# Planetary Defense at NASA

## US NEO Preparedness Strategy & Action Plan

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# Planetary Defense Coordination Office (PDCO)

The PDCO was established in January 2016 at NASA HQ to coordinate planetary defense related activities across NASA, and coordinate both U.S. interagency and international efforts and projects to address and plan response to the asteroid impact hazard.

**Mission Statement**

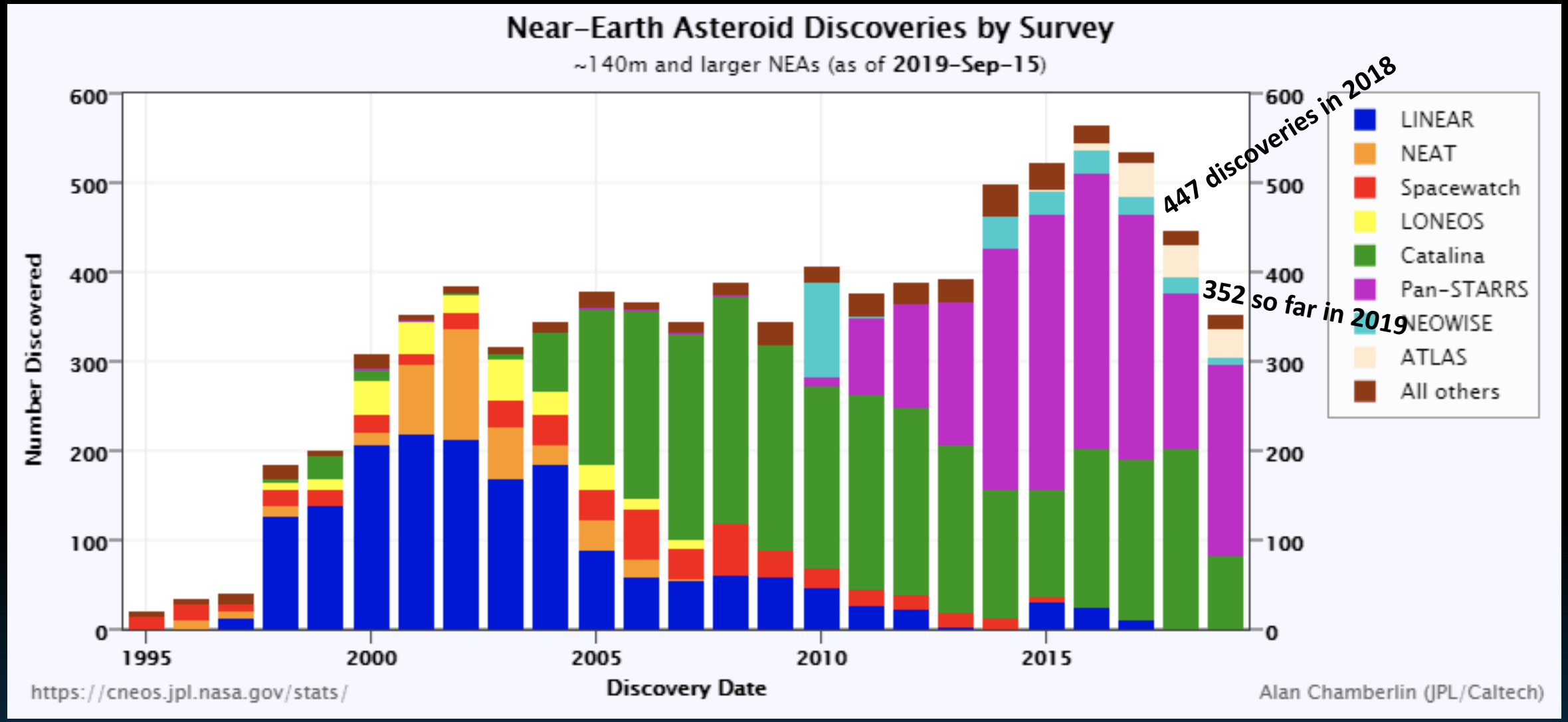
Lead national and international efforts to:

- Detect any potential for significant impact of planet Earth by natural objects
- Appraise the range of potential effects by any possible impact
- Develop strategies to mitigate impact effects on human welfare


