

# Research

Research tech trees for Distant Worlds are defined in the file **research.txt** found in the root game folder.

Each research project is defined by multiple labelled lines of information. The most important data is defined in a line labelled “PROJECT”, with other labelled lines as needed.

Possible lines are as follows:

- **PROJECT**: basic project information (this line must always be present for a project)
- **COMPONENTS**: any components that are unlocked by the project
- **COMPONENT IMPROVEMENTS**: any improvements to previously-research components (i.e. component upgrades)
- **FIGHTERS**: new fighter types that are unlocked by the project
- **FACILITY**: a new planetary facility or wonder
- **ABILITIES**: new abilities enabled by the project, e.g. build new ship type, colonize new planet type, increased construction size
- **PLAGUE CHANGE**: defines new values for a single plague from the **plagues.txt** file
- **PARENTS**: parent research projects that lead to this project, i.e. the path to this project (this line is required, unless it is a root project)

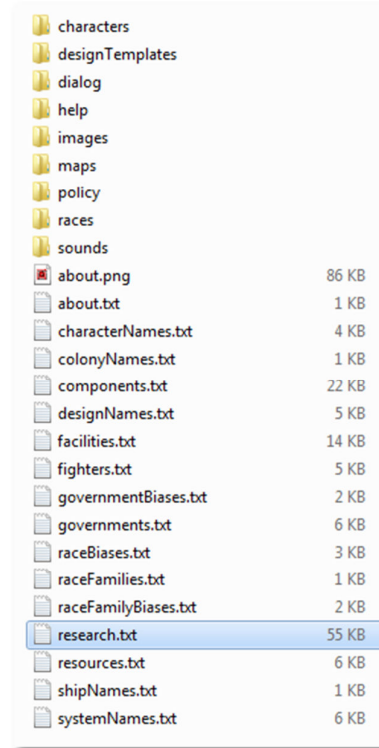


Figure 24. Research file location

A single research project must have at least the **PROJECT** line, and then as many other different labelled lines as needed for the project.

All of the labelled lines under a **PROJECT** line are considered part of that project until the next **PROJECT** line in the file. In other words, subsequent labelled lines are grouped together for the same research project.

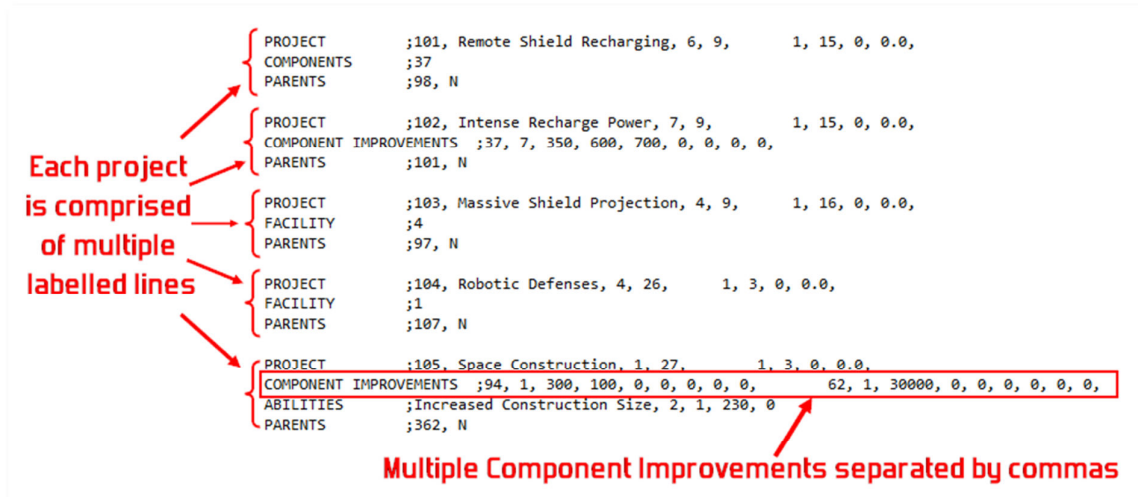


Figure 25. Research file layout

Each of these labelled lines is explained in more detail below.

## Project line

The PROJECT line is always required for a research project. It marks the beginning of the project definition. All subsequent labelled lines (Components, Abilities, Parents, etc) are included in the project until the next PROJECT line, which then marks the start of a new project.

