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AEROSPACE SEMINAR

WEST THEATRE

BREAK

Next Session Begins at 1300

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DSEI AEROSPACE SEMINAR

WEST THEATRE

Panel Discussion hosted by L3Harris: C2 in Space and Implications of Contested Space Superiority

Chris Knapman, VP Business Development, L3Harris

Dr Stuart Eves, Consultant & Director - SJE Space Ltd

Alexandra Stickings, Research Fellow, Space Policy and Security, Royal United Services Institute (RUSI)

Mark Presley, Independent Consultant, MAP Analytics

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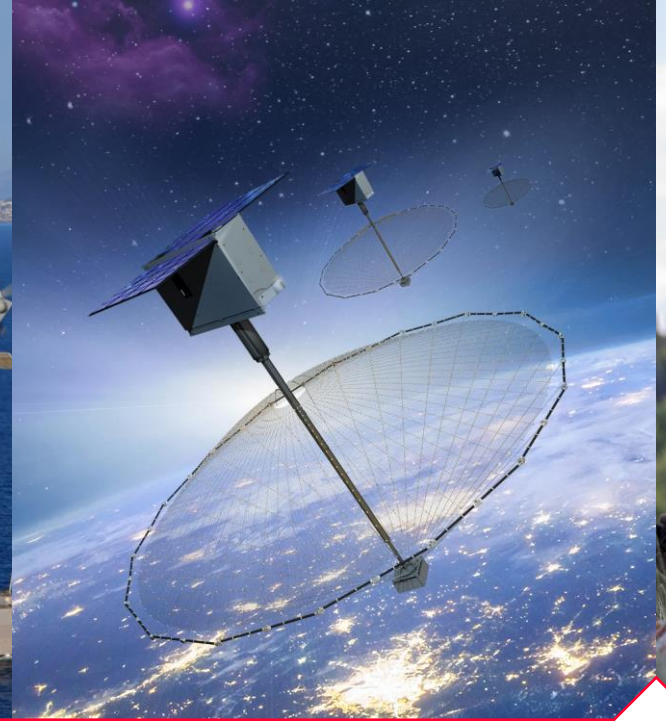
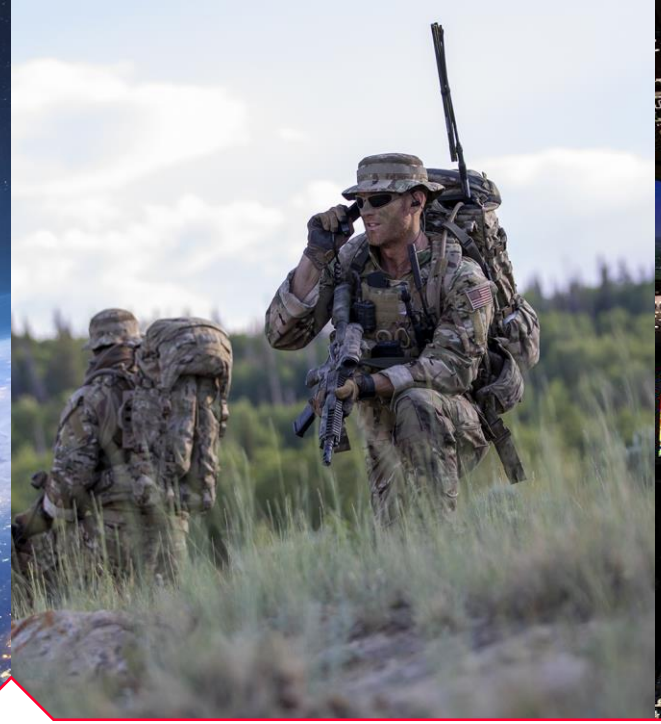


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DSEI PANEL DISCUSSION:
C2 in Space and the Implications of Contested Space Superiority

10 September 2019

The Military Implications of Commercial Space Developments

Dr Stuart Eves

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Commercial Imperatives

- The majority of the mega-constellations that have been proposed are commercial rather than Governmental
  - Rapid Timeframes
    - *Decision making significantly faster than taxpayer-funded projects*
  - Advanced capabilities
    - *High data-rates to very small user terminals*
  - Novel user communities
    - *Aiming to provide space-based alternatives to existing terrestrial infrastructure in may regions*
- The Bottom Line: Commercial capabilities in space will exceed Governmental capabilities in space in the near future

Capacity Change

- In the comms domain, the data rates available to hand-held devices will be increased significantly
- In the surveillance domain, the frequency of imaging opportunities will increase to “tactically-relevant levels”, (i.e. minutes rather than hours)
- The Bottom Line: As with Iridium, military forces worldwide will perceive the benefits of such tactical capabilities and seek to exploit them, ……making commercial systems potential targets, except that they may also be providing critical civilian services

