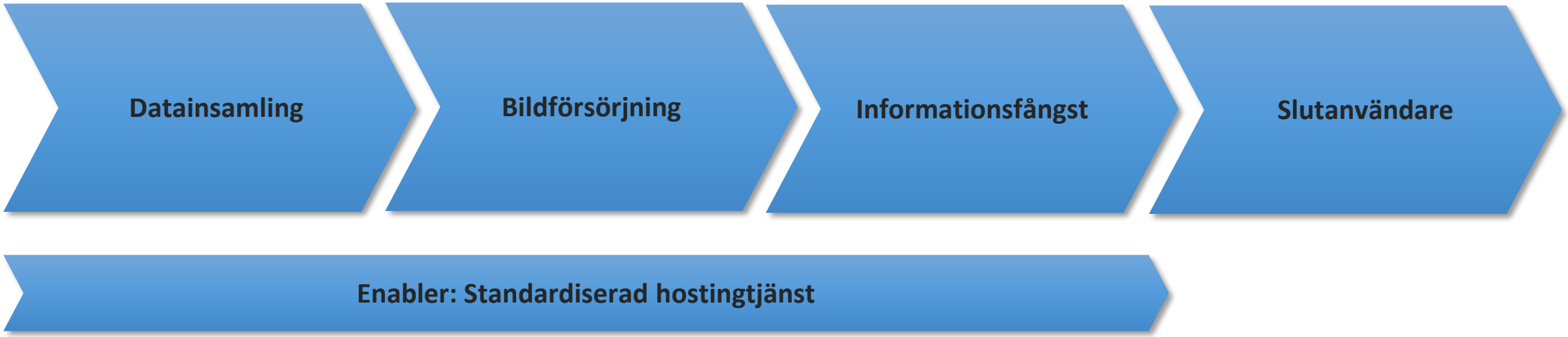
Spacemetric

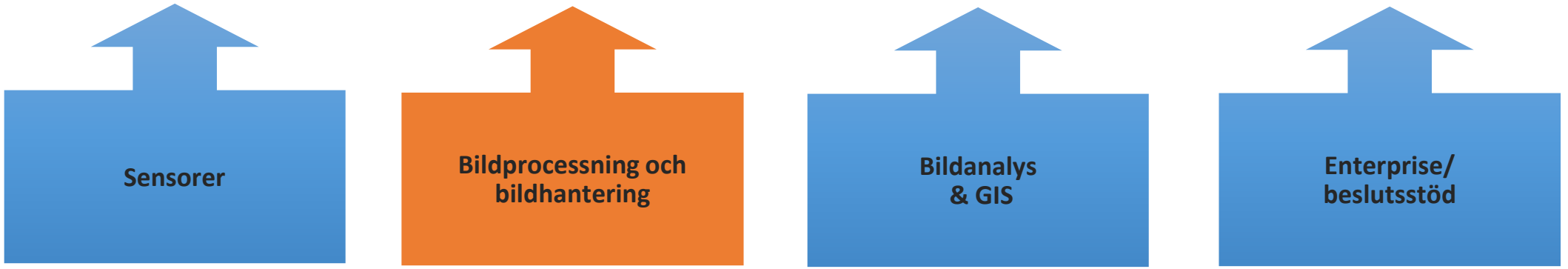
EN VÄRLDSLEDANDE SVENSK LEVERANTÖR AV GEOSPATIAL BILDHANTERING SEDAN MER ÄN 25 ÅR – ETT HELÄGT AAC CLYDE SPACE-FÖRETAG

- Satellit
- Flyg och UAV

www.spacemetric.com

Från sensor till analysfärdiga data





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BLUESTONE

Dataprocessning ombord

Bildhantering ombord från sensor till ortobilder, inklusive smart urval av data för prioriterad nedladdning av data. AI-ready.

CLOUDSTONE

Dataprocessning i molnet

Molnbaserad bildhantering från sensor till ortobilder. Skalbart i alla nivåer.

KEYSTONE

Processning i Ditt datacenter

Bildhantering från sensor till ortobilder. En traditionell klient-serverlösning för större organisationer.