It is comprised of a list of comma-separated values as follows:

Name	Description
<b>Project ID</b>	Unique numeric value identifying the project
<b>Name</b>	Name of the research project
<b>Tech Level</b>	Numeric value that defines how advanced the project is, which determines the default research cost of the project. This corresponds to the 'column' that this project is displayed at in the tech tree, tech level 0 is at far left, tech level 7 is at far right. Each single additional tech level doubles the default research cost of the project.
<b>Row</b>	The vertical position of the project in the tech tree, starting from 1 at the top
<b>Industry</b>	0=Weapons, 1=Energy, 2=HighTech
<b>Category</b>	0=Armor, 1=AssaultPod, 2=Computer, 3=Construction, 4=EnergyCollector, 5=Engine, 6=Extractor, 7=Fighter, 8=Habitation, 9=HyperDisrupt, 10=HyperDrive, 11=Labs, 12=Manufacturer, 13=Reactor, 14=Sensor, 15=ShieldRecharge, 16=Shields, 17=Storage, 18=WeaponArea, 19=WeaponBeam, 20=WeaponGravity, 21=WeaponIon, 22=WeaponPointDefense, 23=WeaponSuperArea, 24=WeaponSuperBeam, 25=WeaponTorpedo
<b>Special Function Code</b>	0=NONE, 1=PreWarp tech that is already research when starting game as PreWarp empire, 2=primitive hyperdrive tech (warp bubble) that must be unlocked before can be researched,

	3=superweapon
<b>Base Cost Multiplier Override</b>	Multiplier factor for modifying the default research cost of the project. Project cost is related to Tech Level - each single additional tech level doubles the default research cost of the project. Base Cost Multiplier Override can be used to make projects more or less expensive than normal

## Components line

The COMPONENTS line is an optional line that defines components that are unlocked by the research project.

It is comprised of a list of comma-separated Component ID values. Each ComponentID must match a component from the **components.txt** file.

You can include a maximum of 4 components in a single research project.

## Component Improvements line

The COMPONENT IMPROVEMENTS line is an optional line that defines improvements or upgrades to existing components. You can include a maximum of 4 component improvements in a single research project.

It is comprised of a list of comma-separated values as follows:

Name	Description
<b>ComponentID</b>	ComponentID value of the component that this improvement is for. This should match a component from the <b>components.txt</b> file
<b>Tech Level</b>	The relative tech level of the component improvement. This should match the Tech Level of the research project itself (Tech Level in PROJECT line)
<b>Value1</b>	Improved/upgraded value for component Value1 relevant to the component type
<b>Value2</b>	Improved/upgraded value for component Value2 relevant to the component type
<b>Value3</b>	Improved/upgraded value for component Value3 relevant to the component type
<b>Value4</b>	Improved/upgraded value for component Value4 relevant to the component type
<b>Value5</b>	Improved/upgraded value for component Value5 relevant to the component type
<b>Value6</b>	Improved/upgraded value for component Value6 relevant to the component type
<b>Value7</b>	Improved/upgraded value for component Value7 relevant to the component type

**NOTE:** for a comprehensive list of meanings for Values<sub>1-7</sub> for each component type, please see the heading '*Meanings of Value<sub>1-7</sub> for each component type*' in the **Components** section

## Fighters line

The FIGHTERS line is an optional line that defines new fighter types that are unlocked by the research project.

It is comprised of a list of comma-separated Fighter ID values. Each FighterID must match a fighter from the **fighters.txt** file.

You can include a maximum of 2 fighters in a single research project.

## Facility line

The FACILITY line is an optional line that defines a new planetary facility or wonder that is enabled by the research project.

It is comprised of a single PlanetaryFacilityID value. The PlanetaryFacilityID must match a planetary facility or wonder from the **facilities.txt** file.

You can only have a single planetary facility or wonder in a single research project.

## Abilities line

The ABILITIES line is an optional line that defines new abilities enabled by the research project.

It is comprised of a list of comma-separated values as follows:

Name	Description
<b>Name</b>	Name of the ability
<b>Type</b>	0=Ship Boarding, 1=Colonize New Planet Type, 2=Increased Construction Size, 3=Enable New Ship Type, 4=Population Growth Rate at planet type, 5=Troops
<b>Level</b>	Numeric value defining the relative level of the ability when compared to other abilities of the same type, i.e. the highest ability will be used
<b>Value</b>	Ability value specific to the ability type. Detailed meanings for each ability type explained below: <ul style="list-style-type: none"><li>when Type is 0 (<b>Ship Boarding</b>): value greater than zero defines percentage bonus to boarding attack strength (e.g. 25 means +25% bonus when boarding enemy ships), value less than zero defines percentage bonus to boarding defense strength (e.g. -25 means +25% bonus defending against enemy boarding)</li></ul>

