

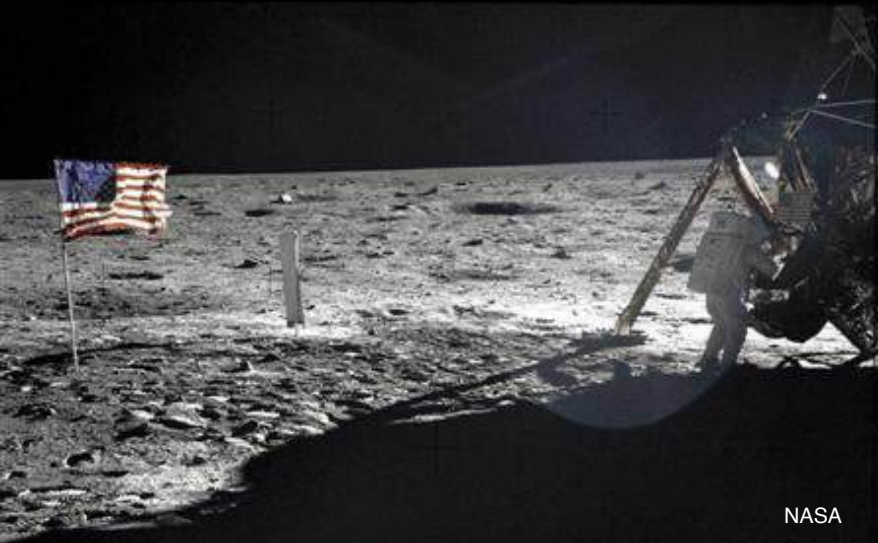
FROM NASA TO ACADEMIA TO ENTREPRENEURIAL SPACE: MY JOURNEY THROUGH THE NEWSPACE REVOLUTION

Dr. John R. Olds, P.E.
Chairman & Technical Fellow
SpaceWorks Enterprises, Inc.

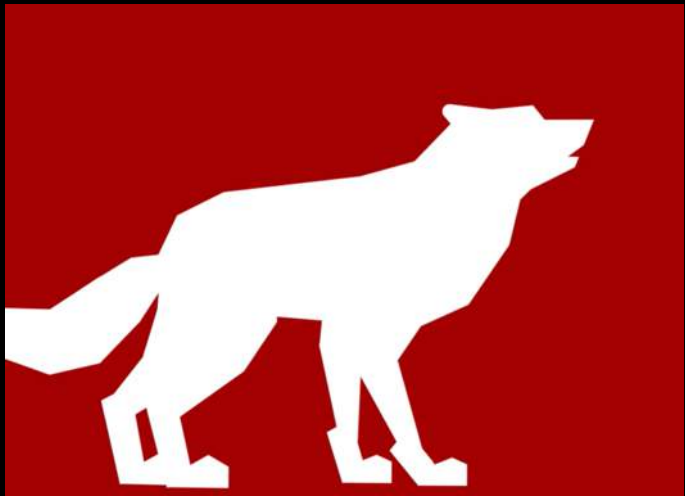
November 12, 2024

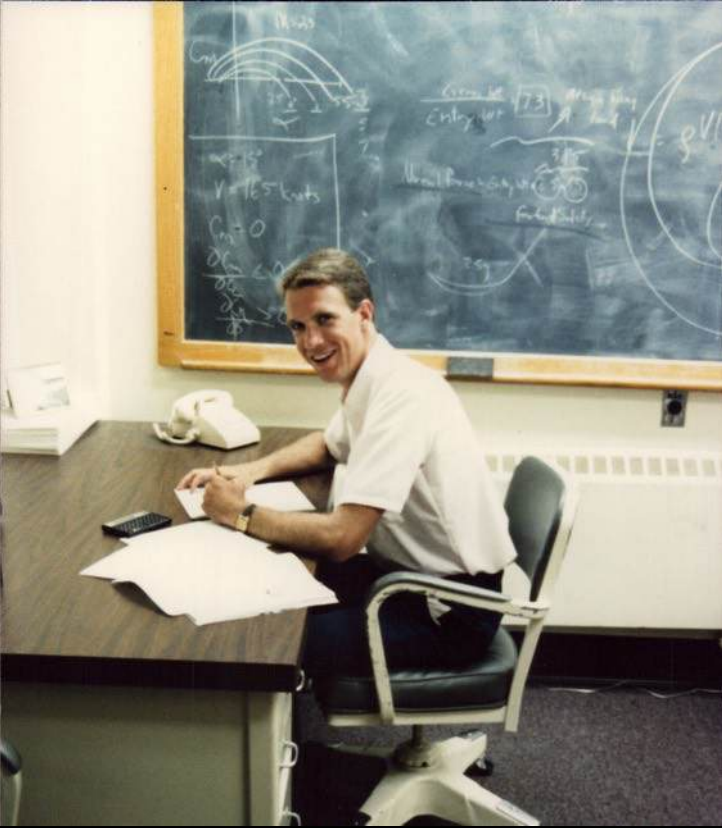


MY INSPIRATIONS AND ASPIRATIONS

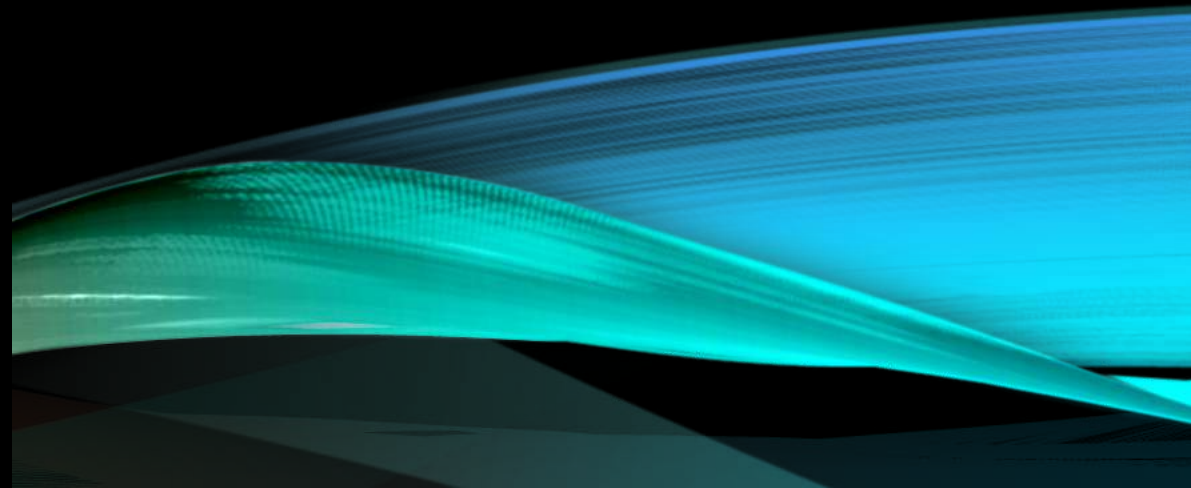
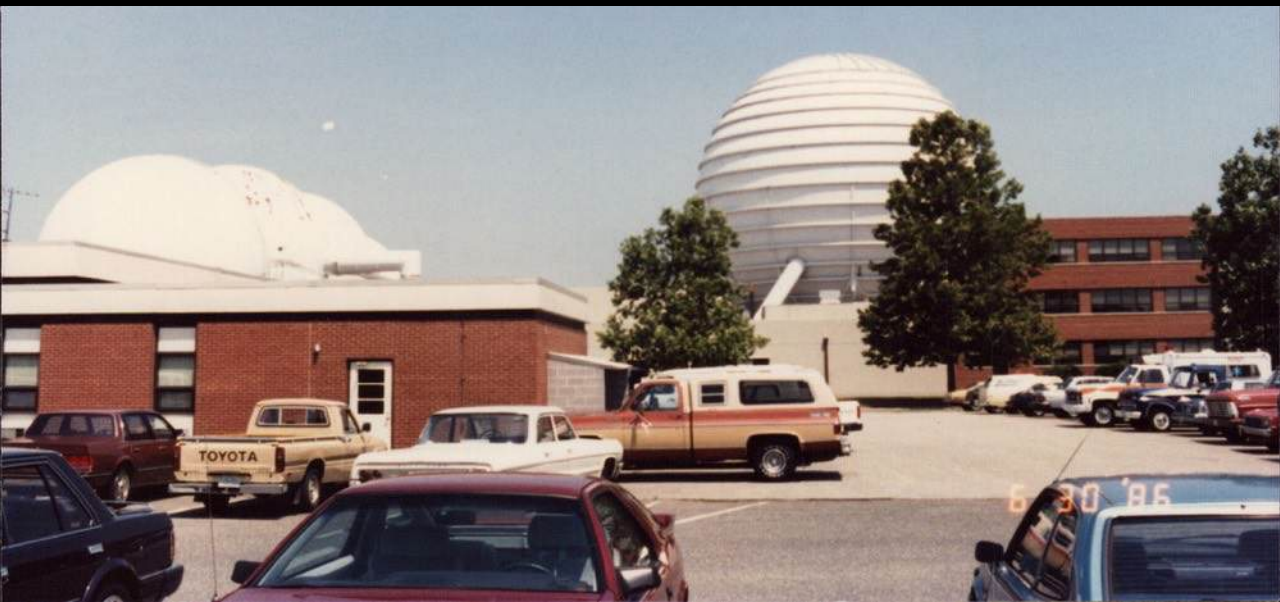