Helägd IPR, NATO JISR, non-ITAR

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NÅGRA KUNDER

SATELLITE

- Airbus Defense and Space
- Surrey Satellite Technology
- Earth-I
- ESA
- Vietnamese Imaging Company
- Metria (Swedish mapping company)
- EU Joint Research Centre
- Kongsberg Satellite Services (KSAT)

MILITARY

- Swedish Armed Forces
- SAAB AB
- NV5
- E-geos and Telespazio / European Commission

AIRCRAFT

- Skyflox
- Frontex
- Lantmäteriet (Swedish mapping authority)

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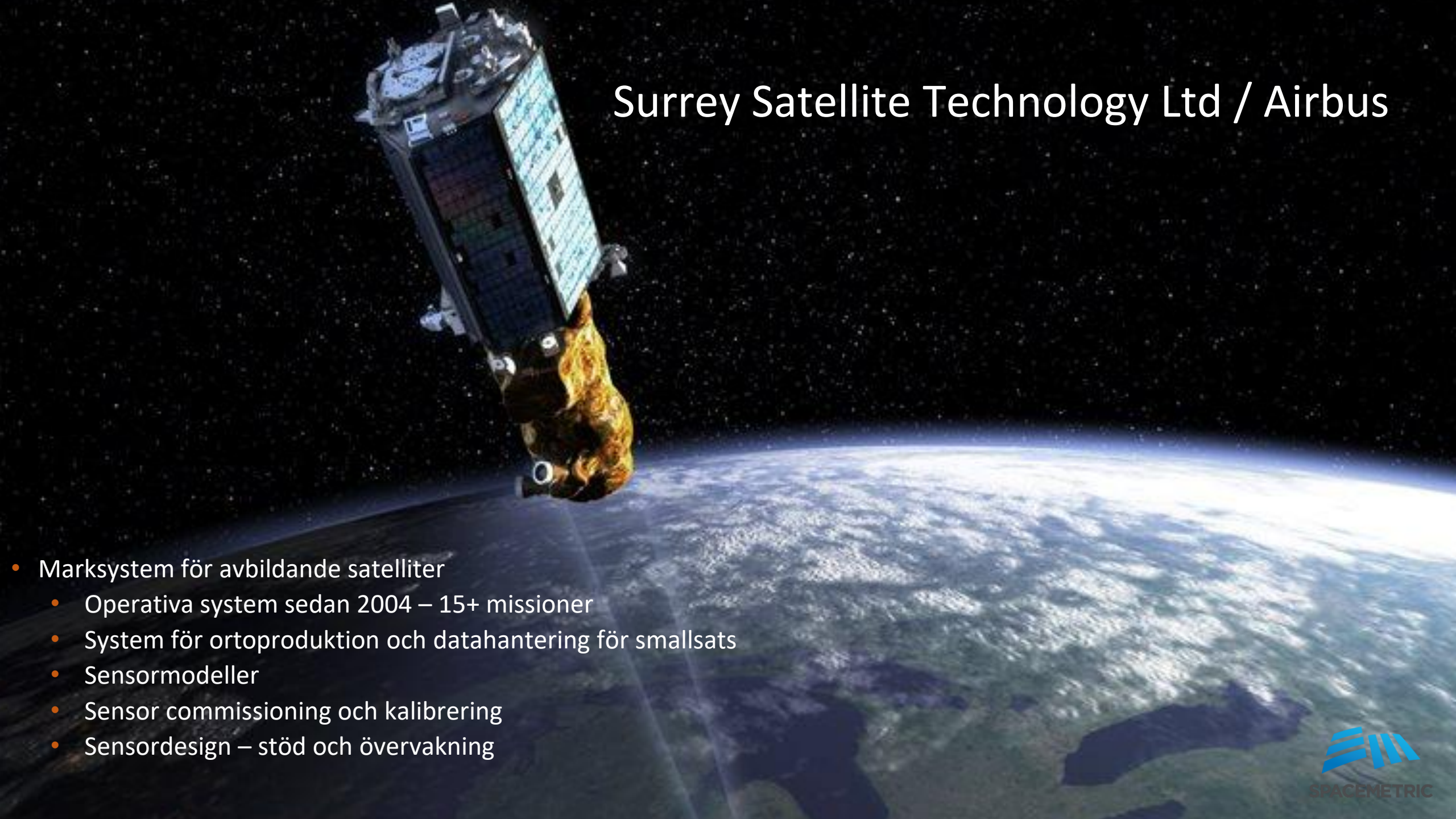
Surrey Satellite Technology Ltd / Airbus

