RTS-GAME

Design Document

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# Setting

This game is set in a sci-fi world where faster-than-light interstellar space travel and extraterrestrial life exists. Some of these life forms pose an existential threat to each other and therefore nations continue to pursue conflict amongst the stars.

The species inhabiting the galaxy, including humans, must use everything at their disposal to travel across the galaxy and claim resources to guarantee the independence and freedom of their peoples.

# Gameplay

## RTS

This game is built around an RTS battle mode where you control units in a 3D bird’s eye view of a battlefield. Units are small, and the maps are big (eg. Wargame, not Starcraft).

### Weapons

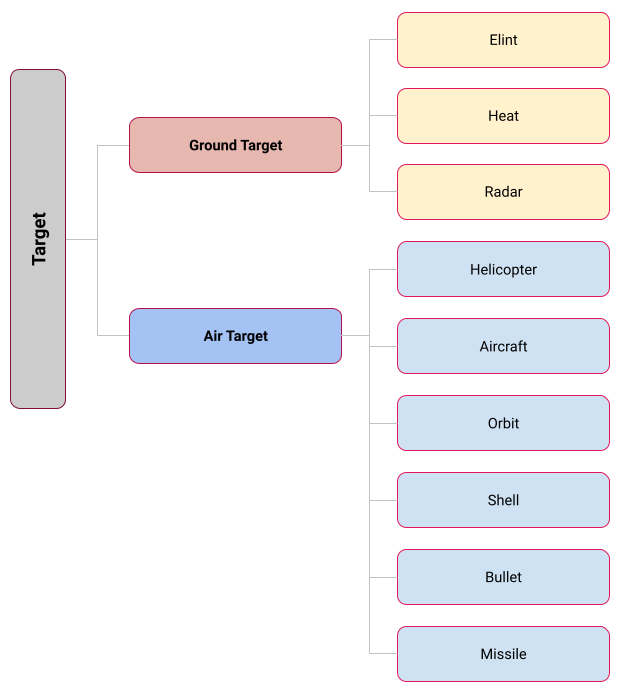
###### Weapon Types

Weapons types are the classes of weapon a unit can wield. This table describes each weapon type intended for implementation and what behaviour it should have.

|  |  |
| --- | --- |
| **Name** | **Description** |
| Small Arms | Ranged weapons that are fired at enemy units, limited damage potential (ex: assault rifles, sniper rifles, pistols, shotguns, etc...) |
| Melee Weapons | Close combat weapons that are swung at enemy units in CQC, limited damage, very effective against infantry, but not infantry armour. |
| Rocket | An unguided self-propelled explosive that hits a point and explodes dealing damage to everything in the radius. |
| Missile | A guided self-propelled explosive that follows a target based on heat/manual guidance and damages the target and everything in a very limited radius. |
| Cannon | A direct attack weapon (such as a railgun or 120mm smoothbore) that fires at long range with anti-armour purpose. Can load AP and HE shells, the latter doing damage to everything in the explosive radius. |
| Shell | A non-propelled object that arcs and explodes on contact with the ground damaging everything in the radius. |
| Guided Shell | A non-propelled object that arcs and explodes on contact with the ground damaging everything in the radius, but can track and follow a network-visible target to hit it. |
| Drone | A drone with an explosive warhead that can be used as a loitering munition, once a target is spotted it can engage, but is much slower and more vulnerable than a missile.. |
| Recon Drone | A drone that orbits around the controlling unit extending it’s spotting capabilities. |
| Electronic Warfare | Weapons that target the electronic links of networked units. |

All units will be equipped with one or more of these types of weapons, each one with it’s own statistics specific to that nation and weapon system.

Weapons are able to target certain types of enemy units. Some weapons are able to target several of these targets. These targets are categorised as follows () :



Essetially, a weapon that can target any Ground based unit is given the «Ground» target specialisation. A weapon that requires a heat signature to target a ground target is given the «Heat» specialisation, etc. A tank’s Active Protection System might be given the following specialisations : «Shell», «Missile». A Patriot missile might be given the specialisations : «Helicopter», «Aircraft», «Orbit».

