

A space-themed background featuring the Earth's horizon at the bottom, a bright light source (likely the sun) on the left, and a dark starry sky with a faint galaxy. A thin, glowing arc is visible in the upper left.

SMALL SATELLITES DRIVING THE MARKET OF MICROLAUNCHERS

TOR-ARNE GRÖNLAND
SENIOR DIRECTOR BUSINESS DEVELOPMENT
& PROPULSION AT GOMSPACE

SMALL SATELLITES DRIVING THE MARKET OF MICROLAUNCHERS

A composite image of space. In the foreground, a satellite with a large solar panel array is shown. In the background, several other satellites are visible against a starry sky. On the right, a stylized Earth is depicted with a blue grid overlay and a bright light source behind it, creating a lens flare effect.

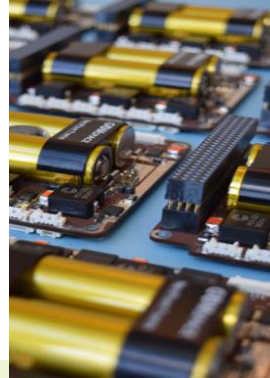
Space Innovation Forum, Kiruna, 11th – 12th March 2020
Tor-Arne Grönland, Senior Director Business Development
email: tor-arne.gronland@gomspace.com

| CONTENT |

- Evolution of cubesats
- Nanosats by numbers
- Market trends
- Concluding remark



| EVOLUTION OF CUBESATS |



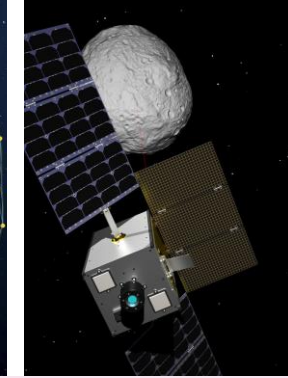
1st decade

- Education,
- Tech demonstration
- Entrepreneurship



2nd decade

- VC driven growth
- Useful applications:
 - ✓ Tracking,
 - ✓ Earth observation,
 - ✓ narrow band communication



