The Future of Space

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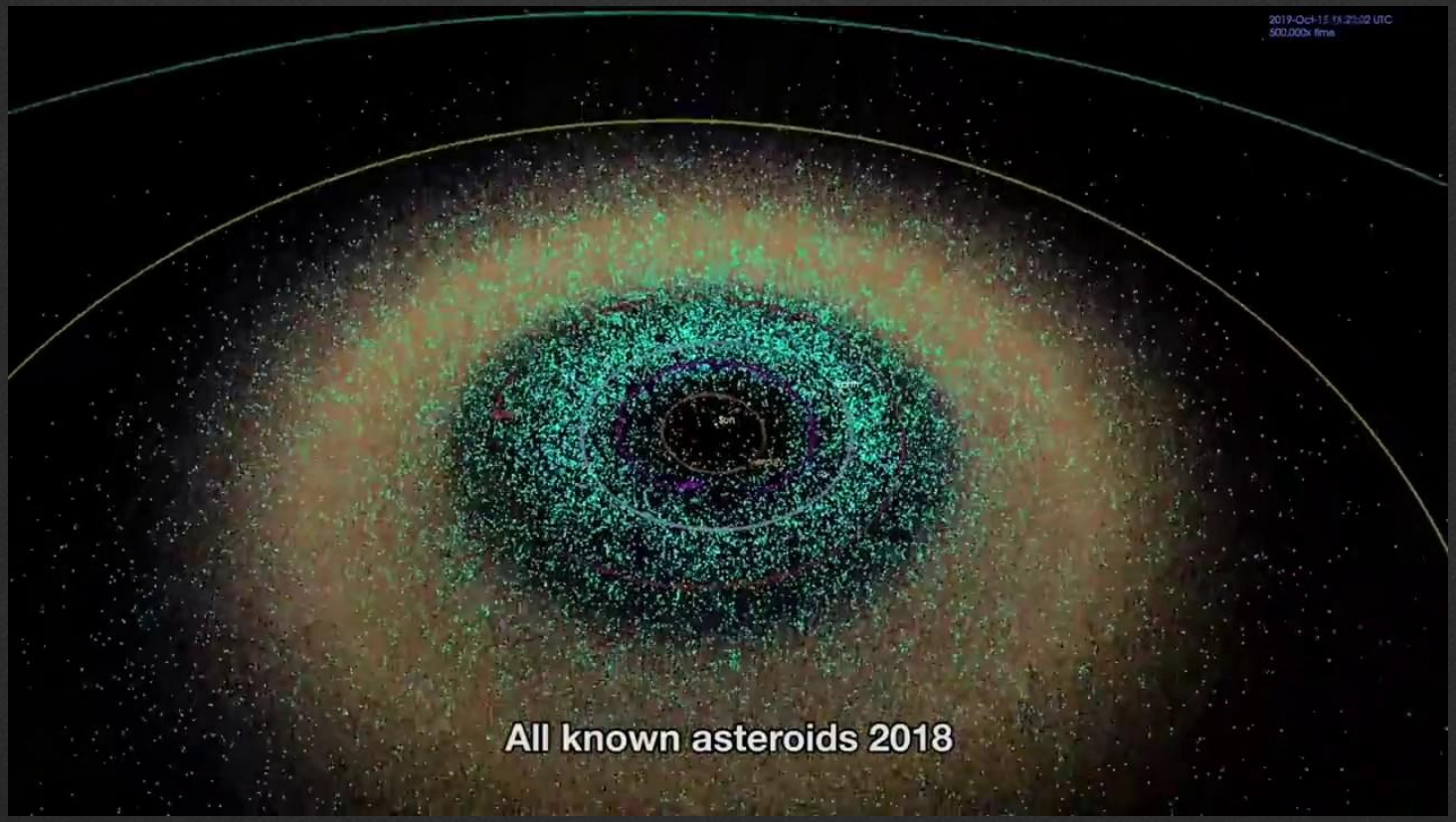
How Many Have You Traveled into Deep Space ?

