

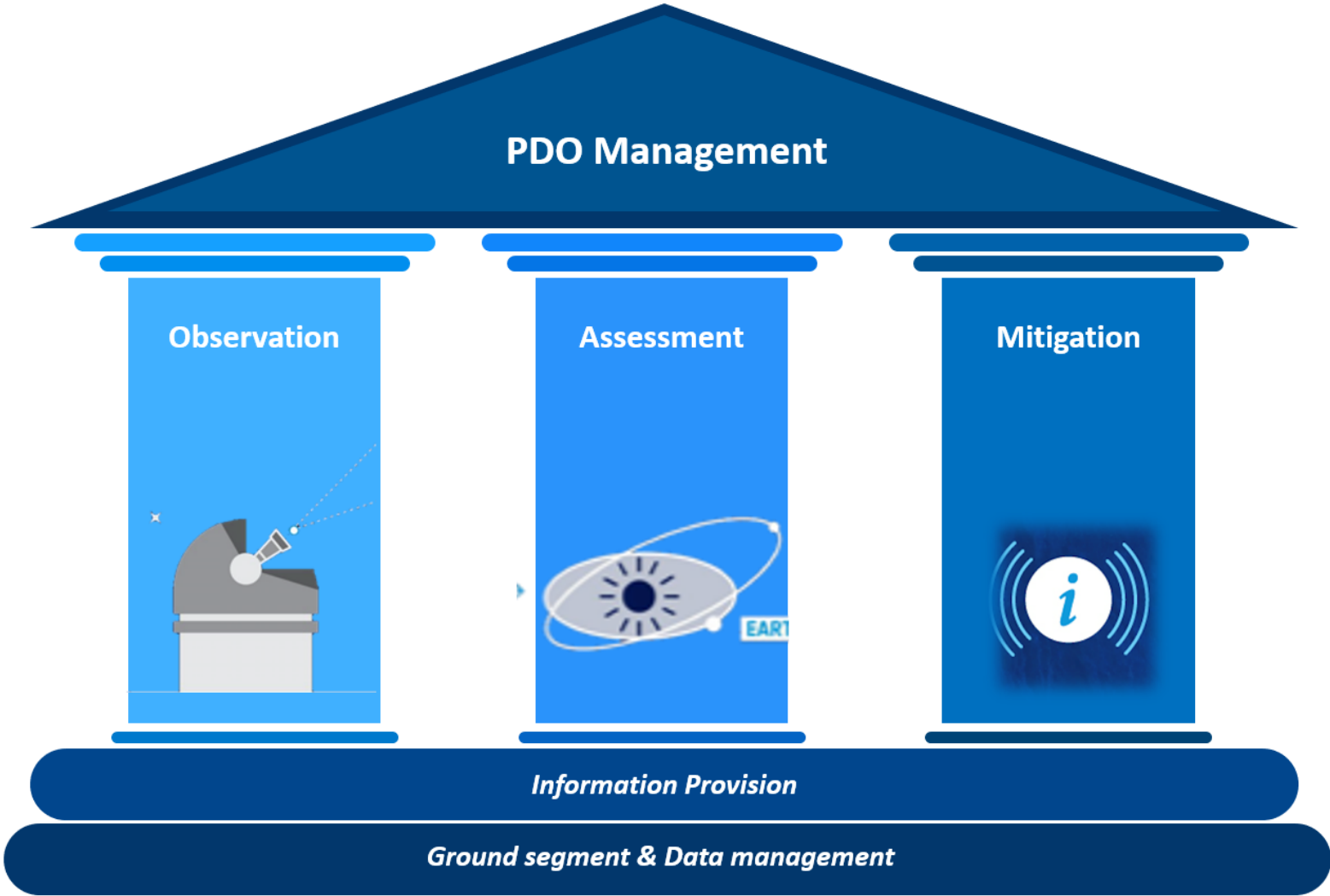
# Updates on ESA'S Planetary Defence Activities



