



**D-ORBIT**  
NEW SPACE SOLUTIONS

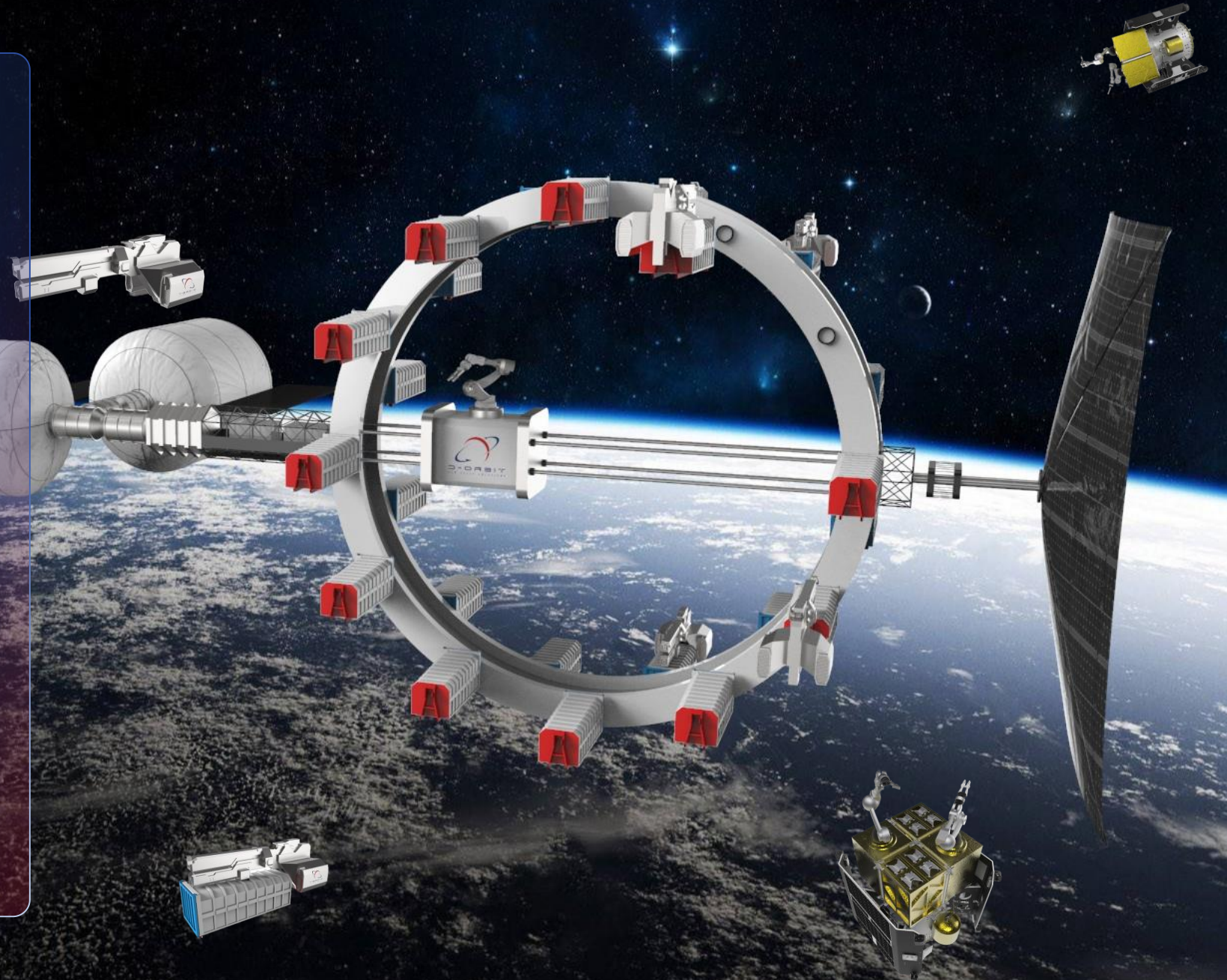
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**D- ORBIT SPACE SERVICING AND LOGISTICS  
INFRASTRUCTURE**

21 Sep 2021- ESA Clean Space Industry Days

# Our Vision

Creating the first space logistics infrastructure to enable the trillion dollar space economy and human expansion in sustainable space



# D-ORBIT'S in A GLANCE

135 people (and growing)

## D-ORBIT UK

ION Advanced Services  
Harwell, UK

## D-ORBIT

Headquarters

Production venue, mission control  
(2,500m<sup>2</sup>)

## D-ORBIT USA

Commercial subsidiary,  
Washington DC

## D-ORBIT PT

Critical software and AURORA mission control software,  
Lisbon, Portugal



# D-ORBIT'S BUSINESS

LEADER IN SPACE TRANSPORTATION MARKET – MOVING TOWARDS IN-ORBIT SERVICING

2021  
TODAY

## LAST-MILE DELIVERY SOLUTION FOR SATELLITES



- World's first in-space last mile delivery service, proven in space with paying customers
- Provides correctly spaced satellite delivery; orbital plane changing; and orbit raising
- Building block to enable future in-orbit services tomorrow

2021  
TODAY

## ADDITIONAL SERVICES: IN-ORBIT SERVICES



- The second life of ION: there are a range of Advanced Services D-ORBIT can provide with IONs in-orbit:
  - In-orbit validation & demonstration
  - Backup satellite service to a constellation
  - Payload hosting and satellite as-a-service
  - Satellite communication hub services

2021-2026  
TOMORROW

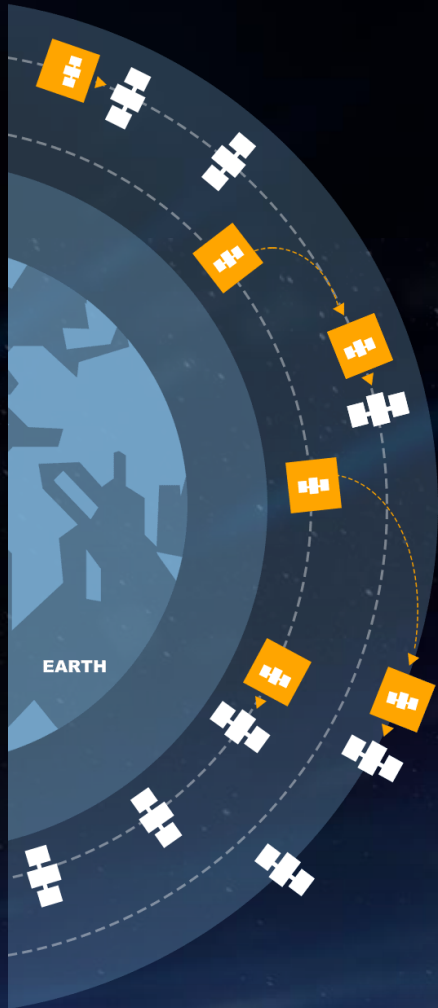
## IN-ORBIT SERVICING



- The combination of existing technology, the scalability of the ION platform and advanced robotics will enable D-ORBIT to provide in-orbit servicing to satellite operators
- In-orbit Servicing includes: Extending the life of satellites; moving satellites to new orbits; and end of life disposal of satellites

