UNISEC-Global The 59th Virtual Meeting

August 16th, 2025, 22:00-24:00
(Standard Japan time GMT +9)

The following report was prepared by UNISEC-Global Secretariat
August 16, 2025
Japan

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1 Opening Remarks

Vesselin Vassile, CASTRA

Dr. Vesselin Vassilev is the CEO of the Cluster Aero-Space Technologies, Research and Applications (CASTRA) in Bulgaria and is affiliated with the Space and Solar-Terrestrial Research Institute (SSTRI) of the Bulgarian Academy of Sciences. He received his M.Sc. in Applied Physics – Microelectronics and Optoelectronics from the University of Plovdiv, Bulgaria, in 1994. He did his Ph.D. in Electrical Engineering from Katholieke Universiteit Leuven, Belgium in 2004 while being affiliated with IMEC. From 2005 to 2009, he worked at Texas Instruments, Dallas, USA as part of the product reliability team in the field of ESD design for advanced integrated circuits. In 2009, he founded Novorell Ltd., providing EDA software tools and consultancy services for ESD design and reliability. In 2010, he initiated the establishment of CASTRA, bringing together over 20 organizations in aerospace technologies and applications. His research interests include ESD protection, microelectronics reliability, and aerospace applications. He is the author of more than 50 publications and two patents and has served as General Chair of the EOS/ESD Symposium.

Pictured: Dr Vesselin while giving the opening remarks

Highlights:

- Extended greetings to all participants
- CASTRA is a Bulgarian Association working in Space and Aerospace technology development
- Four presentations will be from academia and four sessions from Industry

2 Activity Report by UNISEC – Bulgaria

Nikolay Tomov, UNISEC-Bulgaria

Mr. Nikolay Tomov is a Member of the Management Board at the Cluster Aerospace Technologies, Research and Applications (CASTRA) since 2012 and the Point of Contact for UNISEC-Bulgaria since 2018. He is the Founder and Chairman of the Bulgarian Modeling and Simulation Association (BULSIM) and served as Board Director of the European Training and Simulation Association (ETSA) from 2016 to 2024. He is an entrepreneur and shareholder in several companies, including Synergy Simulation & Training Ltd., Integris Lab Ltd., and Innovative Maritime Solutions Ltd., and co-founder of a start-up focused on youth education. He has lectured in Sofia University's Master's Program in Aerospace Engineering and Communications and serves as Global Operations Chair of the Simulation Exploration Experience Initiative, supported by NASA and international partners. Mr. Tomov received

his M.Sc. in Physics and Astronomy from Sofia University and began postgraduate research at the Bulgarian Academy of Sciences, contributing to the conceptual design of a Bulgarian microsatellite.

Pictured: Mr. Tomov file photograph

Highlights:

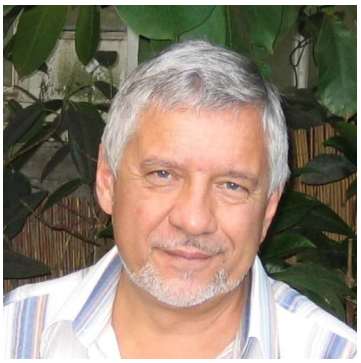
- Mr. Tomov was unable to attend, Dr. Vesselin presents his slides
- UNISEC Bulgaria was established in 2018
    - Legally managed by CASTRA
    - Follows vision and principles of UNISEC-Global
    - Participated in MIC in 2012, 2016, 2019
    - Participated in CLPT-8
    - Held CanSat/HEPTA-Sat training program
    - Organized MIC seminars, workshops
- Bulgarian startup products
    - **Developing radiation hardened integrated Circuits**
    - Another company is developing microelectronic mechanical sensors
    - Some work on multi-spectral imaging sensors
    - And some have developed MBSE software
    - APRS-DP and Store-and-Forward
- University members of UNISEC- Bulgaria
    - Sofia University
    - National Military University
    - Varna High School of Mathematics
    - Technical University – Plovdiv
    - Aerospace Technics and Technologies Lab at TU-Sofia
    - Naval Academy – Varna
    - Bourgas University
    - Medical University – Plovdiv
- Simulation Exploration Experience
    - Conducts annual simulation initiative for universities
    - Coordinated by NASA experts
    - Locally supported by BULSIM
- FreeFlyer Training
    - Is a registered trademark and proprietary software
    - Provide practical experience to students and lecturers
    - Use of software for space missions and design
- Synergy S&T
    - An official representative of EU for the company AI solutions
- Future plans
    - Attracting more universities as active members
    - Supporting the evolution of Bulgarian National Space Program
    - Supporting the growth of Aerospace Engineering University Programs

