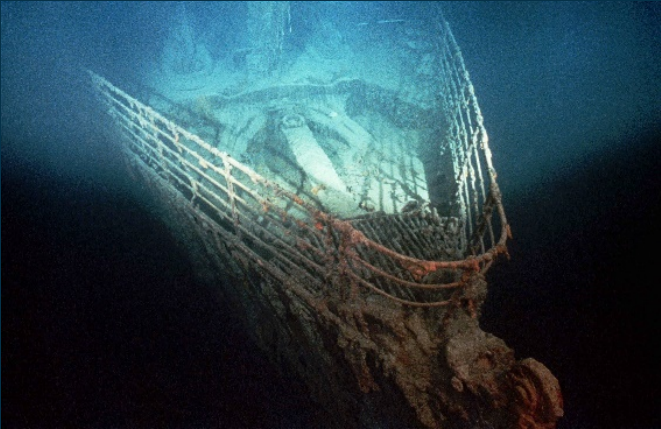
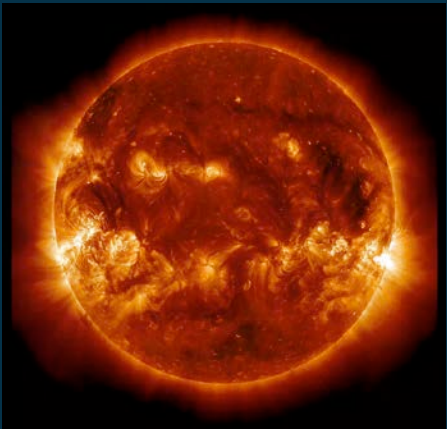


# Space Safety Made in Europe

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Holger Krag  
Space Safety

# Space Weather



# NEW SOLAR CYCLE JUST STARTED!



sciTechDaily

BIOLOGY CHEMISTRY EARTH HEALTH PHYSICS SCIENCE SPACE TECHNOLOGY

HOT TOPICS MAY 10, 2021 | NEW TURTLE DISCOVERED FROM THE LATE CRETACEOUS OF MADAGASCAR

HOME SPACE NEWS

## Mars-Directed Coronal Mass Ejection Erupts From the Sun

TOPICS: Astronomy Mars NASA NASA Goddard Space Flight Center SOHO Sun  
By NASA APRIL 26, 2021

STEREO Ahead COR2

2021-04-17 17:53:30

Imagery from NASA's STEREO-A spacecraft detected the CME erupting from the Sun's limb. This coronagraph image blocks the Sun's bright surface (black circle, center image) to reveal the Sun's corona, or outer atmosphere. Credit: NASA/STEREO-A/COR2.



214 mio years, Ø 100km  
(Manicouagan crater,  
Quebec, Canada)



15 mio years, Ø 24km  
(Nördlinger Ries)



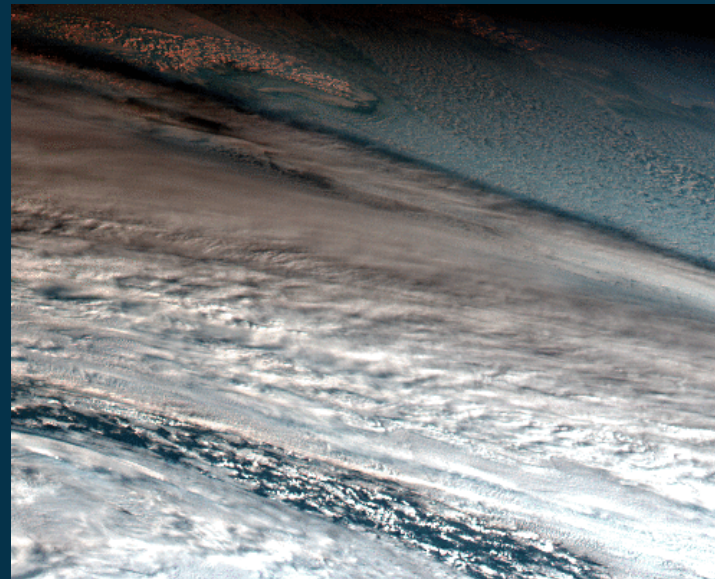
50,000 years, Ø 1.2km  
(Meteor crater Arizona)



(30m diam)  
February 2013  
Chelyabinsk



(10m diam)  
December 2018 –  
Bering Sea



(0.1m diam)  
May 2019 Fireball  
Adelaide, Australia)



