ANNEX C – SSAC Space Report – Roundtable presentations

scottish science advisory council

SSAC Space Sector Roundtable
21 February 2024

Dr Graham Kerr
SSAC Project Lead

scottish science advisory council

SSAC Space Sector Roundtable
21 February 2024

Professor Julian Jones
SSAC Chair

SSAC – Who are we?

scottish science advisory council

- SSAC was created in 2002

- **Council** – currently chaired by Julian Jones; along with 11 members plus 2 associate members and 4 *ex officio* CSA; Chief Scientist, Health; CSA ENRA; Chief Social Policy Adviser

- **Secretariat** – Science Advice and Engagement team within SG Industrial Transformation and Office of the Chief Scientific Adviser Division

Distinctive features of SSAC

scottish science advisory council

- a remit that cuts across all sectors and policy areas;
- we provide independent science advice at “arm’s length” to SG ;
- we have no disciplinary or sectoral “agenda”;
- we operate as a “collective” (i.e. Members have a responsibility to provide checks and balances within the Council);
- our combined knowledge of Scottish science skills and context enables us to ensure that advice commissioned from outside Scotland is appropriate to the Scottish context

Principles of engagement:

scottish science advisory council

- Our focus is on *science* advice, where science includes social and economic disciplines;
- We need to be thinking of future needs and highlighting the potential value of science;
- We can be both reactive (responding to requests from within SG) and proactive (identifying topics we think are opportunities or risks for Scotland);
- In developing Terms of Reference for specific pieces of work we take into account the broader landscape of advice available (e.g. Centres of Expertise, other advisory committees and organisations, the RSE etc)

Recent reports:

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- Link to all SSAC reports can be found here

Some recent reports below:

- SSAC Report - Science and evidence for place-based adaptation
- SSAC Report - Quantum Technology: Opportunities for Scotland
- SSAC Report - Use of Science and Evidence in Aquaculture Consenting and the Sustainable Development of Scottish Aquaculture

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Roundtable discussions will be focussed on opportunities for Scotland's Space sector over the medium to long term (10-20 years).

The outputs from the roundtable will be considered by the SSAC working group to inform a formal report for Scottish Government which will be published on the SSAC website Scottish Science Advisory Council in Spring 2024

Exploring the potential future commercial opportunities for Scotland’s Space Sector

Scott McClelland
Hd New Market Clusters
Directorate for Economic Development

New Market Clusters Unit

To support the emergence of clusters of excellence by 2026

- Establish NMCU as home of SG cluster development policy
- Establish and grow NMCU remit clusters
- Establish SG cluster building capacity

Establish a framework approach to cluster development

- Cluster framework development
- Cluster accreditation
- Cluster data: baseline, E&M, dashboard

Engage and support priority areas to deliver growth

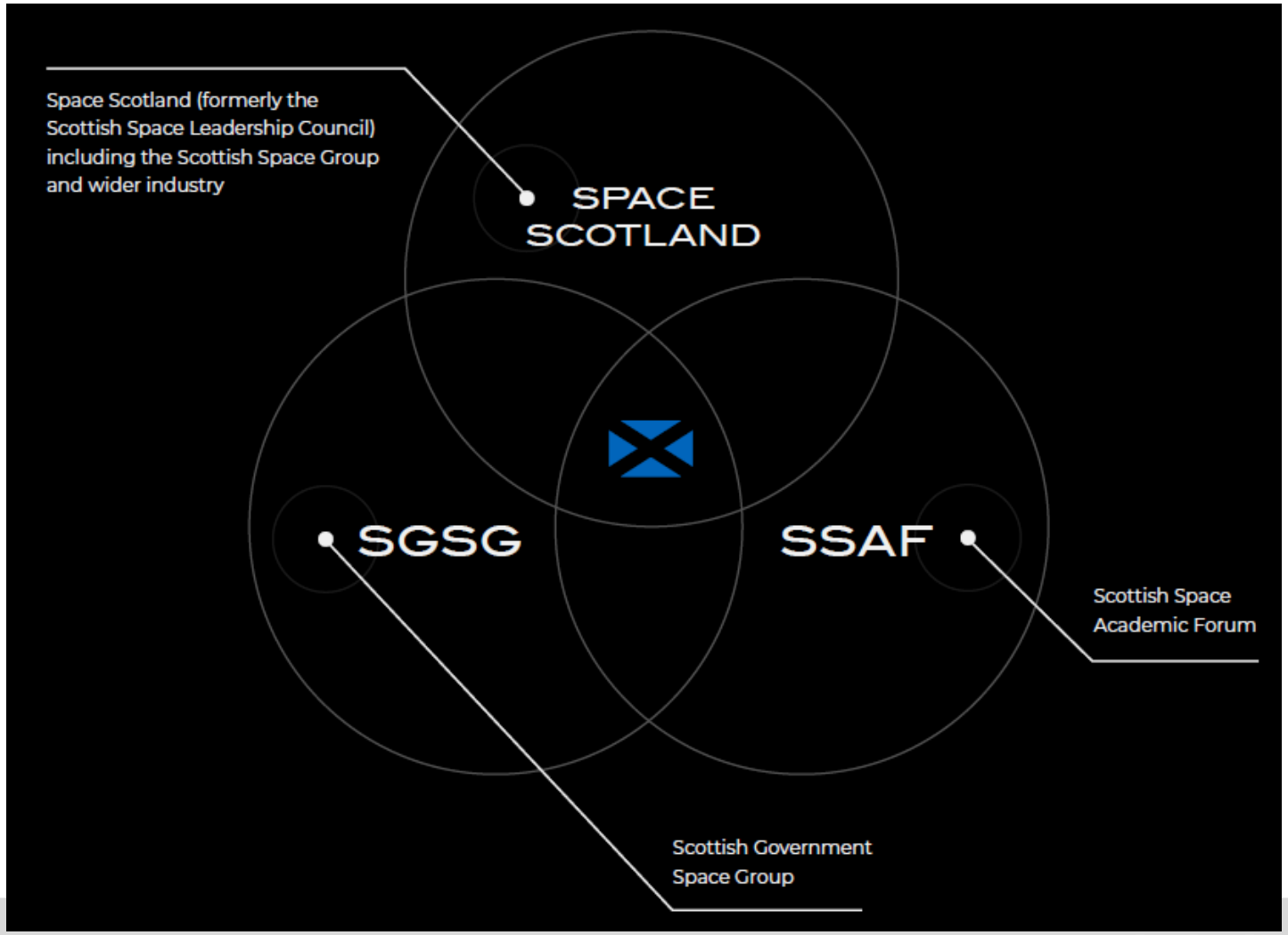
- Specific priority cluster engagement
- Implementation of cluster framework

