



Space Insurance Update

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Agenda

- ➔ Space Insurance Basics ... *what we do*
- ➔ Space Insurance Metrics ... *what we analyze*
- ➔ Space Policy Issues ... *how we make a difference*
- ➔ Conclusion ... *what's next*

What Is Space Insurance?

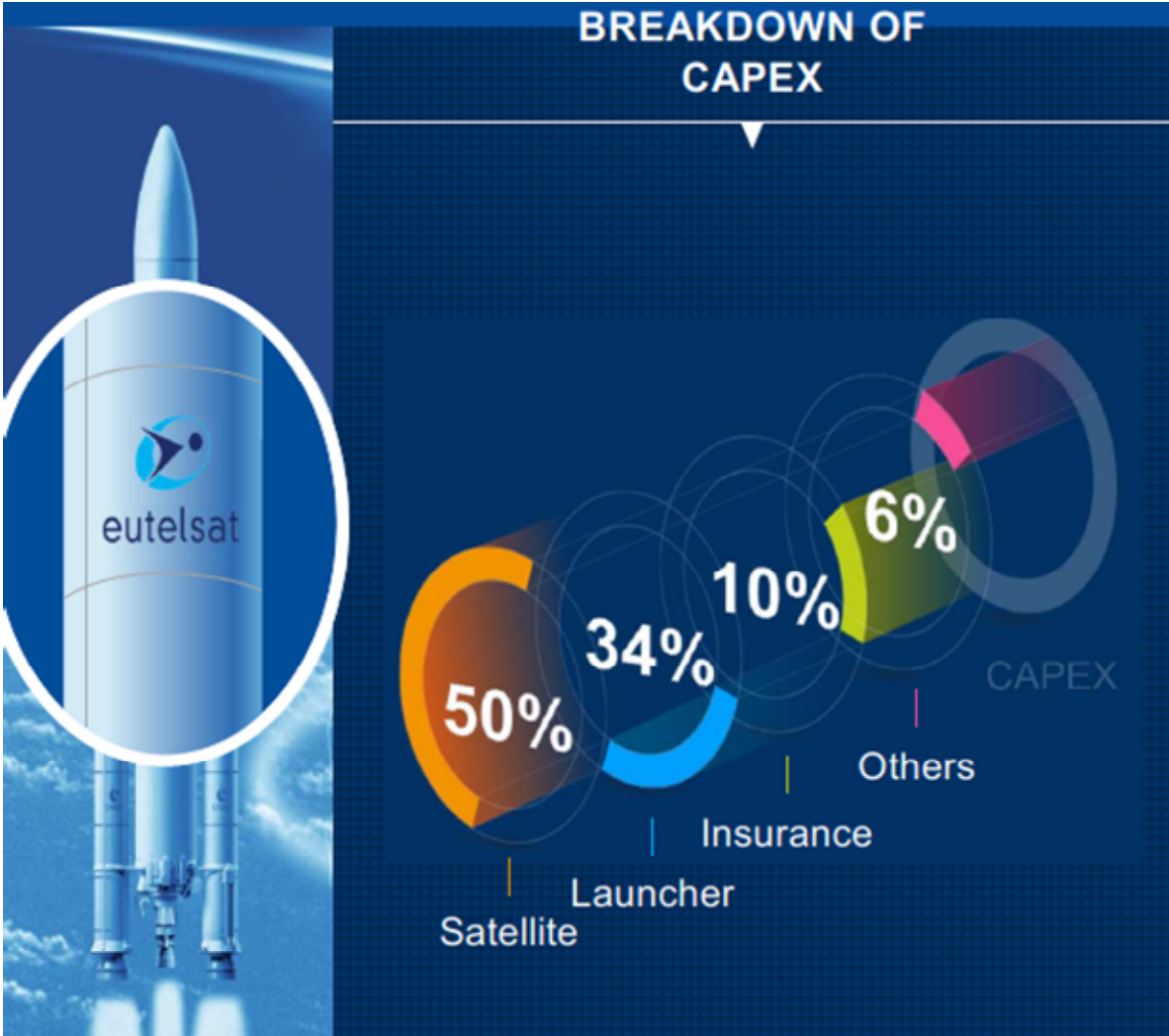
➔ Coverage for...

- ➔ ...**loss**, damage, or failure...
- ➔ ...of **satellites**, launch vehicles, and other space platforms...
- ➔ ...for satellite **owners**, users, and manufacturers, launch service providers, and other space operators...
- ➔ ...during **launch**, initial operations, and on-orbit operations...
- ➔ ...and through the **life** of the satellite or payload

➔ Includes **virtually all technical risk from launch onwards**

- ➔ Covers all risks, with few exclusions
- ➔ Third largest program cost
- ➔ Represents 0.01% of global insurance premiums