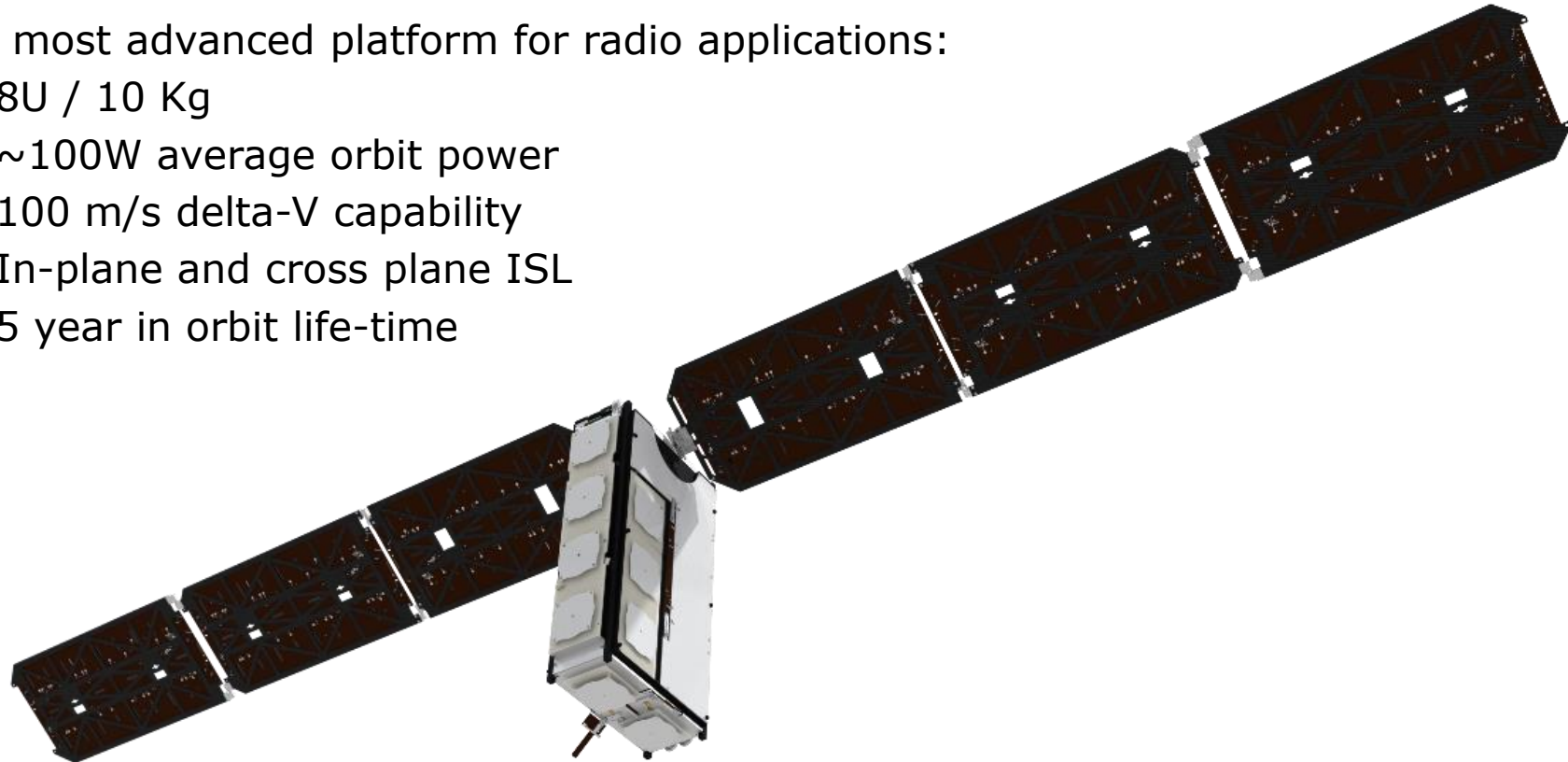
3rd decade

- Prove & consolidate the business cases
- More useful applications:
 - ✓ Wide band comm,
 - ✓ Radar,
 - ✓ Data relay
- Advanced mission:
 - ✓ Proximity operations
 - ✓ Beyond LEO

STATE OF THE ART – SMALL BUT CAPABLE

Our most advanced platform for radio applications:

- 8U / 10 Kg
- ~100W average orbit power
- 100 m/s delta-V capability
- In-plane and cross plane ISL
- 5 year in orbit life-time

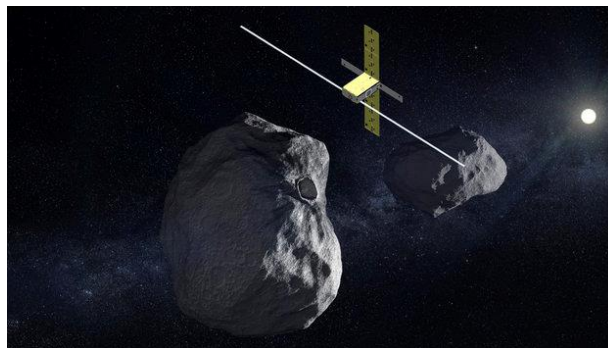


50% of the payload power of "OneWeb", but with 7% of the mass!