- Inspiring students for scientific work
- Involving students in practical aerospace projects
- Attracting funding from companies

3 Keynote on "Bulgarian Instruments for Air and Space adiation Dosimetry and Main Scientific Results"

Tsvetan Dachev, Space Research and Technology Institute

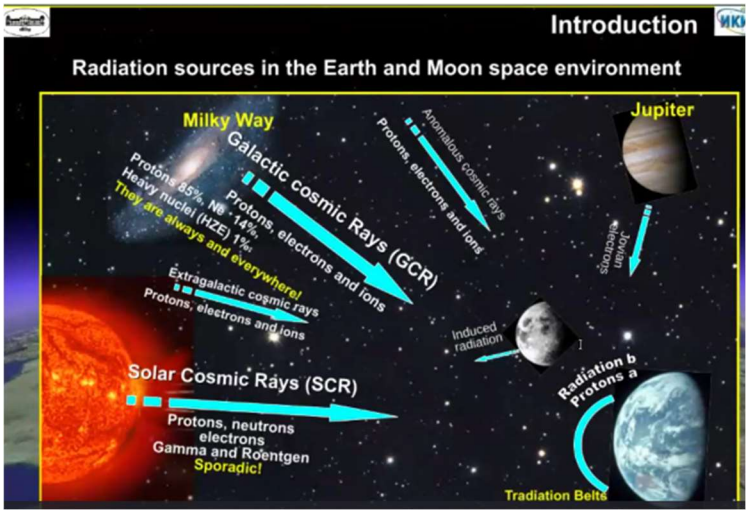
Prof. Tsvetan Dachev is currently a Professor and Head of Department in the Department of Solar–Terrestrial Physics at the Space Research and Technology Institute of the Bulgarian Academy of Sciences (SRTI-BAS), located in Sofia, Bulgaria. He has led major space radiation research efforts, particularly focusing on instrumentation such as the Liulin dosimeters deployed aboard the International Space Station (ISS) and the ExoMars Trace Gas Orbiter. His work encompasses expertise in radiation detection, radiation dosimetry, space science, and solar-terrestrial physics. Prof. Dachev is the author of nearly 200 scientific publications, with over 2,200 reads and a substantial citation count, highlighting his significant contributions to the field.



Pictured: Prof. Dachev file photograph

Highlights:

- Dr. Vesselin presented on behalf of Prof. Dachev
- All elements heavier than iron are stardust
- Our body is billions of years old
- Cosmic radiation
  - Depends on solar cycle
  - Low solar activity means high cosmic radiation
  - Due to magnetic field of earth
- Evolution is based on interaction with solar radiation
- The magnetic field protecting earth is not uniform
- There is a South Atlantic Magnetic Anomaly (SAMA)



Pictured: Prof. Dachev slide on radiation sources

- SAA allows charged particles to penetrate deeper
- **Magnetic field in polar region is less and has increased radiation**
- If magnetic poles change or travel, it will have dramatic effect on climate
- Problem is finding change in magnetic pulse
- Finding dose rate of radiation for satellite is important
- Dose meters have been created in Bulgarian Academy of Science
    - Normal dose rate of Earth is 0.1 μ Gy/h
    - In some areas like Iran, dose rate is ≈ 30 μ Gy/h
    - Moon is ≈ 8 μ Gy/h and Mars is ≈ 8.3 μ Gy/h
- Impact on human bodies
    - Galactic Cosmic Rays (GCR)
    - GCR creates secondary particles and cannot be shielded
    - Increased risk of cancer
    - Behavioral deficits include anxiety, fatigue and decreased productivity
    - Cataract formation, skin tan, degenerative damage to circulatory system
    - Damage to neural stem cells in the hippocampus
    - Changes in microstructure of bones, muscles and cartilage
- **Radiation in space is 100 times more than earth**
- So, very specific protection measures are needed to go to space
- Prof. Dachev and team has developed devices
    - To measure dose of radition
    - Like Liulin-CNR-VG
    - Developed under ICSR and Italian National Research Council
    - Virgin Galactic is using Liulin –CNR-VG
    - Data base is also available for use
- Future work
    - Working with Kyushu, Japan for Liulin-Ten-Koh-2 instrument
    - Collaboration with NASA/Johnson Space Center, USA
    - SRTI-BAS in collaboration with Prairie View A&M University
    - By end of 2025, Lyulin device is to fly on Blue Origin's Shepard rockets
- To conclude the presentation:
    - Space is dangerous for people
    - Liulin instruments are inexpensive and highly informative
    - Colonization of mars would be practically impossible due to radiation
    - New scientific research and experiments are needed for colonization