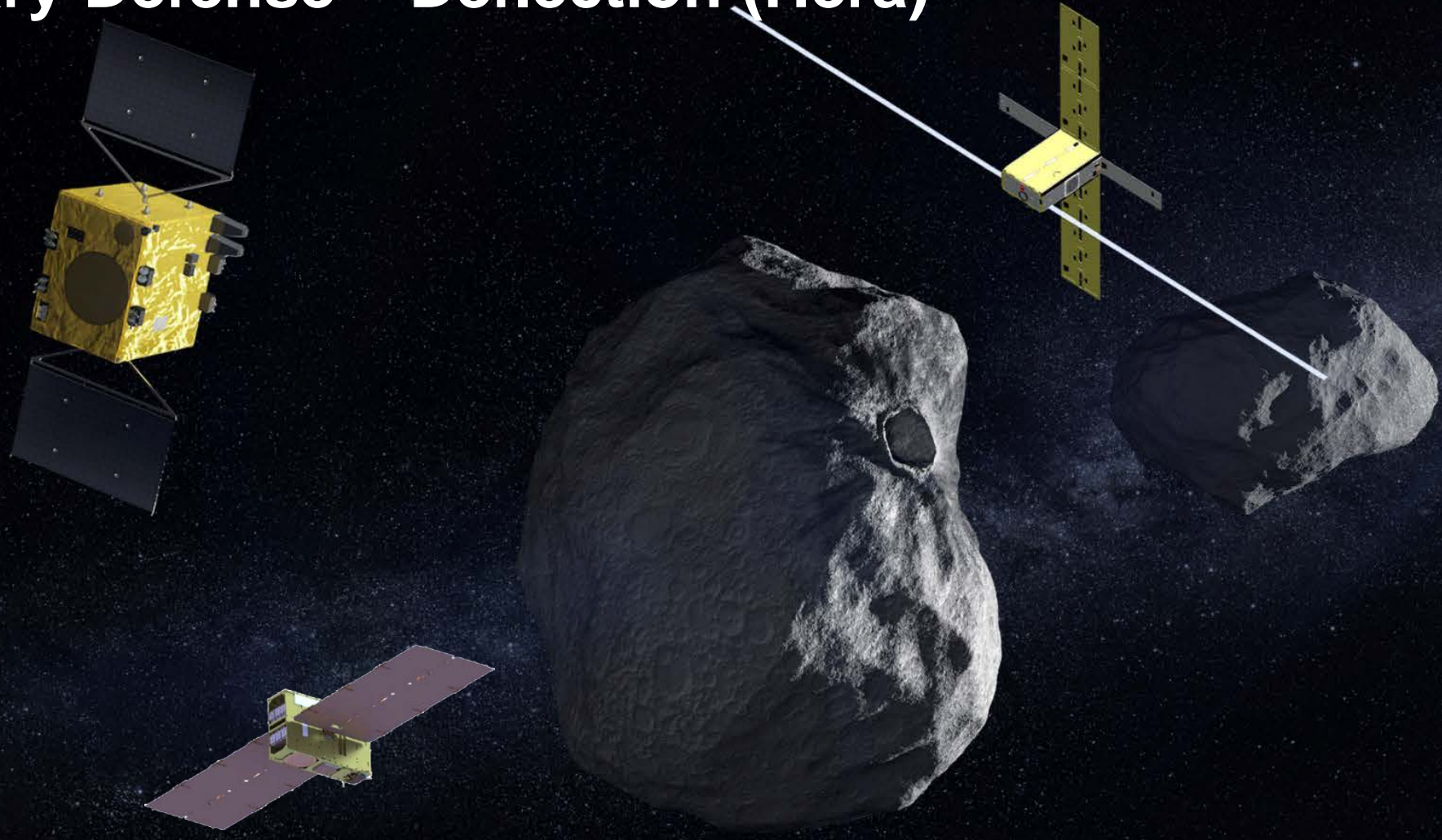
## Wide-field Surveys




## Predictions

Risk List										
Diameter [m]	Date/Time	IP max	PS max	TS	Years	IP cum	PS cum	Vel. [km/s]	In list since [days]	
8*	2095-09-05 23:50	1/16	-3.26	0	2095-2117	1/16	-3.26	12.29	3166	
<a href="#">1979XB</a>	700*	2113-12-14 18:07	1/1.84E6	-3.28	0	2056-2113	1/1.15E6	-2.96	26.04	14277
<a href="#">2019DS1</a>	27*	2082-02-26 19:15	1/787	-3.35	0	2082-2108	1/767	-3.34	15.32	124
<a href="#">2006QV89</a>	28*	2019-09-09 07:03	1/7299	-3.63	0	2019-2117	1/7128	-3.62	12.32	4695
<a href="#">2000SG344</a>	40*	2071-09-16 00:26	1/2096	-3.63	0	2062-2116	1/326	-2.88	11.26	6679
<a href="#">99942 Apophis</a>	375	2068-04-12 15:13	1/531914	-3.67	0	2068-2116	1/434655	-3.81	12.62	4966
<a href="#">2009JF1</a>	13*	2022-05-06 08:12	1/4464	-3.75	0	2022	1/4464	-3.75	26.41	3542
<a href="#">2008UB7</a>	60*	2060-10-31 18:26	1/36101	-3.83	0	2044-2112	1/15203	-3.51	21.57	3746
<a href="#">2006JY26</a>	8*	2074-05-03 01:00	1/86	-3.91	0	2073-2116	1/47	-3.65	11.57	4635
<a href="#">2008JL3</a>	30*	2027-05-01 09:07	1/13280	-3.95	0	2024-2116	1/11551	-3.94	14.01	3906


