

General

Project Name: Beyond The Edge (Survivor's Obituary) [BTE for short]

Genre: Survival

Engine: Unity (2017.3)

Programming Language: C#

Source Control: GIT (TFS)

UI Engine: PowerUI (CSS+HTML)

UI Language: Multilanguage (Currently English and Russian, can easily add more)

Weather Engine: Modified WeatherMaker

Terrain Engine: MapMagic, RTP

Streaming Engine: WorldStreamer

Foliage Engine: VegetationStudio

About

This project was inspired by “Robinson’s Requiem” game [R’sR for short] by a french company Silmarils released back in 1996. Goal of both games — to survive on an alien planet and find a way to escape and return home.

BTE, as well as R’sR provides complex health engine and weather control system. Game consists of bunch of different locations, each one with a different environment options (cold snowy location, hot desert, swamp, forests, ruins of an alien city and so on). Locations are connected via cave systems (fig. 0) or space-time cracks (see *Side Quest #1* section).

Fig. 0



In order to survive, player should sleep, eat (see *Hunting* section), drink, make clothes (see *Crafting* section) and heal by using collected medkit or some alien plants (see *MDUI* section). Player will have to fight with diseases and heal injuries (see *Diseases and Injuries* section).

In a nutshell

Our player wakes up on an alien planet. He does not remember anything about what happened or who he is. He sees smoke and finds debris of his escape capsule module. He finds a Tablet (Multifunctional Device, or MDUI), knife and a medkit. MDUI has some kind of AI inside, and computer tells him that every escape module has emergency

beacon, but beacon must be activated manually. Player finds out that on his capsule beacon is totally destroyed. Computer says that there is information about second escape capsule that left the ship before the explosion, but it cannot tell its exact location. MDUI can show on a map (see *Map* section) locations of a debris, cave entrances and anomalies (space-time cracks). Second capsule can be in any of this locations. Goal of our guy — to find second capsule, activate beacon and survive until rescue team arrives.

Player Parameters and HUD

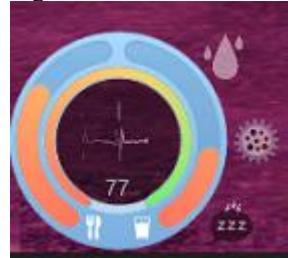
Health Parameters

In addition to standard survival games' Food, Water and Stamina parameters, our player has six more (fig. 5):

- Food Level
- Water Level
- Stamina Level
- Fatigue Level (see *Sleep* section)
- Blood Level
- Body Temperature
- Blood pressure (two parameters here — top and bottom)
- Heart Rate

Basic values are displayed in a HUD in a bottom-left corner (fig. 1):

Fig. 1



Icons on the right — are indicators of blood loss, active disease and fatigue. Other parameter can be viewed in a Medcenter section of MDUI.

Additional Parameters

When swimming under water, you will see oxygen meter (fig. 2)

Fig. 3



Player has Wetness parameter (fig. 3). This is important, because if you are wet, and it's cold "outside", you can get flu (see *Disease Monitors* section). Be sure to make a fire and warm up after the rain or when you left water (on cold locations. On warm locations it's not necessary).

Fig. 3



Survival

Crafting

Crafting system implemented in the game is similar to original R'sR. (see fig. 4) You can combine up to 4 different items in order to get a one new. No blueprints, no one will take your hand and guide you through the game. You must turn on your brain to play. You simply select two or more items in the inventory, and if this combination is valid, you will see available outcomes (only ones, for which you have enough resources). For example, if you have 3 "Fur" and select "Fur" and a needle, you will see "Fur Hat" and "Fur Gloves" options, but you will not see "Fur Jacket" option, because it "wants" 4 "Fur".

You can craft clothes, torches, molotov cocktails, maces, spears, and medical items (empty syringe + adrenaline = syringe with dose of adrenaline; bandage + sticks = splint) and so on.