ASSESS
[CENTER FOR NEAR EARTH OBJECT STUDIES]
IAU
Minor Planet Center
SEARCH, DETECT & TRACK
[GROUND-BASED & SPACE-BASED OBSERVATIONS, IAWN]
PLANETARY DEFENSE
MITIGATE
[DART, FEMA EXERCISES]
CHARACTERIZE
[NEOWISE, GOLDSTONE, ARECIBO, IRTF]
PLAN & COORDINATE
[SMPAG, PIERWG, DAMIEN IWG]

PLANETARY DEFENSE COORDINATION OFFICE

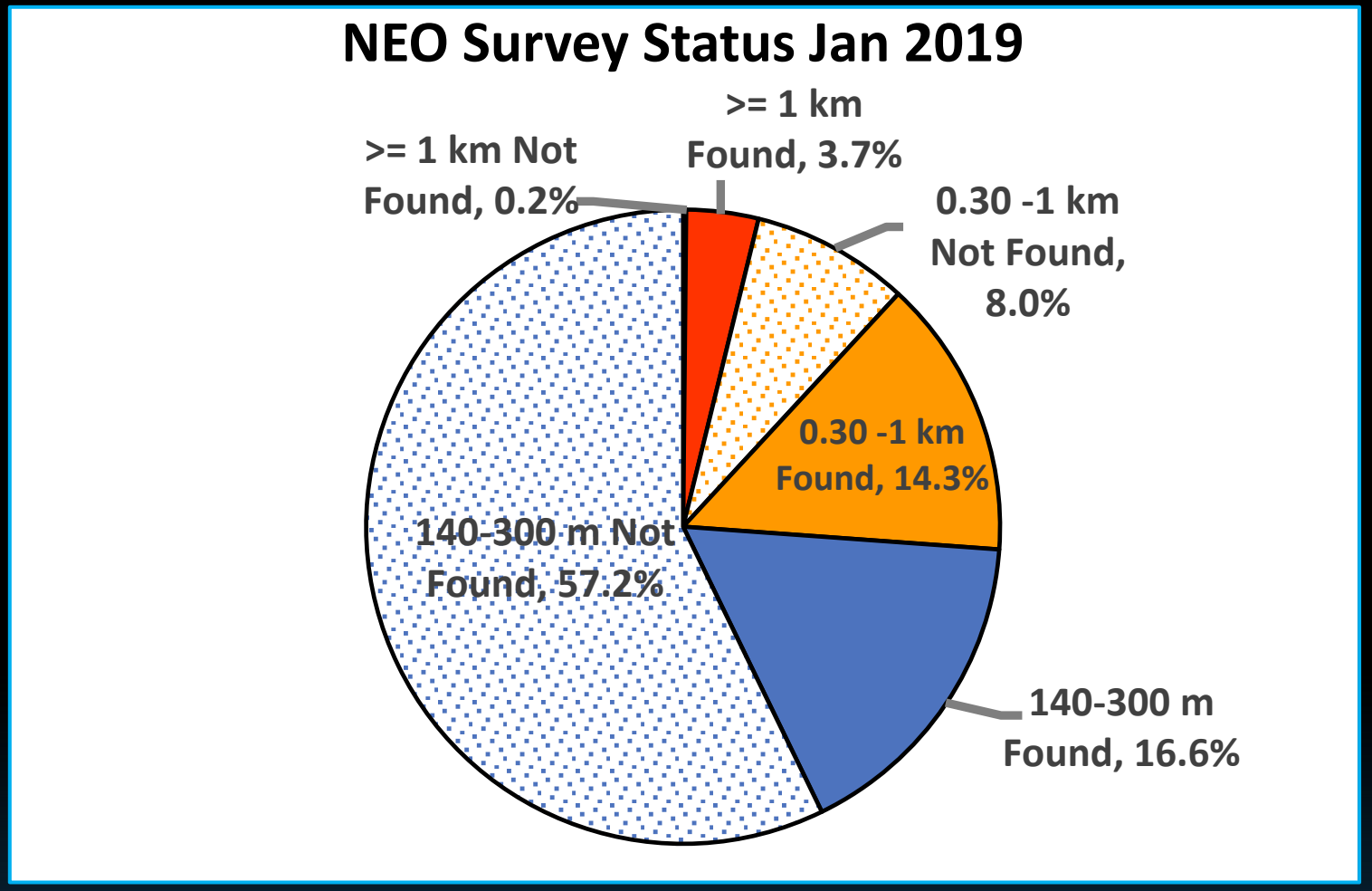