# Planetary Defense – Deflection (Hera)





# Tracked Population

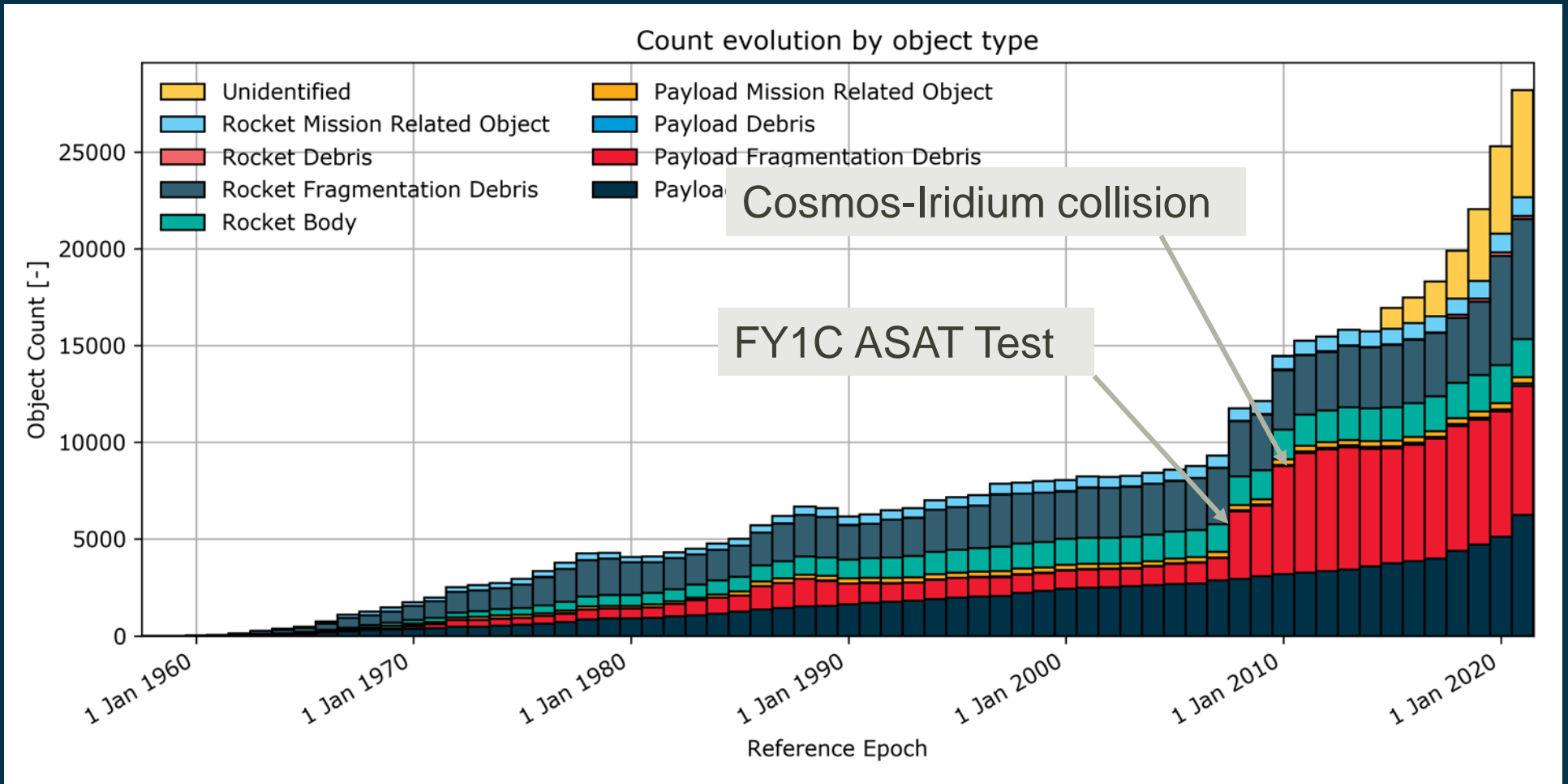
Statistics on space debris at 



 28,000

 8,500t

 88,000m<sup>2</sup>





# Monitoring

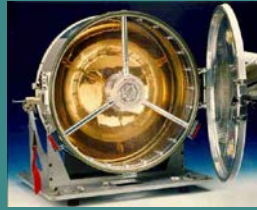
Sporadic detections, statistical counts

Unobserved

Full orbital information

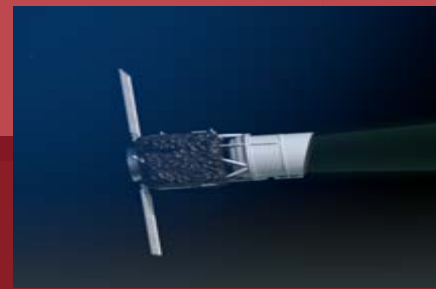


GEO



GORID

Space-based sensor

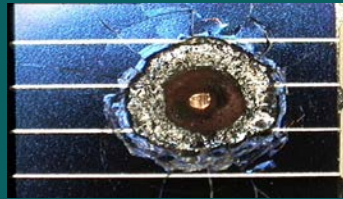


OGS

18<sup>TH</sup> Space Control Squadron, EUSST, LeoLabs, ISON,...

LEO

Hubble Cells



DEBIE



TIRA



EISCAT



Log(Diameter)