Resilience Advantages

- A commercial system based on hundreds of satellites is comparatively invulnerable to kinetic attack
  - *The target satellites are likely to cost less than the kinetic ASAT missile required to attack them. The calculus now favours the defender*
- The sheer volume of traffic makes finding exploitable intelligence a challenging task
  - *Can Governmental collection systems keep pace with the commercial traffic?*
- Intersatellite/Networked links between satellites and significant levels of on-board autonomy can provide rapid warning of, and response to, interference, jamming, etc.
  - *Hostile acts can be attributed and publicised. Satellites will react dynamically.*

- The Bottom Line: Not easy to attack (with impunity)

Differing Perspectives

- Military and Commercial entities have distinctly different priorities:-
  - Protection costs money
    - *Unless a commercial organisation has a customer prepared to pay for resilience capabilities such as encryption and satellite hardening measures, they are unlikely to form part of the system design*
  - Commercial contracts have penalty clauses
    - *Foreign satellite operators will generally be unwilling to stop providing commercial services that are contracted to an adversary*
  - Surge requirements could be hard to meet
    - *A commercial operator will not necessarily prioritise a particular nation's military communications in a time of crisis*

SSA will also be commercialised

- The commercial sector is taking the lead on establishing the “Rules of the Road” for avoiding contention between constellations
  - *International agencies such as the UN have proved to be ineffective to date*
- The tracking data needed to mitigate the threat from on-orbit debris will be provided by commercial companies such as LeoLabs
  - *The commercial sector will be able to provide dedicated services for mega-constellation operators from globally distributed sensors*
- The Bottom Line: Commercial SSA will be better, and more resilient, than Governmental SSA

Conclusions

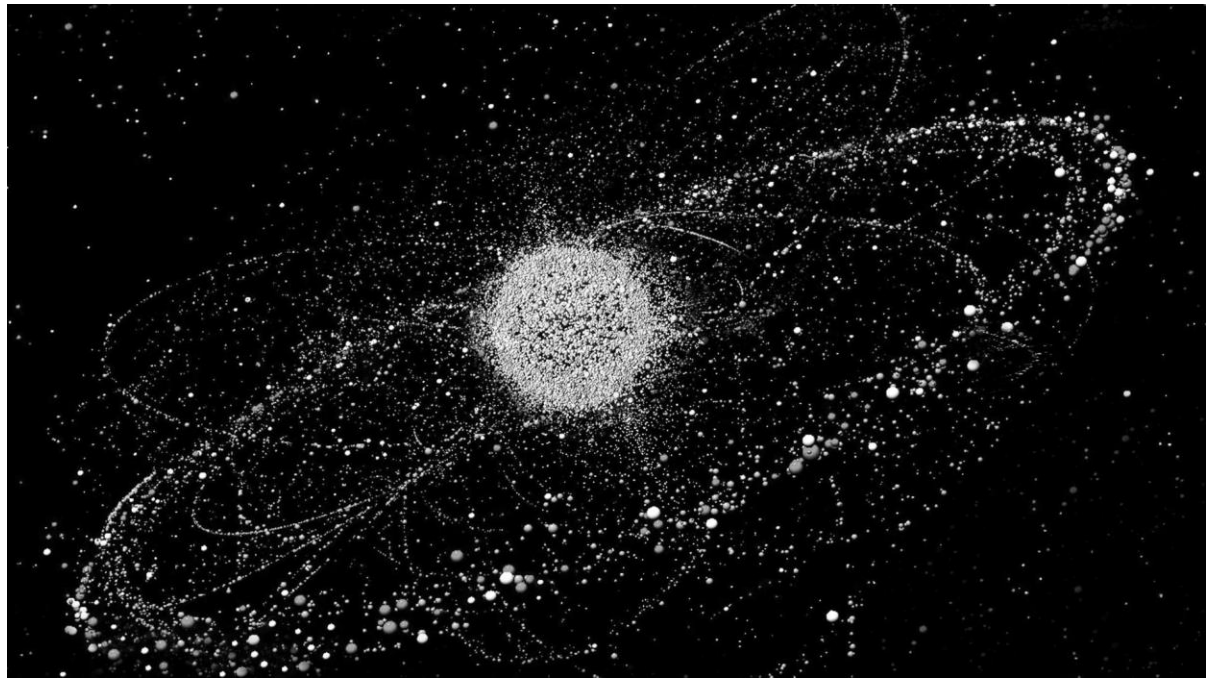
- There's going to be a lot of stuff up there
  - You probably won't know exactly where it all is
    - You probably won't know exactly what it's all doing
      - Both you, and your enemy, and a lot of entirely uninvolved civilians, may be using it
        - You won't know whether to attack it
          - You probably won't know how best to attack it
            - And you may not succeed if you try

- The Bottom Line: "Hmm, tricky!!"