Typical GEO Satellite Program Capex Profile



For small LEO systems, satellite cost is often less than launch cost

Source: Eutelsat Investor Presentation, November 2019

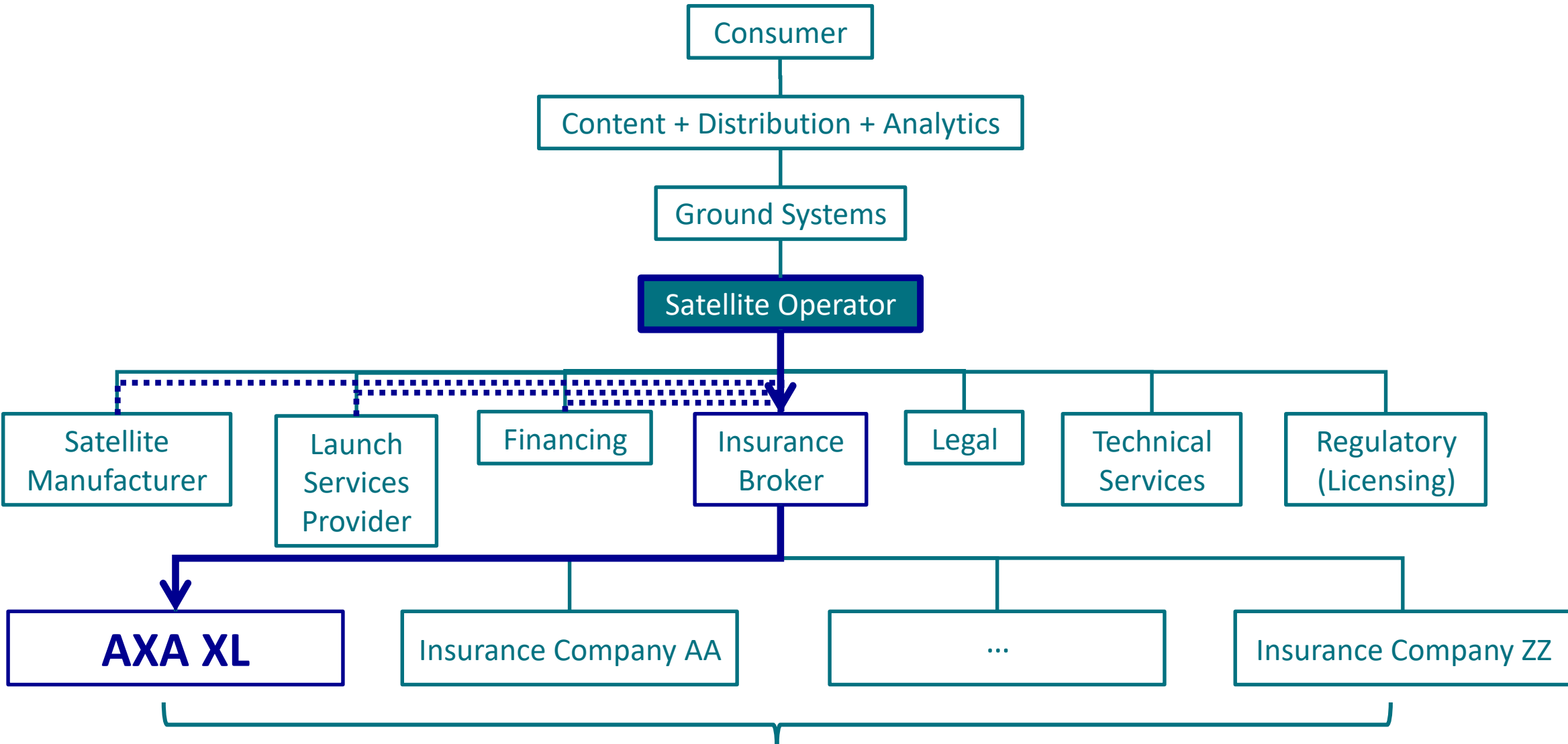
Phases of Operations and Coverages

Phase	Insurance coverage	
<p>Launch vehicle flight</p>	<p>Launch vehicle flight only: Covers launch vehicle flight phase, from ignition of launch vehicle to separation of satellite in orbit.</p>	<p>Launch plus one year: Covers launch vehicle flight, post-separation phase and in-orbit life to one year from launch.</p>
<p>Post-separation (initial operations)</p>	<p>Post-separation: Covers initial operations phase (orbit raising, deployments, testing) and in-orbit life to acceptance or one year from launch.</p>	
<p>In-orbit life</p>	<p>In-orbit: Covers in-orbit life for one year at a time. Renewed annually based on satellite health.</p>	

The Underwriting Process

- ✓ Industry tracking
 - ✓ Program briefing
 - ✓ Program documentation
 - ✓ Q&A
 - ✓ Coverage design
 - ✓ Policy wording
 - ✓ Pricing
 - ✓ Accounting
 - ✓ Pre-launch information
 - ✓ Claims handling
 - ✓ Salvage

Satellite Value Chain



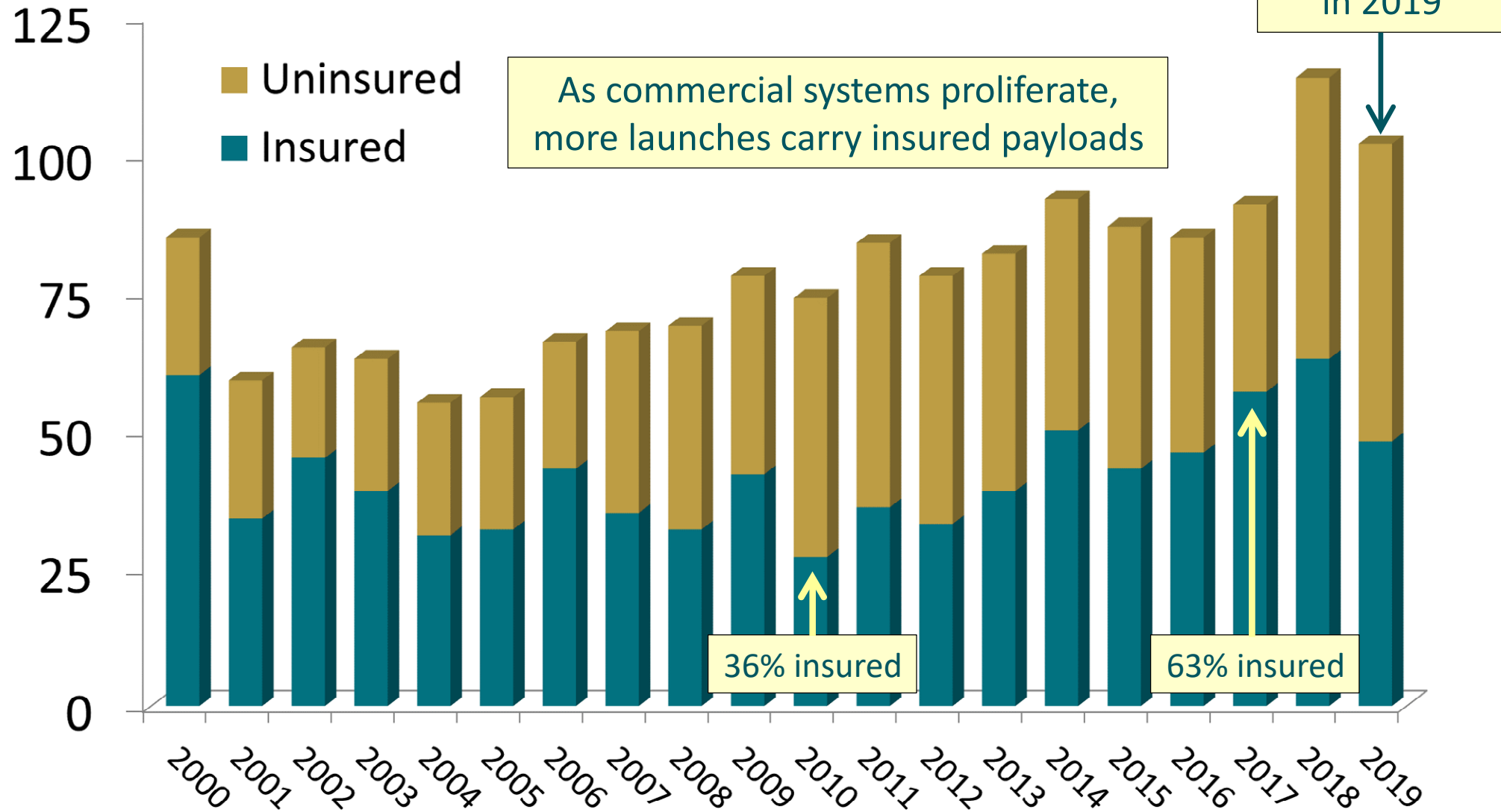
~35-40 direct space insurance companies worldwide

Unique Challenges in Space Insurance

- ➔ **Technical:** rapidly-evolving technologies, small satellites, new launch vehicles, constellations, custom-built satellites, generic anomalies, space environment
- ➔ **Actuarial:** low frequency + high severity = volatility, small population = large variance, large range of values
- ➔ **Market:** short tail, high cash flow, uncorrelated risks, low cost of entry, soft insurance market

