



OFFWORLD
— TRADING COMPANY —

**SAVE HUMANITY. TURN A PROFIT.
PREFERABLY BOTH.**

ALMANAC

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OFFWORLD TRADING COMPANY STRATEGY GUIDE

by Sander "Cubit32" Buruma

1. INTRODUCTION

What I expect to convey to you in this guide are a mindset as well as the tactics and strategies that I've come up with that will help you compete against AI opponents in the campaign, skirmishes and daily challenges as well as against human opponents in online Multiplayer 1v1, team and FFA matches.

I've tried to compile into this guide my research so that you do not by trial and error have to discover the generalities and nuances of the game that us long time regulars and gaming aficionados have integrated into our psyches. There is no good substitute for the strong desire to win, a lot of experience and a good functioning mind.

If you have technical issues with the game or questions not answered in this guide, please refer to the game forums at forums.offworldgame.com.

I expect you to at least have played the in game tutorials before reading this guide any further. With all that said, my goal is to radically reduce the time it takes you to start enjoying OTC and become proficient at beating AI and human opponents in all formats of the game.

2. GENERAL CONCEPTS

a. Overall Strategy

Offworld Trading Company is an economic RTS which I believe to be vaguely inspired by Starcraft, Settlers of Catan and Transport Tycoon. What I think that the developer's intent was while developing OTC was to create a game that was innovative, intellectually stimulating and fun to play. In my experience as someone who doesn't compete well in First Person Shooter or high APM environments, OTC is a game aimed at a slow paced audience who want to win by wits rather than reflexes (although quick reflexes are definitely very helpful).

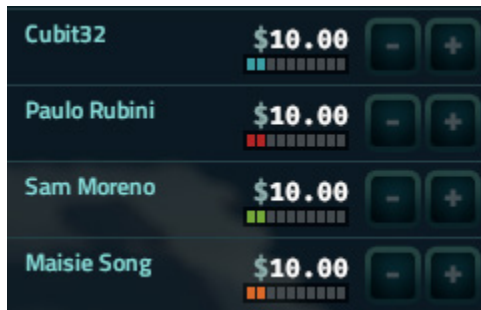
OTC is a game about gaining and keeping the upper hand economically and buying out all your competition. To do so every company needs to earn wealth, which is made up of Cash & Resources. Resource wealth is the cumulative value of all your resource stockpiles and they can be turned into Cash at an instant and are counted as part of your wealth. In almost every game format, gaining as much wealth as quickly as possible is what will win you or your opponents the game most frequently.

Holding onto your wealth and judiciously investing it only when called for (when the investment is very likely to give you a good return within an acceptable timeframe) is what'll elevate your gameplay from average to something above average. Magnifying your wealth continually until you can buy out your remaining competitors and thus win the game is the main strategy of every winning player.

b. Stock

The main part of actually winning (outside of the first rounds of the campaign) is buying a majority of your remaining opponent's stock. In the image, we have 4 companies, one of which is

my own. To win, every other company needs to become a subsidiary of my company. (Subsidiaries are what companies become when they are eliminated.) Every company's stock is made up of 10 units of stock. At the start of the game all companies start with some of their own stock; at 2-4 and 5-8 players, everyone starts with 2 or 3 of their own stocks, respectively. Companies can be eliminated with either a majority buyout or a full buyout. Stock can be bought one at a time until 5 self-owned stock remain or all unowned stock taken. Grey (unowned) stock can be bought for the shown price whereas self-owned stock must be bought for double the price, or more.



A majority buyout happens when 6 units of stock have been bought and are currently owned by OTHER companies. It is possible for 6 stocks of a company to have been bought up by 6 different companies and for that situation to trigger a majority buyout and thus eliminate that company.

A full buyout happens when a second company accumulates enough cash to pay somewhere between double or triple the current stock price per stock that is self-owned by the 1st company or not-owned (ie. grey). Any stock that is already owned by 3rd parties does not need to be bought and cannot be acquired in any way unless said 3rd parties sell out before the target company turns into a subsidiary or the 3rd parties are bought out by the 1st. For every stock that is owned by a 3rd party, self-owned stock becomes 20% more expensive to buy all at once (meaning that the last 5 stock can be as much as 3x as expensive compared to unowned stock). A full buyout can be triggered when you click the buy button while no unowned stock remains, or by holding shift and clicking buy when unowned stock do remain. If the stock purchase button isn't red while holding shift, you do not have enough cash to make an all at once buyout.

When a company is bought out, it becomes a subsidiary, all its wealth vanishes, its debts are cancelled out completely, any stock that company currently owns are divided up as fairly as possible among the companies that invested in its stock (and any stocks that can't be split equally will be sold off and the proceeds split) and the company will be under the control of an AI that tries to produce the most profitable thing of the moment. All wealth henceforth generated from the subsidiary is distributed to its owners at a rate of 1% per second relative to stock ownership. Stock in subsidiaries cannot be sold.

c. Debt

Debt is a negative resource that is technically never good for you. However, early on, it is also almost never really really bad for your company either, so long as it remains under control (ie. You have a good plan on how to win in spite of it). The amount of debt you have is shown to you along the top left hand side of the screen. The amount of debt you have compared to your

company's total value determines what bond rating you have. While you have ANY debt your bond rating will fall in between AAA and D, with D being the lowest. Every company's bond rating is visible along its stock ticker. With a AAA bond rating, you will pay only 1% interest over your debt at midnight. With a D rating, you will pay 30% over your debt at midnight. Typically, you will have about 5k debt while you have a AAA bond rating, 100K debt while you're in a C bond rating (meaning 20% daily interest), and 150k debt while you have a D bond rating. The only downside of debt is that it depresses your stock price, unless you reach the D bond rating.

At D bond rating, you will be completely banned from using aggressive black market items. If you want to recover the use of the black market, you will have to pay off enough to reach a C rating at least momentarily. To see how much you need to pay off, hover over your debt and the mouseover information will tell you exactly how much. On rare occasions, it is possible to purchase a "Cook the Books" black market item, which lowers the threshold at which your bond rating depreciates. Cook the Books is one of the few black market items that can be bought while your company has a D rating.

Generally, if the resource market prices are low, the only way to escape from a D bond rating is to win the game or to build very profitable and very expensive Offworld Markets. However, because of the nature of D debt, you will not be able to defend your Offworld Markets because you won't be able to purchase Goon Squads.

Because of the timing of daily debt interest, it is almost always best to upgrade your HQ just before midnight when possible as this almost always boosts your rating. Paying off debt and upgrading your HQ are the two most effective ways to raise your bond rating. Buying stock, contrary to common sense, does not increase your bond rating because the game doesn't count it into your company's total value, it does however significantly increase stock price. Buying stock actually slightly lowers your company's bond rating because it takes cash to buy stock and cash is counted into your company's total value.

The screenshot displays two panels. The left panel shows company statistics for 'Cubit32 : Level 2 Scavenger HQ'. The right panel shows a stock ticker for four players.

Player	Rating	Stock Price
Cubit32	[AA]	\$10.02
Ilana Kamat	[AA]	\$9.52
Silas Crichton	[AAA]	\$10.23
Sam Moreno	[A]	\$9.29

Company Statistics (Left Panel):

- HQs: \$1,200K
- Cash + Resources: \$1,622
- Structures: \$33,600
- Assets: \$1,235K
- Debt: -\$16,485 (x5)
- (AA Bond Rating: 6% Interest Rate)
- Total Value: \$1,152K
- Target Value per Share: \$11.53
- Current Value per Share: \$10.02
- Stock Price: \$10.02

Total Value = Assets – 5x Debt (on Manager difficulty). Your assets are your HQ value + your structures' intrinsic (unchangeable) value + your cash + your resource stockpiles' value. Resources that are currently being used by your advanced buildings are also counted as assets, until those advanced buildings finalize their project and make the use of their input resources

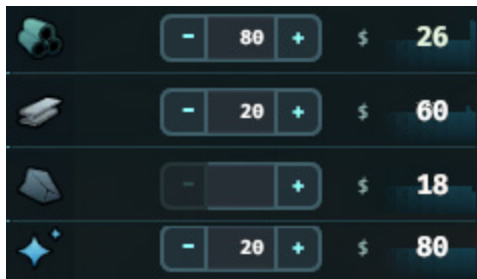
permanent. The ratio of your debt to your total value finally is what determines your bond rating, both are visible by mousing over any company's stock ticker. In a 2p match, 10% Debt to Total Value or worse means a company receives a D bond rating; in an 8p match, it is 5% and somewhere in between that in other formats.

d. Resources

Every resource in the game is worth some value and that value changes every time that resource is bought or sold. Purchases and sales of resources increase and decrease the price respectively. If the same quantity of a resource is bought and sold, the price of the resource doesn't move. Even if 1 million units are bought and sold every second, the price won't change as long as the quantities are the same.

There are 13 or so resources: Power, Water, Food, Oxygen, Fuel, Aluminum, Iron, Steel, Carbon, Chemicals, Silicon, Glass and Electronics. You can consider Cash as a resource even though it doesn't have a colorized icon like the other 13. Of the resources, Power, Water, Iron, Aluminum, Silicon and Carbon are harvestable, meaning they do not require any resources from the player's resource stockpiles in order to be produced. The other 7 resources are intermediate resources and they require harvestable resource stockpiles in order to be produced. You could also conceivably call cash a harvestable resource because it can be produced from (a lot of) Power at a Pleasure Dome.

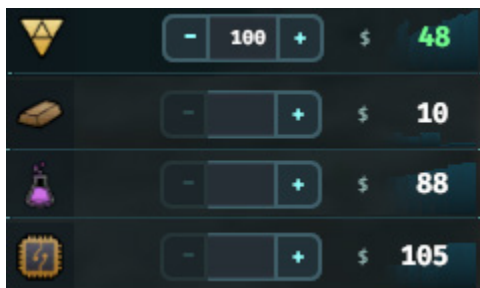
Harvestable resources can be produced at a rate up to almost 4 per second (without upgrades) whereas intermediate resources can only be produced at a rate of about 1 a second (without upgrades).



None of the resources are always going to be the most important, but (depending on the map) the rarest resources are going to be more expensive overall, especially if 1 player gets a monopoly on a specific harvestable resource. Aluminum, Steel and Glass (in order of importance) are the most important resources because they are required to upgrade your Headquarters to higher levels, which will generate the number of claims necessary to properly exploit the resource markets. The general construction resources (see picture) are also required to build most other buildings. So in short, without an adequate supply of construction resources, you're not going to have a successful company because you won't be able to make the buildings to make all the other resources. Of an additional note, Steel requires Iron from Metal Mines in order to be produced and Glass requires Silicon.



Water, Food and Oxygen are life support resources. Power + Fuel can also be counted as life support too as almost every company must use them in order to do anything. Water, Food and Oxygen are constantly consumed starting at HQ2 and up. Oxygen is consumed at up to 0.4/s, Water is consumed at up to 0.8/s and Food at up to 1.2/s on HQ5. Power is used to run almost every building and Fuel is used at a rate of 0.2/s per resource Freighter in flight. Not producing your own life support merely causes your company to accumulate debt. This means you don't need to make life support resources until they get really expensive or until debt becomes a major issue. Power is the only resource that can't be stockpiled (with 1 minor exception), which makes it more unique and a common point of vulnerability. Additionally, the profits from surplus Power production go directly to paying off debt, which makes Power much less desirable to produce because you need cash in the bank to buy stock to win the game and not just a dent in your debt problems. When you produce life support resources, you won't be accumulating stockpiles until you produce more than you consume. Thus, it is very important to always produce (a lot) more life support than you consume so you actually make more cash and wealth which gives you the ability to be in control and aggressive.



The remaining 4 resources, Silicon, Iron, Chemicals and Electronics, aren't in many facets of the game but they are still important enough to consider from time to time. Iron is used to build Steel Mills and the Steel resource. Iron is only a problem if your Metal Mines get attacked while you have Steel Mills and no Iron stockpiles. Silicon is another resource without which it is typically possible to survive because only smaller quantities of it are required; it is used to produce Glass and in small quantities also Electronics. Chemicals require Fuel and Carbon and are used to research technology upgrades (more on those later) and patents (more on those later too). Electronics are exclusively a construction resource for the Robotic HQ and the advanced buildings (Patent Lab, Optimization Center, Hacker Array, Pleasure Dome and Offworld Market).

e. Buildings

There are 19 building for the player to choose from. Resource buildings output resources and sometimes also need input resources to produce their outputs. Advanced buildings have an indirect effect, are more expensive and slower to build, are more vulnerable and any investment in them always take much longer to pay for themselves but pay off a lot more in later stages of the game. What follows are a list of the games' buildable buildings. Base Prod stands for base production of the buildings output resource, per second.

Resource Buildings	Steel	Alu	Glass	Silicon	Carbon	Iron	Electronics	Build Time	Base Prod
Metal Mine								20	1 to 2
Water Pump								20	1 to 2
Elemental Quarry								10	1 to 2
Solar Panel		20		100				20	0.9
Wind Turbine		20			80			20	0.9
Geothermal Plant	120	40						40	2
Greenhouse Farm	20		10					20	0.5
Hydrolysis Reactor	40	10						20	0.5
Steel Mill						20		20	0.5
Chemicals Refinery	40				20			20	0.5
Glass Kiln	40			20				20	0.5
Electronics Manufacturer	40	20						20	.25
Solar Condenser			5					10	0.67
Adv Buildings	Steel	Alu	Glass	Silicon	Carbon	Iron	Electronics	Build Time	
Patent Lab	80						20	40	
Optimization Center	80						20	40	
Hacker Array	40						40	40	
Pleasure Dome	80						40	40	
Offworld Market	400		100				100	60	
Buildings	Steel	Alu	Glass	Silicon	Carbon	Iron	Electronics	Build Time	
HQ2	80	80	20					0	
HQ3	160	160	40					0	
HQ4	240	240	60					0	
HQ5	320	320	80					0	
HQ1 to HQ5	800	800	200					0	

Solar Panels and Wind Turbines produce different amounts depending on their location. Wind is best placed on top of many adjacent cliffs and Solar Panels at high altitudes. Additionally, Dry and Water Ice Condensers and Solar Panels only produce their outputs during the day.

Every intermediate resource producing building has a base production of 0.5 per second for their main resource. The only exception is the Electronics Factory which produces Electronics at a base rate of 0.25 per second. Additionally, the Electrolysis Reactor produces Oxygen in addition to Fuel but at half the rate of Fuel. Intermediate resource buildings generally consume their input resource at a constant and unmovable rate of 1 per second.



The primary resource harvesting buildings (Water Pumps, Metal Mines and Quarries) produce resources at a base rate of somewhere between 1 and 2 per second depending on which resource pips they are placed on. (high, med and low shown to the right.) A Water Pump would on its own produce a base amount of 2.0, 1.5 or 1.0 units of Water per second placed alone on a High, Medium or Low Water tile respectively. Geothermal Plants always produce Power at a base rate of 2 per second, Wind Turbines and Solar Panels under the best conditions produce at an average base rate of 1.0 per second (Solar Panels are only active during daytime). Ice Condensers produce at an average base rate of 0.67/s as they are also only active during the day.

In addition to a resource being High, Medium or Low, two resource pips can also be on the same tile. This only makes a big difference in the case where Aluminum + Iron or Carbon + Silicon combine on one or more tiles because Metal Mines and Quarries can in these cases simultaneously produce both resources. The only other structures that have to be placed on top of resources are Ice Condensers, of which there are 2 types. The Dry Ice Condenser sits on Dry Ice and Water Ice Condensers sit on Water ice. Dry Ice has a darker color and Water ice is pure white. Dry Ice Condensers produce both Oxygen and Carbon at equal rates.

Every resource producing building without exception benefits from being adjacent to identical resource buildings. Any resource building that is adjacent to an identical counterpart generates 50% more output resources (without requiring additional input resources). With adjacency to 2, 3, 4, 5 and 6 identical buildings, the bonus is 75%, 85%, 99%, 95% & 100%. In practical terms this means that your resource buildings are about as efficient as you'll ever need them to be with 2 adjacencies. The only other thing that improves efficiency (not speed) are Optimization Center upgrades (more on those later). The difference between speed and efficiency is that buildings that are twice as fast also consume twice the inputs, while buildings that are twice as efficient still consume the usual amount while producing twice the output.

f. The Black Market

The black market is what your competitors will use in their cunning and diabolical plans to wrest control of Mars and its market from your benevolent influence. In order to prevent your competitors from overtaking you, you need to be prepared to account for the effect that the black market can have.

The effects that the black market can have on a match is tremendous. EMPs and Power surges can completely shut down whole districts of your industry, dynamites can obliterate your advanced structures and Mutinies can steal your profitable resources right out from under you, to name a few things. Black market effects can be bought once every minute (or twice, for Scavengers).

The outlook of the black market heavily influences which companies are or not optimal to use on any given map. In 1v1, but even more so in 4+ player matches, it is very important to just buy cheap black market effects as long as you don't specifically need to buy a specific black market

item and aren't severely strapped for cash. Having black market items stockpiled enables you to take advantage of future opportunities that you can't properly capitalize on if you don't anticipate them by stockpiling black market effects.

The ubiquitous Goon Squad must be utilized from time to time to protect key vulnerabilities, like a 4 tile industrial area or a highly valuable Water Pump, for example. Goon Squads simply prevent 1 black market item targeted at their tile from taking effect, and it gives the blocked black market item to the company that would have otherwise suffered from its effect. Additionally, area of effect black market items (with 1 minor exception) can not affect tiles protected by Good Squads. Other black market items are less ubiquitous and I'll describe them in a later chapter.

g. Player Controls

It is very important (if you want to be competitive) to be quick and able to use the available hotkeys so you don't spend too much time just trying to do what you need to do. To learn them the fastest, take the time to look up the relevant building construction hotkeys while playing instead of clicking buttons. Mousing over buildings shows you their hotkeys.

Other hotkeys include:

Ctrl+Shift+Down:	Sell all resources all at once
Alt+Sell Resource:	Sell all of a particular resource all at once
Tab:	Scroll through all headquarters and the colony
Spacebar, + key, - key:	Pause the game, speed up and speed down (respectively).
WASD:	Scroll the map in any one of the 4 cardinal directions.
Ctrl or shift buy/sell:	Buy or sell 1 or 100 units per click respectively, instead of 10
Ctrl + Click on building:	Turn building on/off
Ctrl + Shift Click on building:	Same as above but for all buildings of the clicked type
Backspace:	Scrap selected building
Shift+Backspace:	Scrap all buildings of the selected type
C:	Claim tile (ie. Press C and then click the desired tile)
B:	Bid on auction (when available).
~: overview	Toggle between the available resource and resource stockpiles
Z:	(While pressed down) hides all buildings
E, R, T or Y:	Found as Expansive, Robotic, Scavenger or Scientific respectively.
Alt + (Shift +) click	Send a shipment early (or all shipments of that type)

3. GENERAL INFORMATION

a. Company types

At the beginning of the match, a player can choose to found as any one of 4 different types of companies, each company has distinct traits. No company type is intrinsically better than any of the others and it is better to know how to play all 4 because it is definitely going to happen that you'll run into circumstances that practically require you to use one specific company.

Seneca Development (Expansive):

- 50% faster Freighter movement
- All buildings cost 50% less Steel
- +1 extra claim per HQ upgrade (up to 4 extra by HQ5)

Expansive companies usually do better on maps where the resources are far apart from each other and aren't laid out in big fields. Because they consume half the Steel compared to other companies, they are also best positioned to take advantage of the Powerful Offworld Market. The Expansive HQ footprint is the biggest of them all and is thus best capable of destroying resource pips during the founding phase.

Reclamation Inc. (Scavenger):

- Carbon replaces Steel as a construction resource (and buildings requires 50% more of it than they would for Steel).
- Receives warnings of upcoming shortages and surpluses
- After using the black market, regains access to it twice as fast compared to other companies.

Because Scavenger can use the black market twice as often, it is very well positioned (especially in big Free-For-All matches) to take advantage of black market items like Mutinies, Bribe Claims, Tile Auctions, Adrenaline Boosts, Pirates and Goon Squads because they directly benefit the Scavenger company in addition to sometimes hurting the target. Scavengers can afford to spend only 3 tiles on their 2 main construction resources, especially when they have access to high Carbon and Aluminum tiles.

New Meridians (Scientific):

- Scientific buildings placed on top of primary resources (Iron, Aluminum, Water, Carbon, Silicon) don't need those resources as inputs (for example this means Farms built on top of Water don't require Water input).
- EMP and Power Surges only last half as long on Scientific buildings.
- 50% faster patent acquisition (taking 33% less time).

Scientific companies are particularly Powerful when they can place their HQs next to fields of Iron and Water and not too far away from Silicon and Carbon. Scientific companies also suffer half as long from EMPs and Power Surges which make them more preferable in matches where these are both present on the black market.

Yoshimi Robotics (Robotic):

- Does not require life support (Water, Food, Oxygen and Fuel).
- Robotic companies use Power as Fuel.
- Uses Electronics instead of Glass to upgrade its HQ, and only half the usual amount.
- HQ upgrades also require half the usual amount of Aluminum.

- Resources gained by crushing resource pips with an HQ found give the player double the usual resource bonus.
- Buildings receive adjacency bonuses from any adjacent buildings that produce one of their inputs, including Power.

Robotic companies generally are better on maps with very scarce Water and/or Aluminum resources and on maps with hybrid metal tiles (tiles which have both Aluminum and Iron).

Robotic companies are also the only companies that can use (Power) production buildings to boost the output of harvesters on lonely resource pips (resource pips not adjacent to other same-type pips).

b. Buildings

There are several types of buildings in the game: primary resource buildings (Water Pumps, Metal Mines, Elemental Quarries as well as Wind Mills, Solar Panels and Geothermal Plants), secondary resource buildings (every building that uses stockpiled resources to produce other resources) and advanced buildings (Pleasure Dome, Patent Lab, Optimization Center, Hacker Array and Offworld Market) which do not produce resources but have other effects.

Primary resource buildings are generally your first source of cash income via the resource sales you get with them. These buildings are free to build but still take 10 to 20 seconds to finish construction. Among these buildings, Water Ice and Dry Ice Condensers can also be included. Condensers, like Solar Panels, only work during the day. Condensers and Solar Panels are particularly vulnerable to the black market because any black market actions used against them in the morning are virtually extended by the fact that they are only active during the day (21:00 to 5:00) and thus can almost completely miss a day's worth of production by suffering from the effects of just one Power Surge or EMP.

Primary resource buildings are a very common point of vulnerability that is very hard to defend and very easy to abuse with the black market. For example, a disabling action on a high Water Pump can potentially disable up to 10 tiles by extension because the Water stops coming in and consequently the Farms and Reactors using that Water will in short order become idle or unprofitable.

Secondary resource buildings produce every other resources from the primary resources. They should generally always be placed next to the headquarters (with the exception of Scientific buildings). When secondary resource buildings are placed away from the HQ, they have to use Freighters to ship in primary resources and more Freighters to ship them back. This costs Fuel, causes delays and is a big vulnerability. Only Scientific players can afford to remotely build their secondary buildings because they do not have to ship in the primary resources if the secondary buildings are placed on top of resource pips that correspond with their inputs.

Advanced buildings cannot be built right away but are progressively unlocked as a company upgrades its HQ during every match. HQ2 unlocks the upgrade and Patent Lab, HQ3 unlocks the Pleasure Dome and Hacker Array, HQ4 unlocks 1 Offworld Market and HQ5 allows you to build a 2nd Offworld Market. Advanced buildings must be connected either to the Colony or to your HQ.

The Pleasure Dome generates cash at a rate of \$4 per second per unit of population. A map's population is the sum of the number of inhabited habitats on the colony plus up to 5, 10 or 15 for every level 5 headquarters of the Scientific, Scavenger or Expansive faction, respectively. The

income of Pleasure Domes is at its highest when placed next to the colony and is furthermore boosted by 10% for every colony habitat that is adjacent to it. Successive Pleasure Domes built by any company will reduce the average income per Pleasure Dome to \$2.5 per population for 2 Pleasure Domes, \$2 / pop for 3, and so on and so on with a minimum of \$1 / pop.

Hacker Arrays allow you to generate artificial shortages and surpluses, which increase or decrease the price of a particular resource. This takes 60 or 30 seconds to activate respectfully and an additional 20 or so seconds to take effect over another 20 seconds. Shortages and surpluses move the price of a resource by an amount inversely proportional to the number of players in the game, making artificial ones especially powerful in duels. Artificial shortages cost \$2K to initiate the first time and become \$2K more expensive every time they are used linearly, not exponentially. Surpluses take half the cash.

Optimization Centers increase the efficiency of resource buildings by up to 100% in steps of 25% per individual upgrade per individual resource. The first upgrade costs 20 Chemicals and takes 40 seconds and every successive upgrades takes 20 more Chemicals and seconds compared to the last. Optimization Centers are especially good when you anticipate a long game, as it takes a long time to reap the rewards from technology upgrades. The Optimization Center benefits from Machine Shops which make it 10% faster for every adjacent Machine Shop.

The Patent Laboratory gives you access to additional traits at the cost of some Chemicals and some time spent on obtaining 1 or multiple patents. Every patent that is already obtained can NOT be obtained by any other companies under any conditions. Patents take as many seconds as they do Chemicals to research. The patents are as follows

Superconductor (40 chems): Doubles Power production that is connected to your HQ. This is particularly useful for Robotic players who have built Power adjacent to their HQs.

Energy Vault (40 chems): Generates +1 Power (not sellable) that generates up to 100 units worth of a stockpile. When Power production is exceeded by consumption, the energy vault tries to compensate.

Financial Instruments (40 chems): Gives 25% of all debt interest to the player (except for the player's own debt).

Water Engine (40 chems): While Water is cheaper, it is used instead of Fuel for Freighters and for Offworld Markets.

Perpetual Motion (60 chems): All buildings consume 50% less Power. This basically has a very similar effect to superconductor but is map-wide.

Virtual Reality (60 chems): Increases Pleasure Dome income by 50%.

Nanotech (60 chems): When buildings are scrapped, they refund all of their build cost. This is extremely useful for Scientific and Robotic players who usually have to spend a lot of resources to build their infrastructure. Nanotech can NOT be used to regain the resources of an Offworld Market.

Cold Fusion (60 chems): Water Powers buildings while Water is cheaper than Power.

Carbon Scrubbing (80 chems): Buildings that require Carbon as an input no longer do so.

Slant Drilling (80 chems): Resource pips count as being on their adjacent tiles as well. This patent can easily lead to a company effectively creating hybrid tiles either through closely

adjacent tiles or by using Core Sample to create resources on tiles next to Metal Mines or Elemental Quarries.

Thinking Machines (80 chems): Black Market effects used against the player last half as long on tiles adjacent to the headquarters. This is extremely useful in matches where the black market is particularly nasty and Offworld Markets particularly good.

Teleportation (80 chems): Eliminates the need for Freighters. All resources are sent to their particular buildings instantly as though they were right next to the HQ. Obviously this patent is the better version of Water engine and it is extremely useful for Scientific players who have remote production areas but are also suffering from the threat of Pirates and Magnetic Storms. One very pleasant side effect of this patent is that all resources that are stockpiled across the map inside buildings are instantly sent, giving a sudden influx of wealth.