Fig. 4



Hunting

You must eat meat in order to survive. Fruits will give you much more water, but you won't be able to fill your Food bar with it. You can hunt on small alien creatures with weapons or by using small traps. You can get fur and meat from them. Or you can make fishing rod and go fishing. By sure to cook your meat and fish before you eat — otherwise you can get food poisoning (see *Disease Monitors* section). And not every animal is eatable in a first place.

Diseases and Injuries

Diseases and healing is a huge part of the game. Fig. 5 (med scanner)
Fig. 5



Disease Monitors

Game has so-called disease monitors. They analyze environment and player parameters and trigger diseases. For example, Flu monitor checks for weather conditions (see *Weather* section), looks at player Wetness and decides if it should trigger Flu. Disease trigger can be delayed, i.e. if Flu monitor decides to trigger Flu, it will schedule this disease for a random time up to two game hours, so player will not get Flu as soon as he left water in a cold weather. He will feel ill some time later. Every disease monitor has disease probability parameter, so you will not get ill every single time you left water in a cold weather, it's randomized.

Another example of disease monitor is Food Poisoning monitor. It looks at what you are eating and will trigger Food Poisoning disease if item is not eatable or is dangerous (like not-boiled and not-disinfected water or not-cooked meat, or some alien fruit). Again, with some probability. Probability of food poisoning described in item itself.

Disease Stages

Every disease can have up to four stages (Benign, To Be Watched, Worrying, Critical). Every stage describes maximum impact on player parameters for the stage. Every stage has its duration. After one stage is over, another is getting activated. Last stage duration is infinite, because player will not last long on Critical stage anyway if he will not start healing fast.

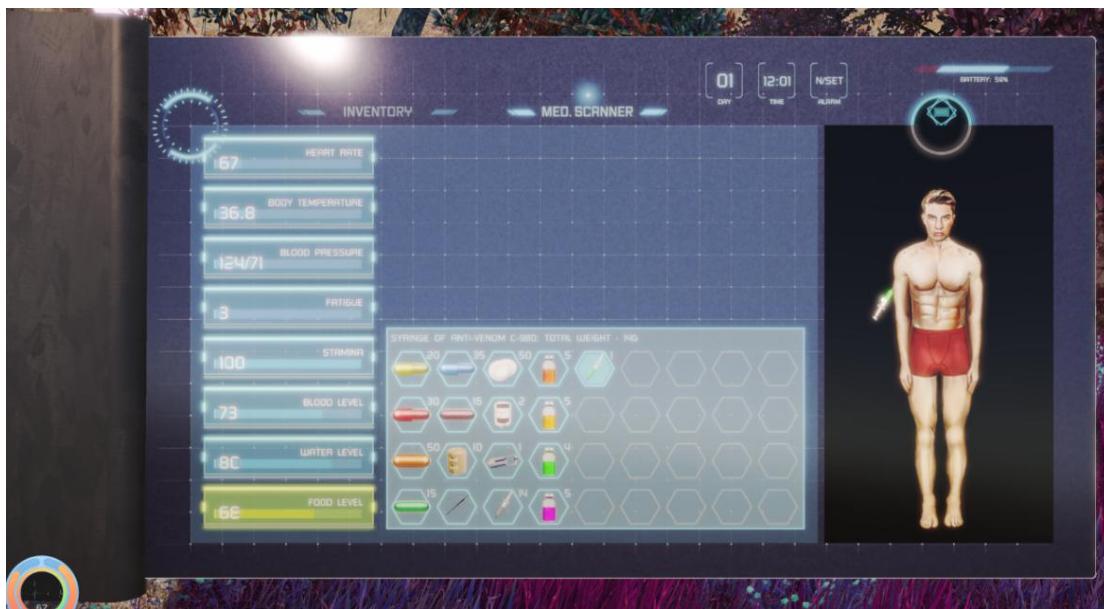
Player can have multiple diseases at the same time. In this case, disease effects are being combined.

Disease by its own is not deadly. Death probability goes up after player parameters reach dangerous levels (i.e. high temperature, high blood pressure, low blood level and so on).

Some diseases can go away after "Benign" stage (will sort of heal itself). Each disease has probability of that.

