



GALACTIC

REM Capabilities of Next Generation Sub-Orbital Vehicles

18th February 2010

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Virgin Galactic**



Virgin



TRANSPORT & TRAVEL



RENEWABLE ENERGY



COMMUNICATIONS



MONEY



HEALTH



LEISURE & ENTERTAINMENT



RETAIL



Business inspiration





Space...

“Houston, we’ve had a problem...”





“The Big Idea”

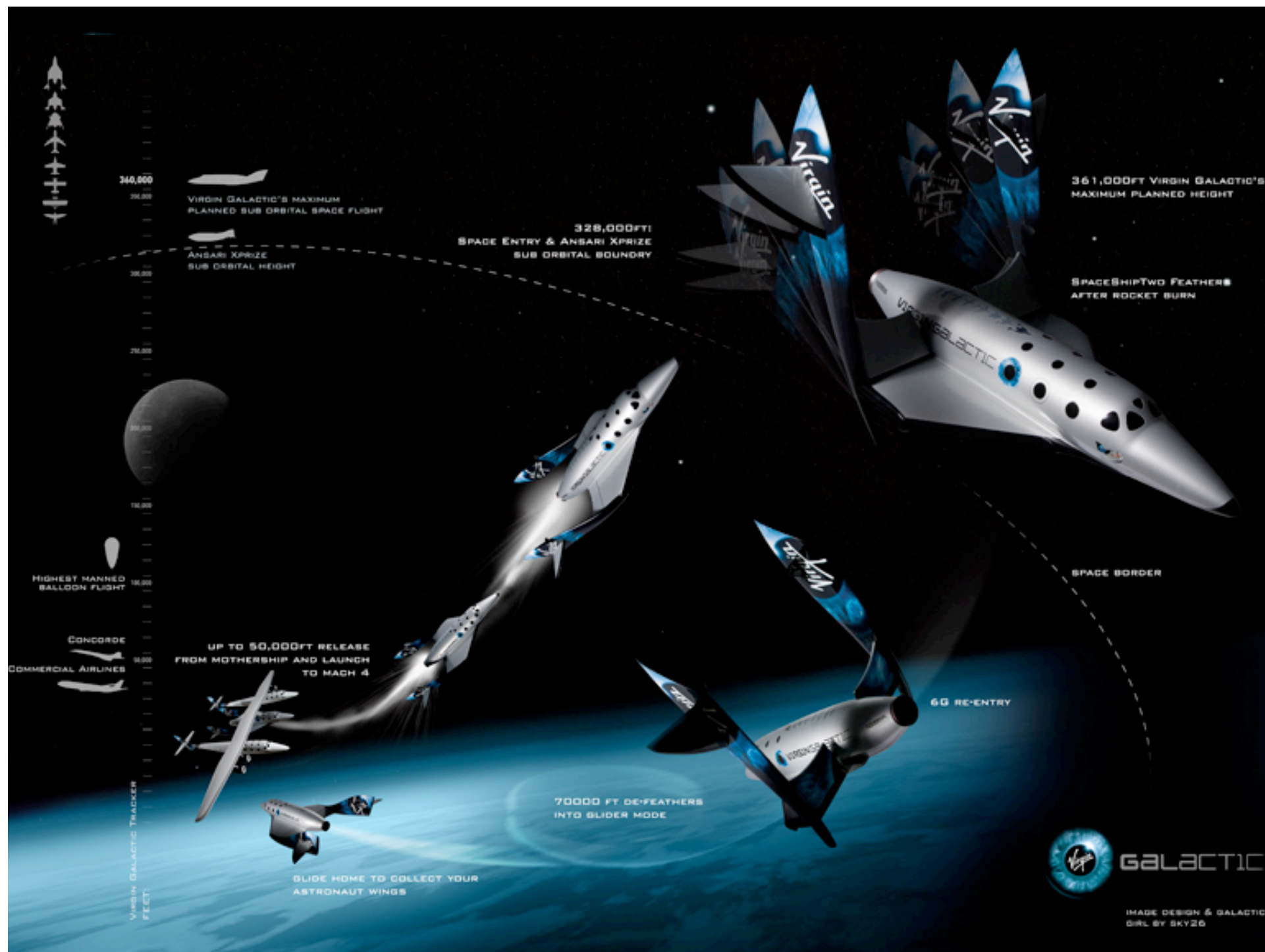




“The Engineer”