4 Presentation on “Living in Space: RPM Simulated Microgravity Studies at Medical University-Plovdiv”

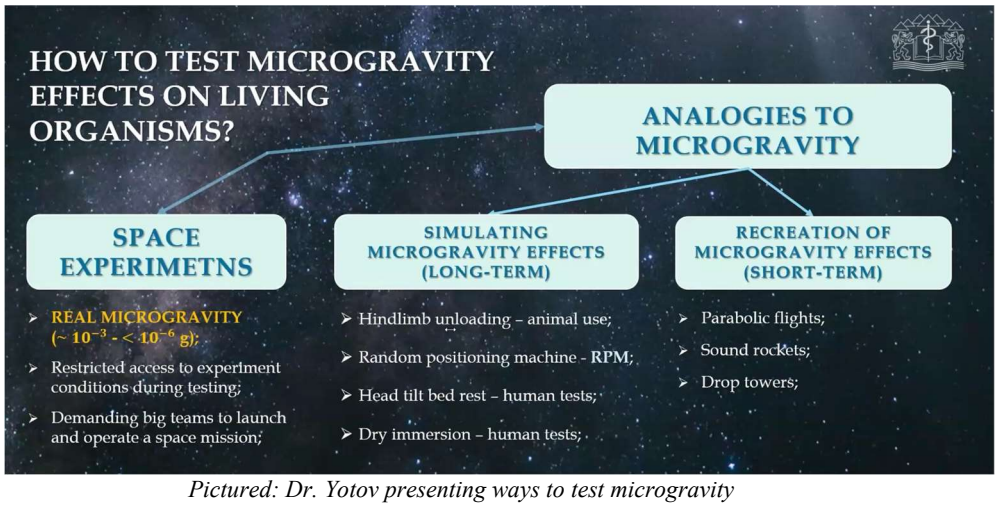
Viktor Yotov, Medical University- Plovdiv

Dr. Viktor Yotov received his B.Sc. in Engineering Physics from Plovdiv University in 2017, followed by an M.Sc. in Subatomic Physics and a Ph.D. in Biophysics in 2019 and 2021, respectively. From 2018 to 2019, he worked as a Physicist at the Institute for Nuclear Research and Energy. Since June 2019, he has been with the Department of Medical Physics and Biophysics at the Medical University of Plovdiv, where he currently serves as an Assistant Professor.

Pictured: Dr. Yotov during his presentation

Highlights:

- Humanity is curios by nature
- One of the most interesting things is the cosmos
- Cosmos is combination of celestial bodies, radiation, objects and empty space
- Empty space is micro gravity
- How micro gravity affects human health:
  - Causes changes in heart rate, blood vessel, lumen
  - Changes in vascular smooth muscle contractility and muscle tone
  - Decrease bone density and increase in height
  - Difficulties in communication and lack of sleep
  - Difficulty performing various tasks and abstract thinking
  - Changes in mucosal barrier, reduced energy intake and weight loss



Pictured: Dr. Yotov presenting ways to test microgravity

- **How Random Positioning Machine (RPM) works**
  - Developed a special prototype with 2 metalic frames
  - Each frame is perpendicular to each other with rotation in 2 different dimensions

        - Independent of eath other
        - In this way RPM re-distributes the gravitational vector
        - If looked in 3D it normally distributes evenly
        - The whole surface area of virtual shpere
        - Used a RAT-RPM Model for testing
        - With RPM-K being the control group
        - And controls being the rats that underwent microgravity RPM
        - RPM significatly reduced the mass of subjects
    - RPM group had lower level of phychological stess
    - The animals also had delayed in first hours and enhanced at 24 hours
    - RPM Simulated microgravity induces
        - Increased acetylcholinesyerase activity
        - Decrese in some oxidative stress biomakers
        - A deterioration in long-term memory functions was found
        - With a pronounced tendency towards more successful learning
        - Increase in contractile reactivity of gastric smooth muscle
        - Delayed evacuation of the upper levels of the tract
    - Summary of the presentation:
        - Some of the obtained results are already known
        - The model is accurate and shows promise
        - The model can be used to evaluate future health problems
        - Animal model gives opportunity to find mechanism of a condition
        - Main limitation include gravity and lack of inonizing radiation
        - Extrapolation of result from a rat to human should be caution

5 Presentation on “Educational initiatives in Earth Observation: Experiences with Copernicus and ESA Projects at SRTI-BAS”