Healing

Every stage for every disease describes its own healing procedures. Fig. 6 (interaction with body — injections)
Fig. 6



It can be some medical treatment (for example, this pill every two hours and that one every three) or some special treatment (for example, injections).

When player start healing, disease chain gets inverted and health parameters slowly returns to normal. If player start healing procedures and forget to take a pill in a time, disease chain will invert back, and player will need to start all over again.

Example: you started to heal Flu on Worrying stage. You took your pills, and now disease stage is To Be Watched. You forgot to take your pill, and now disease is active again on To Be Watched state and goes “up” again. Now you should start treatment of Flu To Be Watched state.

Disease Effects

Disease can trigger some visual effects: blackouts and dizziness. There is also LSD effect, but it is harmless overall and triggers when player eats something “strange and fun”.

Disease stage can trigger blackouts. Blackouts lasts for a few minutes, but they are very dangerous: you can die from cold while unconscious, or you can be “eaten” by some animal. Or you will miss alarm that you set up earlier to take some meds (see *Alarms* section).

Dizziness is mostly harmless, but it gives you a clue that something is wrong (maybe you sick or very tired [see *Sleep* section]). Blackouts can also be caused by fatigue.

Injuries

Here is three types of injuries in the game:

- Injury (heals itself)
- Cuts (normal and deep ones)
- Fractures (open and close ones)

Cuts and open fractures will cause blood loss. You may have to sew up the wound or/and apply a bandage or splint to stop blood loss. Open wounds are dangerous if you will not treat them properly (disinfect and make a bandage), wound can cause blood poisoning, which is very hard to heal. Be careful with that.

Injuries can be caused by animal attacks or can be result of a fall damage.

Sleep

Player needs to sleep. Fatigue parameter tells, how tired player is. Fatigue is measured in percents, but it can be

greater than 100. If fatigue is greater than 150, player can fall asleep in any time, without warning. Fatigue rate can be increased by disease stage and/or by running. If you are not ill and you did not run, fatigue of 100 means that you are awake for 24 hours. Fatigue of 150 means that you are awake 1.5 days (or maybe you run a lot or you have some disease). It depends. High fatigue values can also cause dizziness and blackouts. High fatigue values will stop you from running. After the sleep, your fatigue level is back to 0. Sleeping time is random — between 5 and 8 hours. While sleeping, player sees dreams (fig. 7)

Fig. 7



Be careful when going to sleep. Better be in some warm place and away from animals.

Environment

Game has environment engine (weather and day-night cycle).

Weather

Each game location has environment description. It describes its min-max temperatures, min-max humidity (for day and night separately) and a set of weather effects (snow, rain, lightning, clouds, storm and so on). Every individual weather event is randomized (you may have rainy day, or sunny day, or windy day, or foggy day) (fig 8).

Fig. 8, 9

Fig. 8 (early dev screenshot)

