

Gem Hunter Technical Document

This document contains an in-depth description of mechanics which will be implemented based on industry examples. Each selected example is reviewed from the gameplay aspect. Also, the document contains a description of how new features will be added and what challenges might be faced and how can be solved.

Mechanic 1:

Existing Mechanics:

The player can fire one kind of projectile.

Expand on Mechanics:

Add the different types of “default FPS” (Robert Giusti, n.d.) weapons.

How will be implemented:

The game will have an abstract class Gun with properties fields. Each sub-class represents a new gun type and will have properties according to Table 1.

Table 1. Stats for different type of weapons

Weapon type	Damage per shot, hp	Ammo in clip, pieces	Additional maximum ammo, pieces	Effective range, units	Reload time, s	Cooldown time between shots, s
Melee	5	∞	∞	1	-	0.5
Pistol	15	17	102	10.0	2	0.15
Pump Shotgun	120	5	25	5.0	2.5	0.75
Assault	30	30	90	7.0	3.5	0.074
High-Powered	500	1	2	∞	5	-

Gameplay influence:

Giving weapons to enemies and limiting players ammo, game will push the player to develop virtual and physical skills what is one of the reasons why people love games (Schell, 2008). Moreover, the game will create a lot of different situations, so player will not feel bored.

Challenges:

Allowing enemy to use weapons might break balance. This can be fixed by adding probability table for spawning enemies with different weapons, see Table 2.


Table 2. Chances of spawning enemy type with any weapon type

Enemy Type	Weapon Type				
	Melee weapon chance, %	Pistol weapon chance, %	Shotgun weapon chance, %	Assault weapon chance, %	High-Powered weapon chance, %
Default	100.0	0	0	0	0
Fast	100.0	0	0	0	0
Citizen	70.0	15.0	10.0	4.9	0.1
Police	30.0	40.0	14.0	15.0	1.0
Military	0	20.0	30.0	45.0	5.0
BOSS	0	0	0	0	100.0

Industry Examples:

Counter-Strike (Valve Corporation, 1999) series – Multiple types of guns give a variety of situations on the same map makes the player not feeling bored after a few hours’ session. The disadvantage of such a system are bots in single player. Bots themselves are balanced programmatically, that is why finding a weak place in their mechanics making game less exciting for player.

Borderlands 3 (Gearbox Software, 2019)– Over 1 billion guns (Borderlands 3, 2019). By having so many weapons, players try to get a gun with better attributes and effects for a specific situation. Game walkthrough will depend on which weapon and perks the player got at a specific time. The whole gun scheme describing the weapon system can be seen in Figure 1. Contrarily, weapon equipped needs to be changed and players’ favourite weapons with certain shooting types and power-ups might be useless because of the new enemy level.



