Cleanspace Industry Day 2021

Autonomy and Software-Defined Distributed Architectures as Foundations for In-Orbit Servicing

Redefining space

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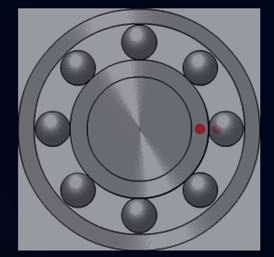
About us

Vision

to play an integral role in the collective effort of future space exploration

Mission

Make space access easy and affordable through reusable space platforms

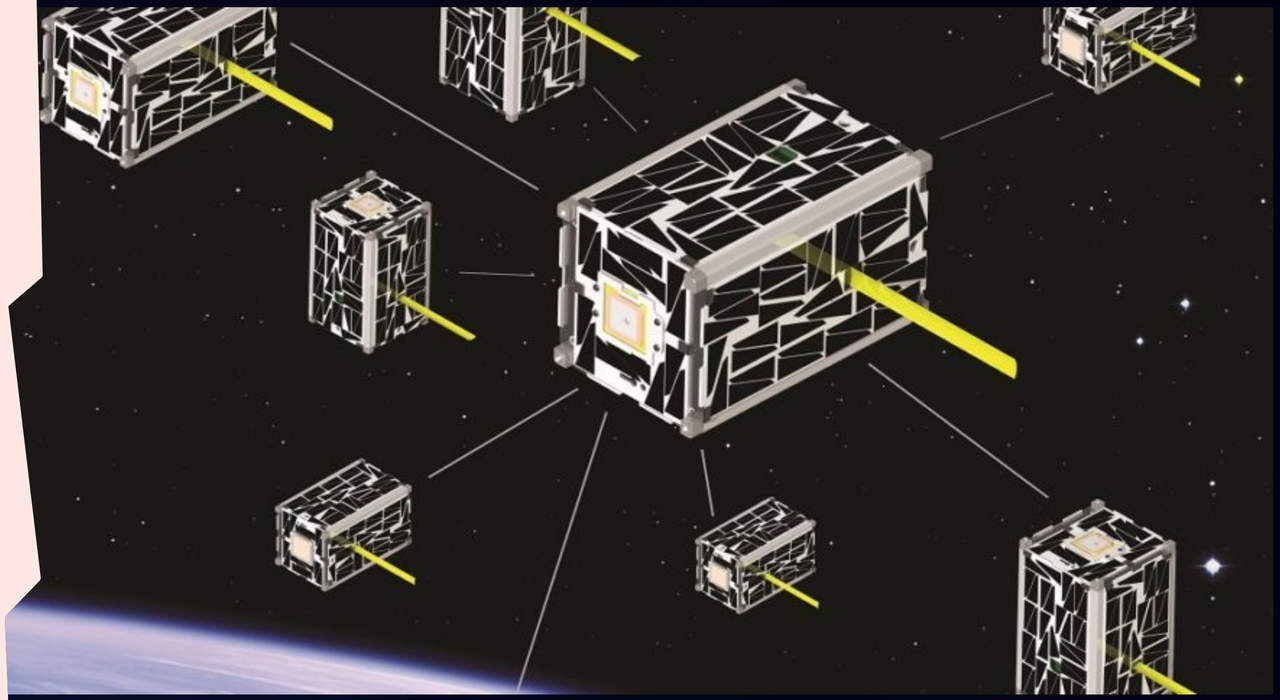


Core Beliefs

Sustainability Innovation Adaptability

ReOrbit is established in 2019, HQ in Helsinki, Finland

The two sides of space today



Classic Space

- single-use, tailormade design
- big budgets, public funds
- long timelines
- huge manpower

Newspace 1.0

- generic platforms
- low cost, low functionality
- low reliability
- limited control

