High Performance Computing, AI, the Metaverse and quantum computing to transform space data management

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Drivers of change

• HPC for AI moving to exascale (e.g. UK gov £900m)
• National / European sovereignty requirements for HPC, AI and data
• AI moving to MLOps (operationalisation) and accelerating generative AI (e.g. Chat GPT) – ESA Digital Twin Earth and ESOC AI roadmap in place
• Metaverse becoming the context for simulation and visualisation
• Quantum computing gradually moving towards commercial applications

How should we respond as universities working with ESA?
High Performance Computing

• Tech companies offering HPC, cloud and AI tools to universities
• Multiple systems / several providers (e.g. Microsoft, AWS, European tech companies)
• University HPC hosting wide range of applications and datasets

• Federated HPC for space with downstream science and services? Complementing centralised ESA?
• ESA_LABs + ESA strategy for downstream applications, beyond institutional partners of ESA in DTE (e.g. Destination-E, ECMWF) and in-bound fellowships into ESA?
• Fellowships in ESA_LABs, between ESA_LABs or across ESA_LABs and ESA?
Operationalising AI capabilities

Super-resolution for satellite imagery

Space traffic management incorporating drag and solar effects
Metaverse capabilities and training

• Metaverse is becoming an environment for simulation and visualisation, including for Digital Twins
• How can we use metaverse for enabling engagement?
• Training remotely and at scale
Quantum Computing for Space

• We have looked at optimising materials for space
• Image data processing from earth observation
• Compression of communications data
• These are still somewhat far from market
• Is this an opportunity we could continue to look at together? Could we engage with European and national programmes together?
In summary

• How can ESA_LABs accelerate our progress with data through working together?
• Are there some ESA tools to get sufficient funding to enable us to work together?
• Can ESA help us through being a partner as well as a funder?