

11th Conference on European Space Policy



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Business Bridge Europe 11th European Space Policy Conference

“Space for Europe, European Space in the World”

22-23 January 2019, Egmont Palace, Brussels



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Brussels - 22 & 23 January 2019 - Palais d'EGMONT
Organised by Business Bridge Europe

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DAY 1: 22 JANUARY 2019

Welcome Message

The conference started with a special address from the following speakers:

- **Didier Reynders**, Deputy Minister, Minister of Foreign and European Affairs and Defence, Belgium
- **Elżbieta Bieńkowska**, Commissioner for Internal Market, Industry, Entrepreneurship and SMEs, European Commission

Ms. **Elżbieta Bieńkowska**, Commissioner for Internal Market, Industry, Entrepreneurship and SMEs, opened the 11th European Space Policy Conference by underlining the timeliness of the event and acknowledging its growing success. She started by noting that the speeches she gives at this Conference have evolved over time to address not only the plans of the European Commission but also the vision set for Europe in space. Getting close to the end of the 2014-2020 Multiannual Financial Framework of the European Union, the spotlight has been put on the major progress accomplished, which deserves to be recognized and advertised, and on the proposals on the table for the next MFF. Ms. Bieńkowska encouraged the audience to feel proud of what Europe has achieved collectively: Europe now has both the best Earth observation and global navigation systems in the world. This, together with other major successes in the space domain and a world-class space industry, make of Europe the second space power.

Ms. Bieńkowska then argued that a paradigm shift in the global space sector must be acknowledged and that Europe must react and adapt to new realities. At the European Commission level this was translated in the adoption of the Space Strategy in October 2016 and, more recently, in the proposal for the EU Space Programme for the next MFF presented in June 2018. This proposal is structured around four objectives:

- Ensure the continuity in the investment towards Galileo, EGNOS and Copernicus;
- Support the evolution of these programmes towards new needs;
- Promote the adaption of the EU space sector to new realities: economic of course but also strategic (non-dependence, autonomous access to space) and security-related (SSA and GOVSATCOM initiatives);
- Optimise the ways of working to be more effective and efficient, which translated into a proposal for slight adjustment in the governance.

Beyond the EU Space Programme, other framework programmes will support space, such as Horizon Europe and InvestEU.

Setting up an appropriate approach for Europe to the current transformation of the space industry requires a change of mindset and adequate instruments to leverage the strengths of all actors – public and private, big and small, traditional and new. On the public side, for example, there is a need for a more open and flexible procurement and for a quicker decision-making process. With regards to new instruments and initiatives, she presented the planned Space Fund, which aims to mobilise 300 M€ from public and private investments and a new partnership with ESA (100 M€) to join forces and support in-orbit validation and demonstration. In addition, Ms. Bieńkowska called for the establishment of a large European Space Equity Fund.

Ms. Bieńkowska then shared some thoughts and open questions on a European Space Force, the establishment of a European Space Council or the evolution of geo-return and single market rules. She noted that these questions transcend her mandate as Commissioner or even the mandate of the European Union itself but should be addressed to set in motion a process to define Europe's vision for space. Such vision should not revolve solely around economics but also embrace strategic concerns such as autonomy and should resonate with European citizens as it is the case in the United States or China, in particular thanks to clear space exploration ambitions.

Mr. **Didier Reynders**, Deputy Prime Minister and Minister of Foreign and European Affairs and Defence of the Kingdom of Belgium, focused his opening address on the industrial revolution mentioned by Ms. Bieńkowska and more specifically on challenges for Europe and how Belgium is approaching these issues.

The European space sector is facing a rapidly changing competitive landscape with the entry of a variety of new players and a profound transformation of the economics of launchers. In this changing international environment, Europe must reaffirm its ambitions and decide the place it wants to hold. From this perspective, 2020 is a landmark and a starting point.

Mr. Reynders shared his opinion that a key element to secure a leading position for Europe in the global arena will be its level of strategic autonomy in space. Another important element will be the capacity of European stakeholders to cooperate toward common objectives. This is essential because no member state can achieve an ambitious space programme alone.

Belgium contributes its share to this European endeavour. As a matter of fact, Belgium has the highest investment per capita in the space sector which allowed the country to develop a solid industrial base and some excellence centres such as the space hub in Redu.

Mr. Reynders concluded his speech by recalling that the European approach to space can be successful only if it builds on a critical asset: young people and education.

Round Table - “European Space Strategy: New Programmes for 2030”

The conference started with a round table bringing together high-ranking government officials and representatives of the European space industry to share their views on current and proposed developments in the European space policy and on long-term perspectives for the European space sector.

The round table was composed of the following panellists:

Moderator: Marc Paoloni, Partner, Business Bridge Europe

- **Manuel Heitor**, Minister for Science, Technology and Higher Education, Portugal
- **Massimiliano Salini**, MEP, European Parliament
- **Johann-Dietrich Wörner**, Director General, European Space Agency
- **Pierre Delsaux**, Deputy Director-General, DG GROW, European Commission
- **Jean-Loïc Galle**, President, Eurospace

Mr. **Massimiliano Salini**, Member of the European Parliament started by sharing his view on the regulation proposed by the European Commission for the EU Space Programme and underlined that this proposal will play a big role to ensure the continuity of EU space programmes (Galileo, Copernicus, EGNOS) but also to address new challenges related to the exploitation phase of these programmes including development of the downstream sector and maximisation of end-user benefits. Ensuring the continuity is however not enough and the proposal reinforces or introduces other initiatives such as SSA and GOVSATCOM. This fits with the growing need to secure space systems as a critical infrastructure and, in parallel, to further exploit the features offered by satellites for new government security-related missions.

Considering a longer-term perspective, Mr. Salini explained that, in the current unstable political environment, promoting synergies between space and other programmes of the Union is essential. This contributes to positioning space as a key sector for the European competitiveness, strategic autonomy or economic diplomacy and therefore as a priority for public institutions. Within the space sector itself, guaranteeing an autonomous access to space is certainly a top concern. This will require an aggregation of demand for European launchers, a support to technology development and innovation and a continuous investment in ground infrastructure.

Mr. **Jean-Loïc Galle**, President of Eurospace, the association of the European space industry welcomed the proposal of the European Commission for the next MFF and in particular the level of budget (16 B€) contemplated for the 2021-2027 period. Industry also welcomed the European Parliament recommendation to increase the funding available for Defence & Security programmes SSA and GOVSATCOM.

Mr. Galle recalled that the European space industry is very competitive and innovative, despite the limited public budgets devoted to the sector as compared with those that the competitors benefit from in other regions. To maintain this state of play, public support to research and development is critical. From this standpoint, industry estimates that mobilising a budget in the order of 4 B€ as part of the framework programme Horizon Europe would be necessary. Mr. Galle also shared industry’s concerns over the lack of a dedicated budget line for space within the cluster “Digital and Industry”.

Mr. **Manuel Heitor**, Minister for Science, Technology and Higher Education of Portugal, started by underlining that it is now time for action with important decisions to be made for the competitiveness of the European space industry and for European economy and society at large. For this, Mr. Heitor called for a convergence of Member States on the last critical points of the proposals currently under negotiation.

Mr. Heitor shared his opinion that the future of the European space sector will be strongly influenced by Europe’s capacity to stimulate innovation, entrepreneurship and growth. Portugal has adopted an ambitious incremental approach in this sense including the adoption of a space legal regime, the creation of a space agency, the introduction of various initiatives like the development of an Earth Observation platform and the development of strategic partnerships with the United States or China. An important area of development for Portugal is the launch sector with plans to build a spaceport in the Azores that would be ready in 2021.

The selection process of the consortium that will design and build this spaceport is on-going and progressing well.

Mr. **Pierre Delsaux**, Deputy Director-General of DG GROW, explained that the proposal of the European Commission has now been debated by both the European Parliament and Council. The next step involves a trilogue discussion to converge on a common agreement. Mr. Delsaux shared his confidence that the negotiation should conclude by the end of February. He however called for caution as space is not the only element of the MFF and reminded the audience that promoting space as a priority for Europe is a continuous challenge. From this standpoint it is essential to raise awareness on the strategic importance of space but also to celebrate the successes and progress of Europe in this sector. Europe is not proud enough of its great successes in space. And yet, these achievements are often praised beyond European borders by the U.S. government who benefited from Copernicus data for disaster management or Apple who acclaimed Galileo as the best navigation system in the World.

Mr. Delsaux then answered the concerns raised by Mr. Galle with regards to the lack of a dedicated budgetary line for space within Horizon Europe. He explained that it should be seen as an incentive for the space sector to be more innovative, more efficient. Mr. Delsaux shared his belief that, eventually, this will be beneficial for the sector.

Mr. **Johann-Dietrich Wörner**, Director General of the European Space Agency, concluded the round table with a presentation of ESA proposal for the Council at Ministerial level "Space19+" that will take place in November 2019. This proposal is based on continuous discussions with Member States, industry but also the general public that ESA consulted during open events called "Space Talks". Mr. Wörner also shared the results of a recent poll conducted by ESA and which showed that 90% of European citizens have a positive view of space activities but also vastly overestimate the investment in space (i.e. respondents estimated the cost of space activities in Europe is around 250 € per person per year while the actual investment is rather around 10 €).

Mr. Wörner explained that the proposal for Space19+ is firmly oriented toward the Space 4.0 change of paradigm. In the area of technology for example, ESA Director General wants to embrace forward-looking research in areas such as Artificial Intelligence which he believes holds great promises for the space sector. The proposal is structured around 4 pillars:

- Science & Exploration as the backbone of ESA expertise;
- Safety & Security to address both the protection of systems in space (space debris, space weather, sustainability) and the use of space capabilities for security on Earth;
- Applications in the field of Earth Observation, Telecommunication and Navigation;
- Enabling & Support including activities in the field of R&D, infrastructures and operations.

Questions were raised during the Q&A session on whether Europe is lagging behind and properly prepared for current and upcoming developments in the global space sector. To answer these concerns, Mr. Galle recalled that the European space industry is still very well positioned on open commercial space markets across the value chain (i.e. satellites, launch services, applications, etc.) and is also very innovative and successful in new segments such as Internet of Things. Mr. Galle underlined however that the situation should not be taken for granted and that a continuous effort is required to adapt and prepare the future. He shared his opinion that the growing gap between European and foreign (U.S., China, Japan) public budgets for space should be a bigger concern than the capacity of Europe to surf on the New Space wave. From this perspective he called space policy actors to focus on initiatives that resonate with the general public to rise the priority awarded to space. For this, he identified four areas with high potential: Defence & Security, Environment, Connectivity and Space exploration. Mr. Heitor complemented this answer by recalling that R&D and synergies with other sectors need to be supported with appropriate budgets. He also underlined that, eventually, a collective approach to space is necessary to improve public outreach.

First Session - “European Digital Autonomy as a Strategic Goal: the Key Role of Connectivity, including SatCom, Digitalisation and A.I. in delivering Space Services”

The first session of the conference addressed the role of space to support the digital autonomy of Europe. During the session, panellists discussed the different facets of the issue including the use of satcoms for connectivity, the integration of space capabilities in upcoming 5G networks but also the development of technologies holding great promises for new space services and synergies between space and non-space sectors.

The session was composed of the following speakers and panellists:

Guest Speaker: Mariya Gabriel, Commissioner for Digital Economy and Society, European Commission

Moderator: Jean-Jacques Tortora, Director, European Space Policy Institute

- **Carlos Zorrinho**, MEP, European Parliament
- **Roberto Viola**, Director-General, DG CNECT, European Commission
- **Carlo des Dorides**, Executive Director, European GNSS Agency (GSA)
- **Magali Vaissiere**, Director "Telecom and Integrated Applications", European Space Agency
- **Evert Dudok**, President, ESOA
- **Rodolphe Belmer**, CEO, Eutelsat
- **Christophe de Hauwer**, Chief Strategy and Development Officer, SES
- **Jurry de la Mar**, Head of International Sales, T-Systems
- **Luigi Pasquali**, CEO, Telespazio

The session was opened by a keynote address of Ms. **Mariya Gabriel**, Commissioner for Digital Economy and Society, who recalled how much 2019 is a milestone for all European institutions and for Europe at large due to the upcoming elections. She further remarked that Europe cannot ensure safety and security of its citizens together with a sustainable economic growth without a full commitment for the development of a digital economy and autonomy. To be positioned as a single digital power, Europe needs to be equipped with the right instruments, embedded into a strong policy. The digital revolution is a unique opportunity to strengthen synergies among diverse fields, including cybersecurity, which is also key to ensure autonomy. Ms. Gabriel argued that this could only be achieved through a broad, multisector approach bringing together areas like connectivity, Artificial Intelligence, health, climate, environment and security to design common strategies tackling global societal challenges. In the space sector, she acknowledged that European autonomy is fairly advanced, in particular for digital technologies, owing to strong value chains and know-how within ESA, allowing the creation of a single ecosystem in which space is a crucial player.

With regard to connectivity, the infrastructure for communication and radio diffusion is the backbone of Europe's strategy when it comes to broadband. From this standpoint, the role of space systems is critical and the next generation of satellites is already expected to further improve coverage for the whole European territory. She also recalled how, thanks to PPPs set in 2014, the development of 5G should be complemented by satellite hedging ensuring a seamless coverage in remote territories.

Referring to the increasing importance of AI technologies, Ms. Gabriel stressed the need for a deeper exploitation of the huge amount of data provided by the two European flagship programmes, Galileo and Copernicus. For this, she emphasized the urgency to build a new generation of data processing capacities as part of Europe's effort to maximise the benefits of its space programmes. Cutting-edge data processing would help European institutions and businesses to exploit the full potential of space data.

Ms. Gabriel then recalled the importance of cybersecurity in the framework of the digital economy, highlighting the need for Europe to protect its critical infrastructures against cyber-attacks. She stressed that this is a major concern for the Commission, and underlined the strong political agreement on the importance of this topic. The Commissioner shared a proposal for more investment in developing European cybersecurity skills. She remarked that quantum communication and computing is a promising technology for increased capacities, security and resilience. Europe should be more ambitious, aiming at positioning itself as a leader

in this domain. She also mentioned discussions within DG CNECT about a proposal to set up a public authority on quantum computing, and, with regard to space, the key collaboration between ESA and the EC to develop space quantum technologies.

The special address was followed by speeches from the panellists.