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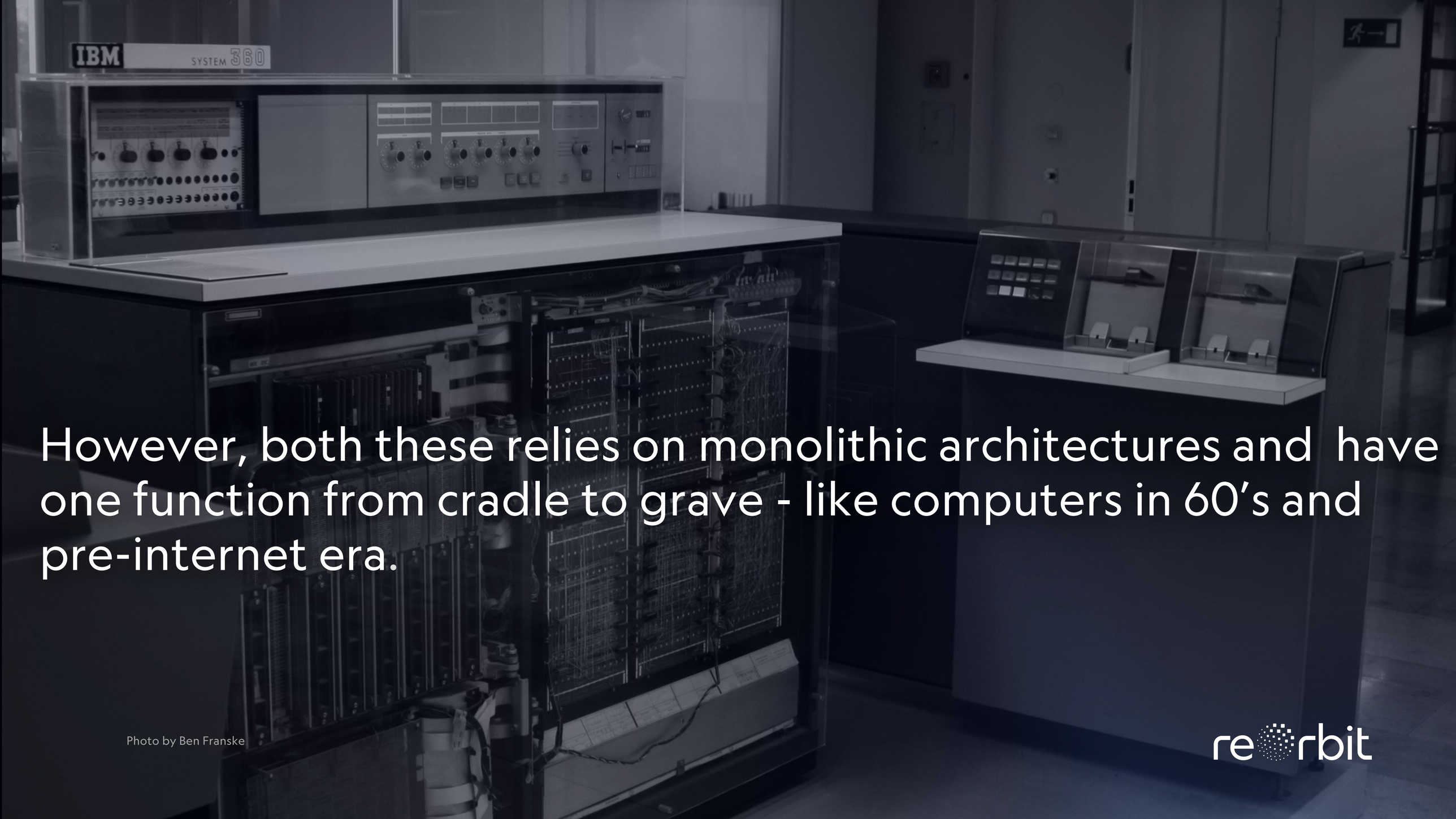

However, both these relies on monolithic architectures and have one function from cradle to grave - like computers in 60’s and pre-internet era.