Lachezar Filchev, SRTI-BAS

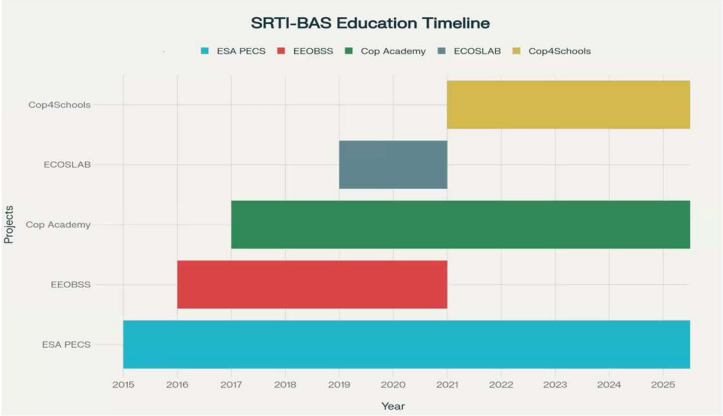
Prof. Lachezar Filchev received his M.Sc. in Physical Geography and Landscape Ecology and a Postgraduate Diploma in Environmental Management from the Mediterranean Agronomic Institute of Chania. He earned his Ph.D. in Remote Sensing from the Space Research and Technology Institute, Bulgarian Academy of Sciences in 2012. From 2004 to 2007, he worked as a Teacher and Cartographer. Since 2007, he has been with the Space Research and Technology Institute (SRTI-BAS), where he currently serves as Professor and Head of the Department of Remote Sensing and GIS, leading projects in remote sensing, GIS, and environmental monitoring.

Pictured: Prof. Filchev during his presentation

Highlights:

- First education project of SRTI-BAS started in 2015
- Developing comprehensive earth observation curriculum for Bulgarian secondary schools

- Started education in **Earth Observation for Bulgarian Secondary Schools (EEOBSS) in 2016**
- **Sofia University involved**
- Became a key Copernicus Academy member
- Continuing the efforts in secondary school education
- Started "Education with Science" with collaboration of Bulgarian government
- And then did Copernicus4Schools involving 11 European countries
- Targeting 4000+ students with disaster management education



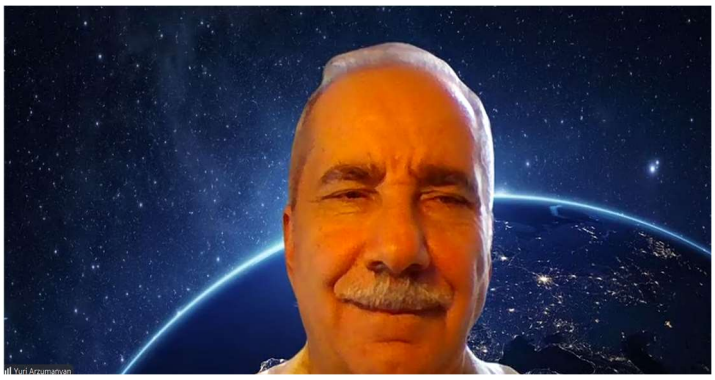
Pictured: Prof. Filchev presenting timeline of SRTI-BAS Education Initiatives

- EEOBSS
  - Summer schools across Bulgaria and is based on MOODLE courses for remote sensing
  - Developed in Bulgaria, schools carried out with **practical learning for free**
  - Published online and can be downloaded, course is also available in Bulgarian language
- E#COSLAB
  - National program mainly oriented with natural hazard using data from Sentinel –2A
  - Also useful for wildfire monitoring
  - Oriented towards information technology**, fit in curriculum of IT and programing classes**
  - Training included satellite component diagrams
  - NASA-style educator training
- Copernicus4Schools
  - Cop4Schools is **the great Disaster Challenge**
    - Taking place on 19 March, 2025
    - Deemed to reach out 11 countries simultaneously
    - Working on a topic concerning disaster
    - Disaster given for brainstorming was Major flood events
  - Nationwide involvement was including 300 students, 10 schools, 50 teachers
- In 10 years of SRTI-BAS and now connected with Greek, Germany Universities
- Attracted funding from EU institutions as well as National funding
- Participated with 11 nations
- For The great Disaster Challenge reached 4000 students and 300 schoolteachers
- Education Methodology is to start with basic, real-world problems
- **Technique is Project Based Learning (PBL) and keeping it simple**
- Use High-res satellite imagery
- Provide live demos with free and open-source software and have Layard technical explanations

6 Presentation on "Reusable Space Launch Systems: Advantages and Challenges"

Yuri Arzumanyan, Balkan Space Engineering

Dr. Yuri Arzumanyan is a spacecraft engineer and aerospace expert, works on a position of Head of Scientific Program Team in Balkan Space Engineering. He graduated from the Moscow Aviation Institute and has held senior roles at the Moscow Institute of Thermal Technology, ASTEK, and KBTM, contributing to projects like Sea Launch, Land Launch, Dnepr, and Tsyklon-2K. From 2016 to 2019, he was Commercial Director at S7 Space Transportation Systems. He has received the Lenin Komsomol Award, holds multiple patents, and has authored numerous publications.