# OUR BUSINESS

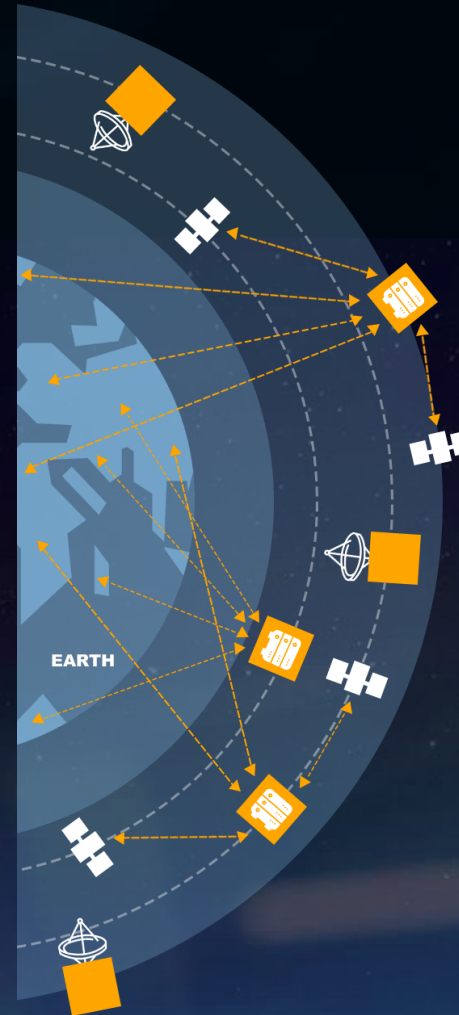
D-ORBIT CAPABILITIES TODAY



## SATELLITE TRANSPORTATION

Optimizing satellite transportation:

- Fast dispersion
- Phasing
- Orbit raising
- Plane change
- In-Orbit Servicing



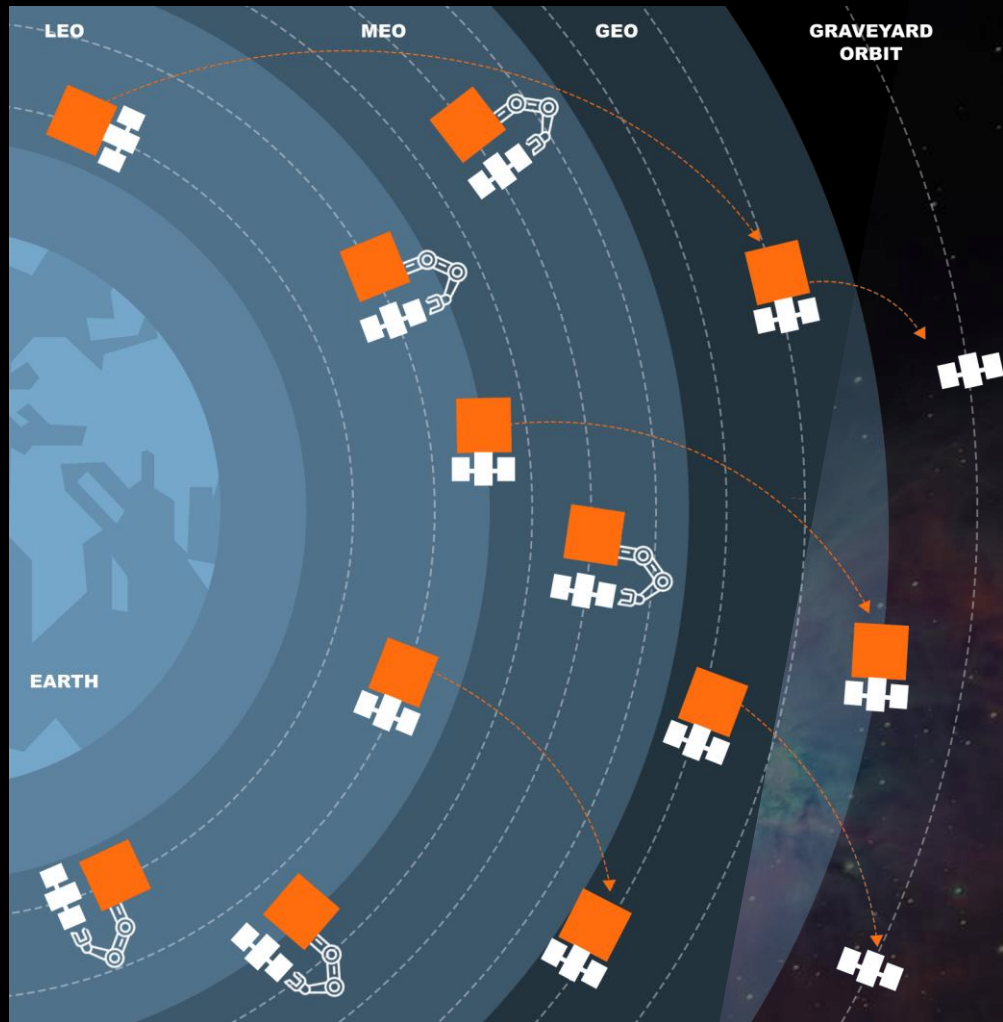
## ADVANCED SERVICES

Optimizing satellite operations:

- Data Center / Edge computing
- Fast validation of hosted payloads
- Satellite for rent
- Constellations gap filler
- In-orbit satellite storage
- Data relay network