Units will have weapons that can target one or more of these targets, but are often specialised for damaging either soft or hard targets. Explosives are better at damaging soft targets, though large enough explosives will still damage hard targets. In the same way, penetrating weapons like 120mm railguns, will be highly effective against larger and harder targets like tanks, but can still be fired to kill and suppress infantry, but will not be effective. Essentially, the target specialisation determines what targets that weapon can track and engage, but not what that weapon is effective against. For instance, some anti-aircraft missile launchers may be used as impromptu MLRS but will be extremely ineffective and inaccurate. Different types of ammunition will not change what targets the weapon can target, but will change the effectiveness of that weapon against different types of units (ie. Laser guided ATGM firing explosive munition vs infantry / HEAT munition vs tanks)

###### Weapon Statistics

Each weapon will have a statistic sheet that like the following :

These statistics are described in the following way:

- Name (String) : the name of the weapon

- Type (Enum) : the type of the weapon (Small Arms / Cannon / Missile / etc…)

- Range (int) : the range of the weapon in metres

- Targets (List[Enum]) : the types of target this weapon can function

- Shot types (ShotType) : the shot types of the weapon

- Type name (String) : the name of the shot type (AP / HE / Smoke)

- Ammunition (int) : number of shots for each shot type

- Damage (list[Damage]) : the damage emitted by this weapon

- Damage type (Enum) : Explosive, Kinetic, HEAT, Light, Fire

- Damage (int) : the amount of damage dealt by the shot

- Piercing (int) : the amount of armour penetration at 500m of the weapon in millimetres.

Damage types are described as follows :

- Explosive (HE) : these munitions explode on or near the target, causing a certain amount of damage to every unit in the blast radius, reducing as the unit is farther from the centre of detonation. They can still have an armour piercing value, mostly related to the scattered shrapnel.

- Kinetic : only entities that are directly hit by this physical munition take damage. It applies to the physical armour of a unit.

- HEAT : only entities that are directly hit by this physical munition take damage. It applies to the HEAT armour of a unit.

- Light : only entities that are directly hit by this laser munition take damage. It applies to the HEAT armour of a unit.

- Fire : entities within the zone of this liquid weapon take damage. It has an armour piercing value, which affects the physical armour of a unit (representing that unit’s structural integrity).

### Unit

###### Unit Types

This table describes the types of units available in the game for all factions organised by role. So a unit of one type for one faction will not necessarily look like a unit from another faction of the same type, but they will perform a similar operational role.

|  |  |
| --- | --- |
| **Category** | **Description** |
| Command & Control | These units coordinate their surrounding units and act as comms network nodes. |
| Logistics | These units transport supplies for combat units. |
| Reconnaissance | These units spot and identify enemy units, sending that information to the comms network. |
| Infantry | These units are individual squads of soldiers that can ride in transport vehicles to help deployment. |
| Mechanised | These units are individual squads of soldiers using advanced combat gear such as mech suits who can ride in specialised transports to help deployment. |
| Armour | These units are heavily armoured vehicles that cannot carry infantry. |
| Fire Support | These units provide mobile weaponry support to the rest of the force, but are not battle-line units such as artillery. |
| Air Defence | These units provide coverage for friendly units from airborn threats such as aircraft, drones, larger missiles/rockets and dropships. |
| Electronic Warfare | These units disrupt enemy EW and communication, and also can act as comms network nodes for friendly units. |
| Aircraft | These units traverse through the sky at altitude and can spot and attack units that are either in the air or on the ground below them. |

### Unique Mechanics

The unique mechanics are individual abilities and gameplay mechanics that allow units and maps to provide interesting situations. These are split into several categories.

**Deployment :**

- Orbital drop : units drop in from orbital ships, arriving quickly and accurately to the drop site.

- Parachute deployment : units parachute out of aircraft that have to travel to the drop site with relative accuracy.

- Burrow deployment : units explode from the ground within a few seconds, but can only be used on natural terrain like grass or forests.

- Ground deployment : units drive in from offmap bases.

**Mobility :**

- Jump pack (range) : allows rapid movement in a arcing trajectory to a target location within range.

- Transport (capacity) : allows infantry units to board the transport up to the transport capacity.

- Landing / Takeoff : this unit can VTOL.

- Direct move (target) : moves in the shortest possible path to the target (distance).

- Fast move (target) : moves in the fastest possible path to the target (time).

- Hidden move (target) : moves in the most covered path to the target, and takes cover at the target.

- Combat move (target) : moves in the most covered path to the target, stopping to fire weapons if enemies are spotted. And takes cover at the target.

**Combat :**

- Fire position (target) : unit fires weapons at the target location, or will direct move to range and fire. Fires one load of ammunition.

- Smoke position (target) : unit fires smoke rounds at the target location, or will direct move to range and fire. Fires one load of ammunition.

- Turn on/off (weapon) : allows the unit to use or not use a weapon depending on the setting, useful for stopping stealth units from revealing their positions.

- Optimal shot (weapon) : toggles the unit to only use their weapon against optimal targets (120mm railgun VS tanks rather than infantry), unless fired upon.

- Effecient shot (weapon) : toggles the unit to only use their weapon when the chance to hit goes above your personal setting (default 50%), unless fired upon.

**Spotting :**

- Deploy light recon drones (range) : improves recon in forests and buildings within range.

