



SPACE CLOUD

PROBLEM:

The 'space cloud' is a smart, satellite constellation concept providing resilient and trusted global space services. This includes communications, surveillance (ISR) and Position, Navigation and Timing (PNT) capabilities directly to Defence personnel.

RESEARCH QUESTIONS:

How do we fuse data sources, and distribute data processing, across a constellation to provide greater resilience to deliver the mission?

The following technical questions should be considered in the scope of autonomous (and distributed) on-board data processing:

- How do we undertake trusted and assured on-board distributed processing of satellite sensor data in a smart, small satellite constellation?
- How do you conduct appropriate data compression and analysis to send to, and receive from, terrestrial users and other satellites?
- What are the appropriate means of resilient communication between the satellites?
- How do you best conduct internal diagnostics (station keeping, collision avoidance, failure detection/fault isolation/failure resolution)?
- How do you form the most appropriate constellation or formation to execute the mission objectives, and as circumstances dictate, can it be changed mid-mission through autonomous decision making?

- How to optimise constellations and formations to maximise the desired effects for a given investment of resources?
- What are the appropriate standards for satellites within a constellation or formation to interoperate?

All responses must specifically take into account and demonstrably cater for the low SWaP requirements, and environmental conditions, of space.

EXPECTED OUTCOMES:

A prototype package demonstrating distributed data processing and fused data communication, showing an understanding of how to achieve the appropriate level of on-board decision making.