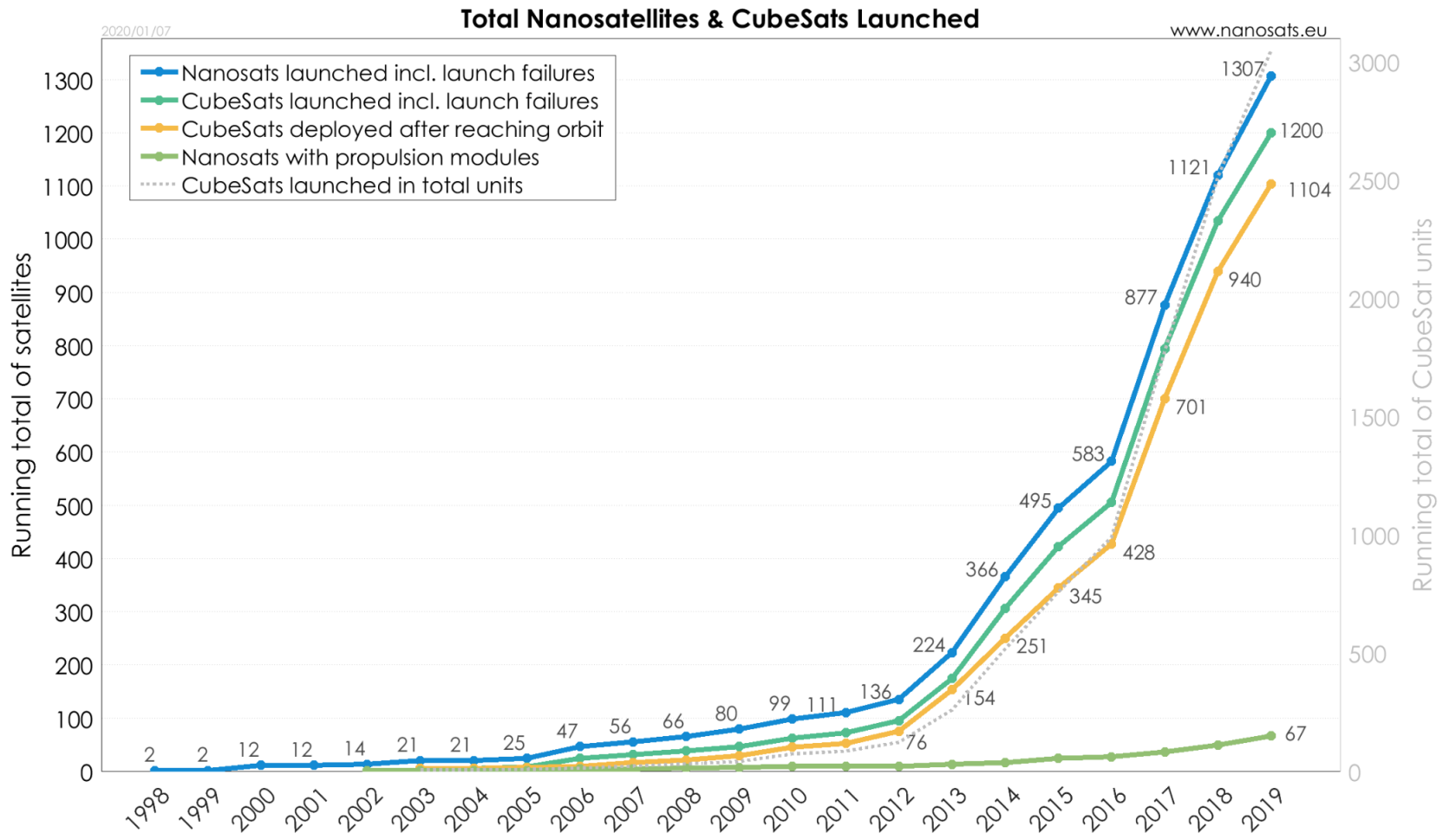
MORE ADVANCED MISSIONS

GomSpace is leading several ESA missions:

- RACE, 2x 6U, Rendezvous and Docking experiment,
 - GOMX-5, 2x 12U platform for wideband,
 - Juventas, 6U deep space mission,
 - M-ARGO, 12U stand alone asteroid explorer,
- and participating in many more.