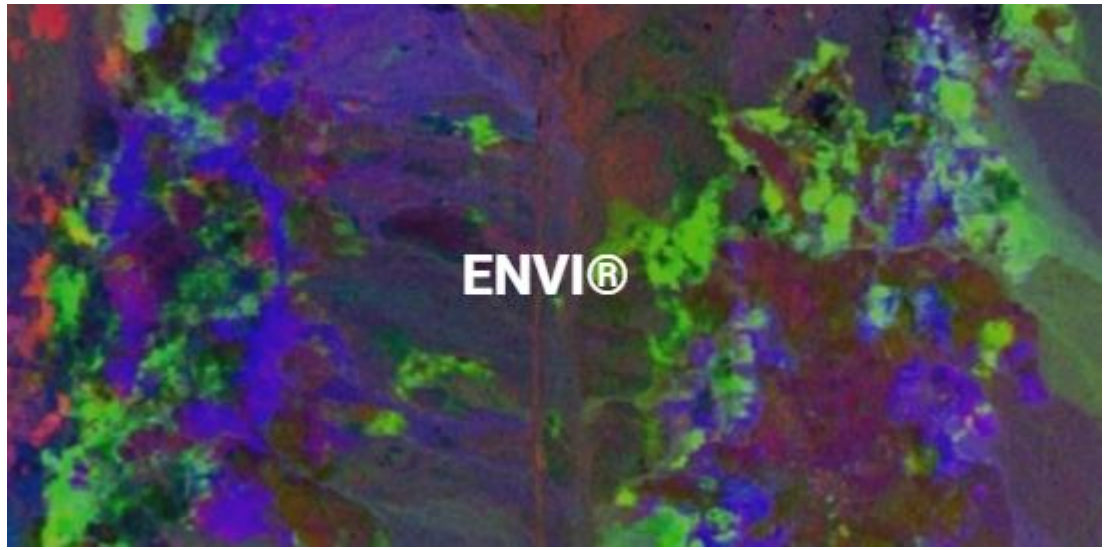


- Marksystem för avbildande satelliter
  - Operativa system sedan 2004 – 15+ missioner
  - System för ortoproduktion och datahantering för smallsats
  - Sensormodeller
  - Sensor commissioning och kalibrering
  - Sensordesign – stöd och övervakning

NV5 ENVI – världsledande mjukvara för bildprocessning och analys

Fotogrammetrimodul

- Keystone ”under huven”
- Noggrann ortorektifiering
- Extraktion av 3D-data från stereo
- Partnerskap sedan 2008
- Distribueras över hela världen av NV5



NV5 ENVI®

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EDGE PROCESSING – FÖRDELAR

- Bildprocessning nära sensor
- Kortare tid från data till information
- Effektivare användning av nedladdningslänk / bandbredd
  - Nedladdning av metadata (ex. var ligger bilderna på kartan)
  - Nedladdning av prioriterat bildmaterial
  - Nedladdning av analysresultat – t.ex. ”var finns fordon?”

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EDGE PROCESSING

- Bildbehandling på satellit i omloppsbana – i rymden sedan 2022
  - Dataavkodning, spektralbandsregistrering, ortorektifiering
- Strömmande video för flygburen övervakning
  - Dynamisk anpassning till nedladdlingslänkens bandbredd
  - Cropping, rescaling, re-coding
- Bildbehandling på mikrodator & FPGA & ASIC
  - Dataavkodning, bandregistrering, brusreduktion

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- Försvarsmakten, IMINT
- Gripens spaningskapsel – bildarbetsflöde för snabb undrapportering (< 1hr)
- Taktisk UAV – realtidsvideo katalog, visualisering & access

Foto: Niclas Ehlén/Försvarsmakten

Federated Mission Networking (FMN)

- Informationssystem för samarbete t.o.m. SECRET inom bl.a. NATO
- En viktig funktion är ”Joint Intelligence, Surveillance and Reconnaissance/Coalition Shared Data” (JISR/CSD).
- JISR/CSD omfattar:
  - Bibliotekstjänster
  - Strömmande data (video)
  - Styrning av undprocessen (Intelligence Requirements Managemen / Collection Management)

R&D summary

Innovair
- Key facilitator – Sweden's national strategic innovation programme for aeronautics, a joint initiative of Vinnova, Formas and the Swedish Energy Agency

Swedish National Space Agency:
- Another key facilitator helping to keep our R&D pace

