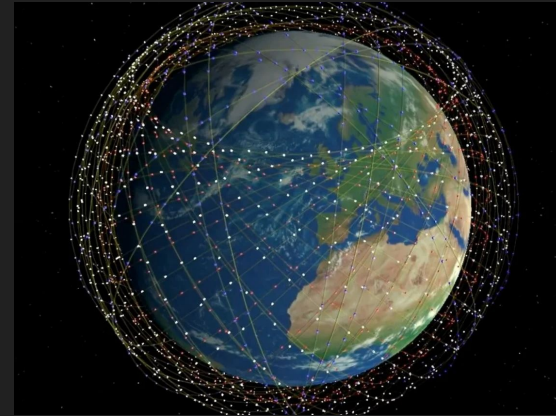


# Commercial Space





# Agenda



1

Industry Overview

2

Relevant Segments



3

Government + Environment

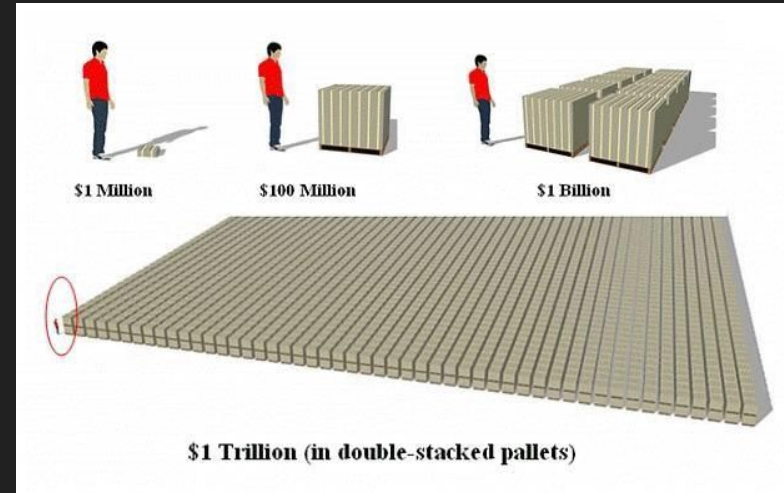
4

Discussion Questions!



# Industry Overview

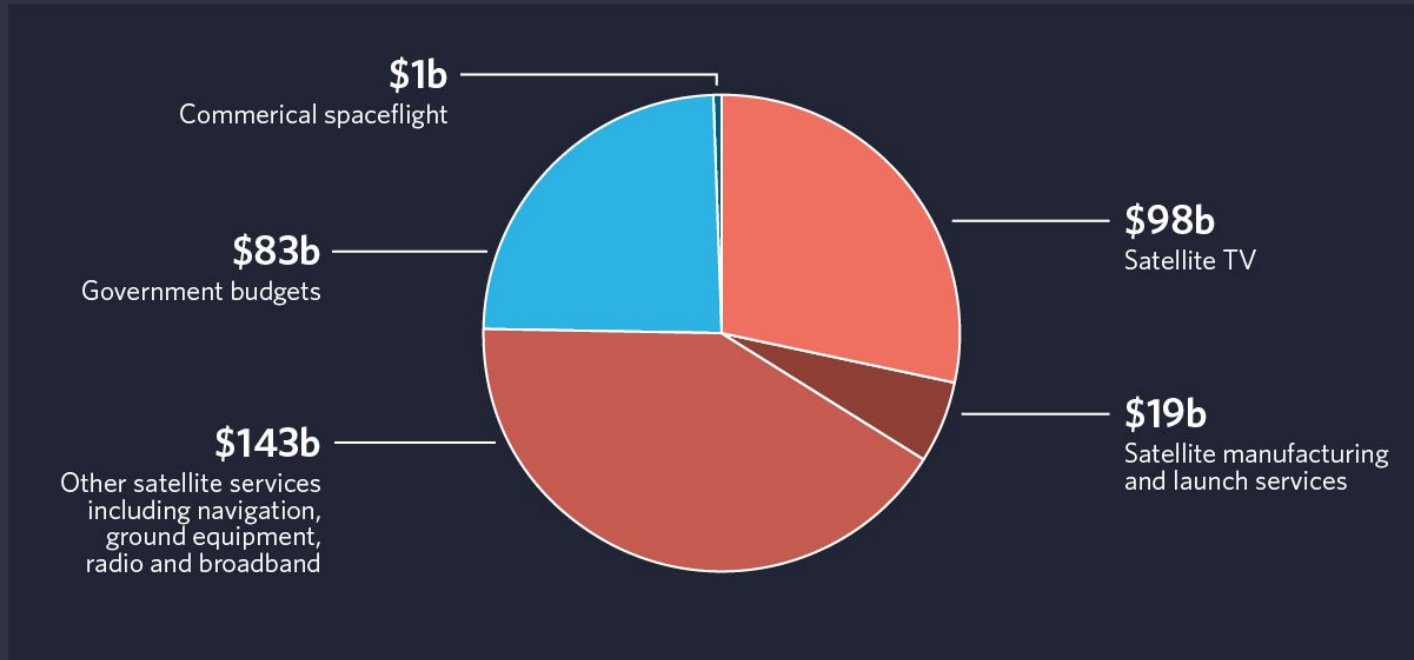
- Space industry valued at over \$423 billion (2019)
  - Shoutout Communications
- Revenue from satellites was \$271 billion (2019); 95 new launches in 2019
- Government spending only comprised about 20% (\$87 billion) of the global space economy (2019)
  - Shoutout NASA
- Could grow to \$1 trillion by 2040



All statistics are from Statista

# Satellites Drive the Commercial Space Industry

The space industry was worth \$345 billion globally in 2016. Three-quarters of sales involved satellites. Government budgets made up the rest, along with a tiny portion coming from commercial spaceflight.