Richard Moissl and the Planetary Defence Office Team

08/02/2023





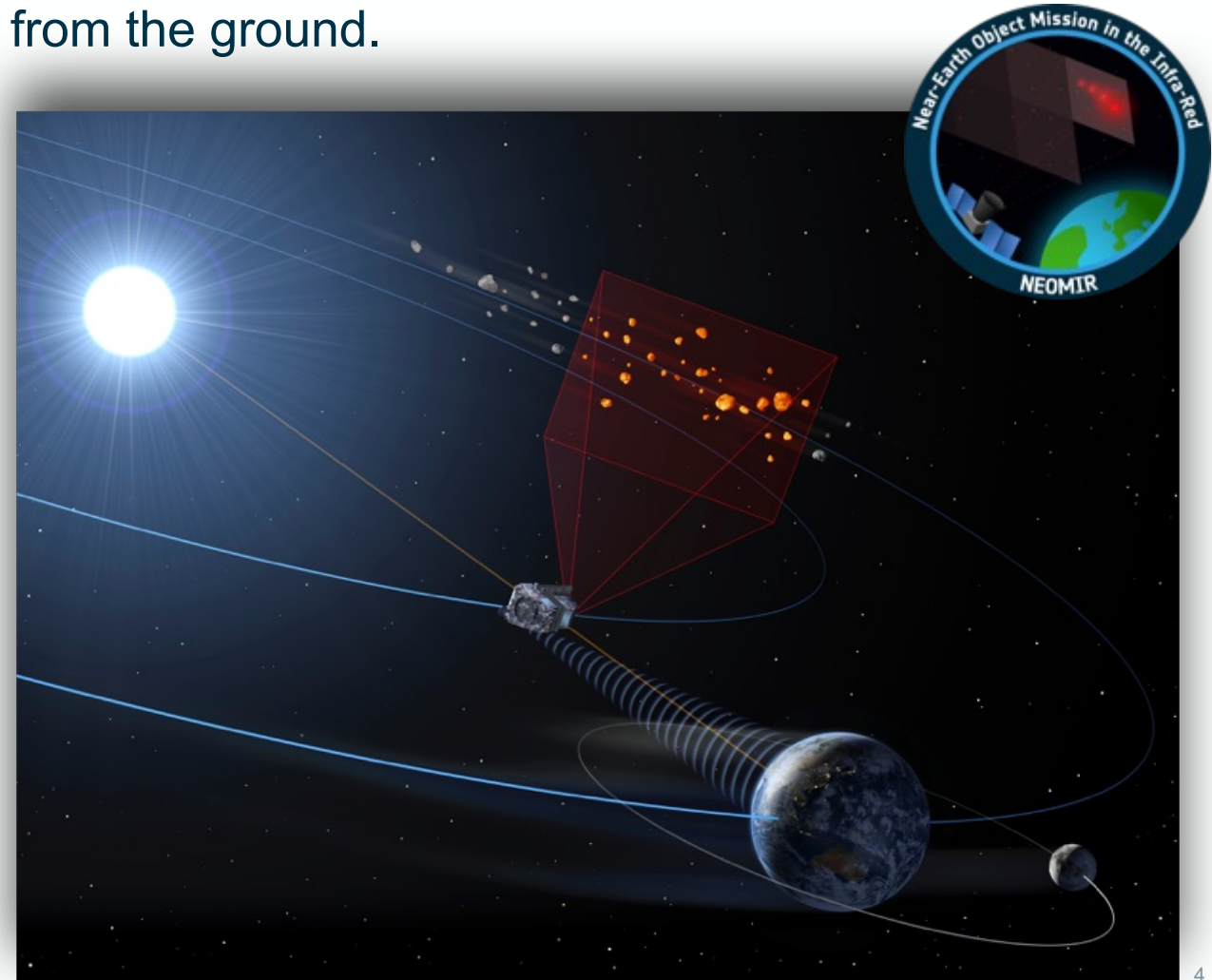
- Starting the second Period of S2P
- New Mission studies (Satis/RAMSES, NEOMIR)
- Two conferences:
  - Imminent Impactors (/w EU)
  - NEO and Space Debris
- 10 Years anniversary of the Near Earth Objects Coordination Centre (NEOCC) at Frascati coming up in May
- Detlef's Retirement



ESA is currently studying a NEO Mission in the InfraRed (NEOMIR) to focus on detecting impactors coming from the Sun direction, thus not detectable from the ground.