ANSWER: Everyone here has traveled billions of miles in deep space on space ship Earth

How Vulnerable is Space Ship Earth

The thin sheath of atmosphere that protects us from cosmic hazards is proportional to the thickness of the rind of an apple

The Dangers of our Solar Neighborhood "2029 to be the Year of Planetary Defense"



World Unaware of Growing Dependence on Space—A Hidden Resource

We depend on space systems for navigation, timing, air safety, communications, networking, internet, tele-education and tele-health systems, national defense, weather forecasting, monitoring climate change, security systems, smart farming, pandemic controls, missile defense and warning, and more

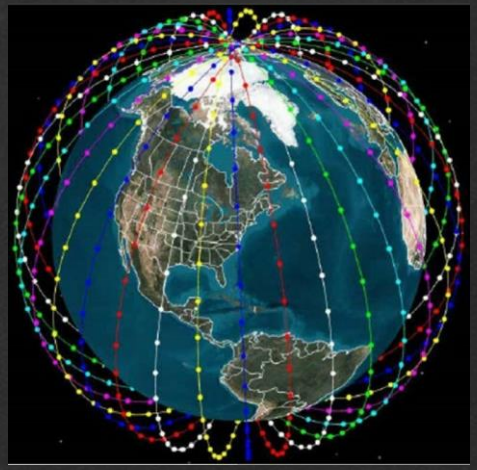
Let's explore the future of space

- Space will represent a $ trillion economy by 2040 and is one of the fastest growing markets (Merrill-Lynch). Commercial space revenues are now nearly 3 times government space budgets
- The International Space Station deorbits in 2030 and will be replaced by commercial private space stations
- Space systems are critical to coping with climate change and most of the U.N. sustainable development goals
- Space systems key to national defense from missile defense, to military communications & networking. Also key to our global alliances. We **urgently** need a Space Traffic Management system.
- High Altitude Balloons and Platform Systems are a part of that future. Amazon and Facebooks looked at a global balloon/HAPS system before going to LEO satellite nets. Space debris another big space concern. Space stations and $100s billions of satellites at risk.

New Commercial Space Developments involves more than just business

- There are important social, economic, educational and health services that are important to the world's future that depend on commercial space systems.
- New systems such as Elon Musk's Starlink networking satellite system and Jeff Bezos' Amazon's Kuiper network will bring the Internet, tele-education and tele-health to the world. Chinese plan to launch over 10,000 satellites to compete.