Patent Labs receive 10% bonus per adjacent colony laboratory, but in my opinion this benefit is merely cosmetic because the cost of the Chemicals is usually a much greater concern than the time it takes to acquire a patent.

The last and final advanced structure is the Offworld Market. Offworld Markets are by far the most expensive to build and usually the most profitable on a per-tile basis. Launches consume 100 units of a particular resource plus 20 Aluminum and 20 Fuel and generate a lot wealth every time they go Offworld. The prices of resources Offworld (rather than on world) are different. Offworld prices are random at the beginning of every match and increase over time. Offworld Markets get 10% faster for every adjacent colony warehouse and can NOT be scrapped once completed.

c. Black Market

The black market is made up of several purchasable actions that can be bought for a price. This price starts at a base amount that is determined by how many players are playing in any given match. The more players, the lower the base price. Every time a black market action is purchased, the black market becomes unavailable to the company that just used it for 60 seconds or 30 seconds if the company is a Scavenger. Every time a black market action is purchased it becomes approximately 33% to 50% more expensive for everyone to use. Additionally, there is a small ping over any black market icon every time a company purchases it that is visible to everyone. In a 2p match the base price starts at \$3k and will go as low as \$1k in an 8p match.

Black market actions like EMPs and Adrenaline Boosts (that affect tiles over time) will experience diminishing returns, meaning that the same black market item used multiple times on the same tile will slowly have less and less effect.

It is NOT possible to actively stockpile more than 1 use of a black market item. It is only possible to stockpile more than 1 if someone targets one of your tiles with a Goon Squad using an action which you already have, in which case you'll end up with multiple units of that action.

The items that may or not appear on the black market are almost entirely random:

Bribe Claim: 1 extra claim per purchase.

Goon Squad: Protects a tile from black market effects. When a black market action targets this tile specifically, it triggers the Goon Squad and will defend the tile for a short while. Actions that are used on tiles with Goons Squads are granted to the defender.

Cook the Books: Improves your bond rating. The presence of this black market item alleviates some of the problems that comes with too much debt, but the depression in stock price is not one of the problems being solved. Cook the books can help you stay out of D levels of debt. Cook the books and Bribe Claim are the only two options you can still use while having a D bond rating.

Pirates: Steals at 100 units in resources by attacking Freighters traveling across a specific small region of the map. The Freighters that go through its area of effect will be pirated. Each attack will take half of the resources on the Freighter.

Magnetic Storm: Destroys all Freighters and any other moving units in any given area. This is particularly fiendish to use against Scientific players who decide to produce their profitable resources away from their headquarters because their shipments of resources are usually extremely valuable and consequently painful to lose. Magnetic Storms can be combined with dynamite because the repair droid that can repair a building can be destroyed and thus cause additional delays to a building being repaired.

Adrenaline Boost: Doubles the speed at which the targeted buildings work. The targeted tile will receive the longest lasting boost. Adrenaline Boosts are generally best used after your competitors use their own black market opportunity so they cannot respond to it until a minute after you activate it.

EMP: Electromagnetic Pulses freeze buildings for a time. The targeted tile is frozen for 100 seconds, the buildings next to it for 50 seconds, and the next ring of buildings 25 seconds. EMPs can be targeted on empty tiles which guarantees that they don't trigger a Goon Squad.

Power Surge: Freezes buildings like an EMP, but will jump from tile to tile. The 1st tile is frozen for 100 seconds, the 2nd for 90, and so and so on. Power surges will not jump to Goon Squaded tiles and will go around them if they can. Power surges will not jump back to a tile which it has already jumped to.

Circuit Overload: Spreads like a Power Surge and lasts longer but instead doubles Power consumption instead of freezing the affected buildings. (However, buildings which produce Power are frozen by Circuit Overload.) This effect can also often be used to cheaply undo a competitor's Goon Squad.

Slowdown Strike: Cuts the speed of targeted buildings in half. Slowdown strike is the only offensive black market action that can ignore a Goon Squad.

Core Sample: Generates extra resources on tiles that have none. The chance to generate a specific resource can be as much as 90% on specific terrain types. River and lake beds give a 90% chance to generate Water, volcano terrain 90% Iron, sand 90% Silicon, rocky 90% Aluminum and crater terrain 90% for Carbon. Normal terrain is completely random. Core samples can give a low, medium or high resource pip and this particular chance is entirely random.

Core sample is particularly Powerful when combined with the slant drilling patent and/or right next to lonely high resource pips.

Robotic players in particular can make good use of Core Sample by using it on tiles next to their Geothermal Plants because the Geothermal Plant will guarantee that any incidental high tiles will produce 50% extra.

Hologram: Causes the target tile to appear to be something that it is not. Only spies can show your opponents what the targeted tile really is. Holograms will tend to appear to be the same as buildings adjacent to them or a random advanced building when not available. Holograms do not trigger the black market cooldown when purchased and are always available for purchase. To prevent your opponents from inferring that you're making a tile somewhere hologrammed it is generally best to activate this action right after using a different particularly distracting black market action like a mutiny or EMP on a location far away.

Spy: Spies do not trigger Goon Squads and give complete information on the targeted and surrounding tiles that they target for the remainder of the match. Spies do not trigger Goon Squads but are however able to reveal them. Information that spies provide include the exact nature of an advanced building its activities and the amount of resources stockpiled inside of a building. Spies do not trigger the black market cooldown when purchased and are always available for purchase.

Network Virus: Spreads like a Power surge, lasts shorter on successive tiles and instead forces the target buildings to be online and use resources regardless of whether or not the target company wants them to be. Input resources will be bought with debt if cash and resource stockpiles are not available. Network Virus also prevents the scrapping of any building it affects and eliminated Holograms.

Dynamite: Demolishes the target building, forcing it to need to be repaired at the cost of half its construction resources and taking its full construction time. Dynamite is particularly fiendish to use against Offworld Markets as well as buildings that are far away from the headquarters, because the repair droid that does the repairs travels very slowly and will consequently take a lot of time when it needs to travel across half the map.

Mutiny: Takes control of the target building for 120 seconds. Mutinies can be used to counter-mutiny the Mutinies of your opponents. Mutiny is particularly fiendish when used in conjunction with Goon Squads, which are capable of being used on mutinied tiles and consequently countering counter Mutinies.

Underground Nuke: Underground Nukes reduce any low or medium resource pip to trace, cutting its base production value to 0.25 per second or to 1.0 per second (low) if used on a high resource pip. The presence of this black market effect is particularly tough on any non-Scientific companies who cannot afford to claim.

Auction Tile: This action will only appear in 4 player or more matches. This will cause the targeted unclaimed tile to go up for auction or (if targeted on one's own tile) auction one's own tile (in which case the owner can't bid in the auction itself). If a self-owned tile is being auctioned, the proceeds go to the company initiating the auction as CASH (and not debt relief), otherwise the proceeds will disappear into the ether.

Black market auctions are particularly useful when bribe a claims aren't available. This action is best used on tiles connected to your headquarters because they have the least value to your opponents and the most value to you. Because it triggers a black market cooldown like any other black market action, this action really needs to be worth it and the player who initiates it must simply be willing to let it go if the auction price goes too high.

This black market action can also enable you to weigh opponents down with debt if they bid too aggressively on auctions.

Auctioning one of your own tiles can be a good way to get the last bit of cash to win a very close buyout race. You could even sell off an Offworld Market (after getting a sendoff) in the desperate hope that someone is willing to pay tons of debt for it, activate an adrenaline boost on top of it to sweeten the deal.

MULE: An Easter egg for gamers who get the reference; produces 200 units of a primary resource over time. It is an okay action to use if you need a little more of a primary resource. However, it takes a long time to get there, a long time to get back and generally isn't that good and rarely appears in a match and hardly gets used when it does because it triggers the highly valuable black market timer and isn't all that good in general.

Several black market items are semi mandatory in multiplayer matches, meaning that either one or the other **MUST** be present in every multiplayer match and both of them could be. Goon Squads are **ALWAYS** available if at least two items would trigger it. Power Surges or EMPs, Mutinies or Dynamites and Pirates or Magnetic Storms are semi-mandatory.

d. Match Runout

Every day from 5:00 to 21:00 is daytime, during which Solar Panels, Ice Condensers and Dry Ice Condensers operate at their full capacity regardless of which hour of the day it is exactly. The match always starts at 6:00 on Mars. All debt interest is accrued every day at midnight, and the random auction is generated at 12:00 every day except Day 1. Every game second represents 10 minutes and every day lasts 148 real seconds (or 24 hours and 40 minutes in game time).

There are also several unannounced random effects in the game, Solar Flares (100 seconds of double solar Power & 50% increased condenser production), Dust Storms (50% less condenser and Farm production but double wind Power) and various other random events that increase or decrease the price of one or more resources.

e. Game Facts

The following are some basic facts of the game that don't fit into a particular category:

1. The market gets more volatile the fewer players are in a match. This means that prices will jump up and down much more readily in a 1v1 than in a 4v4 match. The degree by which the market is more or less stable is almost directly proportional to the number of players in game.
2. Wind Turbines produce a 0.4/s base amount of Power increased by every down-facing slope next to them, up to 1.0/s for 4 down-facing slopes.
3. The first founder always starts with a black market cooldown of 2 minutes. In a 1v1, the 2nd founder starts with 1 minute. For a larger number of players, the black market delay is shorter the later a company founds.
4. Tiles can spawn on a map containing multiple resources. When these multiple resources are Aluminum and Iron or Carbon and Silicon, a single Metal Mine or Quarry can produce both at the same time.
5. Freighters will transport between 20 and 60 units of a resource at a time. 20 units of the primary resources, 40 units of Fuel, Oxygen, Food or Steel or 60 units of Chemicals, Electronics or Glass will fit into a single Freighter.
6. Freighters consume 0.2 units of Fuel per second and move 1 tile a second. Mathematically this means that if a primary resource must travel 100 tiles, it takes 1 unit of Fuel per 1 unit of primary resource to transport. This particularly means that all

companies but particularly Scavengers need to be very close to primary resources. This also means that Water needs to be fairly close by because the Water being far away means that more Fuel needs to be to ship in the Water with which to make the Fuel with which to ship the Water. Secondary resources almost never consume enough Fuel for transport to worry about.

7. The general amount of value that can be extracted from a particular resource is based on its price. In a 2 player match, if a resource is 100\$ the total value that could be extracted from that resource at an instant (by selling out a large stockpile) is roughly 100\$ to the 2nd Power times 2, or 20,000\$. As a general rule, selling out a large stockpile of resources will give you the square of the price of that resource multiplied by the number of players in game. This number is further multiplied by a factor that gets closer to 1 (from 2) depending on the degree by which a resource is priced higher than 100\$. As a general rule, selling out a quantity of a resource that lowers the price of that resource by 50% will recover about 75% of what you would get for driving the price to \$1. This means selling out a stockpile completely isn't always a good idea when that causes the price to plummet from \$300 to \$1.
8. Every dollar that goes into a resource can be extracted again by selling that resource at some later point (not considering random events and Hacker Array activities).
9. 10k of debt makes it 20k cheaper to buy all 10 stock of a company all at once or 12k one at a time if all 10 stock were unowned.
10. It is possible to get 2 Offworld launches off of a competitor's Offworld Market by queuing up an Offworld send before activating your mutiny on their Offworld Market. A similar effect can be achieved for Hacker Arrays, Patent Labs and Optimization Centers.
11. Buying 6 unowned stock in a company generally takes about 7x the stock the price.
12. Back to back shortages have an effect roughly equivalent to 1/s resource consumption per player, up to 8/s in an 8p match.
13. 100k of company assets increases the stock price by 1, meaning that 100k of cash+resources makes it 20k more expensive to buy all of your company all 10 stock at once. The 100k to 1 relationship begins to diminishes after about 2,000k worth of assets are accrued.
14. HQ value starts at 600k in an 8p match, goes up to 1200k in a 1v1 and increases by 20% with every upgrade.
15. Stock prices will adjust over time from their current value to a target value by about 5% of the difference per second. Price changes due to stock trading are instant.
16. In 2p and 3p games. a black market purchase makes that item more expensive to purchase for the player making the purchase than for other players.

4. STRATEGY

a. Tactics

Tactics are the parts that make up a strategy. There are several tactics known to me that can be used to gain an advantage over your opponents:

Buying into a Shortage

When a random event or a Hacker Array causes a shortage the price of a resource automatically goes up, investing your spare wealth into that shortage will generally increase your wealth by between 15-50%. Buying into a shortage does bring a risk if someone else has a stockpile of the resource into which you're buying because they can tank the price of that resource and basically steal some of your wealth.

Overproducing & Stockpiling

This is simply producing way more than propriety would usually demand on a moment to moment basis. Overproducing is best done with primary resources that are adjacent to your HQ. Aluminum as an example is one of the easiest resources to stockpile and one of the best because you need only a limited amount to upgrade your HQ to level 5 and only a little bit extra for some additional buildings. Thus it can be very profitable to overproduce Aluminum at the start and generate a stockpile of 600 units and then re-use the tiles for something actually profitable.

Withholding Stockpiles

New players will often sell out all of their stockpiles even when this reduces the price of a resource to 1\$. It is almost always a bad idea to sell any resource for a price of 5\$ or less. Reducing the price of a resource by 66% by selling it down will net you about 85% of the wealth that can be generated by driving the price to \$1, preventing it from becoming much too affordable while still consolidating wealth.

Attacking a Goon Squad

If you know with certainty that an opponent has used a Goon Squad on a tile, you can use a fairly benign black market effect to remove it without risking being retaliated against with more painful black market effects. Good black market effects to attack Goon Squads with are Network Virus and Circuit Overload.

Stockpiling Wealth

Obviously stockpiling cash and resources is a good idea but it is also something that new players don't always do when they are in a rush to achieve HQ4 or HQ5. Sometimes upgrading costs 100k and the new claims you get by upgrading don't really have a way to pay you back the 100k that it costs you to upgrade. In that case, delaying the upgrade can be better.

Retooling

Changing some of your old production buildings into others should be a simple choice when the resources they are currently producing aren't worth a lot but the resources they could produce are. Retooling is best done when the required construction resources are cheap and the resources you're retooling for are expensive. This means that Expansive players are better at shifting around their production because they only use half the Steel to re-tool. The Nanotech patent also

makes this extremely easy for any company but especially for Scientific and Robotic whom have no construction bonuses.

Timed Auction Bidding

When auctions pop up, instantly bidding on them generally will influence (most) opponents to re-bid on an auction. If you insta-bid and rebid on an auction a couple times in a row and then drop out, you can manipulate some of your opponents into needlessly taking on too much debt. Conversely, waiting to bid will generally cause your opponents to let an auction go to you as long as they don't value it too much for themselves.

To best take advantage of this you need some experience with evaluating how much you can afford to bid on an auction because you'll need to make up your mind about what to do beforehand so you have the best opportunity to either saddle your opponent with a lot of debt or conversely win an auction cheap that is extremely valuable. Your bidding patterns can be a very useful tool.

Spreading Buildings Around

The black market is a common tool that will be used against you. To negate the effects of the black market it is generally better to split up your production buildings out over several areas around your headquarters to mitigate the effect that it will have. If the black market is particularly unfriendly to you (ie. it has EMPs and Power Surges and you don't have a Scientific company), having more than 3 tiles adjacent to each other will make the effects of the black market worse.

Investing Spare Cash

Whenever you have cash lying around, particularly during the early stages of a match, it is almost always best to invest it in Food or another resource that is continually going up in price. Doing this will increase the value of the cash you've just invested and make it more expensive for your opponents to use as life support. Naturally spare cash should only be invested in a resource that your opponents don't have stockpiled nor are producing to excess.

Never Always Auto Selling

Many times, holding on to Food instead of selling it is the better idea, like when you're the only one producing it. Naturally holding on to a resource means you have to monitor who is beginning to produce it so you can respond to that by using the black market against it or by selling out of the resource (and moving into another one) as soon as they get their production up.

Black Marketing the Early Bird

Using the black market can be a particularly favorable option for 2nd or late founders, particularly with a mutiny. Whoever founds first will under no circumstance be able to defend themselves against the black market effects of late founders until after 2 or so minutes pass. This is particularly true in big Free-For-Alls.

However, early game black market purchases should generally only be made upon reaching HQ level 2. Otherwise, the black market purchase may delay your HQ upgrade by too much time and hurt you more than it helps.

Fuel Debt to Cash

It is possible to transform a portion of debt into cash by remotely producing Fuel. This is done by simply making a patch of Fuel producing buildings 1 tile away from your headquarters while simultaneously consuming a lot of Fuel by shipping in a lot of resources from far away and selling the Fuel when it comes in. Magnetic Storms must be mitigated by sending shipments early and out of sync. This tactic is not viable when the black market provides Pirates.

Dynamite +

Dynamite is particularly fiendish to use against remote Glass Kilns because they can store up to 59 units of Glass before sending it. You can destroy 59 units of Glass and up to 40 units of Oxygen by detonating a remote Glass Kiln at the right time. Spies can be used to reveal the stockpiles, or you can simply try to time your dynamite according to when the Glass Kiln should have a lot stockpiled. Some opponents will send their shipments early, so don't always anticipate being able to do this.

Resource Probing

Do you want to know if someone has stockpiles in a resource? Look at their Cash + Resource value, Buy 200 units or more of it, look at their C+R again and see how much the difference is. This is particularly easy to do during auctions because the C+R value doesn't fluctuate much then due to the passage of time. Buying 200 units at a time can be risky because your opponent can always sell out of his stockpiles if he has them, so you need to be quick about it.

If you want to know at an instant and with accuracy, you could even initiate a black market auction to give you all the time you need to do some resource probing. Smaller purchases (or sales) can also be made and you can infer by the change of C+R how much or not your opponent has. A purchase of 10 units at 100\$ costs 1,000\$, thus if the C+R changes by 1,000\$ as a consequence of your 10-unit purchase, this means that your opponent has massive stockpiles. If the change is only 500\$, the stockpiles are considerably less. If there is no change, they have no stockpiles.

Reverse Psychology

Do you know your opponent never ever Mutinies your Geothermal Plant after they see the price of Goon Squads increase? Then hold onto your Goon Squad and use it elsewhere when and where they won't expect it. Naturally you need to be highly certain that your opponent won't try to make a run for something valuable of yours anyway (like when they've used spies).

Hiding your wealth

This can particularly important in big Free-For-Alls, where people's stock prices are low and majority buyout opportunities present themselves. When your Cash + Resources gets high enough a big flashing 50% (or more) will show up next to your name showing them how close you are to having enough wealth to be capable of buying them out by majority or all at once.

Nanotech can be used to hide your wealth by producing a lot of expensive structures like Pleasure Domes, Solar Panels or wind mills. The resources these structures are made of should however not have been stockpiled by any of your opponents because that will destroy the value of the resources out of which the buildings are made.

Stocks are another thing in which you can hide your wealth, by selling out of them later when a majority buyout opportunity presents itself. You do lose at least 10% of the investment if the stock price doesn't increase after you buy them.

Failing to Finish a Scavenger

In a Free-For-All, as a general rule, players will retaliate as soon as you start buying into their stock by buying into your stock too and by throwing a lot of black market effects at you. Because Scavengers have twice as much access to the black market, you need to be certain that you can finish your purchase of them quickly (or that the black market is too expensive to use) and decisively because kicking a Scavenger's hornets' nest is a bad idea if you can't finish them quickly. Failing to Finish a Scavenger is a losing tactic. Failing to quickly finish any player is generally a bad tactic in a Free-For-All.

Slow Rolling

Slow Rolling is when you don't upgrade at the earliest opportunity. Generally, it is always best to upgrade to HQ2 ASAP. However instantly upgrading beyond HQ2 should never be an automatic decision, especially when there aren't so many important tiles to claim nor profitable resources to produce. I'll often invest in a resource that the colony is consuming and that my opponents don't produce and instead constantly sell out of my construction resource until it effectively only costs me 10K or less in Cash+Resources to upgrade. In this way you'll enter HQ3 or 4 well prepared.

This is a particularly good tactic when you're in the lead and your opponent is producing the exact same construction resources as you. By selling out of them yourself and buying into Glass (to excess) when both you and your opponent require it, you make it much harder for them to also upgrade because the only resources they produce are worth less and less and the ones they need are worth more and more. By the time they are done selling out their construction resources to get the 40 or 60 units of precious Glass, your Aluminum and Steel upgrade cost may well be only \$3K and you'll have used your opponent's production to get some cheap extra construction resources.

Upgrade Surfing

What I mean by upgrade surfing is buying 1 or 2 stock in a company just before or at the exact moment that it upgrades its HQ and selling out when the stock price peaks. Stock prices will practically always increase in value by at least 10% (before day 4) whenever a company upgrades (especially the ones that do not generate debt). Selling a stock gives you 90% of the funds you paid for it, not counting any differences due to stock price changes or stock trading by other parties so you'll need at least a profit margin of 10%.

Buying more than 1 stock in other companies is like kicking a hornet's nest, so be careful. People can be very defensive of their stock. Purchasing your own stock before upgrading is a lot safer because your opponents (in Free-For-Alls) won't find it to be nearly as threatening as you buying into one them.

Selling out from 10 to 5 (or possibly even less, but with risk) of your own stock can give you the ability to buy another company out without risking getting bought out through majority.

If you want to buy one company's stock while selling another's at the same time, first buy the other stock, sell the first stock and then wait for the timer to recover in order to repeat.

Intel Gathering

Some players don't regularly check on their opponents often enough, but it needs to be done, especially in a 1v1 match. It is not enough to just see which resources you have and your opponents have. Ideally, your screen is hovering over your competitors' HQs 24/7.

Attacking Water Pumps

As of the time of writing, it is a very common mistake among players of all types to leave their Water Pumps completely undefended almost always. Take advantage of this by throwing an EMP, Power Surge or 2 underground nukes at them and buying up a lot of Water.

Emergency Cash

Are you short an amount of funds that if they existed would enable you to buy out an opponent before they buy you? Cancel Offworld sends, cancel patent acquisitions, cancel optimization upgrades, sell out of your stock (when safe) and sell all your resources with ctrl+shift+down.

Hologramming the Offworld

Using a hologram on your Offworld is a common and obviously good tactic. However, it is hard to successfully disguise an Offworld because there are a couple telltale signs that an Offworld is being built.

Because Offworld construction usually spikes the price of Steel, Glass and Electronics all at once, the spikes in the prices of these resources are highly noticeable, especially in a 1v1. Additionally, plenty of people monitor the wealth levels of their opponents by regularly mousing over their stock ticker. A decrease in wealth of 50-100k almost always indicates that someone is building an Offworld (if there is no other reason for their wealth to have vanished).

Additionally, you first need to have an empty plot to hologram if you don't want your opponent to have an opportunity to see the Offworld Market construction before it gets hologrammed.

Firstly, the problem of resource price spikes can be mitigated by slowly acquiring the required resources ahead of time. The second issue is very hard to disguise but you could first throw a black market effect on someone (to distract them) and then immediately place your Offworld, leaving a gap of time during which your wealth is probably not being monitored.

Thirdly even if your opponent(s) do see that you're obviously building a hidden Offworld Market somewhere, you can still disguise its location as long as no spies are available by deleting a patch of buildings and rebuilding them along with a hologrammed Offworld Market. You can also discourage the use of spies by buying up a bunch yourself.

b. 1v1 Skirmish

Founding

This applies to 1v1 matches on small maps with default settings. 1v1 automatch happens on a small map, reveal map enabled and all default settings. The 1st founder in a 1v1 usually takes on some starting debt or extra cash.

At the beginning, you will only have about 40 seconds to decide what the best founding location is and what its value is in terms of how much debt a found is worth taking on for in order to found 1st on it. Practically every 1st found is NEVER worth more than 50k debt because that is about the threshold of debt that puts you permanently into D levels of debt.

Every 1st found location should be valued according to the colony, the black market and its proximity to primary resources, especially Iron (or Carbon), Aluminum and Water. The spot that is the closest to each of these (especially Iron or Carbon and Aluminum) is almost always the most valuable. The further away your primary resources are, the more Fuel it costs to ship them in and the longer it takes for you to truly access them.

The biggest black market factor by far that influences founding are Pirates. With Pirates available, Scientific founds are only viable when they are next to a lot of Water (or Silicon) and Iron. The presence of both EMPs and Power surges makes non-Scientific companies less viable. Mutinies, Pirates and bribe a claims make Scavengers more viable. Underground nukes make non-Scientific founds less viable, but Robotic players can better deal with them because they use less resources overall.

Resource generation severely impacts the types of companies that are viable in any given match. The lack of Iron and Water triangles (or better) makes Scientific almost completely nonviable. The lack of high or medium Carbon pips next to other Carbon pips makes Scavenger much less viable. When the different primary resources are far apart, Scavenger in particular is less viable due to Fuel costs.

With the lack of medium or high Iron pips, Scientific is more viable because their buildings don't suffer from low quality resource pips.

Finally, the colony always spawns with several of one particular module type (in addition to habitats) at random. These will continually and exclusively consume one of the following: Glass, Power, Chemicals or Electronics as well as a little bit extra of the remaining 3 resources after it grows. Habitat modules next to the colony will always consume Food, Water and Oxygen in similar ratios to company headquarters.

Naturally, if the colony consumes Glass, non-Robotic companies are less viable (unless they plan to produce Silicon+Glass by HQ2 or 3). If it consumes Power, Scavengers will be more viable (because Quarries consume a lot less Power than Steel Mills+Iron mines). If the colony consumes Electronics, Robotic players are less viable. Chemicals consumption doesn't affect company viability a lot, but it is a slight positive for Scavengers because they (should) always have better access to Carbon to produce the Chemicals with. The colony will always consume Food, Water and Oxygen which makes life support almost always expensive by day 2 or 3.

The 3-point checklist for a found's value is in my opinion made up of three major facets: resource distribution, the black market and colony resource consumption (as I've described them in the previous paragraphs). Of these the first two resources and the black market are more important. An additional checkpoint can be Offworld Market prices. If Offworld prices are high, Expansive companies are better because they can build (and repair) Offworld Markets cheaper.

I find that it works the best for me to evaluate resource distribution by checking the high Iron and Carbon pips first (by clicking on them) and then checking how close they are to the high or medium Water and Aluminum tiles. Silicon is the least important in these considerations, unless

the colony primarily consumes Glass. High Iron or Carbon pips (adjacent to other similar pips) close to Aluminum, Water and Silicon are the most valuable but very rare.

After considering the black market and the colony too, you also have to consider what effect your found will have on the viability of other founding locations because your HQ found will prevent another HQ from founding within 4 tiles of any of the tiles that your HQ occupies. and additionally resource pips up to 4 tiles away from your HQ will be protected for 20, 40, 60 or 80 seconds depending on proximity to your founding location (meaning you're the only one that can claim them for that long). It is always disadvantageous to wait to found after the 1st founder has founded. It is also almost never viable to wait for resource pips to come out of the 20 to 80 second protection timer either. Because players should not wait, resource pips that come under a founder's protection generally (especially at 40+ seconds) can be assumed never to fall under the 2nd founder's control until HQ2 (and possibly never if the 1st founder has the opportunity to upgrade first).

Finally, you also have to consider that hills and cliffs block headquarters meaning that your founding location might on rare occasions be capable of blocking HQs from founding within up to 8 or so tiles of it.

