

In space, no-one can hear you manufacture

Pevans reviews *High Frontier*

The latest game from Phil Eklund and Sierra Madre Games, *High Frontier* is a stunning piece of work. Phil really is a rocket scientist and the game reflects his expert knowledge. *High Frontier* is about the exploration and development of outer space. This is not *Star Trek*-style galaxy-spanning adventure, but realistic, hard science set within the confines of the solar system. It turns out space exploration is hard work, even in the form of a game.

High Frontier comes in a shallow box—there's not much air inside this one. There's a solid board that shows the inner solar system, based around the Sun. It's a bit confusing at first as there are a lot of lines criss-crossing between the planets, moons and asteroids. These represent the low-energy Hohmann orbits that spaceships would use for cost-effective (but slow!) travel between the planets. Places to land are shown as hexagons with various symbols that indicate their size and type and, importantly, how much water is there.

Circles at intersections show Lagrange points where rockets can turn without penalty. Pink circles are 'burns', where rockets must use fuel: for example, to leave or enter orbit. Other circles are hazards—my favourite is what I initially thought was a pair of underpants, but is actually a capsule dangling from a parachute. This is an aerobrake space, allowing craft to make an unpowered landing through atmosphere. There is a lot of information on the board and it's worth taking a bit of time to study this. As a shortcut, the 'obvious' routes to major destinations (such as Mars) are highlighted.

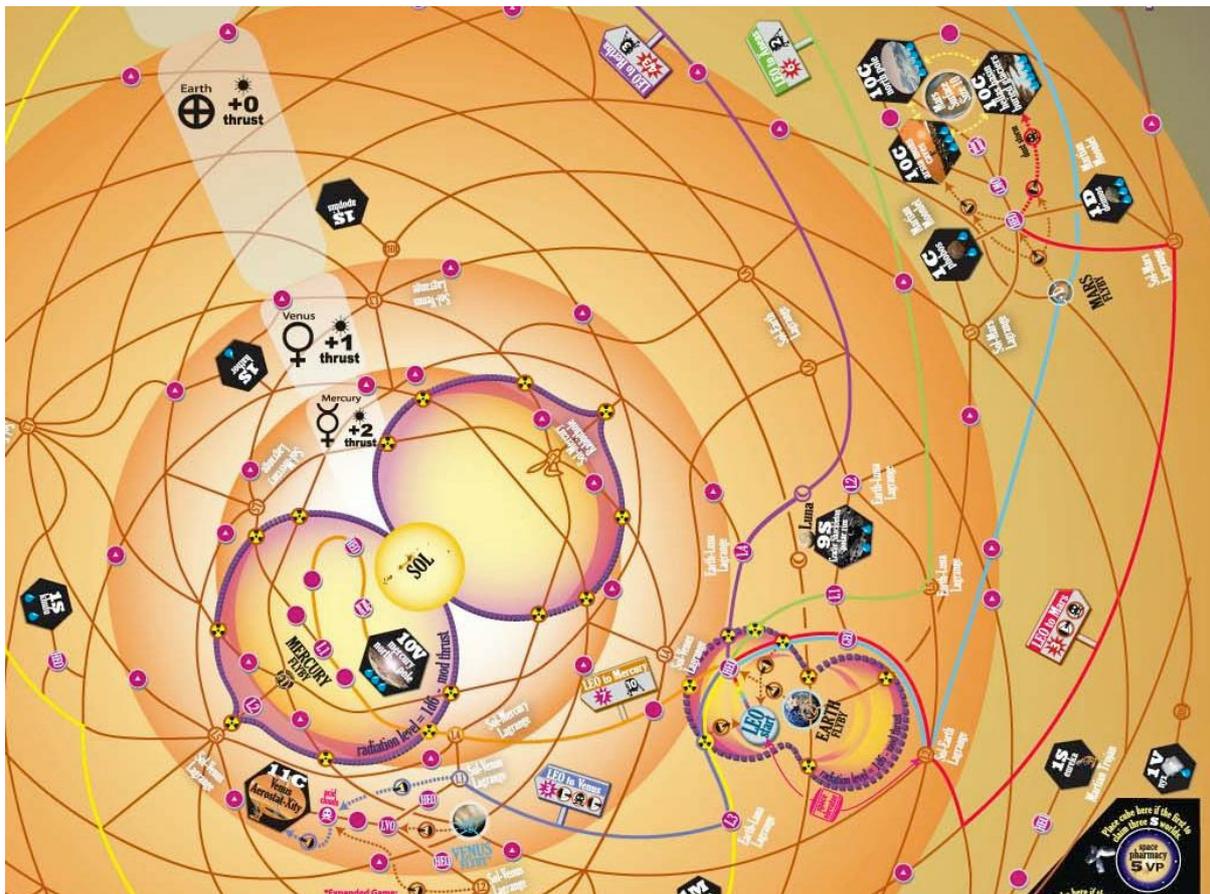
Other components are the neat little rocket pieces in players' colours along with wooden cubes and plastic discs as markers. Other discs are neutral markers and money. In addition to their pieces, each player has a sheet of cardboard, their 'mat', which provides spaces for their 'stacks' of cards and shows a synopsis of the game turn and available actions. Most importantly, the mat shows the status of your rocket. A player's turn is quite simple and can be over very quickly: move your