- Deploy heavy recon drone (range) : deploys a new unit that can fly around within range of the base unit, improves recon in open spaces.

- Electronic Detection (range) : a listening station that improves spotting of units emitting signals within range, dependent on signal strength.

- Air Radar (resolution) : a radar station that can detect airborne units with a larger «cross-section» statistic than it’s resolution, resolution increases with decreasing range to the target.

- Ground Radar (resolution) : a radar station that can detect ground units with a larger «cross-section» statistic than it’s resolution, resolution increases with decreasing range to the target.

**Network :**

- Connection (range) : a passive statistic that can be switched on or off measured in «signal strength» that represents how connected your unit is to your army’s information sharing system within range. The stronger the signal, the longer the range.

- Electronic Jamming (range) : a passive statistic that can be switched on or off measured in «signal strength» which can block weak enough connections within range. The weaker the connection, the farther the blocking will work.

## Campaign (TBD)

This section defines the behaviour of the campaign mode (TBD).

# Factions

## United Nations

The UN are humans from Earth in the 2220s. They explore the galaxy using wormhole technology in the form of gateway cannons, that project a tunnel from the cannon to another system for vessels to traverse, or expensive jump ships that create a gateway that other vessels can pass through and then pass through itself. Famed for their ranged combat, vehicles and complex logistics chains.

The United Nations represent the combined nations of Earth and the Colonies. Each nation collaborates with the UN, providing divisions to the total United Nations Army Command (UNAC) and United Nations Marine Command (UNMC).

Their forces feature a strong support, air and orbital component.

The support forces focus on static and mobile air defence systems, with integrated and/or separate radar stations, and missile air defence systems. They also have short range AA units designed primarily for helicopter and drone defense. Artillery is organised into smaller mortar carriers, larger static and self-propelled tube artillery, and long range missile artillery. Most of the larger munitions featuring smart guidance technology for extreme accuracy if networked properly. They also include logistics forces in the form of static drops from orbit or air, as well as transport helicopters and trucks.

The air forces focus on three types of aircraft : air superiority, ground strike, and support. Air superiority fighters feature high stealth capabilities and high manoeuvrability, with internal weapon bays carrying air-to-air missiles and railguns. Ground strike aircraft feature high stealth capabilities and internal weapon bays, but also can increase payload on external hardpoints with reduced stealth. The support forces are able to paradrop infantry and light vehicles, as well as supplies if necessary.

Finally, the orbital component provides orbital strike capabilities using railguns and missiles, as well as orbital deployment and orbital supply drops. Though these capabilities are limited and expensive compared to other options.

The main ground component of the force is a fairly standard composition of infantry equipped with medium to long range weapons, as well as specific groups for closer and longer engagements, and anti-armour and anti-aircraft roles. They also have a number of wheeled and tracked vehicles to carry them in. They can also be supported by a suite of tanks.

Their primary combat focus is coordinated fire support, notably air dominance.

## Naëmu

Naëmu are a historically omniscient race of humans that once seeded Earth with life but whose empire was collapsed by a genetically engineered virus in a cataclysmic war with the Sprats. They travel through the galaxy using teleportation which transports people or vessels to where they’re needed, but their resources and availabilities are low due to their relatively crippled economy. Famed for their close combat, individual short distance teleportation and anti-gravity vehicles.

Their forces are focused on rapid assaults and short distance teleportation. They have a small population and limited infantry. They favour rapid strikes and small group assaults. They are organised into the Planetary Force and Void Force.

The planetary force is more of a garrison force, with the goal of defending locations and rapidly striking locations. They rely on the void force for a numerous deployment of air forces.

The ground force is composed of mostly infantry equipped with melee weapons and short range laser weapons. This infantry is very well trained and wears portable teleporters able to make short 1-2 meter jumps, which allows for automatic shot-avoidance and a rapid assault capability. They can also be carried in very fast hover APCs, and supported by heavier hover tanks. They also have some small deployable indirect fire support vehicles and small infantry squads, armed with high energy anti-armour lasers, anti-infantry lasers, anti-air lasers.

The air forces have a lot of capabilities. They posses fast and extremely manoeuvrable air superiority fighters armed with lasers and long range missiles. Their bombers are well equipped and provide very precise ground support with guided bombs and lasers. Their high-altitude bombers carry high payloads and deliver precise long distance ordinance.

Their primary combat focus is speed.

## Sprats

The Sprats are a strongly communal race that were contained by the ancient Naëmu empire and fought a war to escape their influence. This resulted in the annihilation of both nations’ industry and many of their settled worlds. They travel using warp drives to squeeze time and space ahead of them to travel across the galaxy. Famed for their powered infantry suits and walker-based machinery.