Pictured: Dr. Arzumanyan seen during his presentation

Highlights:

Introduction
• Reusable systems – key to lowering launch costs.
• Aspire Project: Launcher R1 + Spaceship S1 + Ground Infrastructure.
• Goal: Integration into commercial launch & orbital transportation market.

Aspire System Overview
• Aspire S1 (RTSC): up to 2 t to/from ISS.
• Aspire R1: reusable first stage and fairing, >12 t to LEO.
• Infrastructure: launch, landing, maintenance facilities in Kazakhstan.

Capabilities
• Launch of satellites & spacecraft to multiple orbits.
• Cargo & crew delivery to ISS and private stations.
• Cargo return to Earth.
• Future: orbital labs, space factories, human spaceflight.

Evolution of Reusability
• Space Shuttle (1981), Buran (1988).
• Falcon 9, New Shepard, Starship (2010–2025).
• Current trend: mass adoption of reusable systems.

Key Challenges
• Higher structural efficiency required.
• Additional systems: landing legs, fins, parachutes, navigation.
• Thermal & aerodynamic protection during reentry.
• Complex ground servicing, inspection, repair.
• Entirely new design approach needed.

Mass & Economics
• Mass increase: +35% (reusable 1st stage), up to +1000% (fully reusable).
• Most expensive elements – engines & upper stages.
• Cost reduction: 10–30% if ≥10 flights per stage are achieved.
• Further cost savings only possible through full ground segment redesign.

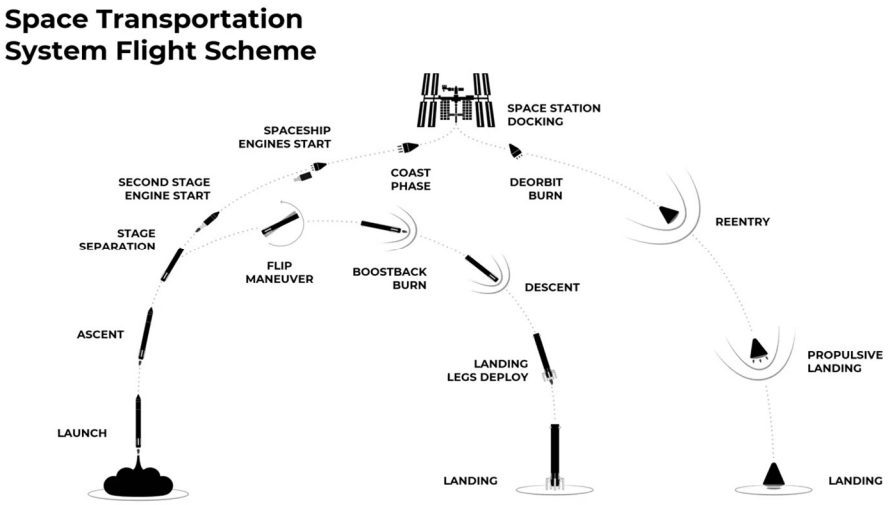
Landing Methods
1. Ballistic return along ascent trajectory.
2. Ballistic return near launch site (boostback).
3. Aerodynamic reentry + parachute landing.
4. Aircraft-type return (with air-breathing engine).

Conditions:
• Reentry at 40 km altitude: 1400–2200 m/s.
• Strict requirements for propellant reserves and control systems.

Conditions for Reusability
• Use of new lightweight materials and manufacturing methods.
• Extended testing & diagnostics.
• Maintainability: fast replacement of critical components.
• New ground servicing philosophy (different from expendable LV).

Infrastructure Needs
• Dedicated landing zones (ballistic, parachute, runway).
• Transportation & return to launch site.
• Diagnostic & repair equipment.
• Flight control systems for recovery operations.

Conclusion
• Reusable launch systems can cut costs by 10–30%.
• True economic viability requires high launch rates.
• Ground infrastructure must be fully rethought.
• Aspire follows the global trend: eco-friendly methane engines, reusability, wide mission portfolio.