Photo by Ben Franske

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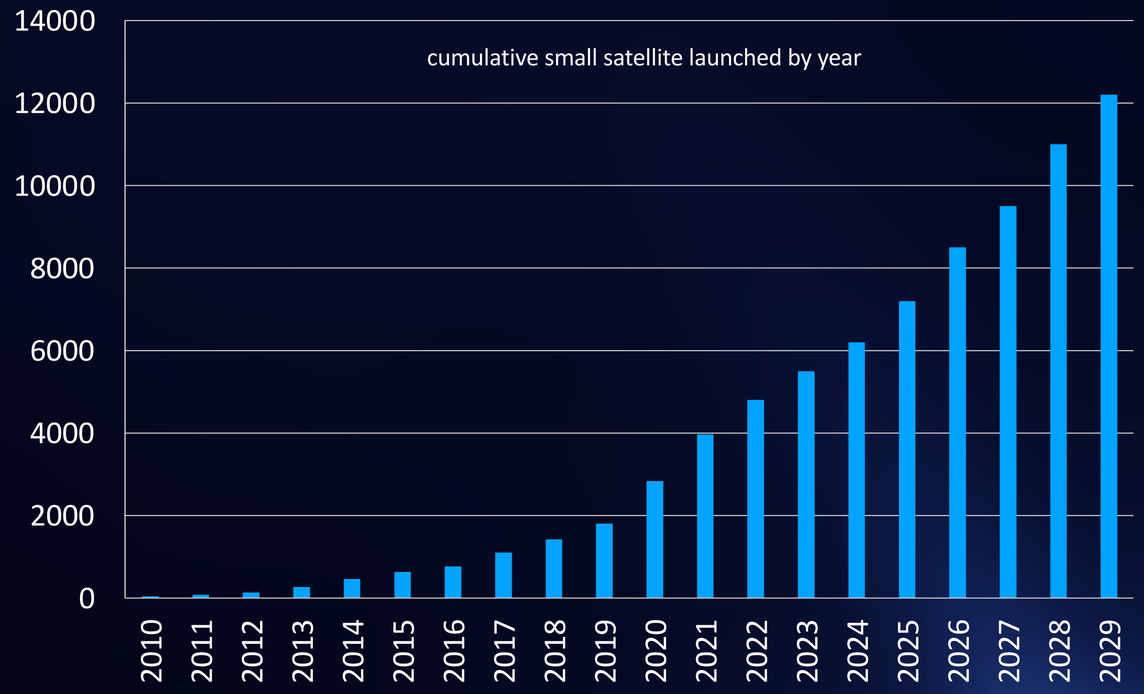
The industry is approaching a dead-end

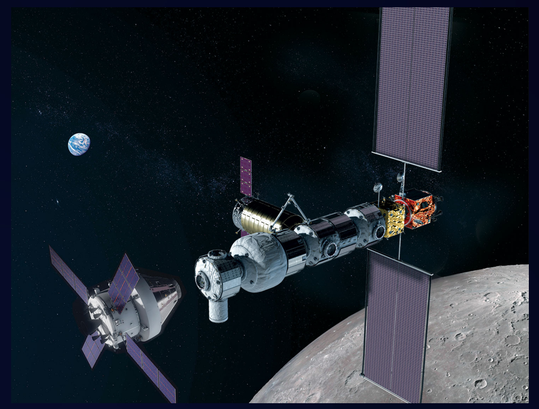
Space will not be able to realize its vision of cost-effective exploration and reliable use of orbits if one satellite = one function



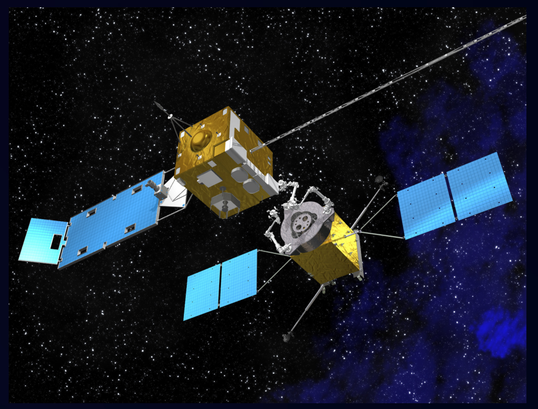
- The number of satellites is growing at a rapid pace, ~4000 functional satellites orbiting our planet.
- All these satellites have one function from cradle to grave i.e ‘functionality supersede utility’.
- Most these satellites operate in groups (constellation), yet practically all of them are loners.
- They phone home at rigidly scheduled times to report what they’ve seen.