Robotic Telescope



Laser Testbed



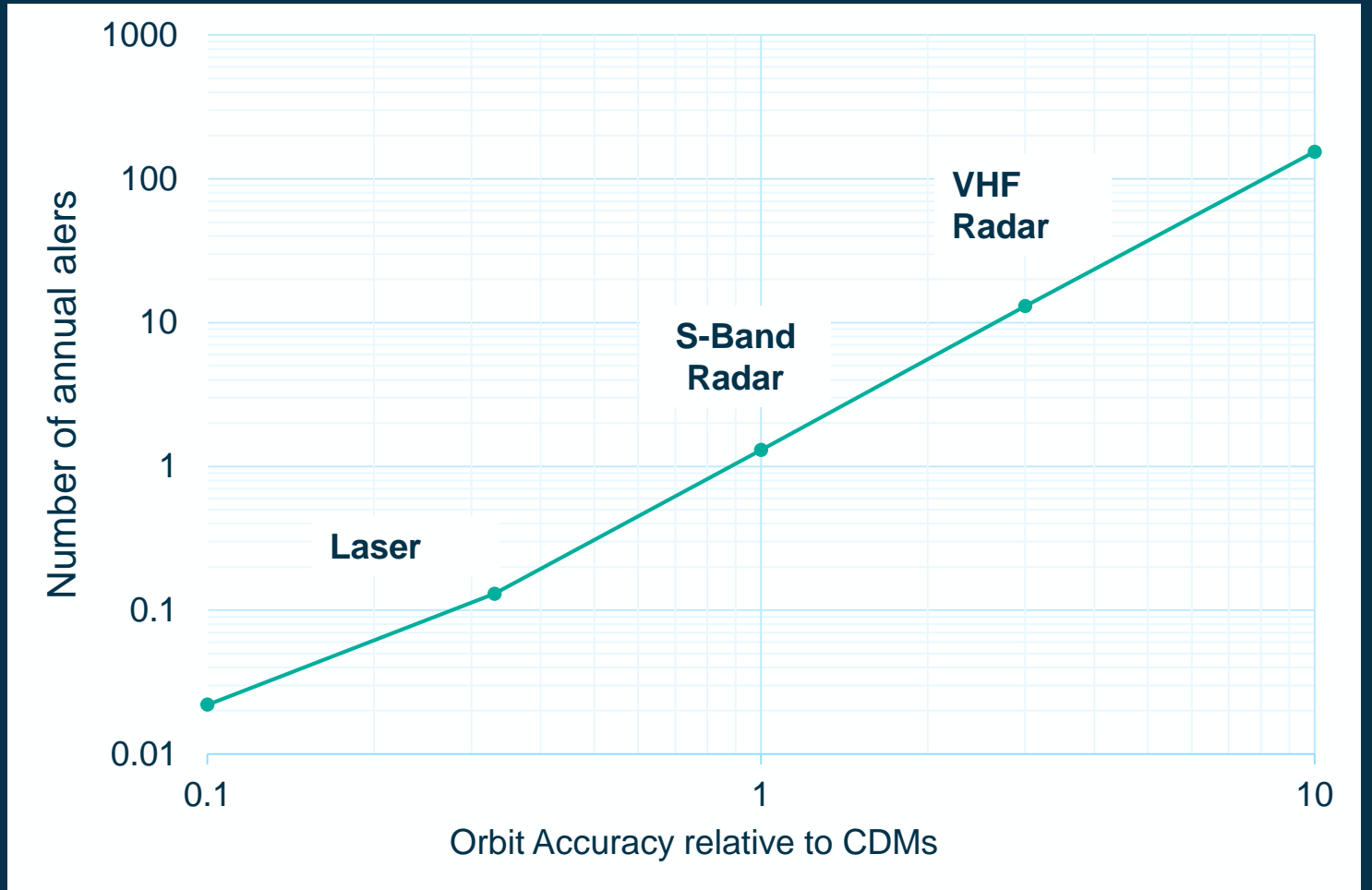
Phased Array Demonstrator

ESA UNCLASSIFIED – For ESA Official Use Only

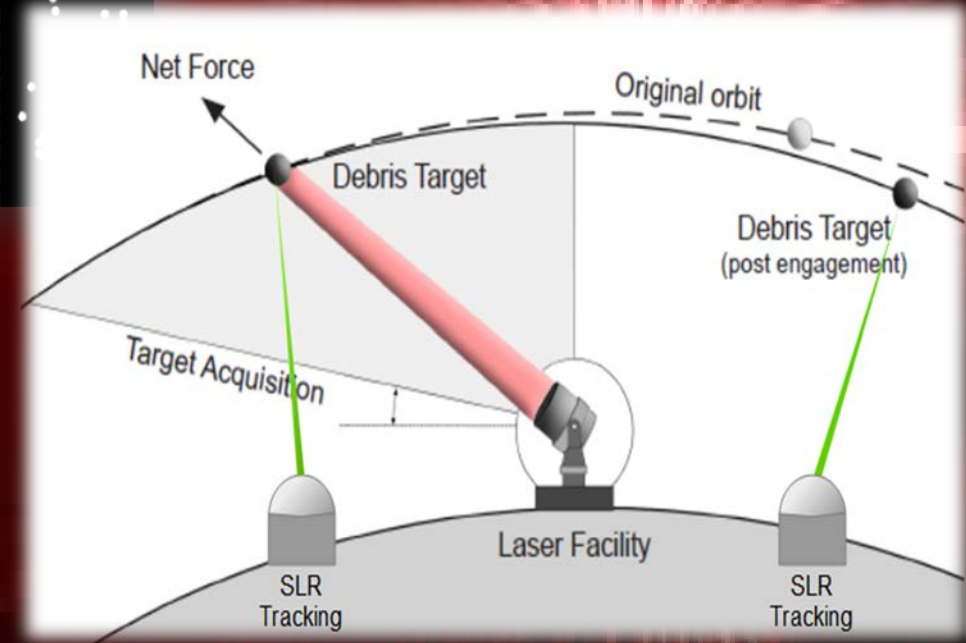
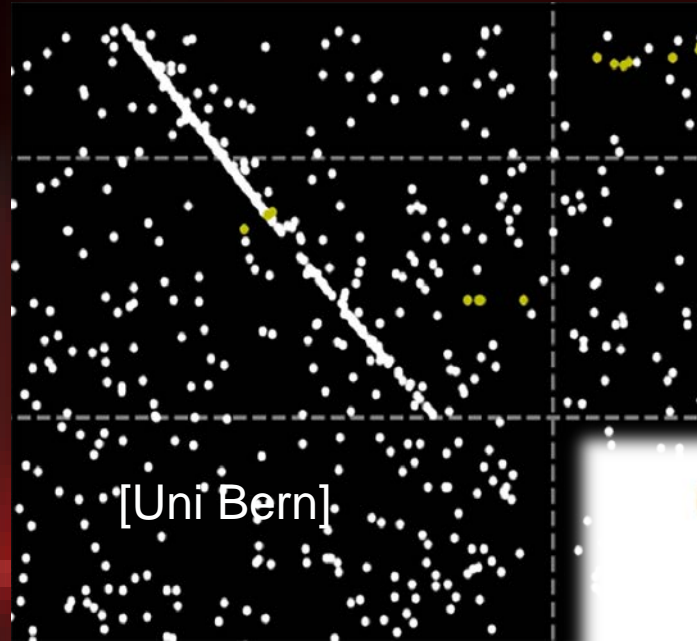
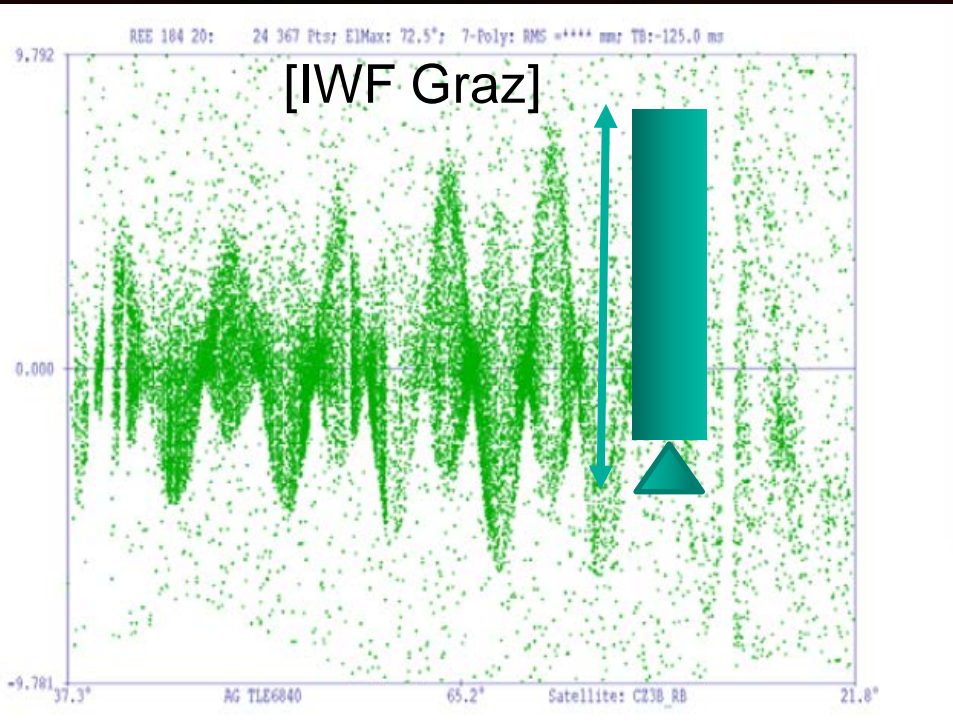