RESPONSIBILITIES

- Cluster development policy (including cluster framework)
- Space
- Critical Technologies (Quantum, Photonics, Semiconductors)
- Robotics and Autonomous Systems
- Aerospace and Defence manufacturing
- Industrial Biotechnology
- Michelin Scotland Innovation Parc

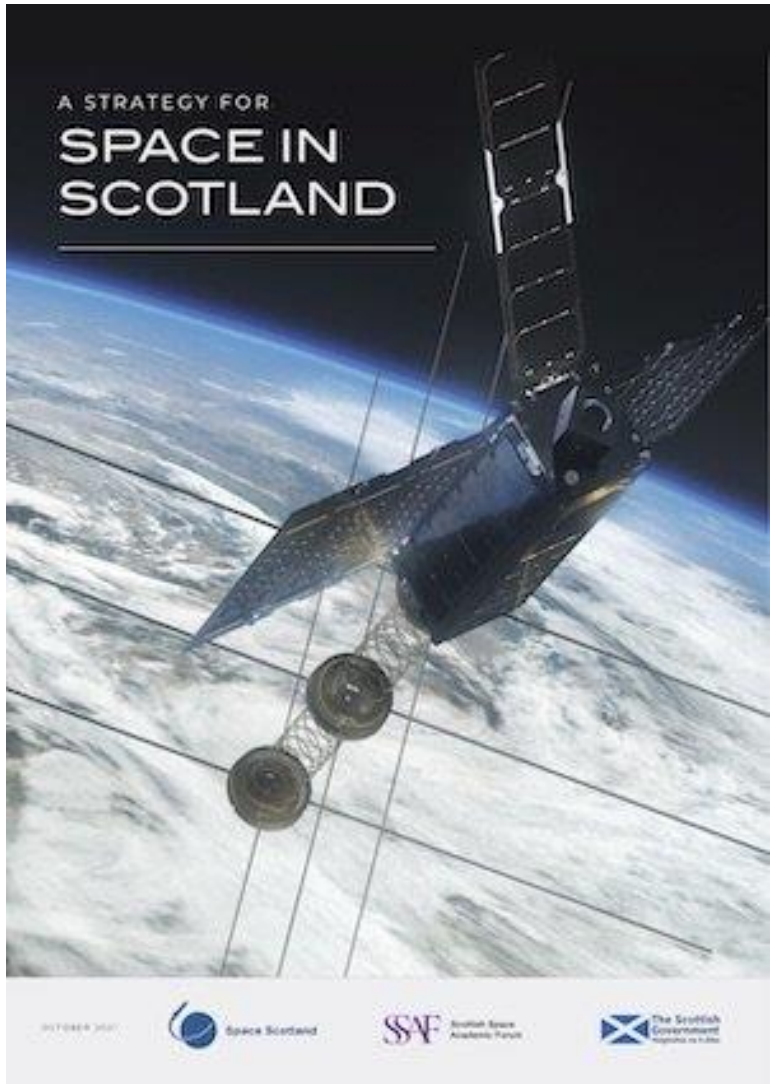
GOVERNMENT AMBITION

Our ambition is for Scotland to lead Europe in end-to-end capability for small satellite design, manufacture and launch, including earth observation data solutions that are critical in tackling climate change.