# Task: Find NEAs 140 Meters and Larger



PLANETARY DEFENSE COORDINATION OFFICE

# Progress: 140 Meters and Larger

## Total Population estimated to be ~25,000




**At current discovery rate, it will take more than 30 years to complete the survey.**

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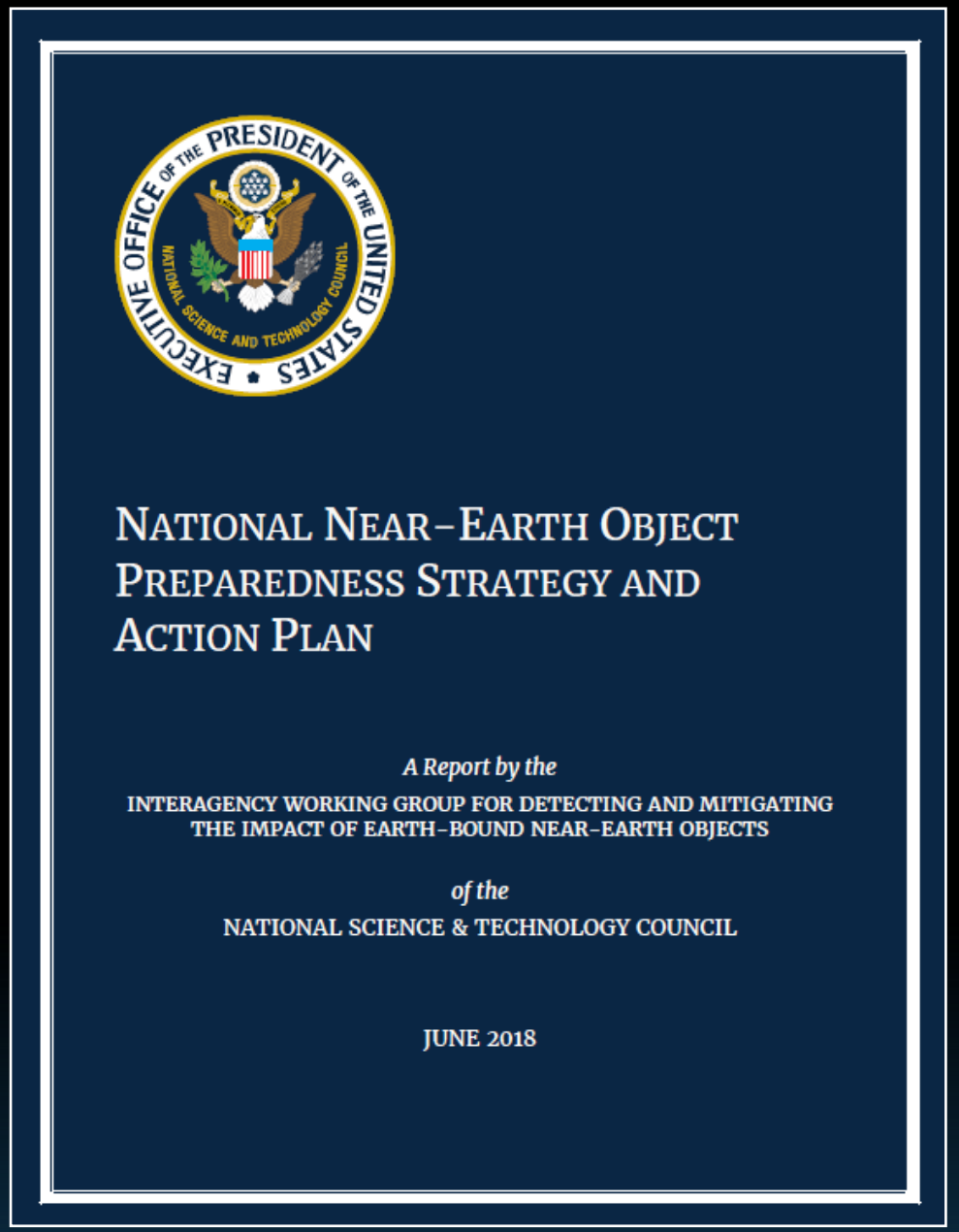
COORDINATION OFFICE

