

Hi this is Steve Nerlich from Cheap Astronomy www.cheapastro.com and this is *Private space*.

As you are probably aware, Barack Obama, the US President of Irish descent with an apostrophe lost somewhere along the way (good line), canned the previous administration's Constellation program – which we had covered way back in Cheap Astronomy episodes 33 and 34. And that's fine... I mean, if we could be consulted in future - it was a double episode, you know... but look, it's fine.

The Constellation Program was by and large just an announcement, tasking NASA to do something without committing much in the way of new funding – essentially this was a final term President making an announcement and passing the whole issue of funding onto the next administration. And the next administration with no more capacity than the last, just went mmmm... nup.

But that's not the end of the story - the next generation model for space travel is now private enterprise. The pending retirement of NASA's Shuttle fleet after 30 years of flying was after all a logical point for generational change. So the future will be about private enterprise doing stuff directly for consumers, as well as providing services which the government can purchase from them.

Both aspects of this seem like a good thing, since it doesn't just mean the US consumer or the US government will purchase services – the whole thing has developed a much more global ownership. So although a lot of the commentary is about when and how the US will get back into space, it's not just about the US anymore.

NASA is still in the game of course, both with JPL's ongoing robotic exploration of the solar system and beyond - and President Obama did state that NASA would start developing a heavy-lifting rocket by 2015, although that may be a promise depending on the President's re-election in 2012.

In terms of a visionary goal, Obama's sound-byte was "50 years after the creation of NASA, our goal is no longer just a destination to reach. Our goal is the capacity for people to work and learn, operate and live safely beyond the Earth for extended periods of time".

Other aspirational goals he announced were a visit to an asteroid after 2025 and a Mars landing by the mid 2030s – but since these dates are long after he leaves office, they are about as definite as the Constellation program was – but we'll see.

As aspirational goals go – these seem pretty sensible, since a presumably near-Earth asteroid mission is stretching our reach a bit without huge risk and of course it might strengthen our capacity for asteroid defense if something wicked comes our way.

And the underlying program objective of operating and living safely beyond the Earth for extended periods of time is something we are going to have to achieve before we seriously contemplate the at least seven month journey to Mars. I mean really, 2030 sounds wildly optimistic, given the technical and physiological challenges involved.

But anyhow, just what is the private sector up to? Virgin Galactic is investing a lot in sub-orbital space tourism with a space port under construction in New Mexico and the WhiteKnightTwo and SpaceShipTwo system design nearly ready to go.

Virgin also has future plans for orbital flights. And that's kind of a big step. A sub-orbital parabolic flight path – where you go up, come to an almost standstill and then glide back down again is certainly challenging, but you don't need a heat shield. With orbital flight you go up and you have to keep on going at a speed of around 30,000 kilometres an hour to stay in orbit. If you want to come back down again, the most efficient way is to use a heat shield so you brake against the atmosphere. Otherwise you have to burn a huge amount of fuel to slow down which then adds to your launch weight so you need more fuel to launch and yada, yada. So the step from sub-orbital to orbital is a big one - and SpaceShipTwo won't be making it.

Virgin Galactic is looking at collaborating with Sierra Nevada Space Systems on the Dream Chaser spacecraft – essentially a space shuttle analogue which would be launched vertically atop a rocket, carrying 6 people and a pilot into orbit and then re-entering the atmosphere and gliding in to land - just like the Space Shuttle did.

Also jockeying for position in sub-orbital and maybe future orbital space are some IT geeks like XCOR Aerospace's CEO Jeff Greason (a former Intel processor maker) and also John Carmack (the ID Software cofounder – think Doom and Quake) who founded Armadillo Aerospace.

XCOR has plans for a rocket-launched two seater Lynx space plane. Armadillo don't really have a spacecraft, but are developing rocket launch systems – and might perhaps end up working with Space Adventures – the outfit that can get you aboard the Russian Soyuz spacecraft, at least to go to the International Space Station. But if a private supplier can deliver a more robust rocket launch system than the Russian's orbital-only rocket system maybe the Soyuz can take tourists on lunar or a flyby mission.

Currently, Space Adventures really is the only outfit with genuine space tourist credentials – having already sent up six clients into orbit and they have a seventh on their books. Arguably they are just a broker for you to get on board a Russian launch, but if you go to their website and have a spare \$150 million you can just go ahead and sign up now – and they are already talking up the lunar flyby mission. And if you are a bit short of cash - with a mere five grand, Space Adventures can still get you on board one of those parabolic, weightless, vomit-comet flights.

And then there's Space X. Set up by Elon Musk – co-founder of Paypal, SpaceX has already flown unmanned orbital flights, first with their Falcon 1 rocket and then they orbited a 12 kilogram wheel of cheese with their Falcon 9 rocket.

Space X is also developing the Dragon re-usable crew vehicle and NASA has announced that the combination Falcon 9 rocket and Dragon capsule combo will be the next generation solution to ferrying NASA astronauts and cargo to the International Space Station. The Dragon can potentially carry seven crew – though for long haul flights, it would probably just sit three or four since it will need to carry more fuel.

And what about those long haul flights? SpaceX has plans for a Falcon heavy-lifter rocket – which might lift twice the payload of a Space Shuttle. This heavy-lifter could launch the Dragon capsule plus some additional rocket staging to enable it to blast out of Earth orbit and do a lunar flyby mission. Well, at least when its built.

And even though the Constellation launch system is gone, the Orion capsule is still alive and well, although now it's called the MultiPurpose Crew Vehicle – still being developed by Lockheed Martin with the aim of carrying four astronauts for up to three weeks. This is the spacecraft that might deliver on Obama's envisioned asteroid mission – and sure maybe even the Mars landing some day.

The other player worth mentioning in this space is of course China - who can already get into orbit with the Shenzhou spacecraft – and they also seem to have their sights set on the Moon. And if like Bill Clinton once said – *it's all about the economy, stupid* – they might be the next ones to get there.

Thanks for listening. This is Steve Nerlich from Cheap Astronomy, www.cheapastro.com. Cheap Astronomy offers an educational website where we're just waiting for that right moment to go public. No ads, no profit, just good science. Bye.