Co-operation with Swedish Academia

Constant look-out for like-minded industrial partners

70-80 % of the budget is R&D

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PEONEER

- **Persistent earth observation from Space with automated interpretation of data and information, including AI, cloud solutions, and real time on-board processing**
- Europakommissionen (European Defense Industrial Development Programme)
- 2020 – 2025; slutdemo maj 2025. Spacemetric demonstrerade ombordprocessning och försåg Airbus med korrigerade data ombord. Detta möjliggjorde AI-analys ombord och nära realtidsleverans av underrättelser till marken.
- Projektet skapade en prototyp och har ombetts inkomma med ett förslag till demonstrator
- Lett av e-GEOS (Italien) with åtta partners (Airbus, Terma, …)
- Spacemetric: Bilddatahantering och arbetsflöde

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INNOVAIR project: AUTONAV and Follow-On Projects

- Innovair – Sweden's national strategic innovation programme for aeronautics, a joint initiative of Vinnova, Formas and the Swedish Energy Agency
- Autonomous UAV Navigation Support from Real-Time Visual Mapping
- Innovair project 2019 – 2023
- Co-operation with Royal Institute of Technology
- Patented for autonomous navigation in non-urban terrain
- Follow-on project for the Swedish MoD included on-board production of real-time 3D point clouds, led to TRL 4
- **Potential end game: Resilience to degraded global positioning and on-the-fly, on-board, 3D visualisation**

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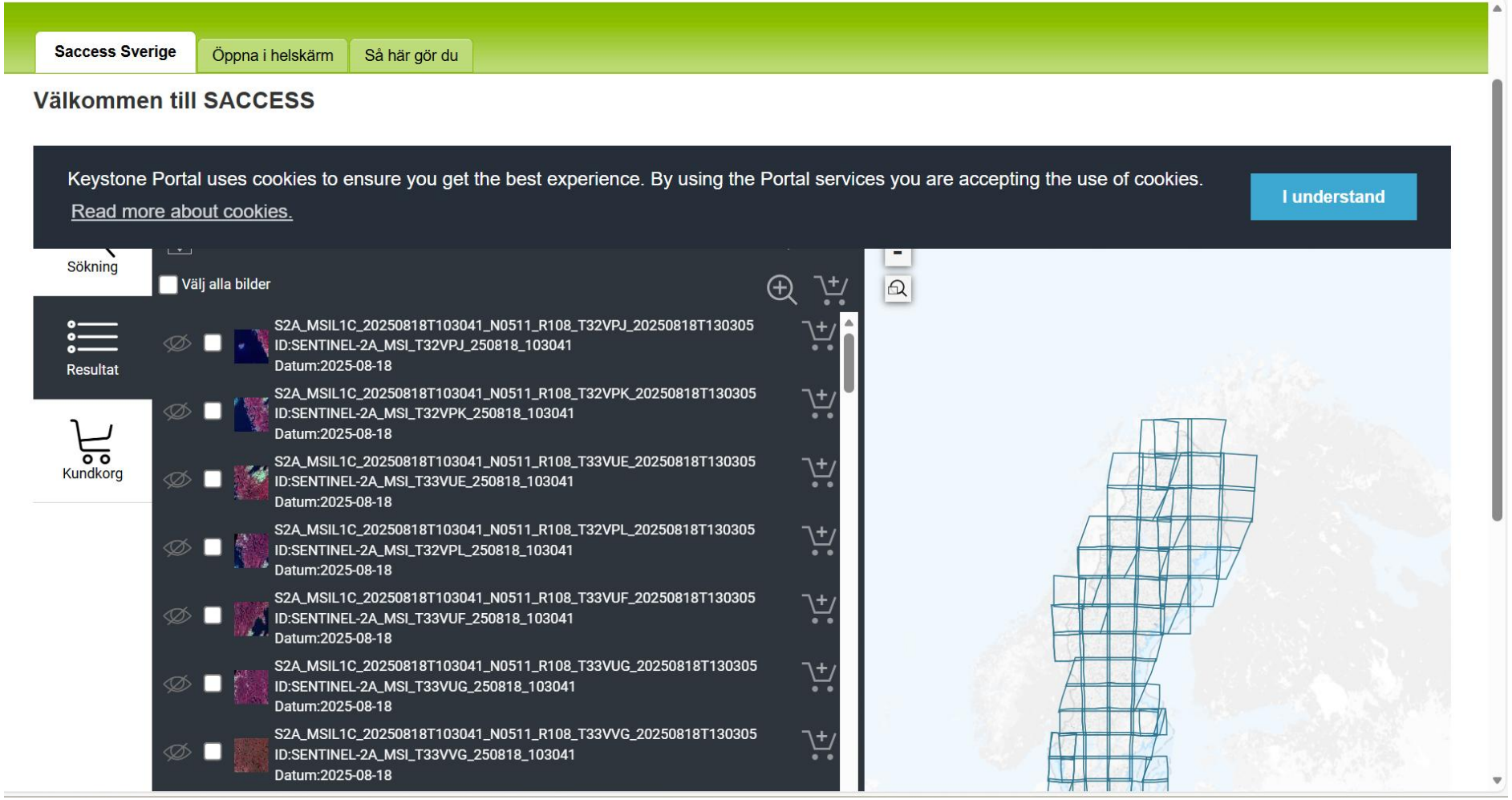
Samarbete med Lantmäteriet – SACCESS