Pictured: Dr. Arzumanyan presenting flight of reusable satellites

7 Presentation on “Ground Infrastructure for Education and Professional Remote Sensing Applications”

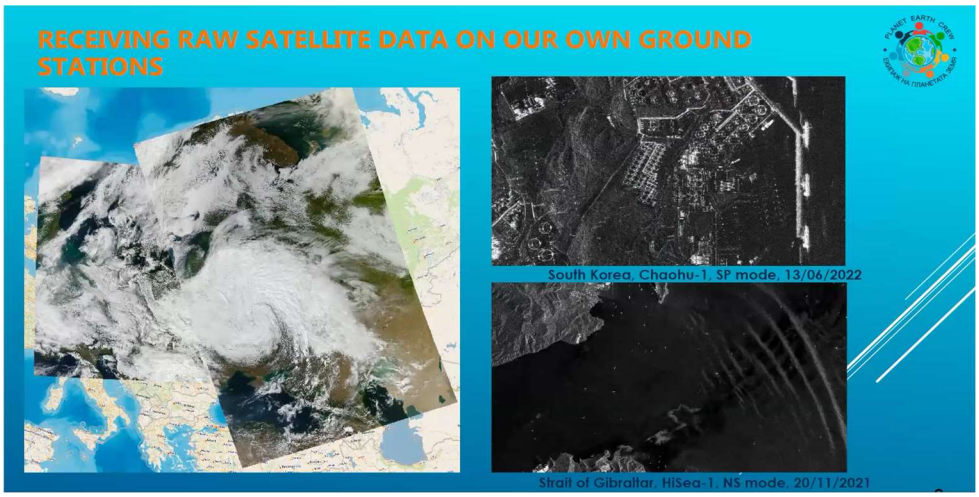
Madina Uzhahova, Planet Earth Crew

Madina Uzhahova is the CEO of Planet Earth Crew. Planet Earth Crew provides a unique opportunity to receive data from various Earth observation satellites directly to a workplace.

Pictured: Ms. Madina during her presentation

Highlights:

- Planet Earth Crew team has 35+ years of experience
- In creating technology for receiving, processing and using satellite images
- **Create demand for direct downlink data delivery**
- Company products and services
    - Ground stations
        - Complexes operated via radio channels in X- and L- frequency ranges
        - They provide an independent platform together with satellite owners
        - Receiving data directly to your workplace
    - Antennas and engineering kits for education
    - Services based on satellite images
        - Fire monitoring
        - Disaster monitoring
        - Oil spill monitoring
        - Receiving raw satellite data on our own complexes



Pictured: Ms. Madina presenting raw data received by Planet Earth Crew Ground Station

- Detection of oil spills
    - Determination of size and spots drift
    - Find out possible impact of oil spills on environment
    - Assistance in assessing the possible damage
- Fire monitoring
    - Tracking the spread of fires in real time
    - Identifying the ignition points
    - Monitoring and assessing the extent of wildfires

        - Determine optimal routes for fire suppression
        - Preventing the spread to new territories
- Antennas and engineering kits
    - Equipment for students from primary school to university
    - Courses for teachers
    - Set of teaching materials
    - Including assignments
    - Archive satellite images and spatial data
    - Full cycle skills
    - From assembling and tuning an antenna to obtaining a satellite image in real time
- Mission and goal
    - Unite satellite operators to benefit end customers
    - Decrease the price and latency
    - Access real time viewing of each local point
    - This approach is extremely important where every second counts
    - Customers can access earth images over 10 to 20 million kilometers
    - Directly from satellite within minutes
- Two offers
    - Ground station as a product
    - Flexible Software for daily remaps of local area