	<ul style="list-style-type: none"> <li>when Type is 1 (<b>Colonize New Planet Type</b>): 1=Continental, 2=Marshy Swamp, 3=Ocean, 4=Desert, 5=Ice, 6=Volcanic</li> <li>when Type is 2 (<b>Increased Construction Size</b>): maximum size ship that can be built (e.g. size 300). Maximum construction size for Bases not at colonies is always 3 times larger. Bases at colonies have no construction size limit</li> <li>when Type is 3 (<b>Enable New Ship Type</b>): Value is UNUSED</li> <li>when Type is 4 (<b>Population Growth Rate at planet type</b>): 1=Continental, 2=Marshy Swamp, 3=Ocean, 4=Desert, 5=Ice, 6=Volcanic</li> <li>when Type is 5 (<b>Troops</b>): for all troop types when value is zero then means Enable new Troop Type, for Infantry, Armored and Special Forces troop types value greater than zero means percentage bonus to attack strength (e.g. 25 means +25% attack strength), values less than zero means percentage bonus to defense strength (e.g. -25 means +25% defense strength). For Planetary Defense troop type value greater than zero defines additional percentage bonus to damage amount against invading troops, value greater than zero defines additional percentage bonus to intercept chance against invading troops</li> </ul>
<b>Related Object Index</b>	Extra sub type for some ability types as explained further below: <ul style="list-style-type: none"> <li>when Type is 3 (<b>Enable New Ship Type</b>): 0=Carrier, 1=Resupply Ship</li> <li>when Type is 5 (<b>Troops</b>): 0=ALL Troop Types, 1=Infantry troop type, 2=Armored troop type, 3=Planetary Defense troop type, 4=Special Forces troop type</li> </ul>

## Plague Change line

The PLAGUE CHANGE line is an optional line that defines changes to a plague from the **plagues.txt** file.

It is comprised of a list of comma-separated values as follows:

Name	Description
<b>PlagueID</b>	PlagueID value of the plague that this change is for. This should match a plague from the <b>plagues.txt</b> file
<b>Description</b>	Textual description of this plague change
<b>MortalityRate</b>	Numeric value defining the rate of population loss caused by the plague, measured in population lost per second. Should be in range between 1 and 100,000,000
<b>InfectionChance</b>	Numeric value that determines the chance of the plague spreading to other nearby colonies. Higher values means higher chance of spreading. Should be in range of 0 to 1000
<b>Duration</b>	Numeric value that defines the typical average duration of the plague at a colony, measured in seconds. Thus a value of 300 means 6 months of game time. Should be in range of 1 to 1200
<b>ExceptionMortalityRate</b>	Numeric value defining the rate of population loss caused by the plague for the Exception Race (defined in <b>plagues.txt</b> ), measured in population lost per second. Should be in range between 1 and 100,000,000

<b>ExceptionInfectionChance</b>	Numeric value that determines the chance of the plague spreading to other nearby colonies for the Exception Race (defined in <b>plagues.txt</b> ). Higher values means higher chance of spreading. Should be in range of 0 to 1000
<b>ExceptionDuration</b>	Numeric value that defines the typical average duration of the plague at a colony for the Exception Race (defined in <b>plagues.txt</b> ), measured in seconds. Thus a value of 300 means 6 months of game time. Should be in range of 1 to 1200

It is comprised of a single PlanetaryFacilityID value. The PlanetaryFacilityID must match a planetary facility or wonder from the **facilities.txt** file.

You can only have a single planetary facility or wonder in a single research project.

## Parents line

The PARENTS line defines parent research projects that lead to this project, i.e. the path to this project.

This line is normally required for a research project. However if the project is a root, or starting project, then it will have no parents, and thus does not need a PARENTS line.

The PARENTS line is a list of multiple parent research projects, each one comprised of comma-separated values as follows:

Name	Description
<b>Parent Project ID</b>	ProjectID value indicating the parent research project. Must match another project in this <b>research.txt</b> file
<b>Required Parent</b>	Y/N value indicating whether must first research this parent project (Y) or is optional path (N)

# Plagues

Plagues can infect colonies and reduce their population. Plagues can also spread to other nearby colonies. Plague outbreaks can occur randomly or can be triggered by a game event.

All of the plagues in Distant Worlds are defined in the file **plagues.txt** found in the root game folder.

