AFA
AEROSPACE FUTURES ALLIANCE

WA STATE SPACE COALITION

Overview: Washington State's Commercial Space Industry



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AFA

AEROSPACE FUTURES ALLIANCE

WA STATE SPACE COALITION

MISSION

The Aerospace Futures Alliance is the advocate for Washington state’s aerospace industry and helps member companies connect and grow.

VISION

Washington is the recognized center of aerospace innovation and excellence around the world, and our aerospace industry gets stronger every year.

Washington State Space Industry: Opportunities for Aerospace Suppliers

Funded by the Snohomish County Economic & Workforce Recovery Task Force

Introduction to the Space Economy

- ~$200B global space economy
- Communication, navigation, & remote sensing via satellites
- US is very dependent on space economically and militarily

3,000+ operational satellites in orbit

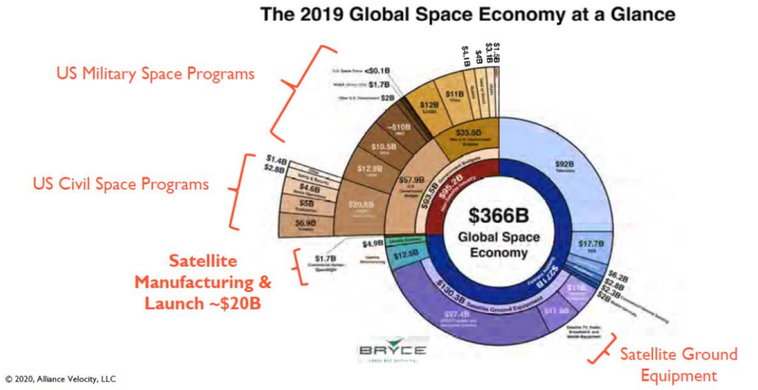
~100 orbital launches per year

US government spends ~$50B/year on space

$6B space equity investments in 2019

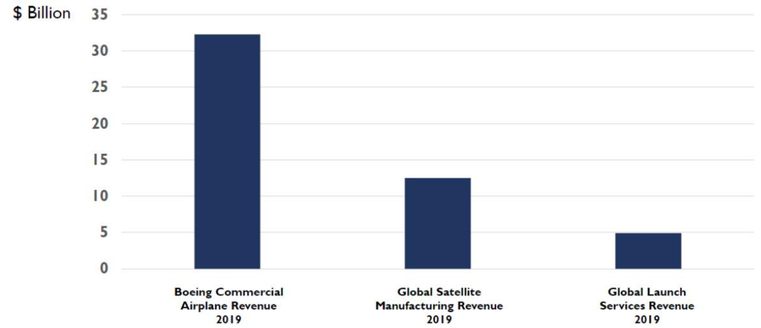
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How Big is the (Relevant) Space Market?



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Space Market in Perspective



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Technology & Process Innovation

Volume Manufacturing



Planet Labs

Advanced Communications



Tethers Unlimited



Kymeta

Space + Cloud + AI



Microsoft



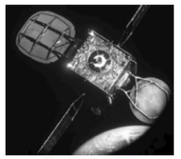
Miniaturization & COTS

UW HuskySat



Relativity Space

Additive Manufacturing



Northrop Grumman

Autonomy & Robotics

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Washington is a "Space State"

Amazon planning 3,236-satellite constellation for internet connectivity



Spaceflight looks to more rideshare missions with fewer satellites per launch



Amazon activates ground station business with first two of 12 stations



Blue Origin unveils lunar lander



SpaceX launches 60 Starlink satellites, begins constellation buildout



LeoStella looks for more customers as it opens satellite factory



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WA Space Company Potential Needs

SPECIALIZED MACHINE SHOPS

- Low volume, high complexity, rapid **prototyping** of specialized parts – **speed** and **flexibility** is important
- **Ceramics** and ceramics **precision machining** – high temperature capable e.g. Silicon Carbides, Zirconium Carbide
- High temperatu[illegible]d **ex**[illegible] mate[illegible] mach[illegible]g
- **Forged comp**[illegible]**ent**[illegible] p[illegible]su[illegible] vessels[illegible]zzles, p[illegible] temperature all[illegible]t[illegible] pu[illegible]
- **Carbon fiber** [illegible]fication for austere environments – lightweight, tough, UV and radiation resistant, thermal extremes
- **High strength** material manufacture and fabrication e.g. Dynema or Zylon – faster and cheaper than existing overseas suppliers

TESTING CAPACITY AND SCALE

- Super **high-quality**, **rapid** turnaround testing support
- Testing support for **vibration**, **shock**, **thermal** at extreme stress levels
- Testing scaling for **larger** components and assemblies
- **[illegible]mal [illegible]uum** t[illegible]ting for [illegible]llites
- **Rad[illegible]tion** [illegible]g fo[illegible]compo[illegible]nt[illegible]d ass[illegible]blies
- [illegible], Ult[illegible]cou[illegible]n[illegible]other [illegible]**non-invasive** testing of de[illegible]weld[illegible]nd as[illegible]lies
- Hot hydrogen testing at temperatures up to **2,000 – 3,000 Kelvin**
- Pressure testing chamber at up to **20 – 25k psi** chamber pressure
- Testing is potential entry point – "**tip of the spear**" approach. Potential to scale to manufacturing sub-systems – vacuum ovens, wind tunnels, high pressure chambers

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Washington's Space Ecosystem



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WA Space Company Potential Needs

SPECIALIZED COMPONENTS

- Specialized, **custom PCB** design and fabrication
- **Reaction wheels** for Satellite Control
- Optics for **star tracking** (high-enough precision = ITAR-controlled)
- **Radiation hard**[illegible]d f[illegible] comp[illegible]rs and [illegible]wer sy[illegible]ns (doubly so for MB[illegible]and E[illegible]tates)
- **Active RF** comp[illegible]ents – Lo[illegible]e Ampl[illegible]rs
- Cryogenic equipm[illegible]t to handle **liquid O2** and **liquid [illegible]2**
- Control systems – instrumentation, controlling of actuating
- Digital and analog electronics for **Micro-Satellites**
- **COTS** ("Commercial-off-the-shelf) components – gaining traction - higher system level performance at lower cost
- Custom packaging: hermetically sealed steel, ceramic, circuit boards - custom and highly engineered with plating, seals

PEOPLE, SKILLS & RECRUITING

- We are **always** looking for good people. Different culture to Boeing – **hands on** work – technicians – **hands on** build – we **make** a lot of hardware
- Recruiting – **finding people** with the right background and [illegible]e is v[illegible]challe[illegible]g
- [illegible]cruiting[illegible]e [illegible]eop[illegible]with a[illegible]**space engineering** AND [illegible] **Sci**[illegible]e [illegible]s[illegible]m A[illegible]ite[illegible]re b[illegible]ground
- [illegible]ple br[illegible]s[illegible]p[illegible]r **re**[illegible]**ns**[illegible] with t[illegible]m fr[illegible] **previous** jobs
- It is **critical** to develop **relationships** and **credibility** before expecting business
- We are acquiring new business and **need good people**
- We want to work with suppliers who have **flown in space before**

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INDUSTRY NEEDS

HB 1190 can benefit established aerospace employers and support growth of the commercial space industry in Washington by:

- Supporting established industry-led efforts
- Unifying public and private efforts to study and growth the industry
- Developing an actionable business plan for growth of the industry
- Prioritizing and financing testing infrastructure needs, research and development, certifications, and developing local talent