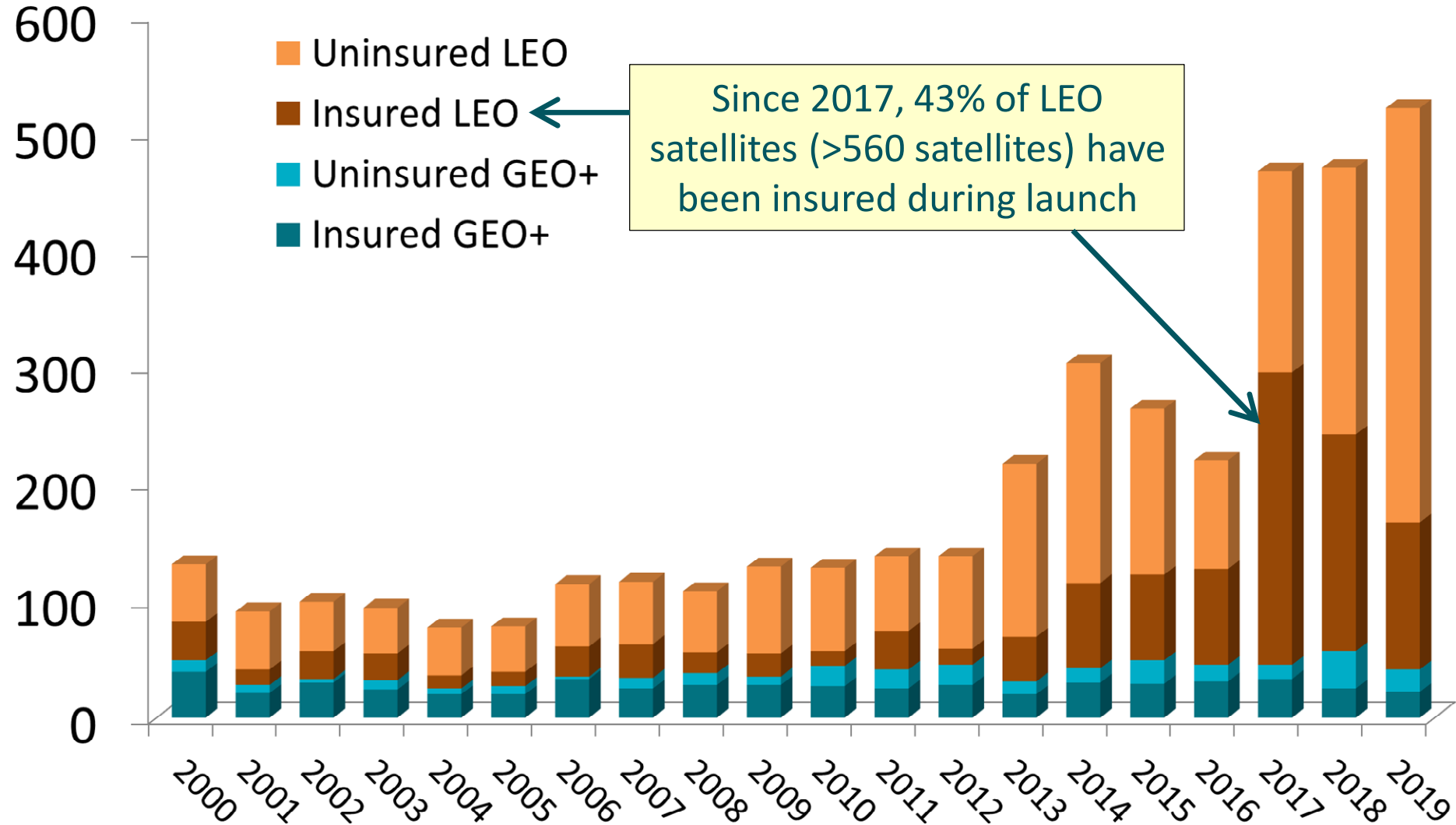
Launches to Orbit

Market insured vs. uninsured



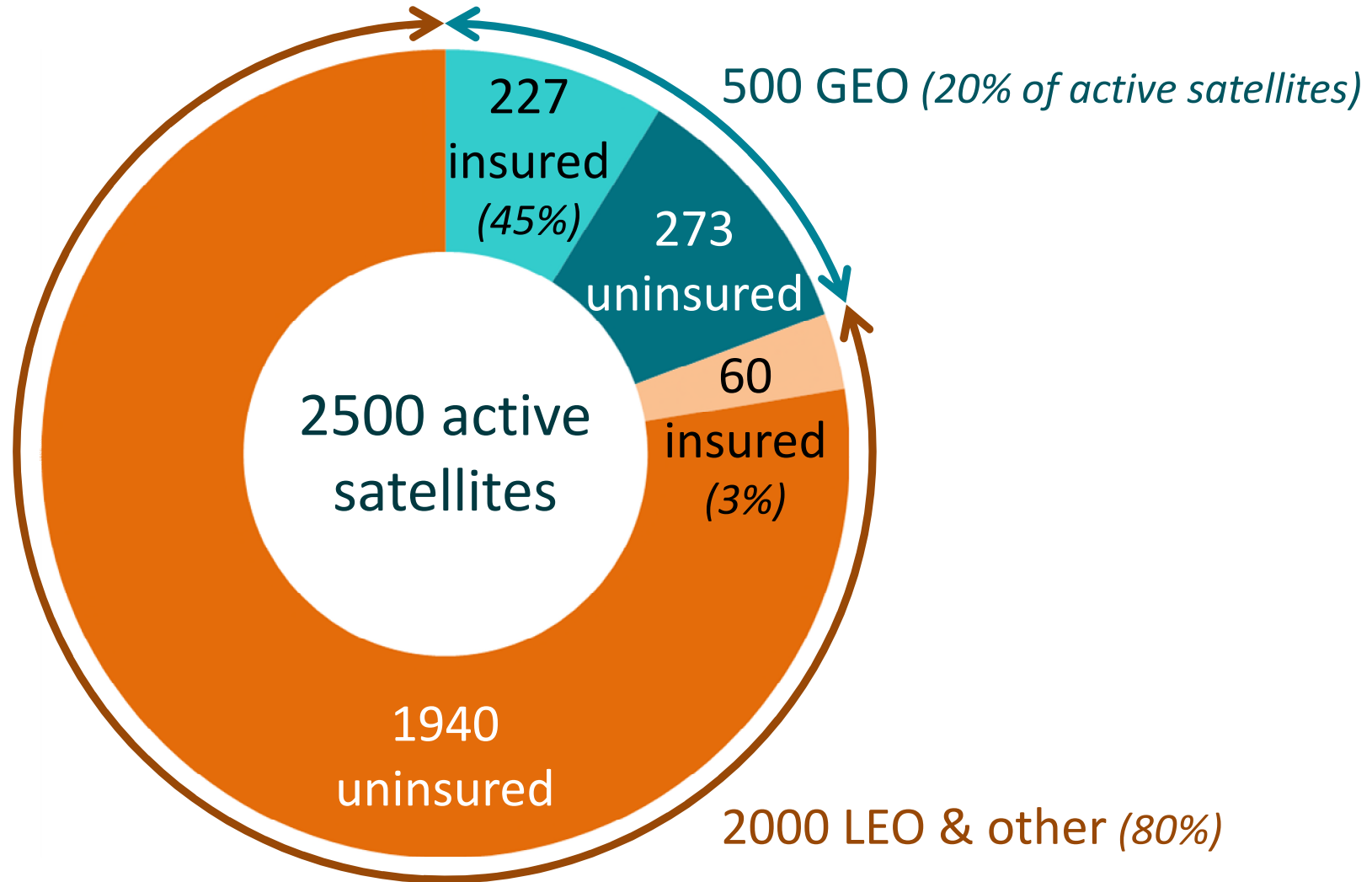