BORDERLANDS 3 WEAPONS CHEAT SHEET

LAST UPDATED:
20/09/2019

<h3>WEAPON STATS</h3> <p>THERE ARE SIX PRIMARY STATS TO EACH GUN IN BORDERLANDS 3:</p> <ul style="list-style-type: none"> DAMAGE HOW MUCH DAMAGE YOU DEAL WITH EACH SHOT ACCURACY YOUR WEAPON BLOOM/SPREAD. THE HIGHER YOUR ACC, THE CLOSER YOUR BULLETS TRAVEL TO YOUR CROSSHAIRS HANDLING THE HIGHER YOUR HANDLING, THE LESS YOUR CROSSHAIR SWAYS & THE LOWER YOUR RECOIL RELOAD TIME HOW LONG YOUR GUN TAKES TO RELOAD. FOR COV GUNS, CHANGES TO REPAIR TIME AFTER OVERHEATING FIRE RATE HOW QUICKLY YOUR GUN FIRES IN SHOTS PER SECOND. MULTIPLY BY DMG TO CALCULATE YOUR GUN'S DPS MAGAZINE SIZE HOW MANY SHOTS YOU CAN FIRE BEFORE HAVING TO RELOAD <p>THERE ARE ALSO VARIOUS OTHER SECONDARY STATS AND ATTRIBUTES, SUCH AS CRIT DAMAGE, ELEMENTAL DAMAGE, FIRING MODES, AND MORE.</p> <p>ALL ARE IMPORTANT.</p>	<h3>MANUFACTURERS</h3> <p>ATLAS HIT YOUR ENEMIES WITH A TRACKER TAG, AND YOUR BULLETS WILL HOME IN ON THEM</p> <p>COV INFINITE MAGAZINE SIZE, BUT WILL OVERHEAT IF FIRED CONTINUOUSLY</p> <p>DAHL TOGGLE AT WILL BETWEEN TWO DIFFERENT FIRING MODES (E.G. FULL-AUTO + BURST)</p> <p>HYPERION WEAPON-MOUNTED SHIELD WHEN ADSING; GREATER ACCURACY THE LONGER YOU FIRE</p> <p>JAKOBS POWERFUL DAMAGE; CRIT HITS RICOCHET TOWARDS OTHER TARGETS</p> <p>MALIWAN TOGGLE BETWEEN TWO ELEMENTS AT WILL; STRONGER ELEMENTAL STATS IN GENERAL</p> <p>TEGORE TOSS YOUR GUN WHEN RELOADING FOR EXTRA DMG (DON'T WORRY, IT REAPPEARS IN YOUR HANDS AFTER RELOADING)</p> <p>TORGUE HAS AN EXTRA "STICKY" FIRING MODE. STICKIES DEAL +DMG WHEN STACKED</p> <p>VLADOF HIGH FIRE RATE, LOW MAG SIZE; OFTEN HAVE UNDER-BARREL ATTACHMENTS SUCH AS SHOTGUNS & GRENADE LAUNCHERS</p>	<h3>ELEMENT DMG</h3> <p>SOME GUNS HAVE A CHANCE TO DEAL ELEMENTAL DAMAGE OVER TIME. DIFFERENT ELEMENTS ARE MORE/LESS EFFECTIVE AGAINST CERTAIN HEALTH TYPES:</p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="4">NORMAL MODE</th> </tr> <tr> <th></th> <th>FLESH</th> <th>ARMOR</th> <th>SHIELDS</th> </tr> </thead> <tbody> <tr> <td>KINETIC</td> <td></td> <td>-20%</td> <td></td> </tr> <tr> <td>FIRE</td> <td>+50%</td> <td>-30%</td> <td>-30%</td> </tr> <tr> <td>SHOCK</td> <td>-20%</td> <td>-20%</td> <td>+100%</td> </tr> <tr> <td>CORROSIVE</td> <td>-20%</td> <td>+50%</td> <td>-30%</td> </tr> <tr> <td>CRYO</td> <td></td> <td>+20%</td> <td>-30%</td> </tr> <tr> <td>RADIATION</td> <td></td> <td></td> <td>-30%</td> </tr> </tbody> </table> <p>THESE MULTIPLIERS BECOME MORE EXAGGERATED IN TRUE VAULT HUNTER MODE:</p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="4">TRUE VAULT HUNTER