The Sprat Armed Forces are heavily focused on deploying fast assault powersuit infantry supported by slow and heavily armed battlemechs built to take hits and provide large amounts of fire support. They have limited air support, but excel at ground based fire support like artillery, guided munitions and multiple launch rocket and missile systems.

Their forces are built around rapid infantry movements supported by a slowly advancing fire support base. Reinforcements can be quickly deployed near the front lines with precise orbital drops available for most of their units, though larger ones can only be deployed from their heaviest dropships, which are vulnerable to heavy AA defenses.

Their primary combat focus are slow armoured advances.

## Alvearium

The Alvearium, or the Hive, is a race of chemically controlled hive-mined ant-like creatures that traverse the galaxy in huge numbers of sublight ships. Their warfare relies on key units commanding hordes of lesser units that cannot be individually controlled. These lesser units are however high in numbers and effective at multi-axis assault tactics, as well as very high-stealth units in natural terrain and burrowing assault units.

The Alvearium spreads across the galaxy hunting for food for their expanding horde. Their key units are the command creatures that guide and command the main (extremely cheap and expendable) forces that quickly sprint across the map. Their more elite forces maintain their autonomy, and can be deployed from tunnel networks underground. More elite infantry forces can also be deployed from fast transport monsters which can also fight intensely when needed. Their chitin armour is not as tough as manufactured composites, but their lower armour quality is offset by much higher environmental adaptability like chameleonic camouflage and hunting instincts. Though the main body of the horde is difficult to conceal.

Their primary combat focus is concealment and surprise attacks.

## The Network

The Network is a superintelligent AI that produces a race of networked robotic peoples that function together as one thanks to a permanent network link. They traverse the galaxy in ships that use short-distance teleportation to hop across the galaxy from planet to planet. They are famed for their mechanised units, drones and powerful electronic warfare, but are also vulnerable to strong counter-electronic warfare and electronic detection equipment.

The Network’s combat capacity is based on it’s robotic combat arm. It focuses on heavy use of drone swarms and robotic war machines. Without network control, they’re automated controls take over, but this simple targeting system has limited functionality, as the AI obviously knows from experience that making something smart could be making something that will eventually replace it.

Their primary combat focus is victory overwhelming numbers.

# Sub-factions

Humans :

- United Nations

- Resistance (uses high stealth guerilla tactics and decoys (ie. Cheap units that resemble powerful units))

Naëmu :

- Naëmu

- Alfan

Sprats :

- Expansionists

- Collaborators

Alvearium :

- Alvearium

- The Cutaways

The Network :

- The Core

- The Rogues

# Game scene organisation and hierarchy

## Scene Organisation

In order to organise the scene tree, for each major scene function (loading, battle, main menu, campaign, etc…) the following nodes must be present in the scene for it to be functional. All these scenes are managed by a GameManager Node that handles game startup, menu, load transitions and scene instantiation/deletion.

Battle scene :

The battle scene must be contained within a Node3D root node as the scene is three dimensional. This scene acts as the container of the battle scene and all the battle scene components are children of this node. This node is instantiated by the game manager when a battle scene is launched.

A battle scene must contain a Terrain (or Map) scene containing the terrain geometry for the level as well as all functions the terrain must fulfil. These fall under five main categories :

* level geometry
* collision geometry
* navigation geometry, navigation links (bridges, tunnels, etc…)
* Unit spawn points
* Control or capture points (can be inactive based on game mode)
* foliage
* environmental particle systems (birds, rain, snow, etc…)
* environmental FX (fog, fires, etc…)

The Terrain scene must be completely interchangeable so that any other function in the battle scene is not dependant on a particular level being present. The other scenes in this hierarchy must be able to operate with any loaded level.

It must also contain all of the logic used for creating the navigation maps and initialising the navigation server. It must at minimum contain a “land”, “helicopter” and “naval” navigation map that units can be assigned to.

The battle scene must also contain a PlayerInterface. This scene acts as the player’s interaction point so that they may influence the game state. The interface must contain the UI, camera system, and actions system. This scene should be able to be added to any scene to immediately have a UI, camera controller and interface with which to select and order units around.

The battle scene must also contain a Factions register : Multiple nodes organising the unit scenes that have been spawned per faction and per unit type. Each unit must be registered to a particular navigation map initialised by the Terrain scene with a bitmask indicating traversable region types defined by the navigation server.

Each faction can be controlled by a different player and multiple players may control the same faction. Each player (AI included) must have their own branch of the tree.

Finally, the battle scene must contain an environment node which details all post-processing and lighting settings used for the entire scene. The settings of the scene will differ based on the quality settings chosen/defined by the player/programmer. This scene only affects the rendering engine and should not be used by any of the gameplay elements.