NASA

# New White House Guidance released on 20 June 2018

https://www.whitehouse.gov/wp-content/uploads/2018/06/National-Near-Earth-Object-Preparedness-Strategy-and-Action-Plan-23-pages-1MB.pdf



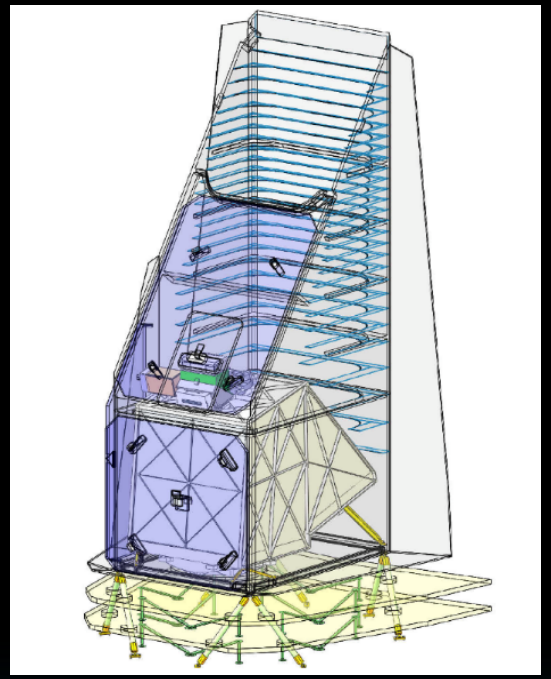
# National NEO Preparedness Strategy and Action Plan

Goals in the New Action Plan

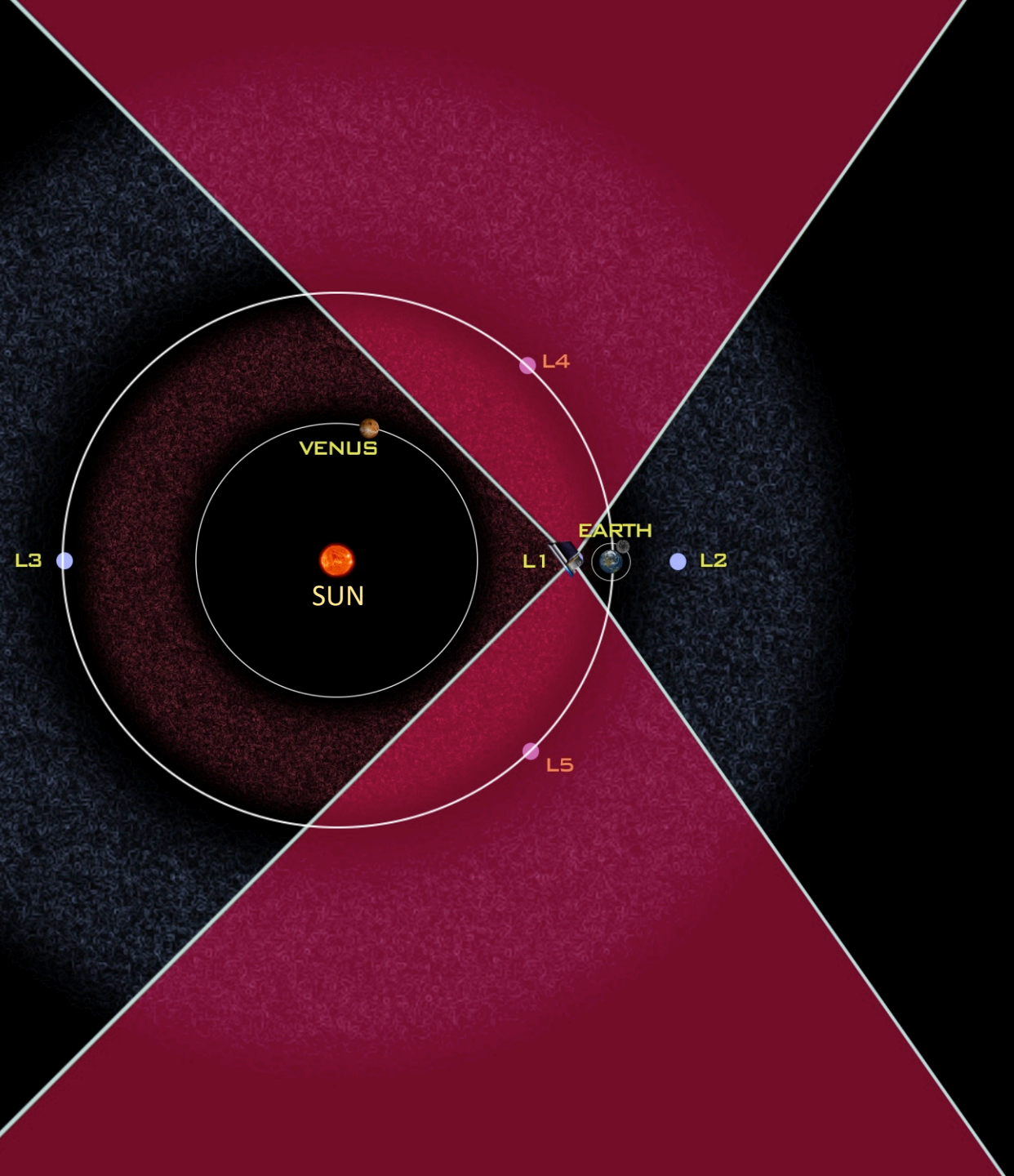
- Enhance NEO detection, characterization, and tracking capabilities
- Improve modeling, predictions, and information integration
- Develop technologies for NEO deflection and disruption
- Increase international cooperation on NEO preparation
- Establish NEO impact emergency procedures and action protocols