Satellites Launched

Market insured vs. uninsured during LVF



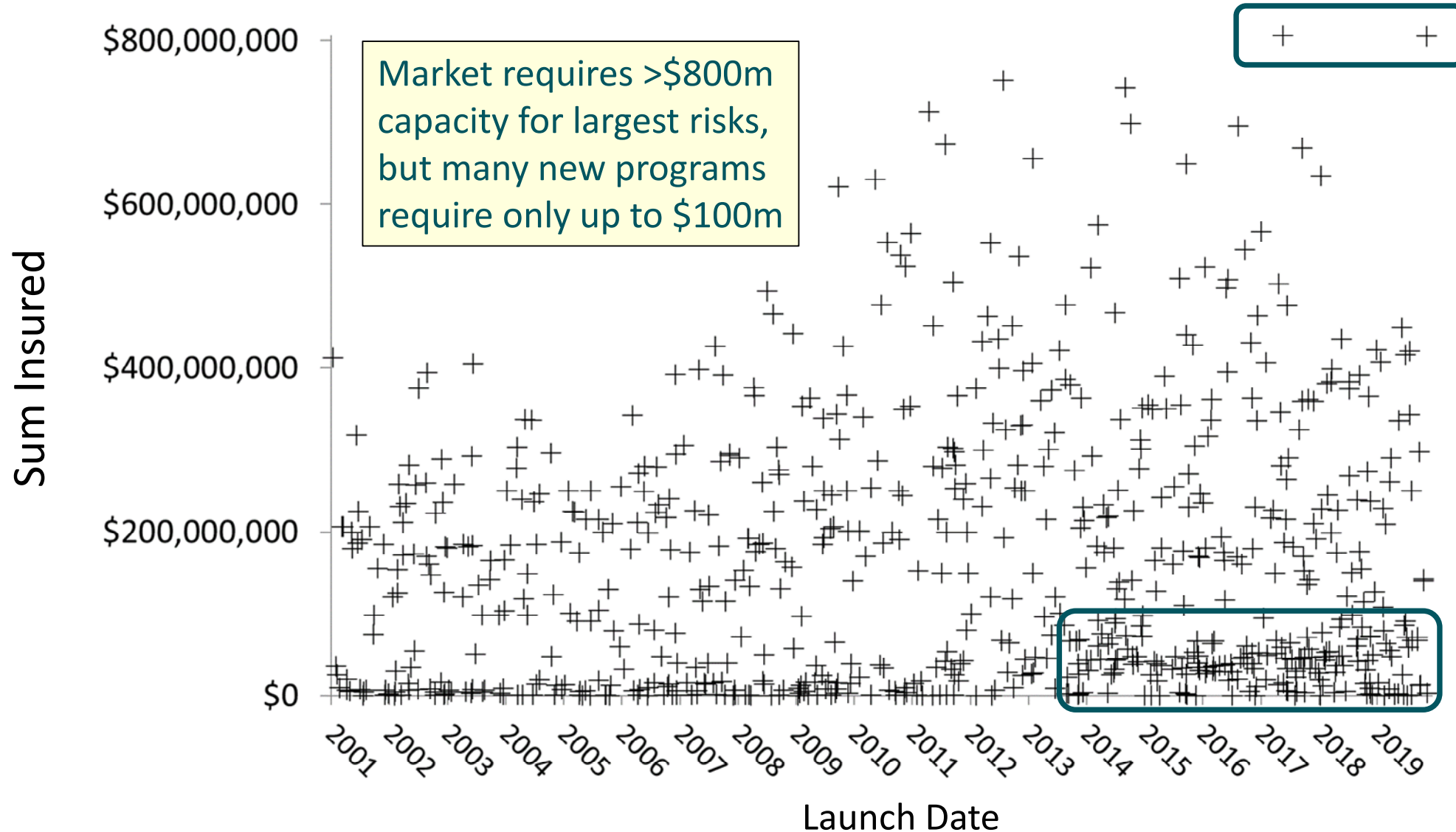
Market Insured vs Uninsured Satellites In Orbit