# OUR BUSINESS

IN THE SHORT TERM



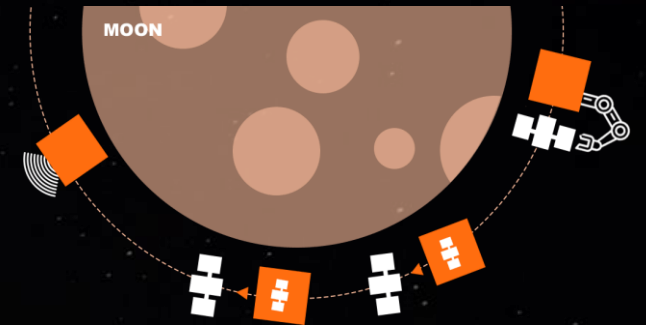
## IN-ORBIT SERVICING LEO to GEO

Optimizing satellite revenues:

- Life Extension
- Orbit-Orbit
- LEO/GTO to GEO transportation
- Inspection
- End-of-Life / Disposal

## RESCUE and EMERGENCY MISSIONS

Support and rescue  
stranded or lost satellites



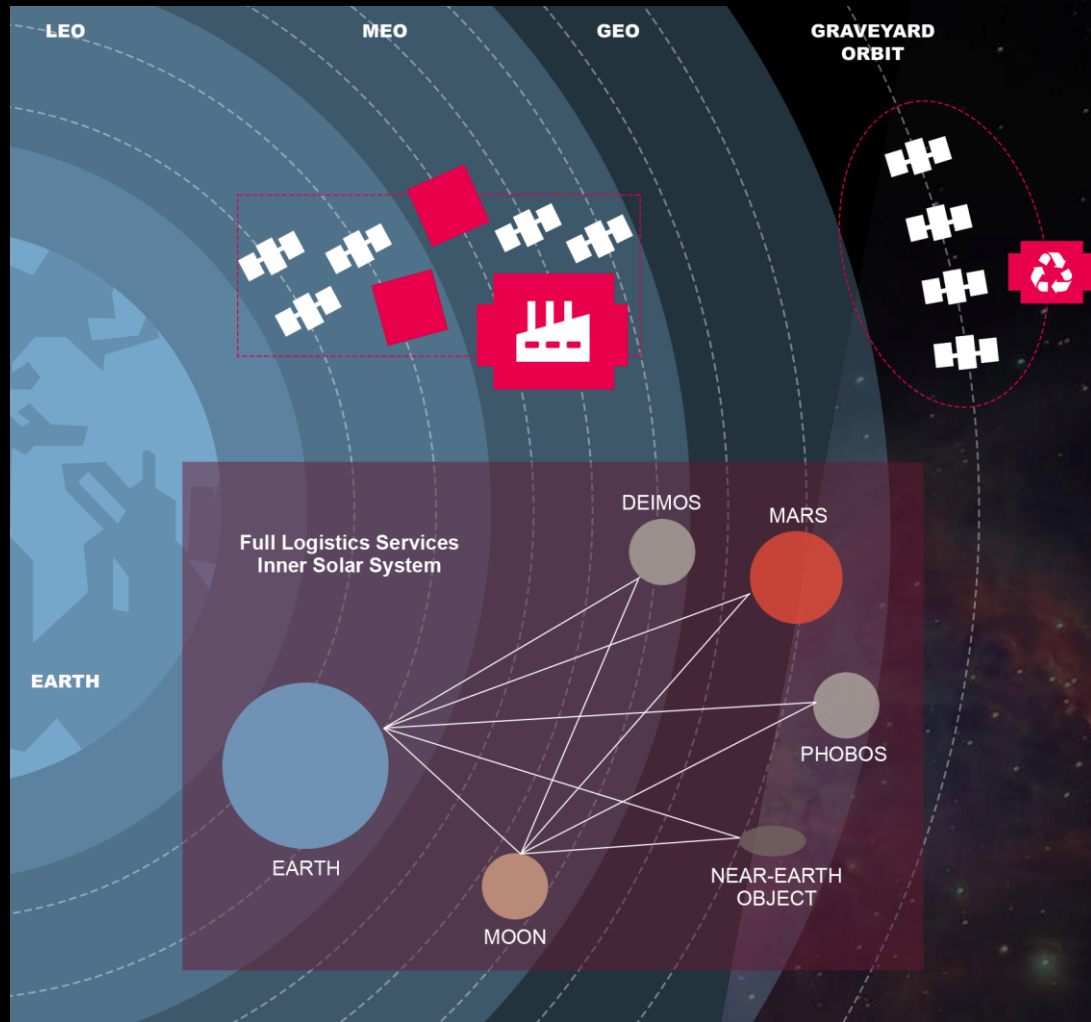
## MOON-BASED LOGISTICS

Support incoming Moon  
Exploration missions:

- Lunar satellite constellations transportation and maintenance (IOS)
- Advanced Services
- Connect Moon with Earth

# OUR BUSINESS

IN THE LONGER TERM



**SATELLITE RECYLING and IN-ORBIT MANUFACTURING (MEDIUM TERM)**

Optimizing satellite and cargo performances, reduce costs, accelerate expansion



**FULL LOGISTICS, INNER SOLAR SYSTEM (LONG TERM)**

**ASTEROID MINING (LONG TERM)**

Recurrent cargo lines connecting Earth, Moon, Mars and the Asteroid Belt:

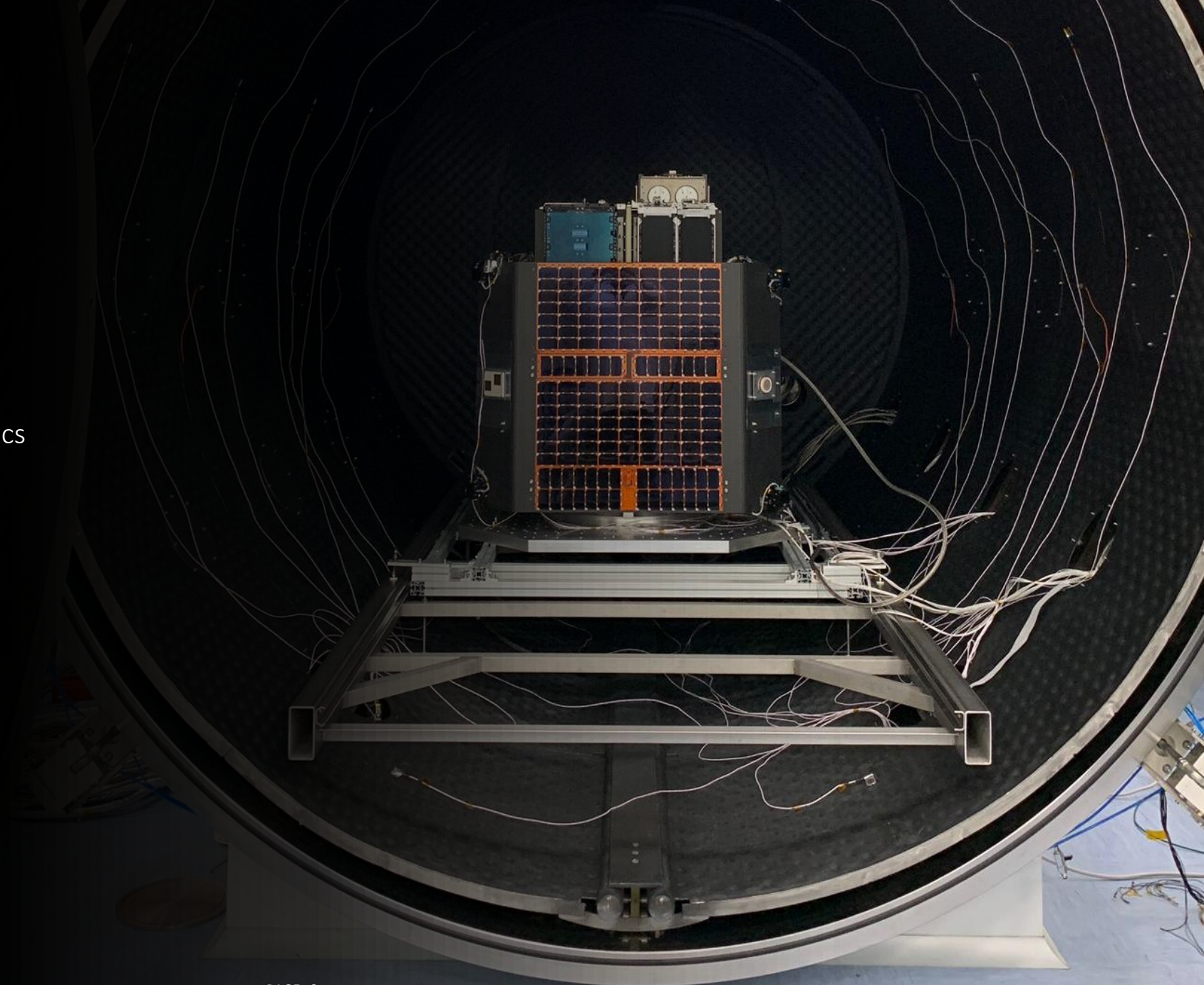
Raw material for the Circular Space Economy

- Colonies Supply delivery
- Space Tourism
- Raw material transportation from the asteroid belt, Mars and Moon



# ION Space Carrier Vessel

A Fundamental Step into Servicing and Logistics

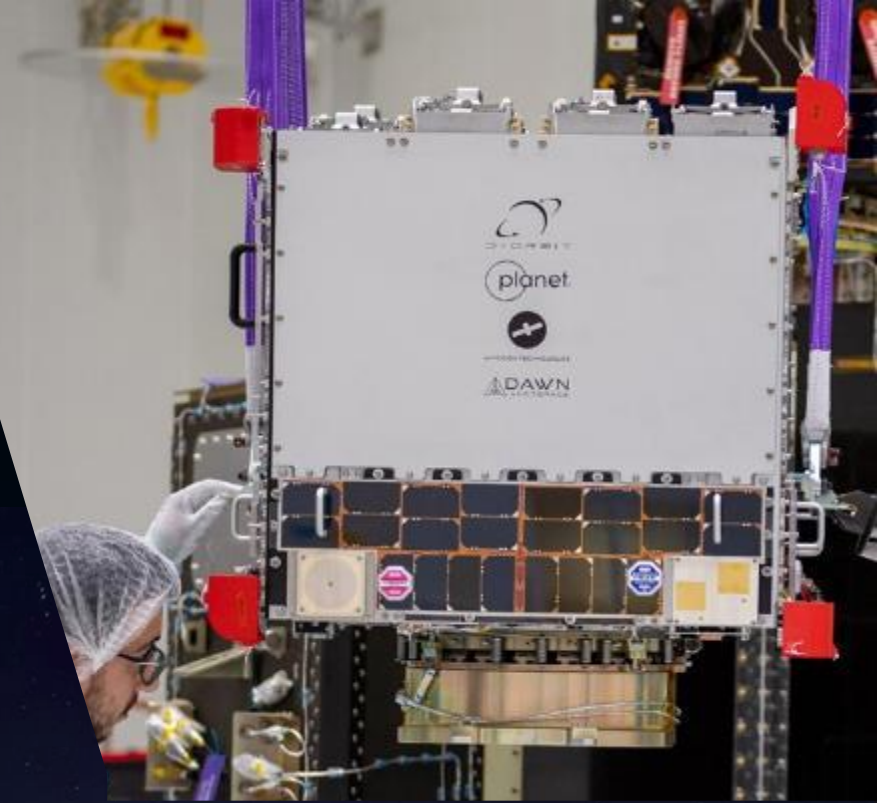




# FAST SAT DELIVERY

D-ORBIT ION SATELLITE CARRIER

A space “cargo” satellite capable of transporting satellites into the right orbit and into the right place in space



ION aggregates multiple Payloads



Integrated and launched in large rocket



Each Payload precisely released into its target orbit



Payloads in position and ready to operate in few weeks!

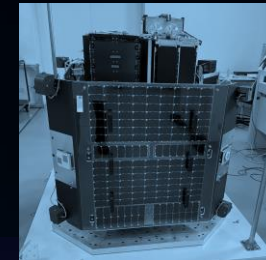
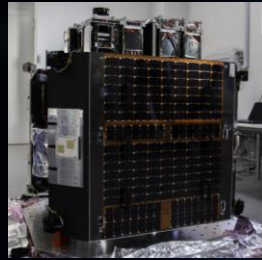
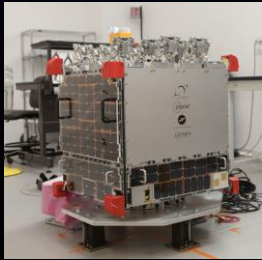


Multiple orbits in the same mission!



