Technolution

FOUNDING

UNIVERSITY OF TWENTE.

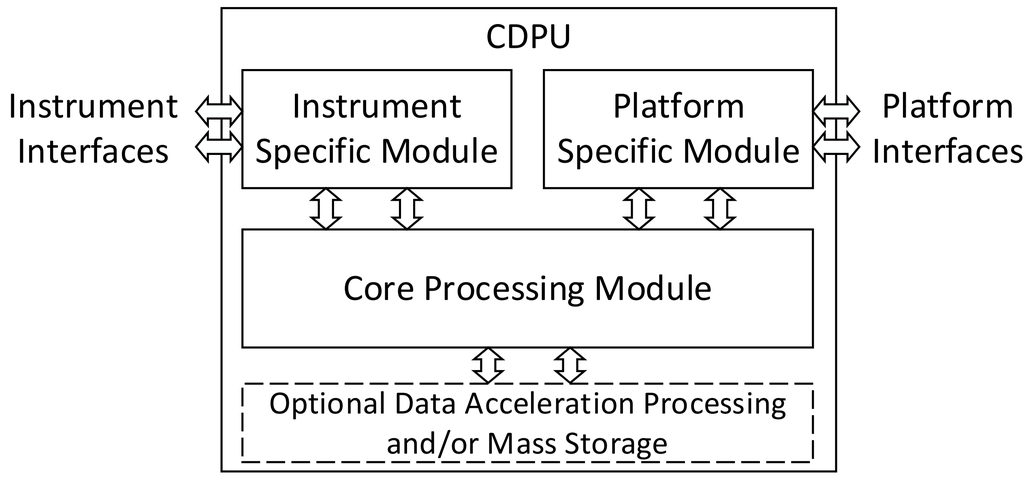
irdeto
Protect. Renew. Empower.

TRISTAN
RISC-V

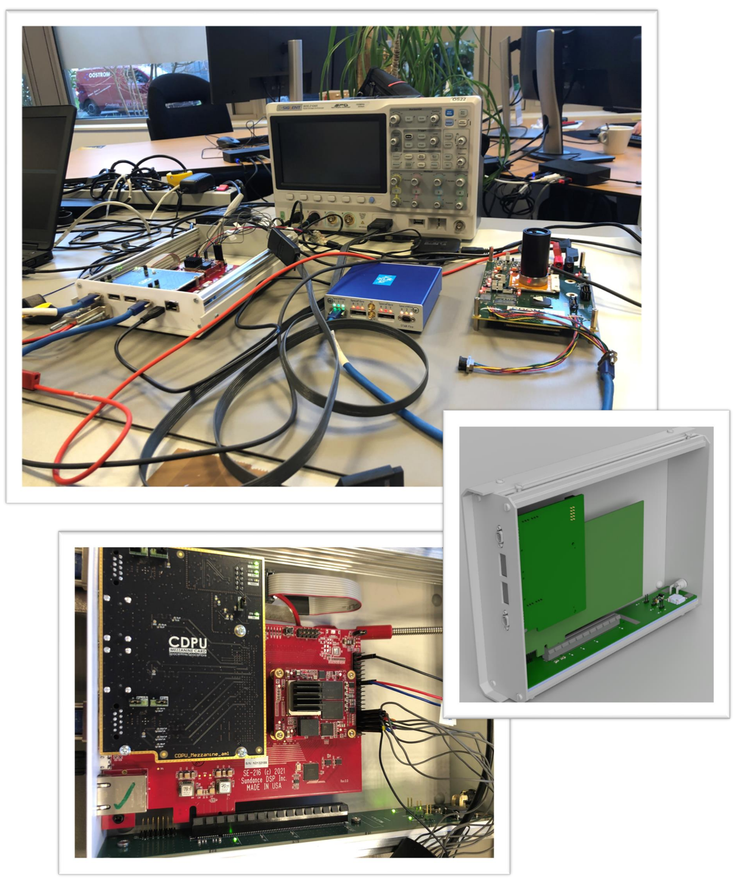
SmallSat Payload Control & Data Processing: High-Reliability and High-Security with RISC-V

The **Control & Data Processing Unit (CDPU)** offers flexibility and reduced Time-to-Orbit for compact SmallSat instruments

- Flexibility at design-time
- In-orbit reconfigurability
- In-orbit edge computing (image processing, encryption, instrument autonomy)
- >5 years in-orbit life-time (LEO)