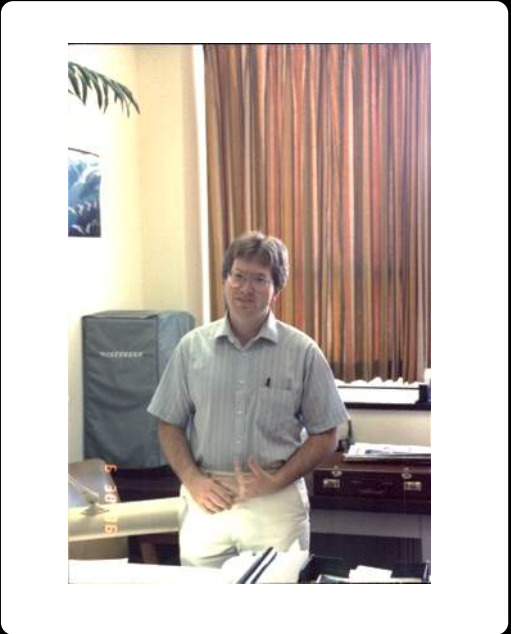
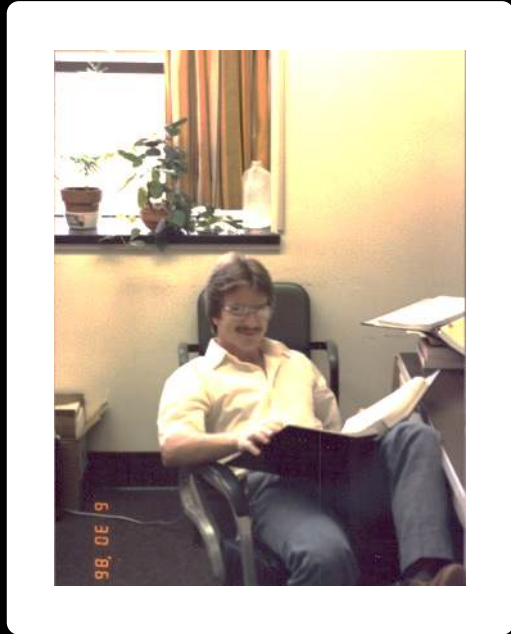
MY EXPERIENCES AS AN AE AT NC STATE





THE 1986 LARSS PROGRAM AT NASA LANGLEY

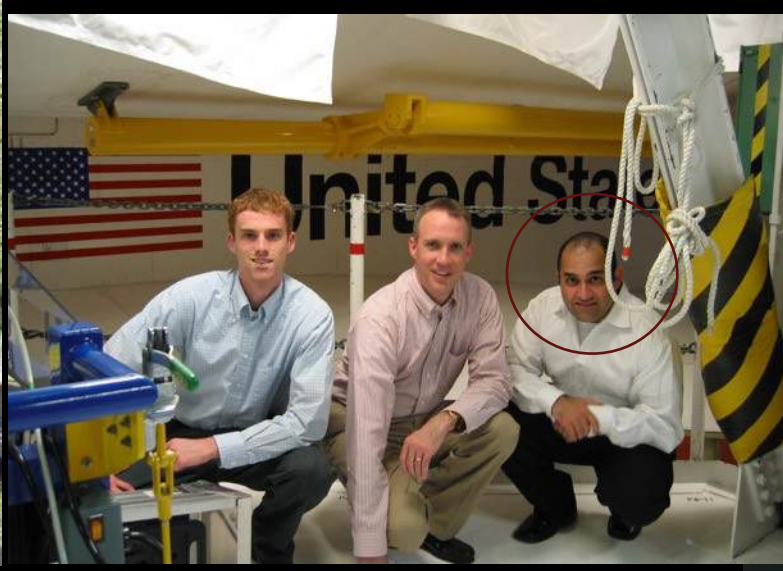
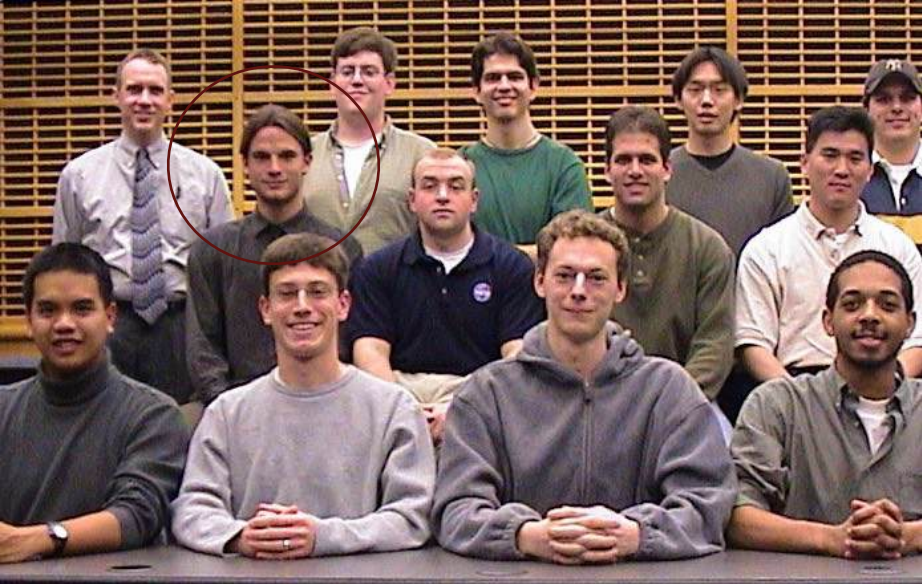




THE 1986 LARSS PROGRAM AT NASA LANGLEY



**BACK TO THE
VEHICLE
ANALYSIS
BRANCH FOR
MY PHD
RESEARCH
(1991-1993)**



MY ADVENTURES AS A COLLEGE PROFESSOR (1993 – 2006)

NC STATE UNIVERSITY




Georgia Institute
of Technology

SPACEWORKS ENTERPRISES INC (2000-)