8 Presentation on "Challenges & Opportunities for Space Technologies Commercialization"

Stella Tkatchova, European Commission

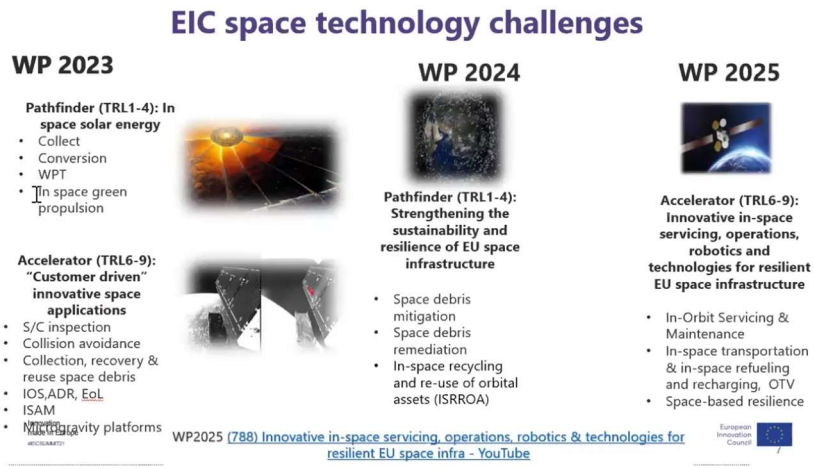
Dr. Stella Tkatchova holds a Ph.D. in Aerospace Engineering from TU Delft, Netherlands and a Master of Space Studies from the International Space University, Strasbourg, France. She began her career at ESA's ESTEC, working on the Galileo and ISS programs, and later managed research and innovation projects for the European Commission in the aviation sector. She also worked as a Space Business Engineer at Rhea System S.A. and co-founded a company supporting SMEs and start-ups in the Newspace industry. Since joining the European Innovation Council (EIC), she serves as Programme Manager for Space Systems & Technologies, overseeing the development and commercialization of space technologies.

Pictured: Dr. Stella during her presentation

<u>Highlights:</u>

- EIC role in European space industry
    - **EIC funds game changing innovations and funds a diverse space portfolio**
    - From low TRL to high TRL through its Pathfinder, Transition and Accelerator programs
- EIC space portfolio

- Pillar I: Space debris sustainability
- Pillar II: Enabling space technologies
- Pillar III: Earth observation and meteorology



Pictured: Dr. Stella presenting past challenges and mitigation

EU member states and Associate ones can apply to the EIC WP2025 Accelerator space challenge
Deadline is 1st October, 2025
EIC WP2025: Innovative in-space servicing, operations, space-based robotics and technologies for resilient EU space infrastructure

- In Orbit Servicing & Maintenance- RPO, RDV, in-space robotic manipulations
- In-space Transportation and in-space refueling, OTV
- Space-based resilience - space-based cybersecurity for satcom, nav, EO and IOS missions

Space-based robotics and Technologies
Background

- **Current satellites are not repaired or refuelled**
- 85% are discarded due to fuel depletion
- Increased collision avoidance maneuvers shorter lifetime
- 650 GEO satellites with 120 GEO beyond their lifetime
- Flight proven life extension mission
- EU lacks cost-effective, scalable, and resilient mature space technology
- To extend lifetimes and protect space-based infrastructure

- Conclusion
  - Space SMEs and start – ups will have offer affordable
  - Cost-effective technologies for IOS and active debris removal
  - Space SEMs need to be aware of historic commercialization lessons
  - Prepare to be risk averse and resilient in a complex macro-economic environment

Q/Ans:

Q: **UNISEC Participant: Could you please give a brief about the ground station and space commercialization activities taking place in the African continent as well as Nigeria?**

A: ***Vesselin Vassilev:*** *Yes, certainly, it would be very interesting to learn about activities in Africa. I know Nigeria is pushing strongly for developing space capacity. We can continue this conversation maybe bilaterally and in a smaller group. Please share your contact information so we can be in touch. Thank you.*

Q: **UNISEC Participant: Will**

A: ***Sota Kaneko:*** *Next year is also domestic. But we want to make it international in the future.*

9 Announcement and Acknowledgment

Haruka Yasuda, UNISEC-Global

Highlights:

- **Nano-satellite IoT Constellation Program**
  - A new program launched by UNISEC-Global
  - Jointly design satellite bus (3-6U) with online guidance
  - Each satellite will be developed by each country with its own funding
  - If difficult, we will jointly search for international funds
  - All the satellites have the **same mission payload** to contribute to solving global problems
  - Or any local problem as a constellation
  - Each country can have **one specific mission payload** for its own interest
  - Web: https://unisec-global.org/iot.html
  - Interested ones can submit the form
    - Link: https://forms.gle/WcdvQ9GiQV9rxssj6
  - Contact: iot@unisec-global.org

- **The Mission Idea Contest**
  - The 9th Mission Idea Contest : to the Moon
    - Theme: Lunar Mission
    - https://www.spacemic.net/
    - 25 abstracts were submitted from 14 countries
    - 10 finalists and 4 semi-finalists were selected
  - **Important Dates:**
    - Full Paper submission due : August 25, 2025 (Finalists and Semi-finalists)
    - Final Presentation : November 1, 2025 at the 11th UNISEC-Global Meeting in Tokyo
    - Contact: info@spacemic.net