# ION SWIFT (R)EVOLUTION

Three Missions in Nine Months and a Growing Degree of Complexity



## FIRST MISSION

Mission Name: **ORIGIN**  
Carrier Name: **ION SCV 001 Lucas**  
Date: **September 2020**  
Status: **Ended successfully in Oct.'20**

Launch site: Guyana Space Center  
Launcher: Vega  
Mission: SSMS POC Flight

Satellites onboard: 12  
Client: Planet Labs

**Validation in space of AURORA,**  
D-Orbit's proprietary cloud-based  
mission control software.

## SECOND MISSION

Mission Name: **PULSE**  
Carrier Name: **ION SCV 002 Laurentius**  
Date: **January 2021**  
Status: **Ongoing**

Launch site: Cape Canaveral  
Launcher: SpaceX  
Mission: Transporter-1

Satellites onboard: 20  
Clients: Planet Labs and one  
undisclosed US customer

Hosted payloads onboard: 2  
Clients: EICAS Automazione, IAC

**Validation in space of ION  
Hosted Payload Service,** D-  
Orbit's innovative plug-and-play  
technology for in-orbit  
experiments

## THIRD MISSION

Mission Name: **WILD RIDE**  
Carrier Name: **ION SCV 003 Dauntless David**  
Date: **June 2021**  
Status: **Ongoing**

Launch site: Cape Canaveral  
Launcher: SpaceX  
Mission: Transporter-2

Satellites onboard: 9  
Clients: Deimos Space, Endurosat, Orbital  
Space, ISISPACE, Reaktor Space Lab,  
Marshall Intech Technologies, Royal Thai  
Airforce.

Hosted payloads onboard: 3  
Clients: Stellar Project, Unibap, HPS

**Testing of Nebula,** an on-demand,  
on-orbit cloud computing and data  
storage service at the core of D-  
Orbit's future services

## FOURTH MISSION

Mission Name: **DASHING THROUGH THE STARS**  
Carrier Name: **ION SCV 004 Elysian Eleonora**  
Date: **December 2021**  
Status: **Waiting to launch**

Launch site: Cape Canaveral  
Launcher: SpaceX  
Mission: Transporter-3

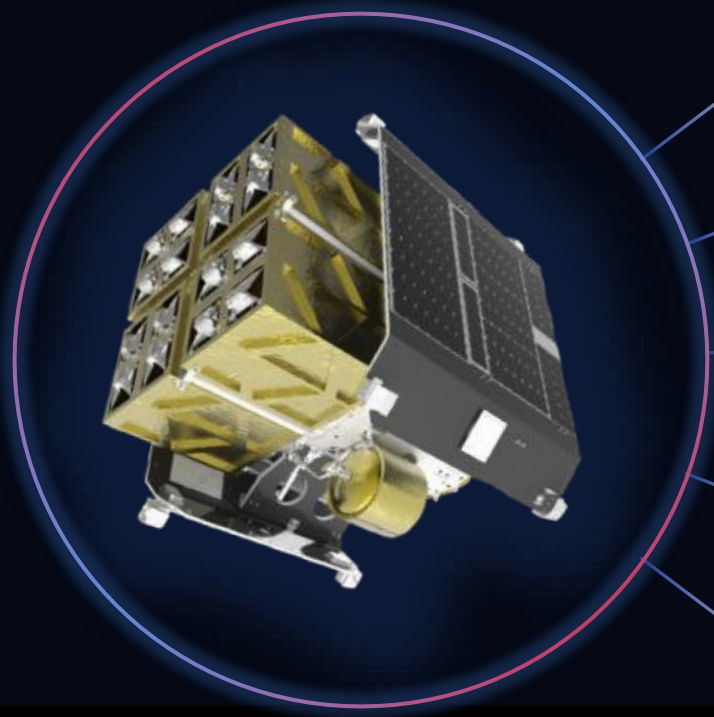
Satellites onboard: Not-disclosable yet  
Clients: Not-disclosable yet