SPACEWORKS ENTERPRISES INC TODAY





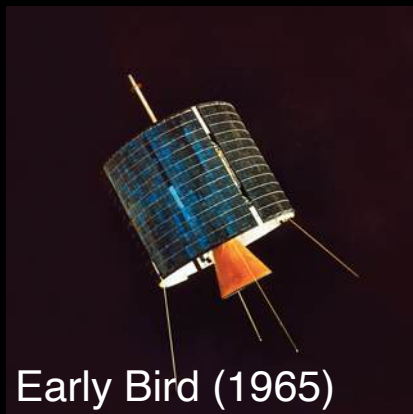
**THE
REVOLUTION IN
THE U.S.
COMMERCIAL
SPACE
INDUSTRY**

The backdrop
to my 35+
year career in
aerospace

DAWN OF COMMERCIAL SPACE



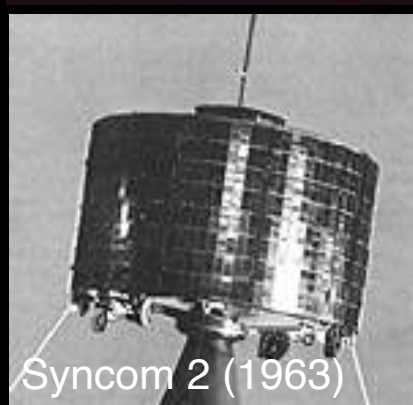
Echo (1960)



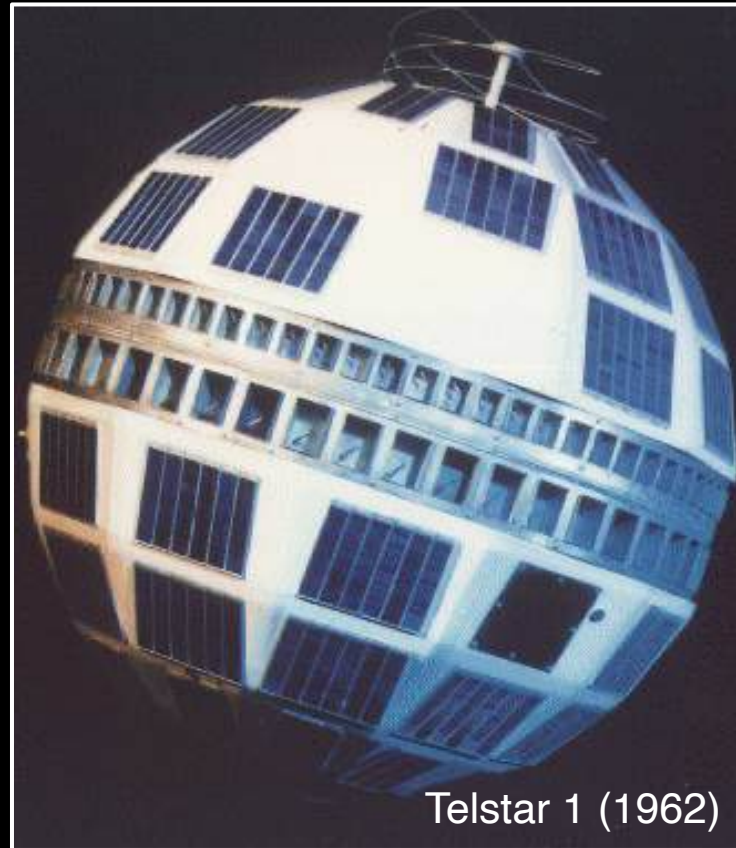
Early Bird (1965)



Syncom 3 (1964)



Syncom 2 (1963)



Telstar 1 (1962)

New "TELSTAR" relays phone calls and TV pictures for first time!

Bell System microwave-in-sky satellite is latest communications triumph for America arising from telephone research

The world's first private enterprise communications satellite is now being used for dramatic experiments in relaying telephone calls and television internationally.

Its name: Telstar. It was launched from Cape Canaveral at Bell System expense by the National Aeronautics and Space Administration.

Telstar receives signals beamed to it from a ground station, amplifies them and transmits them to another station on the ground below—perhaps an ocean away from the first one. The new satellite thus acts as a microwave relay station in the sky, enabling voices, TV pictures and data messages to leap thousands of miles in a new and exciting way.

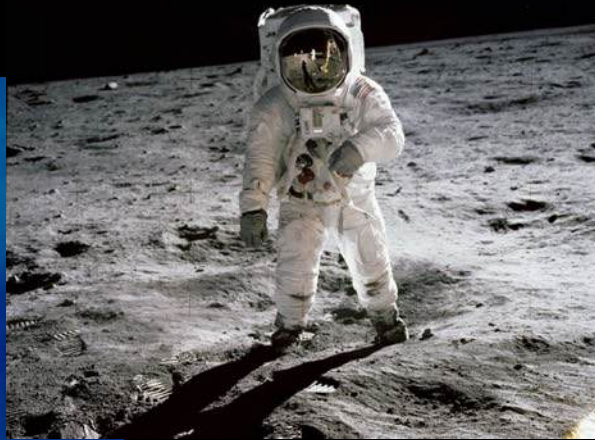
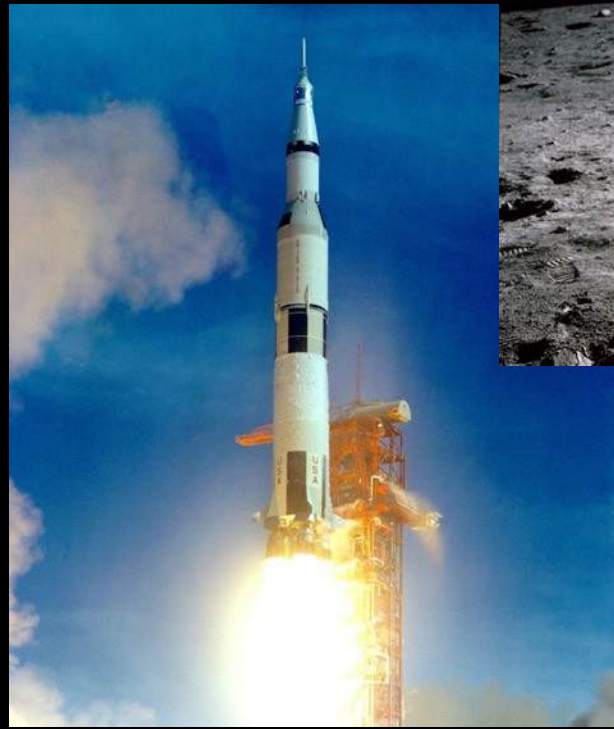
The ground stations in the U.S. now being used for Telstar were built by the Bell System at Andover, Maine, and Holmdel, New Jersey. Organizations abroad have built stations in England and France. The latter, a near replica of the station in Maine, was assembled with Bell System cooperation. A receiving station in Italy will be ready late this year, and another in West Germany next year.

Telstar is a major experimental step toward a world-wide satellite communications system that was first proposed as a practical venture at Bell Telephone Laboratories. Progress toward such a system has depended on many contributions by the private communications industry, including six basic components—the transmitter, the solar battery, the traveling wave tube, ruby masers, the waveguide, and new antennas for the ground stations with innovations in circuitry—direct outgrowths of Bell System research and development.