Practically every found should be next to Iron (or Carbon for scav) unless that prevents you from claiming plenty of tiles next to your headquarters. The next best resources to be adjacent to are Aluminum and Water. Some consideration should also be given to clifftops, because clifftop tiles can be converted to produce quick and easy Power.

Considering how good the best possible 1st found can be and how bad it will make the 2nd found should finally determine how much debt the 1st founding location is worth taking on for. Many games between competent players are decided as soon as just one player has founded. It is absolutely paramount (this cannot be overemphasized) that you identify a 1st and 2nd founding location. If you do not identify a 2nd founding location before your opponent finds it is extremely likely you'll waste a lot of time or make a mis-found. On the other hand, you can also found way too early and your opponent will have a lot more Power in the random auctions and in how much debt they can spend on life support and upkeep.

Actually Founding

The found itself should always be with an appropriate headquarters: a Scavenger close to Carbon or any of the others close to Iron. In my experience an Expansive found should always start with 1 Metal Mine on a high Iron pip, another mine on a high Aluminum pip and a Steel Mill. A Scientific generally should start with 3 Steel Mills in a triangle (unless high Aluminum tiles are more than 2 tiles away from the HQ and likely to be taken by the 2nd founder) and adjacent to plenty of Water. As it happens Robotic generally should get a lot of Iron/Aluminum by founding on top of Iron and/or Aluminum and make 1 mine on a high metal pip and 2 Steel Mills off in another area adjacent to the headquarters but separated from the Metal Mine.

The 1st founder has the opportunity to use their spare cash (that which they don't need to upgrade) to spike the price of Aluminum or Steel to make it more expensive for their opponent to upgrade to HQ2. I usually wait until my opponent makes their 2nd found before buying into a resource that isn't adjacent to their headquarters because they will be forewarned of your market

manipulation and may find Robotic on a patch of Aluminum and sell out of overpriced Aluminum before you can respond.

Glass can be manipulated too but only after upgrading to HQ2.

The player generally should have thought up a plan on how to reach HQ3 (or above) ASAP with a 100% guarantee (i.e. in spite of the black market effects that your opponent could affordably and conceivably throw at you and in spite of the tiles they could block). This planning is generally too difficult to complete before you found but the effort should still be made after identifying the 1st and 2nd founding locations. HQ3 is always the top priority before considerations are made about how to finally win the game because almost no 1v1s ever are concluded before then nor is it ever a bad choice to reach HQ3 before anything else.

Upon reaching HQ2 Scientific and Scavenger players usually have enough tiles left over (after getting 3 Steel Mills or 2 Quarries and 1-2 Aluminum mines) to grab other important tiles, starting with Water and/or Food for Scientific. Other factions generally should wait until HQ3 before grabbing more than 1 Water tile and beginning to build life support or Glass.

Every little disadvantage in a 1v1 compounds many times over because there aren't any intrinsic disadvantages to being in the lead. The only disadvantage that could be considered intrinsic to the leading player is debt, because the 1st player to found usually starts out in the lead but also takes on a significant amount of debt. The leading player is generally the one with more wealth or a higher HQ level. The things that put a leading player in the lead can and should be used to put the runner up even further behind.

c. 4 player FFA

Founding

Founding in a 4 player Free-For-All is similar to how it is in a 1v1, except that you have to identify 4 viable founding locations instead of 2. If you don't identify more than 3 good founding locations within 40 seconds, found early at all times.

Due consideration again should be given to resource distribution, the black market and the colony. The colony has less relative effect on market prices with more players, especially when compared to 1v1 so no big expectations should be made of the resource that happens to be consumed by the colony. In FFA, more consideration can also be given to Offworld prices because Offworld Markets are regularly very profitable depending on which resources have the high Offworld prices. If Food or Fuel are high priced Offworld, that makes Offworld better because Fuel and Food require less tiles to be produced than Oxygen. If Oxygen is high and Dry Ice is available, that is also almost equally good because Oxygen then does not need Water. Chemicals or other resources could also randomly be expensive but the 3 Water based resources are the more common suspects.

The black market's negative effects should be given a little less consideration because a Free-For-All environment does not encourage attacking your opponents as much and so fewer players actually do. Spending money on purely negative black market effects put you behind and the other person behind but not the remaining 3rd parties that weren't affected by that black market

effect. This means that the black market should be used offensively less regularly compared than in a 1v1.

The most influential black market item in a FFA is the underground nuke (especially when some resources are rare) but combinations of other effects are also very important to notice before deciding which founds are and are not viable. The absence of holograms and presence of dynamite make Offworld Markets highly undesirable because they stick out like sore thumbs, making their owner an acquisition target and requiring a lot of Goon Squads to prevent from being constantly forced offline via the black market.

In my experience it is better to found slightly early (i.e. with around 20k debt) to ensure that you have a good founding location. As it stands as soon as someone founds almost everyone will follow moments afterward and you'll get left out in the cold if you haven't prepared. If you identify 4 viable locations (in a 4p FFA) you can afford to wait so you get earlier access to the black market and an extra claim. Scavengers in particular can found late when the black market offers things like free claims, Mutinies, Pirates and Adrenaline Boosts because black market items are cheaper in 4 or more player matches and thus they don't suffer from expensive black market prices until later.

Actually Founding

The types of founds you can make are more varied in a 4p FFA because you'll be able to rely on other people producing your construction resources frequently. In my opinion it is much riskier to rely on other people producing your construction resources for you, but it can work when no conventional founds are available. The types of founds that you can make in a 1v1 can also be made in FFAs but in FFAs you can also make other founds like the following:

Robotic: 2 Solar Panels 1 Silicon Quarry, particularly Powerful with sparse Silicon. Alternatively, 2 Wind Turbines off somewhere and 1 Carbon Quarry can also be done. The Robotic HQ must be placed on top of some Silicon or Carbon in order to have the resources with which to make the 2 Solar Panels or Wind Turbines.

Expansive: 1 Geothermal and 2 Aluminum mines adjacent to the HQ. The 1 Geothermal could be Goon Squaded and boosted afterward when possible. When Mutinies are available the Geothermal MUST be Goon Squaded because everyone will be using Mutinies on your Geothermal Plants.

The previous 2 founds can be properly made by selling off your starting resources and depending on your opponents for keeping your construction resources cheap so I don't recommend them if you can make a conventional found. Alternatively, construction resource pricing can be mitigated by claiming 1 high Iron tile and making 2 Steel Mills at home on HQ2 until the day that Steel becomes cheap enough not to produce yourself.

Scavenger: 1 Geothermal and 1-2 Quarries and perhaps an Aluminum mine. Naturally it is best to have free claims on the black market when you decide to make this found. You depend on the income of the Geothermal so it also needs to be protected ASAP.

Post-found, the top priority should be upgrading ASAP to HQ3 or 4 and then evaluating where you're at compared to everyone else and identifying who is a good acquisition target.

General

Some players will happily overproduce certain primary resources and sell them for cheap, when you notice this you can take advantage by buying up small stockpiles of them and under producing primary resources yourself (although you should still catch up in the long term unless they're your subsidiary).

It is generally a mistake to purchase another player until after they've made an Offworld or 2, have obtained optimization upgrades and/or have solid primary resource production. If you do purchase another player, even by majority and even for only 50-80k of funds, you usually still only get very little benefit and you'll be down a big sum of funds and you'll need a lot more funds to buy the rest of your remaining stock with.

The players that have the most Offworlds the earliest are the best targets to purchase because they'll make the most profitable subsidiaries while suffering from a lack of cash with which to defend themselves at least until 2 or 3 minutes after their Offworld finish construction. Usually, it is possible to keep an Offworld offline long enough to buy out its owner (by having 1 effect pre-purchased and triggering its Goon Squad next and 30 seconds later using the pre-purchased effect).

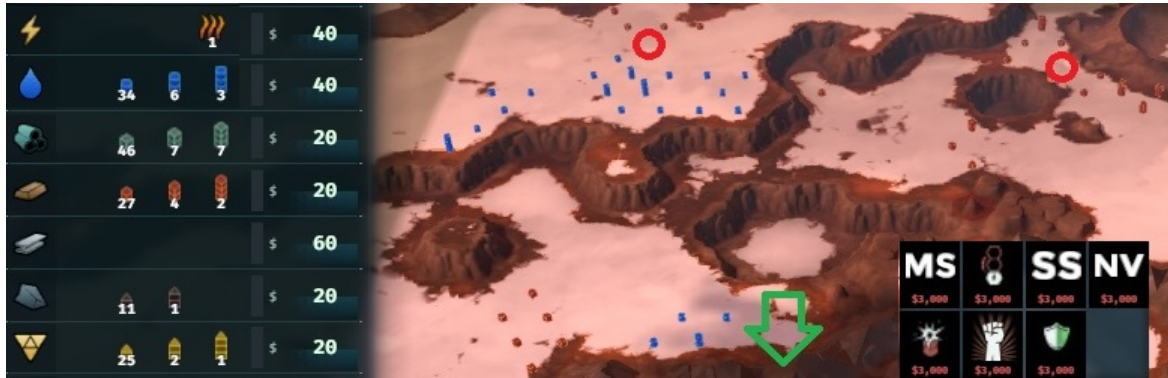
Once someone is bought out their Offworlds almost always are completely left alone and will generate tons of profit for their owner's owner.

If someone begins to buy into a lot of your stock you are almost always forced into a fight to the death with them, which can only be ended by the one or the other being bought out. People initiating an attack on you cannot be easily controlled, why they do what they do is sometimes beyond comprehension. When someone buys multiple of your stock, you absolutely have to defend yourself because anyone who does so will eventually accumulate the wealth they need to complete their attack if you do not defend. This can lose you the game because someone who attacks you may not make a good subsidiary and thus can enable a 3rd party to get the 4th party who may or not turn out to be a better subsidiary.

Luck plays a significant part in Free-For-Alls, but I find that most FFA players still approach the game methodically and selfishly (i.e. players generally only do things that benefit them, and not to spite others). This means that people don't usually use black market items against you unless they think that they benefit. For example, if you build 3 Farms after someone else already built 3 Farms, that person may use black market items against you because you started to directly compete with them in Food. You must consider whom you make your enemy when you decide to get into a resource.

5. EXAMPLES

What follows are some examples and what I think about how to deal with them in terms of founding. As always 1st and 2nd found must be identified within 40 seconds and you must be prepared to instantly found 2nd or late in the case your opponent(s) founds first because time is precious. Circles and arrows represent resources or founding locations. Iron = red, blue = Water, Alu = Green, etc

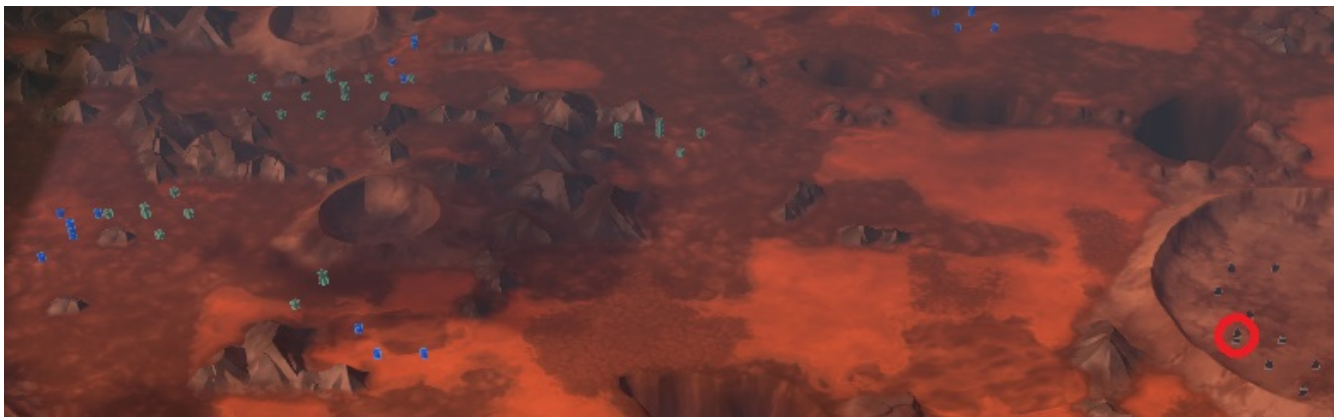


1v1 Map 1 Founding

Colony consumes: 0.8/s Power

The left hand circle is a good founding location for a Scientific player, especially because there are no Pirates on the black market. There is also only 1 Geothermal spot on the map. The right-hand patch of Iron pips is a good Expansive location, but due to the presence of nukes on the black market is not as valuable as the Scientific location on the left. The Scientific location doesn't suffer from the low quality of the Iron pips, is directly adjacent to the Water and Aluminum is close by in the direction of the green arrow. In this particular case the colony consumes 0.8 units of Power in addition to the usual amount of life support from habitats. The screenshot shows the northwest corner of the map, the Silicon is to the far southeast and it would require the teleportation patent to realistically use.

The Scientific spot I pointed out would be by far the most valuable but as always a 2nd founding location must be decided upon. In my opinion the Expansive spot is a good 2nd option. The high Aluminum pip to the south is alone and the nearest other Aluminum tiles are much farther away and less feasible. Founding as Expansive second would be undesirable because you'd be competing for the Aluminum, which the 1st founder will have better access to and is thus much more likely to be able to claim before you.



Fortunately, there is another possible 2nd founding location to the south (see screenshot). Besides the two I already presented and this one, there are no other viable ones. This end of the map has a patch of Carbon with a medium Carbon tile and plenty of Water/Aluminum. It is also closer to the Silicon to the east. Because there are underground nukes on the map the value of the 1st Scientific found is increased. However, the colony's Power consumption and the 1

Geothermal tile makes this 2nd founding location “foundable” because the only 2 options with which to make Power besides Geothermals are Wind Turbines and Solar Panels, which require a lot of Carbon or Silicon one of which a Scavenger will definitely have. The colony’s Power consumption also makes Scavenger better because Scavengers don’t use much Power.

I estimate that the Scientific spot would be worth about 35k worth of debt to found first on because of the presence of nukes on the black market and the relatively suboptimal 2nd founding location. The more skilled I’d guess my opponent to be, the closer to 35k debt I’d found.



1v1 Map 2 Founding

Colony consumes: 0.8/s Electronics

The Iron and the Water is further apart in this example and too far apart to directly connect to a Scientific HQ regardless of how exactly it is located. Fortunately, Pirates are absent so the Water tiles are still as good as adjacent to the headquarters. The 1st founder will still have to claim the 2 underlined Water tiles to prevent the 2nd founder from blocking off adjacency bonuses and to grab the only high Water tile on the map.

There are high Aluminum pips just outside the borders of the screenshot. If you look at the number of Water tiles that the map has you will realize that the patch of Water shown is just about the only Water on the entire map. As it stands there happens to be a lone Water pip to the north and two adjacent one’s northeast. Additionally, the map only has some Dry Ice to the south and no Water ice so Water will be a major issue on this map.

Assuming that the 1st founder finds Scientific between the Water and Iron, he will certainly reach HQ2 before the Water tiles come out of protection and thus will be able to use 2 of its spare claims to secure the 2 underlined Water pips which in turn will put the 2nd founder in a situation with poor access to Water.

The colony consumes Electronics, is east of the shown area and patches of Iron with high pips are just south of it. An Expansive found close to that Iron is viable but not most desirable which leaves Robotic an option as none of the Carbon pips are adjacent to any others (meaning Scavenger is not really a viable option). In almost any event, the 2nd founder will be 2nd to HQ2. Because of the Water advantage the Scientific 1st found is highly valuable as it will have a very big advantage over the 2nd founder; the 1st found should be worth about \$30k of debt.



1v1 Map 3 Founding

Colony consumes: 0.8/s Electronics

This map has 2 founding locations that I consider the best. The obvious 1st founding location is the one with the hybrid tiles. The Water pips are all medium or worse which favors the Robotic found. Also, the hybrid tiles and the founding location will provide the resources for an instant upgrade, the black market is very soft and Geothermal Plants are good because there aren't any Mutinies on the black market. The 1st founder has the option to hold on to the Aluminum until the 2nd founders starts producing his own or alternatively sell it (and 10 Electronics) early in order to upgrade instantly. An Expansive headquarters in this location is viable too. The first 3 buildings should probably be a Metal Mine on the medium Iron pip, another mine on the hybrid tile toward the headquarters and a Steel Mill to connect everything to the HQ.



The 2nd founding location in the image here is a Scientific spot next to 3 Silicon tiles and plenty of Iron. I consider it viable because of the lack of Pirates and thus the viability of remote life support production. It would be a more ideal to start next to the Water if it also had Iron. Additionally, the nearest Aluminum tiles are of low quality.

If it were possible to start adjacent to the high Silicon tiles just a little bit north without losing adjacency to the Iron, that would have been better because it would provide much better access to cheap solar Power (because of the higher quality Silicon). As it is, the low Silicon tiles are better for Glass Kilns because they do not have to hold a stock of Oxygen in order to function because they will connect to the headquarters.

I estimate that the 1st founding spot is worth about \$25k of debt because the 2nd founding spot isn't terribly bad either and because the 1st found's hybrid tiles aren't awfully good.

1v1 Map 4 Founding



Colony consumes: 0.8/s Electronics.

This map gives a long laundry list of viable founding locations. The east (circled) location shows what I believe to be the best founding location but the one to the far southwest (circled) is a decent contender.

The southwestern location could be founded with a Scientific headquarters, adjacent to the Iron and Silicon, but it will also have to claim an empty tile (probably best filled by an Optimization Center) if Pirates are to be prevented from abusing life support production. Its major problem is that it is far away from Aluminum. The contender location east of the colony is adjacent to Aluminum, Iron and Water, which is much better than being adjacent to Silicon, Iron but not Water.

Additionally, the black market contains 5 items that are directly beneficial to their user, and there are 2 adjacent medium Carbon tiles to the far north (circled) which means a Scavenger found between that Carbon and the Water+Aluminum is totally acceptable too and possibly highly

recommended. An argument could also be made for an Expansive found somewhere just west of the colony because of the presence of high Iron pips, especially if the other player founds non-Scavenger.

Because the east Scientific founding location starts next to Aluminum I think it makes a 1st found worth about 15k of debt. The 2nd found is best made by crushing the Aluminum north of the colony with Expansive and claiming a high Iron tile just west of there and 2 Steel Mills next to the headquarters.

The other 2 2nd finds I already described are viable too but they are vulnerable to Aluminum price manipulation by the 1st founder. However, if your opponent doesn't raise the price of Aluminum the other 2 finds are fine too as long as you manage to make 1 starting Aluminum mine and manage to buy your 60 extra Aluminum while the price is right.

4p FFA Map 1 Founding



Colony consumes: 1.2/s Electronics.

The green arrow shows a big patch of Aluminum to the west. The red circles show founding locations. There are two high Iron pips fairly close to each other and it is possible to prevent the other players from founding right next to them but it is not quite possible to block them off completely. Also, there are nukes on the black market which is particularly bad because all the Water on the map is far away from high Iron and high Carbon pips.

At first glance, this map looks reasonably Scavenger friendly because of the high/medium Carbon pips but this must be reconsidered upon realizing that the Water is very far away and very sparse (there are only 2 medium and 2 high Water tiles). Because of the fact that distance automatically means that the Water being harvested will be used to make the Fuel to ship the Water, the Water situation really is quite terrible. These are strong arguments for founding Robotic.

On the other hand, making a fancy Power play is also seemingly bad because the high Carbon pips certainly will encourage 1 or 2 players to found Scavenger (especially because the Iron situation doesn't support more than 2 Iron-companies) which means that Steel will cost a LOT because you need at least 2 Steel sellers to make a Power play really viable. Thirdly, only 3 Geothermal Plants are available.

There is a good Scavenger found to the northeast, having 1 high and 1 medium Carbon pips adjacent to each other, nearby Aluminum and just north of it a high Water pip and an adjacent low Water pip. I think that that is by far the best founding location and worth about 20-25k to found first on. Founding 2nd, 3rd or 4th next to one of the Iron pips as Robotic is probably the only other viable option. Because it can turn out that all of the remaining options will be blocked, I really recommend founding early.

Alternatively, a Scientific late found could be made next to the Water patch to the far northwest and 3 Farms made right off the bat but again this highly depends on there being 2 Steel producing companies in the match. It is possible to crush 4 Water tiles with the Scientific headquarters and claim the hi and medium Water tiles that remain and basically monopolize Water by obtaining the slant drilling patent and using underground nukes on Water tiles that aren't your own.

4p FFA Map 2 Founding



Colony consumes: 1.2/s Glass

This map has plenty of Water and plenty of Aluminum but a shortage of Iron and Carbon. The 2 red circles show where basically all the maps Iron is. Additionally, there is a high Carbon tile to the northeast (brown arrow) and a couple pairs of low Carbon tiles in 3 other areas (see the 2 brown arrows in the west and the brown circle). All of the map's Silicon is to the south and is all

low quality. This is a significant issue because the colony consumes Glass which requires Silicon. Finally, Geothermal locations are plentiful so Power should not become a major issue.

The black market has free claims but not much else to really support a Scavenger black market rush. Iron companies can start on or near the two Iron patches, and the other 2 players will probably have to make do with Carbon or forego making their own Steel. This makes early founding an advantageous strategy again because there are less than 3 good founding locations. The patches of Carbon make decent late Scavenger finds but if 2 Steel producers found before you, founding a late Power robot is fine too (2 Solar Panel, 1 Elemental Quarry) on the Silicon to the south.

The lack of Pirates on the black market makes Scientific very viable on this map. If a Scientific player can obtain teleportation they will also be able to generate a lot of profit from Glass.

4p FFA Map 3 Founding



Colony consumes: 1.2/s Electronics.

The map has plenty of Iron and Aluminum and one patch of high/medium Carbon to provide the building blocks for the usual founding options. Unfortunately, all of the Water patches don't have any high quality Water pips and they're very small. High Water pips exist but are on their own. To conclude, the Water situation is fairly unimpressive. Slant drilling is a very valuable patent on this map because there is no other (practical) way to squeeze enough Water out of this rock dry map. There is Silicon in the northeast and southwest corners of the map although not a huge amount of that either. Other than the circled Carbon, the remaining Carbon tiles are alone.

Naturally, a Scavenger found in between the Aluminum and Carbon is an option, as well as Robotic or Expansive founds almost anywhere in between the Water and construction resources. There also happens to be a low Iron/alu hybrid tile to the west that is adjacent to a high Iron tile,

which would be an excellent founding location for an Expansive or Robotic found. Robotic is naturally more favored on this map because the Water situation is fairly terrible and because they can use their trait to boost the production of high quality but lonely Water Pumps by deploying Wind Turbines or Solar Panels adjacent to lonely Water Pumps.

The black market is fairly timid this match as it doesn't provide a lot of direct attacks to throw at one's competition. The lack of Pirates favor a Scientific found but the map itself does not. There is not one found that is overwhelmingly better than the other but care must still be taken so that you don't get locked out of Water (which would happen if everyone else claims the rest of the good Water) before you reach HQ level 3. As such I think that it is better to voluntarily found late in order to get an extra free claim and be able to buy a cheap 2nd from the black market.

4p FFA Map 4 Founding



Colony consumes: 1.2/s Glass consumption.

There is plenty of Iron to go around on this map. There is a lackluster amount of Carbon too, which would typically mean that Scavenger is a bad choice, but the black market is looking very well stocked with plenty of offensive effects, two of which can feed a Scavenger's early game efforts directly. The Water situation is slightly unique because all of the map's quality Iron is southwest whereas all the maps Water is all northeast. The Water is laid out in 3 reasonable patches each with at least 1 medium Water pip and one which has 1 medium and 1 high Water pip. There is 1 high Aluminum pip in a big patch near the Iron but 2 others near the Water to the northwest. There are 9 Geothermal spots on the map.

The colony consumes Glass and the Silicon situation is fairly dire. There is a pair of low Silicon tiles in midst of all the Iron and 2 Silicon couples north and also east of the colony (in the top right corner of the image). This means that Glass is nearly guaranteed to become very expensive (and thus profitable) even though the Silicon pairs are of low quality.

It is fairly safe to assume that 3 Iron companies will found in the southwest corner because that is a fairly safe thing to do, as Expansive or Robotic. The distance to the Water is a fairly big problem. Scientific isn't very good on this map because there are Pirates on the black market and the Water isn't adjacent to any potential founding location. Expansive and Robotic have the best time coping with distances and so are better on this distance heavy map. It should be quite safe to expect that the other 3 players will choose 2 or 3 Iron companies to found on this map, each of them producing their own Steel. If you see 2-3 Steel producers found, it is very safe to play the Power Expansive in the north east by founding Expansive, building 1 Geothermal Plant + 2 Aluminum mines or 1 Aluminum mine and 1 Water Pump (a Water Pump on HQ1 is reasonable this time because there is only 1 high Water tile on this particular map). As usual, the Geothermal should be protected as soon as possible. By HQ2, at least 2 Farms should be built.

The Expansive northeast Power play would be my favorite tactic because I think that that it is an unexpected way to play in addition to actually being good in this specific environment.

The patch of Iron the most northeast is almost adjacent to the colony and is actually fairly close to the map's Water. Because that location is so close to the Water, it should be the 1st founding location of whoever it is that founds first. The 2nd and 3rd founding locations should be closely behind it towards the southeast.

The 1st found should be worth about 10k of founding debt because no specific founding location is overwhelmingly better than any other. There is still the Scavenger founding location that could be utilized effectively by someone who knows how to use the black market, but it remains sketchy because the Carbon is of low/medium quality.

6. FINAL WORDS

*In general, to become good at this game I think you need to play 50% and study 50%. Before clicking the "play" button remind yourself what your founding priorities are and what you need to know in order to make the best plan correctly. Also remind yourself that both you and your opponents will face the same initial circumstances, good or bad, as you do so do not despair if the game throws something at you that doesn't look pretty.

I wish you good times with the game.

CAMPAIGN

By Michael “Zultar” Califf

OVERVIEW

Offworld Trading Company's Campaign is a very different experience from the standard skirmish matches. Instead of a mad dash to the finish line, chasing after the money on the map, the campaign is about building a specialized corporation over the course of several missions, forcing the maps to make money for you. In between these missions you'll be able to spend your earnings on engineers and managers for your corporation, eventually turning your fledgling start-up into the dominant force on the red planet. However, be careful not to fall too far behind. Unsuccessful corporations (or even those that are just less successful than everyone else) will be eliminated as the campaign progresses as they have proven that they don't have what it takes to survive in this unforgiving environment. In the final mission, you'll have to assert yourself as the paramount entrepreneur on Mars. The campaign ends in one final skirmish match, with each remaining CEO bringing their economic strength to bear against the others. Only one CEO leaves this mission victorious, having established a monopoly on the Martian market.

7 SOLS

All that said, there's a lot to cover before you can become a successful CEO in a Martian campaign. The missions themselves are something you're unlikely to be familiar with. Thankfully, there is a way for you to get the experience you need, playing the “7 Sols” option in a skirmish match. This option can be enabled in the “Game Rules” menu when setting up the skirmish. It should be noted that this option varies slightly from the campaign missions themselves; however, the differences are mostly due to the campaign being an extended experience and should be easy to adjust to once the basics are understood.