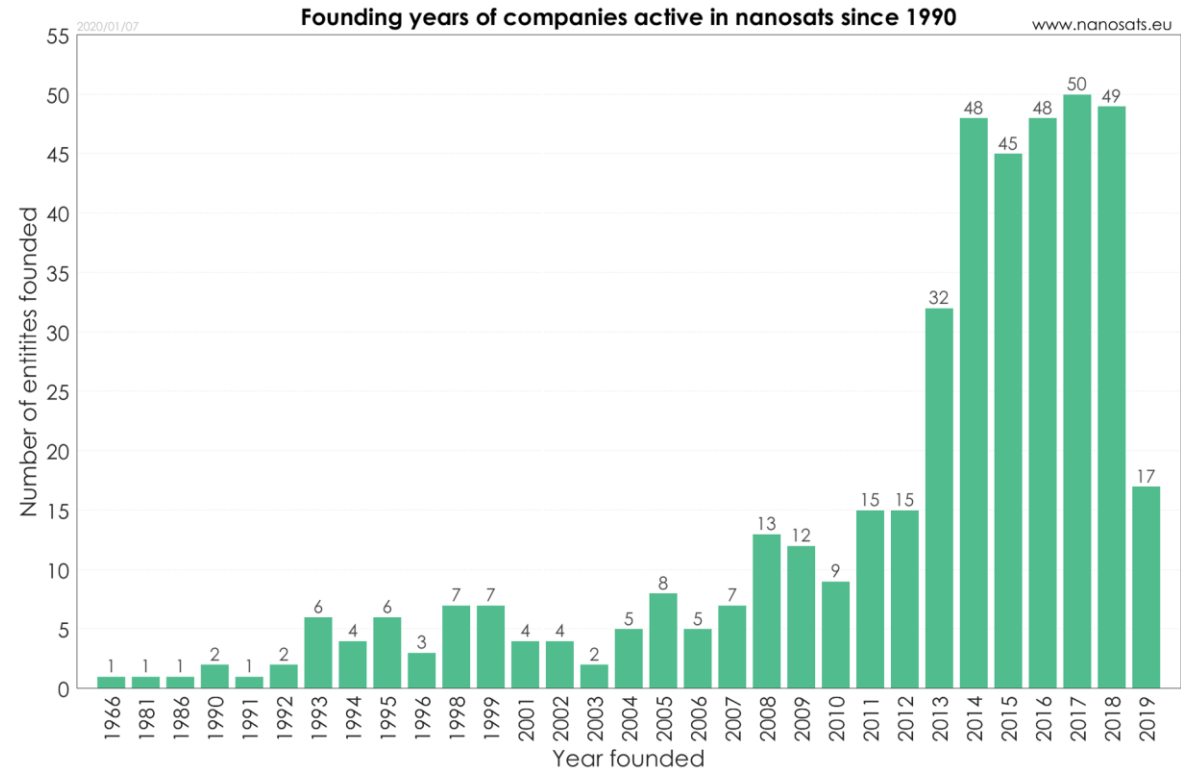


LAUNCHED - ACCUMULATED



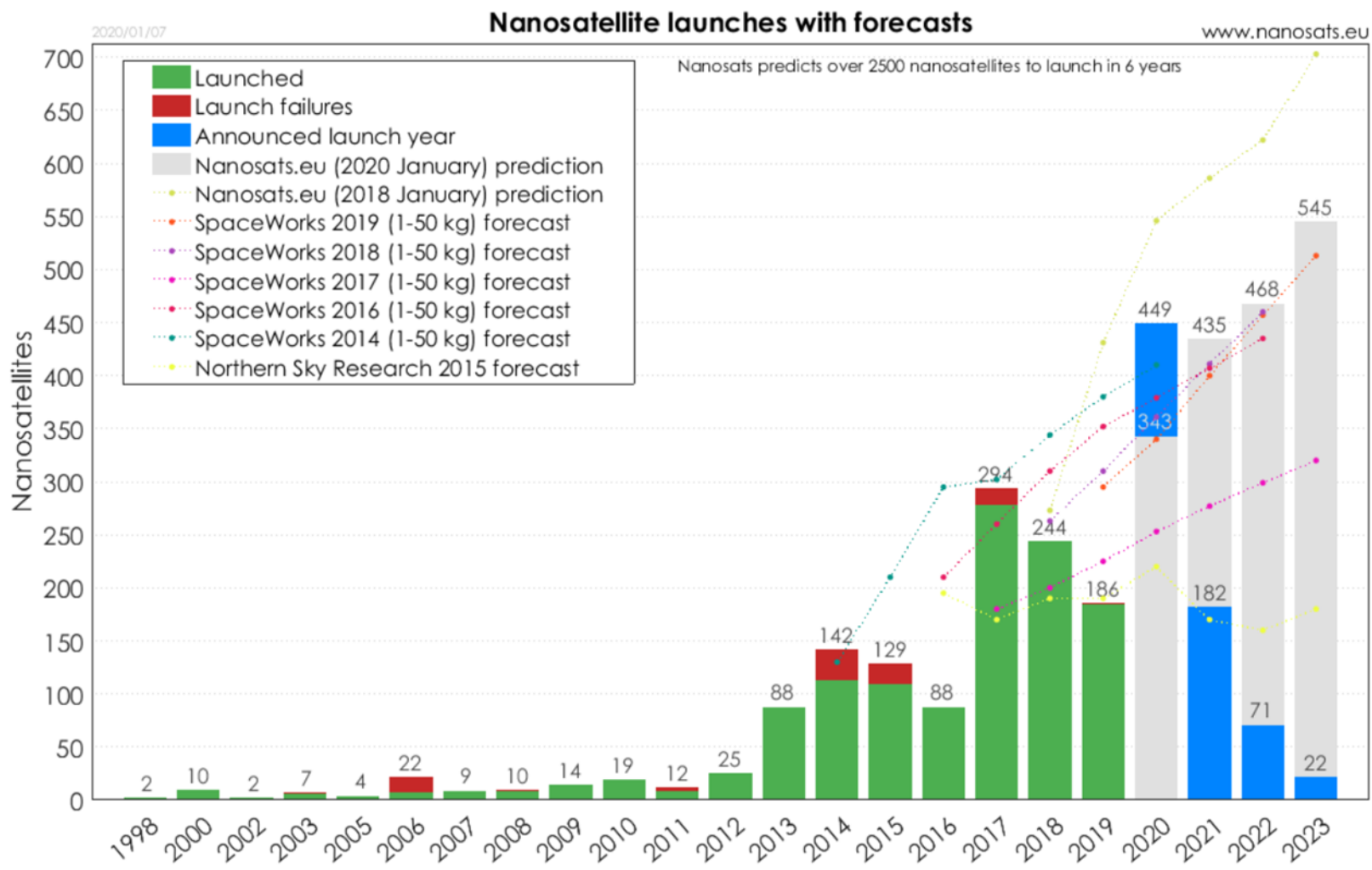
NEW SPACE COMPANIES FOUNDED

- Dominated by young companies, many funded by Venture Capital
- Both capability and reliability is increasing
- Challenges such as operations, security, and space debris needs to be handled