Processing S/W

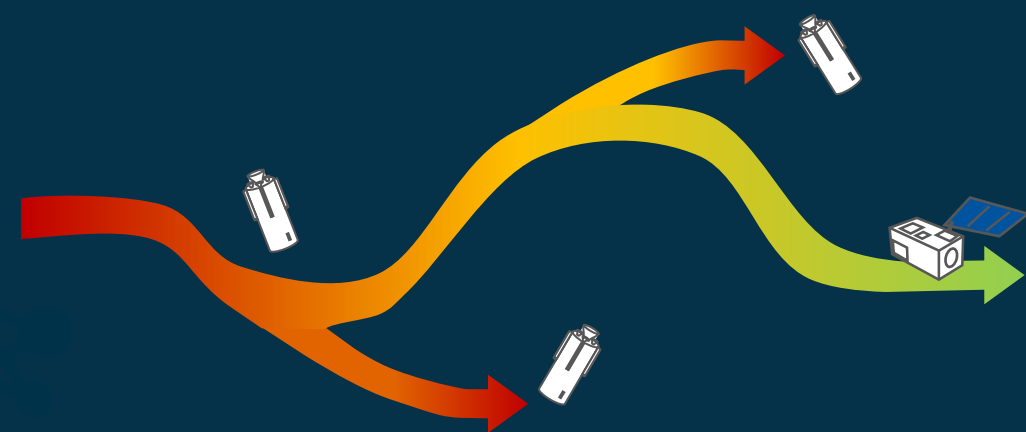
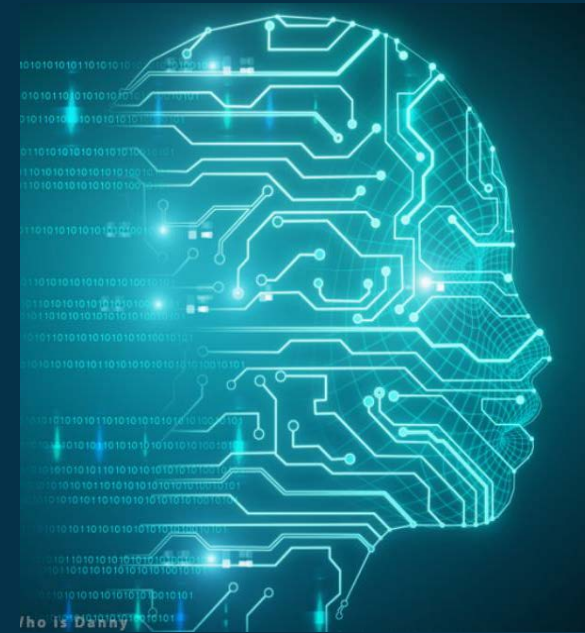
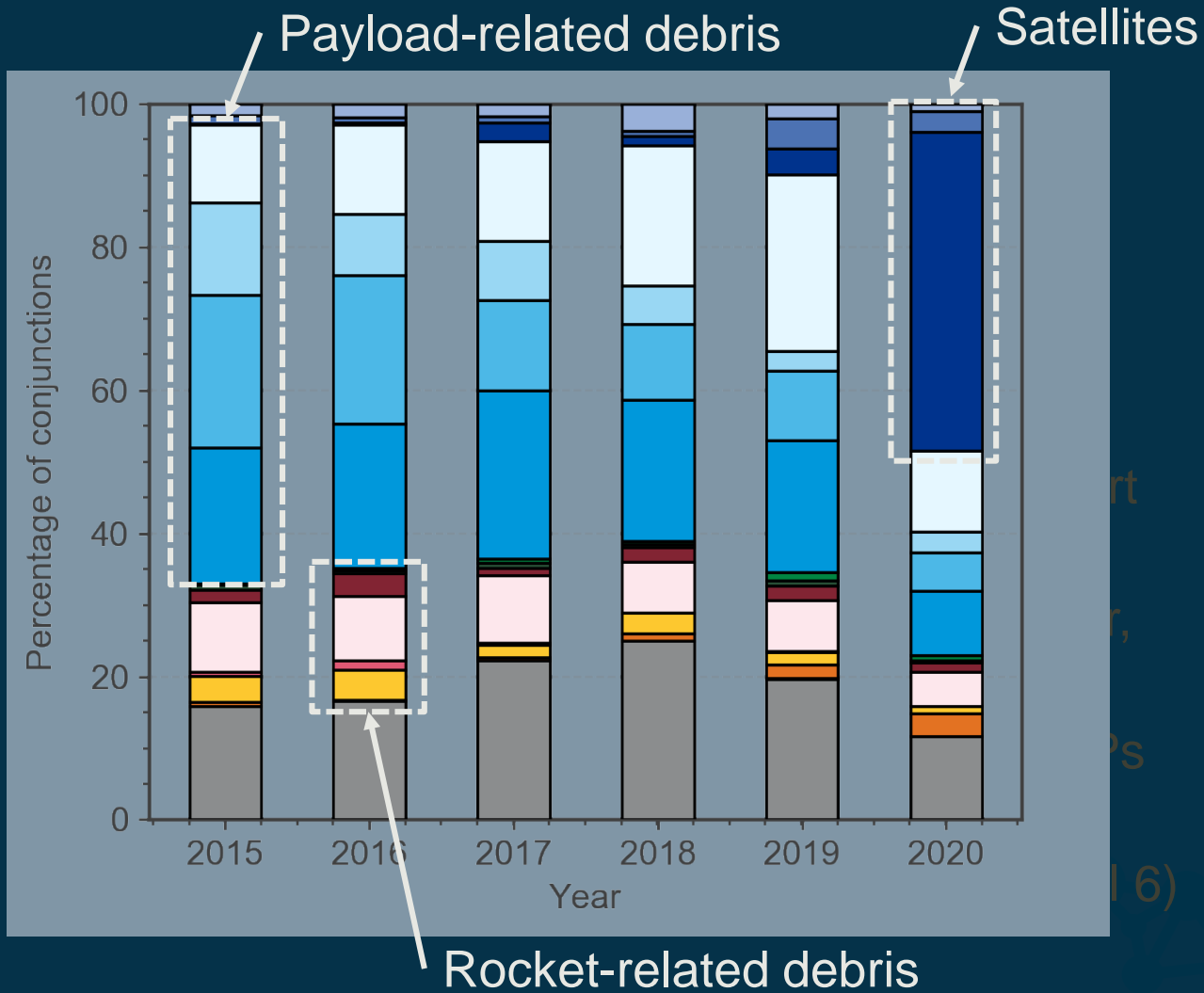
# A New Aspect of SST