Initially when launching a 7 Sols skirmish, things should look very familiar. Resources, buildings, and money are all on the left. Black Market in the bottom-right corner. Stock in the top-right. The stock interface itself is where you'll notice the first major change. Stock Price is still there, but the buy/sell button for each company has been replaced with a number. We'll come back to this number in a moment because you'll notice that without a buy/sell button, you can't acquire your opponents to win the game through the standard skirmish rules. This is because in 7 Sols, your objective is to have the highest stock price at the end of seven Martian days (sols). Everyone survives in this mode until the very last moment, doing everything they can to acquire as many assets as they can to become the most valuable company in the region. With this in mind, let's head back to that little number next to your stock price.

This new number indicates how much “Colony Stock” each corporation owns. Colony Stock is acquired by purchasing modules (neutral buildings) for the Neutral Colony, the foundation for the market in Offworld Trading Company (this colony is also what your camera starts over every game). You'll immediately ask yourself why on Mars you would invest money in this Colony instead in your own company, but it turns out there are a couple of reasons this investment can

be a strong choice. The first and most obvious reason is that each Colony Stock you own will increase your stock price by 5%. As the goal in 7 Sols is to have the highest stock price, this is clearly an important benefit. Another important thing to consider is that the modules you're adding to the map will consume resources. If you purchase the right modules – preferably those that are consuming the resources you're producing – you can end up increasing your profits simply by driving demand sky-high.

The interface for purchasing Neutral Colony modules is located just below the stock interface. There you'll see four modules listed. These will always include Habitats, where the Neutral Colony houses its people. Also available will be three potential workplace modules for the Colony's residents. These can include Laboratories, Machine Shops, Offices, or Warehouses. Which of these are available is dependent on the Neutral Colony's sponsor (America, European Union, Russia, or China). Cost, Consumption, and Availability of each building are listed on the table below.

Module	Cost	Consumption (per sec.)	Availability
Habitat	100 Aluminum	.1 Water .15 Food .05 Oxygen	All Colonies
Laboratory	40 Electronics	.2 Chemicals	EU, RU, US
Machine Shop	40 Chemicals	.2 Electronics	CN, EU, RU
Office	40 Glass	.2 Power	CN, RU, US
Warehouse	60 Steel	.2 Glass	CN, EU, US

It should be noted that a module will only consume resources if a colonist moves in to use it, and colonists will only move in if they have both a place to live and a place to work. Also, all modules include a base Cash cost in addition to their Resource cost. This cost will increase as modules are purchased. This makes when and what modules to invest in an important question for the duration of a 7 Sols match.

CAMPAIGN

There are a few differences between a 7 Sols match and a standard campaign mission. The most important of these is that in the campaign, the victor is not the corporation with the highest stock price. Instead, the player who owns the most Colony Stock is declared the winner and receives the Perk Reward for future campaign missions. This reward is listed just below the neutral buildings interface. In addition to this, the colony now has a Future Income value. This value equals \$20,000 for each colonist that ends the mission at the Colony. Finally, instead of receiving a 5% stock boost when purchasing a module, you will simply increase the percentage of the colony that you own. This is important, as it will increase the percentage of the colony's Future Income value that you receive after each mission for the rest of the campaign (including the

current mission). The amount you would expect to receive based on the current game-state is displayed as “Estimated Future Income.”

CAMPAIGN FLOW

Your Offworld Trading Company Campaign will begin by setting whatever options you would like to use (including difficulty level) and selecting a CEO. If you're unsure what difficulty level to use it is recommended you start on “Assistant” or “Employee,” which will provide you with some small bonuses as you're first learning to play. There are nine CEOs, all with their own advantages and disadvantages. We'll come back to those later, as to understand the CEOs first you'll need to understand how the campaign works, but for now know that this is simply whose shoes you are stepping into in order to run your company.

After selecting your CEO you will be taken to the “Share & Earnings Report” screen. This is where you manage your company between missions. There is a wealth of information about your corporation and your competitors available here; you'll want to make sure to familiarize yourself with the screen quickly. The first thing you'll likely notice here is Mars itself, taking a large chunk of the screen and showing you where your next three potential missions will take place. To the left of Mars you'll see the missions listed, along with images indicating what Reward you'll receive for completing each mission (potential Rewards listed in the “Campaign Perks” section of this guide). It should be noted that you'll only be able to compete in one of these missions, the other two will be completed by some of your AI competitors while you're busy with your choice. Selecting a mission will cause information about it to appear in the bottom-left corner of the screen. This includes details about what type of colony will be present, what sort of map the mission takes place on, what black market purchases will be available, who your competitors will be, and again what the reward is for winning the mission.

That covers the missions, but there's plenty more left to see on this screen. Up and to the left of Mars you'll see the Stock Price of each corporation, listed in descending order by value. This can be considered a general ranking of how well each corporation has performed up to this point in the campaign. That is to say, corporations that have been doing well are likely to have more assets, and therefore a higher stock price, than corporations that have been struggling. Stock Price itself has a base value of \$3.40, which will then be increased by cash on hand, value of Headquarters and Structures you've built each mission, and value of Labor you've acquired across the campaign (discussed below in this section). Debt on the other hand will significantly harm your Stock Price, with the degree of harm being dependent on what difficulty level you've selected. Stock Price is not particularly important at the start of the campaign, as the first two missions take place during Growth Rounds where no one can be eliminated from the campaign. However, Elimination Rounds start on week 3, and at the end of each mission during an elimination round one corporation is, as may be expected, eliminated - the corporation with the lowest stock price. The exception to this is that if a corporation has won one of the missions available that round, they are protected from elimination, so the corporation that is eliminated will have the lowest stock price among the companies that did not win that particular round.

To the bottom right of Mars you will see your Cash, Debt, and Revenue. You'll start the campaign with \$600k Cash, \$0 Debt, and \$200k Revenue. Cash is just that, cash on hand that

you may spend as you see fit at the available Labor Pool (covered later in this section). This is generally how you will expand your corporation's capabilities. You'll receive more cash at the end of each mission, equal to the amount of Cash you had the end of the mission, the value of Resources you had at the end of each mission, and your Revenue after the mission added together. Any outstanding debt you have will then be subtracted from your cash immediately, whether it's from the mission you just completed or left over from a previous round. If you do not have enough cash to cover your debt, your debt will carry over into the next round once again. If you do have cash left over at this point, you will once again be free to spend it on expanding your corporation. Revenue was discussed in the 7 Sols section: it is simply the value that all Neutral Colonies together are providing you at the end of each mission, based on your contributions to those Colonies during their respective missions.

Finally, in the bottom portion of the screen you will see your Labor Force. These include Engineers, Manager, Scientists, and Astronauts that are working for you and providing benefits to your corporation. This in particular is where the Campaign differentiates itself from skirmish games, and where CEOs clearly differ from each other. The Engineers displayed here will show you what standard buildings you are allowed to build, and how effectively these buildings will operate. If you do not have an engineer to operate a particular building, you will not be able to build that building. The first engineer that you acquire will give you access to the building, which will then operate at 50% of its normal capacity. Each additional Engineer will increase this capacity another 25%. So once you have 3 engineers, your building will be operating as expected in a skirmish game, and any additional Engineers will continue to improve it beyond this point. It should be noted that Engineers affect both consumption and production, meaning they will not inherently improve a building's efficiency, just its speed. It is also important to note that Engineers are attached to buildings, not resources. So any reactor Engineers you have will do nothing to improve your oxygen production from solar condensers, the same way that your wind turbine Engineers will not improve your geothermal plants.

Advanced buildings, such as the Pleasure Dome, do not use Engineers. They use Scientists (Patent Lab), Technicians (Optimization Center), Coders (Hacker Array), Astronauts (Offworld Market), and for the Pleasure Dome itself, Managers. Together these are referred to as Specialists. Pleasure Dome Managers function very similarly to building Engineers, the first Manager unlocks the Dome and each additional Manager improves its income by 25%. However, this is the only advanced building that works this way. For all other advanced buildings, you are allowed to construct one building per mission for each operator you have for that building. This means that for Optimization Center, which requires Technicians, if you have one Technician you will be able to build one Optimization Center each mission. If you have three Technicians you will be able to build three Optimization Centers. This rule applies to all advanced buildings that aren't the Pleasure Dome.

The last little bit to this section of the screen is your “Perks” section. Most importantly, this will show you what sort of Headquarters your CEO is allowed to use. It will also show you any bonuses you currently have access to. This can include Perks such as free patents, resource shipments on upgrade, faster patents or optimization research during missions, and so much more. These will be covered in more detail in the “Campaign Perks” section of this guide.

By now, you'll be wondering how it is you acquire these Engineers, Managers, and Perks you've been getting told so much about. As it turns out, that's what the "Hire Staff" button in the bottom-left corner of the screen is for. Select which mission you would like to participate in, then press this button to be taken to the Hire Staff screen. Here you will be able to see what Workers (Engineers and advanced building Operators) and Perks are available for you to purchase this mission. Only 12 Workers and 4 Perks will be available, so you may not have access to everything you would like. For each Worker and Perk available (assuming you have the money), you will be able to decide if you would like to Contract the Worker or Hire the Worker. Contracting a Worker or Perk is generally very cheap, but it means that Worker will only stick around for one mission. Hiring the Worker is instead quite expensive, but means that the Worker will stay with you for the rest of the campaign. It will be up to you to decide which of these options is best for your current situation. Also listed here are the starting values of each resource for the next mission. These numbers are based on how much the resources were worth at the end of the previous round, and you should keep them in mind when deciding what you need from the Labor Pool. After you're finished hiring workers, you can hit the "Launch Business" button, which will take you to an overview of the next mission, including details about what capabilities your competition will have access to. From here, hit "Play Now" to begin the mission.

To summarize the above, the Campaign will follow this path each round.

Receive Income → Pay Debt → Eliminate Lowest Stock Corporation (Rounds 3-6) → Select Mission → Hire Workers → Review Competition → Start Mission → Play Mission → Receive Income

This will continue until the Final Round (7). The Final Round will then play out with standard skirmish win conditions of buying out the entire competition. If you succeed in this, you will have won the Campaign.

CEOs

In a skirmish game, everyone has the exact same abilities and options available. This is not the case in the campaign. Right from the start you will choose which CEO you would like to be as you vie for control of Mars. There are nine options, and each has its own advantages and disadvantages. Here you'll find an overview of each CEO.

Maisie Song

Maisie Song is the simplest CEO on the list. She is the only CEO that begins the game with Engineers for all non-power buildings, with easy-to-use Solar Panels being her power source. Maisie's starting bonus is a free claim, which she receives every mission upon founding her HQ, which at standard difficulty leaves her with 4 claims instead of 3 at the start of the mission. This makes her a bit quicker out of the gate than other Expansive competitors, and it is a strong, consistent bonus in each and every mission. The difficulty for Maisie lies in her jack-of-all-trades nature, she has no mastery over any particular market and will need to acquire Engineers over the course of the campaign to truly compete in the campaign's important markets. Maisie also begins the game with no advanced buildings, which leaves her relatively directionless when it comes to designing her corporation. However, this can be turned to an advantage as Maisie can

simply jump on the first opportunity that presents itself (such as a mission Reward that provides faster optimizations).

CEO Difficulty: Normal
Starting Headquarters: Expansive
Starting Bonus: Extra Claim
Engineer Gap: None
Power Building: Solar Panel
Advanced Building: None

Reni-6

For most players, Reni-6 will be the easiest CEO to handle. As a robotic CEO, his biggest strength comes from having no life-support costs. This is very important in a campaign setting as you are forced to pay back all of the debt that you can at the end of each round. This literally adds hundreds of thousands of dollars to a robotic player's war chest over the course of a campaign. It also makes it easy for Reni-6 to make money with his starting bonus, Superconductor. Superconductor also helps Reni-6 handle his low claim count as a robot, requiring only a couple of well-placed Wind Turbines to keep plenty of power flowing. Reni-6's weakness also comes from his robotic nature; he begins the game with very poor life-support production and no Glass Kiln Engineer. This means he can't easily rely on Warehouses as his workplace module of choice, but his strong Electronics and Chemical production more than make up for this. These two resources can be used effectively together with either Laboratories or Machine Shops, one of which will always be available to Reni-6.

CEO Difficulty: Easy
Starting Headquarters: Robotic
Starting Bonus: Superconductor
Engineer Gap: Glass Kiln
Power Building: Wind Turbine
Advanced Building: None

Frank Dawson

Frank Dawson will be an enjoyable CEO if you enjoy ruining everyone else's day. He is a scavenger by default, which naturally has fast access to the Black Market (which usually remains powerful through each round as the rounds have a set time limit and prices reset the next round). On top of this, Frank receives a free, random Black Market item each time he upgrades his HQ, resulting in 4 free items in a game where he reaches maximum HQ level. Frank also begins the game with a strong spread of Engineers, lacking access only to Steel Mills. While this leaves him cutoff from easy Warehouses, and his weaker Chemical and Electronics production don't encourage Machine Shops and Laboratories, Offices remain a strong workplace Module for Frank with his respectable Glass and Power production. This said, Frank is not without weakness. Being a scavenger can make things hard for Frank if Carbon is simply not as plentiful as Iron, and he's sure to hit a couple of regions without any powerful Carbon sources before the campaign is done. Frank also lacks an Advanced Building, relying on his resource diversity and Black Market advantage to keep his opponents in check. If he can get over these minor speed bumps, Frank can be an extremely power CEO to have on your side.

CEO Difficulty: Normal
Starting Headquarters: Scavenger
Starting Bonus: Free Black Market Sabotage per upgrade
Engineer Gap: Steel Mill
Power Building: Wind Turbine
Advanced Building: None

Ilana Kamat

Ilana Kamat is the first truly difficult CEO to manage, and possibly the most difficult of the lot. As a scientist, Ilana relies very heavily on finding an excellent location to found on (usually with large patches of iron and water nearby). This can be a very difficult thing to do quickly in the campaign, which uses the scanning mode for revealing the map (rather than the reveal map mode that is often seen in multiplayer). And even if you take the time to scour the map for a strong location, there's no guarantee you'll find one, as on many maps it simply doesn't exist. This means that Ilana will often have to simply make do with the best she can find, an uphill battle to say the least. Thankfully for Ilana, her starting bonus is a free Patent Lab, which she will receive upon reaching Level 2 each mission. This will allow her to quickly gain access to tools such as Teleportation and Slant Drilling, helping her effectively use even a very weak starting location. Unfortunately, this bonus only helps so much. The influential Patents are generally quite expensive in both time and resources, so this is not a simple quick-fix to a poor found. Ilana can make up for these difficulties on those few maps well suited to her abilities, especially those that are poor in Carbon. With her ability to effectively produce chemicals and the guarantee that she'll be consuming them, Carbon Scrubbing can be a very useful tool when trying to find a market to exploit. However, strong maps are not common, and Ilana will need to squeeze every bit of profit she can out of them if she's to survive the entire duration of the campaign. One final detail is that Ilana has very weak primary resource production, and is completely incapable of gathering Water, Silicon, and Carbon at the start of the campaign. This prevents her from easily using the ability to found another HQ as her raw resource production is not strong enough to sustain a non-science HQ.

CEO Difficulty: Very Hard
Starting Headquarters: Scientific.
Starting Bonus: Free Patent Lab (HQ2)
Engineer Gap: Water Pump, Elemental Quarry
Power Building: Solar Panels
Advanced Building: None (Patent Lab from Starting Bonus)

Anastasia Xu

Anastasia Xu is where things go off the rails. This CEO is unlike any other. Right off the bat, Anastasia has access to all four HQ types from the start of the campaign. She is also completely unable to make power, and must acquire Engineers for that through the campaign if she would like to unlock power. To make up for this, Anastasia may consume fuel instead of power, and will whenever power is more expensive than fuel. Unfortunately for Anastasia, producing enough fuel to overcome the lack of power is very difficult, and she will struggle with this through the early stages of the campaign. Anastasia's final strength is the two Pleasure Dome Managers she starts each campaign with. Once again, this is a difficult bonus to use, as it virtually requires that you play missions with as many opponents as possible, and will usually

only be valuable in the late stages of each mission. The true power of Anastasia lies in her flexibility, where she has the tools to use any of the corporation types, and handle any resource/colony combination thrown at her. However, she is not well equipped to excel in any of these situations. Anastasia is likely to be a difficult experience for even veteran players; however, the satisfaction for succeeding in such a unique situation is unmatched in Offworld Trading Company's campaign.

CEO Difficulty: Very Hard

Starting Headquarters: Any

Starting Bonus: Can use Fuel for Power

Engineer Gap: Ice Condenser, Chemical Lab

Power Building: None

Advanced Building: Pleasure Dome (x2)

Paulo Rubini

After the insanity that is Anastasia, Paulo Rubini will feel downright conventional, though he certainly has his own unique quirks. Paulo is another Expansive CEO and has a strong setup to support this. While he does lack both Chemical and Electronics Engineers, he has solid production through the rest of his resources, which allows him to upgrade swiftly and take advantage of his Expansive headquarters. The highlight of these Engineers is Paulo's Power as he is the only CEO to begin a campaign with access to Geothermal Plants. However, Geothermal Vents (required to place the plants on) are not present on every map. Paulo starting bonus comes into play here; he begins the game with Cold Fusion. Allowing him to consume water instead of power, Cold Fusion will help Paulo through the dark maps while also guaranteeing for him that water resources will be a good source of money, as he'll be consuming water constantly and driving the prices high. This has the added bonus of focusing Paulo, giving him a clear direction to steer his corporation as he moves through the campaign (life-support, which is so heavily dependent on water). The cherry on top for Rubini is his Goon Squad, which he receives every mission at HQ level 2. This allows Paulo to protect his valuable Geotherms easily, or help keep any other piece of production he deems valuable functional through his opponent's attacks. One small weakness for Paulo is his production for workplace modules, he'll be highly dependent on Warehouses and Offices, and will likely need an extra Glass Engineer or two to truly be able to afford them.

CEO Difficulty: Normal

Starting Headquarters: Expansive

Starting Bonus: Cold Fusion, Good Squad

Engineer Gap: Chemical Lab, Electronics Factory

Power Building: Solar Panel

Advanced Building: None

Joji-5

Joji-5 is our second robotic overlord, and is quite unique among his peers. Joji-5 starts the campaign with an Offworld Market Astronaut, giving him access to an Offworld Market each mission. However, he still has to build this market each mission, so his entire economy is geared in this direction. He has access to Fuel, Steel, Glass, Electronics, and all Primary Resources, giving him exactly the tools he needs to upgrade to and construct this market, and not an

Engineer more. He even gets an electronics shipment each time he upgrades his HQ to allow him to reach his Offworld Market faster. This leaves Joji-5's core decision-making outside of the actual mission, in the Earnings Report screen. He must be careful selecting a mission, particularly focusing on what sort of Black Market is available for his opponents to punish any Offworld Market he manages to construct. Mission Rewards will also be very important to Joji-5, who should always be looking for Perks like Goon Squads and Faster Launches. If Joji-5 can pick his missions carefully, find Steel and Glass Engineers in the Labor Pool (for those faster-launch Warehouses), and get a little lucky with available Mission Rewards, he can be very successful in this Martian campaign.

CEO Difficulty: Normal

Starting Headquarters: Robotic

Starting Bonus: Electronics Shipment

Engineer Gap: Greenhouse Farm, Chemical Lab

Power Building: Solar Panel

Advanced Building: Offworld Market

Sam Moreno

Sam Moreno is another Scavenger CEO, though she is quite different from her counterpart. Rather than focusing on Sabotage, Sam centers on growth. Upon founding her HQ and every time she upgrades it, Sam receives two MULEs. This allows Sam to collect a truly absurd number of primary resources from the ground, and in most missions she will progress through HQ upgrades faster than any of her competitors. This is, of course, assuming the map Sam has found herself on has enough Carbon to support a budding Scavenger company. Sadly, Sam doesn't have much to do after she finishes her upgrades. Sam has no advanced buildings and cannot make Steel Mills, Chemical Labs, or Electronics Factories when the campaign begins. In addition to this, Sam only has one Water Pump Engineer, meaning that after she's used up her MULEs she'll have a hard time keeping her life-support production profitable. After Sam fills these gaps, she can become a dominant player in the market, but until she acquires these extra Engineers life can be a struggle for our Scavenger CEO.

CEO Difficulty: Hard

Starting Headquarters: Scavenger

Starting Bonus: 2x Mule per HQ level (including found)

Engineer Gap: Steel Mill, Chemical Lab, Electronics Factory

Power Building: Wind Turbine

Advanced Building: None

Silas Crichton

Silas Crichton is our final CEO, and once again comes with his own unique skill set. Crichton is a scientist, and therefore suffers from many of the same weaknesses as Ilana Kamat. He relies on strong found positions early and doesn't immediately have any benefit to cover this up. The strength of Silas lies in the second half of the campaign. This is because Silas begins the campaign with a free Optimization Center, which he will receive at HQ level 2 each mission. This ability is relatively weak early in the campaign as prices are low and CEOs struggle to make large quantities of resources. The trick to the Optimization Center is that it magnifies each Engineer that Silas acquire because the Center has the potential to double the output of whatever

resource it is being used to upgrade. If Silas has one Engineer for a building, such as his early game Farms, he can upgrade Food so that his Farms produce as much Food as Farms that have three Engineers. If he already has three Farm Engineers, his Farms could potentially produce as much Food as Farms with seven Engineers, at double the efficiency. This formula is consistent, with the maximum potential production being $2X + 1$ Engineers, where X is Engineers hired. The bigger that X is, the better Crichton's bonus. Crichton does have a little more going for him than just his Optimization Center. He has a stronger primary Resource Engineer distribution than Ilana, allowing him to more easily expand into an alternate HQ, which in turn makes him more resilient to bad luck when it comes to resource distribution on maps. That said, Silas still takes a lot of effort to get off the ground, and his weak power production only makes things more difficult.

CEO Difficulty: Hard

Starting Headquarters: Scientific

Starting Bonus: Optimization Center

Engineer Gap: Electronics Factory

Power Building: Solar Panel

Advanced Building: None (Optimization Center from Starting Bonus)

CAMPAIGN PERKS

Below is a list of all Rewards and Bonuses you can earn or purchase while playing Offworld Trading Company's campaign.

Unlock HQ Perks

Unlock HQ Perks may appear as Mission Rewards, Campaign Events, or in the Labor Pool. If acquired from a Mission Reward or Campaign Event, the unlock will be permanent. If purchased from the Labor Pool, the unlock will last for one round if contracted, and will be permanent if hired.

Unlock Expansive – Unlocks the Expansive HQ

Unlock Robotic – Unlocks the Robotic HQ

Unlock Scavenger – Unlocks the Scavenger HQ

Unlock Scientific – Unlocks the Scientific HQ

CEO Specific Perks

These are the unique Perks that are only obtainable by beginning the campaign as the indicated CEO.

Extra Claim (Maisie Song) – Receive one free claim on found

Free Sabotage (Frank Dawson) – Receive one free Black Market Sabotage with each HQ upgrade

Free Mule (Sam Moreno) – Receive two free MULEs when founding or upgrading your HQ

Fuel Energy (Anastasia Xu) – Use Fuel to power buildings when it is less expensive than Energy

Advanced Building Reward Perks

These Perks will only appear as Rewards for winning a mission. They are quite valuable to the right CEO and often worth whatever it takes to acquire them.

Cheaper Patents – Halve the Chemical cost of Patents

Faster Patents – Halve the time it takes to research Patents

Cheaper Optimizations – Halve the Chemical cost of Optimizations

Faster Optimizations – Halve the time it takes to research Optimizations

Faster Espionage – Halve the time it takes to execute a Hack at the Hacker Array

Faster Launches – Halve the time it takes to prepare an Offworld Launch

Free Buildings

Each Free Building Perk grants a free building when either founding your HQ or upgrading it to a certain level as indicated below. Bonuses last for the indicated number of rounds.

Free Water Pump –	HQ1	2 rounds
Free Metal Mine –	HQ1	2 rounds
Free Elemental Quarry –	HQ1	2 rounds
Free Solar Panel –	HQ1	2 rounds
Free Wind Turbine –	HQ1	2 rounds
Free Geothermal Plant –	HQ1	2 rounds
Free Pleasure Dome –	HQ3	1 round
Free Patent Lab –	HQ2	1 round
Free Optimization Center –	HQ2	1 round
Free Hacker Array –	HQ3	1 round
Free Offworld Market –	HQ4	1 round

Free Patents

All Patents are also Perks, and have the potential to appear in the Labor Pool or as Campaign Event Perks. When acquired from the Pool, they will last for one round if contracted, and will remain permanently if hired. When acquired from a Campaign Event, they will last for the indicated duration.

3 Rounds	2 Rounds	1 Round
Superconductor	Virtual Reality	Carbon Scrubbing
Energy Vault	Perpetual Motion	Slant Drilling
Financial Instruments	Nanotech	Thinking Machines
Water Engine	Cold Fusion	Teleportation

Free Sabotage

Free Sabotage Perks commonly appear as both Mission Rewards and and Labor Pool options. They can also appear as Campaign Event Perks. As a Mission Reward or Campaign Event, Free Sabotage Perks will be permanent. If purchased from the Labor Pool, they will last for one round if contracted and will be permanent if hired. Sabotage is acquired at the indicated HQ level during any Mission that it is active.

HQ1	HQ2	HQ3	HQ4	HQ5
Mule	Underground Nuke	Pirates	EMP	Dynamite
Core Sample	Goon Squad	Magnetic Storm	Power Surge	Mutiny
		Circuit Overload	Adrenaline Boost	
		Network Virus	Slowdown Strike	

Resource Shipment Perks

Shipment Perks are Perks that provide a shipment of a particular resource each time you upgrade your HQ (this does not include founding). Shipments can be obtained permanently by winning them as a mission reward or hiring them from the Labor Pool and can be acquired for a single Mission by contracting them from the Pool. Shipments vary in size based on which resource they provide, and this amount is constant no matter what HQ level the player reaches to earn their shipment.

40 Units per Shipment	20 Units per Shipment	10 Units per Shipment
Water	Food	Chemicals
Aluminum	Oxygen	Glass
Iron	Fuel	Electronics
Carbon	Steel	
Silicon		

TIPS AND TRICKS

- Remember that resource prices carry over between rounds (adjusted to account for all missions that round). Driving up demand early in the campaign by purchasing modules can offer large profits later in the campaign when you have stronger production.

- While you must pay all of your debt back at the end of each round – at least as much as you can – it is still often worthwhile to take on debt early in each mission to guarantee you can upgrade your HQ quickly, affording you many more claims to work with in the later sols of the mission.
- As with any Offworld game, money is to be spent, not hoarded. Saving up for a big purchase can be tempting, but you're likely to be better off investing what you already have.
- Don't be afraid to contract Engineers early in the campaign. Your production is weak, and even if they won't stick around these early Engineers can easily help you make enough to hire what you need in later rounds.
- As the Campaign progresses hiring prices will go down, while contracting prices will rise. Be careful not to hire too early unless you're sure you can afford it.
- Before each Mission you are given a chance to review what your opponent's capabilities are. Use this opportunity. You don't want to drive up the price of Glass only to discover your opponent has more Glass Kiln Engineers than you or establish a Carbon monopoly against an opponent that brought in Carbon Scrubbing.
- Map details are also visible before entering a Mission. Carefully consider important details about each Mission, such as what Black Market is available, how many resources are present, and what sort of Ice the map has (if any).
- Take your time to think when choosing where to found. The game is turn-based until the moment you plant your HQ, and time will only progress when you scan a new location.
- Think carefully when choosing what modules to add to the colony. Habitats may be cheap, but perhaps a workplace would be more valuable if it allows a new colonist to move in. Additionally, Warehouses may be cheaper than Machine Shops, but what good does a Warehouse do you if you have no Glass production? There's a lot more to consider than just “whatever is cheapest.”
- You don't have to win every round, especially in the early stages of the campaign. Make sure you know what the Mission Reward is worth to you, and keep in mind that any money you don't spend in the Mission will be available to you as Cash that you can spend on Engineers, Specialists, and Upgrades. There's always a chance this Cash will be more useful than a Silicon Shipment when Silicon is worth \$10.
- Each Neutral Colony Sponsor provides a unique bonus if you can win at least two Missions where their Colonies are located. These bonuses improve the more you win at each Sponsor's locations, and are listed below. The listed bonuses are not cumulative, each cell of the table indicates exactly what is awarded (so 3 wins in a USA territory awards 1 claim, not 2.)