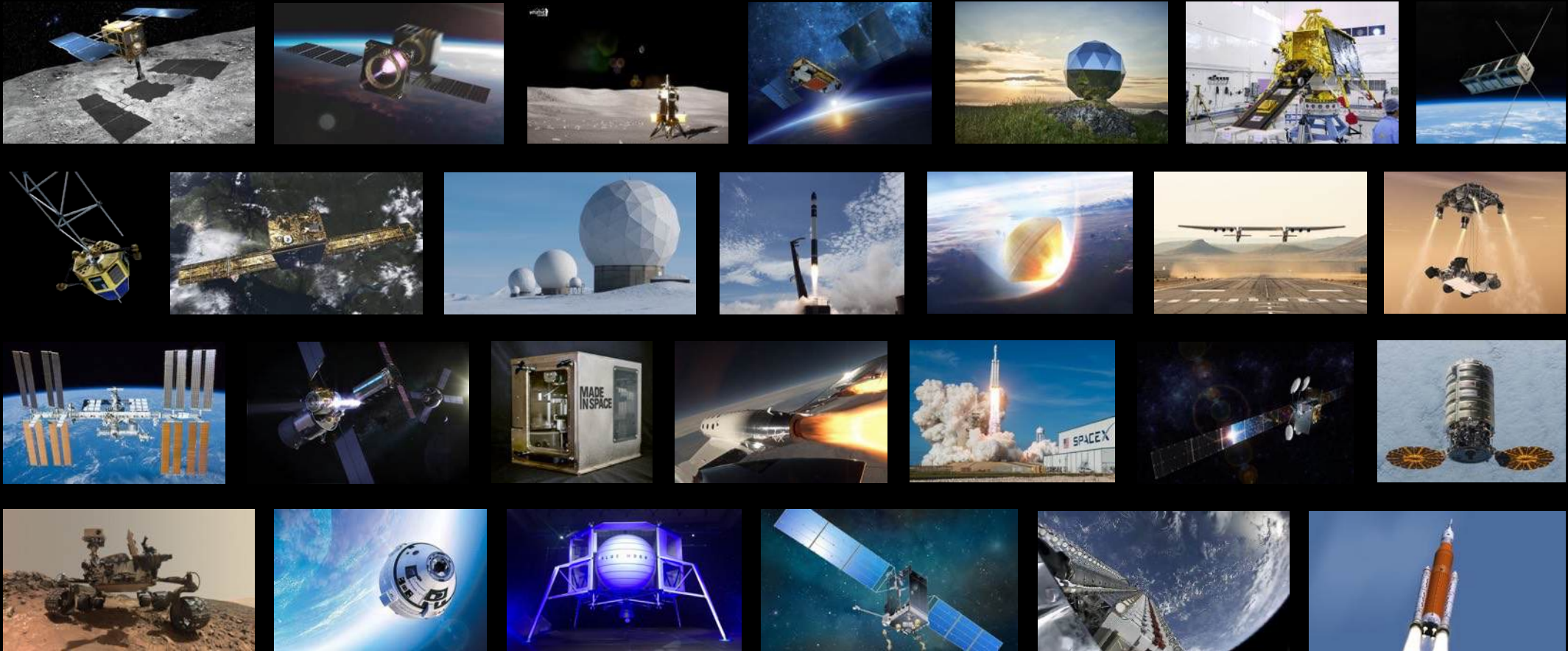
Above all else, Telstar is the latest achievement in an unending Bell System quest—the search for ways to make your telephone service still better, more economical, and more useful.

BELL TELEPHONE SYSTEM
Owned by more than two million Americans

SPACE BEFORE THE 1990'S



SPACE TODAY





WITH SIGNIFICANT INDUSTRY TRANSFORMATION
UNDERWAY, THERE ARE TWO COMPETING SCHOOLS
OF THOUGHT ON THE FUTURE OF COMMERCIAL
SPACE IN THE U.S. (I.E. NEWSPACE)

**Boom? or
Bust?**



THE SPACE BILLIONAIRES

Paul Allen



Elon Musk



Richard Branson



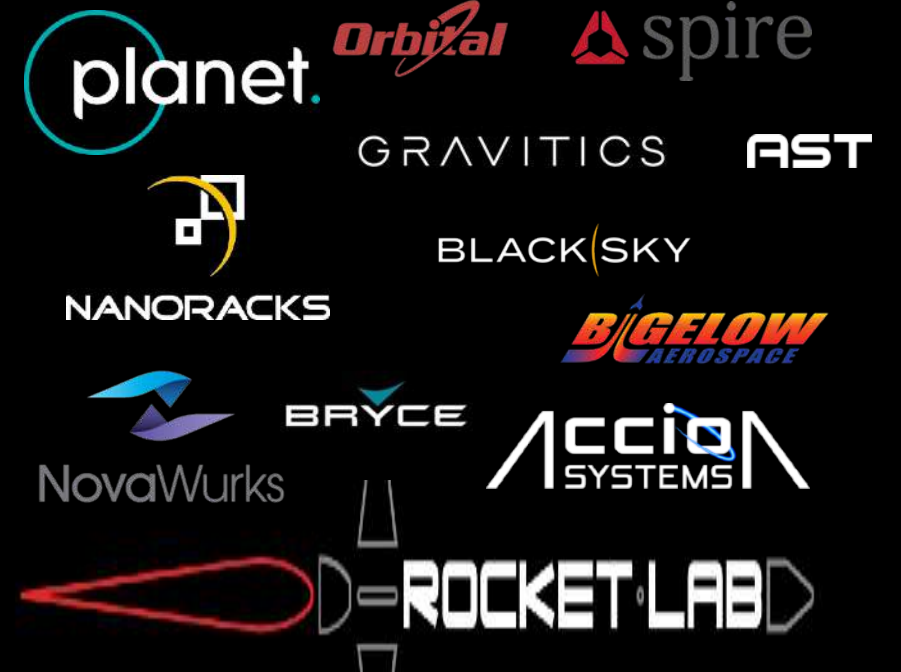
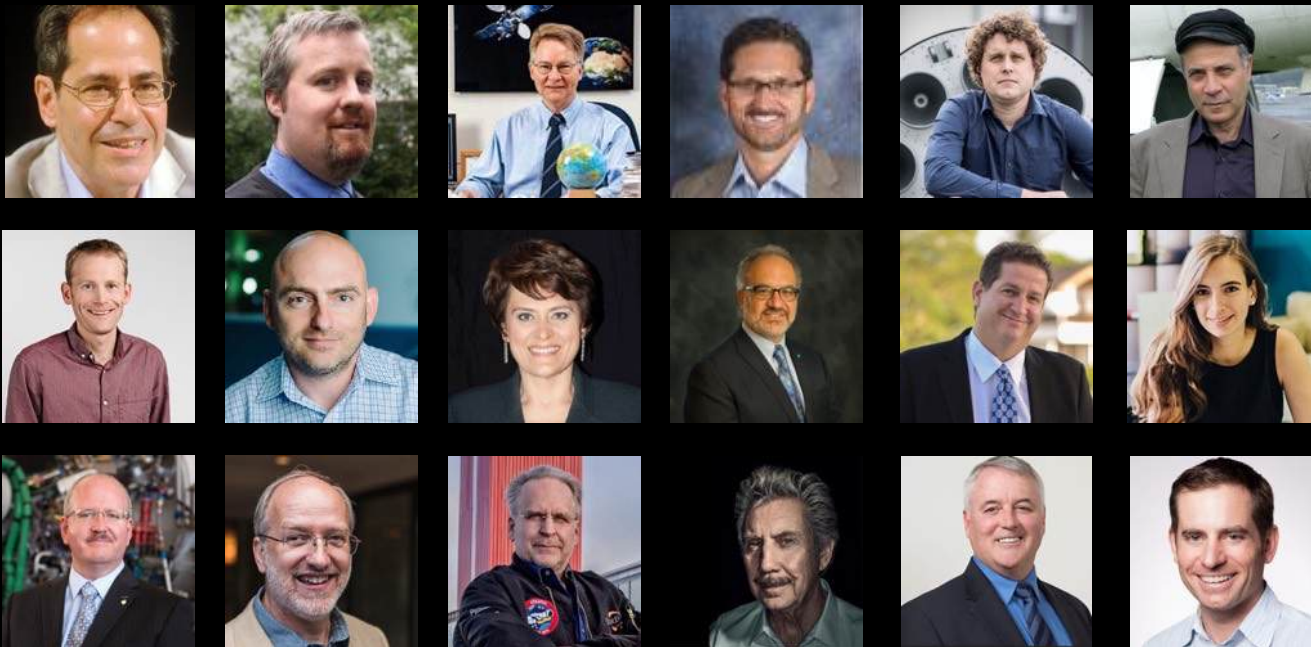
Jeff Bezos