Active satellites as of Feb 2020



Market Insured Values

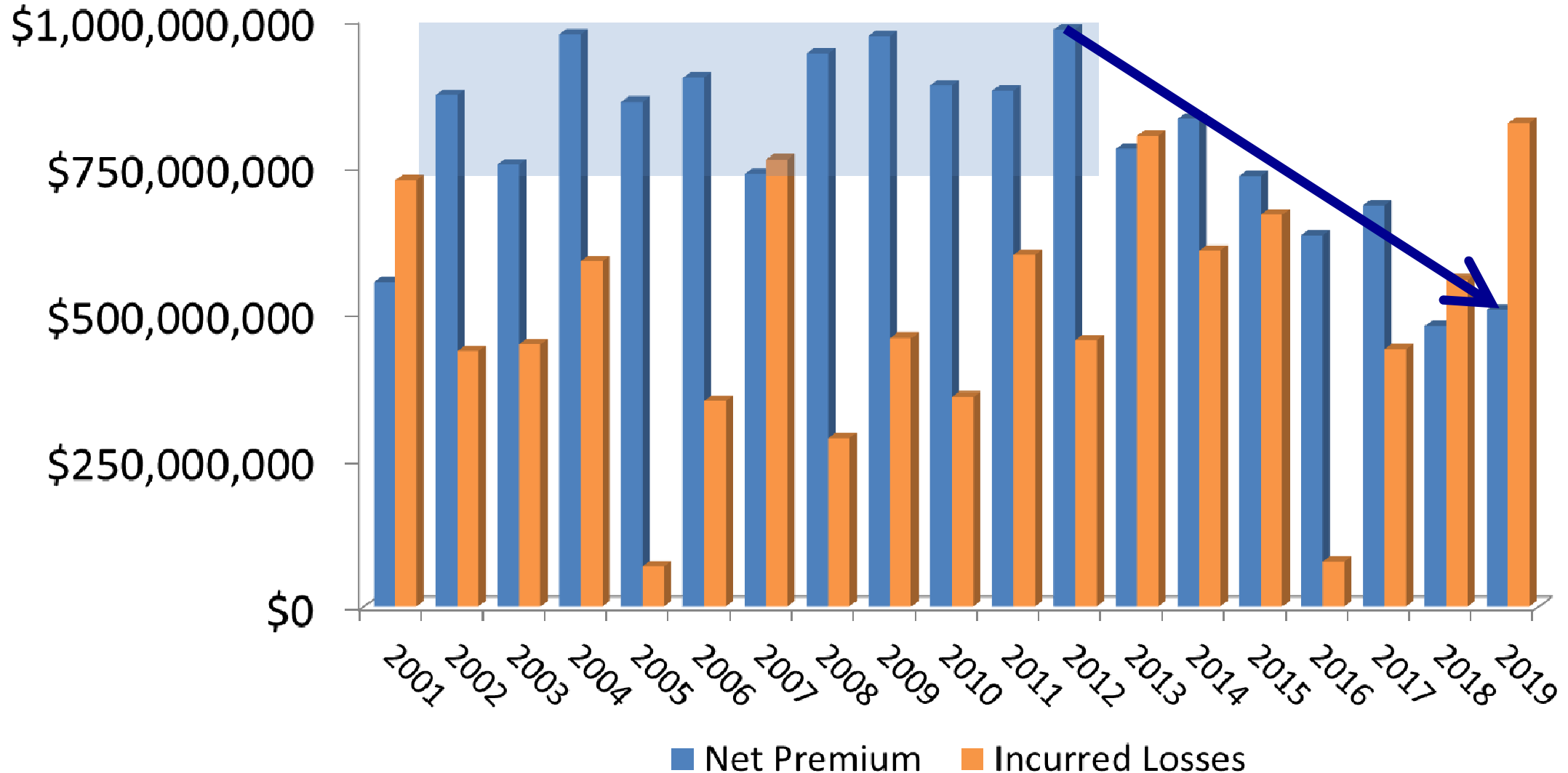
Launch vehicle flight



Market Annual Premium and Claims

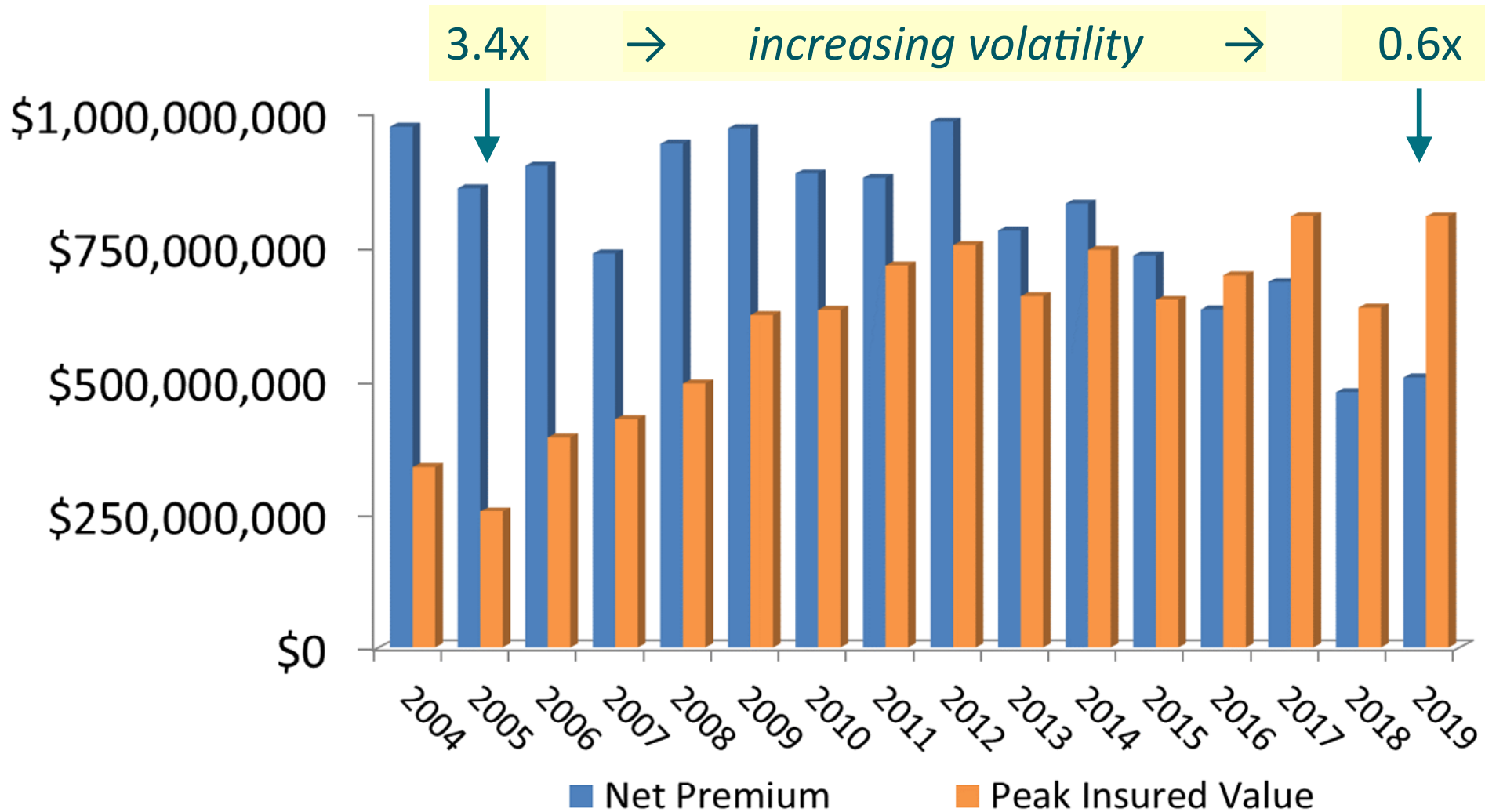
Premium on risks attaching, losses at date of loss

- **Claims** in 2017 to 2019 are **in family** for this class
- **Premium** has **decreased 50%** since 2012
- **Space insurance** is **profitable** if **priced correctly**