The first speaker of the session, Mr. **Carlos Zorrinho**, Member of the European Parliament, elaborated on awareness and understanding of the current stakes for the space sector, from the perspective of an MEP. He explained that MEPs are well-aware of the necessity of a strong and reliable space infrastructure in order to achieve the high ambitions of Europe in the digital domain. He however noted that, while technologies and infrastructures are undoubtedly a key to success, they should not limit the vision: the leadership of the so-called “digital revolution” should be political and focus on goals to be achieved (for example, better and more powerful connectivity for all citizens) rather than on technologies and infrastructures to be used.

Mr. **Roberto Viola**, Director-General of DG CNECT, replied to a question from the moderator about the role of space infrastructure in the European digital autonomy. Mr. Viola took the example of cybersecurity, noting that Europe has now put in place a solid legislation (including the Cybersecurity Act) and that the next step should be focused on technology. From High-Performance Computing (HPC), to A.I. and Quantum, he appreciated European high-level investments compared to other global players, but observed that Europe is still lacking on the applications-side of, for example, Quantum technology. He then highlighted the need for a greater integration of space and terrestrial segments in this domain, acknowledging recent efforts of ESA.

The moderator then asked the third speaker, Mr. **Carlo des Dorides**, Executive Director of the European GNSS Agency (GSA) how the use of digital technologies could help foster the user uptake of Galileo services. Mr. des Dorides started by noting that today, half of the world’s population is connected to the digital world, with a massive growth rate leading every day to new users and new ways to connect – including more and more mobile phones subscriptions, the majority of which are using broadband. The gap between the physical and digital worlds is becoming blurred with IoT devices bridging the two. GNSS is well integrated in this ever more ubiquitous digital economy with over 50% of mobile phones applications requiring geo-positioning. Galileo is achieving an outstanding success in this field, not just in terms of performance but also regarding user uptake (all new smartphones are Galileo compatible) and innovation, helping to bring pioneering technologies to the global market.

Ms. **Magali Vaissiere**, Director of Telecom and Integrated Applications at the European Space Agency, was asked about upcoming proposals from ESA on topics like digitalization and Quantum communications at the Ministerial Council Space19+. Ms. Vaissiere confirmed that digital technologies such as A.I. or Quantum communication will hold an important position in ESA proposal at Space19+. She also recalled the success of the ARTES programme in supporting the competitiveness of the European telecommunication sector on the open market – particularly through several successful PPPs with satellite operators, which resulted in innovative systems being launched. Furthermore, in addition to these PPPs with operators, she suggested that new types of PPPs will be pursued, also for technology validation, as well as in support of the development of downstream applications. At Space19+, she highlighted three strategic themes responding to the needs of digitalization and increasing importance of safety & security:

- Integration of satellites in 5G terrestrial networks;
- Secure satellite communications for safety and security – strengthening European telecom networks;
- Optical and Quantum communications – recalling Europe’s leadership in optical satcom through EDRS, and initiatives expanding its success, on top of new ones such as Quantum GEO.

Mr. **Evert Dudok**, President of ESOA, the association of satellite operators, was asked to elaborate on the current role of European satellite communications – and most importantly, the role they will play tomorrow, considering the fast-changing space environment. First of all, Mr. Dudok stressed the absolute importance and unique capabilities of satellites for a great variety of applications, such as disaster management, security and defence or enabling the Sustainable Development Goals. Satellite telecom operators are and will be the enablers of global broadband connectivity. With regard to 5G, he appreciated how industry is successfully working with EC and ESA, but noted that mobile phone operators do not seem convinced of the relevance of

satellites in their 5G strategies. This is a key point, where ESOA has to work further to convince of the necessity to integrate satellites in 5G terrestrial networks. A major concern is then related to frequencies allocation, which sees mobile phone operators and space operators often at odds. Mr. Dudok concluded his speech mentioning three aspects he would like to see developed in the future:

- A stronger push for Europe to be the number one in broadband connectivity;
- A higher priority awarded to the protection of European data and to making sure handling of such data is secured, referring in particular to development of European cloud capabilities and cybersecurity competencies;
- A focus on financial aspects, namely the (very) limited amount of taxes paid by non-European companies who thrive and operate in Europe, with respect to European ones.

Mr. **Rodolphe Belmer**, CEO of Eutelsat, then elaborated on the most critical challenges for the European satcom sector competitiveness. He started by acknowledging the instrumental importance of coherent public policy and commercial dimensions in developing the satcom sector. Noting the changing environment for satcom, he acknowledged that connectivity is poised to become the core business of satcom operators in the next decade. In this regard, he explained Eutelsat's ambitious strategy to procure innovative High-Throughput satellites from Thales, as well as the company's willingness to enter the IoT segment. With regard to his expectations in terms of policies and support from the public sector, Mr. Belmer noted the strong emphasis put on fibre-based connectivity and the absence of reference to satellite in recent EU telecommunication regulations. He also agreed with Mr. Dudok on the issue of frequency allocation, and the need for protecting the radio spectrum to allow satellite companies to develop and deliver global coverage and high-speed connectivity to European citizens.

Mr. **Christophe de Hauwer**, Chief Strategy and Development Officer of SES, also agreed with the points raised by Mr. Dudok, noting once again that 5G networks, are first and foremost envisioned to cover urban areas, missing out remote areas (3 billion people still live outside urban areas in the World) that only satellites can cover efficiently. Mr. de Hauwer stressed the importance of standards and interoperability between satellites and ground networks to guarantee optimal and seamless integration and ultimately global coverage. This is essential also to foster the uptake of new technologies. For example, cloud computing, whose value is maximised on-the-go, requires satellites to be accessible anywhere, anytime. In this domain, SES and IBM recently signed an agreement to use satellite connection in support of ground connection in order to access cloud systems ubiquitously and seamlessly.

Mr. **Jurry de la Mar**, Head of International Sales, T-Systems, was asked by the moderator to give his view on the current state of play regarding the highly competitive field of ICT. He started by noting the relevance of new tools such as cloud computing and AI also for the scientific sector, and praised the work of the EC for its contribution to the Open Science Cloud. As a result, sharing data in a better way, making it more accessible also to non-experts is clear added-value. In this regard, space can link different sectors, allowing them to embrace new technologies and make data even more visible and useful.

Mr. **Luigi Pasquali**, CEO of Telespazio, focused on the use of A.I. for Earth Observation to transform raw data through a full set of analytics to extract meaningful information and ultimately respond to customers' needs. New and better algorithms are then instrumental in order to process the big data, and extract the right information. Artificial Intelligence is a promising way to fill this need. Mr. Pasquali noted that whilst Europe is working towards attaining digital autonomy, some of the elements of the process he described might still rely on non-European capabilities, for example in the case of cloud computing. He also remarked the new trend – and necessity – of integrating EO with non-EO data, such as location information. Ultimately, he concluded that the actors who will be able to master A.I. technologies (also in the ground segment, to improve the effectiveness of satellite resources) will be those best equipped to respond to market and customers' needs.

Second Session - “Paths for European Space Non-Dependence in the trade, competition and international contexts”

The second session of the conference addressed the place of non-dependence in the European space strategy and how Europe can adapt its approach to take stock of changing trade, competition and international contexts. Speakers shared their views on new challenges faced by the European space sector and discussed how space policy developments could contribute to successfully take up these challenges.

The session was composed of the following panellists:

Moderator: Jean-Jacques Tortora, Director, European Space Policy Institute

- **Marian-Jean Marinescu**, MEP, European Parliament
- **Matthias Petschke**, Director, DG GROW, European Commission
- **Carine Claeys**, Acting Special Envoy for Space, European External Action Service
- **Jean Max Puech**, Director "Internal Services", European Space Agency
- **Jean-Loïc Galle**, President and CEO, Thales Alenia Space
- **André-Hubert Roussel**, CEO, ArianeGroup
- **Johannes von Thadden**, Senior Vice-President, Head of Space and EU Institutions, Airbus Defence and Space

Mr. **Marian-Jean Marinescu**, MEP, claimed that the EU still has a long path to travel in order to reach the full status of a space power. Mr. Marinescu was asked to elaborate on the proposal for a Joint Technology Initiative (JTI) in the space sector (a pilot project similar to other industrial sectors), in which he was involved. According to him, the proposal of the pilot project was based on the assumption that today Europe needs to spend the money more efficiently and looked for ways to work in the same direction as industry. Mr. Marinescu informed the audience that he also proposed another similar pilot project on space traffic management. Space policy, he continued, needs to be innovative and responsive. In looking forward towards the next European Parliament and European Commission, he stressed the importance of continuity of the programmes, setting-up of appropriate framework for governance and pursuit of new security-related capabilities in SSA and GOVSATCOM.

The second speaker of the session, Mr. **Matthias Petschke**, Director for the EU Space programmes Galileo and EGNOS within DG GROW, highlighted that the path Europe needs to take in order to be fully independent is still very long, although Europe already counts with great achievements. He emphasized that although the ambition remains there are still several critical situations of dependence. Mr. Petschke affirmed that, to effectively pursue such ambition, an adequate budget is needed. In the field of GNSS, he added that what is currently proposed for the next MFF is, in his opinion, a good basis to ensure continuity.

Mr. Petschke underlined also the link to the current geopolitical situation emphasizing how the current international context is a stimulus to go towards the development of a space policy driven by non-dependence and aiming at strategic autonomy as the primary objective in an area more and more relevant from economy. He added that around 10% of European GDP depends in one way or another on satellite navigation signals whilst the wide public is not fully aware of this state of play. Mr. Petschke then recalled that, notwithstanding the stable performance reported by Galileo (which provides initial services since December 2016), it is only now that we observe an active market uptake across the world also among key players such as India or Brazil. He added that to testify the great trust placed in the resilience and precision of the services offered by Galileo, the U.S. FCC recently accepted Galileo on U.S. soil. Furthermore, Mr. Petschke shared how the highly competitive EGNOS' industrial components scored good results in negotiation with Africa, which represent a prominent region in European policy and a close partner for further actions. He concluded mentioning launchers as a key issue in terms of dependency.

In responding to the raised question on whether the soft power-oriented approach of the European External Action Service is still valid in current circumstances, the third speaker, Ms. **Carine Claeys**, Acting Special Envoy for Space at EEAS argued that multilateralism represents the DNA of the Union. She also acknowledged

ongoing tensions in the global political environment but at the same time expressed a belief that, in principle, it is in the interest of the EU to further pursue multilateral negotiations exploring the possibility to agree on voluntary international rules applicable to space activities. Some of the current trends in the global space sector and beyond are endangering multilateralism, Ms. Claeys continued. In this sense she pointed out the Russian Federation's approach with regard to the endorsement of the agenda of long-term sustainability of outer space activities or the recently initiated U.S. space traffic management policy initiative, which, in her opinion, might represent a threat to multilateralism. She highlighted that multilateralism is a key tool but should not be the only one considered in approaching future developments in the space field. Accordingly, Ms. Claeys stated that there are 3 core elements of future European response to above mentioned challenges:

- To support EU industrial base on both upstream and downstream side as well as on export market;
- To foster progress in EU space surveillance capabilities as the EU cannot rely on a single external provision for this type of capability;
- To continue in efforts on international multilateral path to create a favourable environment for coordinated international initiatives, including transparency and confidence-building measures, in the field of space sustainability or space traffic management.

Mr. **Jean Max Puech**, Director of "Internal Services" at the European Space Agency began his intervention by emphasizing how ESA's industrial policy has been continuously adapted throughout the years to support a strong and competitive industrial base in line with current and foreseen developments. He went further and stressed the role of ESA in the very development of European industry, highlighting how ESA demonstrated a high flexibility in understanding and quickly reacting to the needs of stakeholders such as in developing flagships programs on behalf of the European Union. Mr. Puech then introduced several objectives that Europe faces in pursuit of European space non-dependence:

- Respond to the need of programme's value for money;
- Improve the worldwide competitiveness;
- Ensure fair distribution of activities among member states (georeturn);
- Give preference to member states' industry;
- Support free competition whenever possible.

Ultimately, Mr. Puech explained that it is important to enlarge the European space community, and that ESA is giving its best effort across all member states, He noted that ESA has recently been working on establishing new instruments for funding (e.g. partnerships with the EIB) and that procurement methods at ESA level are adapting in line with two main factors in this matter– flexibility and agility.

Mr. **Jean-Loïc Galle**, President and CEO of Thales Alenia Space started with an engaging demonstration of the leading role of Europe in the New Space revolution and explained that large European companies show concrete results in investing in New Space. In discussing the widely debated New Space trend, he underscored its two main constituting factors:

- Digitalisation of space assets (more and more space applications);
- Simplification and miniaturization of hardware.

Mr. Galle provided several examples of successful participation of European industry in some of the recent ambitious space projects, including Iridium and Kineis and the Canadian venture Northstar, thus providing evidence of aforementioned highly positive assessment of capabilities of European industry in the New Space sector.

Mr. **André-Hubert Roussel**, CEO of ArianeGroup, started by explaining how Vega-C and Ariane 6 are the two most interesting and exciting industrial projects in the European space sector. He reminded the audience of some of the achievements of the Ariane 5 programme reassuring at the same time about the expediency and flexibility that will be granted by Ariane 6 rockets. He added that the new European launcher family will be twice cheaper than its predecessors and commercially viable on the global commercial market. Mr. Roussel however acknowledged upcoming challenging times for the industry but underlined that ArianeGroup is

ahead of the race and remains competitive as demonstrated by the recent contract concluded with Eutelsat for multiple launches on-board Ariane 6. To secure this competitiveness duplication of efforts among member states must be minimized. To conclude, Mr. Roussel recalled how the Ariane launchers' family has been guaranteeing an independent access to space for Europe for more than 40 years.

Mr. **Johannes von Thadden**, Senior Vice-President and Head of Space and EU Institutions at Airbus Defence and Space put European space ambitions in perspective with those of other space powers, namely China and the United States. He stressed that, for these actors, it is a quest for dominance that is at the roots of their ambitions in space. Mr. von Thadden then questioned what should be the European position in such a landscape. In this respect, he praised the economic performance of the EU as a unified actor by showcasing that EU GDP tops the GDP of the U.S. In addressing what should be done in Europe, he explained that future R&D roadmaps should be developed through a shared platform between industry and institutions with non-dependence as ultimate strategic goal. Other recommendations included strengthening European political union, optimizing budgets, securing a continuous pipeline of missions, acknowledging the increasing relevance of space for security and defence, and fostering a level playing field in the area of international space diplomacy.

Special Address

The conference resumed in the afternoon with a special address from Mr. **Maroš Šefčovič**, Vice-President of the European Commission.