Jeb McCaleb



THE SPACE NON-BILLIONAIRES

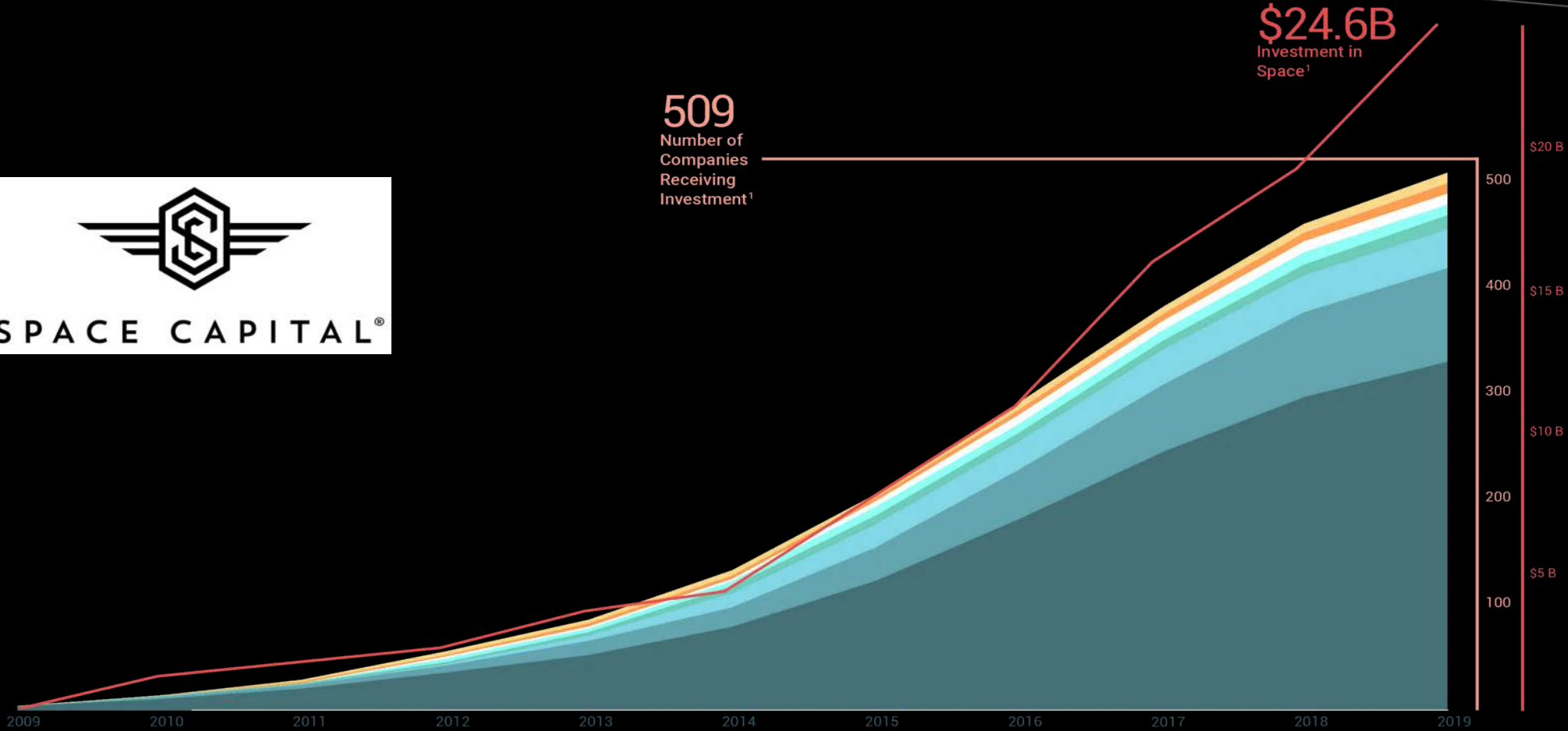


RISE OF NEWSPACE



509
Number of
Companies
Receiving
Investment¹

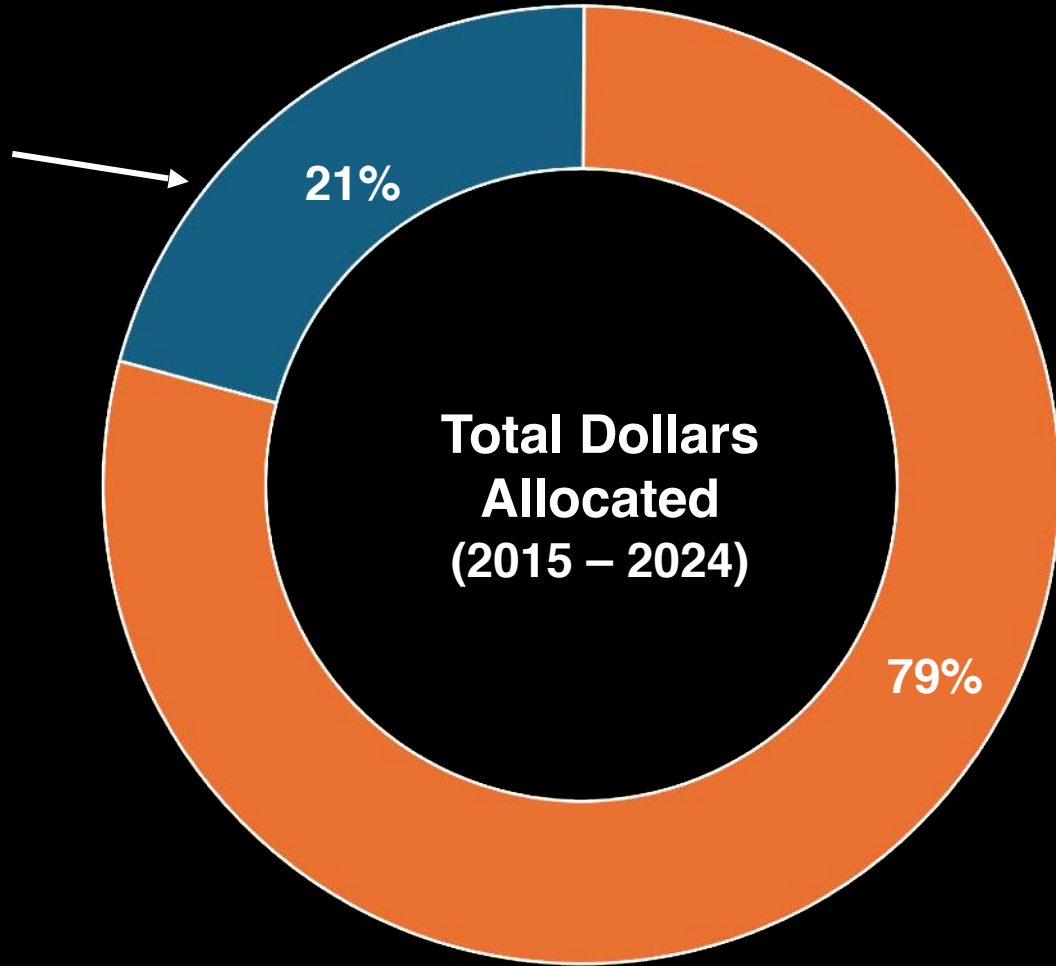
\$24.6B
Investment in
Space¹