MODE</th> </tr> <tr> <th></th> <th>FLESH</th> <th>ARMOR</th> <th>SHIELDS</th> </tr> </thead> <tbody> <tr> <td>KINETIC</td> <td></td> <td>-20%</td> <td></td> </tr> <tr> <td>FIRE</td> <td>+75%</td> <td>-50%</td> <td>-50%</td> </tr> <tr> <td>SHOCK</td> <td>-35%</td> <td>-35%</td> <td>+150%</td> </tr> <tr> <td>CORROSIVE</td> <td>-35%</td> <td>+75%</td> <td>-50%</td> </tr> <tr> <td>CRYO</td> <td></td> <td>+50%</td> <td>-50%</td> </tr> <tr> <td>RADIATION</td> <td></td> <td></td> <td>+50%</td> </tr> </tbody> </table> <p>vs FLESH - use FIRE vs ARMOR - use CORROSIVE/CRYO vs SHIELDS - use SHOCK</p>	NORMAL MODE					FLESH	ARMOR	SHIELDS	KINETIC		-20%		FIRE	+50%	-30%	-30%	SHOCK	-20%	-20%	+100%	CORROSIVE	-20%	+50%	-30%	CRYO		+20%	-30%	RADIATION			-30%	TRUE VAULT HUNTER MODE					FLESH	ARMOR	SHIELDS	KINETIC		-20%		FIRE	+75%	-50%	-50%	SHOCK	-35%	-35%	+150%	CORROSIVE	-35%	+75%	-50%	CRYO		+50%	-50%	RADIATION			+50%	<h3>WEAPON RARITIES</h3> <p>GUNS IN BORDERLANDS 3 ARE MOSTLY PROCEDURALLY GENERATED. BOTH WEAPONS AND OTHER ITEMS SUCH AS GRENADES AND MODS COME IN FIVE DIFFERENT RARITY LEVELS:</p> <p style="text-align: center;">COMMON (WHITE)</p> <p style="text-align: center;">↓</p> <p style="text-align: center;">UNCOMMON (GREEN)</p> <p style="text-align: center;">↓</p> <p style="text-align: center;">RARE (BLUE)</p> <p style="text-align: center;">↓</p> <p style="text-align: center;">EPIC (PURPLE)</p> <p style="text-align: center;">↓</p> <p style="text-align: center;">LEGENDARY (GOLD)</p> <p>LEGENDARIES ARE THE ONLY WEAPONS THAT ARE NOT PROCEDURALLY GENERATED (THOUGH THEY MAY STILL VARY IN STATS). THEY OFTEN HAVE UNIQUE AND POWERFUL EFFECTS.</p> <p>BUT THAT DOESN'T MEAN YOU SHOULD ALWAYS SWAP OUT A GUN FOR SOMETHING OF HIGHER RARITY.</p> <p>SOMETIMES AN UNCOMMON SHOTGUN CAN BE MORE POWERFUL THAN A LEGENDARY SHOTGUN WITH THE SAME ITEM SCORE.</p>	<h3>USEFUL INFO/TIPS</h3> <p>ANointed WEAPONS ANointed WEAPONS AND GEAR CAN BE BOUGHT FROM THE VETERAN STORE ABOARD SANCTUARY (BOTTOM DECK). ANointed GEAR GIVES YOU POWERFUL BENEFITS AFTER USING AN ACTION SKILL OR CHARACTER-SPECIFIC ACTION.</p> <p>WEAPON TYPES THERE ARE SIX TYPES OF WEAPONS, EACH OF WHICH USE DIFFERENT AMMO: PISTOLS SHOTGUNS ASSAULT RIFLES SMGs SNIPER RIFLES ROCKET LAUNCHERS BUT ASIDE FROM PAYING ATTENTION TO BENEFITS LIKE "X% SMG DAMAGE", IT DOESN'T REALLY MATTER WHAT YOU PICK BECAUSE THE GUNS ARE ALL SO FLEXIBLE. A POWERFUL PISTOL CAN BE A BETTER CLOSE-RANGE WEAPON THAN A SHOTGUN.</p> <p>TO MIN/MAX OR NOT TO MIN/MAX YOU GAIN LOOT SO QUICKLY IN BORDERLANDS 3; IF YOU WANT TO MIN/MAX AND ALWAYS TAKE THE BEST WEAPON FORWARD, YOU'LL END UP SPENDING A LOT OF TIME IN YOUR INVENTORY.</p> <p>IF YOU ENJOY THAT, IT'S ALL GOOD!</p> <p>BUT YOU DON'T NEED TO DO THAT IF YOU DON'T WANT TO. THE IMPORTANT THING IS TO FIND GUNS THAT YOU HAVE FUN WITH.</p> <p>CHEAT SHEET BY OLLIE TOMS TAKE A LOOK AT OUR GUIDES ON ROCK PAPER SHOTGUN FOR TIPS & BUILDS!</p>
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Figure 1 This image represents gun system in Borderlands 3 game. (Toms, 2020)