Mr. Maroš Šefčovič joined previous speakers in praising the considerable achievements of Europe in space. He underlined that these successes shine beyond European borders and are valuable and well-regarded by other nations, including established space powers like the United States. A few examples were mentioned: more than 50 petabytes of Copernicus data are downloaded annually, Galileo is now used by more than 600 million people in the World and EGNOS actively supports flight safety across Europe.

The road was of course paved with difficulties, sometimes serious like the injection anomaly of Galileo satellites in 2014, but eventually the perseverance and cooperation of all stakeholders prevailed.

Mr. Šefčovič then noted that the progress made by Europe in the space sector also calls for a reflection on the next steps that need to be focused on. It is with this objective that the European Commission put together the proposal for the next Multiannual Financial Framework. The proposal, which puts forward an ambitious budget, organized around three priorities:

- Continuity of flagship programmes and introduction of new, necessary, initiatives;
- Support to the competitiveness of the European space sector in a changing global environment and;
- Protection of the current and future European space infrastructure.

In the area of New Space, and taking stock of the current dynamic in the space sector, Mr. Šefčovič stressed the necessity to adopt a European approach that should not consist in a duplication of foreign best practices. Having visited several successful start-ups in the Silicon Valley, Mr. Šefčovič noticed that many of these promising business ventures were founded by Europeans. This illustrates the key challenge for Europe in the area: offering better conditions to start an innovative business. It is a matter of risk-taking mindset, in particular by institutions, but also of capacity to mobilize available funds. Various steps are being made in this sense by the European Union. For example, it is now well understood that the use of grants has limits and should be complemented by innovative procurement schemes supporting start-ups with first contracts.

Mr. Šefčovič concluded his speech by recalling that space is and will increasingly be critical to take up key modern challenges like connectivity, climate change or global stability among others. Reaping the full benefits of space for society and economy requires a courageous and ambitious European approach but also the elaboration of proper industrial, commercial, foreign and security policies.

Third Session - “European Union Strategic Autonomy Space, Defence and Security Policies”

Keynote speakers and panellists of the third session of the conference shared their views on a rising space policy domain for Europe: Defence & Security. Taking stock of the interdependence between Space FOR Security (i.e. the use of space infrastructures to support defense and security missions) and Security IN Space (i.e. protection of space infrastructures against security threats), the speakers provided some perspectives on the growing relevance of space defense & security issues for Europe and on opportunities and challenges in this domain.

The session was composed of the following speakers and panellists:

Special Address: Elżbieta Bieńkowska, Commissioner for Internal Market, Industry, Entrepreneurship and SMEs, European Commission

Opening Speech: Eric Trappier, President of ASD - Chairman and CEO, Dassault Aviation

Moderator: Marc Paoloni, Partner, Business Bridge Europe

- **Jean Arthuis**, MEP, Chairman of BUDG Committee
- **Françoise Grossetête**, MEP, European Parliament
- **Jorge Domecq**, Chief Executive, European Defence Agency
- **Tomasz Husak**, Head of Cabinet of Commissioner Bieńkowska, European Commission
- **Nicolas Chamussy**, Executive Vice-President “Space Systems”, Airbus Defence and Space
- **Marco Fuchs**, CEO, OHB (represented by **Lutz Bertling**, Member of the Management Board, OHB)
- **Pascal Legai**, Director, EU Satellite Centre
- **Kai-Uwe Schroggl**, Chief Strategy Officer, European Space Agency

In her special address, **Ms. Elżbieta Bieńkowska** acknowledged a spectrum of synergies existing between the domains of space and security & defence. She developed several examples, explaining that:

- Space has been and will continue to be an enabler to foster a stronger defence cooperation in Europe;
- Although civilian, European space flagship programmes have a strong defence & security dimensions;
- The need to protect the European space infrastructure and to further exploit space infrastructure for security has been translated the Space Situational Awareness and GOVSATCOM proposed components of the European Space Programme.

In addressing the possible ways of exploring such synergies, Ms. Bieńkowska also drew the picture of current European defence cooperation, illustrating the Permanent Structured Cooperation (PESCO) framework, the European Defence Fund (EDF, with proposed budget of EUR 13bn for 2021-2027 budget period), the European defence industrial development programme (EDIDP) and the Preparatory Action on Defence Research. Under these instruments, Ms. Bieńkowska noted continuation of some well-established practises, but at the same time underlined willingness to bring novelties to EU approach, such as stronger focus on the area of disruptive technologies. Additionally, Ms. Bieńkowska underlined one key factor of consideration, agreed under the EDIDP framework, that EU funds in defence should go to EU-based companies.

In putting the spotlight of the speech again on the synergies between space and defence, Ms. Bieńkowska demonstrated the security service of Copernicus Programme, the Public Regulated Service of the Galileo Programme, evolution of the SST and SSA agenda (potentially leading to development of more strategic capacity, such as the space traffic management system) or agreement on the need of a guaranteed access to secured satellite communications, which translated into another new initiative at the crossroads of space, security and defence – the GOVSATCOM.

In concluding her address, Ms. Bieńkowska expressed a belief that innovation in the space sector will be partially driven by military needs, argued that there should be a bigger support in Europe towards disruptive technologies and underlined the need for a convergence on how to tackle the related issues of strategic autonomy and technological dependence. Ultimately, she pointed out to the fact that some member states in Europe have been already considering ways to strengthen their defence doctrines with a space dimension

and raised the question, whether Europe should think about a European response to this, potentially through establishing an equivalent to the Space Force, which is being negotiated in recent months extensively on the other side of the Atlantic.

The opening speech of the session was provided by **Mr. Eric Trappier**, President of ASD and Chairman and CEO of Dassault Aviation. Mr. Trappier stated that there has always been a close relationship between space and defence sectors, underlining that both are high technology sectors of strategic importance and contribute to EU growth. He argued that it is actually not possible to dissociate military considerations from any European space policy developments. He also noted that space is becoming, like ground, air and sea, a potential area of armed conflict and that security challenges to space infrastructures are poised to grow in severity. He demonstrated this by recalling current technological developments in the domain of anti-satellite capacities. Among other challenges, Mr. Trappier emphasized changing characteristics of space environment, mainly due to cumulative space traffic and space debris concerns.

Mr. Trappier then presented three conditions he sees as necessary to face these challenges:

- A voluntary strategy based on ambitious objectives;
- The development of new demonstrators and new programs;
- A significant increase in the budget.

In pointing out to the significance of the new strategic situation, Mr. Trappier argued that space defence is essential to ensure a number of defence missions that are strategic to preservation of European capabilities, sovereignty and interests. He also claimed that in the face of current policy and technological developments by other actors, Europe must act for the preservation of geostationary integrity with strategic dimension not being overshadowed by the erosion of the satellite television market. Mr. Trappier concluded his remarks by presenting belief in defence developments by Europeans and ultimately also belief in European strategic autonomy.

Mr. **Jean Arthuis**, MEP and Chairman of BUDG Committee argued that EU strategic autonomy is a crucial objective, applicable not just to the domain of space but also to defence. He stated that current times create unprecedented challenges that Member States cannot face alone. In going further in detail, Mr. Arthuis stated that efforts towards strategic autonomy for defence and space are underway. Programmes such as GOVSATCOM or SSA are making a clear evidence of this trend. Mr. Arthuis then warned against fractioning and duplication and suggested rather pursuit for a unified approach, which would prevent development of similar technologies in different countries. At the end of his address, Mr. Arthuis advised Europe to position itself as an ambitious and reliable partner. In this effort, pooling resources should be deemed as an important mechanism.

Ms. **Francoise Grossetête**, MEP, similarly reasoned that space and defence policies cannot be separated. It is important, she claimed, to recognize and utilize synergies between these domains and acknowledged that disruptive technologies are changing the overall landscape. Subsequently, she discussed the importance of appropriate funding, stating that an ambition cannot be effectively met without relevant funding. Ms. Grossetête encouraged the audience to think strategically and not consider solely the issue of competitiveness. Continuity of investment, she further elaborated, is a precondition to maintain leadership position. As such, her views called for going beyond the industrial defence base and investigated perspectives for a new legal document to set up the role of European solutions in the field of defence. At the end, she shared the opinion that European decision makers and industry stakeholders need to work together towards convergence allowing for development and agreement upon common values.

Mr. **Nicolas Chamussy**, Executive Vice-President for Space Systems at Airbus Defence and Space first thanked the Commission for a well-prepared strategy as well as recent space regulation proposal. He continued by saying that there are dimensions in military operations and defence needs where space is an undisputed number one provider of capabilities or at least recognized as an integral part. Even in times of transatlantic ties, he pointed out, it is necessary for Europe to maintain strategic autonomy. In his view, space-based capabilities undeniably have the potential to shape the security and defence related decision making. In similar fashion to previous speakers, Mr. Chamussy called for the implementation of new programmes

exploiting synergies between space and security and defence. In this matter, he consequently provided several suggestions for European decision makers:

- Develop more transparent and streamlined governance;
- Leverage and scale up European industrial capability;
- Utilize the experience of industry in constellations programmes;
- Develop missing industrial capabilities;
- Do not shy away from future capabilities.

Mr. **Tomasz Husak**, Head of Cabinet of Commissioner Bieńkowska discussed in his address the importance of space surveillance and tracking (SST) and space situational awareness (SSA). His assessment stressed out that at European level, the SST has been introduced in 2014, reflecting a growing cooperation between Member States. With growing interest from new Member States, he noted, European stakeholders should reflect on future developments and ask whether Europe can go beyond national selfishness. In this respect, Mr. Husak linked the issue of SST and SSA at European level with one of the main themes of conference discussion, the strategic autonomy. This topic, he stated, was understood mostly as a French concern in the past. Recently, he assessed it has become widely approached by other Member States as well. In looking at intersections between space and defence, Mr. Husak claimed that, although civilian, each of the EU flagship space programmes can be used for military purposes. This, he continued does not necessarily leads to offensive capabilities but rather improves general security and defence-related decision making in Europe. In a similar fashion as previous speakers Mr. Husak also expressed the view that space and defence domains are intertwined. The link, he argued, was not clear in the past, but with current developments it is becoming more prominent. In this sense SST and GOVSATCOM bring paramount solutions. Finally, he encouraged the audience to think about future developments and foreseen trends - management system for space traffic, space capabilities for missile warning, space services for police forces, as many examples of the close links between the domains of space and defence.

Mr. **Lutz Bertling**, representing OHB Italia, underscored in his speech the importance of space surveillance and tracking in the area of information autonomy. He reaffirmed that Europe indeed needs to continue in pursuit of strategic autonomy. This effort, he argued, contributed significantly to the growth of OHB Italia. In this, he provided some additional examples, where OHB acquired and maintains expertise in synergies between space and defence. Space based sensors, he argued are an essential part of sound SST capability, although the concept of strategic autonomy itself goes far beyond the SST.

Mr. **Kai-Uwe Schrogl**, Chief Strategy Officer at ESA, welcomed the rising importance of strategic autonomy in Europe. He subsequently argued that it is not a new topic but rather a reappearing one. Pursuing the strategic autonomy in the space sector could, in his view, be compared to autonomy of weather forecasting capability and its significant impact on the issue of security. Mr. Schrogl then highlighted EU-ESA joint statement from 2016, pointing out that one of the main objectives of this document is strategic autonomy in space. The understanding of the concept of strategic autonomy there relates mainly to access to space and operating in space without interference. In the next part of his address, Mr. Schrogl talked about space traffic management. This concept, he argued, has an even larger strategic component and tackles question such as what will be the rules for space users, who will set them or who has to abide by them. One of recent U.S. Space Policy Directives, the SPD-3 from June 2018, has been indeed focused on STM. In this sense it is thus clear, Mr. Schrogl added, that the U.S. is going “full speed” with preparing rules in outer space. As there is not a comparable European approach in motion at the moment of the Conference, Mr. Schrogl stressed out the need to prepare a European position to the STM. He concluded this elaboration by stating that STM is an issue of strategic relevance and contributes to strategic autonomy. Ultimately, Mr. Schrogl informed the audience that ESA is raising the issues of safety and security for the upcoming ministerial meeting in late 2019.

Mr. **Pascal Legai**, Director of the EU Satellite Centre opened his remarks by explaining that the EU SATCEN is the operational brick at the very last point of the value chain in the domain of provision of SSA services or satellite imagery. Mr. Legai reaffirmed the need for Europe to operate with autonomous capacities and in this matter the need to have a complete supply chain. This statement, he continued, is applicable at European

level, even when most of European countries are engaged also in the NATO framework. Mr. Legai noted the increasing importance of the commercial sector at the intersection of space and defence, arguing that even the satellite imagery data that SATCEN works with are generated to a significant extent by commercial sector. In concluding his address, Mr. Legai welcomed the proposal that a unique space programme will be launched at the EU level and underscored that it has the potential to support the credibility of the Union in the international environment.

Mr. Jorge Domecq, Chief Executive at the European Defence Agency, reaffirmed the importance of discussing space and defence as intertwined domains. He underscored the need for a competitive European industry and called for the need to start acting in the field of pursuit of strategic autonomy. Mr. Domecq also underscored the need for a competitive European industry. In discussing the space situational awareness, Mr. Domecq noted that the US orbital tracking system is the most advanced and with expected 1.6 B\$ Space Fence programme will even further and exponentially improve. Furthermore, Mr. Domecq also noted the relationship with efforts in STM. In achieving the notion of strategic autonomy, he underscored the importance of a collective European action, increased resource allocation on space and defence-related technology development, optimized utilization of civil-military synergies across the board and an improved communication and articulation of positions between engaged stakeholders.

Parallel Working Sessions

Topic A - “Space tools, Guardian Angels of Climate and Environment”

The parallel session entitled “Space tools, Guardian Angels of Climate and Environment” revolved around the necessity and benefits of using space tools to address modern – and crucial – societal challenges such as monitoring climate change and protecting the environment. In particular, the focus was put on the development of appropriate services as they are needed to ensure a proper exploitation of space data. In this regard, while Europe can be considered at the forefront, owing to the successful efforts at national, ESA and EC levels with Earth Observation programmes, questions arise now about what will be the next steps, and how can space further deliver to fulfil the critical needs of the future.