Space Scotland (formerly the Scottish Space Leadership Council) including the Scottish Space Group and wider industry
SPACE SCOTLAND
SGSG
SSAF
Scottish Space Academic Forum
Scottish Government Space Group

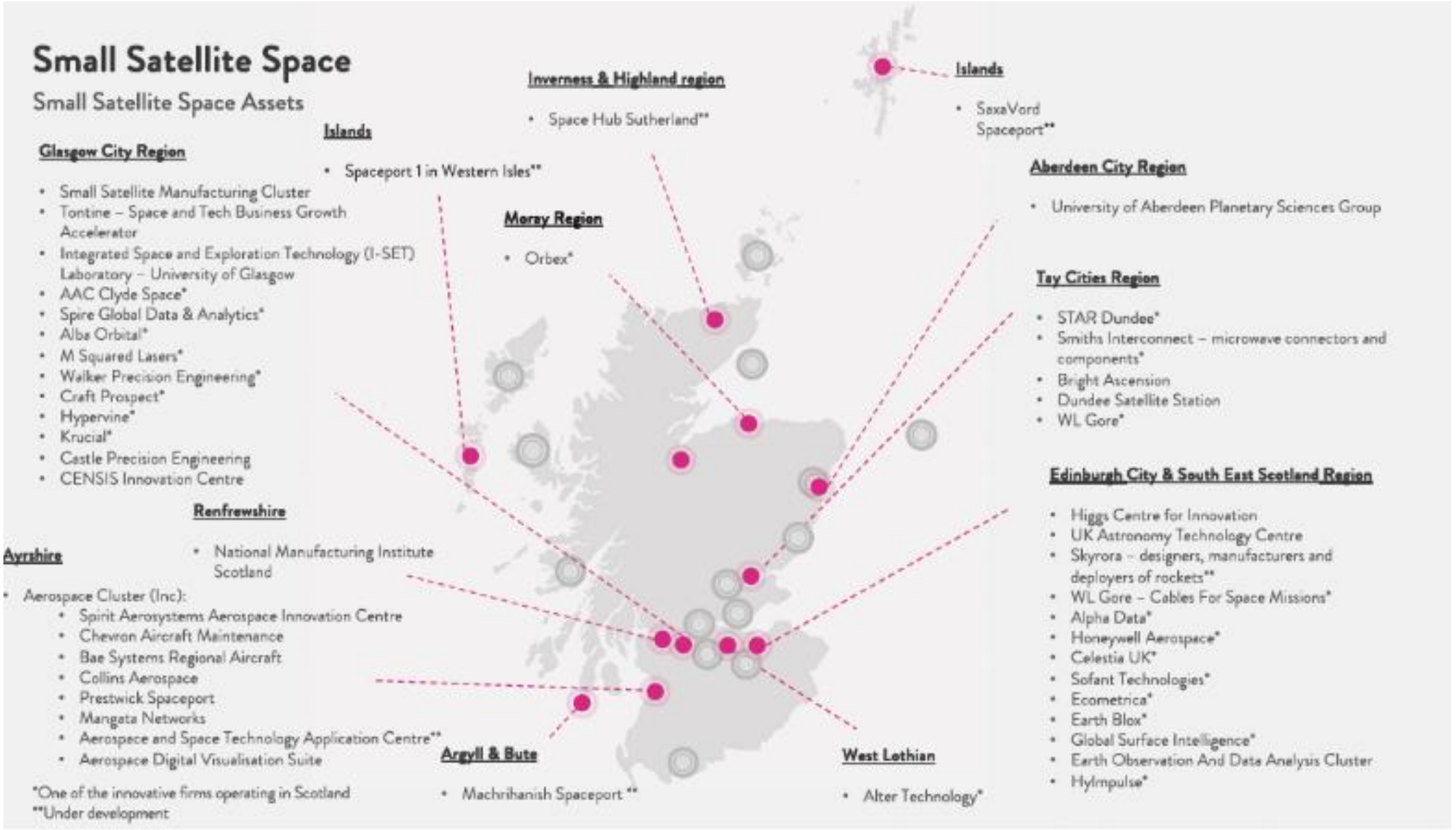
Scottish Space Strategy

- Targeted Inward Investment Plan
- International Opportunities
- Sustainable Launch Capability
- Space Infrastructure
- Skills and Equality of Access
- Sustainable Space
- Future Commercial Opportunities