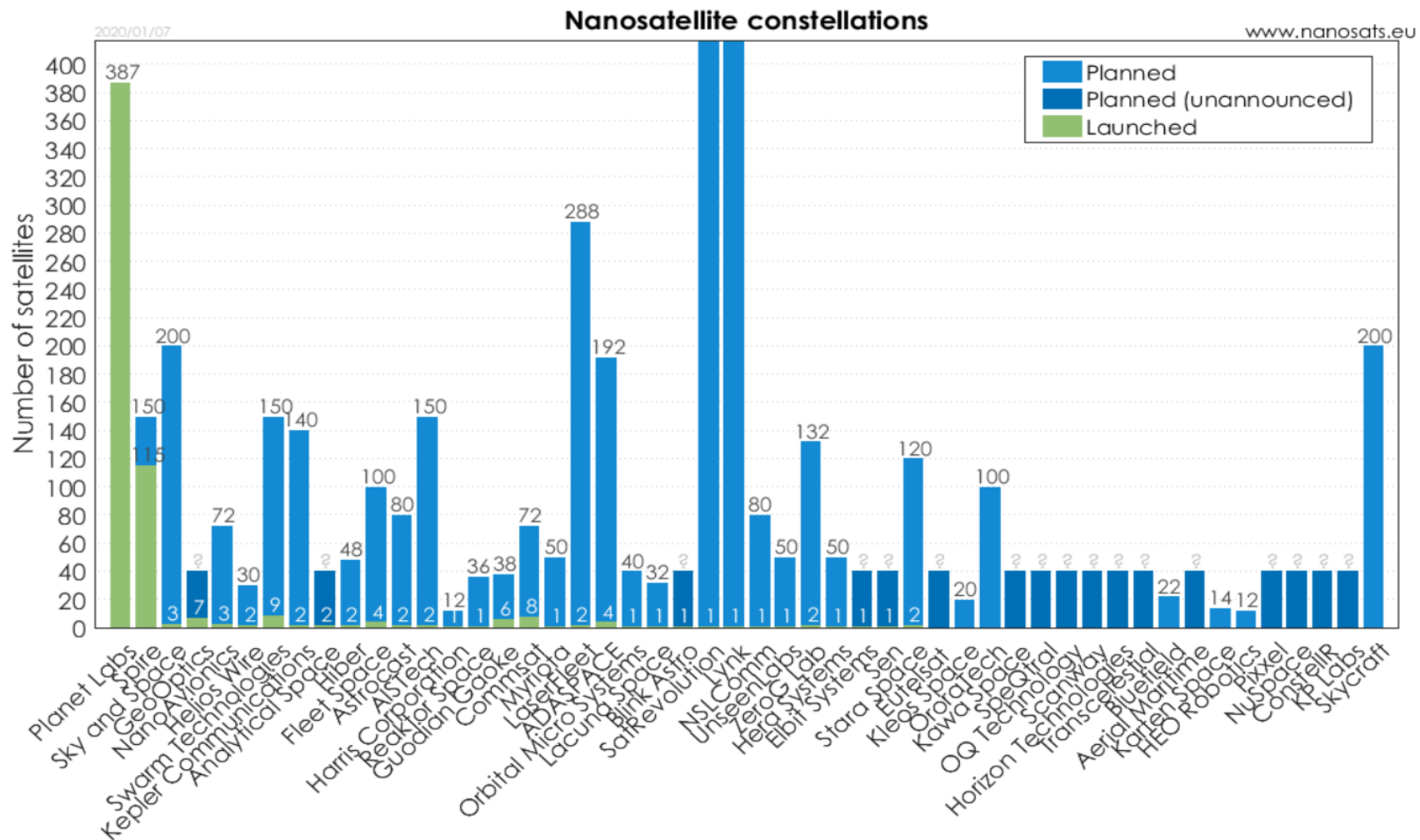


Data from www.nanosats.eu

LAUNCHED – PER YEAR

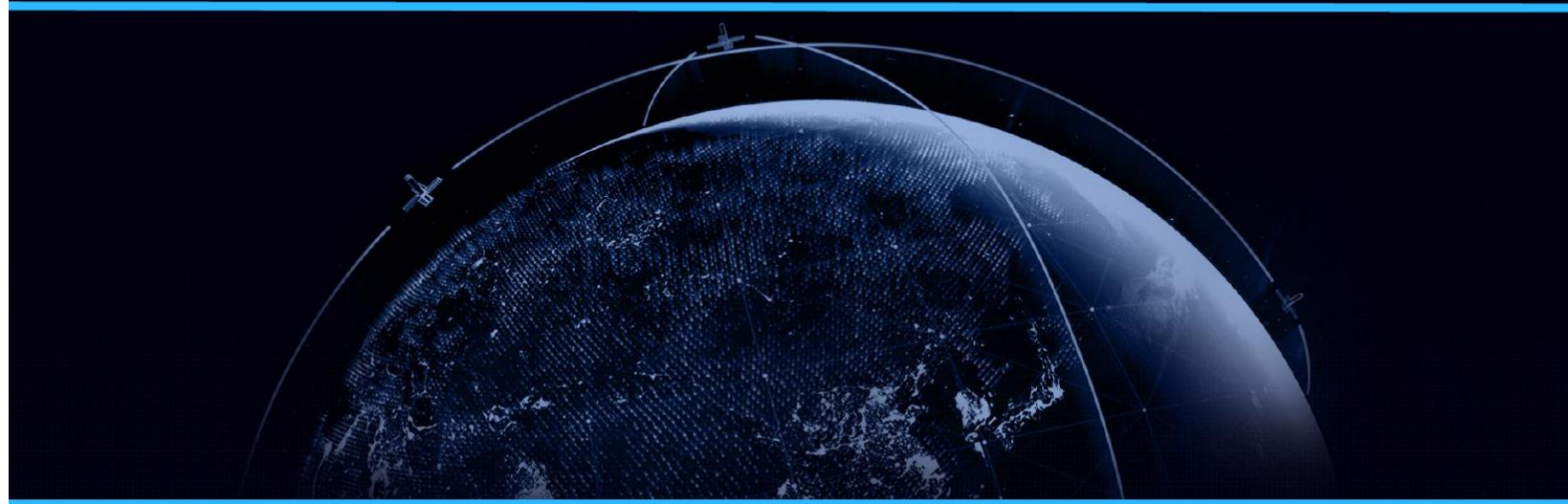


CONSTELLATIONS – LAUNCHED & PLANNED