The session was composed of the following speakers and panellists:

Guest Speaker: Gesine Meissner, Special Envoy of the President of the European Parliament on Maritime Policy

Moderator: Jean-Jacques Tortora, Director, European Space Policy Institute

- **Daniel Calleja Crespo**, Director-General, DG ENVI, European Commission
- **Mauro Facchini**, Head of the Copernicus Unit, DG GROW, European Commission
- **Arthur Runge-Metzger**, Director, DG CLIMA, European Commission
- **Josef Aschbacher**, Director "Earth Observation", European Space Agency
- **Alain Ratier**, Director General, Eumetsat
- **Pierre Bahurel**, Director General, Mercator Océan
- **Alexandre Tisserant**, Director General, Kinéis

Ms. **Gesine Meissner**, MEP and Special Envoy of the President of the European Parliament on Maritime Policy, started by noting the synergies between the space and maritime sectors, as the first one is absolutely instrumental for ocean monitoring. Indeed, she noted that space missions’ data are needed to further develop ocean policies and economies, and particularly to enable and ensure a sustainable development of the oceans. She then remarked the importance of cooperation between different actors, making the example of the German DLR providing space data to the Lisbon-based EMSA, enabling the agency to effectively conduct ship traffic and pollution monitoring. Ms. Meissner then elaborated on the specific role of policy makers in this regard, for example:

- Further helping small companies accessing space data;
- Help ensuring that space data remain open and accessible;
- Encouraging further synergies with other areas of the European economy, and;
- Ultimately raise awareness and communicate effectively on the importance of space, thereby stimulating the uptake of space solutions.

Mr. **Daniel Calleja Crespo**, Director-General at DG ENVI, European Commission, recalled the long road that led to the success of Copernicus today, granting Europe its current status as world leader for Earth observation data. While he conceded that the programme could have developed a bit faster, perhaps with a larger budget and closer cooperation among various actors, he stressed that Copernicus today is truly a “jewel of the crown” for Europe, and that the focus must now be put on further improving it and developing new services. This would enable policy-makers to effectively take decisions based on actual data. Of course, the benefits of this programme extend beyond the data it provides, as it is itself a source of innovation, opportunities and jobs, and ultimately instrumental to enable sustainable development.

Moving on to the topic of space for environment, and in particular the gap between legislation and implementation, Mr Crespo noted how Europe has the most advanced legislation for environment in the world, and is leading in water, air, chemicals and nature protection among other fields. He thus remarked that space systems - and Copernicus in particular - can greatly help ensuring implementation of such advanced legislation. In particular, he mentioned that Copernicus can:

- Empower the citizens and stakeholders, thanks to the information that it delivers. For example, farmers can work in a more sustainable way, and citizens have straightforward access on information on air quality.
- Help monitoring the application of EU law, for example identifying illegal dumps of waste or harmful emissions in the water streams.
- Act as an instrument for enforcement to comply to European legislation. For example, Copernicus data provided evidence of illegal logging in a protected area, enabling the ECJ to take swift action.

In conclusion, he highlighted that the challenge is not just setting up the earth observation system and getting data, but it is about using the data in the most effective and meaningful way. He then noted that in the new proposal for the space programme of the EU, there are references to environmental compliance and assurance in the role of Copernicus.

Mr. **Mauro Facchini**, Head of the Copernicus Unit at DG GROW, European Commission, responded to a question by the moderator regarding the way in which Copernicus data could be more utilized for EU sectorial policies. He started by highlighting that a major challenge now is to ensure continued open and long-term data availability of Copernicus, which is today the biggest provider of data in the world – to the tune of 20 TB per day. As noted by other speakers, the challenge now is to make sure these data are used, starting from cataloguing user needs, and explaining how to use and access Copernicus data through the appropriate platforms that are being developed and deployed.

With regard to sectorial policies, he mentioned that future satellites specifically developed to observe anthropogenic CO₂ emissions will be instrumental in assisting the implementation of agreements such as COP21, and more broadly Copernicus can support addressing several of the UN Sustainable Development Goals.

The moderator asked another question about using space-based measures to enforce international treaties, and potential showstoppers to do so. Mr. Facchini highlighted a few potential issues, for example technological acceptance of such new space tools, in certain areas where other approaches have been used for long time. A suggested solution would be to strengthen and increase dialogue with interested parties, to better explain the added value of remote sensing. Another issue is international recognition, where in order to get a certain solution broadly accepted, it would be beneficial to bring on board several countries – as it is being planned in the international cooperation for space-based CO₂ monitoring.

Mr. **Arthur Runge-Metzger**, Director at DG CLIMA, European Commission, elaborated on a question about climate change and its impacts on society, and how Copernicus can help. He stressed that climate change is a major threat, and that space data can help getting the recognition level needed, to bring countries on board of international climate treaties. Furthermore, in this regard space data are also the only way to monitoring land use change all across the globe. In the European context, the question is how to bring together ground and space-based data, so to achieve a richer monitoring through simpler solutions, and also possibly cheaper for Member States.

The moderator then asked a question about the structure of space budget within the European Commission. Noting how as of today it is originating within DG GROW, and that in light of the need of a greater transversal coordination to ensure that the needs of every Directorate in using space data are met, he enquired whether it would be appropriate to have budgetary allocations within DG Climate to address its needs. Mr Runge-Metzger replied noting that for the development of the tools – that is developing, deploying and improving the satellite systems – it is better to have a vertical budget line in a single entity. Then, DG Climate or other entities could still allocate budget on the application and downstream side, to improve the data utilization, ensure their quality, and ultimately make the best use of them.

The fourth speaker, Mr. **Joseph Aschbacher**, Director of Earth Observation Programmes at the European Space Agency, explained ESA's activities in preparing the next generation EO satellites, as well as the recent creation of Phi Lab, which aims at pushing technologies and disruptive innovation in the remote sensing sector. Firstly, he acknowledged Copernicus as the world's best Earth monitoring programme from space, a fact which is recognized worldwide. He then mentioned also other highly important and related programmes

in ESA, such as the Earth Explorers missions – satellites whose objective is to answer to key scientific questions, equipped with state-of-the-art technology. A recent example is Aeolus, an extremely successful mission that is now addressing a data gap, namely wind measurement, by employing completely new technology developed for this mission.

He discussed another series of missions, specifically addressing meteorology. Located both in GEO and polar orbit, he remarked how also in this segment Europe has top class missions dedicated to weather forecast. Overall, he noted that ESA is entrusted by the EC, EUMETSAT and the Member States to put this portfolio together, comprised of 15 satellites in operation and 25 in development – its biggest portfolio of EO missions ever, and notably one of the largest at international level. However, he stressed that in order to remain in a leading position, it is mandatory to innovate constantly and push the envelope of technology. For this reason, the EOP Phi Lab was created, adding that this years' priority is testing A.I. technology in space. An upcoming experimental EO CubeSat aims at testing on-board data processing in order to autonomously decide which relevant data should be sent to the ground.

Mr. Aschbacher then replied to a question from the moderator about his expectations from the upcoming ESA Ministerial Council, Space19+, in terms of decisions to be taken by the Member States. First, he emphasised that Europe is one of the largest economic blocks, but is investing in space considerably less than the United States or China. On EO, he mentioned the need to guarantee the successors to the first series of Copernicus Satellites, but then look at the opportunity of new Sentinel missions, which could fill current data gaps (such as for CO2 monitoring, or dedicated to the Arctic region), and also to new Earth Explorer missions as well.

Mr. **Alain Ratier**, Director General at Eumetsat, elaborated on climate change monitoring as an objective included in a recent amendment of the Eumetsat convention. In particular, he explained how Eumetsat provides systems for Earth observation and in particular Earth science – be it weather forecast or climate monitoring. Indeed, climate projections are integrated in the very long-term side of the agency's forecasts, and are further empowered by 40 years of data archives, cumulated since the agency's foundation. In this way, it is also possible to further support climate services provided by Copernicus. On a question about cooperation and/or competition for climate change services, Mr. Ratier suggested both will be needed. Competition, in order to build the best architecture, which then enables transparent cooperation with other countries and entities.

Mr. **Pierre Bahurel**, Director General at Mercator Ocean, discussed the topic of climate change and environmental monitoring from the perspective of Mercator Ocean. First, he addressed the need to getting out the best of the Copernicus Sentinel's data, and transform them into products and services ultimately useful to society. He remarked the importance of cooperation and partnerships, noting how this overarching topic goes beyond the space community, mentioning as example that efficient maritime energy production is possible only through very precise space data. Ultimately, he stressed how science-based information is instrumental to enabled informed decision-making for global leaders. Responding to a question about what improvements would be appreciated in his view from the next generation of Copernicus missions, he suggested to further link with user communities around the ocean economies domain, noting that they need at first continuation of the current state-of-the-art missions, but they also express their interest for specific domains such as coastal regions, marine biology and the Arctic.

The last speaker of this session, Mr. **Alexandre Tisserant**, Director General at Kinéis, gave a speech about the activities of Kinéis, a relatively new satellite operator which aims at becoming a connectivity provider for IoT by deploying nano-satellites. The Kinéis project represents a continuation of the Argos system, which was active since the 1980s. He then noted that the whole sector is changing with increased systems performances and an increased number of satellites – but also more simple and affordable solutions. Interestingly, this also calls for integration of space-based systems with ground-based systems, so aggregation of different devices will be a priority.

He concluded noting that the main challenge faced by Kinéis is not a technical one, but rather financial; i.e. transferring the experience from the Argos system to the private sector – as space activities are still perceived as quite risky.

Topic B - "The 2019 World Radiocommunication Conference: what is at stake for Europe?"

The session was moderated by Ms. **Daniela Genta**, Chair of ESOA Regulatory Working Group. The moderator introduced the session recalling the importance of the topics to be discussed at this year Conference. The agenda items are determined in advance by the ITU Council entrusting the Delegates to revise the Radio Regulations, the international treaty governing the use of the radio-frequency spectrum and the geostationary-satellite and non-geostationary-satellite orbits. The objectives of the Conference thus encompass the creation of regulatory certainty for a sector playing an increasingly crucial role in the development of our societies and of our economies. WRC19 aims as well to reach through consensus a global spectrum harmonization instrumental for economies of scale to materialize.

The session was composed of the following panellists:

Moderator: Daniela Genta, Chair of ESOA Regulatory Working Group

- **Piero Benvenuti**, Special Commissioner Italian Space Agency
- **Magali Vaissiere**, Director Telecommunication and Integrated Application, European Space Agency
- **Anthony Whelan**, Director, DG CNECT, European Commission
- **Alexandre Vallet**, Chief Space Services Department, Radiocommunication Bureau, ITU
- **Piotr Dmochowski-Lipski**, Executive Secretary EUTELSAT IGO

The first panellist Mr. **Piero Benvenuti** was asked to illustrate the outcomes of the preliminary discussions within the Italian Government and its advisory bodies. Mr. Benvenuti started by reporting the willingness of Italy to have a strong EU position at the Conference guaranteeing continuity for European infrastructures eventually including the next generation of satellites constellations. Furthermore, the panellist emphasized the full support of Italy to the proposed development of GOVSATCOM, and he further recalled the two calls for tender for commercial partnerships issued by the Italian Space Agency enabling the Italian/French Athena-Fidus to be used for two short term applications. He referred that Italy is also internally reflecting on the opportunity of creating a national hub which would then be open and beneficial at European level. Mr. Benvenuti reported the wish of the Italian Government for the reach of a successful agreement on other topics considered of high priority such as the 5G spectrum allocation. The special advisor affirmed that his country, and actually Europe at large, needs to be ambitious and at the same time very pragmatic. There is a need to accelerate the implementation in order to be fully able to exploit the network and above all the market, integrating different networks for the benefits of the final users. Mr. Benvenuti concluded his speech highlighting the need for Pico/Nanosatellite spectrum allocation which would represent a short time action bringing many opportunities for newcomers and SMEs. He added indeed how this approach offers impetus to many different initiatives in space and suborbital environment.

The second speaker to take the floor was Ms. **Magali Vaissiere** who was asked which, in her opinion, will be the major challenges to be tackled at the Conference and what ESA will do to support the industry. Ms. Vaissiere set the scene highlighting the profound transformation the market is currently undergoing together with the ongoing development of 5G and the new constellations which will be developed by a vast range of the so-called newcomers. She strongly reaffirmed how the programme ARTES has been designed to support the competitiveness of European businesses to their maximum extent. She stressed the high relevance of this conference for ESA and its partners. Furthermore, the panellist identified several opportunities including, the allocation of 66 to 71 GHz band for mobile, and this in her opinion is likely to be the most promising outcome triggering new opportunity for satellite as well. Another crucial point 3rd Generation Partnership Project (3GPP) standardization integrating satellite networks into terrestrial ones to provide the 5G services with the promised key performance indicators, such as global coverage and mobility, service ubiquity, and the required overall network reliability and security.

With the development and deployment of 5G, the satellite sector can leverage from 3GPP standards to reduce the development, deployment, and operational costs of terminals, as well as benefit from the advanced 5G features to ease network operations and guarantee seamless vertical handovers, multi-tenancy, automation and scalability (plug and play solutions) while reducing overall network CAPEX.

Ms. Vaissiere emphasized additional interesting opportunities potentially coming out of the Conference: new maritime bands in EHF will be allocated and a new regulation will be addressed, in addition a decision for NGSO and Q bands on new spectrum allocation and short duration mission interesting for in orbit demonstration will be discussed aiming at more performant output satellite systems.

Ms. Vaissiere concluded by recalling also the challenges and threats which could be overcome by avoiding allocation in C band and 28 GHz. She pointed out also the progressive need to move towards band share. Innovative and sharing mechanism are currently investigating within ARTES and several initiatives might take place in this context.

The moderator turned then to Mr. **Anthony Whelan** asking how the EC will assure the alignment of its MS at the WRC19.

Mr. Whelan in his function as Director of DG CNECT firmly confirms the decision of EU to bring a common position. He emphasized the absolute novelty of this approach which represents the final layer of soft coordination. According to this new procedure Council conclusions will be replaced with a "*lisbonized*" process. Mr. Whelan stressed this core opportunity for all Member States recalling the importance of convey a firm European position peeling off single MS interest once the consensus has been reached internally. The Director confirmed that among the themes mentioned by Ms. Vaissiere, also the commission is interestingly investigating some opportunities and is preparing its position. He highlighted that there is certainly no surprise around the 5G topic of interest. On the opportunity side he identifies the 26 GHz primarily as a good occasion for terrestrial use with significant promising spinoff for space industry. Mr Whelan continues highlighting the full set of issues in the transport domain for which we can expect interesting discussion aiming at finding a balanced approach among diverse interests such as for what concerns maritime and aeronautical distress signal where there will be an interesting balance to be found with new operators together with the need to maximize safety and efficiency and to guarantee the protection of radio astronomy services.

