



# cleansat

BB 13

Drag-Augmentation System Modules for LEO Satellites  
Space Research Centre, Cranfield University

24/05/2016

# Description of proposed technology Building Block

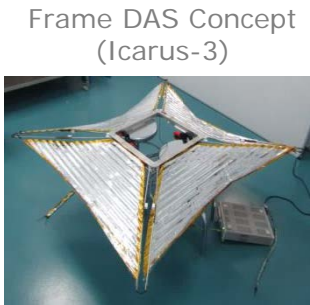
Scalable family of drag augmentation de-orbit devices

- ✓ Deployable Kapton sails
- ✓ Stored energy for deployment

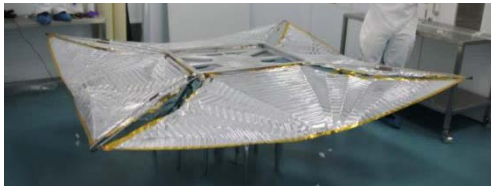
Design Options



Compact DAS Concept (DOM)



Frame DAS Concept (Icarus-3)



Frame DAS Concept (Icarus-1)

Trade offs

Size/Mass

Additional Drag Area

Configuration

Interfaces/Interference

Spacecraft Platforms



TDS-1

ESEO

SSI platforms

LSI platforms

## Applicability



Micro & Mini satellites

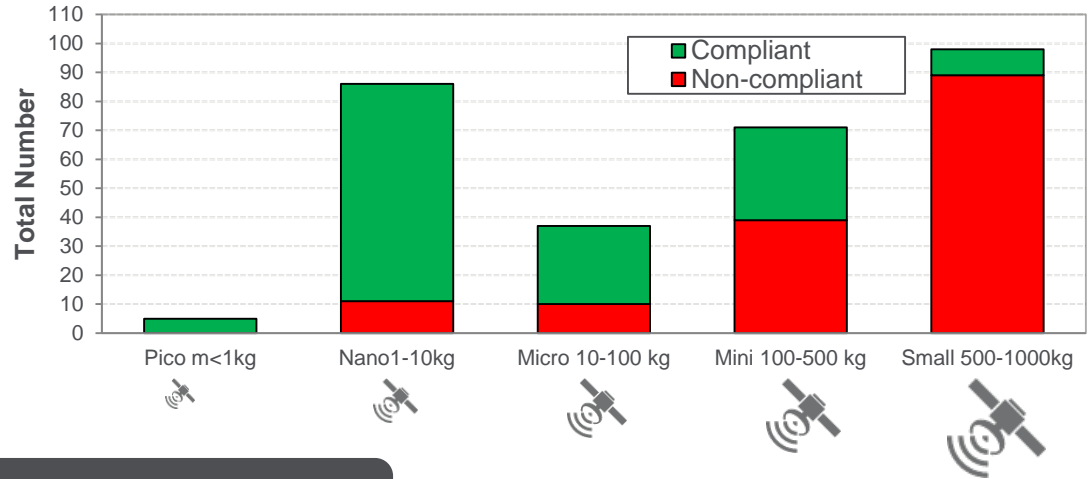


No propulsion/unproven



$h < 800$  km

Compliance with 25 years re-entry for planned satellites 2015-2020 in LEO



## System level impacts

- ✓ Low-mass
- ✓ Low-cost
- ✓ Simple interfaces
- ✓ Add only negligible risk

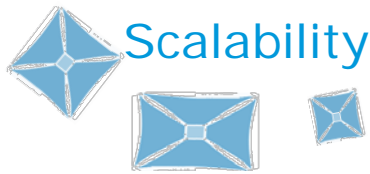


- $M \leq m_{prop}$  for de-orbit
- Scalable, COTS
- S/C to receive command, minimal power
- Safety: arm-fire sequence

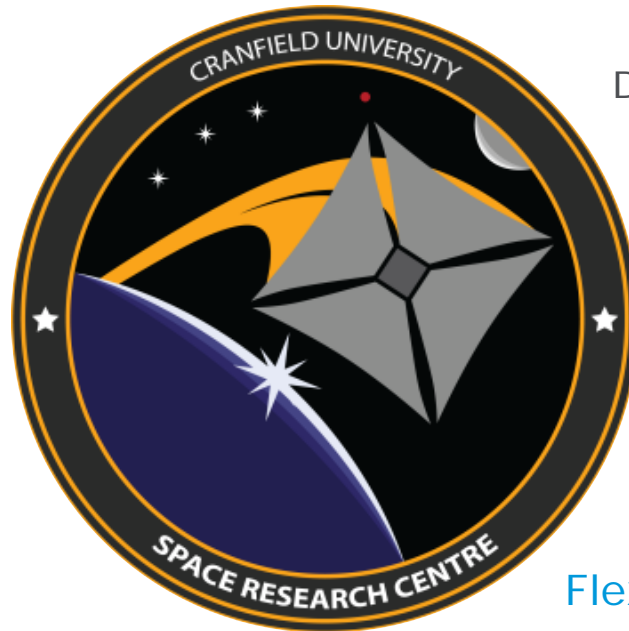
## Main Technical Challenges

How to accommodate the design with the different spacecraft platforms?

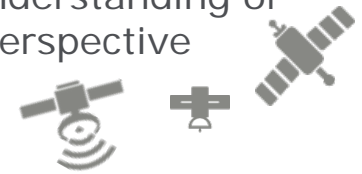
Refine the optimal designs



Adapting concepts



Detailed understanding of user perspective



DAS designs vs. Requirements

Flexibility, Be open minded!

Other configurations?