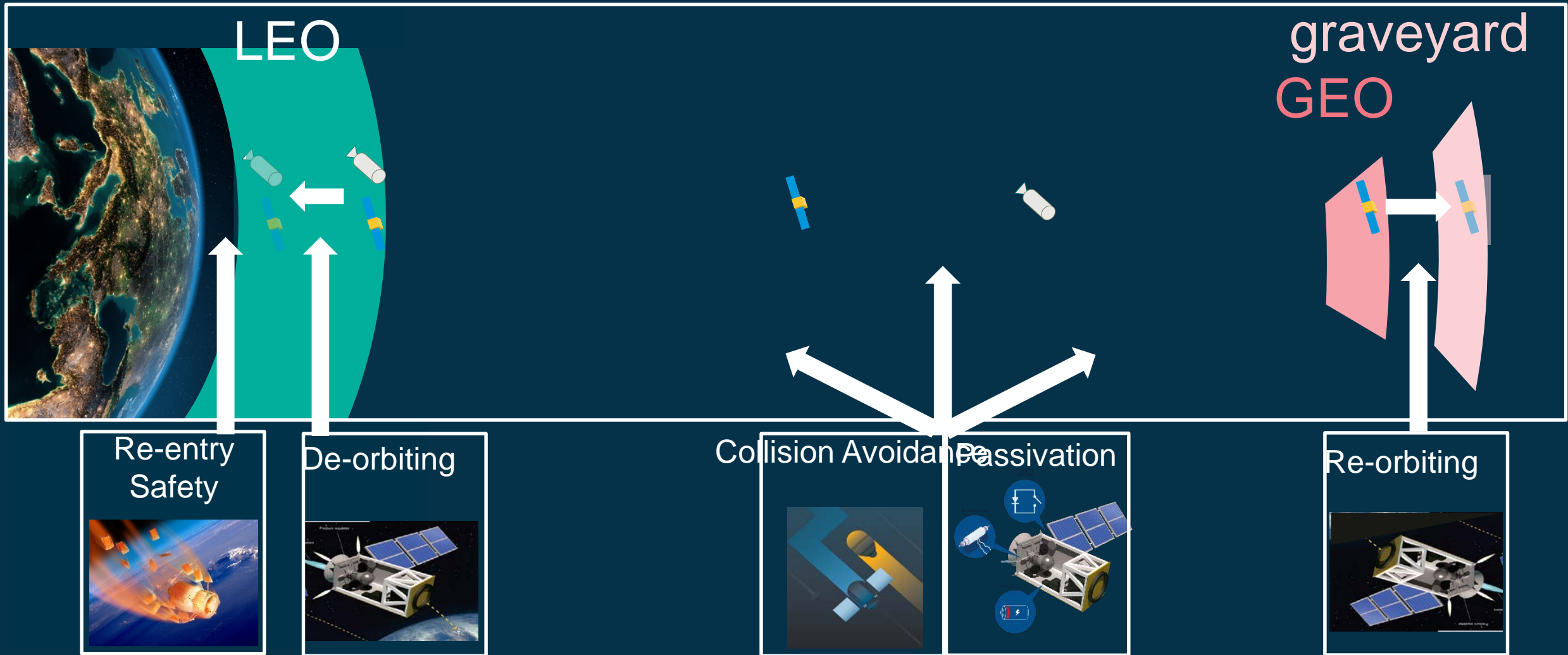
# ESA's Laser Roadmap



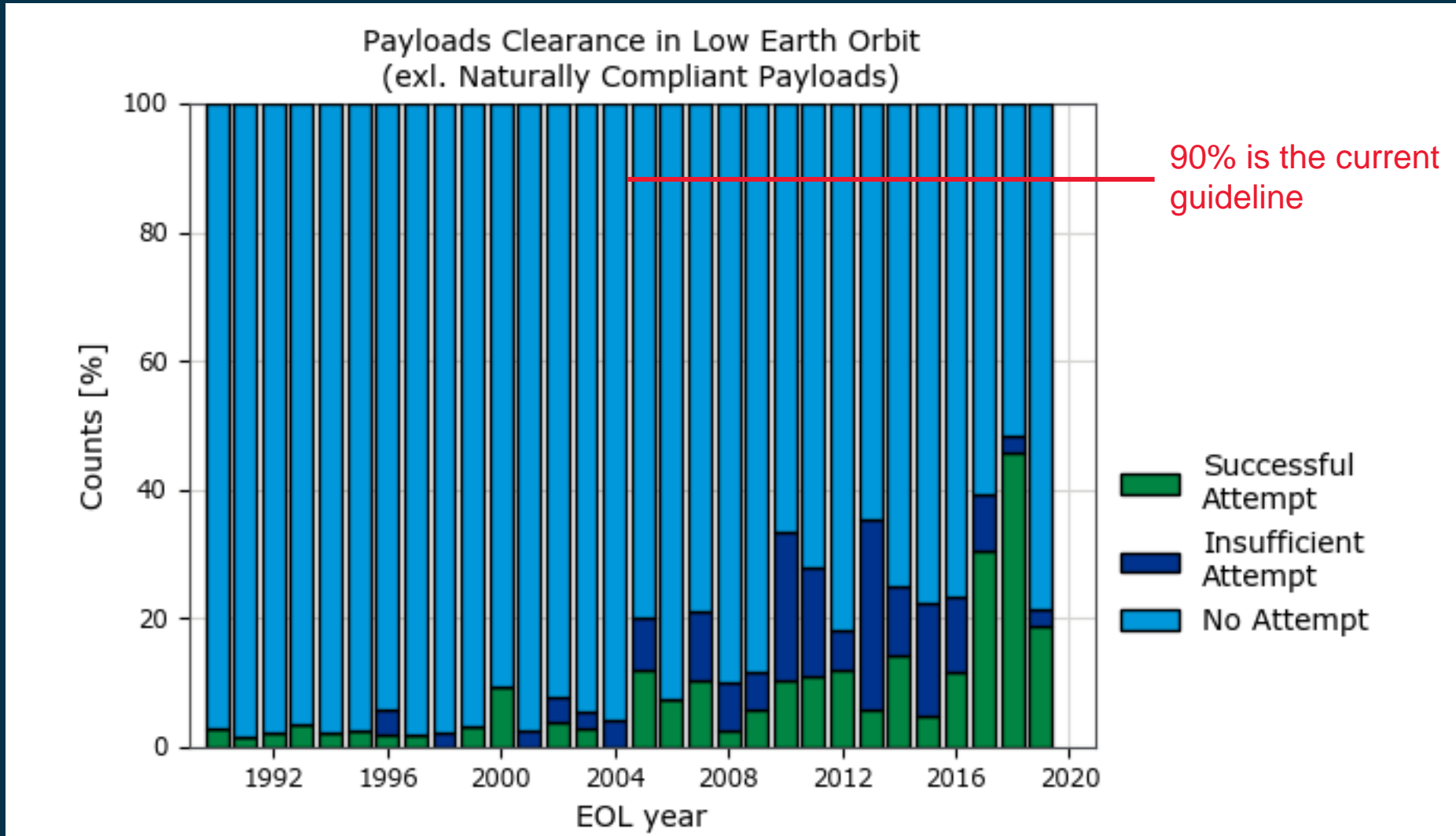
# Space Traffic Management Solutions



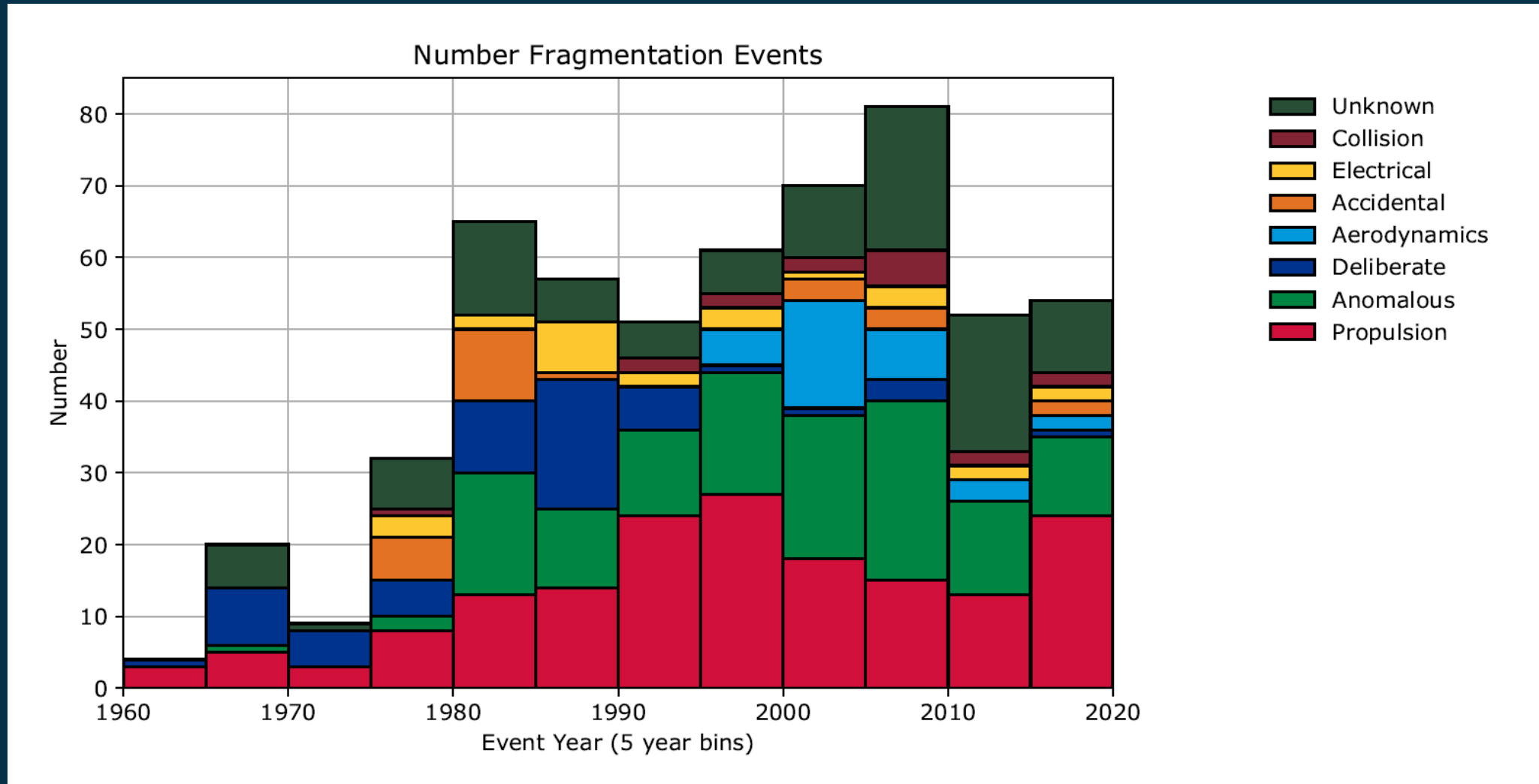