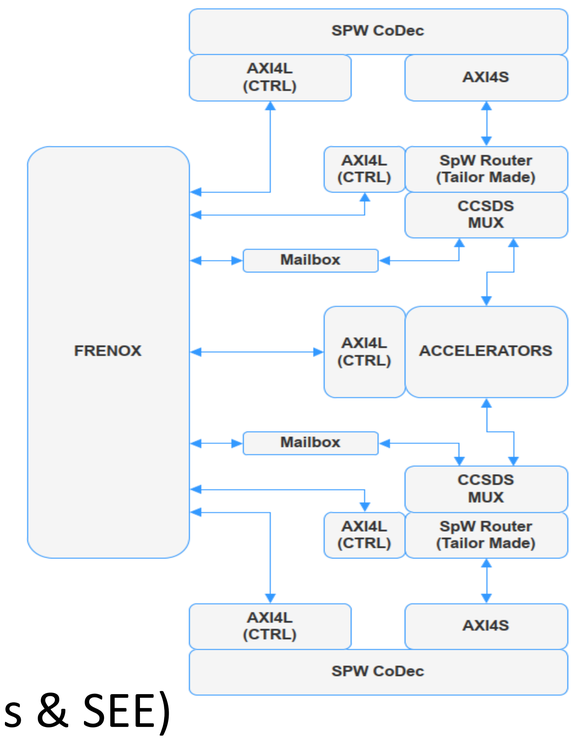


Trade-off: COTS | Rad.-tolerant | Rad.-hardened



CDPU base-line design:

- **FreNox RISC-V IP** (RV32IMA)
- SpW interface IP
- SpFi interface IP
- AXI interconnect infrastructure
- Accelerator support

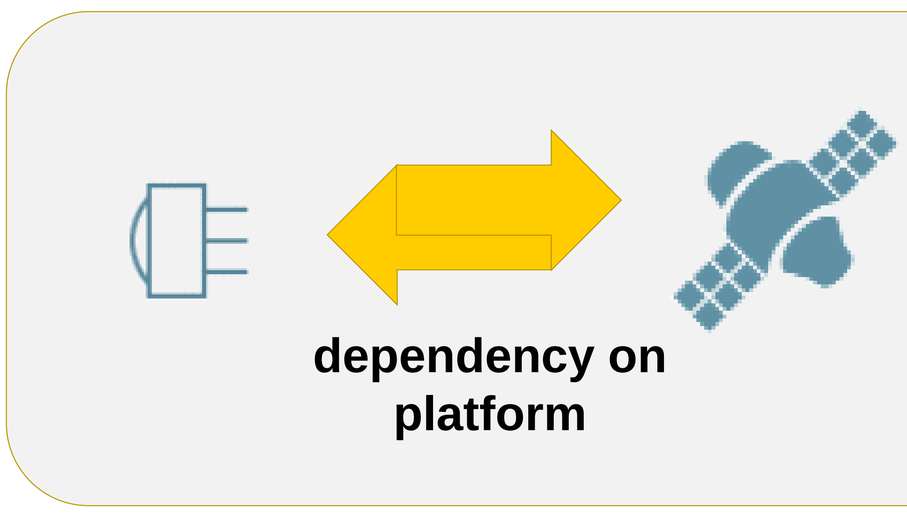


High-Reliability & High-Security features:

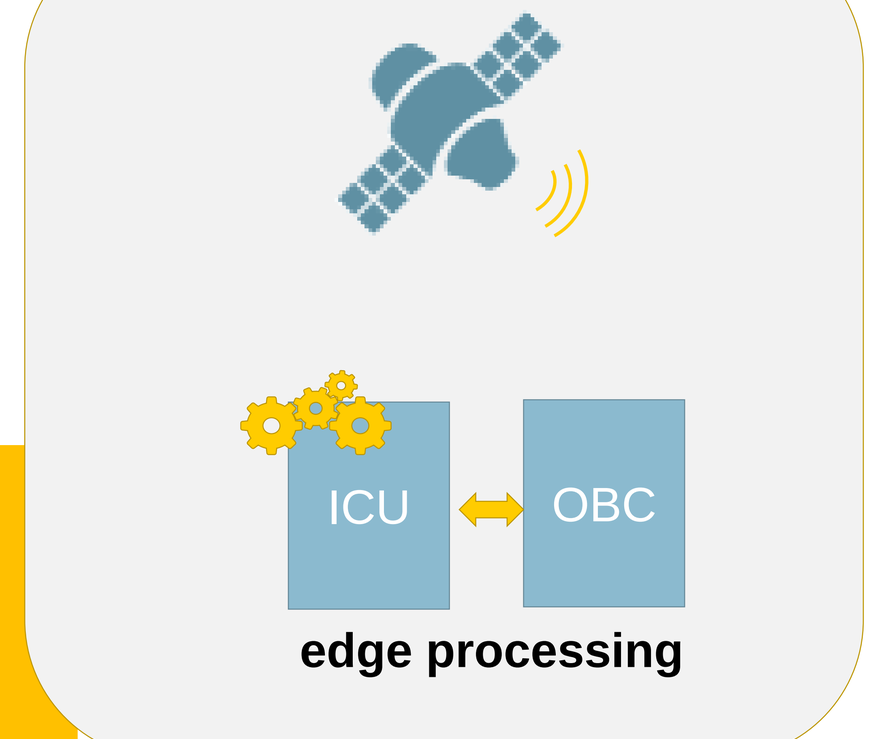
- Lockstep
- Error Detection and Correction
- Lightweight checkers (Hardware Trojans & SEE)
- FDIR handling
- PQC encryption & authentication
- Secure boot & reconfiguration