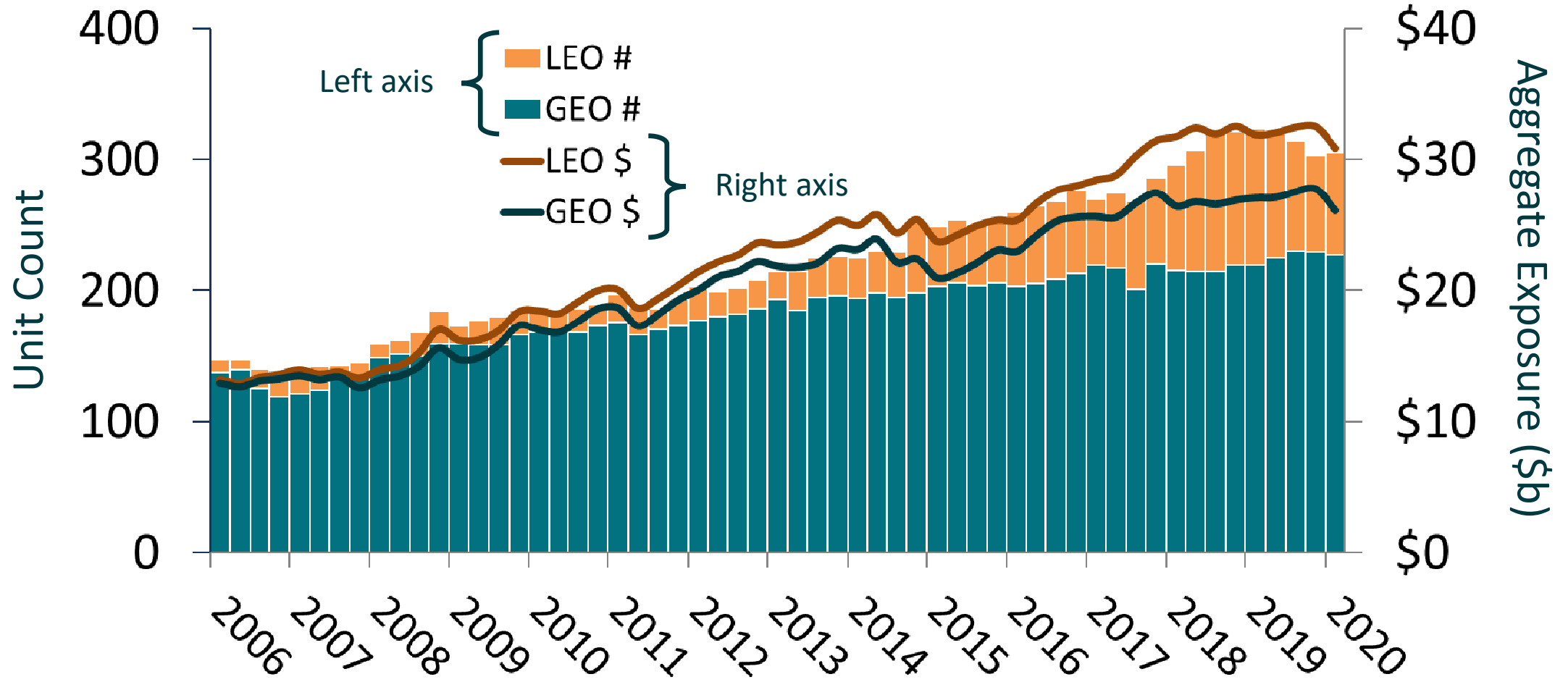
Ratio of Market Premium to Maximum Exposure