- **CLTP14 (CanSat/ CubeSat Leader Training Program)**
  - Date: August 19 – 29, 2025
  - Venue: Nihon University, Chiba, Japan
  - Application Submission Due: April 22, 2025
  - Notification was made in early June
  - CLTP14 Website: https://cltp.info/cltp14.html
  - Contact : secretariat@cltp.info

- **The 11th UNISEC-Global Meeting**
  - Date: November 1 - 4 2025
  - Venue: Tokyo, Japan
  - Early Bird registration is open until September 1, 2025
  - https://www.unisec-global.org/meeting11.html
  - **Tentative Program (T.B.C)**
    - November 1: Opening Ceremony, The 9th Mission Idea Contest: to the Moon, Reception
    - November 2: Nano-satellite IoT Constellation Program Workshop
    - November 3: Regional Report, Deep Space Workshop Student Session, POC Meeting
    - November 4: Supporter Presentation, Industry Visit, Gala Dinner

- **Call for proposal for 15th Nano-Satellite Symposium and the 12th UNISEC-Global Meeting 2026**
  - Next 11th UNISEC-Global Meeting will be held in Japan 2025
  - Will call for proposal for venue of Nano-Satellite Symposium
  - Call for UNISEC-Global Meeting in 2026
  - **Important Dates**
    - Proposal submission due : September 30, 2025

        - Proposal presentation : October, 2025 (at Virtual UNIGLO meeting)
        - Local Chapter voting : October 2025
    - Download the format here: https://unisec-global.org/support.html

- **Launch Opportunity: J-Cube**
    - Special Discounted opportunities
    - 1U, 2U, 3U, deployment from International Space Station
    - Collaborate with UNISEC-Japan's University
    - Technical support will be provided
    - Contact: info-jcube@unisec.jp
    - Website: http://unisec.jp/serviceen/j-cube

- **Next Virtual Meeting**
    - Date: September 20, 2025
    - Theme: T.B.D
    - Host: T.B.D

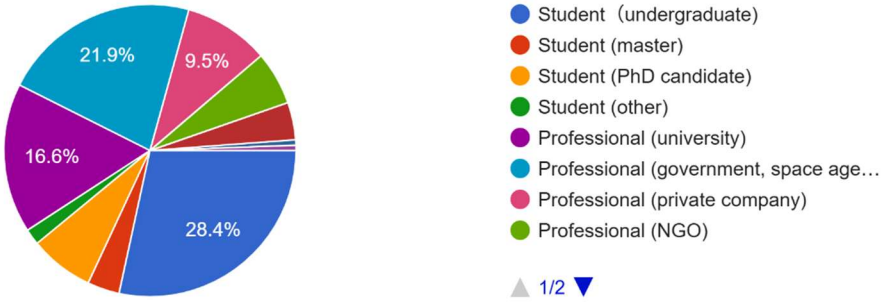
10 Participant Statistics

169 registered participants from 34 countries and regions for the 59th Virtual UNISEC-Global Meeting.

Country/Region	Registrants	Country/Region	Registrants
Argentina	1	Namibia	1
Bangladesh	1	Nepal	4
Bulgaria	24	Nigeria	33
Burkina Faso	4	Peru	2
Burundi	3	Philippines	1
Chile	2	Portugal	1
Colombia	1	Romania	1
Côte d'Ivoire	2	Rwanda	1
Dominican Republic	1	Somalia	2
Egypt	10	Spain	1
Germany	1	Tanzania	6
Guatemala	2	Tunisia	1
India	6	Turkey	1
Israel	1	Uganda	1
Japan	12	UK	1
Mauritania	1	Uruguay	1
Mexico	1	Zambia	38

Student or professional?

169 responses

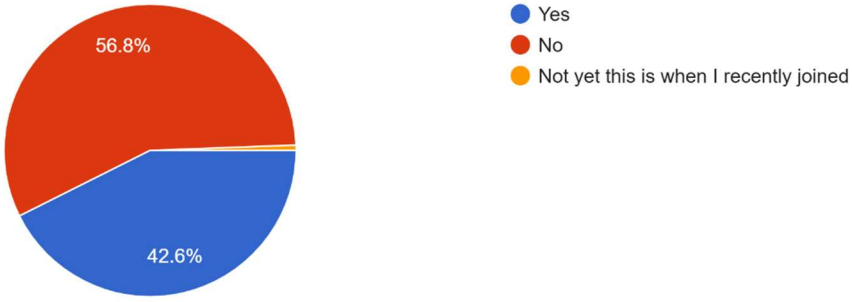


Are you familiar with Bulgarian Space activity or industry?

169 responses

Have you participated in the UNISEC-Global Meeting previously?

169 responses

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6
UNISEC GLOBAL

Thank you