	CN	EU	RU	US
2 Wins	+1 Scan Range	Core Sample	5% Perk Cost Reduction	Extra Claim (HQ 5)
3 Wins	+2 Scan Range	Core Sample, Mule	10% Perk Cost Reduction	Extra Claim (HQ 4)

	CN	EU	RU	US
4 Wins	+3 Scan Range	Core Sample, Mule, Adrenaline Boost	20% Perk Cost Reduction	Extra Claim (HQ 3)

- It can be tempting to fill in all gaps your CEO has in production, but this can often be a mistake. If you try to do everything, you'll usually just end up doing it poorly. If you specialize, you can ensure that you'll be the best in your markets. Focus on driving up the prices of resources you produce instead of making sure you can produce all resources.
- When you're not playing with the Ironman option selected there will be a "Restart" button available on the main menu in each Mission. This button will take you back to the Earning Report Screen, and you will be able to redo hiring, or even select a new Mission if the original wasn't working out, feel free to use this as you like, but don't be afraid to toggle on Ironman mode after you've had some practice. This mode will disable the restart button.
- Each CEO is suited to a different playstyle. If one isn't working out for you, give another one a shot.
- Finally, don't get discouraged. The campaign is very different from a regular skirmish match, and it may take some adjusting to.

FINAL THOUGHTS

Offworld Trading Company's campaign is quite a different experience from the usual fast-paced skirmish mode. It will take long-term planning and forethought to make it through the seven-round marathon. In addition, each CEO provides a unique campaign experience, meaning hours of entertainment and challenge can be found in this mode. It's a difficult task to conquer the campaign, but if you put your mind to it (and read this entire guide), you'll soon learn how to manipulate the Martian markets to your advantage. With that knowledge, you'll have the tools you need to prove yourself the best businessman on the planet and will quickly establish your corporation as the Martian Monopoly.

GEOLOGIC JUSTIFICATION MAPS

By Kirby Runyon

What follows are brief geologic explanations for the custom-made maps for *Offworld Trading Company*. My name is Kirby Runyon, and I'm a planetary geologist currently working on my PhD. Most of my research is on sand dune migration on Mars, but I've done other types of Martian geology, as well as geology on the Moon, Pluto and its moon Charon, comets, asteroids, and Earth.

Many, though not all, of the maps have approximately one-to-one correspondence between real features (like craters, mountains, and channels) and their game-map counterparts. However, this was not possible in all circumstances given the detailed complexities of Mars' surface geology and the necessary limitations for a video game; such maps should be considered to have been inspired by real locations on Mars, and I've noted these regions in their descriptions. I used Mars in GoogleEarth to view the regions and to help me make the maps—I highly commend it to you to explore Mars on your own using “GoogleMars!” You can download it here: <http://www.google.com/earth/explore/showcase/mars.html>. I also used the geologic descriptions in the US Geological Survey global Mars map (Tanaka et al., 2014: <http://pubs.usgs.gov/sim/3292/>). You can order the large-print version at the website.

Personally, I have found that I enjoy science fiction more (whether in games, movies, shows, or books) when a serious attempt has been made to get the science right. It is my desire that the attempts at reasonably accurate geology will make an already fun game even more fun to play in addition to inspiring curiosity and investigation about worlds beyond Earth.

1. OLYMPUS MONS

I've only shown the southwest quadrant of Olympus Mons. The collapsed volcanic [caldera](#) (composed of several smaller overlapping calderas) is at the summit in the northeast corner. There are numerous wind-blown sand streaks down the volcano. There are only a few craters which [indicate the youth](#) of the volcanic construct.

1.1 Olympus Mons Alternate

I've shown the western rim of the volcanic crater (caldera) of Olympus Mons. Inside the caldera are concentric depressions (faults). There are a few ridges, probably piled-up lava. Outside to the east, there are a few lava vents with lava channels snaking down the slope. It's all fairly young terrain (few tens-hundred of million years), so there aren't too many craters built up.

2. HELLAS BASIN

Hellas Basin is a huge impact basin with dried river channels flowing in and a [tectonically contracted](#) basin floor. I tried to capture this with [sinuous raised ridges](#) in the middle of the map. The ancient (3-billion-year-old-plus) terrain surrounding Hellas I have dotted with other fairly large impact craters. Lakebed sediment underlies much of the region which has been excavated by impact events—I've shown this as [inverted stratigraphy](#) in the [proximal ejecta](#) of many of the craters. Excavated [aeolian](#) material (sand) has been blown into the craters' lee sides.

2.1 Hellas Basin Alternate

The last alternate map I did was for where Dao Vallis empties into Hellas Planitia. It's one of the most fun alternate maps I've done. There's a dry river channel emptying into Hellas, coming down from Hadriacus Mons. At various points in the past it probably carried lava from Hadriacus, too. I did a pretty tight 1-to-1 correspondence between real features and the game map, including some (but not all) craters. This is one of the richest areas on the map in terms of resources.

3. ARCADIA PLANITIA

For Arcadia Planitia I used a combination of lake bed sediments and volcanic flows and constructs. Small volcanic cones dot the southern portions and the lava flows inter-finger with more northwesterly lake bed and river sediments. I added several [rampart craters](#) where the ejecta has piled up away from the crater. Some of the southern highlands terrain is [impact breccia](#) that has been embayed by lava flows. Based off/inspired from geologic mapping by the US Geological Survey (Tanaka et al., 2014).

4. SYRIA PLANUM

For Syria Planum I created highly [anastomosing](#) (braided appearance) lava channels, probably the result of thermal erosion and natural levee building. As the USGS map for this region (Tanaka et al., 2014) describes [lobate lava flows](#), I also added lava [tumuli](#) (NE corner), including some evidencing post-emplacment inflation. Based on the orbital imagery I also added volcanic vents as local depressions. Some of the craters have distal rampart ejecta, likely indicating that the impactor struck water-rich sediment. I added stratigraphically lower aeolian (sand) and lakebed sediment around craters that has been excavated from beneath the lava flows from the impacts.

4.1 Syria Planum Alternate

Syria Planum (alternate) zooms in on some collapse pits (aka pit craters), many of which also erupted lava, which I've drawn as lobe-shaped lava flows flanked with rocks. There are a few rampart craters which brought up some wet soil.

5. ISIDIS PLANITIA

Isidis Planitia is almost certainly an ancient, dry lakebed and is an even more ancient impact basin. I've drawn lots of snaking ridges to represent the many wrinkle ridges across Isidis—these are likely the surface expressions of contractional thrust faults. Since most of the ground is dry lakebed, I've also included lots of cracked ground around the wrinkle ridges. The highlands on 3 of the 4 corners are ancient cratered terrain that has not been re-worked by water, with the possible exception of some small channels. On the floor of Isidis, there are a few small craters with “splatty-looking” rampart ejecta, likely indicating the floor was water-rich when it was struck by the meteoroid. Many regions of Isidis I left flat to convey the fact that this is, in fact, a region dominated by broad plains. There are also tens of thousands of [pingoes](#) (singular is “pingo”), which are small mounds of ice that push up the surrounding ground. I've represented these as small mounds throughout the map and covered them with the “ice” paint brush.

6. CHRYSE PLANITIA

Chryse Planitia is a broad outwash plain where many outflow channels dumped their loads of water and sediment. This is also the location of the first Mars Lander—[Viking 1](#)—which landed on July 20, 1976, exactly 7 years after the first human Moon landing by Neil Armstrong and Buzz Aldrin. A dominant landform I've tried to draw are called "[streamlined forms](#)," and they're former islands where water diverted around a topographic obstacle (for example, a crater rim) and formed a teardrop-shaped island. Chryse also has the occasional wrinkle ridge from tectonic (*not* **plate** tectonic) contraction.

7. UTOPIA PLANITIA

Utopia Planitia is a flat, broad plain at northern latitudes. It's mostly water-worked sediment. Numerous mounds almost look like puzzle pieces. Adamas Labyrinthus forms a labyrinth of troughs, which I've tried to capture on the eastern part of the map. There are only a few craters, indicating geologic youth.

7.1 Utopia Planitia Alternate

I chose a portion of Utopia Planitia for the alternate map that the US Geological Survey calls "thumbprint terrain." You can see why. In real life, the area is covered with icy dust deposits called loess. The mesas are more disconnected in the game map than in real life, but hey—sometimes this scientist needs a little artistic license. It's an icy area, and craters are good at exposing that. Also, I added some small hills (which are real) and put some ice on the north side of them which would always be in shadow and hence cooler. That weird crater field of tiny craters in the northwest is real, believe it or not. I suspect it's a field of secondary craters from a large, regional crater—possibly Nier Crater to the northwest since they're aligned radially to it.

8. SINUS SABAEUS

Sinus Sabaeus is a delightful mess. It's the most ancient of terrain on Mars—Noachian highlands. [Volcaniclastics](#), lakebed sediments, [fluvial](#)-reworking of sediments, aeolian (sand) deposits, impact breccia, volcanic breccia—you name it, it's there. Lots of large craters dominate the landscape, as well as some thrust faults manifested as wrinkle ridges. There are a few dry river channels branching through the area. Schiaparelli crater is represented in the northwest corner of the map, and Flaugergues Crater is represented in the south of the map. Several of the large-ish craters I've tried to represent on an almost one-to-one correspondence.

9. SINUS MERIDIANI

For Sinus Meridiani (near the landing site of the [Opportunity](#) rover), I was fairly careful to do a roughly 1-to-1 correspondence between actual craters and craters on the game map, though of course there's still artistic license to capture the sense of the area if not exact features. Many large craters have smaller craters overprinting the rims—I symbolized these with "wonky" craters in the map editor. This area is **extremely** sandy. This area is beaten up pretty similarly to Sinus Sabaeus, so there's lots of jumbled terrain types here as well.

9.1 Sinus Meridiani Alternate

For the alternate Sinus Meridina, I zoomed in on one un-named (as far as I know) crater just southwest of Airy Crater at -6.2 longitude, -1.0 latitude. The centers of the two craters are 94 km apart, in case you want to find it. Really, though, I just wanted to get a good, textbook complex crater in the game, which have been lacking to this point. The map I did is fairly 1-to-1 with the real-life crater.

10. THARSIS MONTES

Tharsis is basically one whole hemisphere of the planet, so capturing its fullness in the simplicity of a game map posed a challenge. For the area I selected composing the three main volcanoes (from south to north, Arsia Mons, Pavonis Mons, and Ascraeus Mons) and a few of the smaller surrounding volcanoes on a 1-to-1 correspondence basis. Myriad small volcanic vents dot the Tharsis rise east of the main volcanoes which I've represented using the "Hills" paint. I've placed Poynting Crater and its asymmetrical ejecta in its proper place west of Pavonis and Ascraeus montes. In the past, huge, cold-based (as opposed to Earth's wet-based) glaciers dropped rocky debris on the west side of the three large Tharsis volcanoes (Arsia, Pavonis, and Ascraeus montes). I've drawn numerous sinuous and sub-linear depressions to represent the myriad [grabens](#) and the volcanic vent collapse features above intruding dikes. The southeast corner of the map begins to grade into Syria Planum and Noctis Labyrinthus. I believe this is the map with the largest extent of Mars represented in the game.

10.1 Tharsis Montes Alternate

I've zoomed in to the north on Ceraunius Tholus. Rahe Crater, which I've included, is a rare elliptical crater from a very low-angle, glancing impactor. The angle between the meteoroids flight path and the ground was probably less than 5 degrees. It has characteristic "butterfly" ejecta in addition to the more normal complex crater morphology of terraced walls and a central peak. Its ejecta is also rampart ejecta, suggesting a wet target rock. Notice how some of the ejecta slid uphill on the slope of the volcano! Also, there are sand and dust streaks to the southwest, just like in real life.

11. SINAI PLANUM

Sinai Planum is a region south of western Valles Marineris. The eastern side of Sinai Planum is tectonically (not at all referring to *plate* tectonics) contracted and I've added ridges to represent wrinkle ridges, which is how they are manifested on Mars. Infrared imaging of Mars shows where numerous individual lava flows flowed from northwest to southeast; I've captured this essence by numerous, sinuous lava channels emanating from fissures in the northwest. The [fissures](#), by the way, are part of Valles Marineris. One small mound in the east has some water-derived sediment. I've featured Oudemans Crater and a few other actual features.

12. SOLIS PLANUM

Solis Planum is basically a continuation of Sinai Planum. Rather than make it totally similar, I went further south to where Solis Planum grades into a plateau. Tons of graben cut across the southwest and southern regions while wrinkle ridges line the east. For the graben, I tried to draw them in a realistic [en echelon](#) fashion. This poor region has seen both tectonic extension and

compression. Numerous small-medium sized craters show central pits (in real life) indicating a layered surface with possible ground ice made all the more likely by the several rampart ejecta morphologies in the area. Volcanics dominate the “paint type” with very rare ice and “lakebed” paint (to symbolize that this region has seen at least some water).

13. VALLES MARINERIS

I drew the central portion of Valles Marineris consisting of mainly Melas Chasma and Candor Chasma. I attempted to get the overall shape of the canyon’s topography correct, and many of the craters are based on actual craters. The outside of Valles Marineris is volcanic, while inside, basically anything that can roll down hill is indeed downhill! Of that, it’s mostly fluvial (represented as “lake bed”) and aeolian fill (represented with “sand”). One of my favorite craters is a large, “central pit” crater in the northwest corner, modeled after the real Perrotin Crater. Central pit craters probably involve ice, though it’s still a mystery. (If you can solve it, there’s a PhD in store for you.)

13.1 Valles Marineris Alternate

In Google Mars I scrolled through part of Valles Marineris until I went, “Oh, wow!” I thought that might be a good place to make a zoomed-in map where I could accentuate small, individual land forms. I chose this part near the northern wall of Capri Chasma where a beautiful debris flow (wet, muddy avalanche) slid down and ran over the floor. It looks like a giant tongue. I think that’s the part that made me go wow. There are lots of “Starfleet” logo-shaped sand dunes called barchan (“BAR-kan”) sand dunes, but I’ve exaggerated their sizes relative to the debris flow. (We planetary geomorphologists would call the shape of the debris flow “lobate” referring to its ear-lobe shaped appearance. Also, notice the many length-wise striations that likely formed as huge boulders etched their way along the debris flow.) This is a very young region with few craters. To emphasize the youngness though, I included no craters on the map. I think that’s a first for me!

14. MARGARITIFER SINUS

Margaritifer Sinus features a lot of [chaos terrain](#) (probably ground that collapsed over a de-watered aquifer) which I represented with lots of uneven depressions clustered together. This region is a geologic mess! Aeolian, volcaniclastics, fluvial systems, rocks, and chaos terrain all jumble together, so I’ve tried to capture that with the “paint” types, especially in the northwest corner.

15. SYRTIS MAJOR PLANUM

The mound in the middle is Nili Mons with the collapsed caldera Nili Patera in the middle. The northwest of the map slopes down to Isidis Planitia. The region is dominated by volcanic flows, wrinkle ridges (thrust faults), and a few sinuous [rilles](#) that have been thermally eroded from flowing lava in the past. Many of the wrinkle ridges strike radially to Nili Patera. Lots of sand accumulates inside the craters.

15.1 Syrtis Major Planum Alternate

The alternate map for Syrtis Major Planum zooms in on a collapsed volcanic crater called Nili Patera. The game map focuses on the western rim of the caldera which has numerous normal faults that give a stair-stepped appearance down into the caldera. There's a huge gash (probably from tension caused by cooling lava) that goes from north to south. The floor of the caldera is covered in sand dunes. There is a high degree of correspondence between the real place and the game map, which is centered near 8.9° Latitude, 66.7° Longitude.

16. ELYSIUM PLANITIA

Elysium Planitia, in this scene, has the Cerberus Fossae stretching across the northeast corner as a series of sub-parallel linear depressions. Athabasca Valles pours out of a double-lobed depression along a portion of the Fossae and “flows” southwest for several hundred kilometers. The flood that carved Athabasca Valles was likely a combination of water and lava flood episodes. Many craters pre-date the lava emplacement and have been partially [embayed](#) with lava.

16.1 Elysium Planitia Alternate

The alternate site for Utopia Planitia is zoomed in on two large craters, Tombaugh Crater (named after the discoverer of the planet Pluto—yes, Pluto's a planet) and an un-named crater to the west. Most things are lava-draped. Part of my motivation for doing Tombaugh Crater is that it's a classic complex crater with terraced walls and a central peak. I did one earlier, but it took up the whole map. This offers a slightly zoomed-out view of a complex crater.

17. CERBERUS FOSSAE

Cerberus Fossae is where I did my master's thesis research, so it's near and dear to my heart. It's a fracture system from which huge amounts of lava and water poured out in the past. It's extremely young (only about 2 million years old [young compared to the planets' 4.5-billion-year history]) and so there hasn't been much time for craters to accumulate on the surface. It's mostly lava but water seems to have played a role in the past. The big lava and water channel is called Athabasca Valles and starts at the Fossae and extends to the southwest for over 300 km. The fossae have accumulated lots of sand in them.

18. NEPENTHES MENSA

Nepenthes Mensa is situated northwest of the [Curiosity Rover](#) landing site and straddles the north-south [global dichotomy](#), which dominates Mars' global topography. The terrain is ancient, beat-up [Noachian and Hesperian aged terrains](#) with lots of craters to show for it. Lots of comminuted impact breccias containing all kinds of mixed-together terrains. There are a few contractional wrinkle ridges (surface manifestation of thrust faults) I've drawn in according to [MOLA](#) and [CTX](#) data from Mars. This map is very close to reality (like most of my maps!) and includes the real craters Ehden, Canillo, Zaranj, & Doba.

18.1 Nepenthes Mensa Alternate

The alternate, zoomed-in map for Nepenthes Mensae features a volcanic sinuous rille and a few un-named craters. One crater has “butterfly” rampart ejecta indicating an oblique impact. The rille was probably carved by lava.

19. HUYGENS CRATER

Huygens Crater is a Noachian-aged crater that is super beat up. It’s also situated in the ancient highlands that are also super beat up with impact craters. Huygens is [a peak-ring basin](#) with an annulus of mountains concentric with the degraded crater rim. The floor is a completely mixed up hodgepodge of geologic units. A number of branching channels “flow” toward the crater from the outside.

20. DAWES CRATER

I really went for a fairly close one-to-one correspondence of features between the real Dawes Crater and my map, mainly because doing so was quite easy for such a medium-sized crater as Dawes. Geologically, it’s a hodgepodge of lots of features all mixed together. I feature an [alluvial fan](#) debouching onto the south floor from fluviially-incised crater rim [gullies](#). There’s a sand dune field in the southern portions, too (both in real life and in the game map!). I’m rather proud of the central pit in the northern crater.

21. TISIA VALLES

A lot of the features on the game map of Tisia Valles directly correspond to their real-life counterparts on Mars. There are a few big craters here, which are easy to make to correspond. Tisia Valles seems to be a circum-Schiaparelli crater graben with lots of [dendritic](#) fluvial incision. According to the USGS geologic map of the region there’s a huge mix-up of volcanic, rocky, sandy, and lakebed facies.

22. NAKTONG VALLIS

There’s a lot of one-to-one correspondence between certain parts of the vallis and some of the biggest craters. A lot of the ground is undifferentiated fluvial, volcanic, and impact material. Lots of height differentials through-out. I left a lot more bare ground this time, just to mix things up.

23. SCHIAPARELLI CRATER

Schiaparelli Crater has a lot of mixed up geologic units. Schiaparelli is a degraded peak-ring basin with a few deltas or alluvial fans near the rims where rivers have drained in. It’s also the destination of fictional astronaut Mark Watney who needs to use the Ares IV MAV to reach the Ares as it passes Mars!

23.1 Schiaparelli Crater Alternate

This is sweet! For Schiaparelli Crater/Alternate I’m doing where Mark Watney drove into the northwest corner of it in the book/movie, “The Martian” (which is FICTION). In many of my earlier maps, when there was a hodge podge of geologic units all jumbled together, I just

scribbled a bunch of “paint” (terrain) types on the maps. Now, I’m doing a better job of still having lots of jumbled geologic units, but also not placing them too randomly. There is a high degree of similarity between the northwest corner of Schiaparelli and the game map.

24. MARIKH VALLIS

Marikh Vallis is in the cratered highlands southwest of Schiaparelli Crater. This is a little different from the other maps in that it’s not set inside a giant crater but rather outside of and amidst craters. Again, lots of mixed up geologic units here.

25. XANTHE TERRA

Xanthe (pronounced, “ZAN-tha”) Terra has had the tar beaten out of it. Volcanic, fluvial, impact breccia and other units crisscross. There are tons of strewn [secondary impact crater fields](#). For the large features I did a one-to-one correspondence of real, natural features to their counterparts on the Game map. Pay attention to Orson Welles Crater in the southeast with a huge channel flowing north from it and Camichel Crater in the west.

I did the lava and river channels differently here than I have for other maps. Often, I raise the whole map by one tile level and then the channel is dropped back down to normal so that the player can still access the bottom. Here in Xanthe, I wanted to see what it’d be like to drop the tiles down to the “-1” level. What do YOU think?

Look up Xanthe Terra in Mars for GoogleEarth!

26. ARES VALLIS

Ares Vallis was refreshingly different. There are lots of terrains that have been modified by flowing water, so I got to lay down lots of “lakebed” and “cracked” terrain types in the game’s map editor. Ares Vallis flows in from the southwest and flows toward the north, emptying out onto a broad, flat plane. The opening to that plane is where [Pathfinder](#) (with its small rover “Sojourner”) bounced down to a safe landing on July 4, 1997. I watched it on CNN as a starry-eyed 11-year-old in a hotel lobby while our family was on vacation. I wanted to give this map close to a 1-to-1 correspondence with Nature, but, alas, Nature is too complicated in this region to be captured exquisitely on a game map. So while the general flow of Ares Vallis is similar to reality, many of the landforms are more representative of the types that actually occur and are near where they would be in reality.

26.1 Ares Vallis Alternate

For the alternate Ares Vallis I zoomed in on a part at Latitude = 13.98 degrees, Longitude = -30.25 degrees. It’s at the edge of part of the river system with some airfoil-shaped mesas that were left standing when water coursed through here.

27. NIRGAL VALLIS

Nirgal Vallis connects to the very interesting Holden Crater, which was considered—but not selected—to be the landing site for the Curiosity Mars Rover. Actually, Nirgal connects to Uzboi

Vallis, which was probably a water channel at one point flowing into Holden. Much of the plains are pretty well beaten up here, like in a lot of other areas. It looks like Nirgal's tributaries are from [groundwater sapping](#) into channelized flow. I've tried to capture the essence with the curvy channel running across the mid-section of the map. I exaggerated Holden Crater in the northeast corner of the map just because I like it so much. I tried to draw a fluvial deltaic system using the "Hills" Paint type at the mouth of where Uzboi Vallis opens into Holden.

28. THAUMASIA PLANUM

Thaumasia Planum was fun because the overwhelmingly dominant landform are wrinkle ridges, which is where the ground has been pushed up by thrust faults at depth. It's also dominated by lava, but I put a few other geologic units around impact craters where they could have excavated and re-deposited other, preexisting landforms. Can you find the crater that has part of a wrinkle ridge going through it? Which came first, the crater or the wrinkle ridge? It's based on Lassell Crater, which you can find in Mars for Google Earth.

29. LYCUS SULCI

Lycus Sulci is part of the "aureole" around Olympus Mons to the northwest. There are tons of ridges, which are [yardangs](#) (piles of sandstone that have been sand-blasted by the wind into streamlined plateaus). There's also a single, large, lonely crater with muted ejecta extending to the north and south (this indicates an oblique impact either from the west or east [yes, it's counter-intuitive]). There are also some elongate depressions, presumably volcanic related. I hope you have fun playing between the yardangs!

30. AMAZONIS PLANITIA

At first glance, Amazonis Planitia looks flat and boring. BUT! there's so much detail in the individual lobate lava flows that make it up. There are tons of craters that are 99.9% erased by lava, and only circular rims partly peek up above the flooding lava. I've shown this in a few places—craters with flooded interiors. There are zigzag ridges of lava that look to have mantled pre-existing topography, and I've tried to capture this around the periphery with a zigzag jigsaw puzzle shape. One of my favorite Martian craters—[Tooting Crater](#)—is on the east side of the map with its extensive rampart ejecta encircling it. In the southern area are a few oblong depressions that were once volcanic eruptive centers. With the exception of Tooting Crater, this map is not a 1-to-1 correspondence with the real Amazonis Planitia, but rather exemplifies the types of terrain present.

31. ULTIMUM CHASMA

Ultimum Chasma is super close to the south pole and is a trough within the south polar cap. In the map, Promethei Chasma is "above" it. It's all ice! Actually, most of what's not ice is sandy. Surprisingly, most of the ice is water ice, though it would get covered and mixed with seasonal carbon dioxide ice, which is the type of ice I've covered it with. There's a fairly strong one-to-one correspondence between real features and what I included in the game map.

32. CHASMA BOREALE

Chasma Boreale is an entrant into the north polar cap. There's lots of dust, rock, and water-worked sediment in the area mixed with water ice. I tried to capture the spiral troughs prominent on the polar cap. It's a much more geologically diverse region than the south polar cap. There isn't really any dry ice at the north polar cap because northern winters aren't as cold as southern winters. The reason is that Mars' orbit around the sun is elliptical, and when the southern hemisphere is pointed away from the Sun (southern winter), Mars is also furthest away from the Sun in its orbit. The opposite is true for northern winters—Mars is closer to the Sun even while it's northern hemisphere is tilted away. Thus, southern seasons are more extreme than northern seasons. The same is actually true of Earth, but our orbit is more circular than Mars' orbit.

33. TYRRHENUS MONS

Tyrrenus Mons is a volcano northeast of Hellas Planitia. There are lots of interesting volcanic fissures, wrinkle ridges, and erosional depressions. The game map is pretty close to the summit and eastern side of the real deal.

34. EBERSWALDE CRATER

Eberswalde Crater may be a future landing site! There's a beautiful old river delta in here that formed when Eberswalde Crater used to be Eberswalde lake! The terrain is a hodge podge of many terrain types, as is typical for old Noachian terrains.

35. KASEI VALLES

Kasei Valles is a series of river valleys well to the north of Valles Marineris. Even though it's mainly river channels, it's ancient and the rocks are mixed up, giving a variety of local geology. This is really a beautiful place to check out in Google Mars!

