The ESA ARTES ScyLight Program

Presentation to EPIC Online Technology Meeting on New Space Communications and Monitoring

TIA-TIS

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EPIC Online Technology Meeting on Quarterly Briefing on New Space Communications and Monitoring Confirmation

ARTES ScyLight PROGRAM

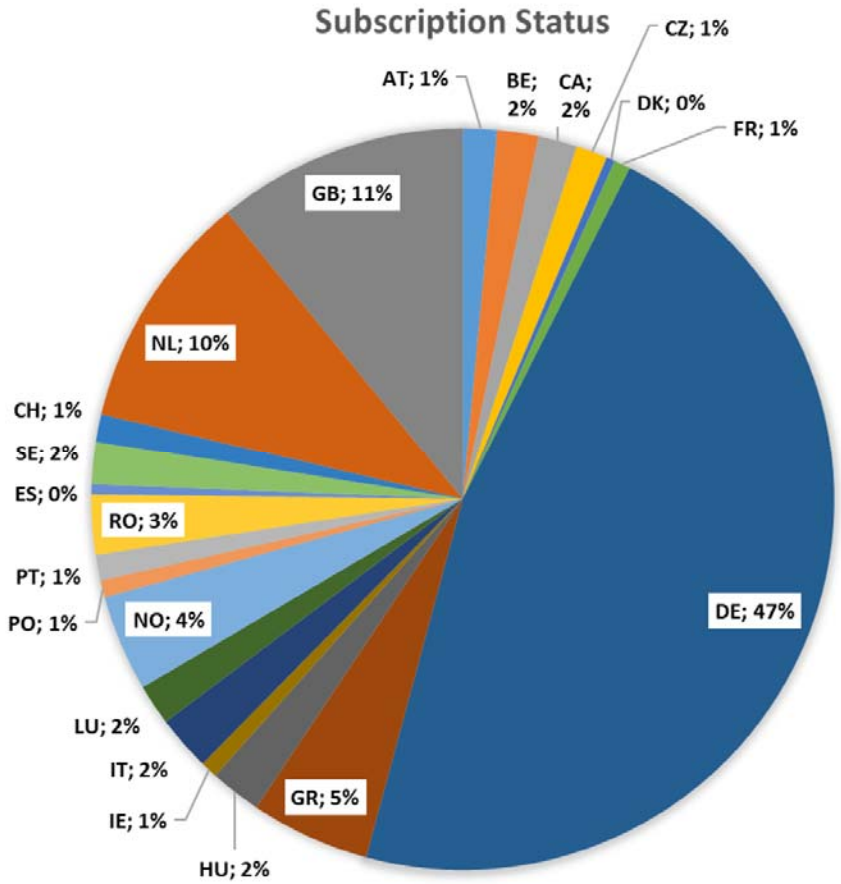
The “SeCure and Laser communication Technology” (ScyLight) program was established at the ministerial council in 2016 to support European and Canadian industries in developments in the fields of:

- Optical Communications
- Quantum Key Distribution and Secure Communications
- Photonics

ARTES ScyLight PROGRAM CONTRIBUTIONS

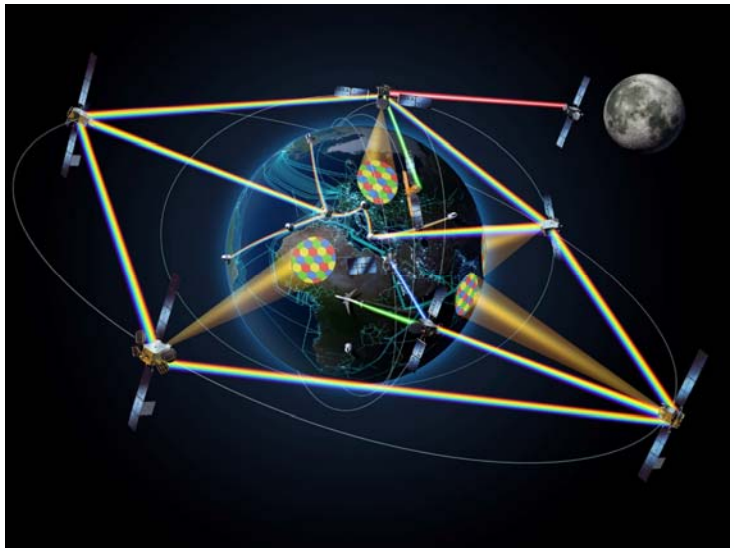
ScyLight is an optional program to which 20 ESA member states have subscribed with a total budget of around 173 Mio €.

The subscription distribution per country is shown.



