1. SPACE CLOUD

PROBLEM CONTEXT

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.

PROBLEM 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.

DESIRABLE OUTCOMES

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