## Mission basics:

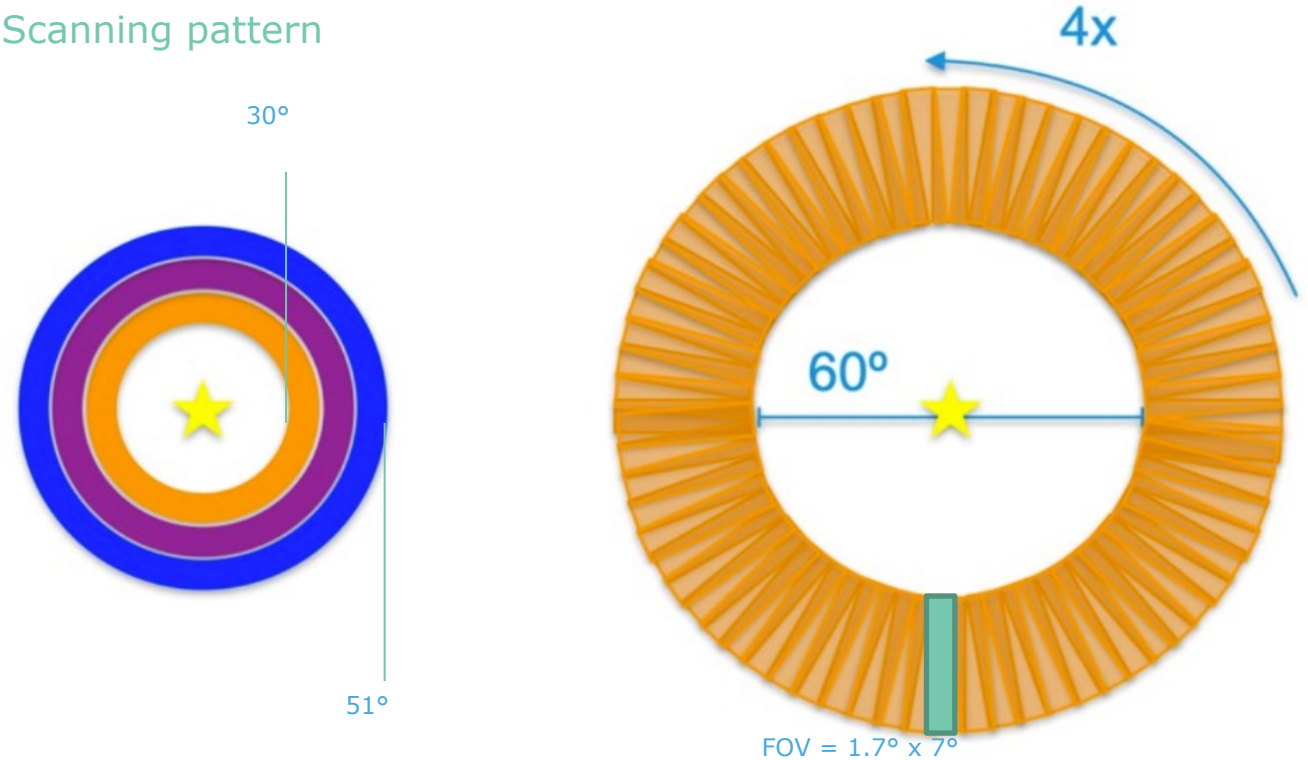
- orbit around Sun-Earth L1
- able to detect NEOs >20 m typically one month before impact
- fast response: max 24h from exposure to data downlinked to Earth
- 7 years life-time plus extension
- working in the thermal IR (4-10  $\mu\text{m}$ )
- Launch readiness 2030+



# NEOMIR Survey Strategy

- Field of View:  $1.7^\circ \times 7^\circ$
- Scan  $\sim 3$  concentric annular regions around sun in overlapping 60s (stacked) exposures
- Repeat scan of each region 4x to acquire “tracklets” of NEOs
- Total scan time  $\sim 39$  h

Scanning pattern



→ Detection of NEOs with diameters of 20 m and larger already 3-4 weeks before potential impact