rocket (if you have one in play) and then take one action. It's moving the rocket that can be time consuming (and requires some arithmetic).

The key element of the game is the small deck of cards that represent different technologies. There are three types. Thrusters provide the motive power for players' rockets. Most of these are rocket engines, showing how many 'burns' they can make in a turn (limiting how far they can go in one turn) and how much fuel each burn uses (limiting the range of the rocket). Some Thrusters are more subtle: solar sails use the sun's radiation to move, requiring no fuel, but moving very slowly. My experience is that these are generally only useful in the inner solar system, where the sun is more powerful.

'Robonauts' make up the second set of cards. These are rated for "in-situ resource utilisation" (ISRU). That is, how easy it is to prospect (for valuable minerals) once you've landed somewhere. The lower the rating the better. There are three types of Robonaut, each providing a bonus. The third set of cards is Refineries. These do nothing in themselves, but getting a Robonaut and Refinery to the same place lets you set up an extra-terrestrial Factory. Each Factory is a victory point (and counts towards ending the game), but is more valuable for the equipment it can produce: better Thrusters and Robonauts than can be built on Earth.



A section of the (basic) board showing the Sun, Earth and Mars
Coloured lines are optimum routes—the red one is Earth-Mars

However, I'm getting ahead of myself. There is a fourth, much smaller set of cards: one for each player, showing which 'faction' (NASA, the UN etc) they are playing. These cards also represent the crew of the player's spaceship, should they decide to send manned missions, and each also provides a special ability. Some of the crew cards are also Thrusters (generally needing lots of fuel) and all of them have an ISRU rating—though it's pretty poor.

To begin with, players will buy and sell technology cards. There are two reasons for this. First off, space travel is expensive! You need a lot more money than you start with in order to fund a mission. You can take one income a turn, but buying technology and selling it at a profit can get you money more quickly. The second reason is to cycle through the technology cards and keep the ones you are interested in. This will depend on the mission you're planning, but generally an efficient Thruster and a low ISRU Robonaut are what I'd be after.

Your cards are face-up in front of you and represent knowledge—the ability to build the technology shown on the card. To put together a rocket, you need to build the technology and 'boost' it (and any crew) to 'Low Earth Orbit' by moving the cards to the appropriate space on your mat. This costs money—getting equipment and people from the surface of the Earth into space ain't cheap. Once there, you can put together cards to make a rocket and send it off on a mission.

What I haven't mentioned is the game's currency: it's tanks of water in low Earth orbit. In effect, they embody the cost involved in getting stuff into orbit. Water tanks have a second function in the game: they are reaction mass (aka 'fuel') for spaceships. That is, the material that rockets heat up and expel to move. Adding water tanks to a rocket shows how many burns it can do before running out of fuel. However, water is heavy, so the more you have on your rocket, the more power you need to move it.

This brings me to another element that I haven't mentioned yet. Each card has a 'Mass' value: how big and bulky it is. When you assemble your rocket, you add up the Mass values on the cards and place one of your rocket pieces on the appropriate row of the diagram on your mat. Then you add water tanks. Each tank moves the rocket piece to the right, adding steps of fuel. However, you get fewer steps per tank the more massive your rocket is. What's more, as you add tanks of water, your rocket gets more massive and slows down further!

This sounds complicated and it does take a while to get your head round it. It's all too easy to send off a mission and then realise you don't have enough fuel to get to your destination—let alone get back! I suggest playing a training game first and trying different thrusters. You will quickly understand the balance between mass and thrust and discover the limitations of the technology.