Each line in the file defines a single plague with comma-separated data, up to a maximum of 50 plagues (0-49).

Each comma-separated value is defined in detail below:

Name	Description
<b>PlagueID</b>	Unique numeric ID value of plague. Must be between 0 and 49
<b>Name</b>	Name of the plague
<b>PictureRef</b>	Numeric index value mapping to the image used to display the plague ( <b>images\ui\plagues</b> folder)
<b>MortalityRate</b>	Numeric value defining the rate of population loss caused by the plague, measured in population lost per second. Should be in range between 1 and 100,000,000
<b>InfectionChance</b>	Numeric value that determines the chance of the plague spreading to other nearby colonies. Higher values means higher chance of spreading. Should be in range of 0 to 1000
<b>Duration</b>	Numeric value that defines the typical average duration of the plague at a colony, measured in seconds. Thus a value of 300 means 6 months of game time. Should be in range of 1 to 1200
<b>NaturalOccurrenceLevel</b>	Numeric value that determines how often this plague naturally strikes at colonies compared to other plagues. Higher values mean more frequent outbreaks. A value of zero means no natural occurrences. Should be between 0 and 10
<b>CanCompletelyEliminatePopulation</b>	Y/N value indicating whether plague can completely eliminate the population at a colony. If set to N then population will not drop below 10 million at an infected colony
<b>ExceptionRaceName</b>	The name of a race that has different values for mortality, infection and length. This should match a race in the races folder. Otherwise leave blank if the plague affects all races the same way
<b>ExceptionMortalityRate</b>	Numeric value defining the rate of population loss caused by the plague for the Exception Race (defined by ExceptionRaceName), measured in population lost per second. Should be in range between 1 and 100,000,000
<b>ExceptionInfectionChance</b>	Numeric value that determines the chance of the

	plague spreading to other nearby colonies for the Exception Race (defined by ExceptionRaceName). Higher values means higher chance of spreading. Should be in range of 0 to 1000
<b>ExceptionDuration</b>	Numeric value that defines the typical average duration of the plague at a colony for the Exception Race (defined by ExceptionRaceName), measured in seconds. Thus a value of 300 means 6 months of game time. Should be in range of 1 to 1200
<b>SpecialFunctionCode</b>	0=NONE, 1=Xarakter Virus (Researchable and Deployable)
<b>Description</b>	An extended textual description of the plague. Should be no longer than 200 characters



# Fighters

Fighters launch from carriers and bases to attack and defend. All of the fighters in Distant Worlds are defined in the file **fighters.txt** found in the root game folder.

Each line in the file defines a single fighter with comma-separated data, up to a maximum of 30 fighters (0-29).

Each comma-separated value is defined in detail below:

Name	Description
<b>FighterID</b>	Unique numeric ID value of fighter. Must be between 0 and 29
<b>Name</b>	Name of the fighter
<b>Type</b>	0=interceptor that primarily targets enemy fighters, 1=bomber that primarily targets enemy ships and bases
<b>Tech Level</b>	Numeric value that defines relative tech level of fighter. AI will always build the researched fighter or bomber with the highest tech level
<b>Energy Capacity</b>	Maximum stored energy capacity of reactor
<b>Energy Recharge Rate</b>	Energy output rate of reactor
<b>Top Speed</b>	Top speed of fighter. Top speed is used when attacking, but otherwise fighter moves at half of top speed
<b>Top Speed Energy Consumption Rate</b>	Energy consumption rate when travelling at top speed. Energy consumption at half speed is half of this value
<b>Acceleration Rate</b>	Rate of acceleration for fighter (speed increase per second). Valid range from 5 to 100
<b>Turn Rate</b>	Turn angle per second in radians. Valid range from 0.5 to 6.28
<b>Engine Exhaust Image Index</b>	Index value mapping to engine thrust image in folder <b>images\effects\enginethrusters</b>
<b>Shields Capacity</b>	Maximum shields capacity
<b>Shield Recharge Rate</b>	Rate of shield recharge per second
<b>Damage Repair Rate</b>	Rate of damage repair per second. Value of 1 means can repair 10% of damage per second. Valid range from 0 to 10
<b>Countermeasure Modifier</b>	Percentage value of countermeasures bonus for avoiding enemy weapons fire. Valid range is from 0 to 99
<b>Targeting Modifier</b>	Percentage value of targeting bonus when attacking enemy targets. Valid range is from 0 to 99
<b>Weapon Type</b>	0=beam weapon, 1=torpedo weapon, 2=missile weapon
<b>Weapon Image Index</b>	Index value mapping to weapons image as specified below: <ul style="list-style-type: none"> <li>Beam weapons: beam weapon image index (<b>images\effects\weapons</b> folder)</li> <li>Torpedo or Missile weapons: torpedo weapon image index (<b>images\effects\weapons</b> folder)</li> </ul>
<b>Weapon Damage</b>	Damage amount of weapon
<b>Weapon Range</b>	Range of weapon
<b>Weapon Energy Required</b>	Energy consumed when firing weapon
<b>Weapon Speed</b>	Speed of weapon when travelling to target
<b>Weapon Damage Loss</b>	Damage loss per 100 units range