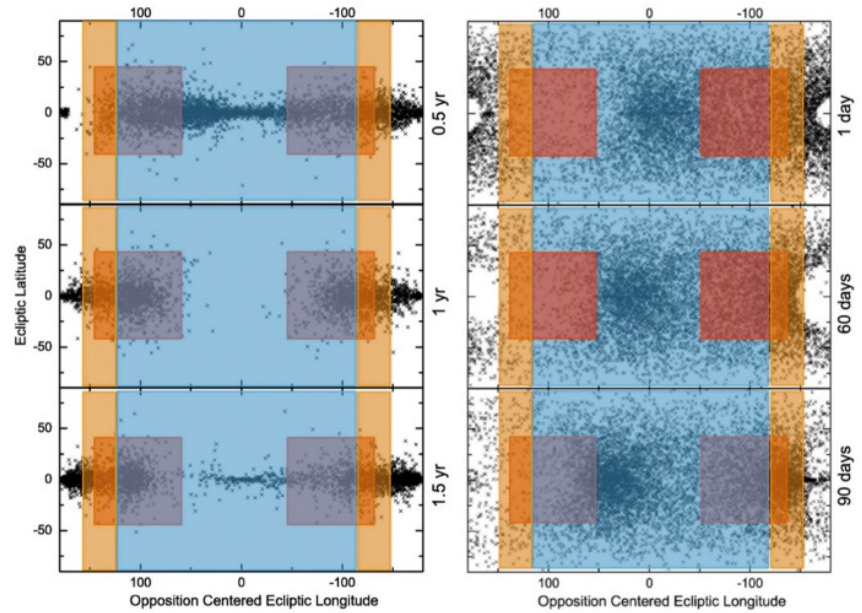
# Complementary to NEO Surveyor



- NEO Surveyor
  - Deep 180s exposures = detection of large, distant Objects (> 140 m @ 1 AU)
  - Slow scans of 80 x 80 degrees Lat/Lon regions at 40 deg elongation from the Sun

- NEOMIR
  - Fast 60s exposures = detection of smaller, closer and faster (~ 15m @ 0.1 AU)
  - Faster scans of 21 deg wide annular region at 30 deg elongation from the Sun

Veres et al., Icarus 203 (2009)

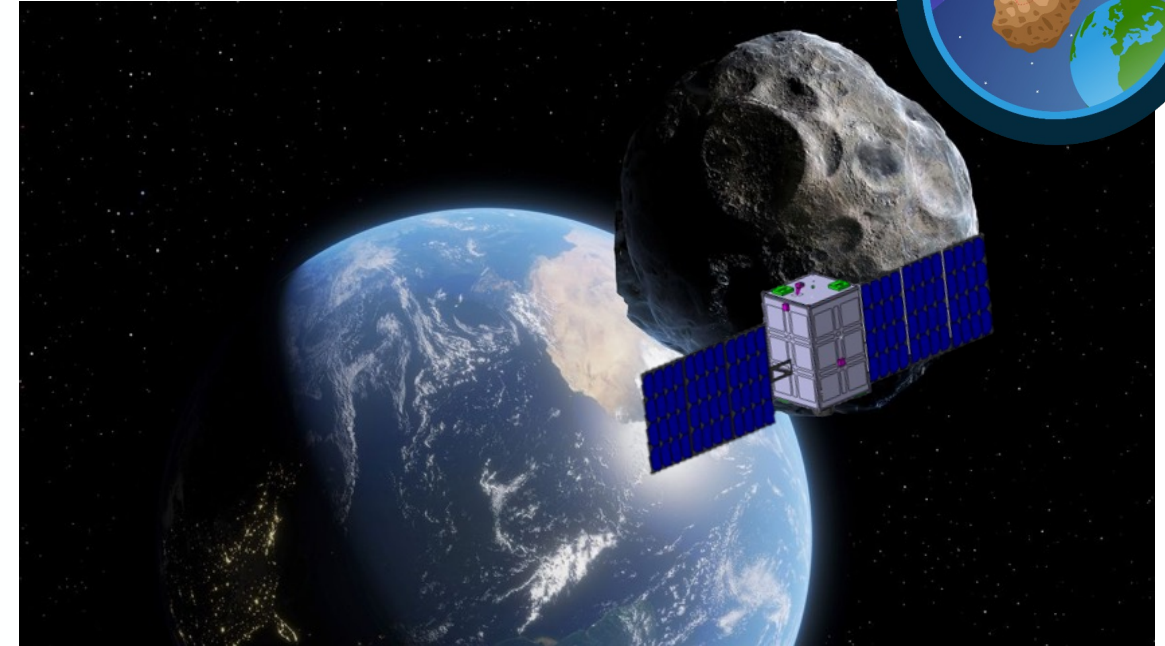


Comparison of Field of Regard between NEO Surveyor, NEOMIR and Terrestrial observations