Source: Space Investment Quarterly, Space Capital and Space Angels Network

IMPACT RELATIVE TO THE US GOVERNMENT

**Private Investment
in US Space (\$58B)**



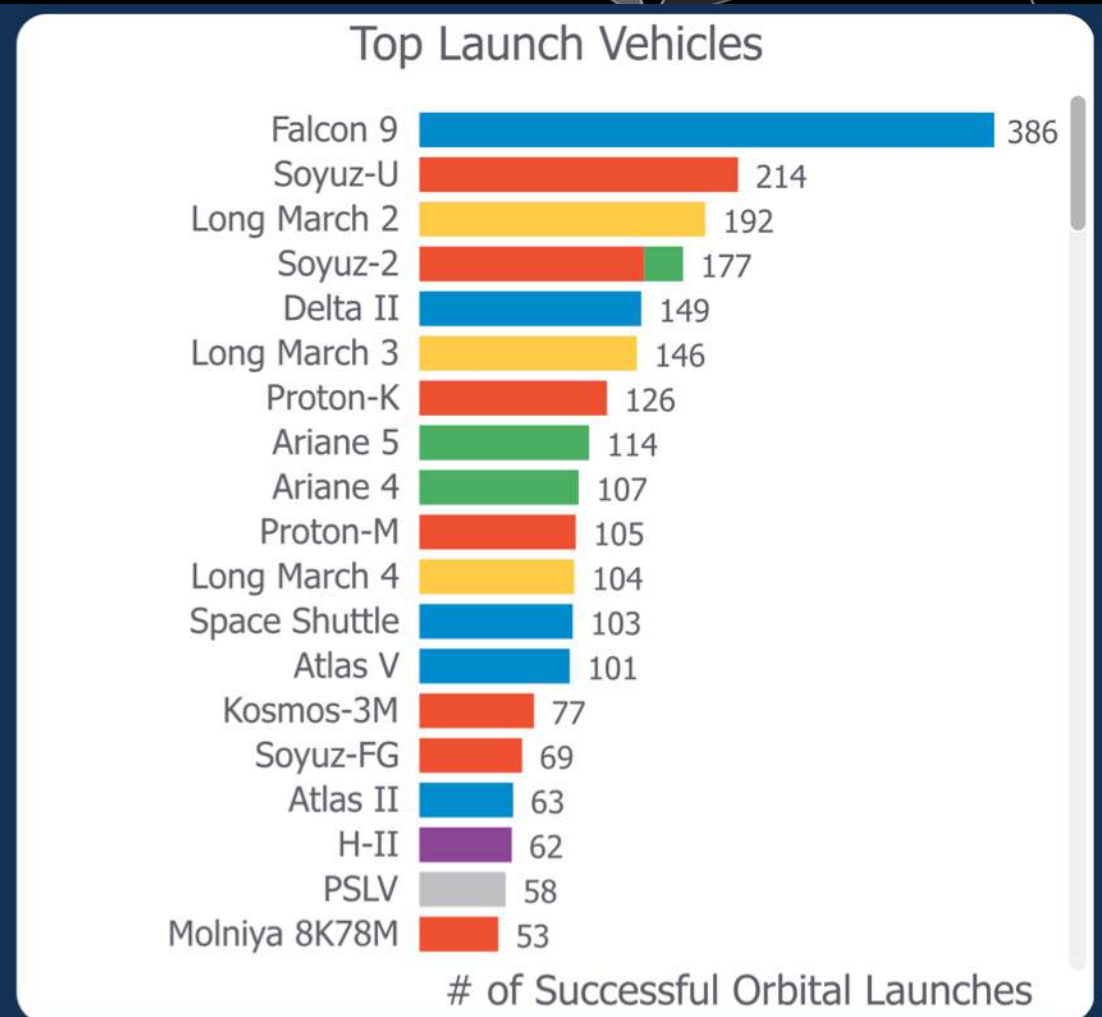
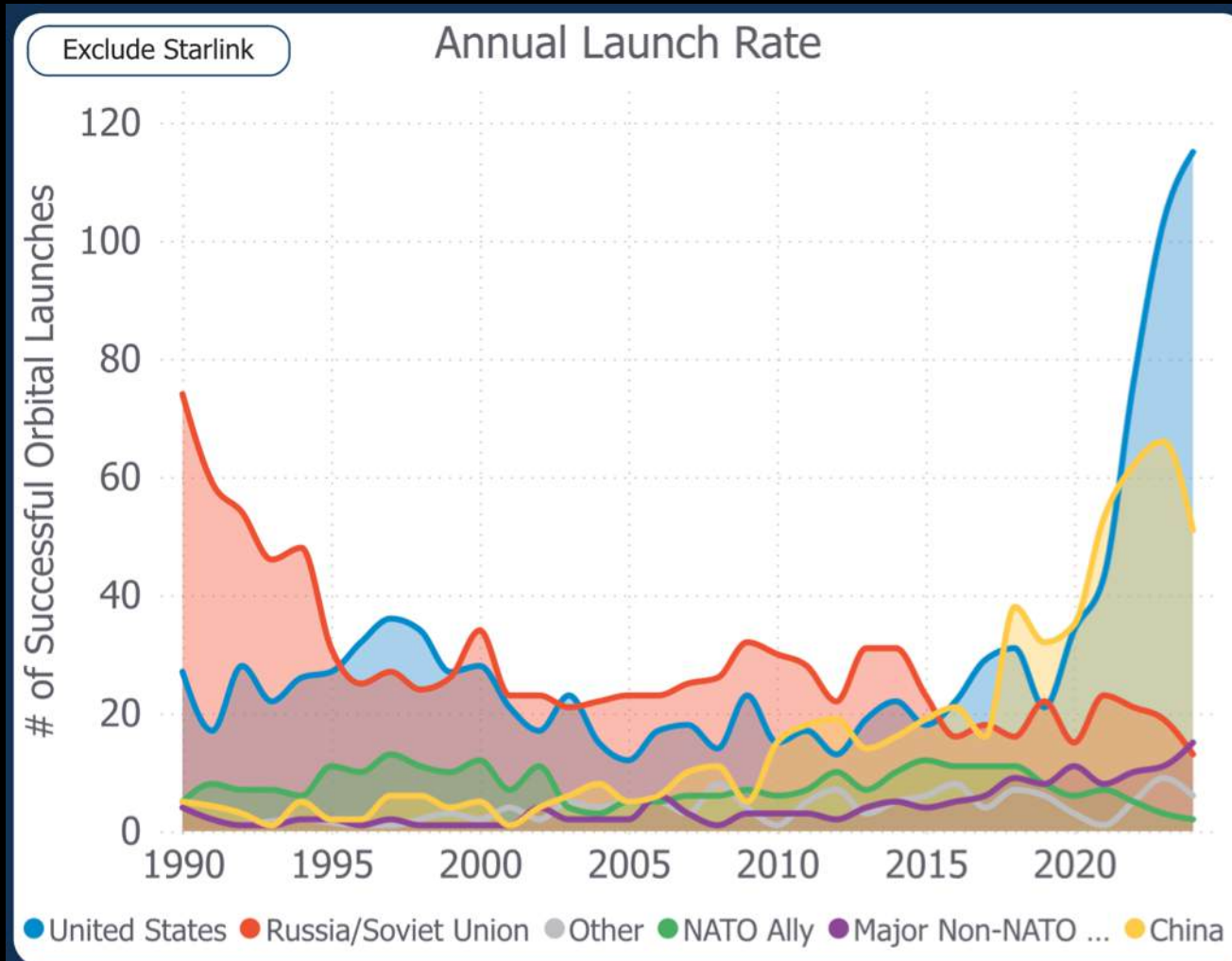
**Cumulative
NASA Budget
(\$219B)**