MAP
Analytica

UK Space Futures

The military operations view of rising commercial influence



The Commercial Context

- Increased commercial launch capacity
- Private space actors are increasingly remote from policy influence
- There is an increasingly nomadic population of satellites
  - Active Debris Removal (ADR) & On Orbit Repair/Servicing (OOR/S) a complexity in itself that also may disguise threats
- Operators are increasingly reluctant to litigate to avoid the potential restrictions that might result
- The rise of very large constellations (OneWeb and Starlink)
  - By their very nature, breaking the terms of the UN orbital debris guidelines: *"Guideline 3: Limit the probability of accidental collision in orbit"*
- Sub-orbital space tourism
- Forum shopping for registration increases the range of regulatory boundaries

Threats and Opportunities this will drive

- **Threats:**
  - Private operators are leading policy rather than being subject to policy
  - More nimble commercial actors will begin to drive SSA and have a potentially better capability.
  - If the military do not engage, they are likely to be market followers rather than market leaders

Threats and Opportunities this will drive

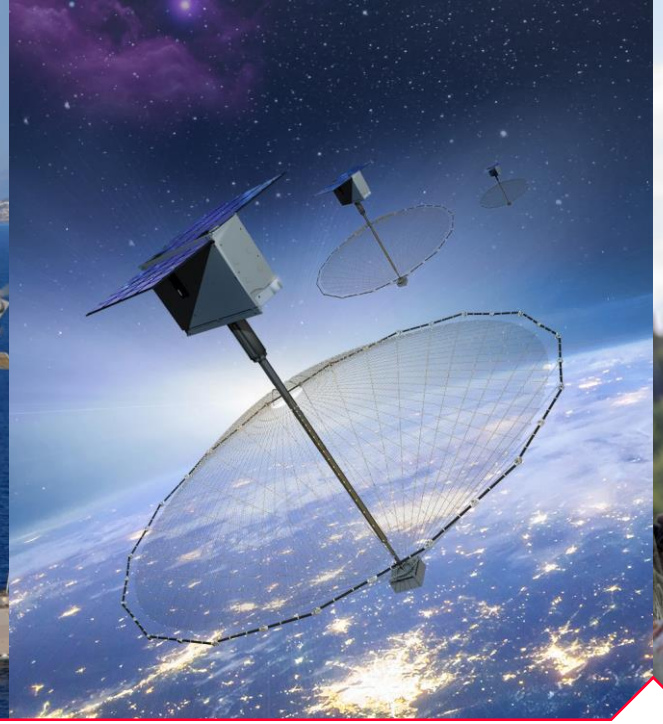
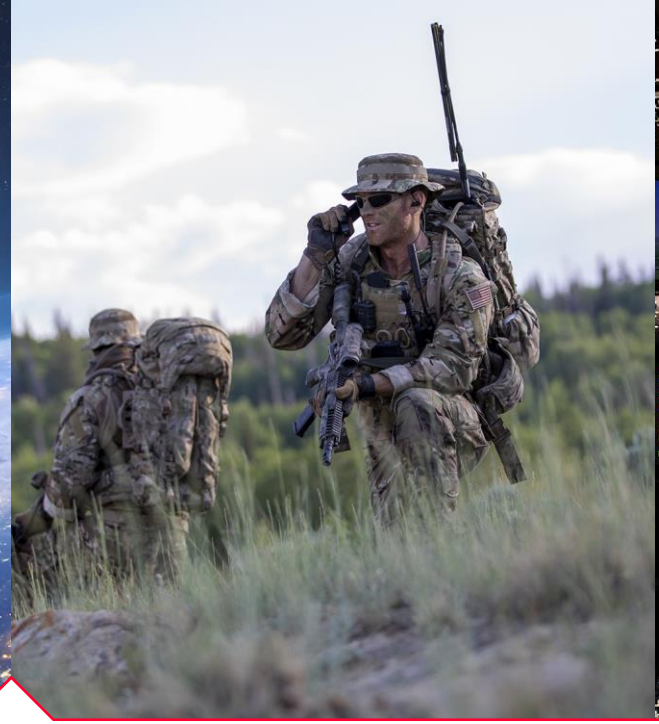
- **Opportunities:**
  - Increased, affordable surveillance capability is available and the need for SSA for all space operators is aligned.
    - Early access will reduce the UK reliance on other nations for space capability
  - Surveillance is no use without the expertise and experience to understand and exploit it. The military experience could drive the evolution of this capability
  - A Combined (military, civil and commercial) space operations centre will be the focus for UK SSA activity and be a catalyst for advocacy, understanding and exchange

Threats and Opportunities this will drive

- **Opportunities:**

  - If the military want to do warfighting, that does not include kinetic activity, it is imperative they can visualize the end-to-end infrastructure that supports satellite operations and can model and simulate the impact of any disruption to deal with a range of warfighting actions, particularly ‘grey-zone’ warfighting actions

Without the foundation of Observe & Orient in space, the ability to Decide and Act will be lost


C2 in Space and the Implications of Contested Space Superiority

Questions?

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