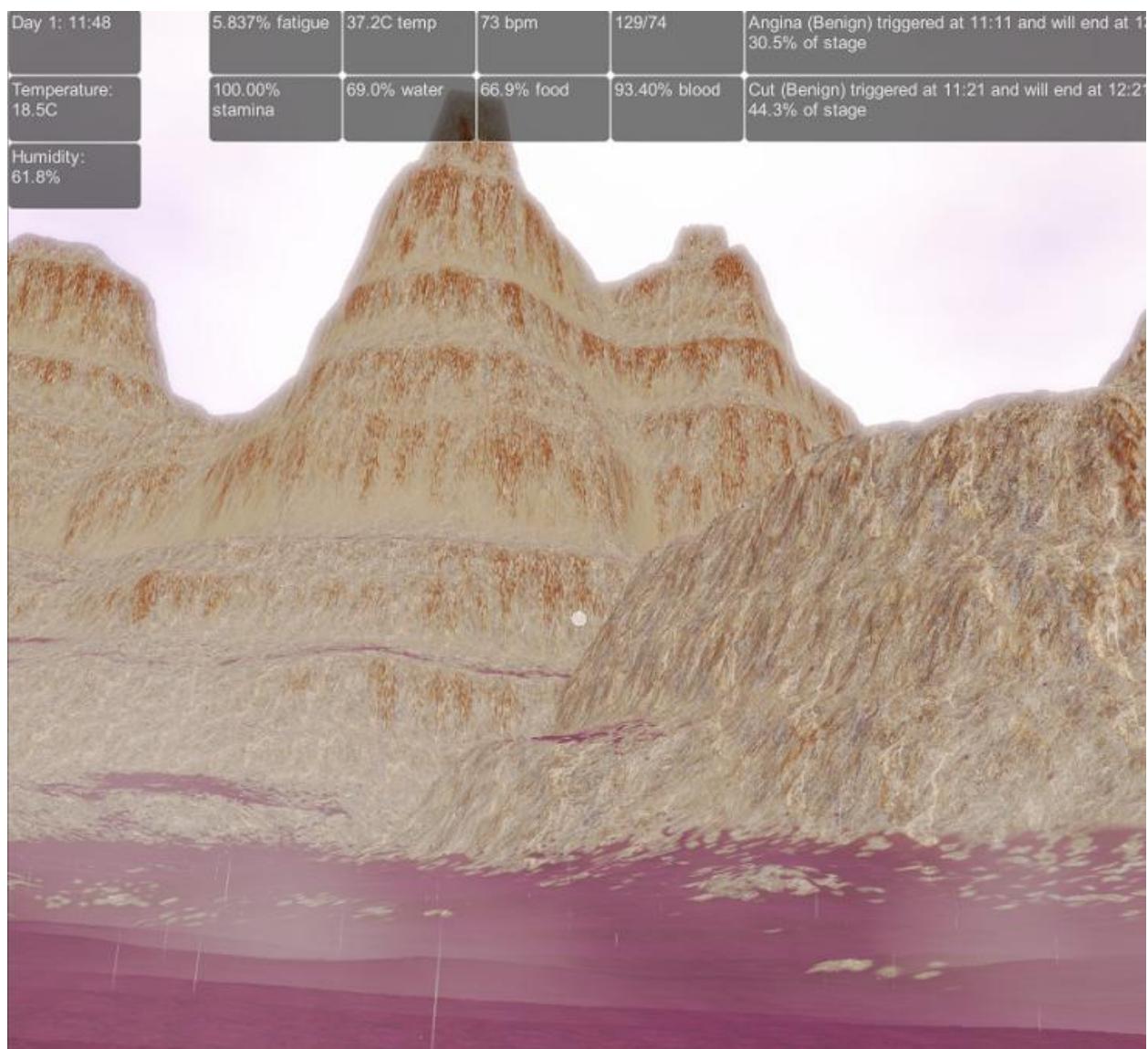
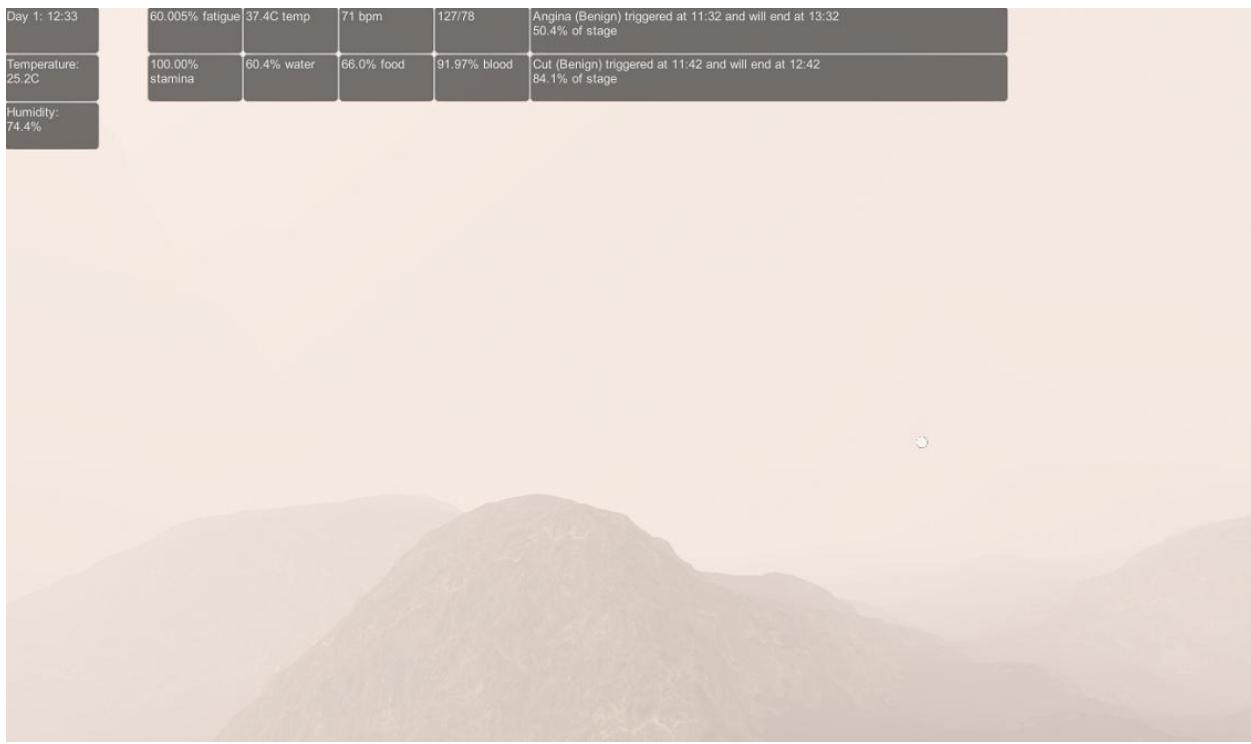