By 2023, there will be 1000 satellites launched per year

re orbit



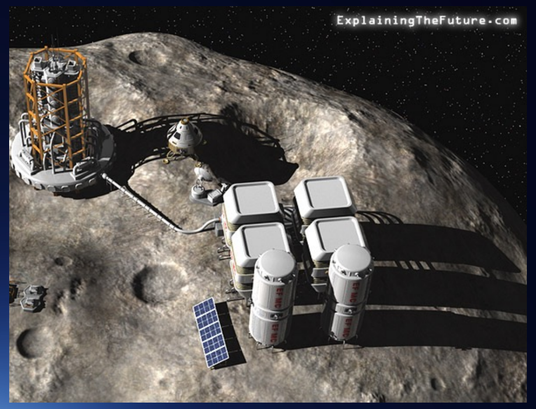
Cis-Lunar Development



Inorbit manufacturing

Current class of satellites will not take us there

Mars Exploration



Asteroid Mining

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How we solve it

With ReOrbit one satellite is no more equal to one function

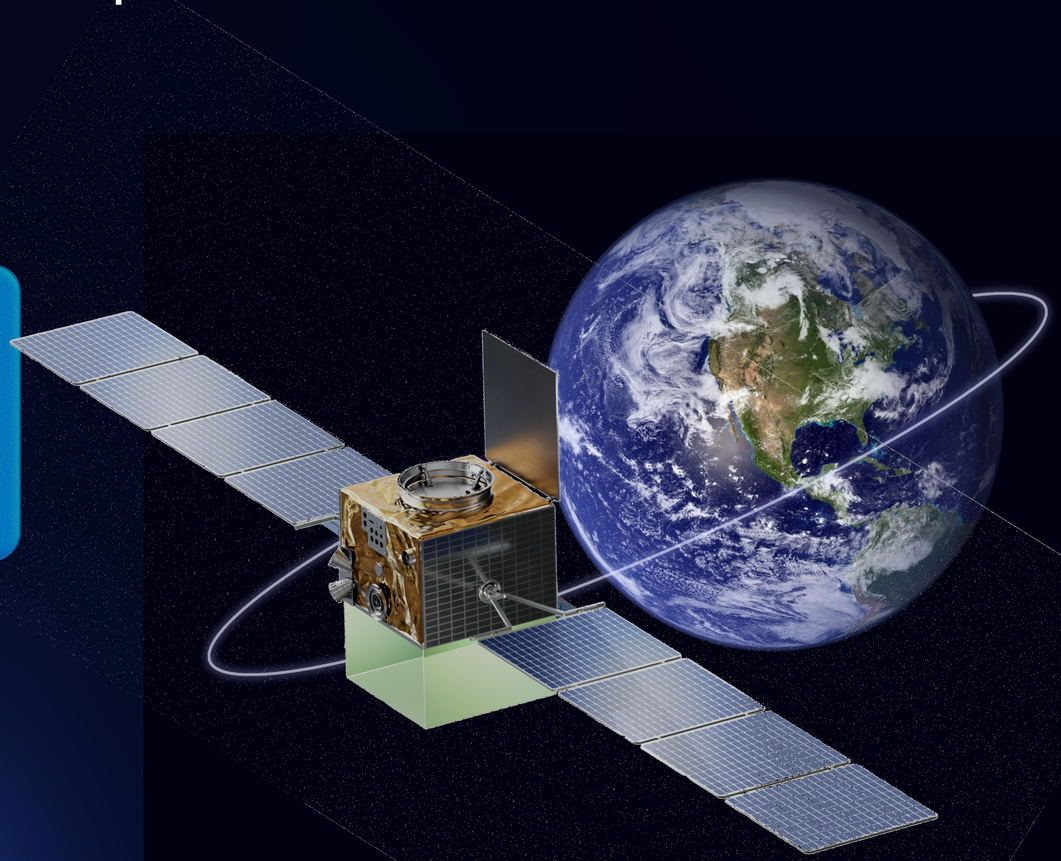
Reconfigurable

Autonomous

Fault Tolerant

Gluon-

A Software define spacecraft



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We are pioneering the Newspace 2.0 revolution

Gluon – Features:

Functionalities:

- Beyond LEO Missions (MEO, GEO and DeepSpace)
- Software-defined architecture & modular avionics
- Reconfigurable in-orbit
- Precision ADCS - Optical Communications Capable
- Modular Structure – easily reconfigurable (150-500kg wet mass)
- X-Band electronically steerable phased array

Advantages:

- High Reliability
- Rideshare-ready
- Autonomous Orbit Keeping and FDIR
- Minimal NRE
- Supports stand alone, constellation or formation flying

Contracted to performing phase B for a MEO constellation.
PDR in Q1 2022. Excpeted flight in Q2023.