Hosted payloads onboard: Not-disclosable yet  
Clients: Not-disclosable yet



# ION SATELLITE CARRIER

SATELLITE LAST-MILE DELIVERY SOLUTION



01



## FASTER TIME-TO-OPERATIONS

Fast positioning in target orbit

02



## LAUNCH COST REDUCTION

Deploy constellation in multiple orbits on a single mission

03



## FASTER TIME-TO-SPACE

Ride on the first available launcher

04



## REDUCTION IN NUMBER OF SATELLITES

ION replenishes constellations faster so there is less need for spare satellites

05



## LOWER MANUFACTURING COST

Reduced need for propulsion decreases costs

Up to **85%<sup>1</sup>**

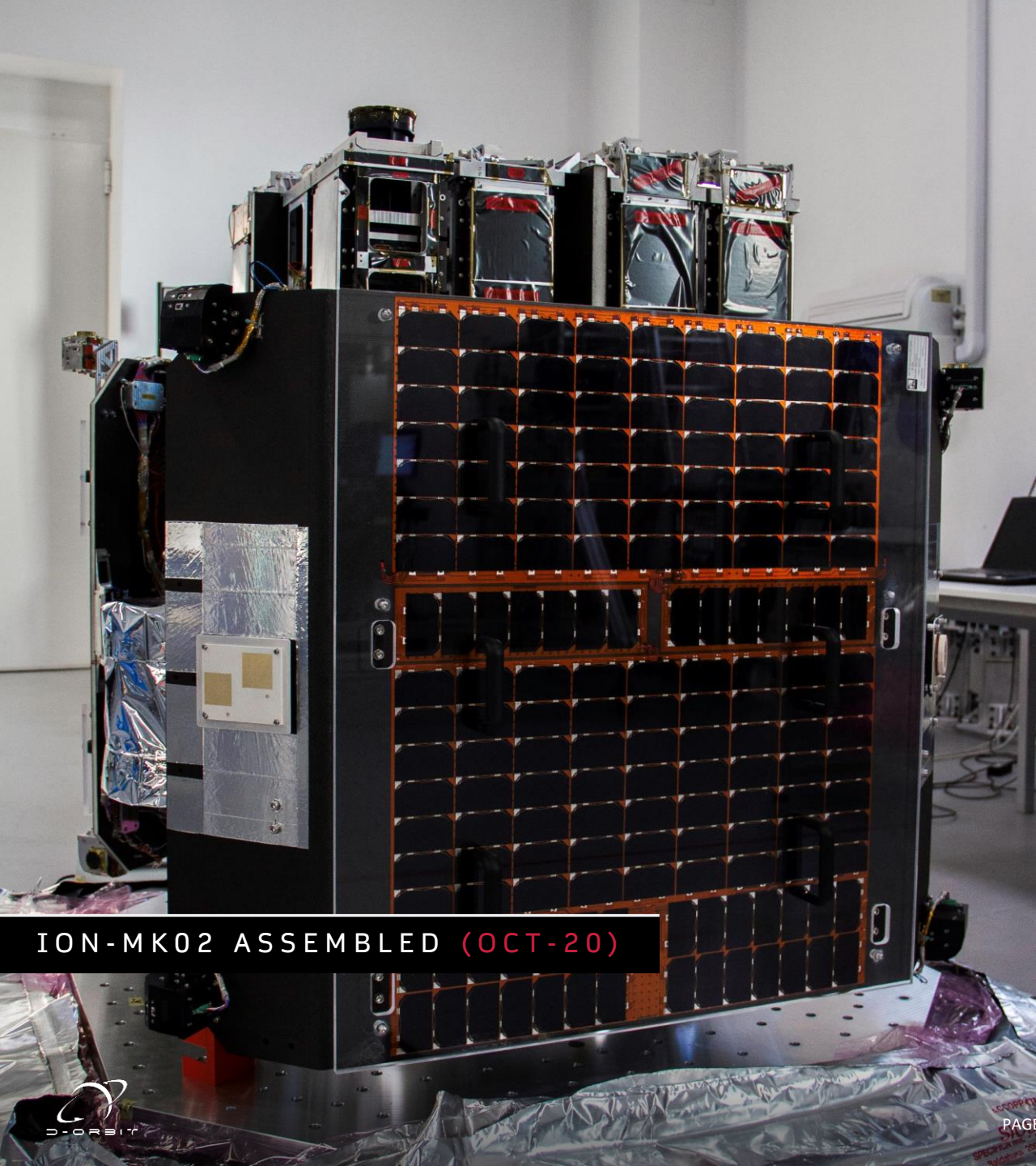
Time reduction from launch to operations

Up to **40%<sup>1</sup>**

Lower cost for constellation deployment



<sup>1</sup> Management assessment based on data from existing customers



ION-MK02 ASSEMBLED (OCT-20)

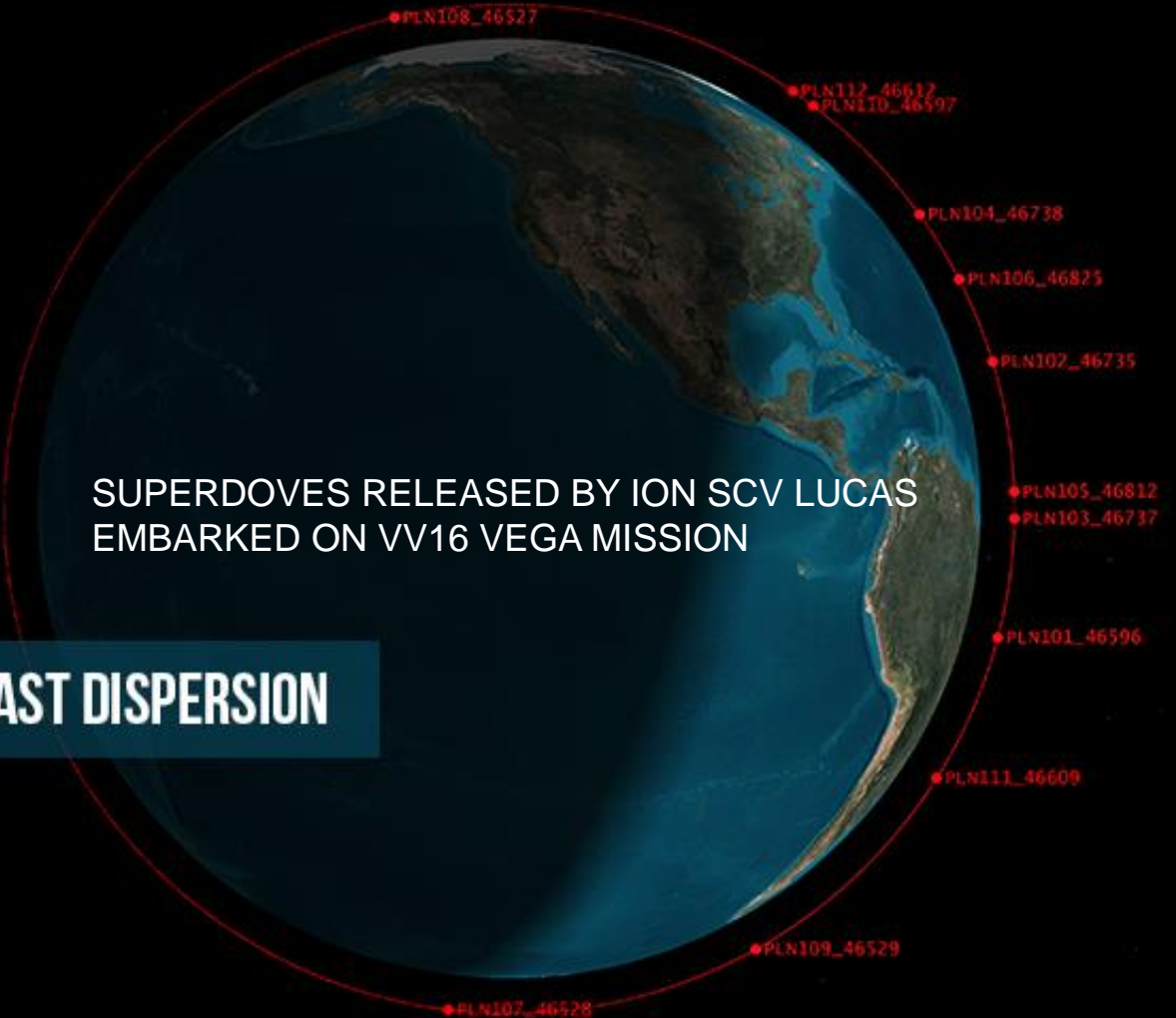


D-SENSE ON ION-MK02 (DETAIL)