Ability to pay largest possible single loss with one year's premium



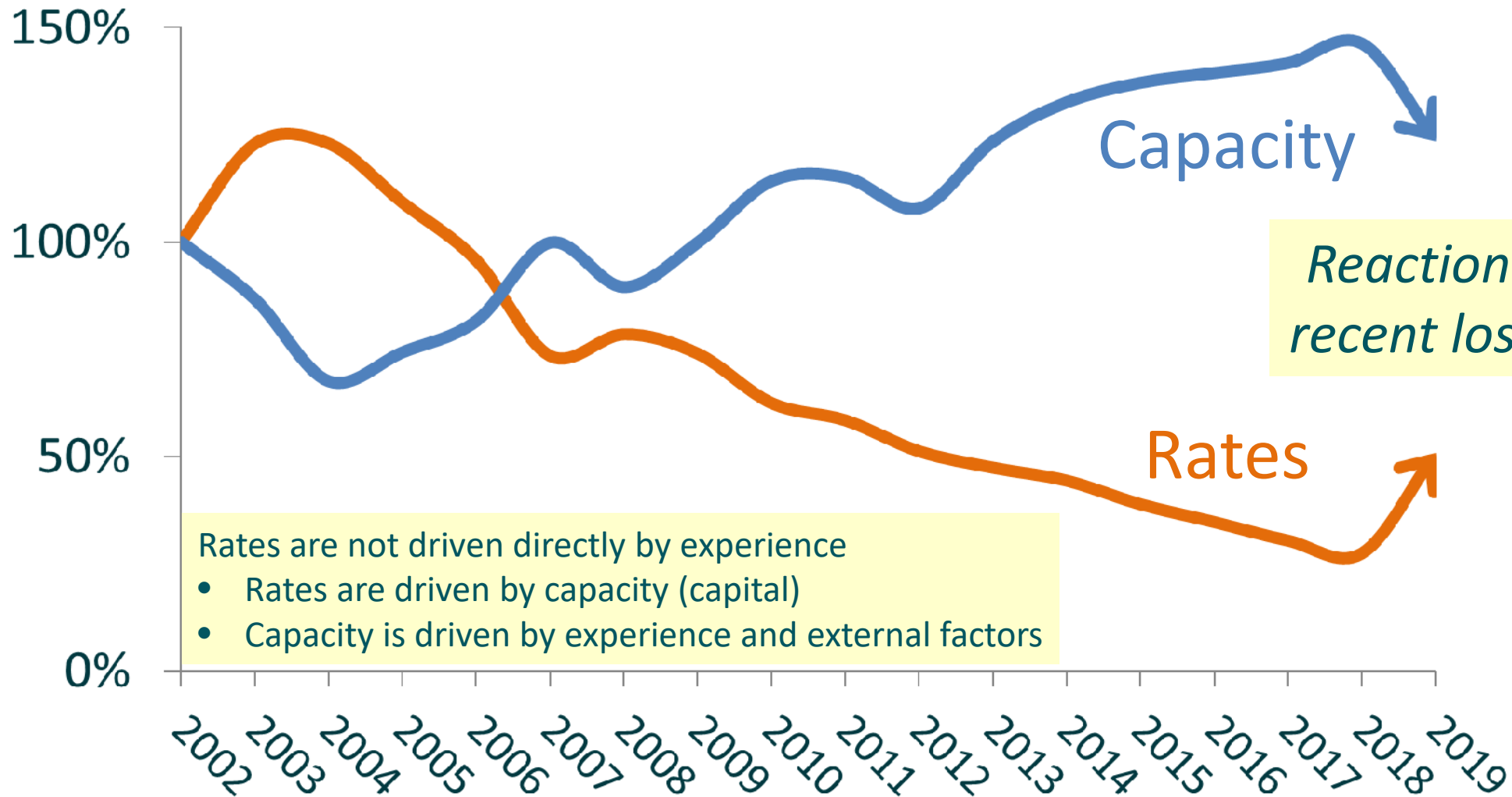
Market Exposures

Insured satellites in orbit



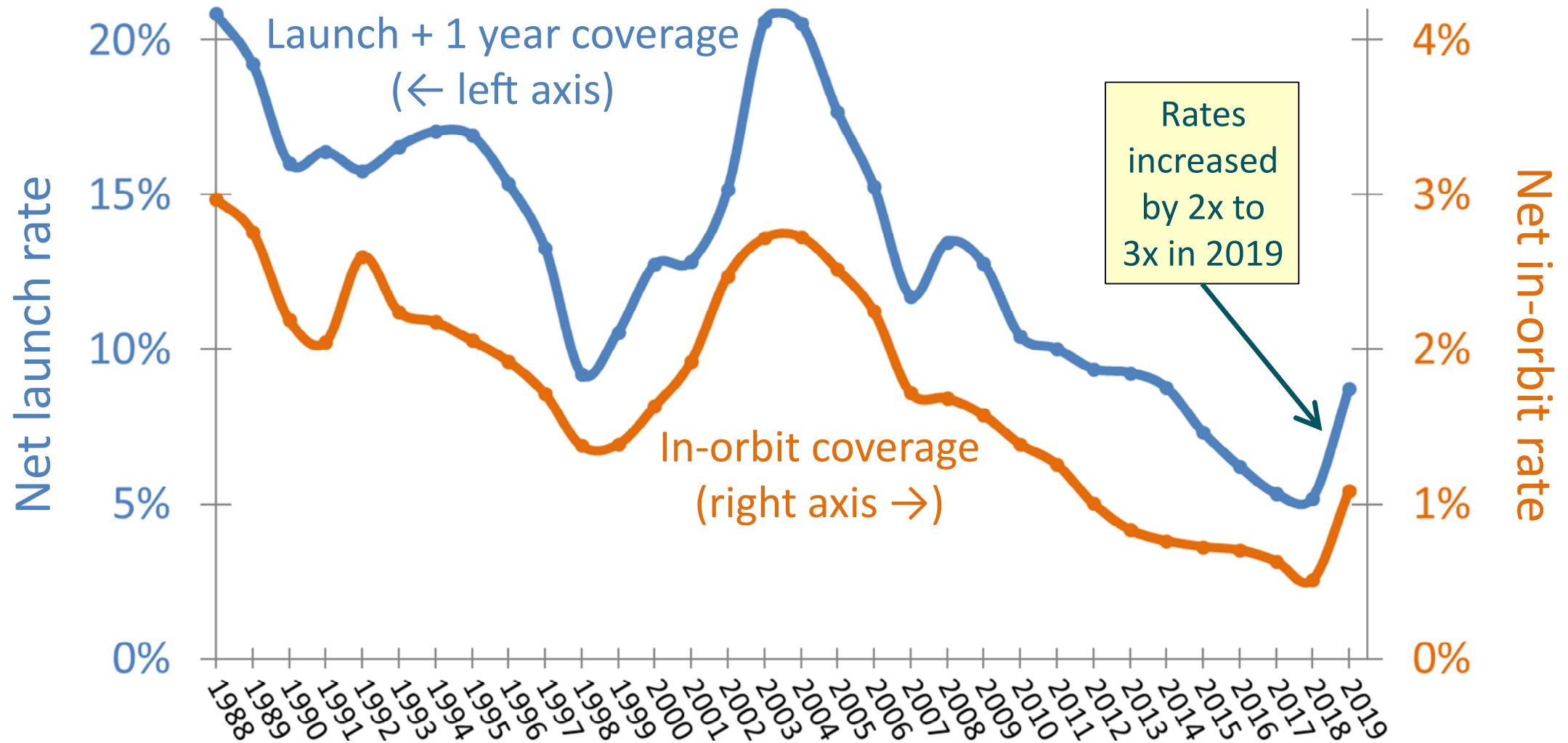
Market Dynamics

2002 = 100%



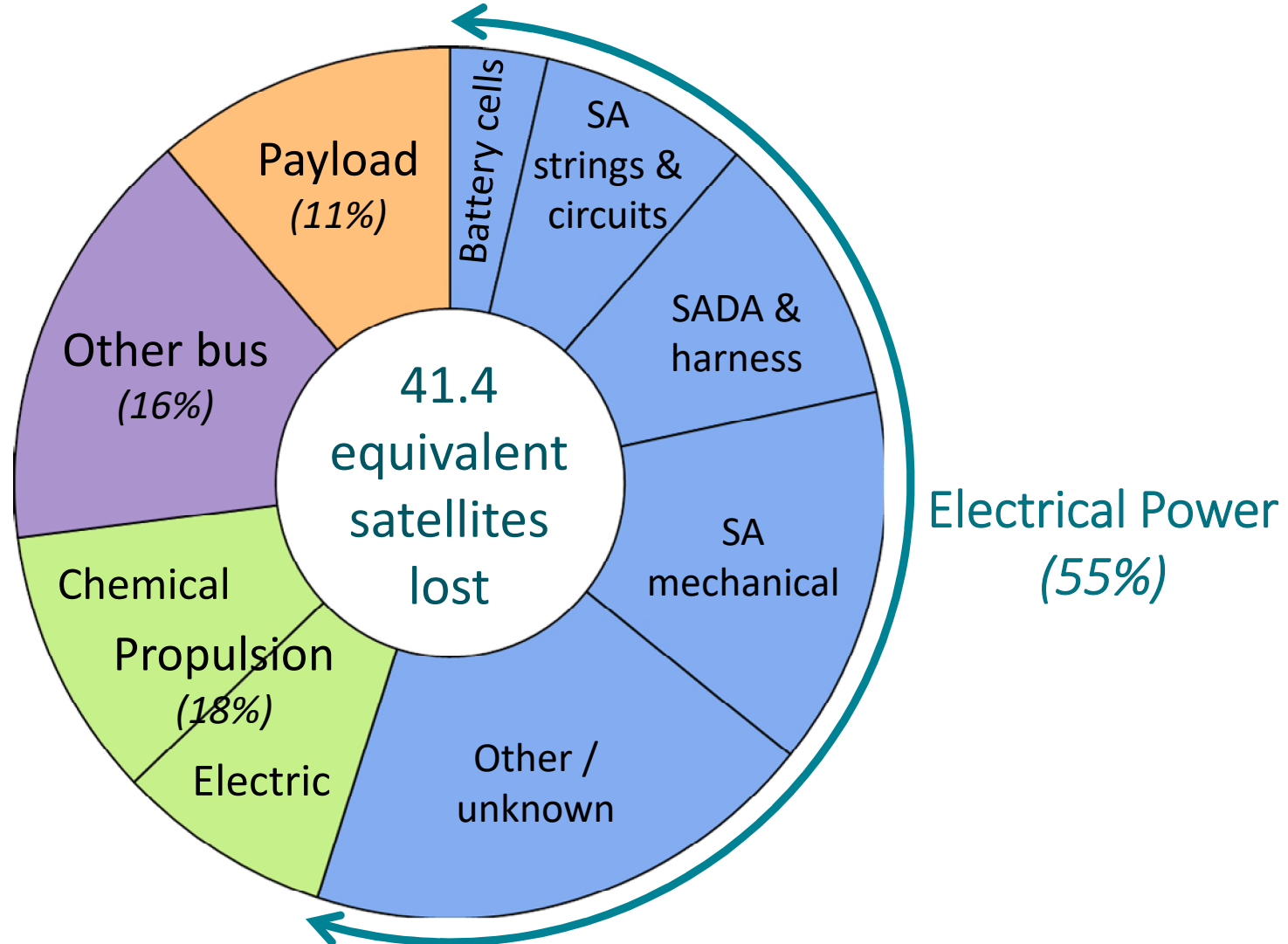
Market Rate Development

Average net rates by year

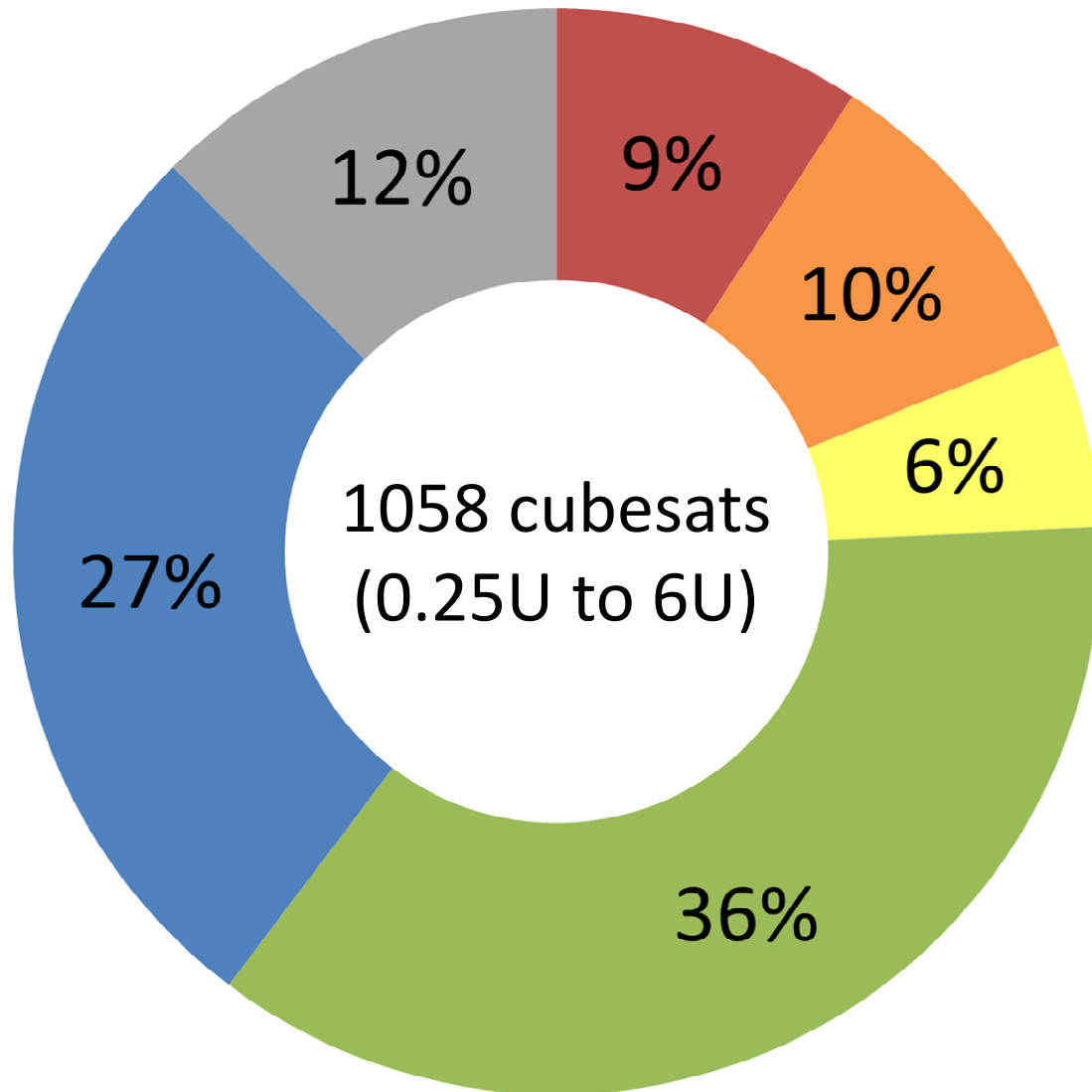


Causes of Losses

GEO satellites launched since 2000



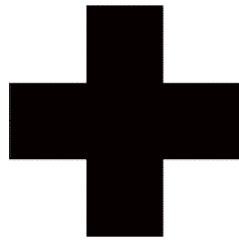
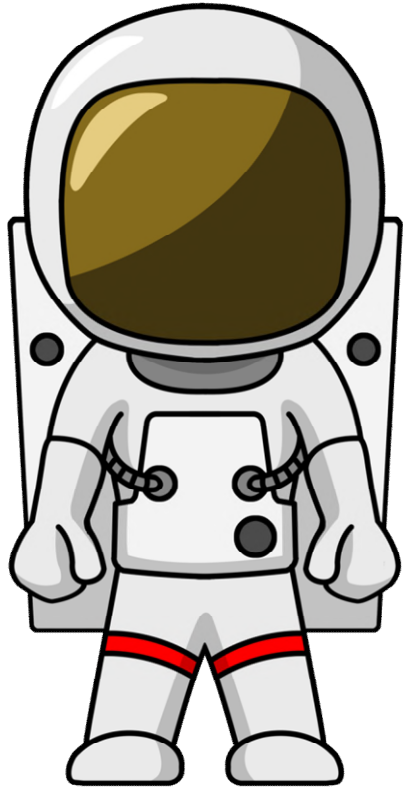
Mission Phases of Cubesat Losses



- Launch Failure
- DOA
- Commissioning Failure
- Partial Mission Achieved
- Full Mission Achieved
- Unknown

Source: "CubeSat Database",
<https://sites.google.com/a/slu.edu/swartwout/home/cubesat-database>

Humans in Space



- 19 killed in or to space
- 10 killed in training
- 300+ non-astronauts



- 35 accidents & incidents affecting 57 people

- 575 people on 338 flights
 - ✓ ♂ 510 ♀ 65
 - ✓ 23 SFP
 - ✓ 13 suborbital



Conclusion

- Space insurance is a critical enabler of innovation and investment
- Space insurers have suffered increasing losses and decreasing premium over the past several years
- Insurance companies recognize space insurance volatility and have become more conservative
- We work closely with industry to foster success and sustainability
- ***AXA XL is leading the insurance market in returning to profitability and responsibility in space***



Questions?



Thank you