36. LYOT CRATER

Lyot Crater (French pronunciation: Lee-OH) is a fairly young and very large crater (237 km/147 miles diameter) and breaks up the monotony of the Utopia & Acidalia Planitia northern lowlands. There's lots of water-laden sediment and rocks, and the deepest part in Mars' northern hemisphere is inside Lyot. Lyot has a peak ring of mountains thrust up as rock bounced back after the impact.

36.1 Lyot Crater Alternate

I realized this game essentially has no complex craters in it! My bad. Lyot crater technically is one, but it's a weird shape. Anyway, I've zoomed in on the central peak of Lyot crater. There are lots of dunes to the southwest. To the northeast I've shown the concentric hills forming part of Lyot's weird, complex rim or maybe peak rings.

37. ARABIA TERRA

I decided to do a stereotypically “boring” spot on Mars when I decided on Arabia Terra. Even though much of the southern hemisphere looks like Arabia (and **is** Arabia Terra, for that matter), I’ve focused more on areas on Mars with exciting geology. But there’s a certain satisfaction in a “boring” place, don’t you think? It’s a flat plain with tons of craters. Also, since it has lots of craters that have brought stuff up from below, it’s a hodgepodge of geologic units.

38. GUSEV CRATER

Gusev Crater was the landing site for the rover Spirit, which landed in January of 2004. In the game map, Gusev Crater occupies the northwest quadrant, and a lava channel breaches the southeast crater rim. Once upon a time, Gusev crater was a lava lake that was fed from the winding channel in the southeast corner of the map. Spirit found evidence for hydrothermal vents in its final resting place in the Columbia Hills, which I’ve represented as a small rise near the crater’s center. The surrounding plains are ancient (Noachian-aged) cratered plains with a little bit of every geologic unit.

39. OLYMPIA UNDAE

Olympia Undae is a sand dune field of mostly barchan-type sand dunes that partly encircles the north polar ice cap. It’s frost-free in the summer, but most of the year it’s covered in ice. I’ve drawn the sand dunes as they would be in spring-time when the frost is starting to melt from the dunes. The north sides of the dunes still have a lot of frost cover while the south sides have thawed.

39.1 Olympia Undae Alternate

The alternate map for Olympia Undae features lots of gypsum sand dunes with bare bedrock shown in between the dunes.

40. NILOSURTIS MENSAR

Nilosyrtis Major is rife with plateaus separated by formerly glaciated valleys. The ground is a mishmash of just about all types of terrains. Look this up in GoogleMars to see the gorgeous glacial lineations! Also, I left the top of the mesas largely as “normal” terrain. There is a fair bit of 1-to-1 correspondence between real features and features I added in the game.

41. ACIDALIA MENSA

Acidalia Mensa is a plateau hanging out in the middle of Acidalia Planitia in the northern lowlands. The Mensa is cracked like shattered ice. The planitia has a cellular network of periglacial features.

42. GALAXIAS CHAOS

Galaxias Chaos is one of the coolest sounding names on Mars, and it’s just to the northwest of one of the Elysium volcanoes, Hecates Tholus. In order to fit the cool landforms on the map, this

region is more “inspired by” as opposed to representing a one-to-one correspondence between the real place and the game map.

This stuff is called thumbprint terrain! Lava flows wind their way across the terrain. Ice, sand, and dust have all had their way with this area.

OFFWORLD TRADING COMPANY DESIGNER'S NOTES

By Soren Johnson

UNIT SELECTION

Our design intention with *Offworld Trading Company* is to make a real-time strategy game that rewards thinking over reflexes and adaptation over patterns. We want to make a game that focuses on the macro-level decisions of a traditional RTS but without requiring micro-level skill. In games like *StarCraft*, a player without high actions-per-minute counts could never compete at a high level. We want *Offworld* to be a game for people on the other end of the scale, who are competitive and love strategy game but who don't want to be held back by a dexterity challenge.

It's amazing that real-time strategy games ever worked at all. Most video games are about controlling one thing – a character, an athlete, a car, a plane, and so on. The obvious reason for this limitation is that input devices are primarily about direction and movement – consider the joystick, the d-pad, WASD/mouse-look, and even tilt controls. More diverse game interactions have been found primarily on the PC where the mouse gives players precise control over unit selection. Grabbing a bunch of tanks and sending them to wipe out an opponent has been the core of real-time strategy (RTS) games since the very beginning. However, unit selection is also prone to error, difficult to manage, and mentally taxing. Coupling this challenge with the other high-level demands of RTS games (scouting, base building, economy management, army composition) while also dealing with intense time pressure makes RTS games sound more like a stress simulator than entertainment for many players. MOBAs emerged from and then eclipsed RTS games because, while players enjoyed the scale and the competition of an RTS, they preferred the vast simplification of having to manage only one character, which - again - is what video games do so well.

However, just because unit selection is so frustrating doesn't mean that RTS games should die. RTS games are the best place in video games for players who want to *think*. They require difficult choices between short-term gains and long-term goals. They require reading an opponent's mind and predicting her moves. They encourage formulating a plan and then learning when to deviate from it. They are endlessly replayable as every dominant strategy has a counter-strategy waiting to topple it. They are the only way to make multiplayer truly work in a strategic game, avoiding the intractable problem of having to wait for one's turn. Most importantly, real-time games must be played *intuitively*, by feel and experience instead of the painfully slow analysis possible in turn-based games.

Thus, RTS games should live. Unit selection, however, should die. An RTS game is, at its core, about making strategic choices in a real-time environment, about not just making interesting decisions but also about when and when not to make them. Unit selection is just not a necessary part of that formula and often keeps the player from engaging with the game's actual design.

Having said that, it took us awhile to get there. Indeed, *Offworld* actually started as a much more conventional RTS with plenty of unit selection. The player moved Scouts around the map to explore, sent Probes out to claim tiles, used Engineers to construct buildings, moved Pirates to

attack building and shipping lanes, and then moved Police ships around to attack the Pirates. In fact, the player even had to set up shipping routes to move the Freighters from building to building, picking up Iron at a Mine, dropping it off at a Steel Mill, picking up the Steel, and then dropping it off at the market – basically, *Railroad Tycoon* set on Mars.

Micromanaging the shipping lanes was the first to go. The demands of unit management were taking too much player time, turning the game from one about playing the resource market to one about playing the shipping lanes. Instead, Freighters now appeared as soon as a building was full and then went directly to the stockpile at the HQ (and buildings that needed resources were supplied directly from the stockpile). To make up for some of the lost functionality of manual shipping lanes, we added override buttons that forced sending resources to the HQ early or supplying a specific building from the HQ. One concern about losing shipping lanes was that players could no longer make choices to avoid the Pirates by taking a sub-optimal route; however, the immediacy of a shipping lane becoming a fixed, unchangeable part of the map had other advantages – that the map was now defined not just by the terrain but also the vectors connecting buildings to their HQs.

Automatic shipping improved the game experience immediately and immeasurably; players now had time to make higher-level decision, to look around at what other players were doing, and to predict where the market was going to go. Thus, we were encouraged to try to take more and more unit selection out of the game. For example, Pirates now could only be placed on the map but not controlled; moreover, they were temporary, so we could cut the Police entirely from the game as the Pirates would just disappear after stealing a certain number of resources.

Our original model for Engineers was directly from a traditional RTS; the player would train Engineers at the HQ and then move them around the map, constructing buildings on the way. Under this version, players often lost their engineers, which meant they couldn't place new buildings until they found one. Thus, we took away player control of Engineers; they now appeared from the HQ automatically whenever the player placed a new building on the map and then helpfully disappeared when done working. The only downside was that the player didn't have to optimize the question of whether he had enough Engineers to cover all of his tiles – which ultimately just encouraged players to build close to their HQs anyway, and we already had other game mechanics (fuel costs, travel times) to punish players for building too far afield.

Finally, the last controllable unit was the Scout, which the player used to explore the map and discover resources. It was difficult to envision taking control of this unit away from the player, especially since the player actually *did* have time to micromanage exploration before founding an HQ. However, having only one type of unit be selectable just seemed very strange, and we were afraid that having the player select the first unit set up expectations for selecting latter units in the game. Thus, our first attempt to take away Scout selection was by planting exploration flags on the map that the Scouts would aim towards when exploring, somewhat like the bounty flags that are placed in *Majesty*. However, every time a Scout didn't aim for a flag in just the right way made the player yearn for the original selection method. The solution was to cut Scouts entirely and replace them with the scanning mechanic, which lets players simply reveal tiles by clicking on them. This mechanic was simple, effective, and fast, making Scouts completely unnecessary. With that last change, we had removed all unit selection from *Offworld*.

FREE MARKETS

The reason we streamlined unit selection from the game was that we wanted to create room for the part of the game we cared about – the free market gameplay. Originally, this aspect of the game resembled *Railroad Tycoon* as well. Players did not have an HQ at all but the map had multiple neutral Colonies, and the player earned the most money by dropping off a resource at the Colony with the highest demand for that resource. Thus, Steel might be selling for \$10 at a nearby Colony but for \$100 at a distant one, so it was worth the effort to ship the Steel to the other side of the map.

Players had a hard time investing in this version of the game as they felt disconnected from the map, so we decided to add the HQ, a place for the player to store all her resources in a single stockpile. Once the HQ appeared, it also became the natural place to put secondary buildings that required input resources – Steel Mills, Glass Kilns, and so on. At the same time, the HQs replaced the old neutral Colonies (which would make a comeback later in the project), so the local markets were now gone, to be replaced by a single market. In this case, we were heavily inspired by the Market building from *Age of Kings*, which allowed players to buy and sell Iron, Wood, and Stone at prices that went up and down with each transaction. Thus, if one player bought Wood, the price went up for everyone. We built a similar game-wide market but developed one important difference.

The designers of *Age of Kings* hedged their bets on free market dynamics by forcing the purchase price of a resource to be always double the sale price. Thus, if one could buy Stone for \$100, one could only sell it for \$50, which meant that using the market too much would eventually drain away one's Gold. This price relationship greatly hindered one's ability to play the market, preventing it from becoming one of the core mechanics of the game; instead, the market was simply an interesting but inessential part of the whole. In our case, however, the resource market is the *core* of *Offworld*, so we wanted to encourage people to use it as much as possible. We did originally use the price doubling mechanic from *Age of Kings* but, fearing that players weren't using the market enough, collapsed the buy and sell price into a single value; the results were immediate and positive as players started taking advantage of buying low and selling high; the market was now equally driven by the game's rules and by the players' strategies. This one change resulted in the first glimpse of what *Offworld* would become, an intense free market RTS that was unlike anything we had ever played.

CLAIMS

Perhaps the one game element which has changed the least from the earliest prototype to the finished game is the claim system, which was borrowed directly from *the* classic economic video game, *M.U.L.E.* However, the way buildings interacted with claims in *Offworld* did change. Originally, each tile could hold four buildings, and the production bonuses were not between buildings in adjacent tiles but between buildings in the same tile. Two Steel Mills in the same tile got a bonus, three Mills got a higher bonus, and four was the best. However, this system was hard to manage, and the player mostly just built the same four building in each tile every time. Most importantly, players were not specializing in specific resources as they generally devoted

one tile to each one, which was a big problem for the gameplay. If each player is building the same set of resources, the market is going to be less dynamic; players don't have to make hard choices about which resources to skip.

The solution was to allow only one building per tile and to give production bonuses for buildings of the same type in adjacent tiles. (We also switched from squares to hexes around this time, which made adjacency rules much more natural.) The bonuses for two adjacent buildings was +50%, which meant that two adjacent Steels Mills produced as much as three non-adjacent ones (and, of course, consumed less power and iron). This dynamic strongly encouraged specialization, which led to more interesting games as players couldn't just build one of everything and be safe. It was much better, for example, to commit to either Food or Oxygen but not to both, which meant that the price of either one could spike if players all ignored that specific resource (which would then reward the player who first noticed that no one else was making it).

The bonuses were initially +50% for each adjacent building, which meant that the ideal situation was a circle of 6 identical buildings surrounding a seventh building in the center, which would receive an amazing +300% production bonus. We initially thought that committing seven tiles to just one resource would be *too* dangerous for players if the price of that resources crashed (which was likely considering the oversupply), but players instead quickly cycled these seven buildings (meaning to scrap and rebuild them as a different type) depending on the market. It was a hectic experience, and we didn't want the best strategy to be one of constantly scrapping one's building – it felt wrong and also introduced an unwanted dexterity challenge to the game as cycling speed became important. The solution was to add diminishing returns to the bonuses so that the third building gave a +25% bonus, the fourth gave a +10%, and so on. Ultimately, the maximum bonus possible was only +100%, and a player probably would be better off splitting those seven tiles between two resources instead of committing to just one. Now, the triangle of buildings - each with a +75% total bonus - became the new sweet spot, which felt just about right for balancing specialization and diversification. (Interestingly, the final balance is similar to that of *M.U.L.E.*, which also gave bonuses for adjacent building and for every three buildings of the same type.)

RESOURCES

A game with 13 resources would not be very interesting if all 13 resources are basically different flavors of the same thing. Thus, when building the resource tree, we had to think about what purpose each resource served. The natural place to start is the primary resources which are found on Mars. We decided early on to have five primary resources which would appear randomly on the map (although also depending on terrain so that, for example, Iron is most likely to be found on Volcanic terrain). The initial five resources were Water, Iron, Copper, Aluminum, and Silicon. Our secondary resources would derive from the primary ones, creating a resource tree similar to those found in the *Railroad Tycoon* series:

- Greenhouse Farms turned Water in Food
- Electrolysis Reactors split Water into Oxygen and Fuel (Hydrogen)

- Plastics Manufactures turned Fuel into Plastics
- Steel Mills turned Iron into Steel
- Glass Kilns turned Silicon and Oxygen into Glass
- Electronics Factories turned Silicon and Copper into Electronics

This resource tree meant that certain resources were easier or harder to obtain. Steel was easy to make as it simply required Iron while Glass was much harder as it required Silicon and Oxygen (and the latter comes from Water). This difference kept the market interesting as players had to judge a resource not just by its price but also by how hard it was to make the resources. If Glass is \$100, and Steel is \$80, it's not immediately obvious which resource is better to produce as Glass is harder to make and also sensitive to price changes in three different resources (Silicon, Water, and Oxygen).

Furthermore, the resources were differentiated by how they were to be used. Steel was the primary construction material, used to create almost all of the buildings and also to upgrade the HQ, which makes it a very important resource early in the game. Copper and Glass were also used to upgrade the HQ, which made them similarly crucial as upgrading was the primary method to acquire new claims. Other resources - Water, Food, and Oxygen - were needed as life support to keep one's workers alive. These resources were consumed every turn depending on the size of the HQ, which meant that their price would rise steadily if no one was supplying them to the market. Similarly, Fuel powered the player's ships as they moved across the map. Aluminum was used for building ships at the HQ (which was important in this earlier version of the game). Plastics and Electronics (as well as Glass) were cash crops that were not particularly useful to the player but could be driven up in value by onworld demand (a background factor that replaced the old neutral Colonies). A final resource, Power, worked completely differently from all the other resources because it could not be stockpiled and was constantly bought from or sold to the market depending on whether the player had a shortage or surplus of it. Power was important because almost every building in the game consumed Power while working, which meant the demand for Power would consistently increase until players ran out of claims for new buildings.

Thus, every resource in the game had a unique profile regarding how it was made and why it might become valuable. This diversity meant that players knew that investing in a specific resources meant different things for their overall strategy – claiming Water was important for ensuring access to life support, building Glass ensured that the player could upgrade and claim more territory, making Electronics meant that the player would be able to make cash by selling a rare and expensive resource, and so on.

Of course, the resource tree changed a few times before our final version. One concern was Aluminum, which wasn't a particularly interesting resource as it didn't lead to any secondary resources. Furthermore, we liked that the Metal Mine could sometimes produce multiple resources if the player found a tile with multiple deposits of Iron, Copper, and Aluminum, and we wanted the same feature for the Quarry. However, instead of cutting Aluminum, we cut Copper and moved Aluminum into its slot as an upgrade resource for the HQ. (By now, ships were no longer constructed by the player, so we also didn't need a resource dedicated to that purpose.) To take the place of Copper, we added Carbon, which would also come from the

Quarry so that it could ideally produce multiple resources (Silicon and Carbon). Electronics would now also come from Silicon, Carbon, and Aluminum, making it unique as the only resource that required three inputs.

The final change to the resource tree was to replace Plastics with a more interesting resource. Electronics and Glass were useful cash crops based on onworld demand, but they were also important for either building the Offworld Market or (in the case of Glass) upgrading the player's HQ. Plastics, on the other hand, really didn't have a purpose if the price was not high. At the same time, we had learned that the game was more interesting if costs were in resources, not in cash, so that their true price fluctuated depending on the market. Patents and optimizations had been priced simply in cash, but if they cost a resource instead, players could decide to make that resource to help themselves conduct research (or to profit from other players' research). Thus, we replaced Plastics with Chemicals, which would now be used for patents and optimizations. Further, Chemicals would come from Fuel and Carbon, making the resource similarly difficult to make as Glass and Electronics.

DEBT

One of the trickiest parts of the design was how to handle when the player needed to consume a resource but had none in her stockpile. Our initial solution was that every time a player could not supply the needed Power, Fuel, or life support, the game would lower that player's stock price. If this penalty was applied too many times, the company would drop to a price of \$1 and would soon be acquired by a competitor. The system worked, in that players would be afraid to run out of required resources, but the system was also obtuse and caused permanent damage to players; each stock penalty lasted for the rest of the game, which meant we were encouraging a very conservative strategy of always making required resources first.

The solution was the debt system, which kept track of each time the player needed to buy a required resource from the market, acting as an unlimited line-of-credit. The debt would also affect the player's stock price but, significantly, a player could pay off the debt to recover later in the game. Too much of a resource shortfall early in the game was no longer a death sentence. The system now worked because it was transparent, players could see how bad their debt was getting and decide when to fix the problem.

However, as all game designers know, give players a new feature, and they will do everything they can to break it to their advantage. "Debt diving" became a term among the players for ignoring debt in favor of resources that produced straight cash in the hopes of buying out the other players before dying to too much debt. It was a dangerous strategy but, in the hands of the best players, also a dominant strategy. (Simply put, a player with \$300K in cash and \$200K in debt can easily beat a player with \$100K in cash and no debt, even though their net assets are identical.)

The solution was bond ratings, which changed the interest rate paid on debt each day depending on the ratio of a player's debt to his total assets. The better bond ratings (AAA, AA, A) had interest rates between 2% and 6%, which were quite manageable. However, once a player sunk to a D rating, the interest rate jumped to 30%, which meant that a player could die to debt as her

debt might increase faster than she could pay it down. Finally, players with a D rating were also locked out of the black market, which meant they could no longer sabotage their competitors and were also vulnerable to sabotage without access to the defensive Good Squad. Basically, D debt is very bad — bad enough that while players would still use debt as a tool to accelerate their progress at times, they were also acutely aware that going too far could mean disaster.

AUCTIONS

Auctions were an early element of *Offworld*'s design that were compelling from the beginning. Player interaction is the core of competitive strategy games, and one risk of making an RTS without combat is that players might feel they are playing competitive solitaire, focusing mostly on their own buildings and ignoring the other players. Thus, auctions are a great way to put players into direct conflict as they bid on items, driving up the price until all but one blink. Judging the value of an auction is tricky, and many players experience the “winner’s curse” common in auctions where the winner of the auction ends up losing the game from overbidding.

Initially, we implemented three types of auctions: a new claim, a specific tile, and an unclaimed patent. One mechanic we originally tried with auctions was creating a new resource deposit specifically for an auction if no unclaimed source existed. For example, if all the Silicon tiles on the map had been claimed, the game would create a new source of Silicon and auction it off. We had wanted to create meaningful auctions, but this situation was *too* meaningful. If a player had accomplished the difficult task of claiming all the Silicon on the map, she felt cheated if the game magically created a new one. The player had the painful choice of either overbidding to protect her monopoly or letting it go and losing a rare advantage. We didn’t want to punish players who went for the strategy of monopolizing a specific resource, so we took away the feature.

As development continued, we integrated new features to improve auctions. Once the black market was no longer a fixed set of seven items but a random selection from a larger pool, we could then auction sabotage items which were not available on the black market (if the item was on the black market, then there was little reason to bid much over the current price). Once special buildings (Patent Office, Hacker Array, etc.) could be built next to the Colony, we could then auction them off since they would be potentially valuable to all players (although we never auction off Offworld Markets because that would be insane).

One other important change was only possible once debt became a game mechanic. Originally, auctions were paid directly from cash, which meant that players were often selling all their resources to be able to outbid their opponents. However, at some point, players are simply going to hit a limit and have no more cash to bid on an auction. Further, if the auction comes at a point when most players are cash poor (possibly from recently upgrading HQs), one player might be able to win an important auction simply because he was the only player in the game with money on hand. That situation felt wrong, especially when a rival player was willing to bid if only she had the money. The solution was to instead pay for auctions out of debt, which solved the problem completely. Players were free to bid as much as they wanted to on auctions but knew that if they overbid, their stock price might crash to dangerous levels. In the days shortly after this change, there were some hilarious playtests where one player (usually me) overbid heavily

on an auction and then saw his stock price immediately collapse to \$1 and get bought out. Lessons were learned.

REVEAL MAP MODE

We are often asked how being on Early Access changed the design of *Offworld*, and it did so in more ways than we are probably even aware. One of the most obvious changes was the Reveal Map option, which completely changed how the game opens. After removing Scouts from the game, we were pretty happy with the scanning mechanic for exploring the map and founding the HQ. However, once we released the game on Early Access and started running tournaments with the best players, the scanning system became a point of contention. The community argued that if a map had a single best founding location, superior to all others, the game would always be won (assuming evenly matched player) by whoever discovered that founding location first and took advantage of it.

We did have various mechanics in place to balance against the disadvantage of missing the best spot – players who found later can get an extra claim and earlier access to the black market. However, it was hard for us to argue that games would never be won or lost based on who found the best spot first. The solution was to start with the map fully revealed and then let players choose where to found; each player would have the same amount of time to consider which spot to take.

However, obviously just revealing the map would not be enough. Players would frantically look around the map trying to find the best spot, and whoever clicked first would still get a huge advantage. We needed a mechanic to give a cost to founding first. In fact, I had considered a Reveal Map mode before launching on Early Access, but I couldn't figure out a simple way to make it work. Perhaps players could all mark their favorite positions and then, if they conflicted, find some way to negotiate the tie? Perhaps the game should run an auction for the right to found first? That might work in a two-player game, but how would it work for an 8-player game? Maybe there should be blind-bidding to determine the first player to found? Although that would technically work for all number of player, it would turn the beginning of the game into a turgid, turn-based affair, killing multiplayer.

The solution was to use the debt mechanic to make this process both simple and still real-time. After the map is revealed to all players, a debt counter starts at \$200K and then starts going down second-by-second. Founding immediately would cost \$200K in debt, which is far too much to manage; thus, players must wait at least a few seconds before getting serious about founding, which provides important time to look around the map. Then, after players have spotted the best founding spots, the question is simply how much is that spot worth? \$30K debt? \$40K? \$50K?

The system is perfectly balanced for all players, works well regardless of player count, and keeps the game moving in real-time. The option quickly became the standard mode of play amongst the multiplayer community. One further wrinkle was added to this system after a tournament game between PBHead and Cubit in which neither player wanted to found because the map had two great founding locations; there was no reason to take on debt and also give the other player the

free claim for founding second. We fixed this scenario with a founding *bonus* that starts ticking up after the debt counter got to \$0. Thus, in the situation above, the first person to found would get money to balance out the other player's free claim.

NEUTRAL COLONY

I mentioned above that the earliest version of the game had neutral Colonies and no HQs. When we replaced Colonies with HQs, the players were immediately more invested in the game as they felt ownership over a part of the map and could also see the progress reflected in the size of the HQ. However, the game's fiction suffered some as it was unclear *why* exactly these companies were on Mars. Were they just manufacturing resources to sell to each other? Obviously, the Offworld Market was part of the answer as one purpose of business was to supply goods to colonists living offworld in the Asteroid Belt. Nonetheless, the game felt like it was missing some focal point to justify all this business.

Thus, we brought back the Colony, this time as a single entity in the middle of the map that would serve as important source of market demand. (When the game had no Colony, the market had a hidden demand curve which drove up prices; putting a visible Colony on the map meant that we could remove this hidden mechanic.) The needs of the Colony were visible in the types of modules which extended out from its center. Habitat modules would need Water, Food, and Oxygen; Office modules would need Power; Laboratory modules would need Chemicals; and so on. Further, the Colony would grow over the course of the game, increasing demand for these resources.

That simple system, however, was quite different from how the single neutral Colony started, and the process to get to there is a good lesson about how game mechanics work best in strategy games when they are simple and transparent. The original system, in contrast, was complex and opaque. (In Sid's words, the problem with complex, opaque systems is that computer is having the fun, not the player.) Initially, the modules all consumed multiple resources (the Office, for example, consumed Power and Electronics) while also having a cost (the Office required Steel and Glass) which affected the probability of it appearing if those resources cost too much. Further, each workplace module could level up depending on that resource cost as well as the Colony's excess population that needed jobs. Each Habitat module could level up based on its build costs as well as the Colony having more jobs available than population. Moreover, the Colony's population would go up and down depending on the price of life support resources, which could then leave some workplace modules unoccupied so that they didn't consume any resources at all. Thus, the Colony might not be growing because Steel cost too much to construct more modules, or it might not be growing because Food was too expensive, or it might not be growing because there weren't new jobs available for the new colonists. Got all that?

Most players simply ignored the Colony as it wasn't clear what was going into the black box or what was coming out of it. The system needed radical simplification. Slowly, each part got stripped away - the resource costs for each module, the population restrictions from life support costs, the leveling up of each module - until the colony itself was simply a visual indicator of demand. Finally, each workplace module consumed *only one* resource (Offices consume Power, Laboratories consume Chemicals, etc.) and every workplace module had a matching Habitat

module that consumed life support. New modules were added randomly over the course of the game, independent of the players or the market. The Colony was simply another random element which added replay value by diversifying resource demand — if the Colony is full of Laboratories, for example, then the players might want to invest in Chemical Refineries because of demand from the Colony.

PATENT LAB

The patent system was one of the earliest elements of the game to take shape. As both an RTS and a science-fiction game, *Offworld* obviously needed an interesting technology system. However, we wanted our system to have variability (so that players weren't always following the same research path) and interactivity (so that players were reacting to each other's choices). Turning technologies into patents (meaning that each patent could be held by only one player) achieved both goals at once. Players could never count on a specific set of patents because another player might get to some of them first, which meant that players had to watch one another, possibly sabotaging Patent Labs to make sure no one else got to an important patent first. Further, patents appearing as auctions could shift the course of the game significantly.

Superconductor (+100% Power production if connected to HQ) - The best locations for Power (high altitude for solar, steep ridges for wind, and geothermals tiles) might not be near one's HQ, but Superconductor meant that a player need only build Power connected to the HQ. A Solar Panel with Superconductor would generally (depending on altitude) be equivalent to a Geothermal Plant, which could be hugely profitable if Power spikes in price. The most important advantage of building Power close to one's HQ, however, is that those claims can later be deleted and used for something else if Power crashes. However, players often have to build their Power sources before they get Superconductor, which means this strategy is risky if someone else gets the patent first.