# Space-Based Infrared NEO Survey Instrument

- Infrared survey instrument optimized for meeting congressional direction to find and characterize NEOs down to 140 meters in size
- 50 cm wide-field telescope for NEO detection in the infrared
- Optimized to detect NEOs at wavelengths where they are bright, but background stars and galaxies are dim (4-10 µm)
- Optimized to accomplish the GEBrown goal
- No cryogens and no moving parts (except for a one-time ejectable aperture cover)



# Space-Based IR
# Instrument field-of-regard



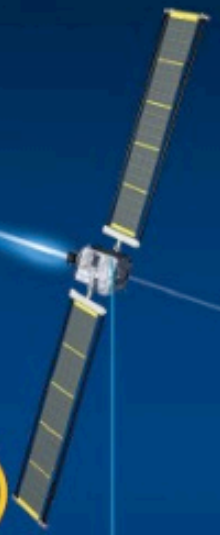
# DART
Double Asteroid Redirection Test

## Launch
**July 22, 2021**

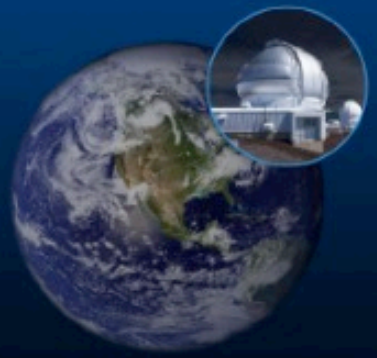
*Falcon 9, VAFB*
*Ballistic Trajectory*

**IMPACT: September 30, 2022**

| | |
|---|---|
| KDP-C | Jun 2018 |
| CDR | Jun 2019 |
| MOR | Sep 2019 |
| KDP-D | Apr 2020 |
| IRR | Mar 2020 |
| PER | Oct 2020 |