Fig. 9 (early dev screenshot)

Beyond The Edge (Survivor's Obituary). Project author: Vadim Gromov



Right now, game has one location — Lifegiving Valley, where game starts. It is good place for survival, with plenty of food and water. (fig. 10) Area size is 64km² (8x8 terrain grid). Right now it has basic trees and grass.

Fig. 10



Day-Night Cycle

Game time multiplier is 10. Every second in real world means 10 seconds in a game world. Sky is procedurally generated, it has two moons and one sun Fig 9 (night).

Fig. 9



MDUI

This tablet is main interface through which player interacts with inventory and stuff (fig. 11). He also can look at his detailed health status (fig. 5), and on current weather conditions (such as temperature, humidity and chances of fog and rain for this day). Every weight and temperature can be displayed in both metric or imperial units.

Fig. 11



Alarms

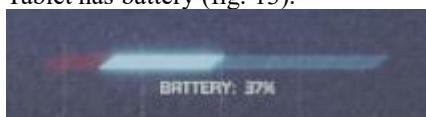
Player can set alarms from MDUI (fig. 12). Alarm will ring if player is not in blackout node. Alarm will wake player up if he is sleeping.

Fig. 12



Battery

Tablet has battery (fig. 13).



On Easy mode, battery is infinite (fig. 14).



On other modes player should replace MDUI battery as soon as it is drained. Batteries can be found in debris. When battery is drained, MDUI will let player only to interact with inventory, heal and eat (fig. 15). No med scanner, no food scan, no environment info, no time or alarms. Med scanner tab in this mode is called First Aid as it allows only to consume pills and make injections.

Fig. 15



Inventory Section

Food Scanner

On Consumables tab, player can scan collected fruits and plants. You can eat it anyway, but you should scan it first in order to know whether it is eatable in a first place. If plant has some medical properties, it will show up in Medcenter after the scan. Player can consume water and food in this tab.

Inventory

Inventory (fig. 4) allows player to combine items (see *Crafting* section) or drop them. You can disinfect water here by combining water and disinfecting pellets.

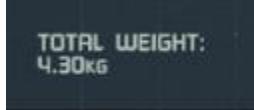
Inventory Weight

Each item has weight. (fig. 16, 17). Inventory has weight limit of 50Kg, and player movement speed is related to weight he is carrying now. After 50Kg limit player will not be able to move. The more he is carrying, the slower he moves.

Fig 16



Fig. 17



Handheld

In this section player can set handheld items (knife, torch, mace, spear) to a hotkeys (1, 2, 3, etc.) or drop them.