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VINNOCUT 1 and 2

- **Using radar satellite data and AI** for monitoring forest clear-cuttings 2023-2026
- The Swedish Forest Agency needs to pinpoint exact dates of clear-cuttings.
- Spacemetric performed preliminary initial tests and supplies a system for searching and retrieving time series data over selected areas, with correct format and geometry. Swedish AI company Qamcom delivers AI algorithms.
- The first project was promising, resulting in the current follow-up project to make methods more general
- The first project was supported by the Swedish innovation and research program “Advanced Digitalisation”; the follow-up project by the Swedish National Space Agency

We are funded by the innovation and research program Advanced Digitalisation

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INNOCARM

- **Adding Spacemetric’s geographic data management and Swedish SME PandionAI’s AI tools to Carmenta's visualization tools**
- The project merged the three capabilities, **enabling Carmenta to market and sell the combined offer to its customers**
- Some development included of both Spacemetric’s and PandionAI's capabilities.
- Project supported by Innovair, the Swedish National Aeronautical Innovation Programme, a joint initiative of Vinnova, Formas and the Swedish Energy Agency
- 2023 - 2025

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INNOSAAB

- **Adding Spacemetric's geographic data management and Swedish SME PandionAI's AI tools to SAAB's on-board capabilities**
- The project merges the three capabilities, aiming to **enable SAAB to market and sell the combined offer to its customers**
- Some development included of both Spacemetric's and PandionAI's capabilities.
- Project supported by Innovair, the Swedish National Aeronautical Innovation Programme, a joint initiative of Vinnova, Formas and the Swedish Energy Agency
- 2023 – 2025