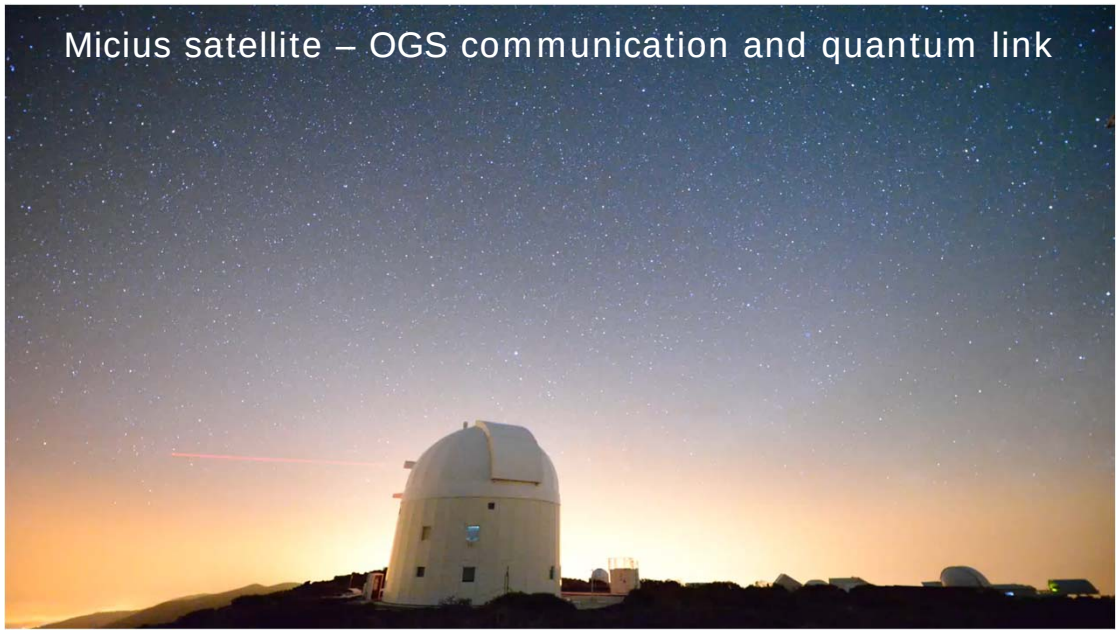
ScyLight is developing the following technologies:

- **Space/air-borne Optical Communication Terminals**
  - ✓ Optimized cost, size, weight and power (C-SWaP)
  - ✓ Volume production capabilities
  - ✓ International standardization
  - ✓ Multiple partner terminal operation, or switching capabilities
  - ✓ Ranging, time and frequency transfer
- **Reliable transmission through atmosphere**
  - ✓ Adaptive optics
  - ✓ Turbulence compatible modulation and coding schemes
- **Feeder Links and Optical Ground Stations (OGS)**
  - ✓ Transmit beam pre-distortion
  - ✓ Wavelength Division Multiplexing (WDM)
  - ✓ Guide star lasers and wave-front distortion compensation
  - ✓ Terrestrial connectivity and routing concepts
  - ✓ Laser safety



ScyLight is developing the following technologies:

- **Quantum Key Distribution (QKD)**
  - ✓ High brightness single photon and entangled laser sources.
  - ✓ High-performance single-photon detectors (e.g. nano-wire).
  - ✓ Quantum memories
  - ✓ Quantum protocols
- **Photonics**
  - ✓ Digital Optical Communication
  - ✓ Analog Optical Communication
  - ✓ Integrated photon sources
  - ✓ WDM multiplexer/de-multiplexer
  - ✓ Photonic Frequency Generation and Conversion
  - ✓ Photonic Routing/Switching and Fiber Management
  - ✓ Photonic Phased Arrays (for optical and RF beam forming)
  - ✓ Power efficient amplification systems



ARTES ScyLight – How to apply for funding?

ScyLight supports industry/academia by:

Common System and Critical Technologies Activities

ESA-initiated activities implemented via definition of a roadmap and release of a work plan to develop disruptive and risky technologies (100% ESA funding). **Invitations to tender (ITT) for the work plan activities are announced on the ESA web-site (via EMITS or ESA-star).**

Optical Communication, Quantum and Photonics Technologies/Applications

Industry-initiated activities for developments & in-orbit validation (up to 75% ESA funding).

Call for ideas is always open, you can submit an outline proposal at any time.

Optical Communication Projects/Cornerstone Missions

Demonstration missions to showcase the technology and to foster the **build-up of industrial capabilities** (up to 100% ESA funding).