One thing I spotted in my first game: you don't necessarily have to bring your rocket back. Yes, there are victory points available for being the first to visit certain places and return. However, to build a Factory, you can send a Robonaut and a Refinery as

separate missions. The first becomes an 'Outpost', which you turn into a Factory when the second arrives. This works because cards are knowledge, not hardware. When you 'de-commission' your rocket at its destination, the Thruster card comes back into your hand. You can boost it back into Low Earth Orbit to make another rocket.

Having an extra-terrestrial Factory makes a huge difference as you can now make things in outer space. This is represented by using the other side of a card—the front face is black print on white, the reverse is white print on black. Black cards are highly efficient Thrusters, very effective Robonauts (some have an ISRU of zero) and Refineries that provide bonuses. Suddenly exploring the solar system becomes so much easier. It may have taken 30 turns to get your first Factory established. The next one may only be eight.

The game ends faster than you're expecting. After the long struggle to get established in space (not to mention getting enough cash in the first place), the game really accelerates once Factories are operating. It ends when players have



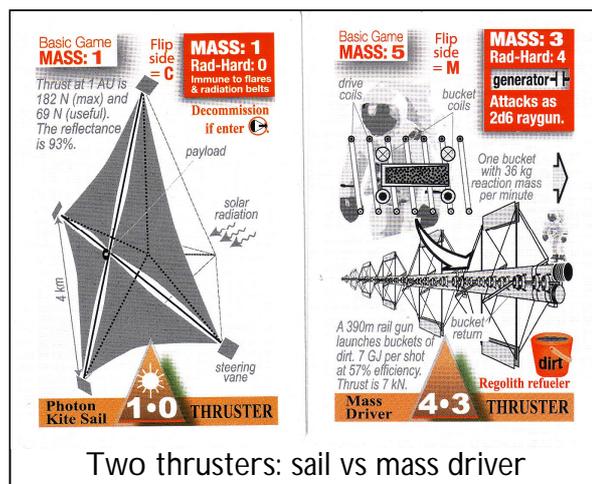
High Frontier and expansion on display at Spiel '10

built a certain number of Factories between them. If one player is racing ahead, they can force a game end more quickly. Victory points are scored for cubes (Factories and other achievements) and discs (successfully prospected 'claims' and colonies) on the board and the player with the most points wins.

I said at the beginning that this is a stunning game. If you don't think so already, let me tell you that what I have described is the basic game. The expanded game adds more details and complications. Spaceships are more complex (needing generators for power and radiators to get rid of excess heat). Players have to take account of radiation and what it can do to their expensive hardware. Rockets can travel faster using slingshot effects and some Thrusters can use rock for reaction mass. Politics between the factions come into play and there are rules for combat.

While the rules cover the basic and expanded games, you'll need the Expansion set to be able to play all of these. As well as the extra cards needed for the more complex rockets, the expansion set includes a second board. This adds the outer solar system to the game, bringing Jupiter, Saturn and their moons into play, and has spaces to keep track of events, the sunspot cycle (which affects radiation levels) and politics. Personally, I think the game is fine with just the basic set, though I do like having the option of flying to Jupiter or Saturn.

High Frontier brings back to me a lot of the science fiction I read as a teenager—all the stories about asteroid mining and the gritty details of space travel. What the game adds is a realisation of how hard and expensive it is to get into space in the first place. However, the potential rewards of manufacturing in space are huge. Well, they are in this game, anyway. I got a real kick out of mounting successful missions and getting Factories set up.



As a game, the challenge of *High Frontier* is in working out how to build and operate effectively in outer space. The competition with the other players adds a bit of spice, but there is not much direct interaction—unless you are playing the politics and combat rules. Having said that, there is only one card for each technology, so there can be a fight to get specific cards. If another player has the Thruster you'd like, you're not going to get it unless they don't want it any more.

As an old-time science fiction fan, I found *High Frontier* a great thrill and I recommend the game—I think it's worth playing just for the experience. If you have an interest in space exploration or fancy the challenge, give it a go. I suggest you stick with the basic game and try a couple of training runs before playing a competitive game. Once you've got to grips with that, try adding in some of the Expanded rules before going the whole hog and adding in the Expansion set.

I do have one niggle with the game, though. The five crew cards are not part of the deck of cards that comes with the game. Instead, they are printed on one of the card sheets and have to be cut out. I can't understand this: surely these five cards could have been printed with the others? It seems like a needless bit of penny-pinching.

High Frontier was designed by Phil Eklund and is published by Sierra Madre Games in the US. It is a strategy board game for 2-5 players (there is also a scenario for solitaire play), aged 12+ and takes 2-3 hours to play. It gets 9/10 on my highly subjective scale.

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