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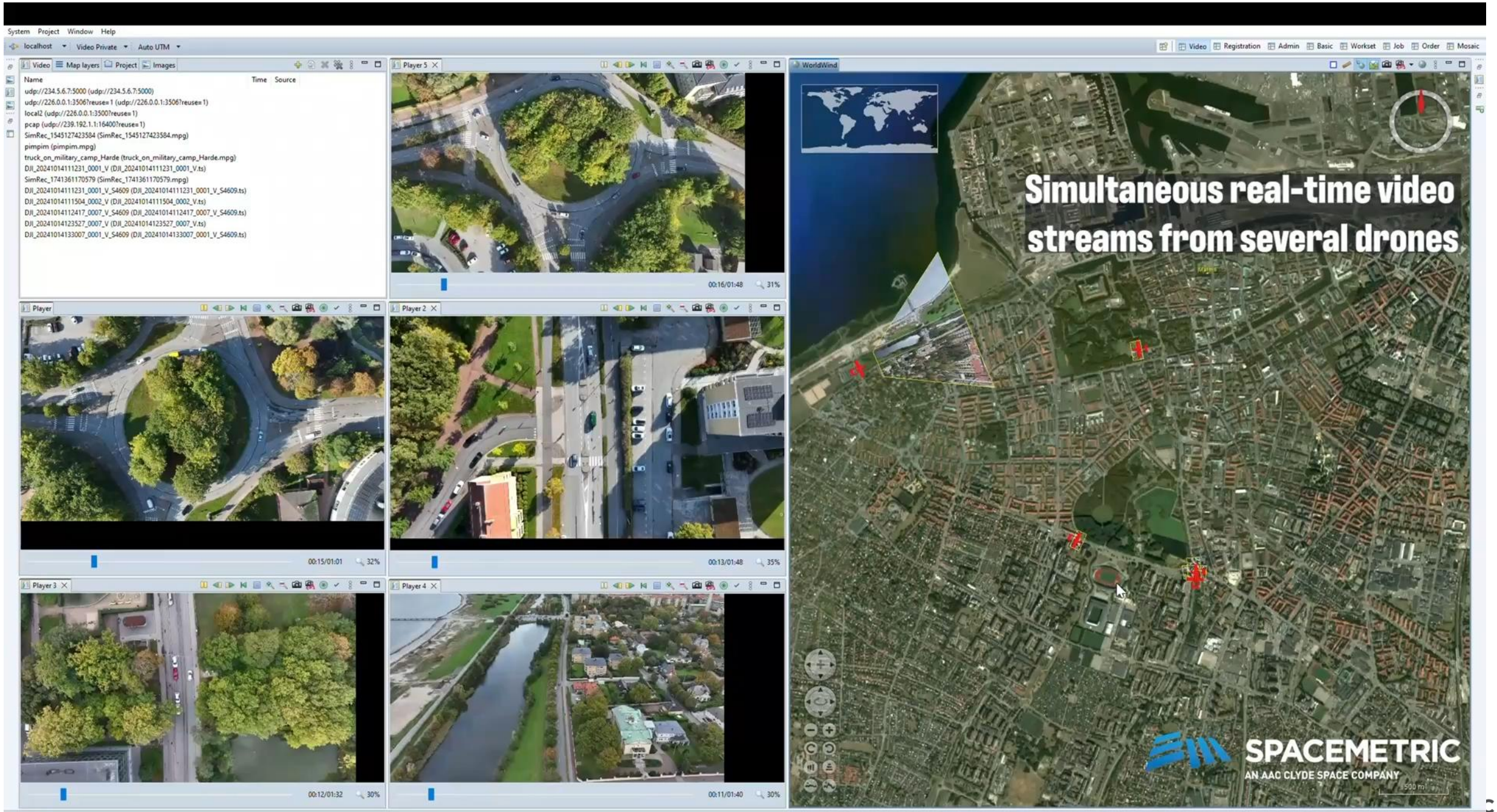
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Player
00:15/01:01 32%
Player 2
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Player 3
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Player 4
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WorldWind
Simultaneous real-time video streams from several drones
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AN AAC CLYDE SPACE COMPANY