# Mitigation of Space Debris



# Post Mission Disposal Today

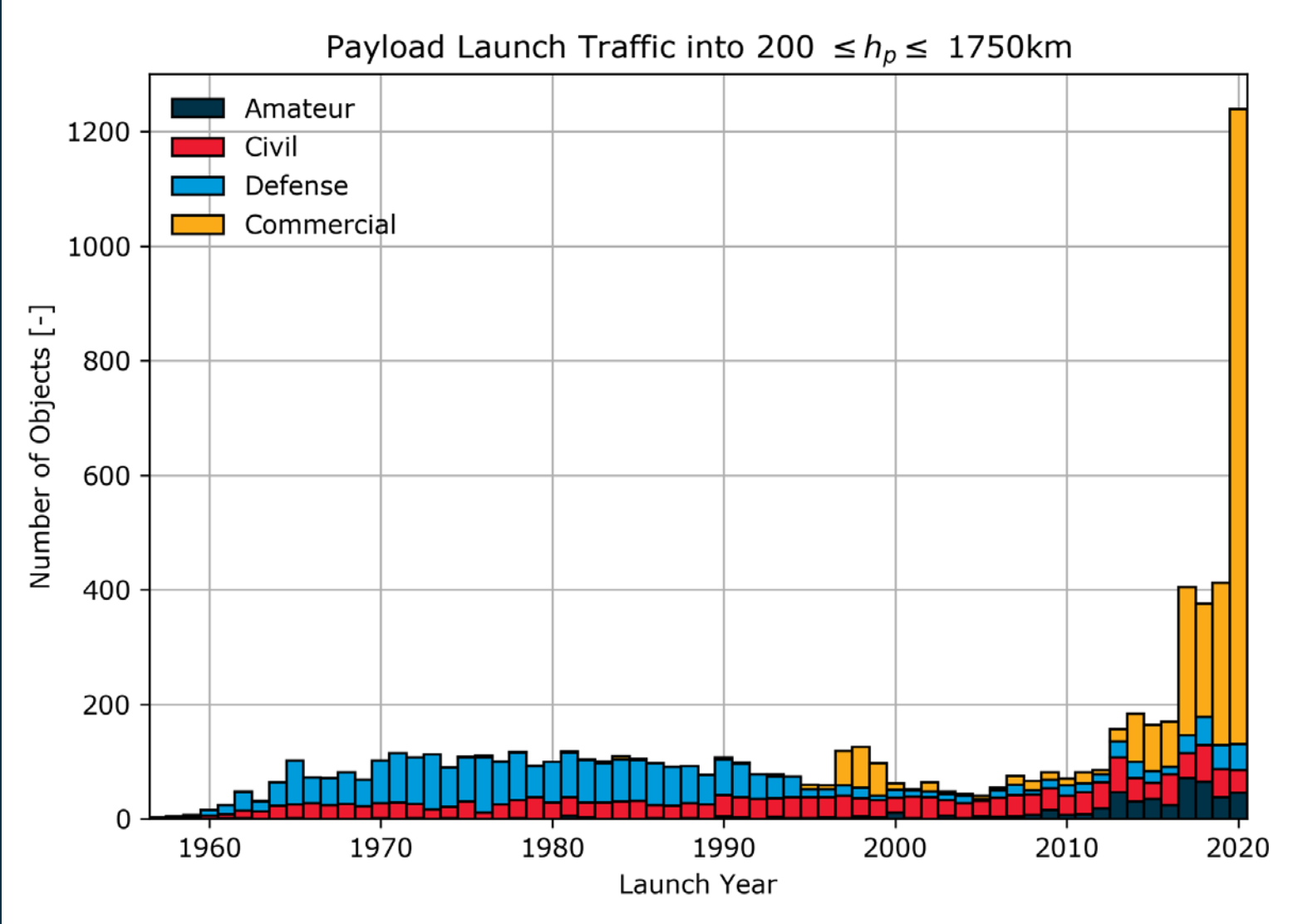


# Break-Ups in Orbit Today

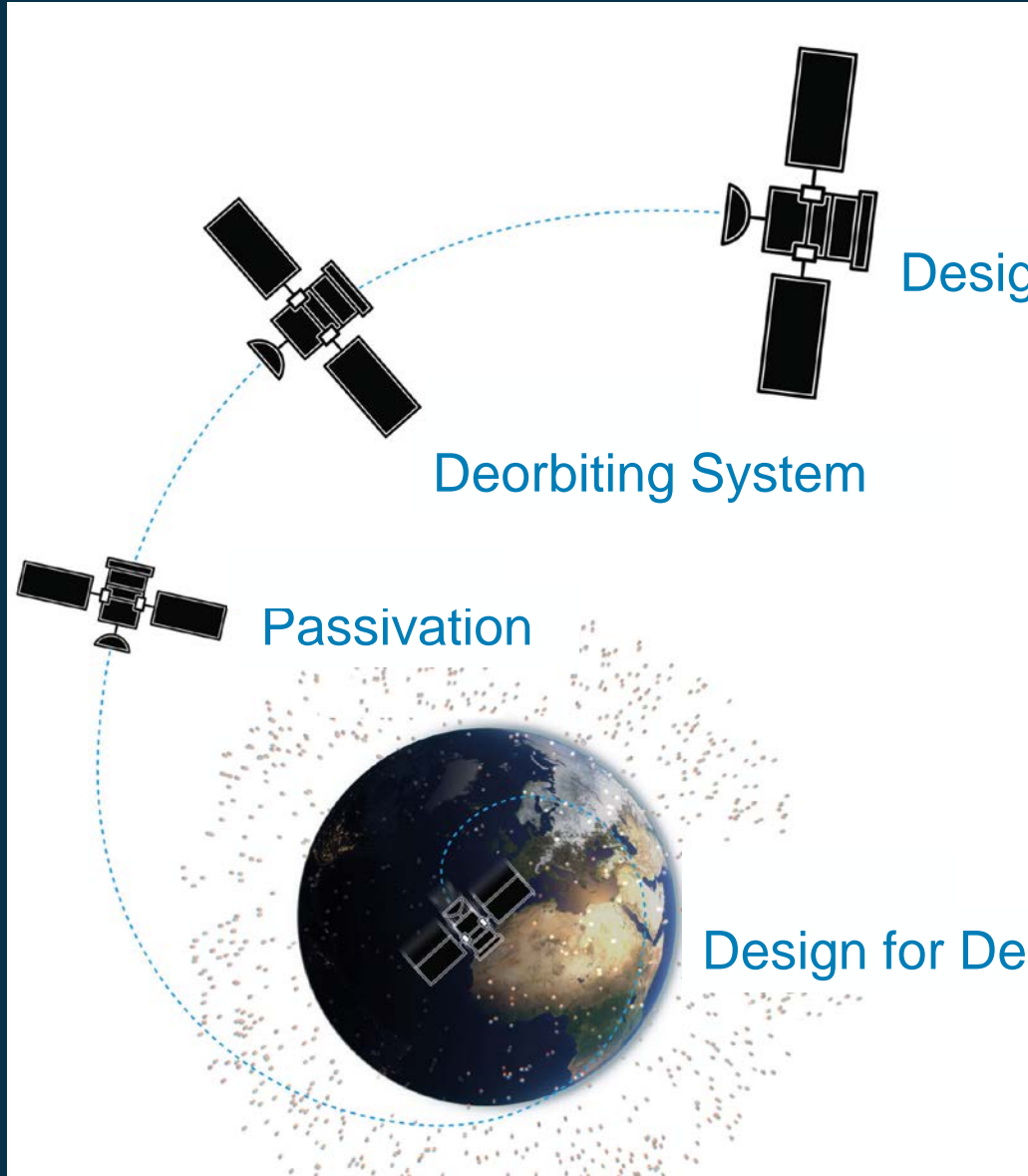




# Space Traffic Trends



# Cleanspace Mitigation Technology

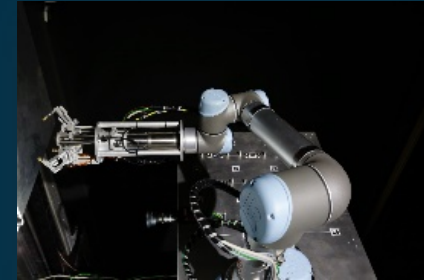
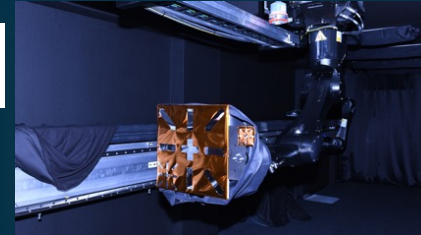


Design for Removal

Deorbiting System

Passivation

Design for Demise



# ADRIOS Roadmap