Mr. **Alexandre Vallet** was asked to introduce the keys objectives of the conference which in his opinion where: 1. prevent international interference and 2. ensure global harmonization which will enable the spontaneous emergence of economies of scale on the industrial side. Mr. Vallet also identified, among other the main trend which can be isolated after the preliminary discussion unprecedented increase in spectrum requests for access. In his opinion this will have huge impact on the international governance under two point of view: 1. more competition for the same spectrum, because indeed the spectrum of usable frequencies is limited and 2. As mentioned by previous speaker the international community is moving from a past individual partition of the frequency into several segments to be allocated to different services towards a current sharing among diverse operators. Mr. Vallet for the sake of clarity explained that depending on the altitude of the frequency it propagates in a different way on Earth. In particular, he explained that for terrestrial usage high frequency are discouraged because not convenient both in terms of cost and of propagation having indeed a local reach however, this is not true for space assets which even using higher frequencies could keep a global reach on Earth. Mr. Vallet concluded his intervention stressing on the fact that the revamped competition for spectrum inevitably implies for government to establish fair trade-offs. His recommendation, in this context, would be to involve in the process downstream entities, which could bring the unique perspective of small endeavours with high growth potential not only in terms of number of companies and services offered but also in market shares, enabling a plethora of benefits for the satellite economy and for the economy at large. Space operators and manufactures are indeed few in the world and it is not through their niche production the community defends the value of space for society.

The moderator addressed Mr. **Piotr Dmochowski-Lipski** asking if EUTELSAT could be considered as the guardian of radiofrequency.

Mr. Dmochowski-Lipski briefly recalled the history of Eutelsat set up in 1977 by 17 European countries as an intergovernmental organisation (IGO). Soon after the launch of the second Orbital Test Satellite (OTS) in close cooperation with ESA, Eutelsat decided to start operations of its first TV channel and in 1983 launched its first satellite to be used for telecommunications and TV distribution. In early 2000 the general liberalisation of the telecommunications sector in Europe, brought EUTELSAT to transfer its assets, liabilities

and operational activities to Eutelsat S.A., the private company that we know today. However, the former IGO was not dismissed but his role and mission was redesigned to basically ensure that Eutelsat S.A. observes the Basic Principles set forth in the EUTELSAT Amended Convention entered into force in November 2002. The above principles revolve around: universal service obligations understood as universal good to be protected, pan European coverage by the satellite system, non-discrimination and fair competition. Today the Organization counts 49 MS from across the world with diverse interests and different positions regarding competition for frequencies. The organization cannot thus be seen as a lobbyist advocating for any particular industrial interest but rather the guardians for public interest understood as preserving interaction at national and international level that those principles of public service are at use. Before concluding he recalled the important role played by SatComs as the unique provider of connectivity everywhere, until the remotest areas of the globe.

The moderator eventually opened the floor to the audience to gather questions. The first question brought a forward-look asking if in the long run the increased difficulty of spectrum allocation on high altitude frequency has any resemblance with STM.

Mr. Benvenuti replied insisting that the challenge the community need to tackle is the sharing of flight volume which will increase density of activities.

Mr. Whelan added that this is not an agenda item for this year WRC, however, he recognized an impact on the future activities, and he stressed the need for a collective reflection through the United Nations which could represent a right forum to initiate this exercise potentially leading to a common regulation echoing a single European vision.

Ms. Vaissiere reaffirmed the commitment of ESA in this regard, she recalled the Agency is already active in structuring a roadmap addressing this challenge entailing a range of elements including density of sensors, aerial vehicle sharing volumes and spectrum, capacity of monitoring continuously, mitigating the risks of critical components, protecting data services and assets from cyber threat, regulation on operation environments avoiding single country regulation. For what concerns STM Ms. Vaissiere mentioned as a current topic for discussion the very altitude platforms competing the spectrum.

Mr. Vallet concluded the round of replies by acknowledging the need for ITU or any derived body to manage both issues the spectrum on one hand and the traffic itself on the other. He confirmed that the organization is basically equipped with the right tools to tackle the issue as it is currently doing for air traffic management and the sharing spectrum. He would also add that the community together with those two aspects should focus on the utilisation of telecoms on board of hubs.

The second question asked the relevant panellist to elaborate more on the novelties of the European approach at the upcoming WRC19.

Mr. Vallet explained that within ITU and in particular at WRC Europe has been the first region to create this original approach bringing forward the first CPT common proposal with various MS further reinforcing the common position. Nowadays all the Regions of the world opt for preliminary regional negotiation between them for 2 main reasons: the talent of engineers, in such field, policy makers cannot avoid to take into account experts recommendations to have a more solid position towards the rest of the World.

Mr. Whelan reaffirmed the crucial role of EU in delivering robust outcome convening the decision take internally through high level coordination. This coordination brings to a self-binding position on a selected number of topics. Mr Whelan further argued that even among MS there is plenty of debate whether this *lisbonization* of the representation process will grant fluent negotiation, still allowing to reactive maintaining the same level of commitment to the bedrock position reached.

The final question come from the representative of a young and bold start-up company dealing with lunar exploration and resources utilization and asked the relevance and interest for the representatives of the allocation of lunar frequencies.

Mr. Vallet replied that there is an actual growing interest around this topic which is for the time being used only for scientific purposes and the spectrum allocated by research is quite fully used by scientific Missions,

however it is worthy to note that the commercial exploitation of resources will make clear the need for an enlargement of frequency allocation. Mr. Vallet added that an ITU study group has been set up to investigate the topic which indeed is of growing interest. He also recalled that only the far side of the moon is part regulated by the treaty, shielding it from electromagnetic radiation.

Topic C - “After EDIDP, European Defence Fund: new opportunities for European companies post-2021?”

In acknowledging the ambitious steps that Europe has been recently taking in the areas of space and defence, above all in bolstering European industries, the spotlight of the third of three parallel sessions was put on intersections and synergies between the domains of space and defence at European level. In particular, speeches by the session panellists and related Q&A session concentrated on identifying the impact of current developments at the EU level on the European industrial landscape in space and defence sectors and on exploring what future initiatives need to arise for space and defence industries in the upcoming budgetary period (post-2021) and beyond.

The session was composed of the following panellists:

Moderator: Jorge Coelho de Jesus, EU Affairs Consultant, Business Bridge Europe

- **Norica Nicolai**, MEP, European Parliament (excused)
- **Pierre Delsaux**, Deputy Director-General, DG GROW, European Commission
- **Rolf Densing**, Director “Operations”, European Space Agency
- **Christine Francillon**, Vice-President “Program director Safety & Security Solutions”, ArianeGroup
- **Ignacio Mataix**, Executive Director T&D, Indra
- **Andrea Nativi**, Senior Vice President of Market Analysis and EU/NATO Policies, Leonardo

Mr. **Pierre Delsaux** thanked for the opportunity to discuss synergies between defence and space in forward looking perspective and noted the ambitious objective of the session to discuss next steps ahead, pointing out in this regard to still ongoing negotiations on current issues, namely the EDF. He also warned the audience that the financial characteristics of the EU Space Programme and other instruments are not guaranteed at this stage, as these issues are still under consideration. This translates into role for every member of the Community to convince the decision-makers at European level about the significance of spending on space.

Mr. Delsaux then welcomed that the EDIDP has been already adopted and moreover that the work on it has been initiated. Building upon this development, he stressed out that the main message he would like to convey to this session is a message of optimistic outlook towards future developments, those that are in process of negotiation and those that are yet to be developed.

In looking at the EDIDP, Mr. Delsaux claimed that initially, the Commission was worried that there will not be enough opportunities to spend the available resources. Currently, in the phase of implementation he expressed satisfaction that there were enough projects submitted and furthermore that submitted projects were of a high quality.

The next phase, Mr Delsaux argued, is the EDF. He noted, that although the Fund is supposed to start in 2021, the preparatory work on it should start as soon as possible. Mr Delsaux also claimed that dichotomy between space and defence is blurry. There are more and more space projects that could benefit from both the EDF. In this respect he encouraged the industry itself to be more proactive and approach the Commission with ideas for future projects.

Finally, he noted the importance of out-of-the-box thinking, which now translates into an increasing relevance of disruptive technologies.

Mr. **Rolf Densing**, took the floor afterwards. In his address he reflected on the increasing importance of the concept of security in ESA operations. Concerning the term defence, he explained, ESA view is not in line with generally understood meaning concerning individual countries but rather revolves around defending the planet in broader sense or defending assets and infrastructures in more narrow focus.

Mr. Densing also briefly discussed expected changes in security-related programmes at ESA level, which ESA is proposing to accommodate under the Space Security and Safety pillar in the future, pending such decision would be approved by ESA member states at next ESA ministerial meeting in November 2019 in Sevilla, Spain.

In later part of his address, Mr. Densing informed the audience about some specific security-related activities shaping the nature of operations at ESA. He noted that receiving collision warnings has been a daily routine at the Agency and that besides such man-made threats ESA SSA programme is working also on near Earth objects and space weather events. Concerning the issue of space debris, he reaffirmed ESA's interest in a continuing work on active debris removal measures.

After these first two speeches a brief Q&A session was opened. The debate orbited around the topics of post-2021 developments and what role could be expected in this period by the industry, Commission and other stakeholders. Mr. Delsaux highlighted in this regard the importance of inclusivity. One of the questions explored the impact of growing space traffic. Mr. Densing expressed a view that increase in space traffic calls for regulation on a global scale and claimed that building a comprehensive space traffic catalogue requires a lot of investment. Mr. Delsaux also responded to this, recognizing that the question of space traffic management is indeed timely and relevant. He acknowledged that the Commission has not been very active in this domain, compared to the U.S. In making this comparison, he stated that the recently launched U.S. policy on STM should be a stimulus for a dedicated European approach in this domain.

The second part of the session was composed of three speeches. The moderator gave the floor first to Ms. **Christine Francillon**, Vice-President "Program Director Safety & Security Solutions" at the ArianeGroup. She began her address to the audience by reflecting on the approach of industry in recent budgetary negotiations. Ms. Francillon admitted that the approach of industry has not been sufficiently proactive with respect to the European Commission and called for more action at the industry side in upcoming developments with respect to the EDIDP.

Afterwards, she assessed the EDIDP. In her view, it should provide synergies to explore in the domains of SSA and SST. In this sense, Ms. Francillon mentioned that ArianeGroup is also working on SSA independently with own capabilities, though she confirmed that the EDIDP provides new opportunities to explore new synergies with other stakeholders or to build new consortia to further progress of development of SSA capabilities.

In providing a reflection of the status-quo of European SSA capabilities, Ms. Francillon acknowledged the still existing de facto dependence on the data provided through the U.S. catalogue of space objects, though on the other hand, the catalogue that ArianeGroup is operating, sees also a considerable number of objects, which are not in the U.S. catalogue. As a result, what the ArianeGroup is proposing now under the EDIDP, is achieving the objective of autonomous European capacity for catalogue of objects in the geostationary orbit.

Mr. **Ignacio Mataix**, Executive Director T&D at Indra took the floor next and underscored that a number of issues discussed at the Conference are indeed relevant and discussed appropriately. He also noted that establishment of the European Defence Agency has been a game-changer at EU level.

With respect to defence industry, Mr. Mataix noted a high level of fragmentation. In moving towards the synergies between space and defence, he argued that surveillance of space is becoming mandatory for defence. There is a growing need to protect space assets, he added. Afterwards he also informed the audience that the company he represents, Indra, has capability in radar technology suitable for SST capacity development. He concluded his remarks with highlighting the strategic importance of space capabilities, arguing, that a day without the capability to utilize satellite systems would have grave economic and societal consequences.

The last speaker of the session was Mr. **Andrea Nativi**, Senior Vice President of Market Analysis and EU/NATO Policies at Leonardo. In his address he firstly highlighted, with a positive assessment, what the European Commission is currently doing in the field of space and in intersections between space and defence. At the same time, however, he stressed out that new technologies and new concepts are evolving and European stakeholders need to adapt to this changing landscape.

In assessing the synergies between space and defence, Mr. Nativi emphasized the need for improved budgetary instruments to support future capacity building to utilize these synergies. Mr. Nativi also tackled issues discussed by previous speakers, namely the SSA and SST, arguing for even more ambitious approach at European level. He argued that there should be more activity done at European level, beyond the SSA and SST, to tackle emerging challenges. These include, among others, counter-hypersonic agenda, missile

defence, early warning, anti-satellite capabilities, or cybersecurity. At the same time though he argued that the continuity of existing programmes should be maintained.

The final message of his address called for deepening and broadening of cooperative approach in Europe, instead of a model when each actor works independently on an own agenda.

DAY 2: 23 JANUARY 2019

First Session - “Financing the ambitions of European Space”

The second day of the conference started with a session dedicated to financing solutions to deliver European space ambitions. The session naturally addressed in more details innovative financing mechanisms which are an integral component of the so-called New Space approach that European public and private stakeholders are increasingly eager to leverage.

The round table was composed of the following panellists:

Moderator: Stéphanie Pochon, Partner at Business Bridge Europe

- **Etienne Schneider**, Deputy Prime Minister and Minister of the Economy and Trade, Grand Duchy of Luxembourg
- **Pedro Duque**, Minister for Science, Innovation and Universities, President of ESA Ministerial Council, Spain
- **José Manuel Fernandes**, MEP, European Parliament
- **Ambroise Fayolle**, Vice-President for Financing Innovation, Science, Education, Digital, and Technology, European Investment Bank
- **Johann-Dietrich Wörner**, Director General, European Space Agency
- **Gert Jan Koopman**, Director-General, DG BUDG, European Commission
- **Guillaume De Dinechin**, Deputy CEO, International Space Brokers, Aon

Mr. **Etienne Schneider** was asked to elaborate on the possibility of replicate also in other countries the Luxembourg experience.