<b>Weapon Fire Rate</b>	Fire rate in milliseconds
<b>Weapon Sound Effect Filename</b>	filename of sound effect used when weapon fires ( <b>sounds\effects</b> folder)

# Planetary Facilities and Wonders

Planetary facilities and wonders are built at colonies and provide various bonuses. All of the planetary facilities and wonders in Distant Worlds are defined in the file **facilities.txt** found in the root game folder.

Each line in the file defines a single planetary facility with comma-separated data, up to a maximum of 50 facilities (0-49).

Each comma-separated value is defined in detail below:

Name	Description
<b>Planetary Facility ID</b>	Unique numeric ID value of planetary facility. Must be between 0 and 49
<b>Name</b>	Name of the planetary facility or wonder
<b>Type</b>	Numeric code specifying the type of facility as specified in the following list: 0=TroopTrainingCenter, 1=RoboticTroopFoundry, 2=CloningFacility, 3=PlanetaryShield, 4=GiantIonCannon, 5=RegionalCapital, 6=FortifiedBunker, 7=TerraformingFacility, 8=WONDER, 9=PirateBase, 10=PirateFortress, 11=ArmoredFactory, 12=MilitaryAcademy, 13=SpyAcademy, 14=NavalAcademy, 15=ScienceAcademy, 16=PirateCriminalNetwork
<b>Wonder Type</b>	Numeric code specifying the type of wonder as specified in the following list (only relevant when Type=8 (Wonder)): 0=NONE 1=EmpirePopulationGrowth: boost population growth throughout entire empire 2=EmpireHappiness: boost happiness throughout entire empire 3=EmpireResearchWeapons: boost weapons research for empire 4=EmpireResearchEnergy: boost energy research for empire 5=EmpireResearchHighTech: boost hightech research for empire 6=EmpireIncome: boost colony income throughout entire empire 7=ColonyPopulationGrowth: boost population growth for single colony 8=ColonyHappiness: boost happiness for single colony 9=ColonyDefense: increase defensive bonus for single colony 10=ColonyConstructionSpeed: increase ship and base construction speed for single colony 11=ColonyIncome: boost income for single colony 12=RaceAchievement: special race-specific wonder, usually tied to race victory conditions
<b>PictureRef</b>	Index value mapping to image used to display facility ( <b>images\environment\planetaryfacilities</b> folder)
<b>Build Cost</b>	Cost to build facility at a colony
<b>Maintenance Cost</b>	Annual maintenance cost of facility
<b>Value1</b>	Numeric value with unique meaning for each facility type as detailed below
<b>Value2</b>	Numeric value with unique meaning for each facility type as detailed below

<b>Value3</b>	Numeric value with unique meaning for each facility type as detailed below
<b>Description</b>	Extended textual description of facility. Should be no longer than 200 characters