Excluding DoD and Non-NASA
government space budgets

U.S. LAUNCH VEHICLES IN THE NEWSPACE ERA



HISTORICAL LAUNCH RATES (1990-PRESENT)



PRIVATE INVESTOR SUCCESSES AND FAILURES

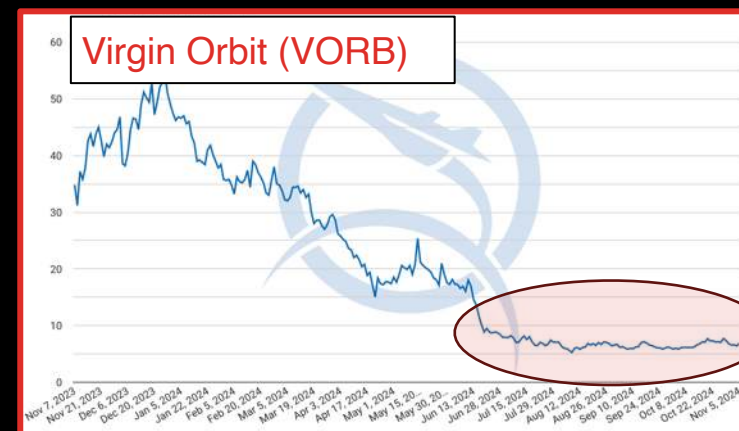
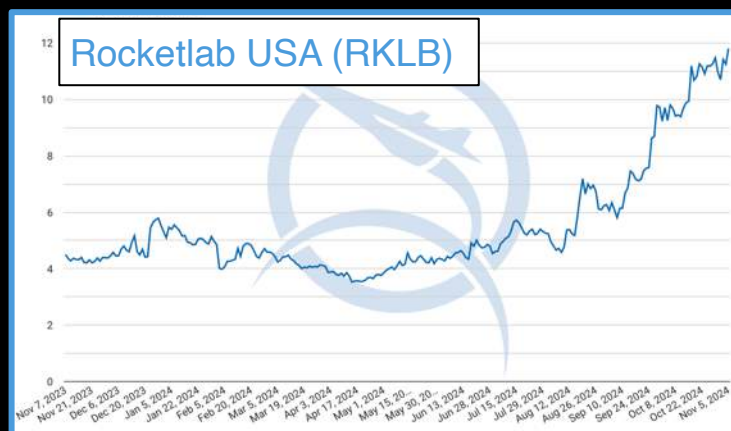
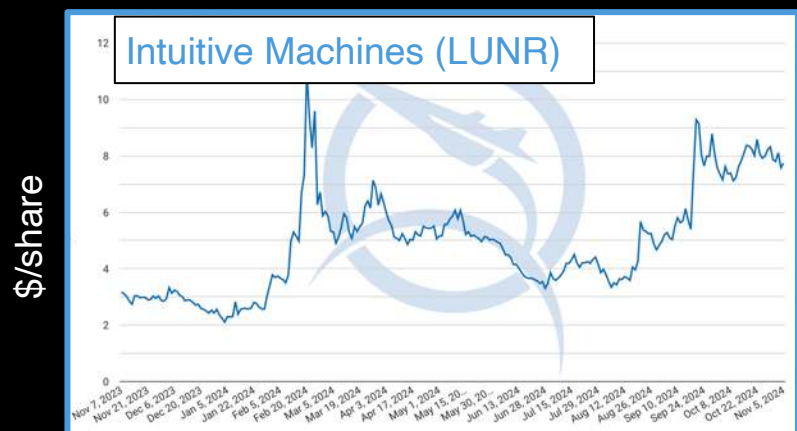
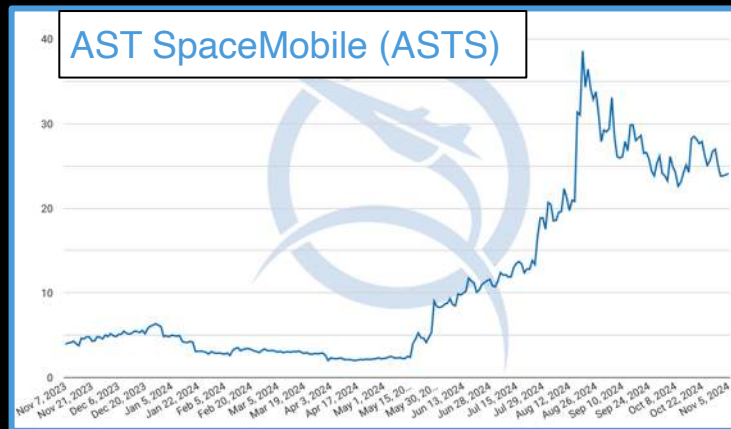
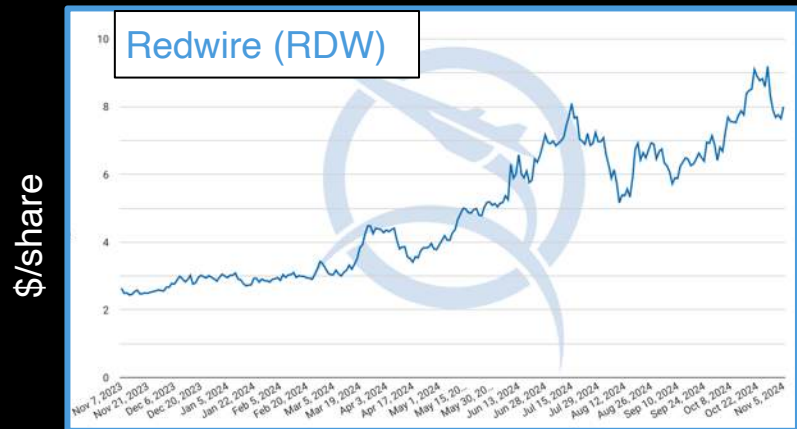
Wins

The Climate Corp (acquired by Monsanto for \$1B)
SkyBox (acquired by Google for \$500M)
RocketLab (public, NZ government)
Redwire (public, AE Industrial)
AST SpaceMobile (public)
Intuitive Machines (public)
Others...

Losses

Teledesic
Iridium (v1)
Astra Space (v1)
OneWeb (v1)
Virgin Orbit
Planetary Resources
Masten Space
Terran Orbital
Reaction Engines
Others...

PUBLICLY TRADED 'PURE SPACE' COMPANIES



SUBORBITAL SPACE TOURISM

World View Voyager



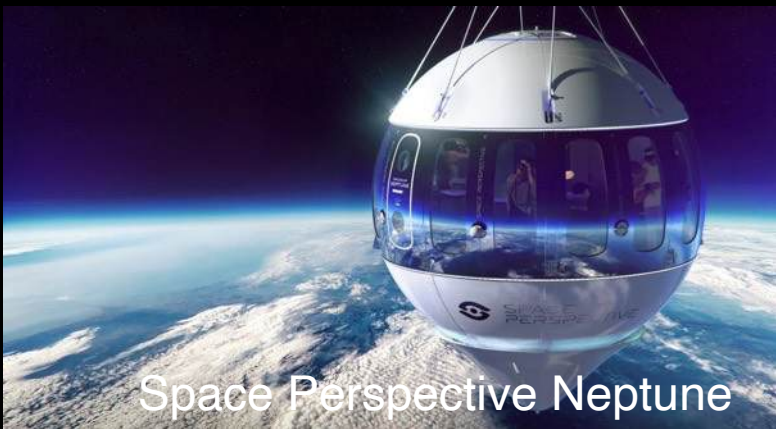
SpaceShipTwo



Rocketplane XP



Space Perspective Neptune



New Shepard



XCOR Lynx



A MARKET UNDER SCRUTINY



SPACENEWS 35 YEARS

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New Shepard suffers in-flight abort on uncrewed suborbital flight

Jett Roust September 12, 2022

X Facebook YouTube Instagram Email Print

September 2022

The New Shepard capsule fired its launch abort motor to get away from its booster after a malfunction about a minute after liftoff on an uncrewed mission Sept. 12. Credit: New Shepard webcast

PARIS — A problem with Blue Origin's New Shepard suborbital vehicle caused an in-flight abort a minute after liftoff Sept. 12, causing a capsule filled with payloads but not people to fire its launch abort motor and parachute to a safe landing.