Mr. Etienne Schneider in the function of Prime Minister explained that being Luxembourg a small country, to ensure growth it is fundamental to support a diversified economy. Bearing this objective in mind the PM recalled the ambition and the vision, pursued by the Government during the 80s to position LUX at the forefront of the satellite business through SES, today one of the biggest satellite operators in the world. PM stressed indeed on the need for public authorities to be able to take risk. As an example he told how in 1985 for the first satellite to be deployed no insurance would cover the costs of a potential failure so the Government entered the game in order becoming a shareholder committing 5% of the total annual budget. However history said it really paid out and nowadays space represents 2% of total LUX GDP, the highest share of EU. Mr. Schneider focussed also on the importance of supporting the creation of new space companies, in Europe. The Government undertook a deep analysis to try to understand how to attract high-tech companies. The findings can be summarized in two points: 1. a solid legal framework was missing, the OST agreement was for LUX the only instrument regulating space activities, stating that space belongs to the entire human kind. This posture is clearly not the best scenario to establish a profitable business. The relevant authorities decided then to put in place a more flexible and business-oriented framework enabling businesses to grow. In addition, to the legal regulation entered into force in 2017 the LUX government understood the need for such technology-intense venture for 2. an easy access to money for R&D. The LUX Government became thus shareholder of a venture capital fund to guarantee access to funding to all kind of space ventures. Also EU institutions are taking their responsibilities in this field and more and more EU and national ministers see the potential for increasing business opportunities in the space field.

To **Pedro Duque**, former ESA Astronaut, the moderator asked how we can plan another Rosetta to inspire the establishment of new endeavours in space?

Mr. Duque after recalling the need for an appropriate funding for space, which in his opinion should foresee an overall 40 B€ for the next budgetary commitments between 2020-27, he mentioned the importance of a better communication about the achievements in the space field. He recalled the poll undertaken by ESA showing how much European citizens think EU institutions are currently spending in space. The result was surprisingly wrong. The results show that a vast majority of the respondents think that EU institutions are

investing in space 200 times more than the actual amount of expenditure for the sector. People need in his opinion to understand more and better that investing in space is worthy. He urged a change in the narrative stressing for a storytelling closer to the understanding of a bigger and diversified audience. He stressed the need for Europe to revamp a long term strategy for human space flight in order to build on its inherent power to inspire the public through the enormous achievements in space science and technology benefitting the whole human kind. He concluded his intervention further recalling the need to work in parallel to design a common European programme for public awareness unveiling the real value of space.

The moderator before introducing the following speaker set the scene evoking the renewed activism of the European Investment bank in the space field, testified by the issue of a new study investigating promising methods policy makers could underpin to leverage European technological leadership to boost investments.

Mr. **Ambroise Fayolle** before entering in the details of the report, presented the current financial context as not sufficient in terms of investment to foster a new ecosystem of space ventures. He explained that currently, financial institutions especially in Europe at both national and international level are more and more unable to take and manage risks. Mr Juncker, president of the EC established thus some instruments enabling European institutions to embark in riskier endeavours with longer foreseen return on investments therefore including technology-development intense businesses as those within the space sector. He recalled the numerous projects mostly active to finance R&D such as the case of AVIO in Italy. The so-called *Junker Plan* will operate until 2020, but perhaps even beyond that timeframe. Mr. Fayolle declared that EIB will continue to provide investment to space ventures like the recent engagement with ONERA and the strong cooperation set up with ESA trying to help space companies striving to enter in the global market to be competitive and position themselves as leader in new markets like Africa. Mr. Fayolle finally recalled further projects currently in a development phase designed together with the EC like the *fund-of-funds*. He additionally updated the audience on the final stage of creation of *InnovFin* to finance VCs. He eventually mentioned one of the most interesting recommendations of the study which calls for the establishment of a “finance for space” forum where experts from academia, policy makers and investors would gather to develop innovative finance solutions for the European space sector. Our activity, he said, in the space sectors is risky but worthy.

The next speaker as representative of the European Commission was called to elaborate on the common achievements and on the future targeted objective. Mr. **Gert Jan Koopman** initially recalled the timeline for approval of the MFF. He reassured about the good progresses made during the negotiation phases although they faced some difficulties due to cumbersome decision on national budgets not sufficient time has been allocated for a proper preparation. A final wrap up and decision is expected later this year, likely in autumn.

Mr. Jan Koopman stated that negotiation revolve around both: a single European space programme and its specific building blocks. He mentioned the good progress made by the Council for the conclusion of an agreement between the two institutions. The Director General confirmed that compared to other sectors Space is more advanced with already a baseline proposal of 16 B€. Mr. Jan Koopman reaffirmed his awareness concerning the additional financial needs of the sector and he reassured that additional sources of finance could for instance be found in the budget of InvestEU, where a number of windows might be opened to fulfil additional demands. Crowded also through the volume of funds mobilized with this system the actual amount of money available will be higher than any possible single programme at the moment. Mr. Koopman concluded mentioning also the possibility for space businesses through Horizon Europe, and further MS contributions. He clarified that EU own resources can be used in a much more effective way in indirect manners, not overlooking any source of revenues.

Mr. **Johann-Dietrich Woerner** was asked to provide an overarching perspective on how ESA, EU and MS can support new businesses to overcome their financial challenges?

ESA Director General building on Pedro Duque’s previous speech emphasized the need to better communicate the value of space for citizens. He stressed the need to treat space infrastructure as terrestrial ones, as part of our daily life. Mr. Woerner thus recalled the importance of a collective efforts to continuously innovate, to install new ones, to maintain the existing ones, to upgrade them, to protect, to adapt them to new challenges and to extend their availability to more and more users with the final goal of benefit from

the services offered through their deployment. This is the assumption at the basis of the proposal regarding the *downstream gateway*. This project will cover all the fields entailing the 4 pillars, namely: science and exploration, safety and security, applications and enabling and support. Mr. Woerner highlighted the need for the Agency to be equipped with a variety of instruments to effectively deal with a diverse range of players and topics. He mentioned as beneficial for the ecosystem at large the need for more fair loans for start-ups and acceptance of higher failure rate. In this context, he brought the example of the ESA Business Incubation Centres (BIC) where currently the success rate of the start-ups incubated is far beyond 80%. Being this a reason of pride for ESA, demonstrating the promising potential of the business models selected, it is on the contrary also a clear symptom of the risk adverse mentality which need to be changed towards a healthier rate of failure around 50%. In this way, the Agency will take more risks but will support the development of even more disruptive companies.

Mr. Woerner finally illustrated new methods adopted by ESA for procuring some of the newest satellites such as Aelos or NEOSAT developed through a PPPs. He stressed the need for the Agency to switch paradigm becoming a reliable partner for industry, politician and all other public players providing the technical support necessary to fairly evaluate space business proposals. ESA is equipped with all the services to play the role of facilitator and broker. A concrete example of the proposed role of broker, bringing together diverse partners to implement a long-term vision could be the moon village which represents a multi-partner, open project. To conclude, Mr Woerner stressed the need for a sustainable long-term vision inspiring new endeavours for the years to come

The last speaker Mr. **Guillame de Dinechin** was asked to advice on how private investment in space and new space could be fostered?

Mr. de Dinechin opened his speech by affirming how insurance companies are offering financial support to space companies with a market worthy 700 M\$. He stated that space is a risky business *per se* however, the inherent probability of loss can be transferred to insurance. Today as a matter of fact, all large commercial players would not launch one satellites without insurance, without a safe net protecting the investment for the smooth delivery of the service. This is an achievement and also represent a change compared to the past decades when public sector programmes using master technologies like GALILEO and Copernicus, in the event of failure during the launch phase or in operating the object, would draw additional public funds to replace it. Today this approach does not sound like a viable option for public administration which face the need to report about the value for money of their investments and insurance is the solution. Hence, Mr. de Dinechin reaffirmed the need to prepare a risk management programme including the allocation of a specific budget for insurance which, given the maturity of the technology would now be much lower than in the past. He finally highlighted how this is currently very well understood from public defence players. To conclude, Mr de Dinechin stressed the fact that insurance would greatly help to boost the new space.

Second Session - “Space 2030: “New Frontiers” for the European Space Industry”

First Round – “Future developments in the European Space Industry”

The first round of the second session brought together a diverse range of perspectives from institutions and private companies to elaborate on the medium- to long-term prospects for the European space industry. The panellists shared their insights on the major trends unfolding in the sector and discussed how space policy developments could contribute to successfully cope with them.

The round table was composed of the following panellists:

Moderator: H  l  ne Huby, Co-Founder, Global Space Ventures

- **Daniel Neuenschwander**, Director "Space Transportation", European Space Agency
- **Andreas Veispak**, Head of Space Data for Societal Challenges and Growth Unit, European Commission
- **St  phane Isra  l**, CEO, Arianespace
- **Philippe Dewost**, Director of Innovation and Foresight Platform Leonard, Vinci
- **Mr Riadh Cammoun**, VP public affairs, Thales Alenia Space
- Giulio Ranzo, CEO, Avio
- **Jana Rosenmann**, Head of Unmanned Aerial Systems, Airbus Defence & Space
- **Hubert Tardieu**, CEO Advisor, Atos

The moderator, Ms. **H  l  ne Huby**, introduced the session and invited the panellists to draw reflections on the following questions:

- How do you see the main disruptive trends in the space sector?
- How does these trends impact European space industry/institutions?
- How should Europe respond the opportunities and challenges that stem from these trends?

The first speaker, Mr. **Daniel Neuenschwander**, Director for Space Transportation at the European Space Agency recalled that the space transportation sector is witnessing dramatic changes in its structure, because of the continuous introduction of key disruptive technologies, the advent of new private players in the commercial launch market, as well as the progressive down-turn of the GEO satellite market and parallel advent of large satellite constellations in LEO. These unfolding trends clearly confront Europe with the need to adapt its strategy in the sector. Drawing on this consideration, Mr. Neuenschwander highlighted two pillars on which European support to the space transportation sector is to be provided:

- Ensuring an independent access to space;
- Fostering the uptake of commercial services in the space transportation sector.

With respect to the first element, Mr. Neuenschwander emphasized the need to take steps that can ensure European consistency and harmonise the mechanisms for procurement, the need for all the public actors to make use of European launchers, to work continuously on competitiveness and cost reduction by introducing new technologies and manufacturing processes, as well as the need of long-term investment to foster innovation and reinforce Europe’s competitive advantage in terms of costs, efficiency, flexibility and availability.

With respect to the second element, the speaker argued that ESA’s role as a European public actor will have to gradually evolve in the direction of becoming an enabler of private undertakings, not only in the field of access to space, but in the broader space transportation sector of the future – which will includes transport in space and return from space. As an example, Mr. Neuenschwander underlined the importance to diversify the professional profiles of the people working in the launcher directorate.

The second speaker, Mr. **Andreas Veispak**, Head of Space Data for Societal Challenges and Growth Unit at the European Commission opened his intervention by underlying the almost unpredictable nature of the future technological landscape. Because technological change is taking place at an unprecedented pace, the speaker argued, it will be essential to stretch our imagination to predict what may happen in a 10/20 years’

timeframe. One of the most important driving force behind the changes in the future landscape for space activities is the digital revolution and, more specifically developments in the area of machine learning and Artificial Intelligence (A.I.). According to Mr. Veispak, these developments will induce important transformations in the ways space activities are conducted, particularly in the downstream sector, with the emergence of multi mission platforms using different data sources from different space and non-space platforms and joining them into a single cloud system

Beyond the disruptions brought by technological advancement, Mr. Veispak highlighted the existence of two important economic disruptions, namely: a competition-driven and a cost-driven disruption. These disruptions are driven by the ever-increasing involvement of new public and private actors in space activities, a trend that will likely advance the already fierce competition, but also stimulate more and more investments in the sector and lead to a democratisation of space.

The third element addressed by Mr. Veispak was the evolving role of the public sector in the conduct of space activities. While recognising the existence of a security and defence dimension that will continue to drive development in space activities, he stressed that most of innovations tend to happen in open ecosystems and hence that the role of the public sector will have to evolve in the future. In this respect, he concluded by highlighting four important roles that will need to be played by the public institutions:

- Providing financing for programmes' development;
- Becoming an enabler of commercial developments through adapted procurement mechanisms;
- Maintaining an efficient regulatory role;
- Proving public services in key areas (e.g. climate changes and environmental protection) while positioning as intelligent anchor customers for large industries, SME and start-ups.

The next speaker, Mr. **Stéphane Israël**, CEO of Arianespace, replied to a question from the moderator, describing how Arianespace is adapting to the evolving sector.

First of all, he acknowledged the changes that are occurring in space transportation: on the supply side, more and more launcher vehicles are being developed and deployed, whilst on the demand side he highlighted a greater diversity in the satellites to be launched. In particular, he mentioned that the sector is moving away from the old paradigm of 3t / 6t to GTO satellites, as there are more diverse masses and volumes, so the balance between GEO and non-GEO satellites is evolving.

He then remarked that Europe's answer to these changes is Ariane 6, and Vega-C. He explained how the new European launchers family is fully adapted to the needs of future customers, and will soon deliver their services over the next decade. On the longer term, he acknowledged that there are some issues that should be addressed. In particular, he mentioned the need to better match geo-return and commercial competitiveness, as both are crucial elements of the European space transportation sector; and then to strike a better match between reliability and innovation. While reliability is certainly a crucial parameter, it is also mandatory to continuously innovate – after the technology that has now been mastered, Europe should now identify and focus on the one it needs and wants to master.

Mr. Israël then stressed that for Ariane, the roadmap is clear, with the upcoming first launch of Ariane 6 in 2020. Additionally, he noted that the building blocks for technological innovation over the next decade have already been identified, which would further reduce engine costs, but also look at other options such as recover and/or reusability. These elements will be brought forward and discussed at the next ESA Ministerial Council Space19+.

Finally, Mr. Israël stressed that behind New Space there is still the reality of power competition among nations, most notably the U.S. and China. The ensuing question for Europe is: where does Europe want to stand? How can it remain in the race and preserve its autonomy? In answering these questions, he reiterated Arianespace's support to the fulfilment of European space ambitions and praised the ongoing efforts of the various actors, including ESA, EC and the EIB.

The fourth speaker of the panel, Mr. **Giulio Ranzo**, CEO of Avio, complemented the previous speakers by offering additional insights on the unfolding trends in the global launch industry and key takeaways on the

company's strategy to cope with such trends. According to AVIO, three main trends are currently shaping the satellite launch industry, namely:

- First and foremost, is a rapid volume increase, which drive high expectations for cost reduction;
- Second, there is a shift in in the type of applications, with an increasing traction of EO missions and hence less mass being launched to GEO and more mass to non-GEO (in 2018, for the first time, same amount of mass was launched in GEO and non-GEO). This in turn, generates expectations for new applications;
- Third, the size of satellites is progressively reducing.