### Meanings of Value1-3 for each facility type

<b>Facility Type</b>	<b>Meanings of Value1-3</b>
<b>TroopTrainingCenter</b>	Value1-3=UNUSED
<b>RoboticTroopFoundry</b>	Value1-3=UNUSED
<b>CloningFacility</b>	Value1-3=UNUSED
<b>PlanetaryShield</b>	Value1-3=UNUSED
<b>GiantIonCannon</b>	Value1=ComponentID of ion cannon weapon component (must match an Ion Beam component found in <b>components.txt</b> ), Value2-3=UNUSED
<b>RegionalCapital</b>	Value1-3=UNUSED
<b>FortifiedBunker</b>	Value1=defensive bonus percentage, Value2-3=UNUSED
<b>TerraformingFacility</b>	Value1=rate of planetary damage repair - 1000 means repair 100% of damage in one year (lower values mean slower rate of damage repair), Value2-3=UNUSED
<b>PirateBase</b>	Value1=empire research bonus percentage, Value2=colony income bonus percentage, Value3=colony corruption increase percentage
<b>PirateFortress</b>	Value1=empire research bonus percentage, Value2=colony income bonus percentage, Value3=colony corruption increase percentage
<b>ArmoredFactory</b>	Value1-3=UNUSED
<b>MilitaryAcademy</b>	Value1 means percentage value increase in appearance chance for troop generals, Value2-3=UNUSED
<b>SpyAcademy</b>	Value1 means percentage value increase in appearance chance for spies, Value2-3=UNUSED
<b>NavalAcademy</b>	Value1 means percentage value increase in appearance chance for fleet admirals, Value2-3=UNUSED
<b>ScienceAcademy</b>	Value1 means percentage value increase in appearance chance for scientists, Value2-3=UNUSED
<b>PirateCriminalNetwork</b>	Value1=empire research bonus percentage, Value2=UNUSED, Value3=colony corruption increase percentage
<b>WONDER EmpirePopulationGrowth</b>	Value1=colony development bonus percentage, Value2=empire population growth bonus percentage, Value3=Colony Type where can be built: 0=ANY, 1=Continental, 2=MarshySwamp, 3=Desert, 4=Ocean, 5=Ice, 6=Volcanic
<b>WONDER EmpireHappiness</b>	Value1=colony development bonus percentage, Value2=empire happiness bonus percentage, Value3=Colony Type where can be built: 0=ANY, 1=Continental, 2=MarshySwamp, 3=Desert, 4=Ocean, 5=Ice, 6=Volcanic
<b>WONDER EmpireResearchWeapons</b>	Value1=colony development bonus percentage, Value2=weapons research bonus percentage, Value3=Colony Type where can be built: 0=ANY, 1=Continental, 2=MarshySwamp, 3=Desert, 4=Ocean, 5=Ice, 6=Volcanic

<b>WONDER EmpireResearchEnergy</b>	Value1=colony development bonus percentage, Value2=energy research bonus percentage, Value3=Colony Type where can be built: 0=ANY, 1=Continental, 2=MarshySwamp, 3=Desert, 4=Ocean, 5=Ice, 6=Volcanic
<b>WONDER EmpireResearchHighTech</b>	Value1=colony development bonus percentage, Value2=high-tech research bonus percentage, Value3=Colony Type where can be built: 0=ANY, 1=Continental, 2=MarshySwamp, 3=Desert, 4=Ocean, 5=Ice, 6=Volcanic
<b>WONDER EmpireIncome</b>	Value1=colony development bonus percentage, Value2=empire income bonus percentage, Value3=Colony Type where can be built: 0=ANY, 1=Continental, 2=MarshySwamp, 3=Desert, 4=Ocean, 5=Ice, 6=Volcanic
<b>WONDER ColonyPopulationGrowth</b>	Value1=colony development bonus percentage, Value2=colony population growth bonus percentage, Value3=Colony Type where can be built: 0=ANY, 1=Continental, 2=MarshySwamp, 3=Desert, 4=Ocean, 5=Ice, 6=Volcanic
<b>WONDER ColonyHappiness</b>	Value1=colony development bonus percentage, Value2=colony happiness bonus percentage, Value3=Colony Type where can be built: 0=ANY, 1=Continental, 2=MarshySwamp, 3=Desert, 4=Ocean, 5=Ice, 6=Volcanic
<b>WONDER ColonyDefense</b>	Value1=colony development bonus percentage, Value2=colony defensive bonus percentage, Value3=Colony Type where can be built: 0=ANY, 1=Continental, 2=MarshySwamp, 3=Desert, 4=Ocean, 5=Ice, 6=Volcanic
<b>WONDER ColonyConstructionSpeed</b>	Value1=colony development bonus percentage, Value2=construction speed bonus percentage, Value3=Colony Type where can be built: 0=ANY, 1=Continental, 2=MarshySwamp, 3=Desert, 4=Ocean, 5=Ice, 6=Volcanic
<b>WONDER ColonyIncome</b>	Value1=colony development bonus percentage, Value2=colony income bonus percentage, Value3=Colony Type where can be built: 0=ANY, 1=Continental, 2=MarshySwamp, 3=Desert, 4=Ocean, 5=Ice, 6=Volcanic
<b>WONDER RaceAchievement</b>	Value1=colony development bonus percentage, Value2=UNUSED, Value3=Colony Type where can be built: 0=ANY, 1=Continental, 2=MarshySwamp, 3=Desert, 4=Ocean, 5=Ice, 6=Volcanic