Energy Vault (Produces +1.0 Power as storage, up to 100 units) - Power is the only resource which cannot be stored and must be sold immediately, which gives it a unique price curve as players with excess Power are constantly selling it. Because Solar Panels shut off at night, the price of Power usually goes up when the sun goes down and then drops during the day. This pattern makes life difficult for players who rely solely on Solar Panels as the price of Power is highest when their production is shut off. Energy Vault lets players avoid this pattern by storing up a stockpile of Power during the day and then using at night when the sun is gone. Also, it is possible for a player to stop selling Power if she wants to keep the price artificially high. Normally, this excess Power is just lost because the player cannot store it; with Energy Vault, however, this tactic is more viable because the player can stockpile this Power for later use.

Financial Instruments (Receive 25% of other player's interest payments) - This patent was the last one to be added to the game because it originated as a response to players taking on too much debt. Although the debt problem was mostly solved by bond ratings, Financial Instruments also made debt dangerous because a player could benefit from everyone else's debt. If an opponent racks up too much debt, simply acquire Financial Instruments and use that daily influx of cash to help buy that player's deflated stock. Naturally, players with a lot of debt also began grabbing this patent as a defensive measure.

Water Engine (Uses Water instead of Fuel for units and launches) - The price of fuel can go up quickly on maps with distant resource clumps (for example, if all of the Water is in the west while all the Iron is in the east). Indeed, sometimes distant mines are turned off because the shipping costs are so high that the building would be a net loss. Water is almost always cheaper than Fuel (as it takes two units of Water to make one unit of Fuel, not to mention the Power consumption and the tile occupied by the Reactor), so being able to spend Water on shipping can be very useful. However, Water Engine did suffer from the disadvantage of being strictly worse than another patent, Teleportation, which simply removes shipping costs entirely. To compensate, Water Engine costs half as much (and takes half as much time to acquire) and is still obviously useful if another player gets to Teleportation first. Nonetheless, we felt that a player should still have a reason to acquire Water Engine even if he has Teleportation, which is why we also let players use Water instead of Fuel to launch resources at the Offworld Market, a building that is unaffected by Teleportation.

Perpetual Motion (-50% Power Consumption) - Although Perpetual Motion does not appear to be particularly interesting compared to the rest of the patents, it is the only item in the game that actually reduces consumption of anything. Perpetual Motion can turn a Power consuming player into a Power producing one. Indeed, it must surely be the most flexible of patents as it would aid every player — even a player with Cold Fusion would benefit because his Water consumption from powering buildings is also cut in half. Thus, even if Perpetual Motion is not as flashy as other patents, it is a good one to research early because *everyone else is going to want it*.

Cold Fusion (Uses Water instead of Power for buildings) - Water is probably the most common resource on average in *Offworld*, which makes Cold Fusion a powerful patent as it enables a player with a good source of Water to just ignore making Power altogether. Cold Fusion can become dominant combined with Water Engine and Water Production optimizations. Nonetheless, the patent was seen as a bit of a trap early in development because if the Water price rose higher than that of Power, the patent is actually a net loss. Thus, we made a small but important change — that buildings would switch automatically between consuming Water or Power depending on which one was cheaper (Water Engine works the same way). The patent now gives its owner great flexibility in manipulating the market; shorting Power, for example, knowing that once the price of Power passes that of Water, all of the player's Power buildings will be selling directly to the market.

Virtual Reality (+50% revenue from the Pleasure Dome) - Because revenue from the Pleasure Dome is so highly dependent on the actions of other players (the potential revenue is divided by the total number of Domes on the map), players want to find ways to discourage other players from building more Domes. Virtual Reality is the best method because once a player acquires it, the potential value of new Pleasure Domes drops (as other players know that their new Domes will never get the boost). Often, it is one of the first patents to be taken as players are afraid of missing out on it. Indeed, before we dropped Virtual Reality from +100%, it was almost *always* the first patent to disappear (which is, of course, why we weakened it as it had become an uninteresting, automatic decision).

Nanotech (Construction resources are refunded when a building is scrapped) - Nanotech was considered perhaps the weakest patent before we released on Early Access, so it greatly surprised us to find that competitive players considered it the *best* patent in the game. The patent enables player to cycle their production from one resource to another for basically free, with the only cost being the time lost in constructing the new building. Internally, we cycled our production far less than we should have, not taking advantage of resources that were rising in price and not giving up on ones that were actually losing us money. Thus, Nanotech is a good example of why development teams don't understand their own games nearly as well as the players do. The patent was brought back into balance by raising its cost and from the diminishing returns on adjacency bonuses, which discouraged cycling quite so quickly.

Slant Drilling (Can mine resources from adjacent tiles) - The value of Slant Drilling varies highly from map to map. Its most powerful use is as a counter to a resource monopoly; if one player somehow claims all the Aluminum, just grab Slant Drilling and put a mine next to that player's best source. The patent is also a useful hedge against Underground Nukes because resources tend to be found in clumps; if someone nukes a player's High Water, there is probably a Medium Water adjacent to her Pump which she can use instead. Slant Drilling is especially attractive to Scientific players as it makes creating building triangles much easier — all they need is one resource tile for up to six adjacent buildings. Occasionally, a Scientific player might even find adjacent sources of Aluminum, Silicon, and Carbon, enabling free Electronics production by using Slant Drilling to access all three resources at once.

Carbon Scrubbing (Buildings consume Carbon for free) - This patent was inspired by the fact that a building could extract some Carbon from Mars's atmosphere, which is primarily carbon dioxide. From a gameplay perspective, making one resource potentially free creates an interesting bit of asymmetry among the primary resources, especially because Carbon is an important input for Chemicals and Electronics, two valuable late-game resources. Thus, one popular strategy after acquiring Carbon Scrubbing is to start Carbon shortages at the Hacker Array, which makes producing Chemicals and Electronics less profitable, which drives up their price as other players cycle away from those resources, which ultimately makes Chemicals and Electronics extremely profitable for the player with Carbon Scrubbing who can ignore the Carbon cost! Also of note, Scavenger players love the patent because it means they can keep all of the Carbon they produce for buildings and HQ upgrades.

Thinking Machines (-50% sabotage protection for buildings adjacent to the HQ) - The original Black Market had no defensive options, which meant that players had no way to protect themselves from EMPs, Dynamites, Mutinies, and so on. Along with Goon Squads, Thinking Machine was added to provide another tool to balance the power of sabotage. Initially, the patent provided complete protection against sabotage, but it was easy to see that was simply too much — the player with Thinking Machines was able to put Offworld Markets next to her HQ and just launch her way unchallenged to victory. After changing the effect to -50%, the patent is still important but no longer dominant. Another nice aspect of Thinking Machines is that players now plan ahead in anticipation of picking up the patent later, perhaps even in an auction, by carefully arranging their claims to provide potential location adjacent to their HQs for buildings to be protected by the patent. Ideally, the player has to make tradeoffs between short- and long-term gains — should I snake my claims out from my HQ to connect to a distant resource (saving Fuel

costs and potentially avoiding Pirates), or should I claim every tile adjacent to my HQ to maximize my potential protection from sabotage?

Teleportation (Resources are transferred instantly to and from the HQ) - Everyone wants Teleportation, even if just to make sure that no one else has Teleportation. The benefits are pretty obvious - no more Fuel costs, instant access to distant resource production - but a few special cases are worth noting. Teleportation makes one immune to Pirates and Magnetic Storms, which can be very important if shipping expensive resources; owning the patent means that the other players will use those types of sabotage only against each other, which is certainly a best-case scenario. Although receiving building outputs instantly is the obvious appeal of Teleportation, being able to deliver inputs instantly is important as well; players are free to place their secondary buildings wherever convenient. A Scientific player with Teleportation has the freedom to put his Glass Furnace on Silicon, his Chemical Labs on Carbon, and his Electronics Factories on Silicon, Carbon, and/or Aluminum, no matter how far from his HQ.

OPTIMIZATION CENTER

Unlike the more orthogonal Patent Lab, the Optimization Center provides consistent and straightforward production upgrades for every type of resource in the game. Originally, the Optimization Center (whose name has become a bit of a running joke in our community as it has also been known as the Engineering Lab, Efficiency Lab, Industrial Lab, Upgrade Lab, and Research Center) gave bonuses not for resources but for buildings. Thus, the player could research Solar Power Production or Wind Power Production. In practice, however, most players were not switching between different sources of Power (or other resources), so the extra complexity of upgrading a building instead of a resource was dropped. (Essentially, claiming a tile with high wind was already a significant commitment.) This simplification also greatly improved the UI for the Optimization Center as each upgrade could be listed right next to the corresponding resource.

The Optimization Center improves the efficiency of buildings (how much of resource X is output per input of resource Y) instead of their speed (how fast resource X is converted into resource Y). For example, a Steel Mill with Perfect Steel Production will produce twice as much Steel but still consume the same amount of Iron. From a gameplay perspective, improved efficiency encourages resource diversification between players and is an important counter-balance to production cycling; if a player researched Perfect Chemical Production, then it might make sense for that player to keep producing Chemicals even if the price drops well below that of Electronics (which is also primarily built from Carbon). This player has a quasi-monopoly on Chemicals as she might be the only player in the game who can make Chemicals profitably (unless, of course, another player starts upgrading Chemical production).

HACKER ARRAY

Probably the most difficult building to use in the game, the Hacker Array is the only way a player can influence the demand side of the supply-and-demand equation. The building emerged from the random event system (inspired by *M.U.L.E.*) which randomly triggered resource

shortages and surpluses during the game. These random events add some nice chaos to the resource market so that it is not so primarily driven by the players. Once they were in place, however, we began to wonder what would happen if a *player* could trigger a random event, especially if the other players couldn't tell if the event was real or not.

Thus, the Hacker Array lets players start artificial shortages and surpluses, which can be a great tool used at the right time. One of the best aspects of the Hacker Array is the paranoia it creates in other players. As soon as a Hacker Array is spotted, players start to doubt the events – maybe one Electronics shortage is inconclusive, but two in a row? (The best, of course, is when those two consecutive event were actually real!) In fact, we had to make an important rule change to the Hacker Array shortly after coming out on Early Access because players quickly discovered that if they built not just one Hacker Array but two or three or even more, they could trigger multiple concurrent shortages of a stockpiled resource, driving the price up so quickly that they could win the game just by selling at the top price. Therefore, we limited multiple hacks of a single resource from processing concurrently; players could still use multiple Hacker Arrays, but they needed to be manipulating different resources.

What makes the Hacker Array so tricky, however, is that unlike the other advanced buildings, there is no guarantee that the building will help its owner the most. A player might short Steel after noticing that he has the most Steel Mills on the map but end up helping a different player who was holding a stockpile of 500 Steel and then sells out of it before the original player realizes what is happening. One of the tensest moments of the game is watching the price of a resource climb up and up and up with one's cursor hovering over the sell button, trying to win the game of chicken by selling for the highest price just before anyone else does.

OFFWORLD MARKET

The Offworld Market was inspired primarily by the triangle trade system outline by Robert Zubrin in *The Case for Mars* — miners in the Asteroid Belt would send rare and valuable metals to Earth, Earth would send colonists and finished goods to Mars, and Mars would send supplies and life support (water, food, oxygen, fuel) to the Belt. Although Mars seems like an unlikely source of, say, food, the important facts are that Mars is significantly smaller than the Earth (so that launching a rocket offworld consumes *much* less fuel) and also much closer to the Belt (saving both fuel and time).

From a gameplay perspective, the Offworld Markets give players access to a much larger trade network with more stable prices. Essentially, there is no way for players to drive down offworld prices because the demand is so high and widespread, which contrasts significantly with the violent swings of the onworld market. This stability is important because, simply put, it guarantees that the game can *end*. Occasionally, players produce so many resources that the onworld prices drop low enough that not enough money is available to end the game in a timely manner. Once players start shipping offworld - often making over \$50K per launch - the end is near.

Thus, Offworld Markets are equivalent to the uber-units seen in traditional RTS's, which are only available at the end of the tech tree and are used to end a game quickly. Because Offworlds

signal the endgame, they are a frequent target of sabotage, especially Dynamites and Mutinies. In fact, some players believe that one Offworld Market is better than two because it is much easier to protect just one Offworld with a Goon Squad. The worst-case situation after constructing a (very expensive) Offworld Market is for another player to steal it with a Mutiny and then start launching resources himself. (Actually, the worst-worst-case is to have someone munity away an Offworld just powered up with an Adrenaline Boost.)

Offworld Markets changed quite a bit over the course of development. Originally, it was actually two buildings - a Launch Pad, which functioned similarly to the current building, and a Space Elevator, which shipped faster and didn't consume Fuel or Aluminum when launching. We combined them into a single building to simplify the game and also to connect the building with the title. Once we chose the name *Offworld Trading Company*, it made sense to have the most important building in the game reflect the title. Also, there were originally no limits on how many Offworlds a player could build, which led to some ridiculous Offworld arms races in which two players had four, five, six, and even more each, making so much money that their stock prices were rising almost as fast as their cash, extending the game far too long. Furthermore, once a player has more than two Offworlds, sabotage becomes a less useful tool against him, which also makes the endgame somewhat stale. Things improved after limiting Offworlds to two per player, and they improved again when we tied the first one to HQ level 4 and the second to level 5. Now, players have an interesting decision to make at level 4. Build an Offworld early (perhaps using a Hologram so no one notices) or push ahead to more claims at level 5?

BLACK MARKET

Although the black market is one of the defining features of *Offworld*, it was not part of the initial game design. The idea originated, after the basic free market gameplay was already in place, from an offhand comment made by one playtester — "It would be cool if I could sabotage the other players' buildings." The game was not supposed to be about combat (although in this earlier version of the game, the player could hire pirate ships that flew around attacking units and building), but some well-timed sabotage sounded interesting and fun.

The first question was how players should acquire sabotage. The idea of something called a "black market" fit well with the economic theme of *Offworld*. Initially, the Black Market was actually a neutral building that appeared on the map, which players could discover during exploration and then access to buy the items. (An equivalent Pirate Haven building existed for hiring pirates.) Each time a player bought an item, he would then be locked out of the market for a specific period of time, so players couldn't sabotage as much as they could afford. (Under the original model, if a player found more than one Black Market, they could buy sabotage more often.)

We were also concerned about players turning an economic game into a de facto military one by deciding to spend as much money as possible hurting each other with sabotage. Therefore, we decided to double the price of each item every time it was bought *by any player*. (Eventually, this algorithm became a little more nuanced; the price went up by less than double, scaled by the number of players, and also increased for the purchasing player slightly more.) This global

increase in price meant that, at some point, the cost of sabotaging another player would be so high that it would no longer be worth doing. Increasing prices globally had another interesting effect; seeing a Mutiny go up in price means that everyone knew that someone just bought one. Who is going to get hit? Which building? Maybe a player should buy a Goon Squad to protect his Geothermal Plant? Of course, once the player with the Mutiny sees the price of Goon Squads increase, maybe she should be more careful where she attacks?

The visibility of black market prices created a wonderful sense of paranoia, and we wanted to ratchet up the level of distrust among players by also not revealing who actually triggered each sabotage incident. When a Geothermal Plant gets destroyed with Dynamite or stolen with a Mutiny, the owner can only guess who attacked him. Hearing inaccurate accusations fly back and forth during play sessions is a singular experience. Players will sometimes engage in crude diplomacy by declaring who they think should be targeted (and why they themselves, of course, should not be). The fear of players aiming to knock out a specific players based on his pregame reputation led to the idea of the Masquerade mode, which hides a player's identity until he is either eliminated or wins the game.

Originally, the items on the black market were the same six every game: Bribe Claim, EMP, Power Surge, Stasis Field, Mutiny, and Underground Nuke. The Stasis Field, which froze ships in place, was cut when the Pirate and Police ships were removed from the game. To replace Pirate ships, two new items were added to the black market that had similar effects but no micromanagement – Pirates attacked shipping lanes and Dynamite destroyed buildings. After playing with this set of items for months and months, we were worried that players had no way to protect themselves from sabotage. Thus, we added the Goon Squad as a check on too much black market aggression.

We launched on Early Access with these seven items - Bribe Claim, EMP, Power Surge, Underground Nuke, Mutiny, Dynamite, and Pirates - which long-time players still think of as the classic set. However, after many more months of play, we felt that we were missing a great opportunity to add diversity to the game (and thus encourage more adaptive play) by adding more items to the black market and choosing them randomly before each game. Eventually, we added twelve more items to the black market, from which around seven are chosen each game.

Initially, the algorithm to select them was quite random, like picking cards from a deck, but this method made the game *too* random as the delicate balance between each type of sabotage and the other game mechanics was lost; for example, a Scientific player didn't have to worry about Pirates or Magnetic Storms if neither one appeared for sale. Thus, we added some rules to govern the black market — there would always be either an EMP or a Power Surge, either a Dynamite or a Mutiny, and either Pirates or Magnetic Storms. Further, Goon Squads would always be in the game as long as at least two items which triggered them were available. These rules helped preserve a bit of the flavor of the classic black market, so that players have a sense of which items are more common and which are more rare.

Bribe Claim - Certainly the simplest black market item, Bribe Claim is one of only two (along with Cook the Books) which takes effect immediately. Everyone wants more claims, but however appealing a new claim may be, players should be careful not to overvalue the item.

Bribing a claim for \$4K may sound great, but what if the player could instead upgrade her HQ for \$8K and get three claims? The best time to bribe a claim is if the player has one claim left for a new building and needs the extra claim to at least build a second building for the +50% adjacency bonus.

Cook the Books - This item is one of only two (along with Bribe Claim) that can be purchased with a D bond rating, which is especially important in this case because buying Cook the Books can actually raise the player up to a C rating. (However, the game will track if the player's debt is so bad that he would be below D if such a rating existed. In that case, buying Cook the Books will *not* raise the bond rating.) Games with Cook the Books available are interesting because players know that they can take on more debt than normal. However, a lower interest rate on a larger amount of debt can still spiral out of control, so sometimes the winner ends up being the Robotic player who decided to skip debt and just sell Power.

Auction Tile - The first version of this item only allowed players to auction off their own tiles. The upside is that the seller is rewarded in straight cash (while the buyer can overbid with debt), and if the other players get into a bidding war, the money can fund something much more important than the lost tile. In fact, the *building* on the tile is auctioned off as well; I've always been curious to know how much people would pay for an Offworld Market although I have certainly been too hesitant to try that myself. However, auctioning off one's own tiles is a rare strategy, so we also added the ability to auction off neutral tiles (although in this case, the money goes to the bank). The typical strategy is to auction off a tile next to one's own HQ so that it is not particularly valuable to anyone else and can therefore be bought for a low price.

Hologram

Philosophically, I have always designed games for both the human and the AI. Obviously, game mechanics needs to be fun for the human as the artificial intelligence is not going to be buying our game. However, I also always evaluate game mechanics by whether the AI can, not necessarily have fun with them, but can understand them and use them in a reasonable way. The hologram is a very interesting black market item that adds an element of guessing the opponent's mind into the game, but it is completely unsuitable for the AI. The problem is making the AI capable of guessing where the humans placed her Holograms. If we don't solve that problem, then the human can easily hide every Offworld Market and just walk to victory. On the other hand, if we DO solve that not insignificant problem, then the human is going to just assume the AI is cheating and peeking at a bit of game state it shouldn't be seeing. It's a classic lose-lose situation for an AI developer. We solved this problem by finally drawing a line between the single-player and the multiplayer versions of the game; the Hologram (along with the Spy and Auction Tile) would be considered Advanced Sabotage and turned off by default in the single-player game. Keeping both sides of the game identical is still the rule, but sometimes breaking that rule is worth it. Holograms were simply too much fun to sacrifice to a philosophical goal.

Spy

Of course, the Hologram would never have worked at all if there wasn't some way to counter it, which is why the Spy exists. However, the Spy does a whole lot more; it reveals hidden Goon Squads, what advanced buildings (such as Patent Labs and Hacker Arrays) are doing, and the stockpile stored inside a building (which can be useful when destroying a full Glass Kiln with

Dynamite). Information is powerful although that power is also hard to quantify; many players felt that the Spy was not worth triggering a black market cooldown, especially when looking for an Offworld Market to steal with a Mutiny. Thus, we removed the cooldown for the Spy, as well as for the Hologram, so that players could use as many as they could afford. Because both items only affect information and not actual resources, this change was still balanced with the rest of the black market. (We also tried taking the cooldown away from Auction Tile, but Zultar proved in a memorable game how much one player could grind everything to a halt by auctioning off all his buildings.)

MULE - A not very subtle nod to one of the major inspirations for *Offworld*, the MULE also lets the player do something unique — to mine resources without constructing a building or even using a claim. Thus, players can acquire 200 Aluminum without actually having to commit to an Aluminum tile. MULEs are also a great way to take advantage of a primary resource that has spiked in value by simply mining the most valuable resource relatively close to the player's HQ. MULEs do, however, consume Fuel while traveling *and* while mining, so players should be careful not to use MULEs if the price of Fuel is too high.

Pirates - As mentioned above, Pirates were originally actual units that the player would buy and move around the map, attacking enemy ships and buildings. The black market version simply stayed on one tile and stole resources from every Freighter that came within range (and would disappear after giving a total of 100 resource to the attacker) Initially, every ship was shot down, so a player hit with Pirates early in the game might be knocked out entirely if he lost his first 100 units of Steel to another player. Thus, we added a dice roll for each shot so that each Freighter had a 50% chance of surviving. This system worked reasonably well but could still annoy players (either the attacker or the victim) if the dice were streaky. Our artists came up with a new concept for the Pirates; they would no longer fly in circles but instead shoot at Freighters from the ground to knock off resources. This art change inspired the final system, which uses no luck and also doesn't strangle victims. Now, Pirates always hit Freighters but only steal *half* of the resources; we're not sure why it took so long to get to this obvious solution! (Putting Pirates on the ground also creates an interesting, if obscure, wrinkle; players can actually remove Pirates from the game if they construct a building in the same tile. Normally, placing a building in a tile just to kill Pirates doesn't make sense, but players should at least consider this possibility when placing them.)

Magnetic Storm

The Magnetic Storm originated from trying to design a way to hurt Freighters differently than Pirates do. We chose the simplest approach — to simply destroy all Freighters (and their cargo) within a large radius. This power can be especially useful if multiple players are shipping across the same territory as it can hit as many units as are within its range. Scientific HQs are especially vulnerable to Magnetic Storm as they sometimes ship Food, Oxygen, Fuel, Steel, Glass, and even Chemicals and Electronics across the map, all of which tend to be valuable. Players who want to wipe out a specific resource can use an EMP first on the distant buildings, which then automatically triggers a shipment to the owner's HQ, which can then be wiped out immediately with a Magnetic Storm. One rare, but still powerful, use of a Magnetic Storm is to prevent a player from repairing a distant building destroyed with a Dynamite; the repair Engineer can be

wiped out just before it gets to the tile (and although the it does regenerate at the HQ, these units travel *very slowly*).

EMP - One of the original black market items, the EMP may have been the first one added to the game as it has such a straightforward effect - simply turn off all the buildings of another player within a certain radius. Initially, all buildings were shut off for the same period of time, but we found the choice more interesting if the effect decreased by distance from the target tile — not only did this effect make sense thematically, but players now needed to consider which specific buildings were the most important to freeze. Because an early EMP can be so devastating (potentially shutting down all of a player's buildings), an expert player will often split her early buildings between different sides of her HQ, making sure that at least half of her production would survive an EMP attack.

Power Surge - The Power Surge works similar to an EMP but is meant to punish players for a different type of arrangement. The EMP is most destructive if a player clumps his buildings together to take advantage of adjacency bonuses. A Power Surge, on the other hand, is most dangerous if a player builds out in snaky lines, which are less vulnerable to EMPs and can be useful for connecting the HQ to distant resources. The Power Surge moves to adjacent tiles randomly but cannot hit the same tile twice. Therefore, if a player isn't careful, a Surge can end prematurely if it gets trapped on a tile without a valid path; the best place to start a Surge is at the end of a line of buildings because it will have a clear path. We made one important change to how Power Surges interact with Goon Squads, which kill Power Surges if they randomly hit them. After the change, the Surge will only move onto a tile with a Goon Squad (even if unrevealed) if there are no other options available, which means that players never get an unlucky roll with Surges. Players had referred to hitting Goon Squads with an unlucky roll as a “bad bounce” — which meant an unintentional and unwanted bit of luck had entered the system. (Goon Squads were meant to protect primarily against single-tile sabotage, like Mutiny or Dynamite; it was not meant to kill Power Surges randomly.) Now, if a player wants to protect against Surges, she should arrange her buildings with chokepoints and place the Goon Squads on those tiles, guaranteeing the block.

Adrenaline Boost - The original concept of the Adrenaline Boost was to be the opposite of the EMP, meaning an area-of-effect black market item that boosted buildings instead of disabling them. However, players need to be careful with Boosts as they increase a building's speed (how fast it works) and not its efficiency (how much of resource X is made from resource Y). Thus, a boosted Steel Mill will produce twice as much Steel but also consume twice as much Iron, which means that the player may not have *enough* Iron to support the boosted Mill, which means the price of Iron will rise as the player has to buy more and more Iron to feed the Mill. By the time the Boost is over, the building might even be running at a loss (especially since the price of Steel might drop from the sudden overproduction). Adrenaline Boosts are also great for advanced buildings as they make them all work faster, meaning quicker patents, optimizations, hacks, and (most importantly) launches. In fact, players favored boosted Offworlds so much that we had to add a special rule for them, increasing the speed of just that one building by 50% instead of the standard 100%. We dislike adding special rules to handle a single tactic, but a boosted Offworld (especially if protected with a Goon Squad) could simply end the game, especially in 1v1.

Slowdown Strike - Initially, the Slowdown Strike was meant to be just an alternate version of the EMP, hitting all buildings within a certain radius but slowing them down instead of disabling them. However, the EMP was still strictly better, which put the item in an odd place; it is never good to give a player two choices, one of which is always worse. We tried to fix this imbalance by giving the Slowdown Strike a bigger radius and longer effect time, but we had to increase those numbers so much that the item somehow felt both too powerful and yet still too weak (because the buildings did keep working). Instead, we gave the Slowdown Strike a unique power — the ability to ignore Goon Squads. This change gave the item an important strategic position, a way to hurt a player even if everyone knows he has a Goon Squad on that one important building. Ignoring Goon Squads only works because the original effect was so weak, an example of solving a design problem with an orthogonal power instead of just turning up the numbers. Further, the Slowdown Strike is the mirror opposite of the Adrenaline Boost (meaning a building with both effects works just like normal), and as players often protect their Boosts with Goon Squads, the Strike is the natural counter to that situation.