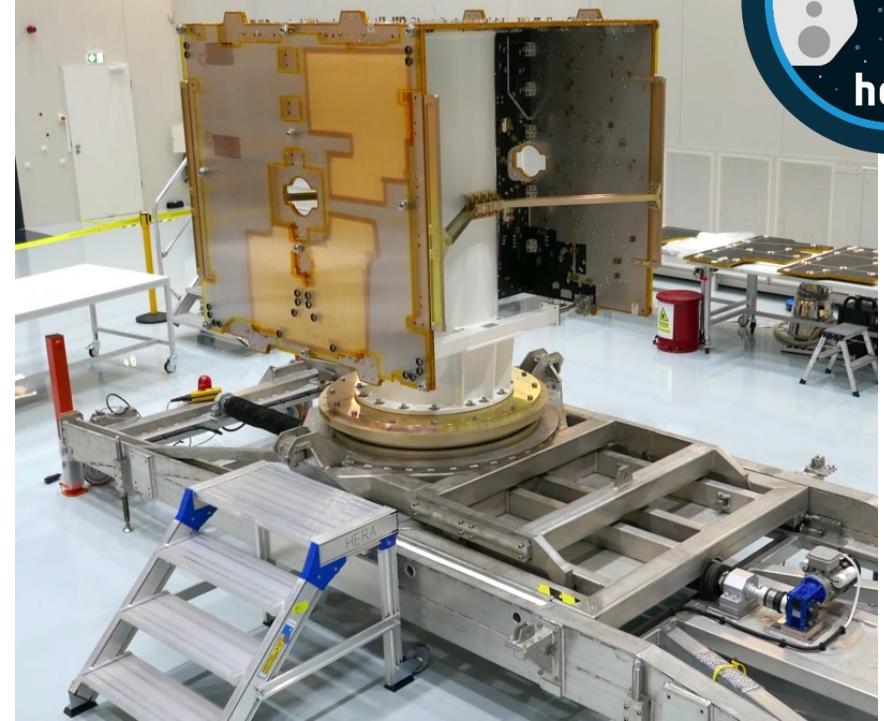


# Apophis Reconnaissance Mission: Satis

- CDF Study in 2022, evaluating a fast flyby and a rendezvous option
- Rendezvous Scenario chosen for further studies:
  - Heliocentric orbit with rendezvous 1-2 months in advance of close approach to earth.
  - 12UXL Cubesat (baselined to follow closely the M-ARGO design)
  - Baseline Payload:
    - Hyperspectral Imager
    - IR imager
- Launch window ends on 13<sup>th</sup> May 2027
- Dedicated Launch on Mircolauncher Vehicle
- Upgrade option to larger S/C being evaluated via GSTP under the name RAMSES



- ✓ All subsystem CDRs closed
- ✓ Propulsion module delivered to AVIO for integration
- ✓ Avionic Test Bench integrated
- ✓ All EM units delivered
- ✓ Core Module integration started
- ✓ All FM units delivered or in delivery
- ✓ Ground Segment Design Review successful
- ✓ CMOC kicked-off, TM/TC I/F workshop held
- ✓ System CDR successful
- ✓ Successful Ministerial covering Period 2



=> Hera is on track for launch in October 24 (on Falcon-9)



- Goal: Record lunar impact flashes from a halo orbit from ‘behind’ the Moon - Relevant for the study of impacts and the meteoroid environment in the Earth-Moon system.
- Status: Phase B study ongoing; ASI/Italy will fund the mission up to and including Phase E; currently identifying launch opportunity (2027?)
- Next Monday: Science workshop – see <https://www.asi.it/en/event/lumio-mission-science-workshop/>