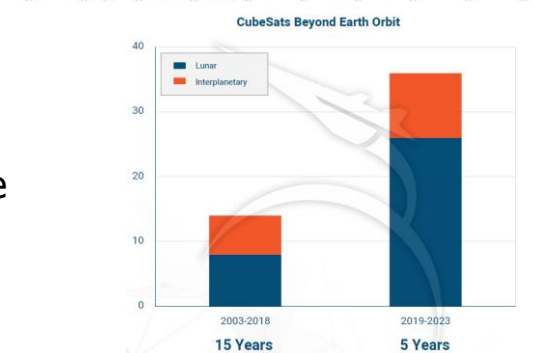
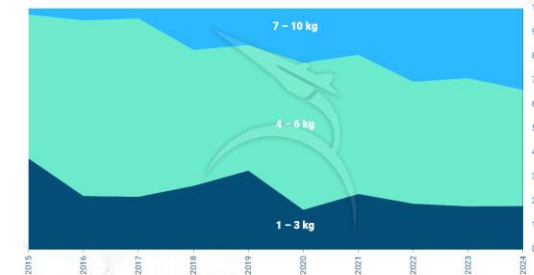
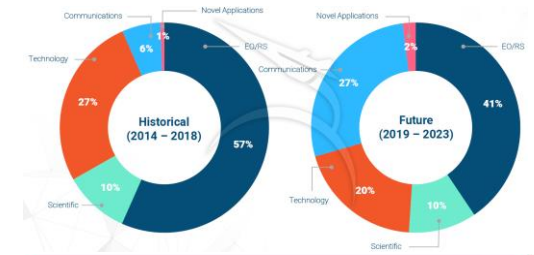
MARKET TRENDS – FROM SPACE WORKS