Small Satellite Space

Small Satellite Space Assets



Glasgow City Region

- Small Satellite Manufacturing Cluster
- Tontine – Space and Tech Business Growth Accelerator
- Integrated Space and Exploration Technology (I-SET) Laboratory – University of Glasgow
- AAC Clyde Space*
- Spire Global Data & Analytics*
- Alba Orbital*
- M Squared Lasers*
- Walker Precision Engineering*
- Craft Prospect*
- Hypervine*
- Krucial*
- Castle Precision Engineering
- CENSIS Innovation Centre

Islands

- Spaceport 1 in Western Isles**

Inverness & Highland region

- Space Hub Sutherland**

Islands

- SaxaVord Spaceport**

Aberdeen City Region

- University of Aberdeen Planetary Sciences Group

Moray Region

- Orbex*

Tay Cities Region

- STAR Dundee*
- Smiths Interconnect – microwave connectors and components*
- Bright Ascension
- Dundee Satellite Station
- WL Gore*

Renfrewshire

- National Manufacturing Institute Scotland

Edinburgh City & South East Scotland Region

- Higgs Centre for Innovation
- UK Astronomy Technology Centre
- Skyrora – designers, manufacturers and deployers of rockets**
- WL Gore – Cables For Space Missions*
- Alpha Data*
- Honeywell Aerospace*
- Celestia UK*
- Sofant Technologies*
- Ecometrica*
- Earth Blox*
- Global Surface Intelligence*
- Earth Observation And Data Analysis Cluster
- Hylmpulse*

Ayrshire

- Aerospace Cluster (Inc):
  - Spirit Aerosystems Aerospace Innovation Centre
  - Chevron Aircraft Maintenance
  - Bae Systems Regional Aircraft
  - Collins Aerospace
  - Prestwick Spaceport
  - Mangata Networks
  - Aerospace and Space Technology Application Centre**
  - Aerospace Digital Visualisation Suite

Argyll & Bute

- Machrihanish Spaceport **

West Lothian

- Alter Technology*

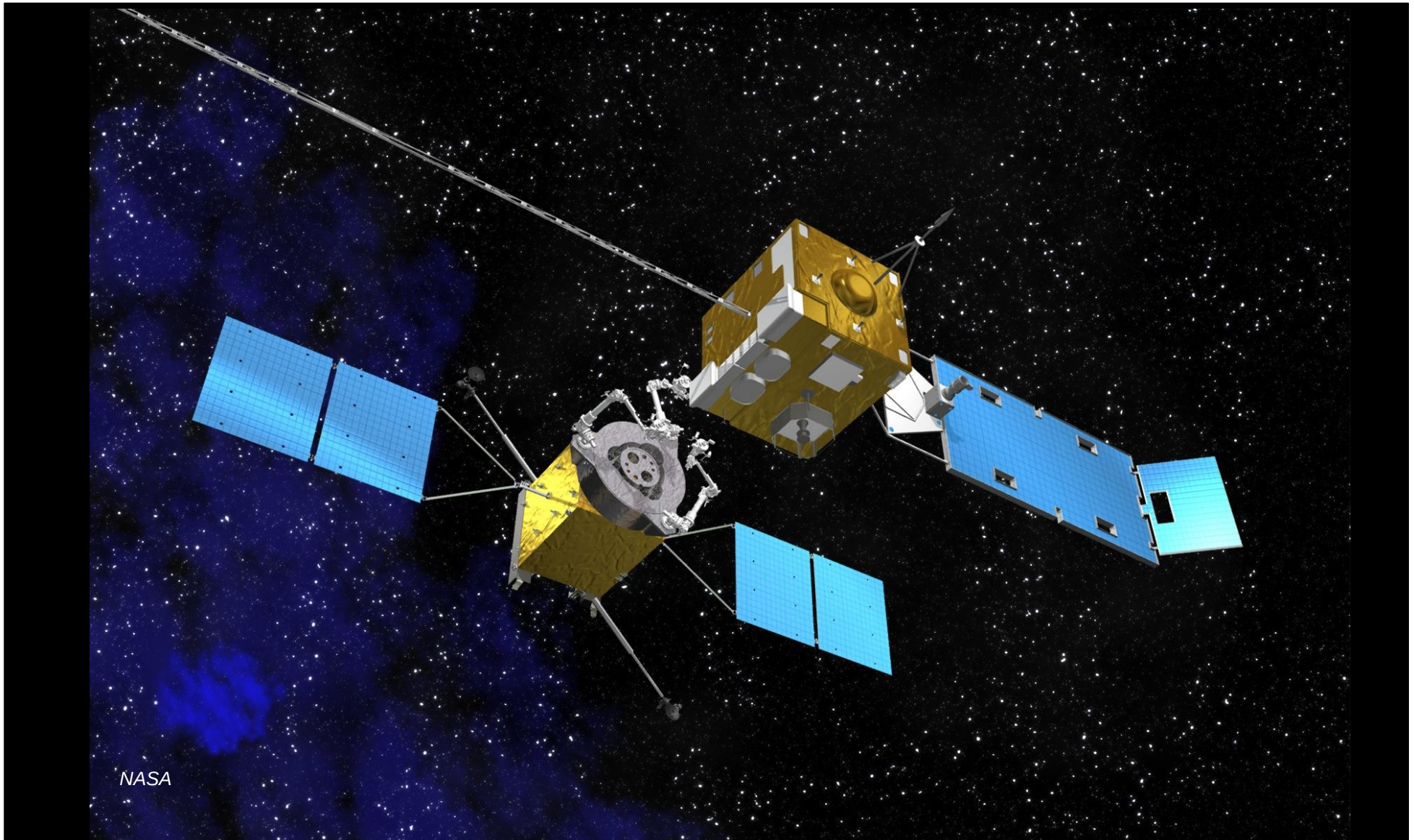
*One of the innovative firms operating in Scotland
**Under development