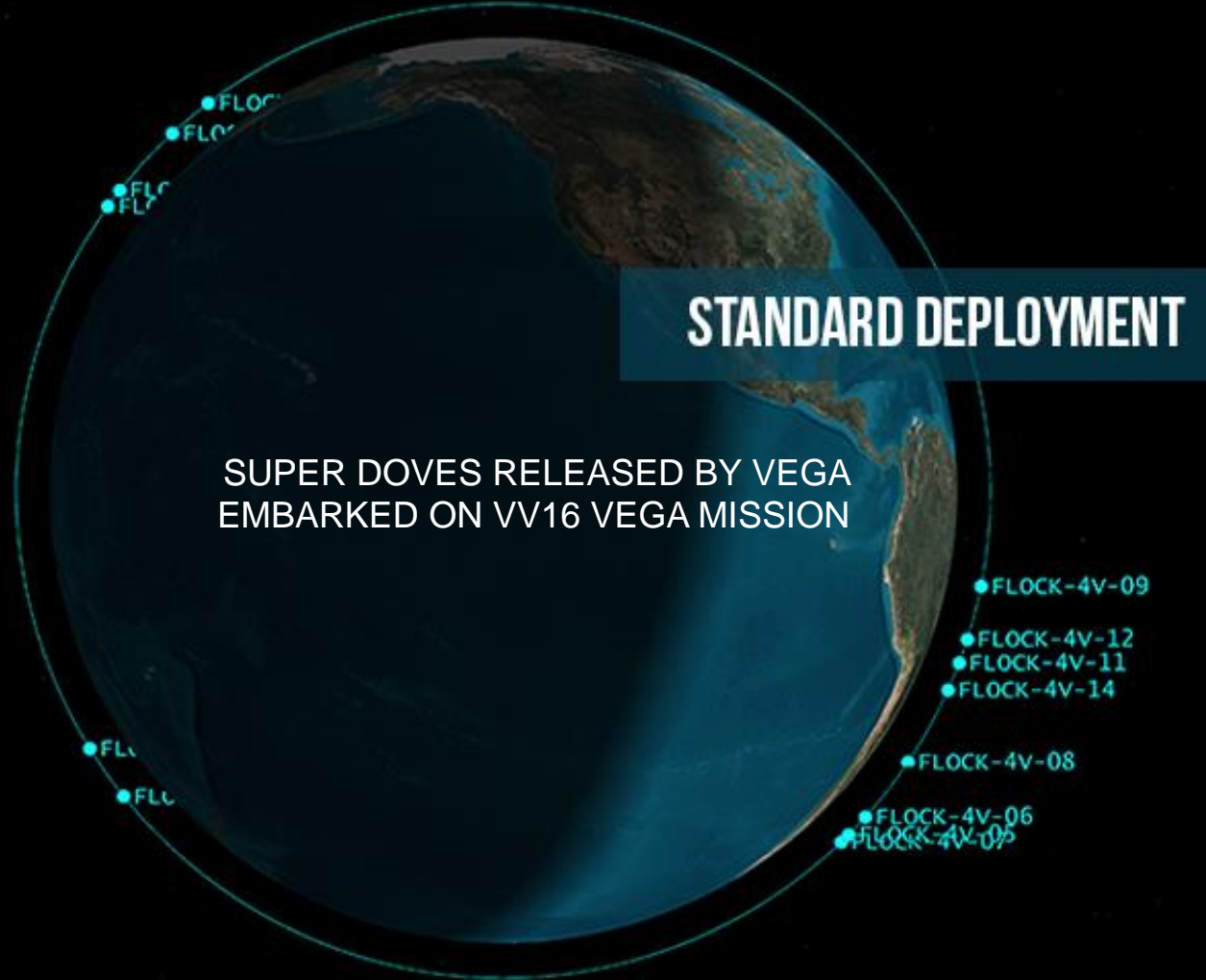
Customer's  
satellite  
deployed by  
ION  
SATELLITE  
CARRIER  
in the right  
position  
in orbit



# Fast Dispersion vs Standard Deployment



Earth Inertial Axes  
2 Nov 2020 12:49:13.516 Real time offset: 0.00 sec



Earth Inertial Axes  
2 Nov 2020 13:18:13.661 Real time offset: 0.00 sec

# ION ADVANCED SERVICES

## THE SECOND LIFE OF ION



### IN-ORBIT VALIDATION AND DEMONSTRATION

- Enabling experiments and the testing of equipment in space
- Make innovative technology flight proven in space and ready for market in a few months



### BACKUP SATELLITE FOR AN EXISTING CONSTELLATION

- ION can be rented as a last constellation satellite after deployment
- ION as an orbital satellite “warehouse” for rent



### INTEGRATING SATELLITE SERVICES VIA PAYLOADS HOSTED ON ION

- Cameras, antennas, sensors, Earth observation equipment
- With 21 ION units already in orbit by 2023, constellations can be offered ‘as-a-service’



### SATELLITE COMMUNICATION HUB SERVICES

- Interlink services
- AI data processing
- IoT communications equipment

This offering will grow as a function of ION launches in the years to come  
ION is the building block for **space infrastructure** to deliver services to customers today, and to enable future products and services tomorrow

# IN-ORBIT SERVICING

ENABLING TARGETED OBSERVATIONS

The combination of **existing D-ORBIT technology**, the scalability of the **ION platform** and **advanced robotics** will enable D-ORBIT to provide in-orbit servicing to satellite operators



SCALABLE AND MODULAR



IN-ORBIT SERVICING  
ACTIVE DEBRIS REMOVAL

<p>TRANSPORTATION</p>	<p>REFUELING</p>	<p>PHASING</p>
<p>MAINTENANCE</p>	<p>EMERGENCY</p>	<p>DISPOSAL</p>

01

Move existing satellites from one orbit to another new orbit

03

Rescue satellites launched or drifting to the wrong orbit

02

Extend the life of satellites

04

Dispose of satellites properly at the end of their life (active debris removal)