Detection Examples from Scene

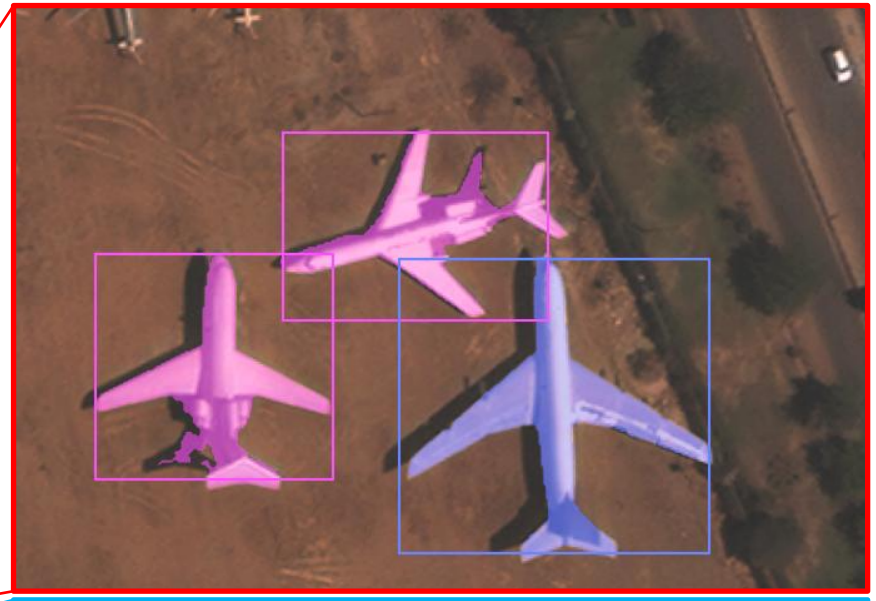
Aggregated Number for this Scene

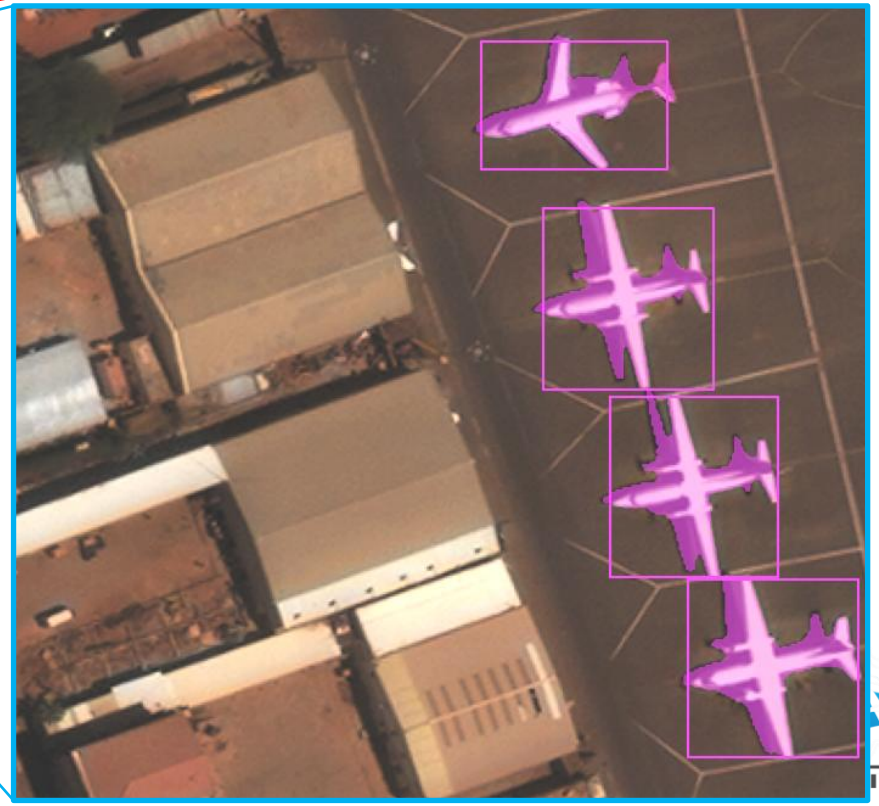
Total nr of detected planes: ***116***

- Small Civil Transport/Utility: ***3***
- Medium Civil Transport/Utility: ***46***
- Large Civil Transport/Utility: ***19***
- Military Transport/Utility/AWAC: ***45***
- Military Bomber: ***0***
- Military Fighter/Interceptor/Attack: ***3***
- Military Trainer: ***0***

Classification of Type

- Small Civil Transport/Utility
- Medium Civil Transport/Utility
- Large Civil Transport/Utility
- Military Transport/Utility/AWAC
- Military Bomber
- Military Fighter/Interceptor/Attack
- Military Trainer





Bluestone On Board, 2024-2025

- **Demonstrating Spacemetrics' Bluestone software for image data management of large video and image information volumes on platforms with limited bandwidth to ground stations**
- Spacemetric, Unibap, and ST Airborne Systems (ST), ST setting the requirements.
- Carried out within Sweden’s strategic innovation programme for air and space, Innovair, a joint initiative of Vinnova, Formas and the Swedish Energy Agency.
- Spacemetrics' Bluestone software for managing video streams and still images to be usable on board ST’s MSS 7000 airborne surveillance and ground systems.
- Ground staff, despite limited bandwidth between ground and aircraft, will have "virtual" access to imagery on board
- On board, there will be "virtual" access to imagery available in the ground system, enabling a better situational picture on board.

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SPEED

- SPEED – Space Processing on Edge (2025-2026)
- SPEED aims to develop an energy-efficient edge AI platform for satellites and UAVs, significantly reducing data volumes and latency.
- The goal is to
  - demonstrate a modular architecture combining CPU/GPU/FPGA with ASIC accelerators
  - extend Bluestone for selective downlinking in near real-time.
- The project will
  - verify that the technology enables faster, more accurate geospatial insights
  - lay the foundation for AAC Clyde Space's Sirius EDGE on-board processor as a future product.
- Carried out by Spacemetric, KTH, and AAC Clyde Space, partially funded by the European Space Agency and the Swedish National Space Agency.

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