Spacenews.com

COMMERCIAL LEO AND GEO EARTH SATELLITES



Amazon Project Kuiper



SpaceX StarLink



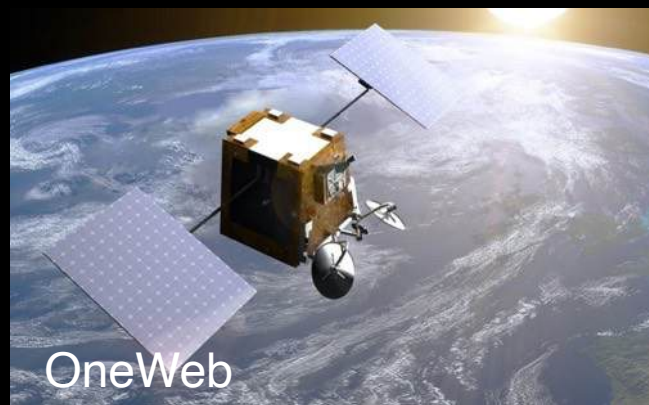
Astranis



Spire Lemur



AST BlueBird Cellular



OneWeb
(EutelSat)



Globalstar



Muon Space Halo



Iridium Next

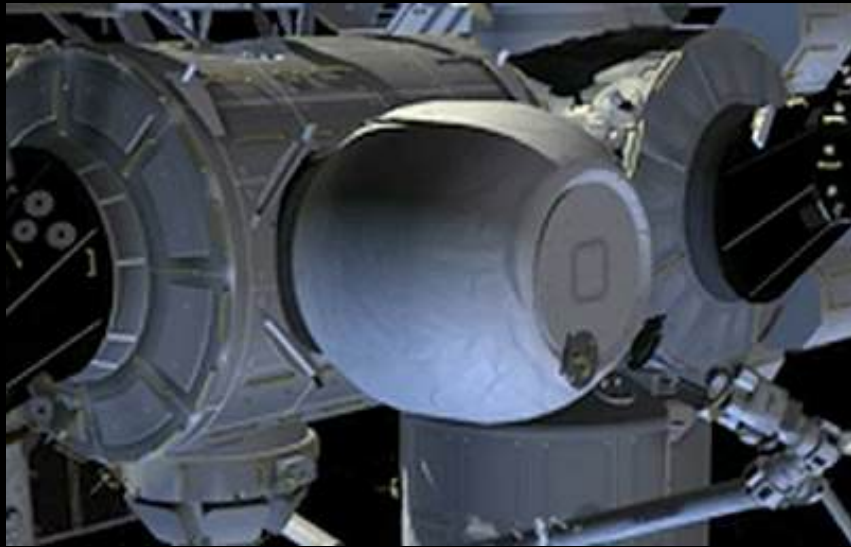


Planet Doves

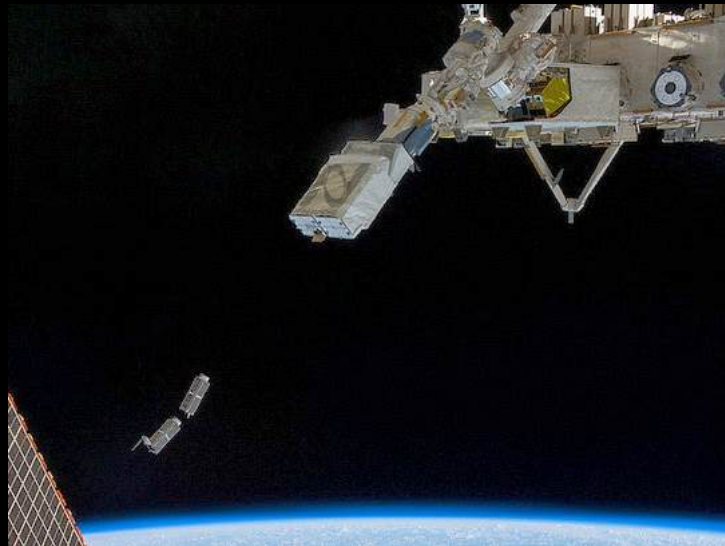
COMMERCIAL RESEARCH ON ISS



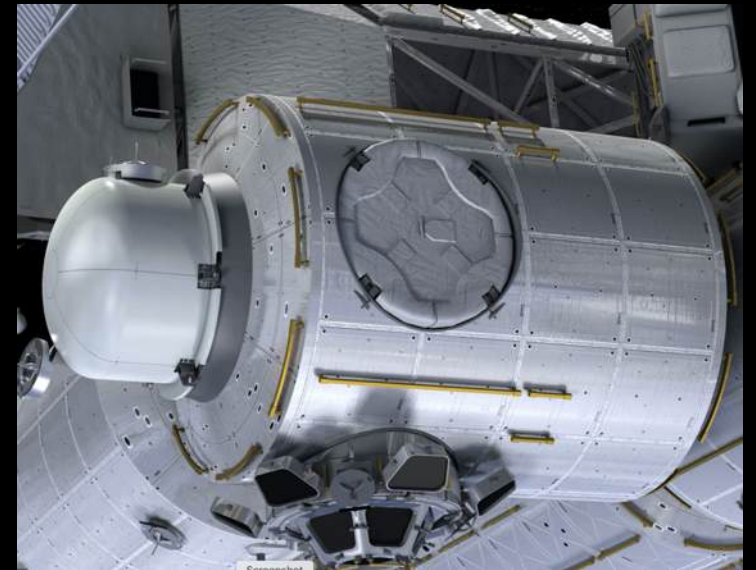
COMMERCIAL OPERATORS ON ISS



Bigelow BEAM



Voyager Space
(NanoRacks) Cyclops




Voyager Space
(NanoRacks) Bishop

BUT IS THERE A REAL MARKET?



**International Space Station
Annual Budget
(~\$3B)**

**ISS National Lab
Annual Budget
(~\$15M)**





CONCLUSIONS

**Boom? or
Bust?**

AUDIENCE PARTICIPATION

1. If you won a lottery prize for \$500,000, would you spend it to fly on a suborbital space tourism mission?
2. Would you buy your basic monthly Internet service from a space-based ISP if it was limited to 100 Mbps?
3. If selected for a “free” one-way colonization mission to Mars (to be an indentured worker), would you leave everything on Earth and go?
4. Is the NewSpace movement destined to be a Boom? or a Bust?

IS COMMERCIAL SPACE REALLY SUSTAINABLE?

- Billionaires and their leadership may not be enough! Sustainability is an issue.
- True commercial space requires long-term investable business plans, revenues, and profits to be sustainable
- The US Government continues to have a key enabling role to play. Ultimately, public-private partnerships may have the best chance at success



CHANGE IS UNDERWAY

Regardless of your optimism or pessimism on any particular aspect of the emerging commercial space industry, it is clear that change is underway. The old government-driven space paradigm is gone and the 21st century belongs to a new generation of space pioneers and businesspersons.

Buckle up Space Fans, we have a front row seat to see how some of these markets unfold in the next 10 - 20 years!



THANK YOU!