Space X sat network 7500 satellites

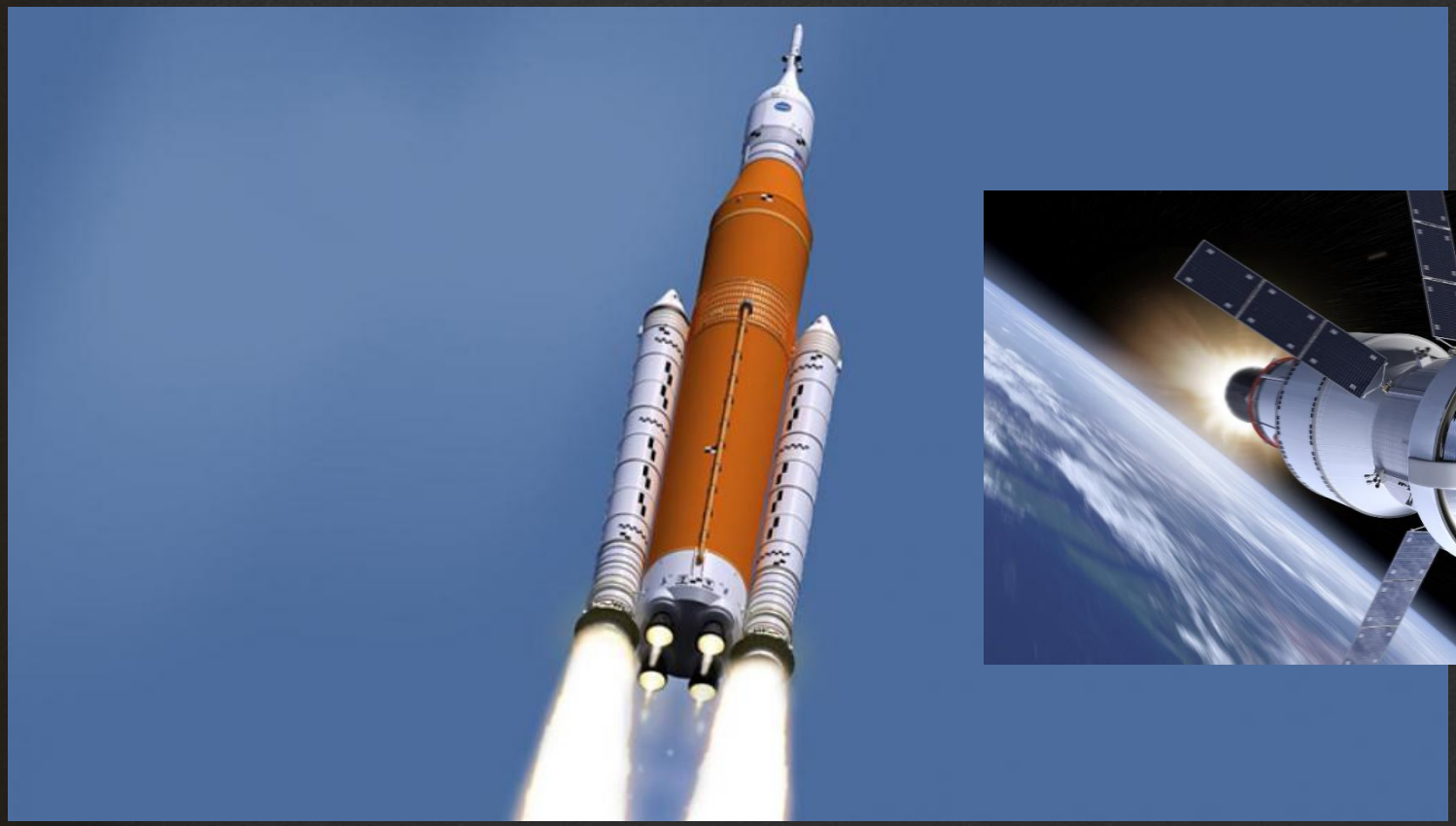


Amazon's Kuiper net 3700 sats

Tele-health & Tele-education

- NASA Site satellite experiments have led to the INSAT satellite network—rural education for over a million people in India.
- I led the INTELSAT Project Share (Satellites for Health & Rural Education) and helped to develop a system for rural education in China for ultimately 10 million students
- Today there are satellite systems in Malaysia, Indonesia, Nigeria, Algeria, Australia, Canada, & dozens more that use satellites to provide rural health and education around the world. Networking sat systems will have the ability to reach billions. O3b network stood for The Other 3 billion.

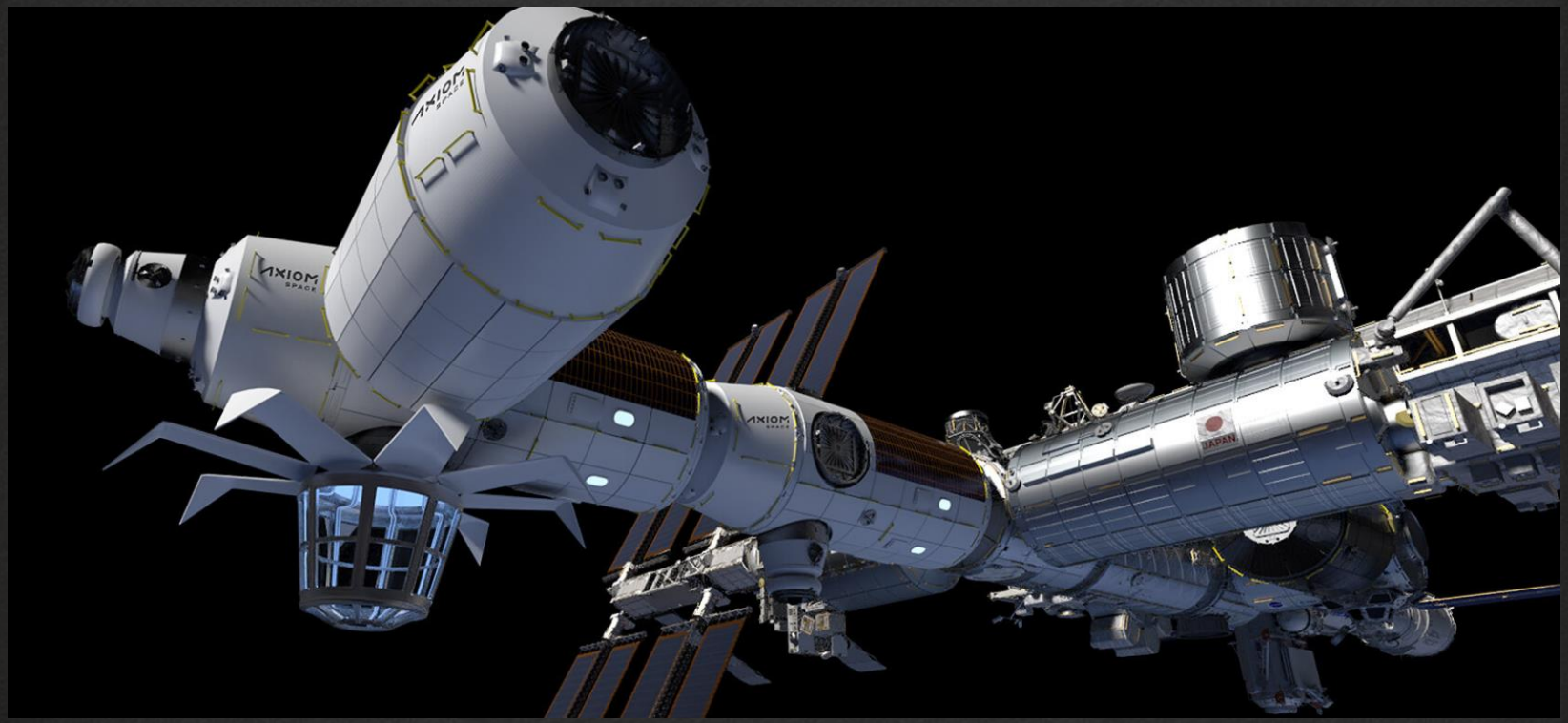
The NASA Artemis Mission is going to the Moon in 2026