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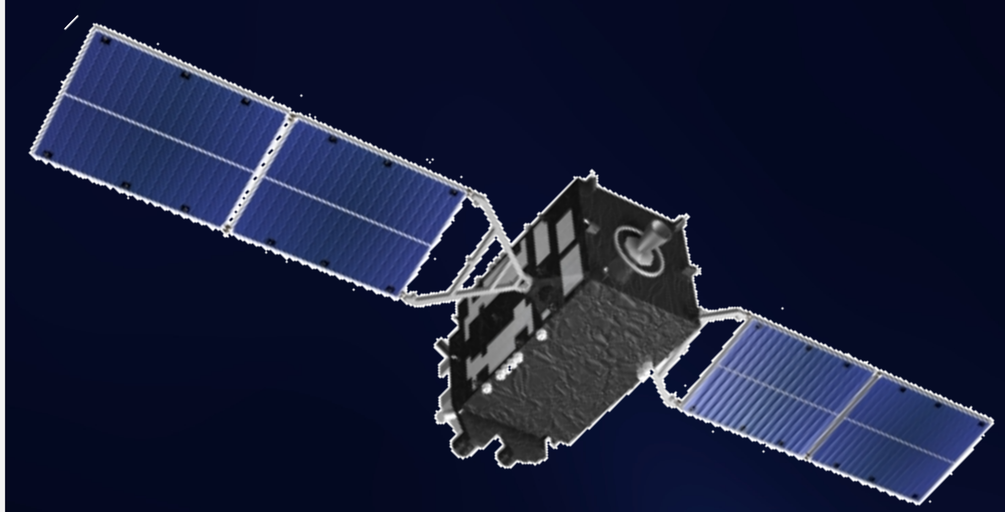
Risk Breakdown of Distributed Architecture

Size

Switching barrier, Risk, R&D cost, Time to market and Space debris



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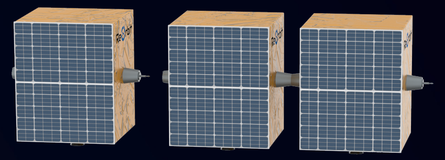
Classic Space

New Space 1.0



Gluon’s Distributed Architecture

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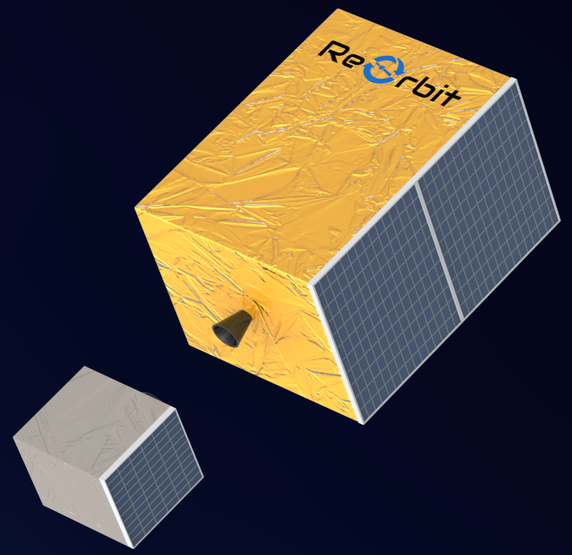
Demo ‘Ukko’ Mission - Introduction



A proof-of-concept mission with 2 Gluons to demonstrate 3 main technologies:

- in-orbit autonomy - FDIR, orbit keeping
- in-orbit servicing - rendezvous and proximity maneuvers, software reconfigurability
- distributed and networked systems - intersatellite communications, formation flying

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Demo ‘Ukko’ Mission : Con-ops

Commissioning + Early Phase

- Autonomous FDIR
- Intersatellite Communication - optical band
- Autonomous and Relative Orbit Keeping
- Relative, precise attitude determination and control

Mission Phase

- Proximity and rendezvous manoeuvres
- Docking simulation
- Formation Flying
- Communication failure scenarios

De-commissioning Phase

- re-configure onboard software
- De-orbiting

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Reusable space systems built for the modern age

Sting

Incubate in the STING, which is one of the Europe's best incubators, within the deep-tech program.

icebreaker

Pre-Seed investment lead by Icebreaker VC

NORDIC STARTUP AWARDS

Winner of the Best Newcomer of the year 2020 in Finland by the Nordic startup award

FIT4 START

One of the 5 selected startup with the space segment by Fit4Start accelerator at Luxembourg.

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