X 15 Development programme 1960s





\$10m X-Prize won in 2004 by prototype SpaceShipOne



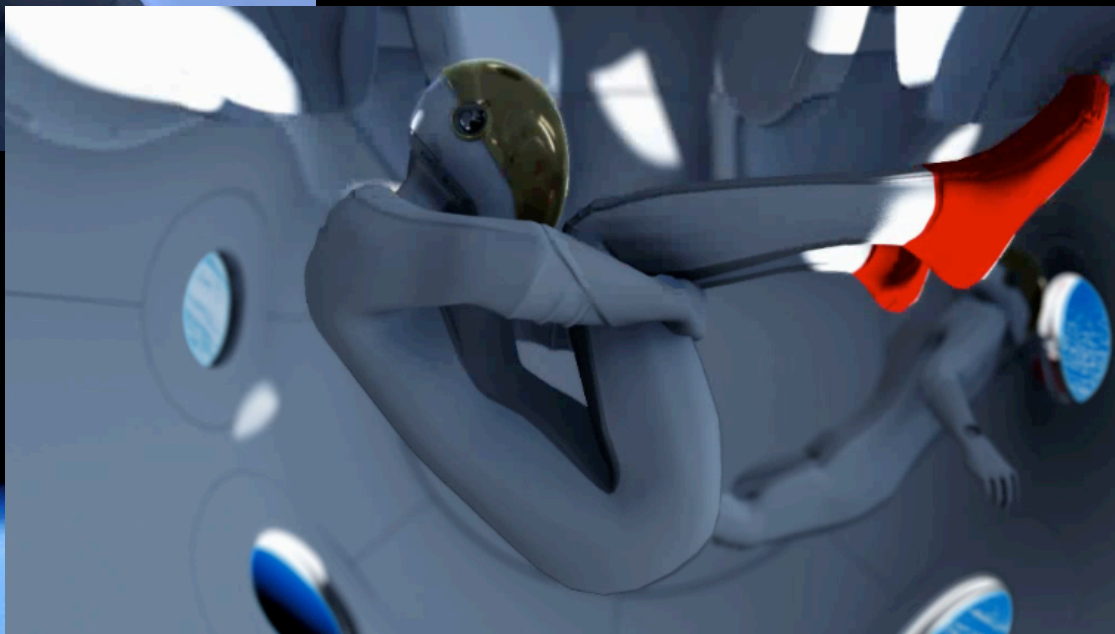
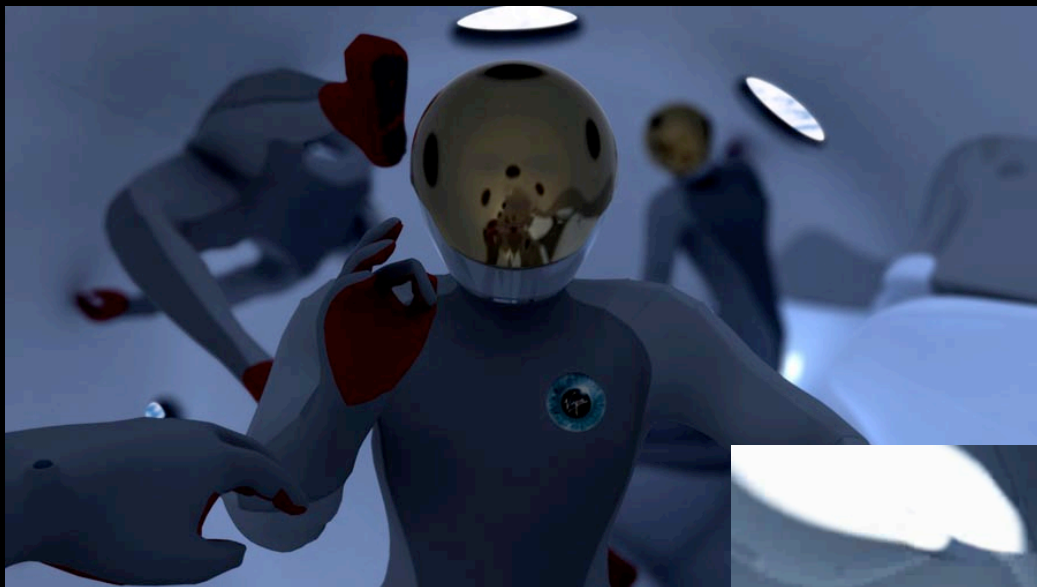