Space Launch System (Biggest and Most Costly Rocket) & Orion Space Capsule

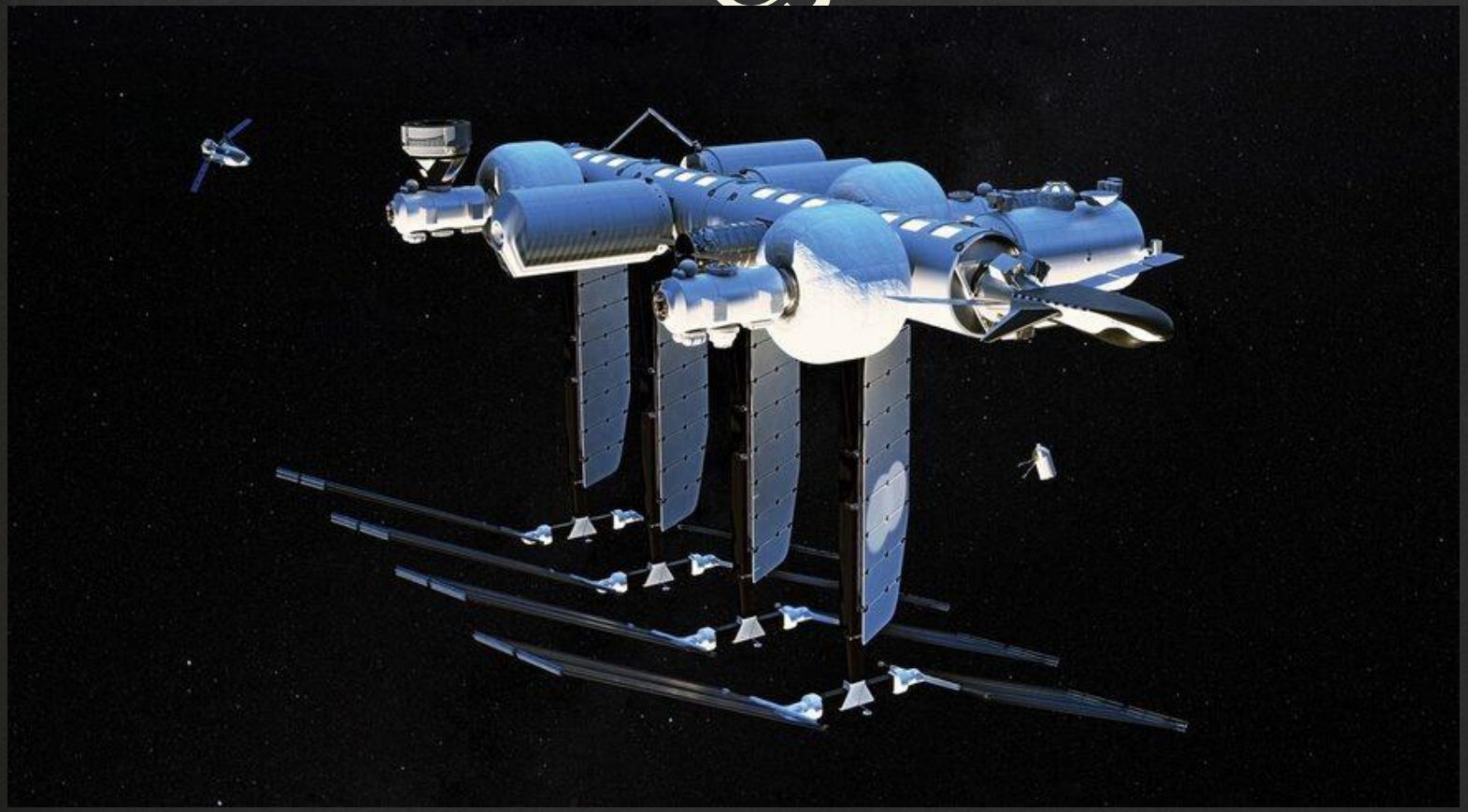
HumanLanding System & Gateway Space Station

The Age of Private Space Stations



Axiom has signed a NASA Space Act Agreement to Deploy this Commercial Space Station in Low Earth Orbit—Thales Alenia is building the habitat unit.