CONTACTS AND KEY EVENTS

ESA releases the ScyLight work plan via its EMIS (ESA-star) web-site.

ScyLight workshops take place every year (with exception of 2020 due to the Covid-19 pandemic).

The next ScyLight virtual workshop is scheduled for June 2021.

For more information on the ScyLight program please contact:

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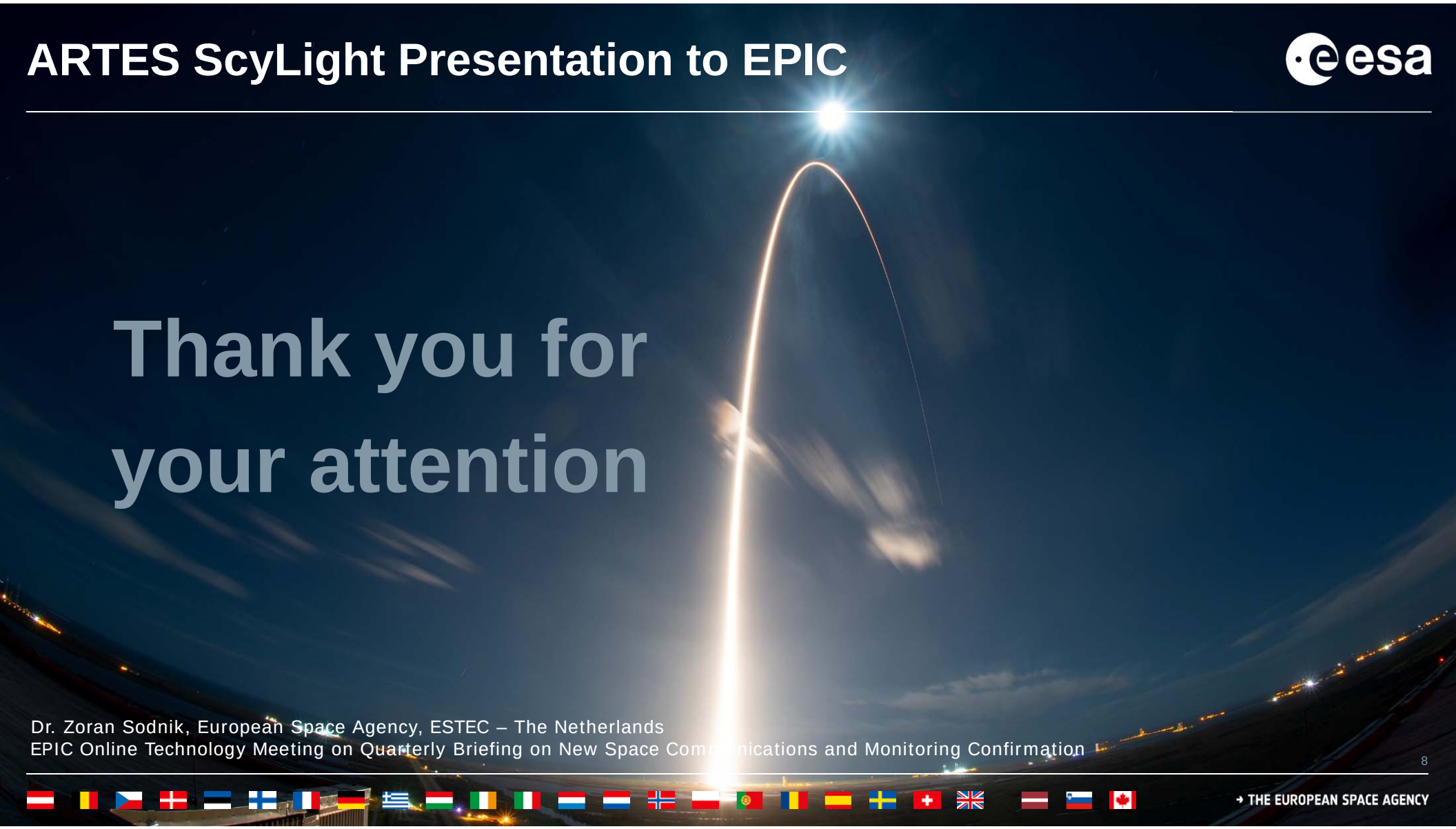
ARTES ScyLight Presentation to EPIC



Thank you for your attention

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European Space Agency

EUROPE'S GATEWAY TO SPACE

WHAT	22 Member States, 5000 employees
WHY	Exploration and use of space for exclusively peaceful purposes
WHERE	HQ in Paris, 7 sites across Europe and a spaceport in French Guiana
HOW MUCH	€6.68 billion = €12 per European per year