

THREATS ANALYSIS ON SPACE SYSTEMS

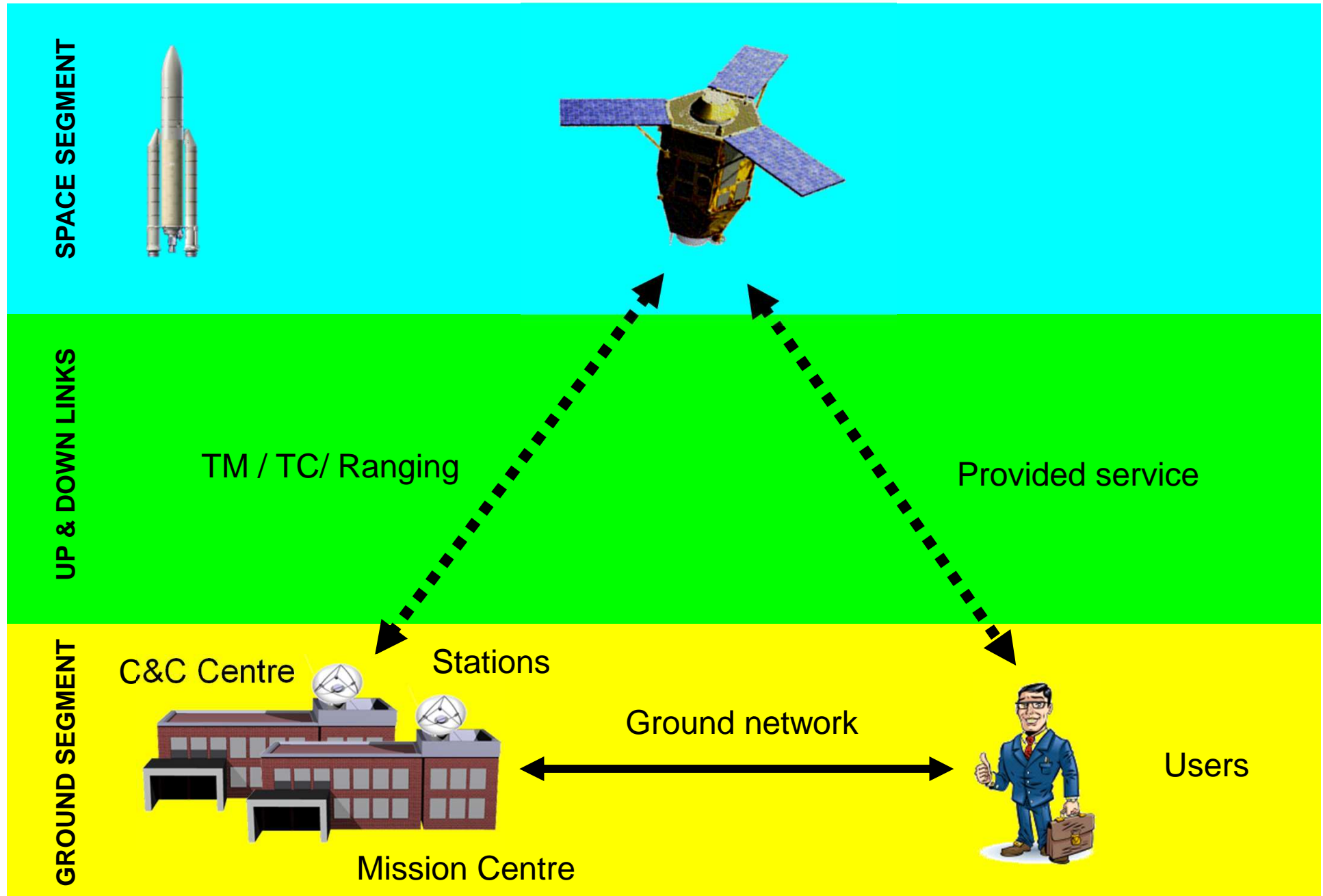
3 MAIN MESSAGES:

3 DIFFERENT AREAS TO CONSIDER

THREATS MAY BE OF VERY DIFFERENT NATURE

THERE ARE SOLUTIONS TO MITIGATE THE RISK

3 AREAS TO CONSIDER



THREATS MAY BE OF VERY DIFFERENT NATURE

NATURAL/ACCIDENTAL

DONE BY PURPOSE

	NATURAL/ACCIDENTAL	DONE BY PURPOSE
SPACE SEGMENT	<p>Normal Space environment</p> <p>Sun activity</p> <p>Debris</p>	<p>Destruction</p> <p>Permanent degradation</p> <p>Temporary degradation</p> <p>Dependency issues</p>
UP & DOWN LINKS	<p>Atmosphere</p> <p>Accidental interference</p>	<p>Interference</p> <p>Eavesdropping</p>
GROUND SEGMENT	<p>Natural disaster</p> <p>Industrial accident</p>	<p>Sabotage</p> <p>Cyber attack</p> <p>Dependency issue</p>

RISK MITIGATION (1)

SPACE SEGMENT

Satellite design: hardening, on board redundancy, in orbit redundancy...

UP & DOWN LINKS

High power emission, spread spectrum, encoding, encryption, coordination within the International Telecommunication Union, anti jamming capability...

GROUND SEGMENT

Safe areas for implementing operational centres, redundant back up centres, physical surveillance & protection of the centres, cyber protection, surveillance & protection of the users...

RISK MITIGATION (2)

In addition to these solutions, risk mitigation is to be also considered at **system level**:

- **System Robustness**: in orbit redundancy (spare spacecraft in orbit), distributed system on several spacecraft and ground centres, redundant independent system...
- **System Responsiveness**: spare spacecraft ready on the ground with fast launching capability...
- **Non dependency** strategy: national source or multiple sources
- **Surveillance (& control)** : Space Situational Awareness

Thanks for your attention

Questions ?

