

# Macro Liability Problems for Singaporean Microsatellites

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# Launching Microsatellites

- Microsatellites are satellites that are around 100kg or less, launched into Low Earth Orbit (**LEO**)
- Specialist microsatellite launch vehicles are being developed (such as *LauncherOne* and *SOAR*)
- Microsatellites are launched as “piggybacks” on launches of conventional satellites on powerful launch vehicles that are capable of carrying a few tonnes into LEO
- For example, the PSLV launch on 30 June 2014 carried a 714kg French satellite (*SPOT-7*), 2 Canadian microsatellites (*Can-X4* and *Can-X5*), a German microsatellite (*AISAT*), and Singapore’s *VELOX-1*



# Scenario 1

- PSLV launch carrying a microsatellite built by the National University of Singapore
- Principal payload is a French remote sensing satellite for private satellite imagery company
- Other piggybacks are two microsatellites for a Canadian university and a German microsatellite owned by DLR, the German space agency
- Launch vehicle suffers from a C&C failure soon after launch and, failing to self-destruct, destroys a semiconductor components factory in Hong Kong



## Scenario 2

- *Ariane V* launching an experimental microsatellite for the National University of Singapore
- Principal payload is a cargo resupply module and component parts for the ISS built by ESA
- Other piggybacks are a large microsatellite for Japan, and smaller microsatellites for an Australian university, the South African government, and an Argentine university
- Launch vehicle explodes after liftoff and a large component, found to be the NUS microsatellite and its orbital transfer engine, destroys a commercial building on Grand Cayman in the Cayman Islands



## Take-Home Messages

- Singapore Government needs to be proactive in ensuring each launch is covered by specific bilateral or multilateral treaties concerning liability under international law
- Launch contracts need to be specific about indemnity or limitation clauses in the event of liability
- Singapore may consider legislating to require licensing and passing on the international liability to the private sector and prescribing mandatory insurance coverage



*Thank you.*