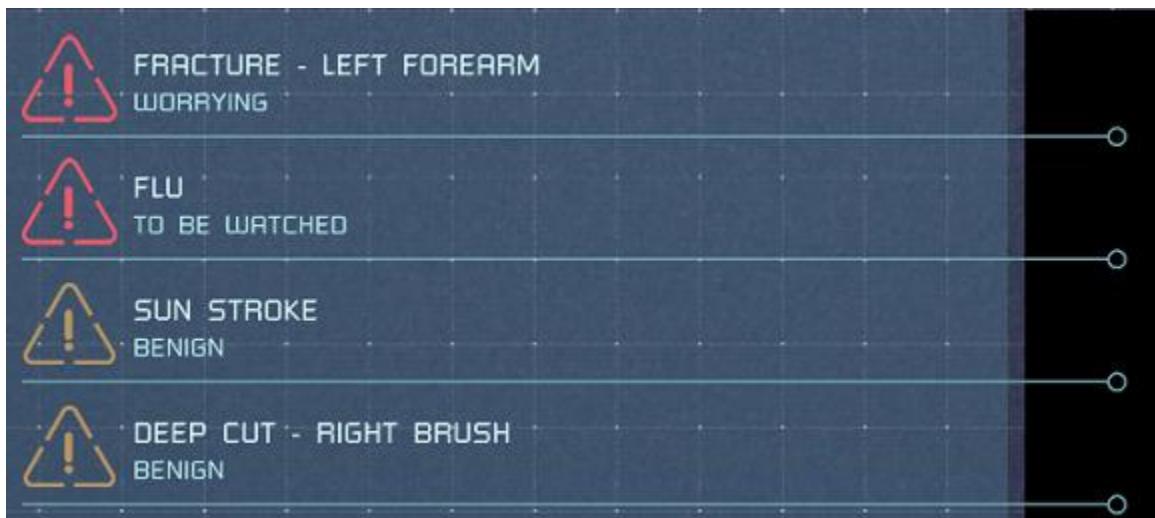
Med Scanner Section

In this section (fig. 5, 6) player can see all his health parameters (fig. 18) and detailed information about diseases and injuries (fig. 19). He can consume pills here or use appliances (fig. 6) (injections, bandages, disinfection sponges, etc.). He can combine medical items here (like empty syringe + atropine bottle = syringe with atropine).

Fig. 18



Fig. 19



Swimming

Game supports on-water and underwater swimming (fig. 3). Oxygen meter will be displayed, and player's wetness level will be set to 100%.

Interaction

Interaction scripts can be applied to any prefab or tree. This script describes interaction logic with this object. Every object interaction script has this set of properties:

- Can you interact with it bare hands?
- What tool is required to interact with object?
- What tools can be used to interact with object? (can be more than one — fig. 22)
- What items will you get by using each tool? Every interaction can return more than one inventory item.

If no interaction script is specified, pointer will remain circle (fig. 20).

Fig. 20



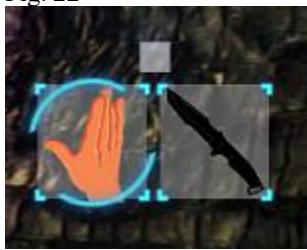
If you do not have required tool, pointer will become a red rectangle (fig. 21)

Fig. 21



If more than one tool is specified, interface will show all the tools that you have right now to interact with object. Switching between tools = mouse scroll wheel, interaction = click. (fig. 22)

Fig. 22



After interaction, collected item (and count) will be displayed (fig. 23).

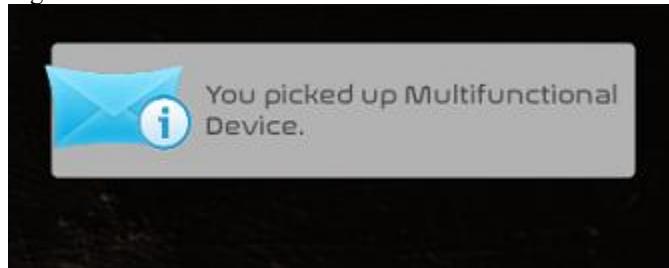
Fig. 23



Messages

Game supports notification system (fig. 24). Can be displayed up to 4 messages at a time.