In explaining how AVIO is reacting to these trends, Mr. Ranzo first highlighted the company's efforts in reducing the cost of launch per kilogram by 50%, thanks to the utilisation of a common stage for both Vega and Ariane. Mr. Ranzo stressed this can be seen as an alternative approach to rocket's reusability, an approach that is also more coherent to the type of market we have in Europe. With regard to the miniaturisation of satellites, the speaker underlined the efforts that are being made to increase the versatility of the Vega rocket. He anticipated that thanks to the installation of the new SSMS device, this summer Vega will be able to conduct a rideshare mission comprising 42 satellites from 10 different customers of 7 different countries. Finally, Mr. Ranzo recalled the advancements that AVIO is pursuing in the area of liquid oxygen and methane propulsion.

The moderator then asked the speaker whether he had any specific request for European institutions that could strongly support the success of European companies in the field. While recalling all the important measures already put in place by national and pan-European institutions, Mr. Ranzo highlighted the need to accelerate decision-making processes and better advertise Europe's achievements in the space sector.

Mr. **Riadh Cammoun**, VP public affairs, Thales Alenia Space, started his intervention by outlining the three main trends he sees unfolding today in the space sector. These are:

- Digital revolution;
- New financing schemes thanks to more innovative public procurement;
- A change in the approach to risk-taking, which when taken into account in systems design and products, it changes massively how industry designs solutions for customers.

In order to cope with global transformations, fast innovation cycles, and disruptive approaches demanded by customers, Mr. Cammoun described the four key features driving the approach of Thales Alenia Space (TAS):

- A pioneering mind-set – for example, investing in emerging private constellations such as O3b and Iridium;
- An anticipating mind-set – through deployment of digital factories, introducing A.I. in its products, machine learning, and the like;
- An innovation mind-set – through which provide tools for employees so they are enabled to create innovation, mock-ups, realize ideas, etc.;
- A risk-taking mind-set – massively important, as TAS has invested in emerging technologies and projects such as SSA, IoT, HAPS and large constellations.

Further elaborating on the risk-taking mind-set, Mr. Cammoun then provided some examples to explain how TAS plans to stay at the forefront of ongoing transformations.

- Large investment placed in small EO satellites with high-revisit times, and investing to realize a shift of paradigm from reactive to proactive approach in data processing;
- On IoT, working with Kinéis to develop the company's nanosats;
- On in-orbit servicing, working on a multi-type mission to provide services in orbit;
- High-Altitude Pseudo Satellites (HAPS) and the Stratobus project, which could enable a broad range of new services and missions.

Mr. Cammoun concluded his intervention that these four elements are changing the paradigm from a static to a dynamic vision of space, one in which TAS is at the forefront of, and contributing with the other industries to European leadership in the sector.

Ms. **Jana Rosenmann**, Head of the Unmanned Aerial Systems programme line at Airbus Defence and Space, was introduced by the moderator as the first non-space related speaker of the session, asking her what space means for the UAS business. Acknowledging the current disruptive trends in the space sector, including the reduction in the cost of access to space, as well as the presence of new players and new emerging services, Ms. Rosenmann affirmed that space offers new opportunities, with an increasing role for digitalisation and connectivity. Digitalisation and new technologies such as HAPS, with Airbus' Zephyr as example, will enable sector operators to discover new services, business and cost models once having integrated them into their portfolio. This is already true for Airbus, as the company has been allowed, thanks to digitalisation, demand for data and connectivity, to deliver new financially viable products and solutions to its customers, including satellite operators.

Asked for a comment on what she would expect from the European space-related institutions, Ms. Rosenmann expressed the wish for such institutions to embrace and support all the emerging disruptive technologies, as none of these, taken individually, will be able to meet the future demand for data. There is a need to consider together a mix of both incumbent and disruptive technologies, to support both, enable the latter without impairing the use of the former, with programmes aiming at this integration rather than at simply investing in single technologies.

Mr. **Philippe Dewost**, Director of Leonard, the Innovation and Foresight Platform at Vinci, opened his speech underlining the importance of enacting marketing strategies for space activities – something that European stakeholders are less keen on compared to other international actors – and highlighting the relevance for European citizens to become more aware and proud of European space achievements.

Mr. Dewost then moved on explaining the rationale for Vinci, a global player in constructions and concessions, to initiate discussions with ESA. The speaker more specifically underlined the company's interest in the Moon Village concept, as they can contribute with their expertise across many fields. Noting that the implementation of this vision will heavily make use of robotics, Vinci could contribute with its know-how in industrial robotic automation systems. Similarly, supporting the future viability of operating and administering complex space infrastructures as a business model, Vinci is interested in providing its experience in concessions, bringing as example that of managing spaceports and space stations on behalf of nation-states.

Asked to conclude with a comment or request to the European space-related institutions, Mr. Dewost called for increasing the pace of European initiatives as well as to “move faster and break things”.

The last panellist, Mr. **Hubert Tardieu**, Advisor to the CEO at Atos, started by introducing his company. Being Atos an IT service company, it is related to space as prime contractor for one of the five Copernicus DIAS (Data Information Access Services), delivering data generated by the programme, as well as a partner of Thales Alenia Space to understand how generate and associate new services to such data. Mr. Tardieu stressed the importance of mixing and merging data from multiple missions, systems and partners, rather than relying on a single source for the data (e.g. Copernicus), bringing as example how exploiting synergies between data generated by the two sides of a market (suppliers and users) can generate new insights and services, facilitating the work of both suppliers and users/operators. Based on Atos' experience in providing services to both sides of the market, Mr. Tardieu suggested the need for Copernicus to create a federated ecosystem based on data sharing between suppliers of data and users/partners. This can be done by addressing both economic issues, such as finding and providing attractive new services to these users so that they can benefit from sharing their data, and technical issues, as the design of the proper data architecture or the preservation of data sovereignty of every partner involved. The speaker concluded underlying that the creation of such federated ecosystem is more a matter of addressing the economic issues, rather than the technical ones.

Following all the intervention, the session's moderator, H  l  ne Huby, asked the panellists which development they would like to see within the European space sector over the next ten years.

Hubert Tardieu, replied that Europe should ideally take a lead in the crafting of an ecosystem to fully exploit satellite data, a path that has not been pursued by the other players and that would hence position Europe at the forefront of one of the most crucial aspects of space activities. Jana Rosenmann, stressed the importance of closing the digital divide, while Giulio Ranzo, identified the need to maintain Europe's independent access to space, the growth of awareness among European citizens, as well as the launch of a new flagship programme dealing with connectivity and big data. On a similar line, Daniel Neuenschwander, hoped for the development of a new flagship programme that will be deployed and refurbished by Ariane 6 and Vega C, while St  phane Isra  l, heralded a new European commitment to human space exploration. Riadh Cammoun identified two main achievements: the mastery of critical technologies, and a European leadership in the field of in-orbit servicing. On his side, Philippe Dewost, once again reiterated the importance of having a "European blockbuster" about space and hence the need to put in place an effective marketing strategy for the European space programme. Finally, Andreas Veispak, hoped for further advancement in the area of EO, with applications becoming seamlessly integrated to consumers across many different sectors.

Second Round – “Facilitating access to "New Frontiers" for European Industry”

The panel of the second round of the session focused on the financial, legal and policy tools that are – or should be – put in place to support the long-term competitiveness of European space industry. Tackling stock of the ever-growing international competition in the sector, panellists discussed ways to set up a favourable ecosystem for start-up and investors and secure the success of European industry in the international markets.

The session was composed of the following speakers and panellists:

Opening Address: Graham Turnock, Chief Executive, UK Space Agency

Moderator: Jean-Jacques Tortora, Director, European Space Policy Institute

- **Pascale Ehrenfreund**, CEO, DLR
- **Eric Morel de Westgaver**, Director of Industry, Procurement and Legal Services, European Space Agency
- **Fabrice Comptour**, Member of Cabinet of Elżbieta Bieńkowska, European Commission
- **Shiva Dustdar**, Head of Division, Innovation Finance Advisory, European Investment Bank
- **Hélène Huby**, Co-Founder, Global Space Ventures
- **Dominique Rora**, Senior Space Underwriter, Axa XL
- **Marc Serres**, CEO, Luxembourg Space Agency
- **Grazia Vittadini**, CTO, Airbus Defence and Space

The second round of the session was opened by the speech of Mr. **Graham Turnock**, Chief Executive of the UK Space Agency, who gave the audience insights on the UK strategy to support the commercial space sector and industrial competitiveness.

Mr. Turnock opened his speech by recalling how the UK Space Agency was established as a commercial-leading organisation with the primary goal to facilitate the rapid development of the commercial space sector, and to create an environment that is beneficial to business and industrial competitiveness. His remarks particularly revolved around UK developments in the upstream, downstream and institutional side.

As for the upstream, he noted how the LEO CubeSat revolution is proceeding at a great pace, with ever-increasing number of small satellites launches. Indeed, the UK has a large number of small satellite manufacturers, such as SSTL and Spire among others, and Mr. Turnock noted the UK’s Government concrete actions in supporting this industry, which revolved around setting up a favourable financial and legal environment (a combination of stable legal and financial structures, as well as tax support to R&D investment and other measures). He further mentioned institutional support to the development of the ground segment (including spaceports), and last but not least to launch vehicles. Indeed, he noted that there is an exciting market currently developing in the UK for access to space.

With regard to the downstream, he recognized that EO data, communications and PNT services are the segments with the greatest potential for market development. As mentioned by other speakers, Mr. Turnock also stressed how A.I. technologies are becoming key enablers in transforming mere data into exploitable information. He expects this market to expand markedly in the future, as more and more missions will be launched and will deliver new data, and he noted that the UK is involved in a variety of projects in this segment as well.

In conclusion, he mentioned the institutional side of UK space sector, first by suggesting that also institutional processes should benefit from reform and modernization, alongside the fast-paced evolution of the sector. He then recalled the UK’s remarkable assets in ESA, naming in particular the ARTES programme. Finally, he expressed the UKSA willingness to increase its successful working relationship with ESA in the future.

Recalling how the ever-growing international competition is confronting the European industrial with a number of challenges, the session moderator, Mr. Tortora, drew the panel’s attention on three pressing requirements for European institutions, namely:

- The need to set up a favourable ecosystem for start-up and investors;

- The need for a sound anticipation and structuration of the public demand;
- The need for an open and fair competition to avoid excessive concentration and the emergence of monopolistic situations.

Building on this, Mr. Tortora invited the panellists to share their vision on the instruments that are – and should be – devised to support the long-term competitiveness of European space industry.

The first speaker of the panel, Ms. **Pascale Ehrenfreund**, offered key insights on how DLR is supporting the future competitiveness of the European space industry. Ms. Ehrenfreund first highlighted that DLR plays a key role in supporting this objective, being one of the largest research centres in Europe in the area of space technology. She subsequently put the spotlight on four key tools that are being devised by DLR in this context. These are:

- Securing investment in cutting edge technologies. She highlighted that funds have been recently allocated for the establishment of three institutes in the area of quantum research as well as in the area of AI, two excitedly relevant areas that may greatly support the space sector of the next decade.
- Establishing platforms for cooperation with public and private entities operating in the space and non-space sectors alike. In this respect, she stressed that DLR is well positioned to pursue this objective because of its engagement in a wide range of research and development projects in the areas of aeronautics, energy and transportation, in addition to space.
- Supporting the growth of space-related education, which is a crucial tool to support future workforce of the industry. In this respect, Ms. Ehrenfreund recalled that DLR now hosts more than 1000 PhD candidates, half of which involved in space-related research.
- Boosting more technology transfers and spin-offs. It was highlighted that DLR can already boasts more than 1500 space-related patents as well as the creation of more than 90 start-ups, the vast majority of which is proving commercially successful. However, more needs to be done in order to embrace a less risk-averse culture and spur the emergence of a more effective ecosystem where different stakeholders can work together more efficiently.

The second panellist, Mr. **Marc Serres**, CEO, Luxembourg Space Agency, was invited to offer a reflection on the country's expectations vis-à-vis their increasing investments in space activities. In answering the moderator's question, Mr. Serres highlighted that the space-related initiatives taking place in Luxembourg are mainly commercially driven and that a sound return-on-investments (RoI) is indeed a crucial consideration behind's the Agency's investment. The expected return, however, is not simply limited to the generation of commercial dividends. In explaining this point, Mr. Serres underlined that space has been identified as one of the pillars to diversify Luxembourg's national economy, and that investment in the commercial space sector are seen as broader investment in high-level education, in research and technology development, and, more broadly, in the creation of a complete ecosystem that will generate positive cascading effects on the country's economy.

Mr. Serres concluded his intervention by stressing that the variety of legal, financial and policy instruments to spur the growth of this ecosystem are complemented by an equally-important sponsorship at the political level. This backing, Mr. Serres concluded, is and will be a particularly important factor to secure the scaling up and eventual success of ground-breaking initiatives such as, for instance, the one related to space resources utilisation.

The moderator asked a further question on how the Luxemburg Space Agency plans to support the scaling up and creation of exist strategies for the various start-ups located in the country. Mr. Serres replied that the support will be offered, towards internationalisation of Luxembourg-based companies, also through close cooperation with European institutions, including the European Investment Bank.

The third speaker, Mr. **Eric Morel de Westgaver**, Director of Industry, Procurement and Legal Services of the European Space Agency, was invited to elaborate on the possible future direction of ESA's industrial and procurement policy. He first noted that industrial policy is one of the most important themes within the ESA Convention and one of the key pillars on which the Agency was built. Over the years, this policy has proved one of the strongest forces in giving shape to the European space industry and ensuring its success

worldwide. However, he also stressed that in light of the unfolding changes and competition dynamics in the global space sector, ESA's industrial and procurement policy needs to become more agile and flexible in supporting innovation and, more crucially, in ensuring unrestricted access to the state-of-the-art technologies and services. Subsequently, Mr. Morel put the spotlight on the main tools and initiatives that are being put in place by ESA to support this objective:

- ESA is preparing a new procurement model for the future Sentinels satellites of EU's Copernicus programme, a model and that is intended to streamline the financing of this ambitious programme and that will be proposed to Member States in November 2019.
- ESA is shifting the focus of its procurement strategy from products to services. In September 2018, for instance, it issued an information request that for the first time required industry to submit proposals for the delivery of In-Orbit-Services for Active Debris Removal.
- ESA is currently enacting a full digitalisation of the entire procurement process (from the circulation of its Invitations-to-Tenders to the signature and management of the contract).
- ESA will propose to its Member States additional tools in the Agency's procurement toolkit.
- ESA intends to foster closer relations with SMEs, by integrating them within the Agency's supply chain, by designing customised activities for SMEs, and by offering improved financial conditions for SMEs.

