah není vytvořen ani schválen Googlem.

Google Formuláře

Readability of diegetic UI

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Character should be used in game inspired by souls genre.

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	0-5	5-10	10-20	20-25	25+
Little genres and small amount of games	○	◉	○	○	○
Many genres or big amount of games	○	○	○	○	○
Many genres and big amount of games	○	○	○	○	○

How much knowledge of soul genre (dark souls, bloodborne, ...) do you have? *

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General

WASD to move, SHIFT to sprint, SPACE to roll, jump when sprinting. Try different movement situation.

Health and stamina readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Comparism to common HUD bar. *

When you imagine common HUD bar in the corner of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	◉	○	○	Presented variation is much better

Additional feedback

Rust
Brownish plate will increase amount of rust, white will decrease.

Rust readability *
Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Edge values readability *
How complicated is to identifying edge value - absolute rust

	1	2	3	4	5	
Very hard	○	○	○	○	◉	Very easy

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When you imagine common HUD bar in the edge of the screen.

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Common HUD bar is much better	○	◉	○	○	○	Presented variation is much better

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Red plate will increase heat, blue will decrease.

Heat readability *

How bad or good is recognizing current heat.

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

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How easy is to recognize change in heat.

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	1	2	3	4	5	
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Healing
E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

Strength readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Used / available readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Additional feedback

Damage boost
Try attacking the monolit with left mouse button. The boost curve is not linear so you need to wait few seconds on start to see difference.

Damage boost readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

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Many genres and big amount of games	○	○	◉	○	○

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Health and stamina readability *

	1	2	3	4	5	
Bad	○	◉	○	○	○	Good

Comparism to common HUD bar. *

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Common HUD bar is much better	○	○	◉	○	○	Presented variation is much better

Additional feedback

Rust
Brownish plate will increase amount of rust, white will decrease.

Rust readability *
Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Edge values readability *
How complicated is to identifying edge value - absolute rust

	1	2	3	4	5	
Very hard	○	○	○	◉	○	Very easy

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E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	○	◉	○	○	○	Good

Strength readability *

	1	2	3	4	5	
Bad	○	◉	○	○	○	Good

Used / available readability *

	1	2	3	4	5	
Bad	○	◉	○	○	○	Good

Additional feedback

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Health and stamina readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

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Common HUD bar is much better	○	○	○	◉	○	Presented variation is much better

Additional feedback

Rust
Brownish plate will increase amount of rust, white will decrease.

Rust readability *
Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Edge values readability *
How complicated is to identifying edge value - absolute rust

	1	2	3	4	5	
Very hard	○	○	○	◉	○	Very easy

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Common HUD bar is much better	○	○	○	◉	○	Presented variation is much better

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E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Strength readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Used / available readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Additional feedback

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	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	○	○	◉	Presented variation is much better

Additional feedback

.....

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Many genres and big amount of games	○	○	○	○	○

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Health and stamina readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Comparism to common HUD bar. *

When you imagine common HUD bar in the corner of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	◉	○	○	○	Presented variation is much better

Additional feedback

I just prefer the look of common hud

Rust
Brownish plate will increase amount of rust, white will decrease.

Rust readability *
Focus on regnognizing that something is happening.

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

Edge values readability *
How complicated is to identifying edge value - absolute rust

	1	2	3	4	5	
Very hard	○	◉	○	○	○	Very easy

With comparism to common HUD bar. *
When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	◉	○	○	Presented variation is much better

Additional feedback

I think haveing an option for an HUD would be nice, but it's pretty good to see these changes on the character

Heat
Red plate will increase heat, blue will decrease.

Heat readability *

How bad or good is recognizing current heat.

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Heat change *

How easy is to recognize change in heat.

	1	2	3	4	5	
Very hard	○	○	○	◉	○	Very easy

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How complicated is identifying edge values - "freezing" and "overheating"

	1	2	3	4	5	
Very hard	○	○	○	○	◉	Very easy

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	◉	○	○	○	Presented variation is much better

Additional feedback

Healing
E to use heal, I and J to change strength, P and L to change amount

Amount readability *

	1	2	3	4	5	
Bad	○	○	◉	○	○	Good

Strength readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Used / available readability *

	1	2	3	4	5	
Bad	○	○	○	◉	○	Good

Additional feedback

It's readable, but I don't really like, how it looks

Damage boost
Try attacking the monolit with left mouse button. The boost curve is not linear so you need to wait few seconds on start to see difference.

Damage boost readability *

	1	2	3	4	5	
Bad	○	○	○	○	◉	Good

With comparism to common HUD bar. *

When you imagine common HUD bar in the edge of the screen.

	1	2	3	4	5	
Common HUD bar is much better	○	○	◉	○	○	Presented variation is much better

Additional feedback

I am not a fan of these three pipes on the character, but I can't realy say why

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