2020
NANO/MICROSATELLITE
MARKET FORECAST, 10TH EDITION

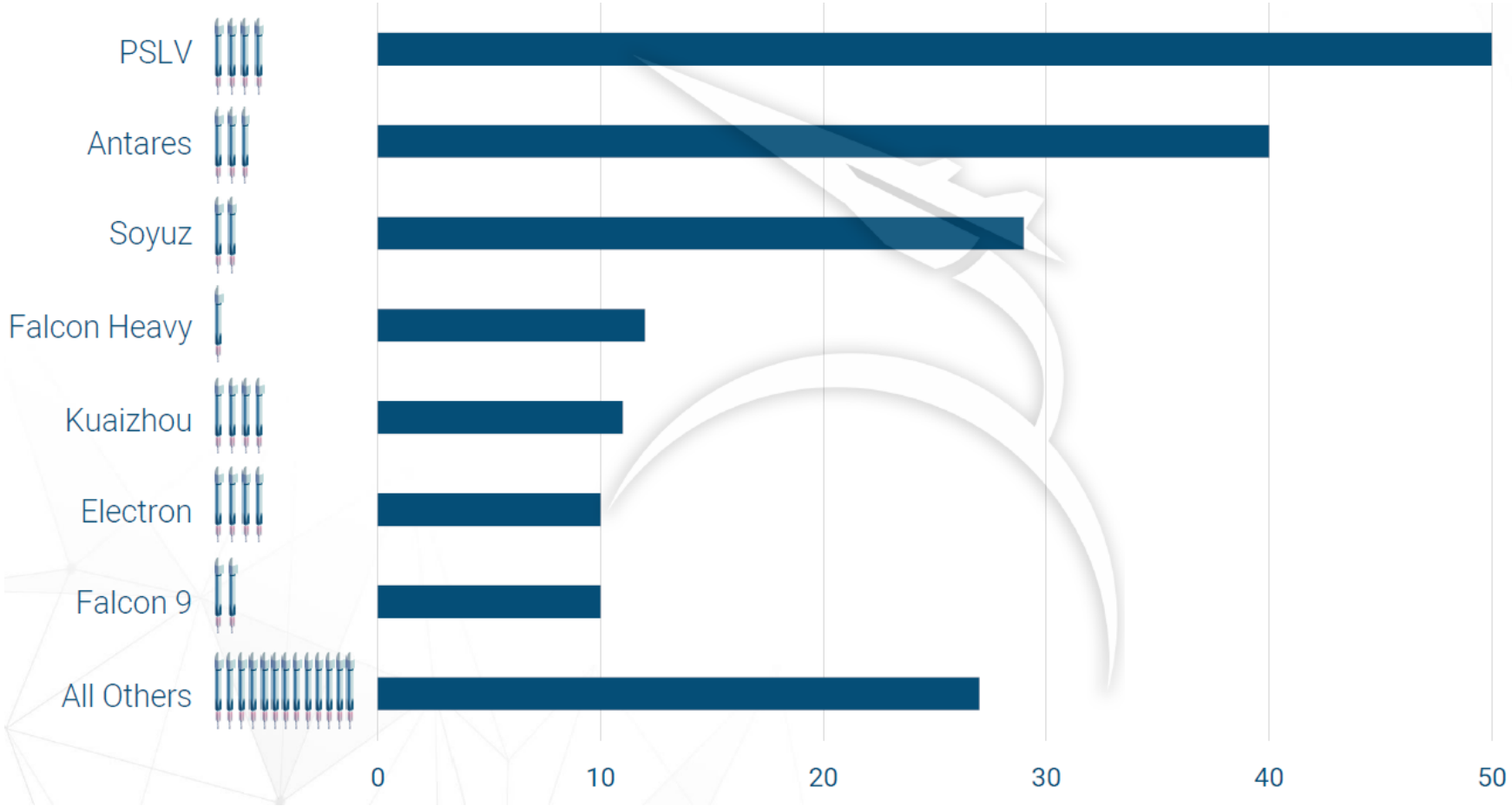


MARKET TRENDS

- Communication is the most rapidly growing application:
 - Numbers are dominated by constellations
- Platform size is growing:
 - Statistics still biased by all the 3U Doves from Planet, but a clear trend towards 6U and bigger
- Highly advanced missions:
 - Interplanetary and other advanced cubesats emerging
- Legislation:
 - De-orbit capability expected to be required in the future
 - Issues like insurance, anti-collision, redundancy, etc more important



| 2019 LAUNCHES OF NANOSATS |



THE MICROLAUNCHER COMMUNITY





*"WE HELP TEAMS ACROSS THE GLOBE
ACHIEVE THEIR GOALS IN SPACE"*

GomSpace A/S | Langagervej 6 | DK-9220 Aalborg East | Denmark
info@gomspace.com | T: +45 71 741 741

gomspace.com