Emerging opportunities for the global space sector

Colin McInnes

Space and Exploration Technology Group

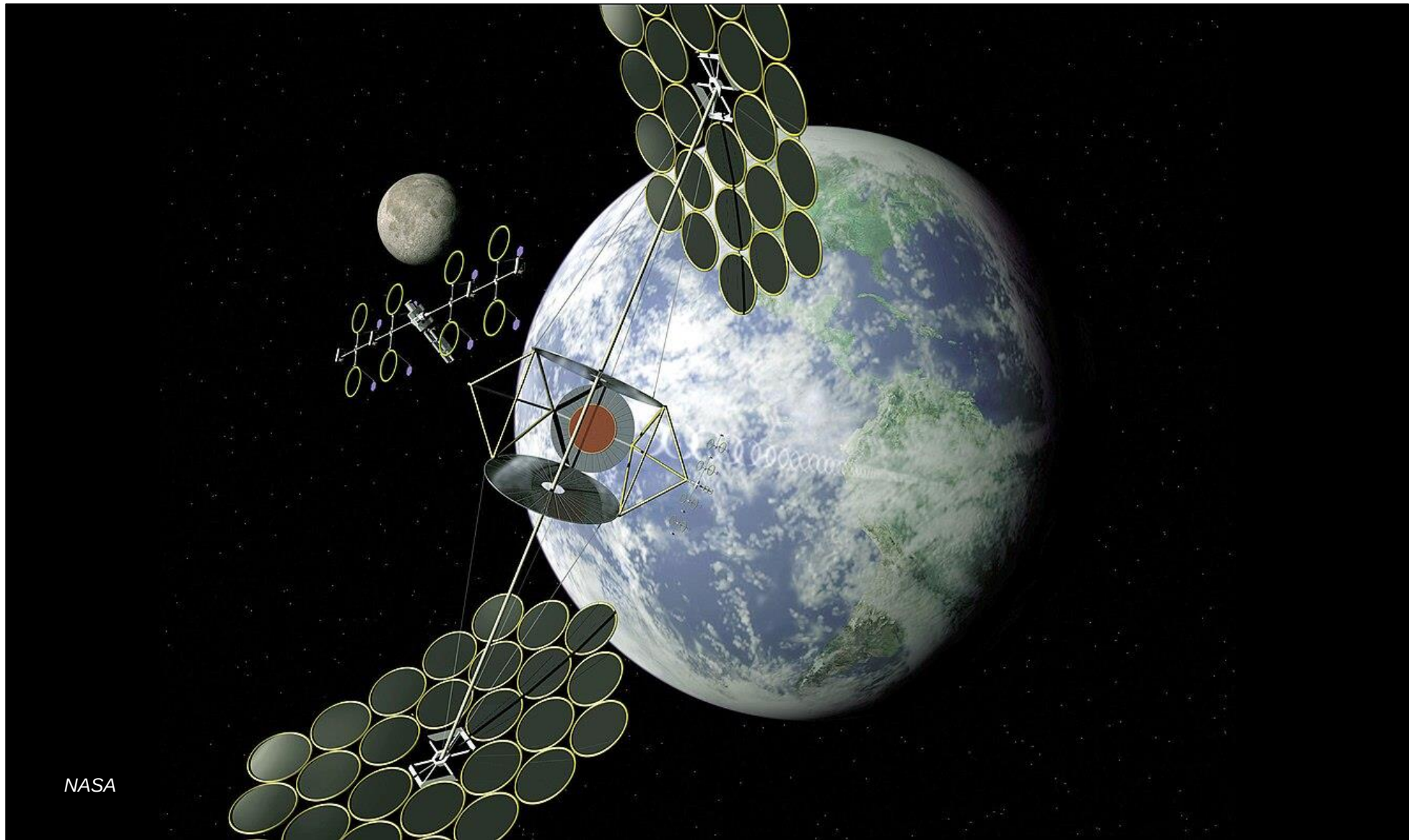
University of Glasgow


NASA

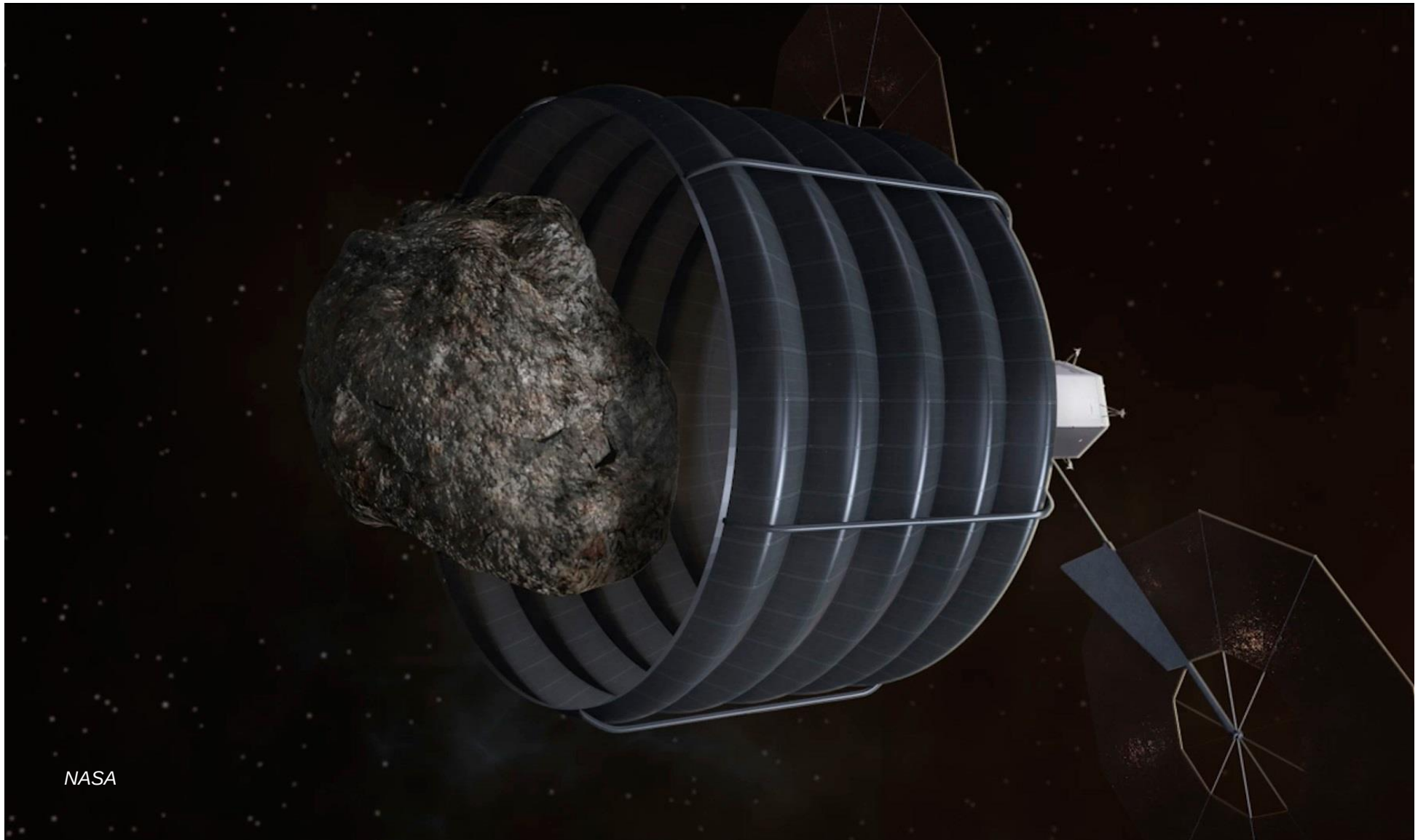
SpaceX

NASA


CREW FIVE
NASA JSC



NASA


NASA

SpaceScotland

Scotland Space Sector

Dr Hina Khan

Executive Director

spacescotland.org

21 Feb 2024

SpaceScotland

Space Scotland

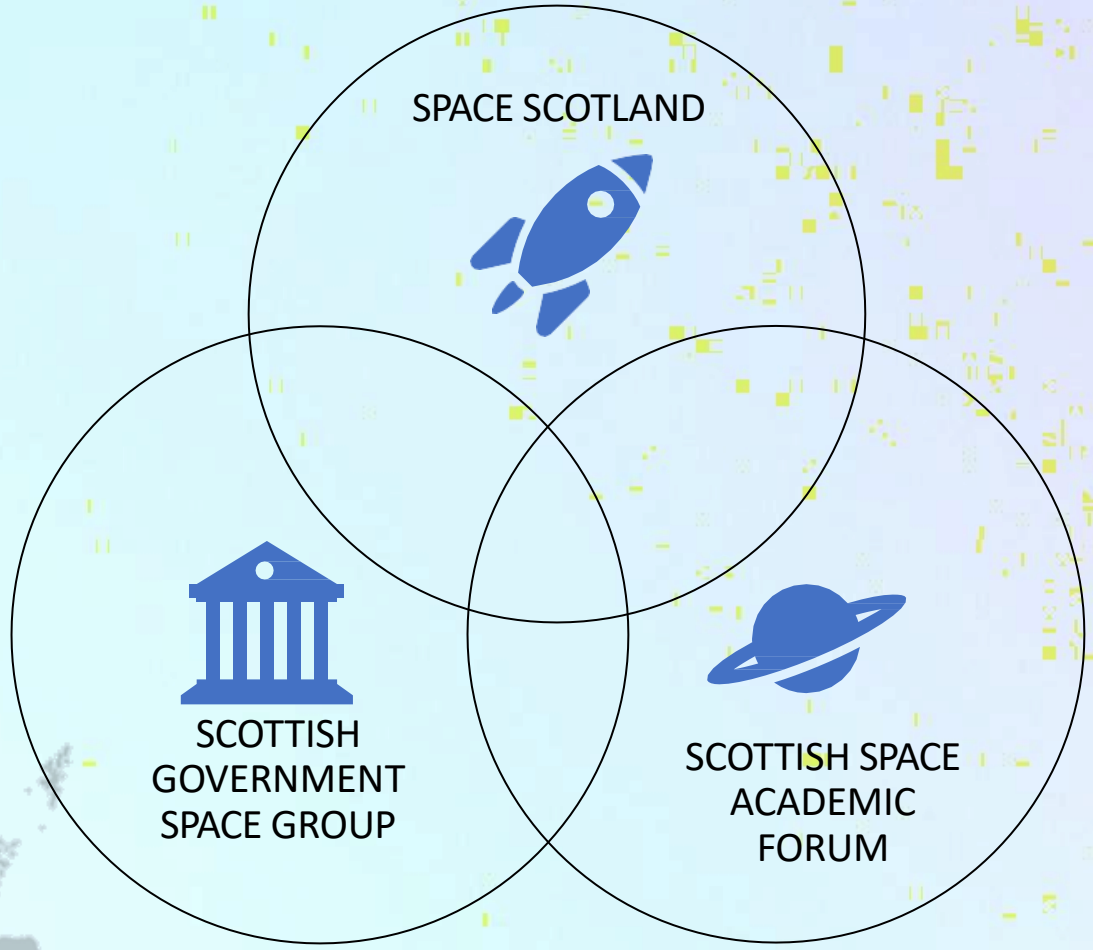
- A collective voice for the Scottish Industrial Space Sector
- Industry voice in the Scottish Space Strategy
- Actively supporting the growth of the sector
- Comprises Industry representatives from Satellite Manufacturers, Downstream Exploitation Companies, Spaceport Operators, Launch Platform and Service Providers and Traditional Payload/Avionics Suppliers, Academia, Catapults and Facilities

Aims