Source: Federal Aviation Administration, "Annual Compendium of Commercial Space Transportation: 2018"

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# Space Internet - Starlink

- Clearest area of industry growth
- Elon Musk's SpaceX satellite internet project known as Starlink
  - Goal: provide low-cost internet to remote locations
  - Currently the FCC has approved SpaceX to fly 12,000 Starlink satellites (Musk wants to increase that number up to 30,000)
- As of July 2021 SpaceX has launched more than 1,700 Starlink satellites
  - More to come!



# Commercial Space Flight

- Could be up to \$8 billion by 2030 (much smaller than satellites)
  - Marketing tool
- Virgin Galactic - Richard Branson
  - July 11 flight - <https://www.bbc.com/news/science-environment-58421796>
  - Lil Controversy → no more launches rn :(
  - 600 customers have paid at least \$200k
- Blue Origin - Jeff Bezos
  - July 20 - winning bid for last seat was \$28 million, next flights could be over \$100 for a seat



# Asteroid Mining

- Highly Speculative
- Water on the Moon - Artemis missions
- Planetary Resources and Deep Space Industries - bubble burst
- Luxembourg - 2017, first European country to establish a legal framework securing private rights to resources in space
- Platinum deposits, benefits could be worth the costs?



# Government Regulation/Support

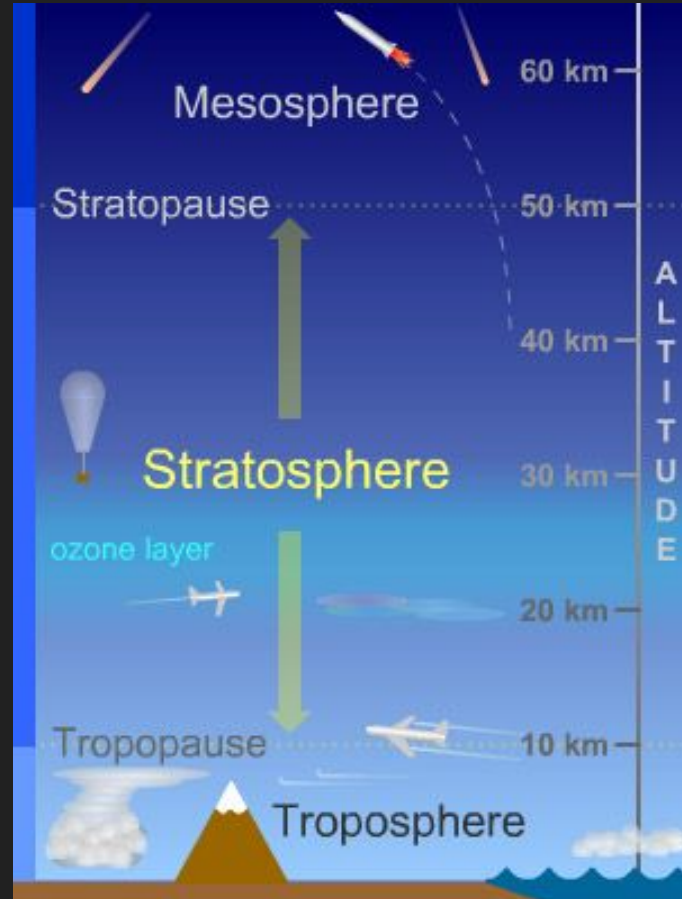
- NASA supports the recent growth of the private space industry
  - Congratulated Bezos/Branson
- Federal Aviation Administration - regulate U.S. airspace
- ORBITAL DEBRIS = less than ideal
  - Clean up? How to limit?





# Environmental Impact

- Space Tourism - 1.5 hour flight = 10 hour commercial airplane flight
- Emitting pollutants in different parts of the atmosphere
  - Effects unknown ...
- Black carbon AKA soot is of particular concern
- Benefits from new discoveries/technologies could offset the costs?
  - Spin-off technologies (microwave, memory foam, etc.)





## Discussion Questions

- How do you feel about the emergence of the commercial space industry?
- Should billionaires use their wealth to become space tourists?
- Should the government allow space tourism?
- Do the environmental and monetary costs outweigh the benefits of space tourism? Commercial satellite launches? Asteroid mining?
- Do you believe the space industry will grow as big as estimated (\$1 trillion by 2040)?
- Jeff Bezos or Richard Branson? (or neither)?
- Would you want to travel to space? Who would you travel with?