Future Astronauts – proof of market





3g's and 3x speed of sound



Suborbital Scientific Research

- Since the 1960's, the value of suborbital research has been well understood –many 1000's of rocket borne suborbital experiments have taken place and sub markets established
- Offers researchers access to
 - space radiation environment
 - upper atmosphere
 - ionosphere
 - aurora
 - microgravity
 - and a vantage point for earth and astronomical observation.

Virgin Galactic –Transforming suborbital flight for Science and Education

- Greater Affordability
Suborbital seats fly for approximately ten times lower cost than standard robotic suborbital sounding rockets flights, eg \$1-2M-class NASA Black Brandt missions, and one hundred to one thousand times lower cost than typical orbital missions
- Availability and Desirability of On-Board Crew
Flying accompanying personnel on suborbital missions opens up new applications and improves quality of experimentation as well as providing powerful incentives for students and scientists.
- Gentler Ascent and Entry Than Robotic Suborbital Vehicles
SpaceShip2's ascent and entry G-loads are well less than half that of NASA's standard Black Brandt and Taurus-Orion robotic suborbital launchers
- Direct Access to the Middle and Upper Atmosphere
Unique and regular access the previously inaccessible “ignorosphere” (150K – 400K feet) is critical to understanding global climate change and other important phenomena.

Virgin Galactic –Transforming suborbital flight for Science and Education

- More Frequent Access to Both Space and the Microgravity Environment
new applications for repeated in-space experimentation
- Significant competitive advantage due to longer and better micro-gravity :
10 x micro-gravity time compared with parabolic aircraft flight and ten to one hundred times lower microgravity levels
- Flexibility
SS2 and WK2 interior and exterior mounted experiments – researcher tended, VG tended or autonomous gives enormous flexibility and cost options
- Benefits of WK
WK2 will offer an excellent proving and training environment for SS2's cabin, as well as an excellent high-altitude research platform in itself. By design, WK2's cabin is virtually identical to that of SS2.





VSS Enterprise – The World's First Commercial Manned Spaceship



**Unveiled on 7th December 2009
and named by Governors
Schwarzenegger and Richardson**



Spaceport America – the artist's impression



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Spaceport America – the real thing!



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virgin galactic

Our USP's

- **SS2 highly likely to be the first commercial suborbital vehicle; prototype proven, commercial vehicle test flights underway, commercial operations in 2011.**
- **At least 5 years ahead of any known competitor with the most developed business: 300 tourist customers, \$39m deposits, 85,000 expressions of interest.**
- **Generous and highly flexible payload capacity and large cabin- out of seat zero g for up to six passengers.**
- **Safer by design: Air launch, hybrid rocket motor, composite construction, patented feathered re-entry system, extensive Virgin Group transportation experience.**
- **WK2 provides a training / proving platform and a unique high altitude, heavy lift, long flight duration capability for tourist and non tourist sectors.**
- **Reusable system and low recurring costs give scope to reduce tourism ticket prices over time and to establish highly competitive entry pricing for non-tourist sectors.**
- **Comprehensive human training centrifuge program has successfully proven the accessibility of VG spaceflight profile to a wide diversity of individuals.**
- **Solid funding stream from Virgin Group – not reliant on customer deposits**



Coming Soon to a Desert Near You!