- To form a community of Scottish Businesses with an involvement in Industrial/Commercial Space to establish the conditions to increase business opportunities, efficiencies, effectiveness and economic impact through collaboration, partnering and mutual support.
- To raise the profile of Scotland as the home of Agile Space and to become a leading global destination to access space and space services, including locating or establishing businesses in a supportive environment.
- To work collectively and with partners such as the investment community, academia and Government to enable such an environment

Scottish Space Sector

SpaceScotland



Scotland space hubs

- Glasgow
  - Satellite design, manufacturing, testing, deployment of full mission services
  - Strong academic links to drive innovation
- Edinburgh
  - Long heritage in data science and earth observation
  - Melting pot for space data companies
- North Coast & Islands
  - Launch providers and services
  - Vertical launch sites on North Coast and Islands
- Dundee
  - World leading subsystem development
  - Leading in areas of data and computational science
- Prestwick - West Coast
  - Heritage of research excellence in aerospace
  - Horizontal spaceport site at the only rail linked airport in Scotland

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Scottish Value Chain

A

Scottish Small Satellites

Design, development, prototyping, manufacture, test, certification & operation of Small Satellites.

A connected supply chain supporting the satellite sector

B

Scottish Launch Services

Launch services for Scottish Space Industry & Businesses.

A cost-effective means of getting Scottish Payloads and other offerings into orbit, and beyond.