Network Virus - Perhaps the most conceptually strange item on the black market, the Network Virus punishes other players for allowing their buildings to become unprofitable. Initially, the effect only prevented players from deleting buildings and turning them on or off. However, as long as a player turned off his buildings when they were losing money, the Network Virus wasn't that dangerous. Thus, we changed the effect to force a building to be always on. Still, players could still find a way out by selling off all of the input resource consumed by the building (which means it would stop processing). Next, we turned on auto-supply for all buildings, which meant that the input resources would be automatically purchased by the owning player. Of course, players found a way out of that too, by simply getting rid of all their cash to prevent auto-supply from happening. To fix that, we made Network Virus auto-supply actually buy input resources from debt if necessary. This change fixed all the ways player could avoid the effect, but it created a new, bizarre problem, which is that auto-supplying using debt is actually a GOOD thing if a building was profitable (because the building can now work even if the player is out of cash and resources). Fortunately, a fix was possible by simply not allowing players to hit their own buildings with a Network Virus, which was not something we had worried about previously. A Network Virus is most effective if the attacker is also manipulating the market at the same time; for example, if Steel Mills are hit with a Virus, the player who attacked should also buy up as much Iron as possible to drive up the price and push the Steel Mills further into the red.

Circuit Overload - Originally, the Power doubling of Circuit Overload was part of the Network Virus. The player couldn't turn his buildings off, *and* the building would consume twice as much Power, which usually guaranteed that the building would be locked in an unprofitable state. However, players quickly found ways to hurt their rivals with the Network Virus regardless of the price of Power, but if Power was high, the combination was devastating. Thus, we created Circuit Overload for just the Power effect. However, because the item didn't affect Power buildings at all, we also extended Circuit Overload to shut down buildings that were producing Power. Occasionally (and especially on maps with lots of Geothermal Plants), the price of Power drops so low that Circuit Overloads are not particularly effective; in that situation, players will often use the item as a cheap and safe method for removing Goon Squads from enemy buildings. (Because the price of Power is low, giving a Circuit Overload to an opponent is not particularly dangerous.)

Core Sample - The Core Sample is the only way to add resources to the map after the game starts. This ability could easily be too strong if players could control which resource is found, so we made the discovery random. However, the probability for each resource is different depending on the terrain; for example, a Core Sample of a Volcanic tile is most likely to find Iron. Thus, players can usually find the resource they want if they take the time to find the right terrain type. Randomness after the player makes a choice is generally not a good fit for *Offworld* (see above as we stopped Power Surges from hitting Goon Squads randomly), but we mitigate that issue by actually showing the odds of discovering the most likely resource to be found in the popup help when mousing over a tile. If players are going to roll a virtual die, best to be as transparent as possible with their chances.

Underground Nuke - In some ways, the Underground Nuke is the mirror opposite of the Core Sample; it is the only way to subtract a resource away from the map. However, that is actually a bit of an understatement — the Underground Nuke is the only way to *permanently* damage another player. Every other type of sabotage, while painful, is still only temporary. EMPs and Power Surges wear off eventually. Pirates leave after stealing enough resources. Buildings destroyed with Dynamite can be repaired. Not only do Mutinies end, but a building can be stolen back with another Mutiny. An Underground Nuke, however, is forever. Thus, players sometimes treat Underground Nukes the way real nukes were treated during the Cold War — with the doctrine of Mutually Assured Destruction. If Nukes are available, players will often *not* use them, unless someone else makes the first move. If one player nukes another's Aluminum, the victim is probably just going to nuke the attacker's Aluminum in return, so maybe the players will all just watch and wait. Not all players are this cautious, of course, but this situation is common enough. One important change to Nukes came when Scientists were no longer the only HQ that could see Trace resources; instead of just removing Trace levels from the game, we made it the minimum state for a nuked tile, which did help Nukes from being *too* powerful.

Dynamite - As mentioned above, Dynamite replaced the ability of the original Pirate unit to destroy buildings. The effect could never be quite as strong as before because an unchallenged Pirate could wipe out all of a player's buildings away from the HQ (which had natural protection against Pirates). Indeed, we were worried that Dynamite was going to be a little bit boring; the building gets blown up and then simply gets repaired. Was there an interesting choice being made? After adding Dynamite to the game, however, we found that it had two interesting uses. First, because the repair unit, the Engineer, is very slow, distance makes a great deal of difference. Dynamite is a powerful tool against a Geothermal Plant, or even just a Mine, on the other side of the map from the owner's HQ. Also, because the owner needs to pay half the construction resources to repair a building, Dynamite is great against Offworld Markets, by far the most expensive building in the game. Even though Offworlds are usually near the owner's HQ (so repair times are minimal), having to buy large quantities of Glass, Electronics, and either Steel or Carbon can really slow down a player. Furthermore, if the saboteur happens to be making Glass or Electronics and would benefit from an increase in demand, it is all the better.

Mutiny - Another one of the original black market items, the Mutiny allows perhaps the most devastating of powers — stealing an opponent's building for a period of time. The Mutiny is best used to take a building at the peak of its effectiveness. If Power spikes, grab a Geothermal Plant.

If Water becomes a problem, steal a Water Pump. Better yet, the player should take one next to his own Pump, benefiting from an adjacency bonus. Advanced buildings are also great targets for a Mutiny to grab a patent, trigger a shortage, or even launch resources offworld. If the launches are arranged ahead of time, a stolen Offworld Market can launch twice during a Mutiny. (Taking a boosted Offworld is one of the greatest pleasures in the game.) Stealing a tile already hit with a Mutiny is also a great move because those tiles are very unlikely to be protected by a Goon Squad (although that is occasionally seen in 1v1 play).

Goon Squad - The Goon Squad has been mentioned so many times already that it is hard to know what else to say about it. Although the item was created to give players a defense against sabotage, we designed it to also encourage *revenge*. If sabotage is caught by a Goon Squad, the identity of the attacker is then revealed, and the sabotage item is then given to the defender. Thus, the game encourages the defender to strike back at the attacker with the same sabotage used against her. Players often make an emotional decision in this situation, even if it's not necessarily the correct one; saving the sabotage for later or for a different player might be the best choice, but revenge definitely feels better. One interesting aspect of Goon Squad use is guessing where one's opponents have placed them; every time a black market item is purchased, the price goes up, so everyone knows when a Goon Squad has been bought. If a player gets down the first Geothermal Plant, and Mutinies are on the market, then a Goon Squad would be a good idea to protect the tile. However, once the Goon Squad is purchased, and the price goes up, everyone is going to assume that the Geothermal is protected. Perhaps it would be better to protect the Steel Mills and catch everyone by surprise? Finally, we made one small but important tweak to Goon Squad after seeing it in action. The protected tile is shielded from EMPs, Power Surges, and other sabotage that hits multiple tiles, which of course reveals the location of the Goon Squad. After seeing players watch for these events, trying to remember which tile had the Goon Squad for later, we decided to just make it easier for players and permanently reveal the Goon Squad to everyone once it had been exposed. If information has been available to players previously, we don't believe taxing their memory is good game design — better to help them remember to inform decisions later in the game.

HQ TYPES

Offworld is an RTS, so having different factions was part of the design from the beginning; what each one meant, of course, took a long time to form. However, one design choice we inherited without really considering seriously was having players choose their faction before the game began — it wasn't a choice because every strategy game ever, from *Civilization* to *Crusader Kings*, from *WarCraft* to *Company of Heroes*, from *Master of Orion* to *Stellaris*, from *Master of Magic* to *Endless Legend*, has players pick their faction before starting the game.

One of our playtesters floated this simple, but powerful, idea after a match one day — "What if I could choose my HQ after I see the map?" This suggestion took about an hour to code and was immediately a giant step forward for the game. Perhaps this idea was a natural outgrowth of the game's design; the HQ types of *Offworld* favor specific arrangements of resources, so players would inevitably wish they had chosen a different HQ after seeing the map. Indeed, the exploration/founding phase of *Offworld* is also quite unique among RTS games (perhaps our background in the *Civilization* series made it a natural starting point for us), and adapting one's

choice in HQ to the random map makes for a very interesting decision. The best *Offworld* players are capable of winning with all four HQs so that they are never at risk of losing a game because the random map doesn't match their favorite HQ. Finally, choosing HQs during the game also meant that players could take into account *each other's* choices; for example, after noticing that all three other players founded Scientific HQs, which often consume tons of Power with secondary buildings like Steel Mills and Electrolysis Reactors, a player might decide to go Robotic and just focus on producing Power, making money as the price spikes earlier than usual.

Expansive - This HQ was always the vanilla one, with bonuses that did not significantly change the game but were still strong enough to compete. Thus, one HQ could be seen as the default - against which the others could be compared - and also what new players could use to get a baseline *Offworld* experience. The most obvious way to make a player stronger was to simply give him more claims, so Expansive HQs receive one extra claim each time they upgrade, a hugely powerful, if also hugely boring, advantage. We also wanted to give them a construction bonus to help them expand quickly, so we made their buildings cost half as much steel as they did for other HQ types. (In our initial Early Access version, Expansive HQs also needed half as much Steel to upgrade, but our community quickly discovered this bonus was hugely overpowered.) The Expansive player tends to look for as many High resources as possible - to feed all the secondary buildings on its extra claims - so we made claiming tiles farther away from the HQ a little easier by increasing the speed of Expansive Freighters.

Robotic - From the beginning, the most obvious way to create a distinct HQ was to simply allow one to ignore life support costs. Thus, the Robotic HQ started as the one which didn't need to worry about Water or Food or Oxygen. We also changed its units to use Power instead of Fuel, so that Robotic players could truly ignore Water entirely by not needing Electrolysis Reactors. The bonus for founding on top of resources originally belonged to the Expansive HQ, which made more sense with its large footprint when HQs got a slow but steady rate of production from the resources underneath them. We determined that it was just simpler (and reduced our UI challenge) to simply destroy the resources on found and give the player a lump sum relative to the resource level. After the change, the Robotic were a better fit for this bonus as they could take advantage of an early resource lead to upgrade fast without concern (because they consume no extra life support as they upgrade). In fact, the Robotic HQ originally consumed Power (and, in a later version, consumed Electronics), but we felt that having the HQ consume nothing as it upgraded made it even more distinct.

However, players felt the Robotic HQ was still underpowered, so we made two further changes. First, we changed the resources Robotic HQs needed to upgrade — needing half as much Aluminum and using Electronics instead of Glass (and half as much as well). Thus, we improved further the ability of Robotic players to upgrade quickly and, perhaps more importantly, changed what type of resources they looked for on the map. Because Aluminum is much less important to them, Robotic players can found in locations that are unappealing (without good access to either Water or Aluminum) to other players. (The high-level goal here is that each HQ type should have a different ideal founding location so that players benefit from being able to play all four types.)

Second, we changed how adjacency rules worked for the Robotic player; buildings would get an adjacency bonus not just for being next to buildings of their own type but also for being next to buildings which supply their input. Thus, a Steel Mill gets a 50% bonus for being next to a Metal Mine that produces Iron while a Glass Furnace would get a 75% bonus for being next to an Elemental Quarry producing Silicon and an Electrolysis Reactor producing Oxygen. We also experimented with giving Robotic HQs a general production bonus relative to how much extra Power they produced but - instead of adding another special bonus to an already long list - we extended the adjacency bonus to include buildings which provide Power. (Thus, Solar Panels would give an adjacency bonus to all buildings which consumed Power.) Again, these changes meant that Robotic HQs benefit from a certain arrangement of resources that might not matter to other HQs, such as a Geothermal near Iron (which could both boost Steel Mills) or a variety of Low resources close together (which enables a chain of input bonuses).

Scavenger - The initial idea behind the Scavengers was an HQ that used a different resource as its primary building material. Almost all buildings in the game require a significant amount of Steel, making it an important resource throughout the game, so allowing a player to bypass that resource entirely radically changes the resource hierarchy. Scavengers originally required Silicon back when Copper was still in the game, but we switched them over to Carbon when it was added because Carbon was the easiest resource to skip during the early game. Carbon only leads to Chemicals and Electronics, both resources that players do not typically need until they have upgraded at least a couple times, so Scavenger players can thrive on parts of the map ignored by other HQs.

We also wanted the Scavengers to thematically be tied to espionage and sabotage, which inspired the HQ's other two bonuses. For espionage, we gave Scavenger players early warning of most random events affecting the resource market, including all of the ones artificially triggered by the Hacker Array. It's difficult to quantify the value of this bonus as it is simply information, but a good Scavenger player will buy and sell rapidly in response to an impending shortage or surplus. Indeed, multiple Scavenger players can greatly amplify the effects of these events; for example, if a Food shortage is coming, the Scavengers might buy up a lot of Food in preparation for the coming rise in price, which of course drives up the price *before the shortage even arrives*. It can sometimes be hard to tell if the price is changing more from the random event itself or from Scavengers playing the market.

To associate the Scavengers with sabotage, we gave them a random item from the black market each time they upgraded. This power was interesting but considered simply too random by most players. In a 2-player match, for example, getting Pirates from the first upgrade could put the other player in such a hole that the match felt over (whether or not this was really true). Thus, we changed the bonus to be a shorter black market cooldown, so that a Scavenger player could buy sabotage items quicker than the other players. This change took away an unnecessary bit of randomness and also had a more pronounced effect later in the game, which improved perceptions of fairness because, early on, the Scavenger player usually couldn't afford to buy sabotage from the black market each time it unlocked anyway. (Although the old random sabotage bonus was removed, we left the code in the game and recycled it as a special power for one of the Campaign's Scavenger executives.)

Scientific

The most unusual HQ in the game - because they can ignore High resources and skip primary buildings - the Scientists also started off with very different powers. Originally, the HQ received Optimization Center upgrades simply from maintaining buildings; if a Scientific player built a bunch of Steel Mills, then he would eventually earn Improved Steel Production, then Efficient Steel Production, and so on — and all for free. The Scientists also were the only HQ that could see and use Trace resources (which, at this point in development, were also generated randomly and were as productive as Low resources). Finally, the Scientific HQ acquired patents faster, which actually was taken away by the time the game released on Early Access but came back later to give the HQ more of a scientific flavor.

This combination of bonuses just didn't seem to work, and Scientists were the least popular HQ. The free optimization upgrades felt too random and hard to monitor; because the player was not making active choices, she wasn't invested in the outcome of the system. We decided to drop this bonus in favor of a new, more radical one — that secondary buildings could extract their input resources directly from their tile. This idea came from thinking about ways to make Trace resources more important for the Scientific player; a few extra Low-equivalent resources was not particularly interesting, but if those resources could be used to power Electrolysis Reactors and Steel Mills and Glass Blowers? Suddenly, the entire map looked different to a Scientific player; that giant cluster of uninteresting Trace and Low Water tiles becomes a money-making machine for triangles of Scientific Farms and Reactors.

Ironically, the Trace resource bonus that inspired the defining feature of the Scientific HQ would not last much longer. The one downside to allowing players to choose their HQ type after exploring the map is that there was no way to show Trace resources only to Scientific players before founding (because, of course, these players are not Scientific yet). For a while, we kept Trace resources in as before and simply revealed them to Scientific players after founding, but it seemed like a weird vestigial rule that didn't fit the current game. Thus, we dropped the association with Scientific players and changed the rules for Underground Nukes so that resources could never be destroyed permanently but instead became Trace resources (which now produced at only a quarter of the rate of Low).

Scientific HQs have one more bonus - protection against EMPs and Power Surges - which used to be much stronger, originally protecting them against *all* types of sabotage. The desired effect was not necessarily to boost the Scientists but to simply make sabotage decisions more interesting. For example, should a player target the Scientist with the highest stock price or someone else without protection against sabotage? Ultimately, this bonus proved simply too powerful, so we reduced it to only affect sabotage which froze buildings. The upshot of this change is that players now have an important reason to check the black market before picking an HQ; if both EMPs and Power Surges are available, then Scientists are a good choice as they have natural protection against a significant portion of the black market.

STOCK MARKET

The hardest part of the game design to get right - and one that changed significantly only a few months before release - was the stock market. The system had both a thematic purpose (a modern economic game needs a stock market to reflect success) and a gameplay purpose (the system serves as a desperately needed victory condition for a game in which wiping out the opponent militarily is not an option). Basically, we needed a way to end the game that was more interesting than simply counting who made the most money.

Our initial idea involved buying out other players and actually acquiring their HQ as well as all of their claims and buildings. After a player had no more shares available on the open market, she would be vulnerable to a buyout, which any player could trigger by paying double value for all of the shares owned by other players. Thus, a player could defend himself by buying up his own stock or attack other players by buying up their stock, in preparation for a later buyout.

This system worked reasonably well except for two problems. First, players often felt that the game spiraled out of control following a buyout because they inherited a lot of new buildings all over the map that they didn't have time to manage. Second, buyouts were all-or-nothing affairs; when two players were racing to buyout a third player, the winner would usually snowball forward and easily dominate the rest of the game (or, if we tried to balance out this effect by making buyouts too expensive, an even worse situation occurred in which players saved up their money instead, in hopes being able to afford the final buyout).

We solved both these problems with the subsidiary system, under which players no longer acquired all of the eliminated player's buildings and claims but instead now owned shares of a new subsidiary, which is the eliminated player's company run by a modified AI that focuses solely on making money (and avoids advanced options like sabotage, patents, auctions, and stocks). The subsidiary simply exists to distribute its profits to shareholders, according to the ownership percentage. This system is much easier for players to handle as they don't need to manage their subsidiary's buildings and also easily handles split ownership, avoiding the problems of the original all-or-nothing system.

Because subsidiaries enabled partial ownership of companies, we were able to add one more wrinkle to the system — the majority buyout, which occurs if the other players own six shares (meaning more than half) of a player's stock. In a majority buyout, the targeted player is instantly eliminated and turned into a subsidiary. This feature prevents players from staying in the game far after the point it becomes obvious that they don't have a chance; if a player's rivals own six or more of his shares, his chances of winning are slim at best. Most importantly, the player is not left around with an opportunity to unbalance the game by, perhaps, using sabotage maliciously to keep a specific opponent from winning. If a player has clearly lost, the company should be run by the neutral, subsidiary AI as soon as possible.

One final important change to the stock system came very late, less than five months before we shipped the game. Some players asked for more transparency in how close players are to buyouts. Thus, we experimented with a system in which players could buyout an opponent's self-owned stock one-by-one (for double cost). Stocks owned in one's own company became the

equivalent of hit points, and when a player ran out of stock, her game was over. The system led to some tense games in which players could easily see how close the game was to ending as they lost control of their own stock, one share at a time. For the first time, three-player games were playable because the two leading players could each end up with half of the last-place one. However, free-for-alls with more than three players suffered because players could team up against one specific player and buy one or two shares each, forcing him out of the game.

Next, we tried a middle ground. Players could buyout shares one at a time until only five shares remained; at that point, the remaining five shares have to be bought all together. This mechanic struck the right balance between making buyouts more transparent while also protecting players from being knocked out by the group. One final small change gave us our final stock system - during a buyout, players have to pay 20% extra for each share owned by a third party, which gives a bonus to players who invest in buying some of the first five shares. Many players didn't even notice this final tweak, but it *felt* better; if a player buys the first five shares in an opponent, she is now best positioned to finish the buyout.

We are often asked how *Offworld* compares strategically to more conventional RTS games. Some parts of the game are so different that it is hard to even make comparisons; however, the development history of the game's stock market is interesting because it ended up in a place that mirrors the most famous dynamic in RTS games - rush vs turtle vs boom. As a short explanation, these three strategies have a high-level rock/paper/scissors relationship. A rusher (who sacrifices economy for early military) will beat the boomer (who sacrifices defenses for a strong economy). The rusher, however, loses to the turtler (who builds defenses in preparation for an attack). Finally, the boomer beats the turtler by outpacing him economically by the end game.

Strategically, our stock system parallels rush/turtle/boom. Going for an early majority buyout of another player is akin to the rush, which is done by investing one's money not in economic growth but in buying another player's stock. This rush, however, can be beaten by a turtle strategy, which means buying up shares of one's own stock, especially that all-important fifth share that prevents a majority buyout. However, the turtler will lose to a player planning to boom by investing as much money as possible in upgrading her HQ, expanding production, and usually building the first *Offworld* Market. Completing the circle, the boomer risks losing to the rusher who only needs to buy those first six shares to knock her out. Most games of *Offworld* have specific key moments when this strategic tension is clear - when a player buys his own fifth share and blocks a majority buyout attempt or when a player spends all her money to upgrade to the final HQ level but forgot to buy enough shares to defend herself. The original stock system did not have these dynamics, so it's interesting to consider how we came upon the rush/turtle/boom mechanics of a traditional RTS, basically on accident.

ADAPTIVE GAMEPLAY

We are most proud of *Offworld* because it makes the player think about each game differently, adapting to the events and environment of that specific match instead of using the same build order or pet tactic over and over again. The game encourages adaptation because so many key parts of the game are randomized each time:

- *Random Maps* - Each map is randomly generated, with different quantities of each resource available. To encourage *interesting* randomness, we associated each resource with specific terrain types (Carbon with Craters, Water with Lakebeds, Silicon with Sand, and so on), which determines how likely it is that resources might appear on a tile of that terrain type. Then, we limited these types of terrain to different sections of the map; if Sand fields are in the northwest while Lakebeds are in the southeast, then the Silicon and Water will be in different parts of the map. By preventing different resources types from being too close together, each potential founding location is defined by what resources are close and what resources are not. We also create a dead zone of resources near the middle of the map surrounding the Colony to encourage players to found near the edges of the map, making longer shipping lanes more necessary.
- *Black Market* - The black market typically has six to eight items for sale, and they are selected at the game's start from a set of eighteen (not unlike the ten card stacks chosen at the beginning of a game of *Dominion*). As mentioned previously, they are chosen not purely randomly but with certain guarantees (for example, either an EMP or a Power Surge will always be available). Advanced players watch the black market carefully before deciding which HQ type to use. For example, Underground Nukes penalize Scavengers (who are so dependent on maintaining their Carbon supply) but barely affect Scientists (who can still put secondary buildings on top of Trace levels of a resource). Pirates and Magnetic Storms are dangerous for Scientists as they often ship expensive resources across the map; on the other hand, EMPs and Power Surges favor Scientists as they have protection against both. Circuit Overload is dangerous for Robotic players as they like to maintain a positive rate of Power. Expansive HQs are a good choice if Bribe Claim is not available because they will be the only ones with extra claims. Furthermore, the items change how each other can be used; Holograms are much more powerful in games without Spies than in games with them.
- *Random Prices* - With the Random Prices option turned on (which is highly recommended for veterans), the starting price of resources also changes from game to game. Although half of the resources stay the same, a quarter of them are reduced by 50%, and a quarter of them are increased by 100%. This option was added once veteran players developed general starting strategies for most of the HQ types. For example, two Steel Mills and a Metal Mine on Iron is a typical Robotic opening; however, what if Iron starts high at \$40 and Steel starts low at \$30? Then, a Steel Mill is going to *lose* money by converting \$40 of Iron into \$15 of Steel (although the actual conversion should be a little better because of adjacency bonuses). The Robotic player can stick to the familiar strategy but might be better off looking for something else. Perhaps in this scenario, Power started higher and Aluminum lower? In that case, a Geothermal Plant would be much cheaper than normal and immediately produce some serious money. Basically, the

best players will reevaluate all of their opening moves depending on the set of prices revealed at the beginning.

- *Random Events* - During the game itself, random events occur that shift prices of resources significantly. Some events (Oxygen Surplus, Food Shortage, etc.) will affect just one resource, driving the price either up or down; these events are the ones which can be created artificially with a Hacker Array, so players should always view them with a bit of suspicion (even if a Hacker Array is not visible as it can be hid with a Hologram). Other events affect multiple resources at once; for example, a Pipeline Leak will drive up the price of Food, Oxygen, and Fuel. Finally, Solar Flares and Dust Storms affect how buildings function; while the former boosts Solar Panels, the latter penalizes them but boosts Wind Turbines. Taken together, all these events ensure that players need to adapt to random circumstance *during* the game as well. For instance, a Silicon Shortage might suddenly make Glass Kilns unprofitable; should the player scrap them for something else, or just hold on until the market balances out again? The answer probably depends on many factors, such as the player's stockpile of Silicon, the Colony's demand for Glass, whether the player still needs Glass to upgrade, the cost of switching to new buildings, and so on. The random event, however, forces the player to consider the situation carefully.
- *Other Players* - The decisions made by other players are, of course, not actually random, but they definitely require the player to adapt. For example, the desirability of each HQ changes depending on the other founds. If other players found Scavenger, then perhaps the player should pick Scientific, which has good protection against sabotage. If everyone goes Scientific, then perhaps founding Robotic and building Power is a good move as Scientific players consume plenty of Power with their secondary buildings. Seeing many Robotic players means, of course, that life support resources will not be in such high demand. Besides the founds, players need to pay attention to what everyone else is building. Is everyone skipping Power? (If so, put down an early Geothermal Plant.) Did most players build Farms and not Reactors? (If so, do the opposite and build Reactors.) Are multiple Patent Labs and Optimization Centers up early? (If so, build Refineries as the price of Chemicals is about to rise.) Basically, watch what everyone else is doing to anticipate where the market is heading.

We hope that we've made a game that lives up to our ideal for strategy games — that the player should always be planning, always be reacting, always be thinking.

SPECIAL THANKS

Offworld Trading Company was not an easy game to make, perhaps most especially because people needed to believe that it would work in the first place. Thus, I need to thank Brad

Wardell, Derek Paxton, Brian Clair, and everyone else at Stardock for believing that an economic RTS would actually be fun.

I also need to thank the team for taking the leap with me and working so hard to build the game. Dorian Newcomb, my business partner, was the game's official Art Director and unofficial Producer, making sure that life on Mars looks amazing and that everyone was working in sync. Jason Winokur was the first programmer to join us, and he handled the graphics, supported modding, and generally made sure our project was in great shape. Dave Wagner implemented multiplayer, replays, saved games, leaderboards, and all the other details needed for a modern game. Jim Alley created all of our interface art as well as our great logo. Josh Hardy, after being lured away from the *Star Control* team, made our building, colony, and HQ models as well as our effects. Joel Bowers implemented the scenario system and then built the tutorials on top of them.

Zack Fowler implemented our terrain system and built the map editor on top of it. Tommy Truong helped us finish, animating our buildings and HQs. Mark Cromer made our sound effects and helped with audio design. Christopher Tin composed an amazing soundtrack that scales with the player's progress. Kirby Runyon created 32 maps by hand, based on real locations on Mars. Andy Hull added some nice polish to our character popups (and invented the giant check for losing). Erik Ehoff made some key early concept art that helped to define the game's look. Shentloc, our localization team, did an amazing job to help us ship in nine languages. (Ten if you count British aluminium!)

I'd like to thank my wife Leyla who, perhaps unexpectedly, fell in love with the game and sunk 1,000 hours into it, her very first RTS; her excitement and encouragement helped me keep going during the rough times. Finally, I want to thank the fans that provided us with amazing feedback and support during the pre-release phase; the game would have been much different (and certainly worse) without them. I specifically want to acknowledge the contributions of the following players: Zultar, Cubit, PBHead, Gameslayer, Blues, Blackmagic, Death Tacticus, Indczn, Kingmorgan, Jaiwera, YerAnd, GalacticWino, Roler, TheSpinCycle, Veivi, UltraPope, Dermas, Heisenberg, Sir Rogers, InSync, and Showcasemike.

Offworld would still just be an idea in my head without the amazing team we have at Mohawk, and I will forever be in their debt for believing in the game and committing to making it great. I think we will all remember that year when we were playing the game internally as one of the best of our careers — iterating on it constantly based on daily games while slowly becoming aware that we were making something truly unique. Actually finishing the game was very hard work, so I am very proud of what we created. I hope the game will mean as much to you.

Soren Johnson
April 2016