Mechanic 2:

Existing Mechanics:

A Berserk phase when Boss is low on health.

Expand on Mechanics:

Add multiple Boss phases.

How will be implemented:

Boss class will have a variable that stores the current phase. When health is getting less than a specific value the event will be called so phase changes accordingly to Table 3. Each phase will introduce a new pattern of a boss attack. In the last phase, the boss will become immune, heal himself and spawn 4 crystals which the player will need to destroy to turn off boss invulnerability.

Table 3. Boss phases depending on its' health

Boss Health, %	Phase name	Pattern of attack
100	Weakling	Single bullet in players' direction
80	Sorcerer	Star attack method
60	Rage	Circle attack method
40	Berserk	Push the player and summon the creatures
20	Nightmare	Throwing meteors on player position
5	GOD	Spawn 4 high-powered turrets + all previously mentioned attacks.

Gameplay influence:

Such hardness involves experimenting with mechanics as a player will not find a weak point of the boss so fast. Moreover, the player will need to spend more time to get used to patterns of boss attacks to eliminate him. Each death is not only annoyance, but also a motivation for player to concentrate bit harder in winning (Tavinor, 2009).

Challenges:

Boss challenge should not be hard as player will feel frustrated, but not too easy as then player feel bored (Schell, 2008). Another one is introduction to gameplay mechanics, different phases of boss might be introduced to player through UI message to the player as it is done in DOOM Eternal, see Figure 2.



Figure 2 Description of the Boss in DOOM Eternal

Industry Examples:

Terraria (Re-Logic, 2011) – Bosses have phases depending on health points left. An advantage of this mechanic in this game is that players need to think about place of battle architecture in advance depending on the phases of the boss. A disadvantage is a game becomes harder than it is supposed to be for new players, who do not understand all the game functionality and mechanics.

Sekiro Shadows Die Twice (FromSoftware, 2019) – Every boss you need to kill at least 2 times. By this game creates different gameplay. If the player uses stealth, he can kill the 1st boss phase not facing any opposition from the boss, but straightforward players will need to fight the boss 2 times, as this mechanics is not introduced to player.

Mechanic 3:

Existing Mechanics:

There is a melee weapon and ranged enemies.

Expand on Mechanics:

Create new types of enemies based on “pattern collection” (Gabriel Rivera, 2012).

How will be implemented:

The game will have an abstract class called Enemy. Each sub-class, which represents a different type of enemy, will have custom property fields according to Table 4.

Table 4. Stats of different enemy types

Type of Enemy	Health Points	Shields	Speed, units/s	Spawn chance, %
Default	45	0	5	20
Fast	10	0	15	20
Citizen	50	0	5	20
Police	70	50	7	20
Military	100	100	8	20

Gameplay influence:

By adding new types of enemies, it is possible to control the challenge of the game. Challenge itself contributes to the dynamic structure of game and reward it garners or leads to player death. (Mark J. P. Wolf, 2014)

Challenges:

Smooth introduction of new class creatures to the player. This can be solved by a previously mentioned UI message about the new enemy type or either summoning a new type of enemy on a new wave. By this, we are going to balance the game and make the player understand gameplay step by step.

Industry Examples:

Plants vs Zombies (PopCap Games, 2009) – Huge amount of mechanics introduced smoothly through the whole game. Firstly, the player gets a new “weapon” and on the next level, there is an enemy which is efficient versus introduced “weapon”. As a disadvantage - the gameplay is getting boring as the player does not feel that a new “weapon”/enemy on a new level is enough to encourage him to explore the game further.

Last of Us Part 2 (Naughty Dog, 2020) – In this game exist such enemy groups as WLF, Guard Dogs, Seraphites, and humans in different stages of Infection. All types of enemies are shown in turn by the developing game plot. The disadvantage of such an approach is the linearity of gameplay. Clearing a section of the game usually means not being able to return. (Walkthrough Team, 2020)

Additional Changes:

Adding tutorial level or wave player will get familiar with controls, types of enemies, weapons, and objectives of the game. The best examples of tutorial levels are in games like Portal 2 (Valve Corporation, 2011) and Call of Duty 4: Modern Warfare (Infinity Ward, 2007). Those tutorial levels are delivered in interactive form, where the player interacts with games’ characters what makes the player feel like a part of the game while exploring the game world.

Summary

The tutorial level will teach the player how to start to play. Adding new guns and enemies will make the game more dynamic and various. Adding hardcore boss, the game “asks” the player to experiment with known to him mechanics. As the total game will be more dynamic, various, and not easy to walk through till the end.

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