PDC2023
Vienna, Austria

Please submit your abstract at https://atpi.eventsair.com/23a01---8th-planetary-defense-conference/abstractsubmission

You may visit https://iaaspace.org/pdc for more information

(please select the topic that best fits your abstract from the list below)
(you may also add a general comment - see end of this document)

Ongoing and Upcoming Mission Highlights
Key International and Policy Developments
Near-Earth Object (NEO) Discovery
NEO Characterization
Deflection / Disruption Modeling & Testing
Space Mission & Campaign Design
Impact Effects & Consequences
Disaster Management & Impact Response
Public Education and Communication
The Decision to Act: Political, Legal, Social, and Economic Aspects
DART highlights

DART Mission – Getting to Dimorphos Impact and Lessons Learned

Elena Adams(1), **Evan Smith**(2), **Daniel O'Shaughnessy**(3), **Geffrey Ottman**(4), **Daniel Wilson**(5), **Edward Reynolds**(6)
(1-6)*The Johns Hopkins University Applied Physics Laboratory, 11100 Johns Hopkins Road, Laurel MD 20723, USA; elena.adams@jhuapl.edu*

Keywords: *DART, overview, technology development, autonomous systems, lessons learned, planetary defense*

ABSTRACT

On 26 September 2022, the Double Asteroid Redirection Test (DART) spacecraft impacted Dimorphos at 23:14:24.183 ± 0.004 UTC, successfully executing NASA's first-ever planetary defense test. The spacecraft was autonomous for the last four hours of flight, executing maneuvers to target first Didymos, and then Dimorphos, while simultaneously streaming images back to Earth in real time. The DART mission started in 2015, went through its Preliminary Design Review in 2017, and was confirmed in 2018. It launched on a Space X Falcon 9 from the Vandenberg Space Force Base in November 2021, after performing its system integration and test during the COVID-19 pandemic. Leading up to the impact, DART had many firsts. The DART mission tested multiple technologies for the future NASA missions, including SMART Nav (Small-body Maneuvering Autonomous Real Time Navigation), advanced ion propulsion with the NEXT-C ion engine, an FPGA-based avionics called CORESAT, and new types of solar array and high gain antenna. The mission included the

LICIACube CubeSat from the Italian Space Agency which was released from the spacecraft 2 weeks prior to impact for flyby imaging of the Didymos system after DART impacted Dimorphos.

Although DART was ultimately a triumph, it experienced many challenges along the way that threatened its feasibility. From technology development that required multiple redesigns of key spacecraft subsystems and the mission trajectories, switching from NASA Risk Class D to Class C mid-mission, a telescope mirror failure of the DRACO imager spare during unit-level integration and test, pervasive staffing and supply chain challenges during COVID to operating at the performance limits of the onboard sensors. The DART mission contributed many lessons learned to future planetary defense mitigation missions, but ultimately it was the program's philosophical commitment to testing early and often, and the team's cohesion and perseverance that made DART a spectacular success.

****

Comments:
Time slot availability: Preferably during the first day of the conference, during DART highlights

Poster or presentation