Fig. 24



Console

Game supports console (by pressing ~). Can be used to debug things (change weather, trigger diseases and injuries, turn on and off fog, show debug overlays — and so on).

Locations and Caves

There will be seven locations in the game. Right now, one is kind of ready — Lifegiving Valley.

You can find night vision devise inside debris, and this will be very helpful in caves (but this device will consume batteries fast). Cave monsters are very sensitive to light, so if you use torch as usual, there will be much greater chance to wake them up.

On Swamp location there are creatures that are very sensitive to sound. Do not run. Do not walk to this location if you have flu, because your coughing and sneezing will wake them up.

Side Quest #1

Goal of the first side quest — is to find ancient alien city and find out, why this advanced civilization has gone. Player will find clues to this and will realize that they started experimenting with 4-th dimension, and after all something went wrong, and space was wrapper to a degree when objects shifted and merged into each other (he will see time to time skeletons and alien building parts “merged” into cliffs and stones). Space-time anomalies (portals) — are echoes of this tragedy.

He can find artifact in this alien city that will trigger the second ending (see *Second Ending* section).

Side Quest #2

Goal of this side quest — is to find out, what happened to a ship. Why explosion happened? Why he crashed? He will read logs he find in a debris and will find out that that was a big exploration-kind ship with dozens of people on board. Their goal was to find another planets suitable for further colonization. He will find out eventually that he is the one who blew up this ship.

Original Ending

After activating emergency beacon, he will wait until rescue team arrives (this location is very, very hot and hostile, and he will need to change beacon batteries every three game hours, so he will need to be prepared for this to survive these hours). He successfully rescued.

Additional Ending

After his interaction with an artifact from Side Quest #1, he will lose consciousness. After he wake up, he will eventually notice that he can eat what he could not eat before, that aliens are not attacking him as before.

Medscanner is blurry, cannot show any details.

When rescue team arrives, he comes forward, but crew members start shooting. He looks at his arms and realizes what is happened. He is no longer a human. Rescuers shooting him down.

Easter Egg

Game will contain a reference to original R'sR game. Near the second rescue capsule he will find hanged up man in the age of 50-ish. He can read a name on his badge: Trepliev-1.

What is done

- Health engine
- Healing
- Inverting and inverting back disease chains
- Consuming items
- Applying items to body (almost ready)
- Weather engine (using WeatherMaker)
- Day-night cycle (using WeatherMaker)
- Environment descriptions
- Randomized weather events
- Inventory engine
- Crafting engine (for tools and meds)
- Interaction engine
- Disease monitors
- Fall damage
- Injuries
- Caves (one for now). Using RTP's ability to cut holes in terrain and blender's metaballs
- Sleeping
- Sneezing, coughing
- Blackouts
- Dizziness
- Fatigue effects
- Swimming (on- and under water)
- Wheeze and heart pulse after intense running

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- Player speed affected by inventory and fatigue
- Ability to run affected by inventory, fatigue and diseases
- MDUI (except of food scanning and Handheld section) (using PowerUI)
- MDUI battery logic
- Start screen (New Game with difficulty selection for now) (using PowerUI)
- Notifications engine
- Streaming (needs optimization) (using WorldStreamer)
- Terrain tessellation (using RTP) and culling (using WorldStreamer)
- Vegetation culling (using VegetationStudio)
- Procedurally-generated terrains and vegetation (MapMagic and VegetationStudio)

Right now it is important to make landscapes really alien-line and beautiful and boost up FPS (I'm getting 42 FPS on GTX1070 in 1080p and terrible slowdowns on loading async scenes with terrain and stuff — down to 10 FPS at that point).

I have 12 years experience in programming, no experience in Unity at all and very little experience in 3D and SpeedTree, so I need people who really knows what to do, how to create beautiful alien vegetation and how to optimize things, because overall game code is ready by 80% right now.