C

Scottish Launch Vehicles

Design, development, manufacture, test, certification and operation of a Scottish Launch Vehicle capable of orbital entry and space operation

D

Downstream Industry

Making & Delivering a Globally Distinctive Scottish Proposition

Development of globally distinctive data & information analyses and product provision. The application of algorithms and other image and signal processing to offer new and novel products to a global market

E

Future - New Applications / Non-Traditional Payloads

Research, design, development, and manufacture of payloads, technologies, systems and services as part of an overall growth in Space – including, energy production, zero-G manufacture, habitats, Lunar Projects, asteroid prospecting

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Component & Sub-System Supply

Long heritage in fundamental component development for space missions, supplying critical material and subsystems to deep space missions and the global space manufacturing industry

Space Exploration

Science grade expertise in space exploration missions and NASA/ESA flagship programmes on deep space tech, planetary exploration and fundamental science mission to advance human curiosity

SpaceScotland

Scottish Space Ecosystem

180 companies

8500 employees across the sector

Diverse range of industries:

Small satellite manufacturing

Rocket and launch vehicle manufacturing

Vertical and horizontal launch

Data analysis

Earth observation

- Sustainability at the heart of the sector
  - Up to 90% less carbon is produced by green rocket fuels used by Scottish companies.
  - The world's first carbon-neutral spaceport is in progress at Sutherland in the Scottish Highlands.
  - A 50% drop in space sector emissions will be achieved by 2030 — with a goal to reach net zero by 2045.

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Small Satellite Capability

CRAFT PROSPECT
a space engineering practice

albaorbital

AAC CLYDE SPACE

spire

Images courtesy of Spire Global

SCOTTISH EARTH OBSERVATION SPACE DATA COMPANIES

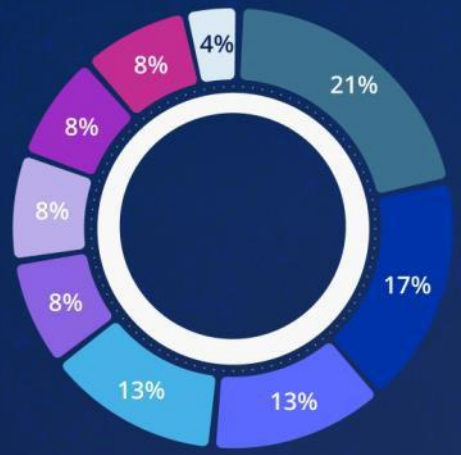
The use of space data from Earth Observation satellites is a Scottish success story, with a growing ecosystem of Scottish companies using this space information to improve our world.

Companies Capabilities

29 are directly involved in the Earth Observation space downstream sector

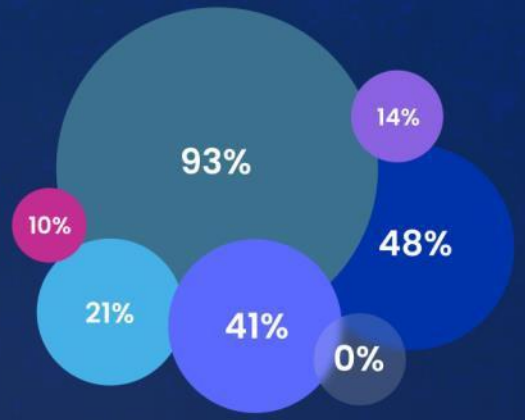
130 companies indicating space activity in Scotland

Number of Scottish Earth Observation Data Companies by City or Region



Scottish EO Company Applications

21% Natural Capital · 17% Environmental · 13% Meteorology · 13% Energy · 8% Geological prospecting · 8% Sustainability · 8% Humanitarian · 8% Agriculture · 4% Waste



Scottish EO Company Waveband Use

Optical; 93% · SAR; 41% · FAR IR; 21% · Near IR; 48% · LIDAR; 10% · IOT; 14% · UV; 0%

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UrbanTide · Carbon360 · S2C · tradeinspace · TOPOLYTICS · Resilience Constellation · Hypervine.io · manos nalytics · spire · EARTH BLOX · AAC CLYDE SPACE · Brainnwave · weather2 · Adrok · EOLAS · Symbios · gsi · SPACE INTELLIGENCE · TREEMETRICS · PLANETARY AI · WEATHER STREAM · DCAT · ASTROSAT · Ecometrica · Terrabotics · earthwave · NIRAS · Dundee Satellite Station Ltd

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Scotland's Space Strategy

SpaceScotland

Over the next decade, we aim to help deliver:

- An annual contribution to the Scottish economy in excess of £4bn.
- An increase in the workforce by five times the current level.
- A globally recognized strategic location and European leader for commercial space developments.
- A range of managed launch and orbital services, supporting the highest launch cadence in Europe.
- An increased and diverse workforce with improved participation that is fully reflective of Scottish society and ensures space is open for all.

Emerging Capabilities

SpaceScotland

- Innovative technologies from satellite design and manufacturing links to other sectors
- Incorporating novel research ideas into commercial opportunities
  - e.g. Craft Prospect working closely with academics on quantum technology for the next level of data security
- Use of data services for non-space sectors – fintech, biotech, agritech etc
- The National Robotarium is leading innovation in robotics in all sectors
  - In Orbit manufacturing is a key area that requires intricate robotic technology to build infrastructure of exploration and lunar mission
- Sustainable and responsive action towards space technology and launch capabilities

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QUESTIONS?

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