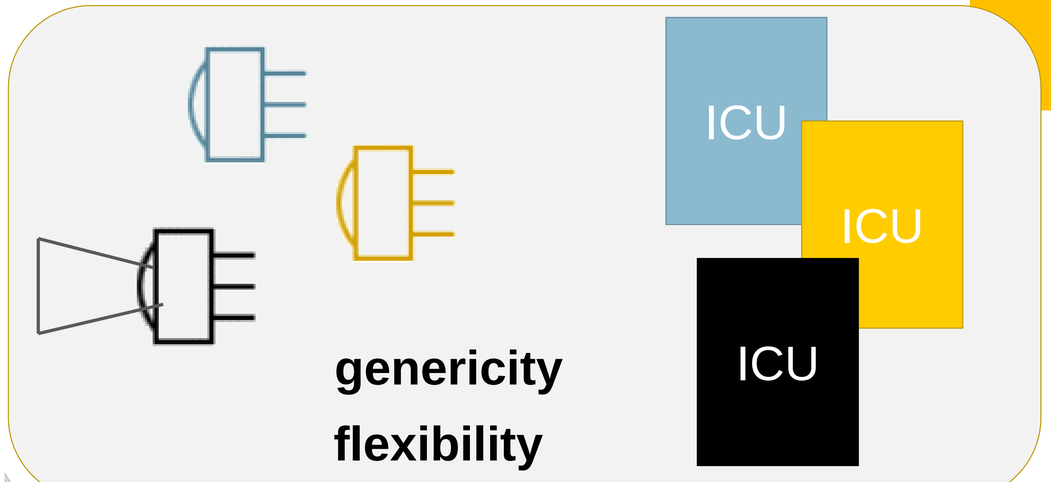
Implemented in **(RT) PolarFire FPGA**

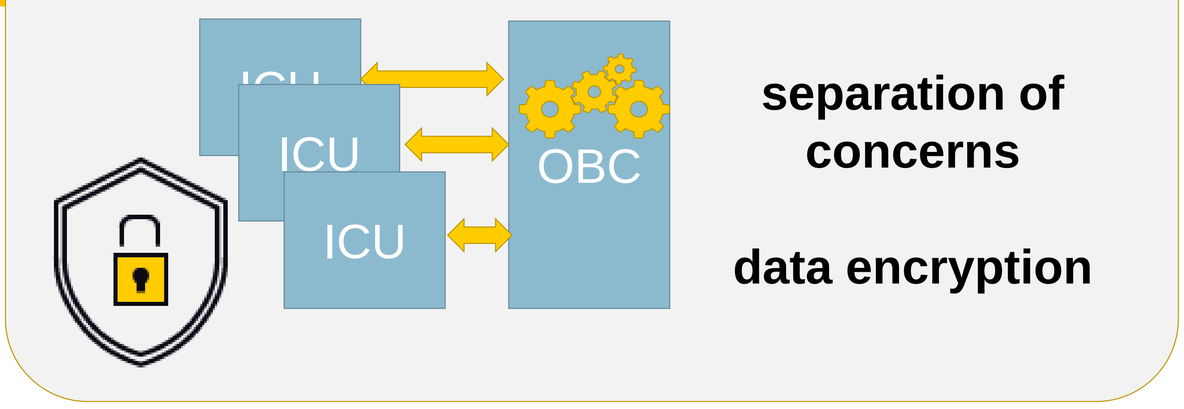
- Successfully tested with 4Mpx camera head (3D PLUS)



Challenges to address for NewSpace SmallSat







European Commission

KDT JU
Key Digital Technologies Joint Undertaking

TRISTAN has received funding from the Key Digital Technologies Joint Undertaking (KDT JU) under grant agreement nr. 101095947. The KDT JU receives support from the European Union's Horizon Europe's research and innovation programmes and participating states are Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Germany, Denmark, Estonia, Greece, Spain, Finland, France, Hungary, Ireland, Israel, Iceland, Italy, Lithuania, Luxembourg, Latvia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Sweden, Slovenia, Slovakia, Turkey

Supported by esa Netherlands Space Office

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