**LICIACube**
*(Light Italian Cubesat for Imaging of Asteroids)*
ASI contribution



**DART Spacecraft**
650 kg arrival mass
6.65 km/s closing speed

**Didymos-B**
163 meters
11.92-hour orbital period

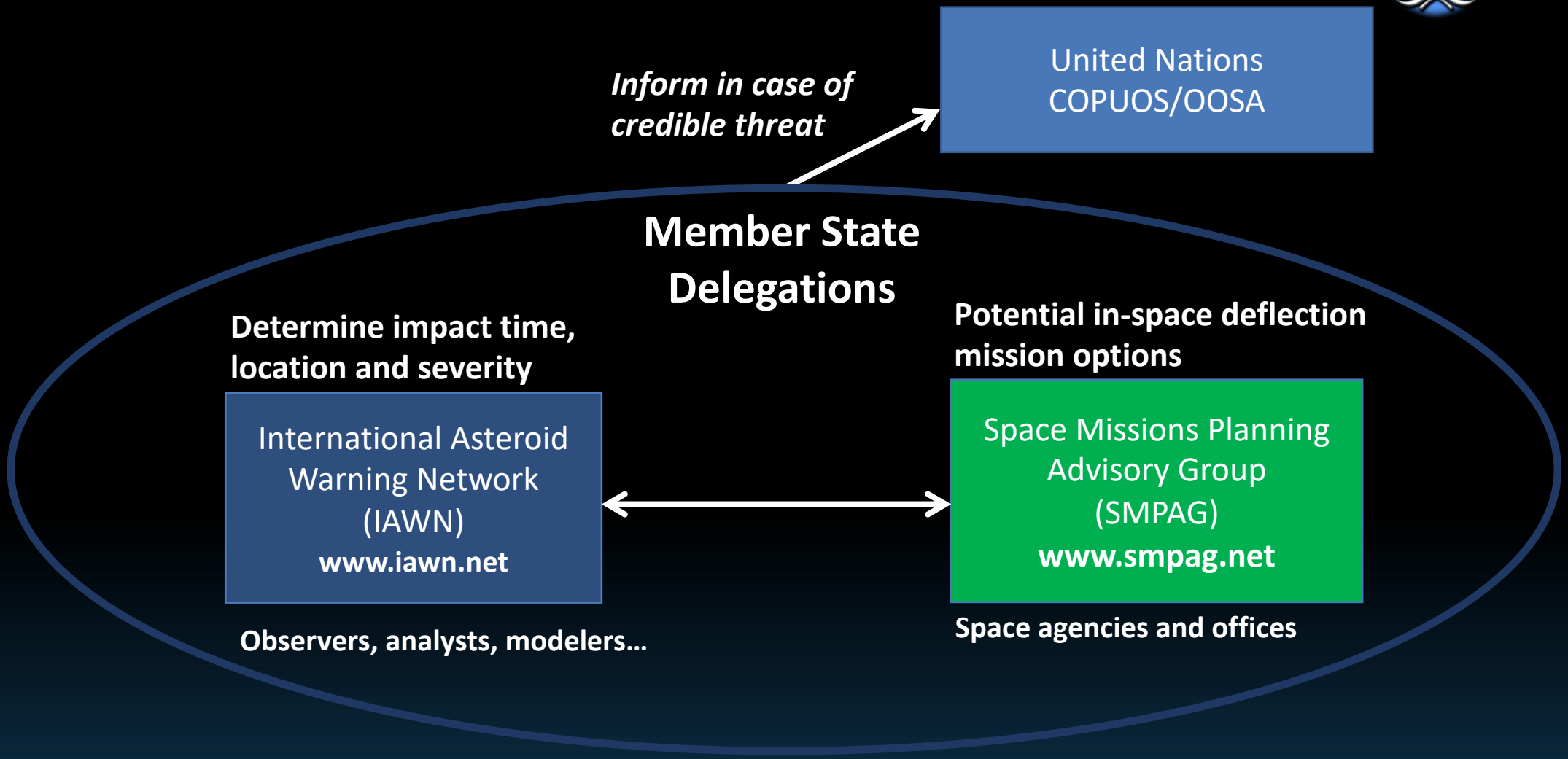
**65803 Didymos (1996 GT)**
1,180-meter separation between centers of A and B

**Didymos-A**
780 meters, S-type
2.26-hour rotation period

**Earth-Based Observations**
0.07 AU range at impact
Predicted ~10-minute (~1%) change in binary orbit period

- Target the binary asteroid Didymos system
- Impact Didymos-B and change its orbital period
- Measure the period change from Earth

# UN Committee on Peaceful Uses of Outer Space (COPUOS)
# UN Office of Outer Space Affairs (OOSA)
## Overview for NEO Threat Response



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Near-Earth Object Observations Program – Interagency and International Partnerships – Mitigation Research