Blue Origin: Orbital Reef



Nanoracks & Lockheed Martin Space Lab

Northrop Grumman

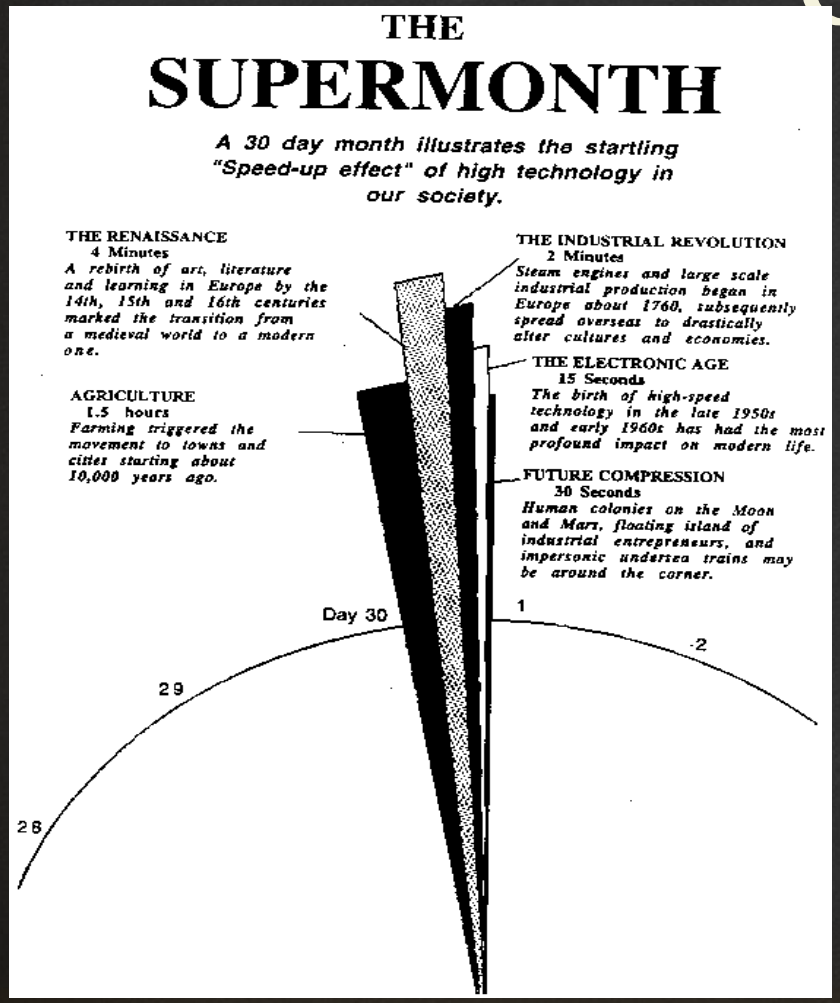
Unity spaceplane flights via Virgin Galatics

Blue Origin New Shepard flights

The future of space is here today

- Thousands of satellites in commercial constellations for networking, comms, remote sensing, navigation, automatic identification systems, RFGeolocation, medical alerts, smart farming, tele-health & education, and more.
- Commercial launch industry is today much less costly. They are launching nanosats to satellites many tons in size
- Space tourism. $54 million/person into orbit. $450.000 sub-orbit
- Hypersonic transport, Space mining, planetary defense and space shields, space elevators, etc.
- PROBLEMS: Dangers of space debris, Need for Space Traffic Management including balloons in Protospace, Misuse of artificial intelligence, and cybersecurity attacks. Regulation always behind technology and the dark web in modern society. Space is like the Wild West in many ways.

Buck Rogers Technology Is Coming Ever Faster



- "New Space" technology from SpaceX (Elon Musk), from Blue Origin (Jeff Bezos) Virgin Galactic (Sir Richard Branson, Paul Allen who funded SpaceShipOne. They have transformed the world of space and here on Earth as well.

Thank you.

Questions Anyone

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