# GROUP IN-HOUSE TECHNOLOGIES

READY TO PROVIDE IN-ORBIT SERVICING

Technology developed in-house since 2011 and **proven in space** provides the foundation for current and future services

## D-SENSE

Multi-sensor for AOCS, satellite tracking and rendez-vous

**PROVEN IN SPACE:**

**ION Origin mission (2020)**



## IA-CORE

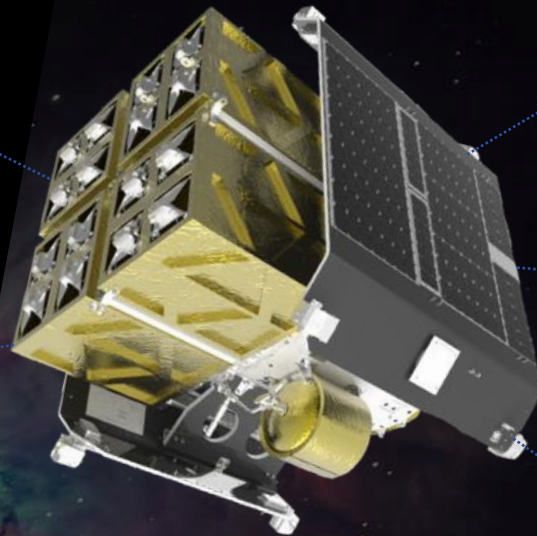
Advanced distributed computer, for future AI applications

**PROVEN IN SPACE:**

**ION Origin mission (2020)**

**D-ORBIT'S** **incremental products & services development approach** leads to a more sustainable growth, by generating revenues in adjacent markets and scaling gradually to a full-service solution.

# ION



## D3

Decommissioning system for satellites

**PROVEN IN SPACE:**

**Alice-2 mission (2013)**

**D-Sat mission (2017)**



## D-SAT

First satellite-as-a-service Space proven hardware incorporated into ION

**PROVEN IN SPACE:**

**D-Sat mission (2017)**



## AURORA

Mission control software for the deployment and management of constellations

**PROVEN IN SPACE:**

**D-Sat mission (2017)**

**ION Origin mission (2020)**

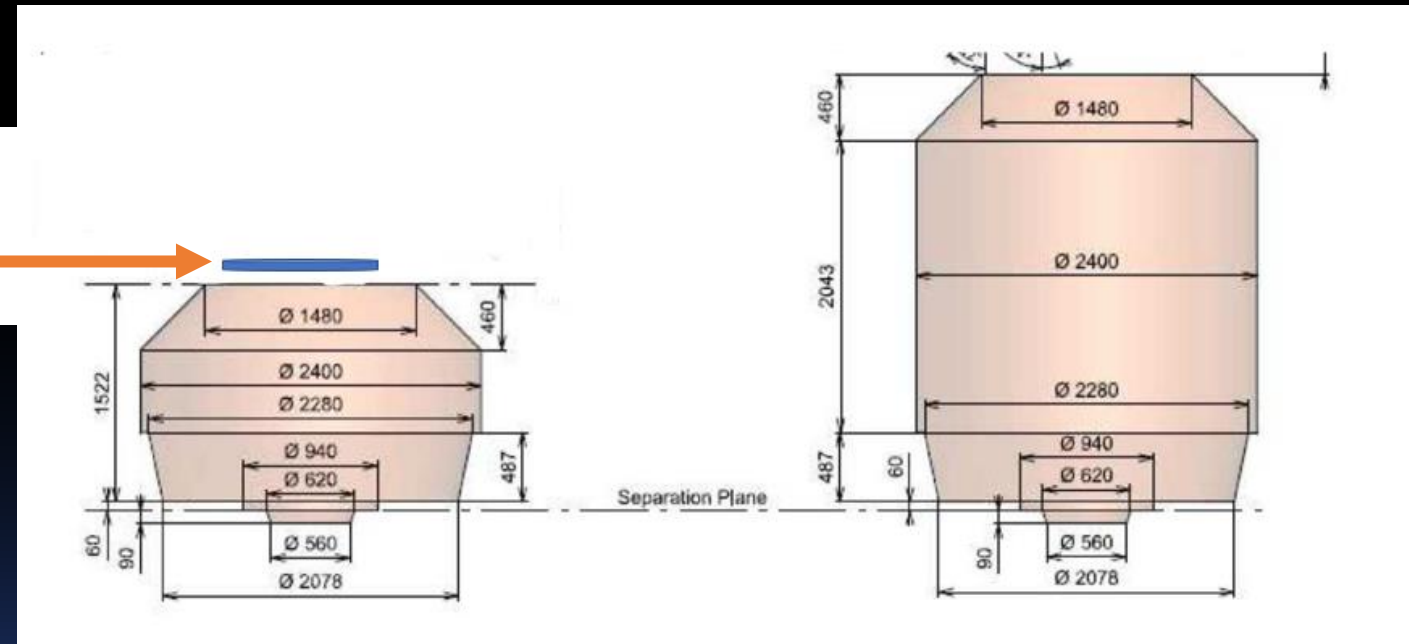
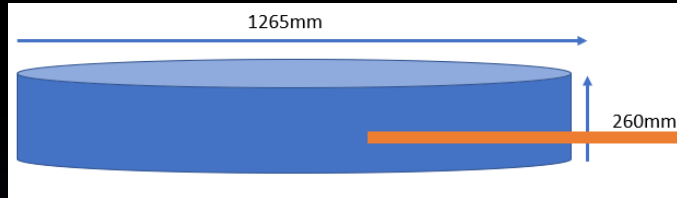


# IN-ORBIT SERVICING

## Deorbiting-Kit (aka D3)

D-Orbit UK awarded of developing a Autonomous Deorbiting Kit System for Future LEO Missions (more details on Thursday at 12 noon – presentation by Diego Garces de Marcilla)

- To be installed on satellites and space infrastructure before launch to assure a safe deorbiting at EOL
- Future developments to make the system suitable for being installed in space on existing space assets to provide services such as:
  - Orbital Relocation
  - Life Extension
  - Removal at EOL



# CIRCULAR ECONOMY IN SPACE

ENABLING AN EFFICIENT AND WASTELESS USE OF "RESOURCE SPACE"





**D - O R B I T**  
*N E W   S P A C E   S O L U T I O N S*