Mr. Morel concluded his intervention by underling the importance of complementing these short-term adaptations with the enactment of a long-term acquisition policy that will open new frontiers for the European space industry.

Mr. **Fabrice Comptour**, Member of Cabinet of Elżbieta Bieńkowska, European Commission, discussed the major provisions contained in the June 2018 EU space programme proposal that will be driving EU's industrial policy in the coming years. The first element on which Mr. Comptour put the spotlight on is the prospected launch of an integrated space programme, which will encompass multiple components, namely: an autonomous civil global navigation satellite system (Galileo), a regional satellite navigation system (EGNOS), an autonomous and user-driven Earth observation system (Copernicus), a space surveillance and tracking system (SST) and a governmental satellite communication system (GOVSATCOM).

Mr. Comptour then clarified what the overarching objective of the EU's space programme is, i.e. to provide high-quality and up-to-date and secure space-related data, information and services meeting existing and future needs and able to meet the Union's political priorities. Towards meeting this objective, the speaker highlighted the importance played by the provisions of the space regulation, including most, most notably, Article 5 – which spells out EU's commitment to support to autonomous access to space – and Article 6 – which defines EU's actions in support on an innovative space ecosystem in Europe. On this latter point, Mr. Comptour underlined the three “accesses” that needs to be realised to boost the emergence a stronger *New Space* dynamic in the European context. These are:

- *Access to finance*, which still remains a challenge in Europe, particularly if compared to the situation in U.S. To address this issue, the EU is launching a series of initiatives such as *Venture EU*, a fund-of-funds which aims to increase the size of available VCs funds in Europe, as well as a dedicated public-private *Space Fund* of 300 M€.
- *Access to procurement*, since space start-ups do not need only grants and equities but, more crucially, contracts. The proposed solution is to award start-ups with feasibility contracts as well as to make European public procurement much more open to all the players on the ground.
- *Access to space for start-up*, since a key challenge for many start-ups remains the in-orbit demonstration of their systems. Among the possible solutions he highlighted the opportunity to regularly dedicate one launch vehicle to the deployment of innovative projects by start-ups.

Mr. Comptour concluded that these “three accesses” would attract an increasing number of start-ups in Europe that will ultimately lead to the creation of a more innovative space ecosystem.

Building on these suggestions, the moderator asked Ms. **Shiva Dustdar**, Head of Division, and Innovation Finance Advisory at the European Investment Bank to provide the audience with an overview of the activities

conducted by the Innovation Finance Advisory as well as on the findings on their new study on access to finance for space companies.

Mrs. Shiva Dustdar emphasised that *InnovFin Advisory* was set up as a joint European Investment Bank - European Commission initiative under Horizon 2020 to assist public and private counterparts to improve the investment-readiness of complex, innovative projects that need substantial long-term investments. In addition, *InnovFin Advisory* conducts studies on several thematic areas, including life sciences, mobility, micro-electronics as well as space. It was in this capacity that *InnovFin Advisory* released a study on “The future of European Space Sector: How to Leverage Europe’s technological leadership and boost investments for space ventures”.

Subsequently, Ms. Shiva Dustdar summarised the main findings of the study, by highlighting some the most pressing issues and common themes within the European space sector. These issues include:

- The existence of a knowledge gap on both the investors and companies’ side, with the former still lacking a clear understanding of space technologies and applications and the latter finding hard to navigate through the various financing mechanisms at their disposal. She also stressed that the landscape of space sector support mechanisms remains too fragmented, and that procurement is still geared towards the traditional space industry.
- The existence of a finance gap, with companies in both the upstream and downstream sectors of the space industry struggling with access to finance. This primarily seem to stem from the fact that space innovations have a longer development cycle than general technologies, capital intensive and subject to many risks, but also from the fact that investors do not see exit opportunities yet and find the market still immature.

Drawing on these findings, Mrs. Shiva Dustdar concluded her interventions by formulating some policy and finance recommendations, which include the development of innovative procurement and industrial policies from the public sector to boost technological development and commercialisation, the setting up of Venture Capital Funds dedicated to the space industry, and the establishment of a multi-stakeholders/inter-disciplinary forum with representative from industry, the finance community, academia, policy-makers that will tackle the information gap and introduce innovative financing solutions.

The next speaker, Ms. **Hélène Huby**, Co-Founder of Global Space Ventures was requested to provide an assessment of Europe’s major strengths and weakness with respect to entrepreneurship, industry and innovation. In answering the question, Ms. Huby identified three major strengths:

- Firstly, she underscored the European DNA, meaning the unique historical legacy that has brought Europe in space through a paradigm of cooperation and common institutions.
- The second strength she highlighted is the highly skilled workforce on which Europe can rely, particularly at the engineering level.
- Third is industry. Europe can boast worldwide industrial champions and a unique mode. In this she also noted that the way for start-ups to become champions is to cooperate with big industries.

Ms. Huby subsequently identified three major weakness in Europe’s current landscape for space.

- The first is the difficulty to build a shared and precise vision among the different European countries. Any vision must be shared among European countries, and space institutions. The roadmap also has to be precise.
- A second major weakness is the inadequate speed of decision-making.
- A third major weakness is the lack of equity funds. Ms. Huby noted that there is much is being done for the venture capital side, but when we think about next stage, a lot of European start-ups can not find EUR 50-100 M€ funds in Europe and are as such forced to relocate outside of Europe. That is why, she argued, we need a European private equity fund.

In concluding part of her intervention, Ms. Huby provided the audience with several recommendations in order to better support innovative space projects:

- Fostering of bold ambitions;
- Improved legal framework (issues such as export regime, licensing processes, space traffic regulation);
- Improved speed and adaptability of decision-making;
- Thinking more in terms of services.

Mr. **Dominique Rora**, Senior Space Underwriter at Axa XL offered the perspective of insurance companies on risk management in space ventures. In his address he noted that insurance companies embrace risk and stated, interestingly, that space sector is generally underinsured, with just 10-15% of active satellites being insured. Usual clients within this part of space projects that are insured are companies operating large telecommunications geostationary satellites. Smaller companies usually do not buy insurance for their space projects. To demonstrate the value of insurance for space projects, Mr. Rora claimed that insurance will be needed to attract funds, as in the past it was, in fact the facilitator in development maritime trade as well as in GEO utilization.

Concerning this state-of-play and foreseen developments, Mr. Rora noted that he expects a change in the insurance dynamic to occur in upcoming period. He associated this to changing landscape of satellite industry. He noted that the industry market is going to change from market of few clients with specific large-scale projects to a more frequent and less impactful model. In thinking about ideal future developments Mr. Rora suggested to move forward with institutions, so that insurance services could be considered and involved from the start of the project. Similarly, he also called for an increased involvement of insurance providers with the industry, claiming that insurers need to be partners for the industry.

Finally, Ms. **Grazia Vittadini**, CTO, Airbus, closed the panel on by elaborating on what the new frontiers for the European space industry are and what shall be done to reach them. Ms. Vittadini first stressed that Airbus is actively pushing the boundaries on several new frontiers of technology development, such as, most notably, in the areas of interplanetary space transportation, extra-terrestrial mining, in-orbit manufacturing, quantum technologies and on-orbit operations and services.

Beyond technology development, the main challenges that Airbus sees and faces are related to:

- *Mindset*: there is urgent need in Europe to refresh the debate and define a new European approach to such key issues-areas as human spaceflight activities.
- *Red Tape*: European industry needs the right set of supportive regulatory measures as well as an efficient, coherent European space governance and strategy. There is, more specifically, a need to converge towards sustainable solutions to define one single European space strategy for the 21st century, without too much time to define who does what on based on which geo-return principle
- *Money*: beyond budget, there is a need of more robust business models to guarantee the success of key programmes and a need for industry to harness a strong public anchor customer.

Ms. Vittadini concluded her intervention by highlighting that to ensure optimised industrial solutions it will be fundamental for industry to become more involved in the definition of agenda and the setting up of the institutional architecture for the European space programme. Equally crucial will be for public European actors to become more effective anchor customers for European industry, most notably, by stopping Europe's non-sense in the area of access to space: European institutional demand for launchers must be satisfied by European launchers.

Closing Address

The conference was concluded with a speech from:

- **Geneviève Fioraso**, President of the Advisory Board of the European Space Policy Institute
- **Monika Hohlmeier**, Member of the European Parliament and Chair of the “Sky and Space” Intergroup

In her speech, Ms. **Geneviève Fioraso** underlined the key words of the conference (“creativity”, “disruption”, “connectivity”, “innovation”, “Artificial Intelligence”, “competitiveness”, “European added-value and pride”, “risk taking”) which capture the essence of the change of paradigm that the European space policy must embrace and support. The current challenge that Europe faces eventually is cultural. To take up this challenge Europe must, first, reaffirm its ambitions and its own way in space. This is a top priority in such changing global landscape.

Ms. Fioraso also stressed at various occasions the special importance of communication with European citizens. Space is a dream and an incentive to develop a common vision. As it has been mentioned, space should be a source of European pride and optimism. She concluded by underlining that some very good questions were raised during the conference on Europe’s path to the Moon, European cooperation in space defence or on the relevance of a European Space Council among others. She invited all stakeholders to take a fresh look at these topics and to consider them as the different facets of the same issue: the need for a clear European vision in space.

Ms. Fioraso delivered an adapted version of the following speech:

I would first like to thank the organisers for having put all of this together. We had a very dense one-day-and-a-half with highly interesting presentations and lively exchanges of views. It is always a honour and a pleasure for me to participate in this event which has become an annual rendezvous for the whole European Space community. I would also like to salute, both as a former French Minister in charge of Space and as current President of the Advisory Board of the European Space Policy Institute, how much this conference positively contributes to making space a political topic.

The title of this conference, “Space for Europe, European Space in the World”, nicely reminds us that Space is by sheer nature a global sector. We should never lose sight of this international dimension in our discussions among European stakeholders.

This event has been the opportunity to make the status of the ending Multi-Annual Financial Framework. I would like here to salute the progress made thanks to the efforts of the out-going European Commission. Of course, some further improvements still need to be made, in particular for a better coordination of the various European stakeholders, but Space is now addressed at political level and there is a reasonable level of awareness among European policy makers on the contribution of Space to the various public policies.

However, it makes little doubt that in the course of the term of the next Commission, Space will need to be addressed not only as an internal European issue, but also most certainly for its international implications:

- If we have good reasons to be satisfied of the current situation, we also have to pursue our efforts to keep the leading edge and to ensure that Europe continues to get the place it deserves in the global space economy. It is all about creativity and innovation; it is all about competitiveness of our industry, which is an everlasting effort in a changing world where – unfortunately - no position can be gained forever.
- Reaffirming Europe’s ambitions in Space is more than ever required in the changing global environment.
 - This is particularly timely and opportune in the current context of finalisation of the next MFF in which space is now embedded as a critical and essential part of Europe’s public policies for the well-being and security of European citizens,
 - This is particularly timely and opportune to prepare the next decisions to be made at the next Council at ministerial level of the European Space Agency,
 - This is particularly timely and opportune to shed light on the upcoming challenges ahead of the European Space industry.

In this context, the European Space policy should aim at meeting the conditions to ensure:

- **First**, a favourable ecosystem for start-ups and investors, including access to innovative funding,
- **Second**, a sound anticipation and structuration of the public demand,
- **Third**, an open and fair competition to avoid monopolistic situations.

As previously said, this needs to be envisioned in a global perspective. The European Space policy cannot be any more elaborated in isolation. It needs to be conceived as a component of a broader ensemble. In this respect, it is critically important to know what the rest of the world is doing, to understand their rationale and to draw the lessons learnt from their experience.

I have no doubt that everybody in this room is convinced that Space is playing an increasing role in the everyday life of European citizens. This still needs to be fostered in the broader European political context. The recent debate on the potential implications of the Brexit - in particular on the UK national security - is just another evidence of the degree of criticality that space infrastructures have gained.

Europe has vital interests in space. We must accept it and draw the consequences of this reliance in our Space Policy. Let me share with you my perception of what needs to be ensured in order to safeguard the interests of European citizens:

- **First**, the delivery of services with the required level of performance and reliability. For this, we need robust space programmes and a competent industry readily available to deliver the “state of the art”. This is the mission of space agencies to ensure that.
- **Second**, the long term stability and predictability of public investments. The next Multiannual Financial Framework and the upcoming ESA Council at Ministerial level shall provide for this.
- **Last but not least**, we need to ensure the security of our space infrastructures. Let’s put aside for the moment the threats of hostile activities in orbit. This has Security & Defence implications that would need to be addressed in a more appropriate framework. However, many other factors actually need to be considered for the risk they pose to the European economic security: natural hazards of course, as well as the consequences of an increasingly congested outer space.

Space pioneers were lucky enough to deal with Space as an infinite resource. We now know that the “useful” space - the one close to Earth - has some limitations, and that we are getting close to them. In this respect, outer space is just like airspace and seas and needs to be monitored and managed properly.

This is obviously a global endeavour; a global endeavour to which Europe needs to contribute its share. I am sure that you will agree with me that these are all highly interesting and challenging topics. Thank you again to all the speakers and panellists who agreed to share with us their views and reflections.

Ms. **Monika Hohlmeier**, concluded the conference with an engaged speech on the specific importance of space in the current unstable European political landscape. As vice-chair of the European Parliament budget committee, Ms. Hohlmeier recalled the substantial progress made by European institutions in the negotiation process for the European space programme. A more ambitious budget is envisioned will be essential to support European space industry competitiveness and to progress on the way to technology independence. Beyond an appropriate budget, Ms. Hohlmeier stressed that Europe needs a clear and shared vision in space.

At a time of growing nationalism, the clear and massive added-value of European cooperation in space, together with the successes achieved, should be reminded and praised. With European elections looming over the horizon and an unknown outcome, some dossiers may have to be argued again to convince new politicians and policy-makers. This could very likely be the case for space and defence. Although the European Parliament is rather convinced today by the necessity for Europe to have the right capabilities and competencies and that the way ahead should be structured around a common European approach, this may change after European elections.

Ms. Hohlmeier concluded with a call to the space community to continue the effort to raise awareness about the space sector.

Mission Statement of ESPI

The European Space Policy Institute (ESPI) provides decision-makers with an informed view on mid- to long-term issues relevant to Europe's space activities. In this context, ESPI acts as an independent platform for developing positions and strategies.