

Space Sciences Committee Polish Academy of Sciences / Gdańsk Branch  
in cooperation with  
Baltic Sea & Space Cluster and Polish Space Agency (POLSA)  
invite for conference:  
Launch of the Polish Space Rocket  
**13th May 2021, Słupsk**



Pomeranian Academy of Słupsk  
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## Abstracts

### “YOUNG STARS” SESSION

*chair: PhD Paweł Chyc*

1. Joanna Muńska, **Artificial Intelligence (AI) Definition**, University of Business and Administration

Technologies based on artificial intelligence change the world faster and more significantly in comparison with well-known technological innovations. Artificial intelligence is commonly used and commercialized. On February 19th, 2020 European Commission published “White Paper on Artificial Intelligence”<sup>1</sup>. Since that time it has become determinant of European directions of union regulations and also the science of law of artificial intelligence initiatives. In truth it is not a legal act but the set of thoughts and ideas to determine directions of future legislative changes in whole European Union. In “White Paper on Artificial Intelligence” European Commission has made an attempt to define artificial intelligence as: “systems, that behave intelligently thanks to analysis of an environment and actions - as it were autonomous, to reach specific aims”. It is accepted that smart action allows to make decisions in unassisted way, according to conclusions taken from gathered knowledge and experiences. Artificial intelligence is commonly used in everyday life of each person. With artificial intelligence we can fill in medical documentation, sign an agreement or use cars brought to market and controlled by artificial intelligence. They are also computer programmes, that substitutes workers in different places of work, also in bailiffs’ offices. The artificial intelligence definition used in legal regulations is not unambiguous. It is mentioned in very individual way as the points of view in different studies show. That is why there can be many definitions of an “artificial intelligence”. For several dozen years artificial intelligence was a subject of scientists’ interests mainly who gave their attention to broadly defined as science fiction. Nowadays the subject is very popular and it is very often present public debates about social and economic topics and it is one of the factors that has an influence on social changes and economic development. There were attempts to define the term “artificial intelligence”, that ended up on composed and complicated logical sentences, not simple or unequivocal conception of definition. Mostly cited is the definition implicated in Turing’s analysis, that is: “the ability of a machine to copy and imitate human intelligence”. In the same way was defined “artificial intelligence” in PWN Polish Language Dictionary. Because of different fields of knowledge, the definitions are different eg. In computer science it is checking the rules that control human mentation to describe computer systems or computer programmes intended to simulate human thinking.

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Those systems “learn” from data how to continue studying during working, when the taken decisions are optimised, a database and knowledge are broadened. Each of the mentioned artificial intelligence definitions should have a phrase “ability of learning” or in the interpretation of the definition there should be an explanation that it “improves the way of its’ working”. The system that “learns” accepts different forms. It can give data and information which can be used in many ways, also to later analysis or to recommend clearly defined actions that can be taken up (a recommendation can be accepted or denied) or to undertake particular actions on one’s own (actions can block or cancel).

2. Dorota Michalska-Sieniawska, ***Legal aspects of Health Security related to the broadcasting of satellite signals***, University of Business and Administration/ Pomeranian Center of Human Rights, Gdańsk

Modern space technologies include, above all, satellite communications, satellite navigation and satellite remote sensing. Everyone can benefit from these technological advances. First of all, each of us uses satellite communication, which is the basis of modern communication. This communication is based on the transmission of messages using electromagnetic systems. This involves launching artificial satellites into space and then sending signals back to Earth. These circumstances of the new communication technology raise a lot of controversy and fear, even fear of the deadly harmfulness of these signals (e.g., microwaves emitted by satellite devices and terrestrial receivers) in a large part of the general human community. So we should answer the question about the right to be free from fear of health hazards and as well about ensuring health security, to which the international law, i.e. the UN Declaration of Economic and Health Security of December 11, 1969, refers.

3. Grzegorz Diemientiev, ***The use of Remote Sensing Techniques in Environmental Protection***, Pomeranian Academy of Słupsk

The presentation presents a proposal for the use of photogrammetric and remote sensing tools for environmental protection. Using simple measurement methods and available tools, they allow for quick and accurate acquisition of data necessary to analyze and assess environmental degradation. In the era of more and more frequent extreme weather phenomena in the world, the mentioned remote sensing techniques will become a helpful, if not the only tool for analyzing and forecasting the effects of human impact on the environment.

4. Damian Stoltmann, Magdalena Pawlik, ***Electronic Center for Sharing Oceanographic Data eCUDO.pl - generally available Baltic satellite data***, Pomeranian Academy of Słupsk

Electronic Center for Sharing Oceanographic Data eCUDO.pl is a project implemented from February 28, 2019 as part of the Digital Poland Operational Program. The Pomeranian University in Słupsk implements it together with 6 other institutions involved in sea research: the Institute of Oceanology of the Polish Academy of Sciences (project coordinator), the Maritime Institute in Gdańsk, the National Marine Fisheries Institute, the National Geological Institute of the National Research Institute, the University of Gdańsk and the University of Szczecin. The main goal of the project, planned for 3 years, is to increase the digital availability and usefulness of public sector information by adapting the resources of oceanology science to digital form and creating a common national research infrastructure for the collection, processing and sharing of oceanographic data. The Pomeranian University will mainly provide access to environmental parameters and characteristics of the processes

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taking place in the Baltic Sea, mainly derived from satellite data. Among other things, a lot of data will be shared, e.g.: photosynthetic primary production, photophysiological properties of phytoplankton, components of the radiation budget, the range of the euphotic zone. The result of the eCUDO.pl system will be a database of oceanographic research, which took place in our country. Full digital access to this database will contribute to a significant development of knowledge about the Baltic environment, but will also enable a more comprehensive analysis of the processes taking place in this ecosystem sensitive to anthropopressure.

5. Mateusz Dyrda, **Rocket assisted robotics. New concept of rocket-based photogrammetry scanning device for autonomous ground vehicles support**, Robotic Association SKALP
6. Adam Labuhn, Julia Licbarska, Paweł Mering, **Mars Colony Hackathon Project Report**, University of Business and Administration Gdynia

Members of the Student's Sea & Space Cluster, law students of Kwiatkowski University - Julia Licbarska, Paweł Mering and Adam Labuhn - took part in the "Mars Colony Hackathon" event organised on 22 April 2021 thanks to the cooperation of the US Embassy and the Polish Space Agency.

The meeting had an open character and the invitation to participate was addressed to students from all over Poland who are interested in various issues of space exploration. During the hackathon, participants, together with expert mentors, searched for answers to several fundamental questions in the aspect of ambitious plans to "inhabit the Red Planet", such as how will life on Mars look like? Where will we establish our first colony and how will it look like? What system of government will we adopt? What will we wear there?

WSAiB students took part in a panel led by Prof. Małgorzata Polkowska, where together with students from other universities they created a draft Constitution for Mars. The group included in the project such elements as the political system, administration and judiciary. Other workshop groups worked on issues such as settlement location, architecture, art and daily life on Mars.

The Mars Colony Hackathon was highly appreciated and satisfied by the participants, what is a good prognosis for the future and confirms the wide interest in this topic and the need for discussions in this area among young scientists. At the same time, the discussion formula proposed by the organisers proved to be extremely interesting and worked very well in practice. The organisers of the event are to be thanked and congratulated.

## **SECURITY APPLICATION**

*chair: prof. Marek Grzybowski*

## **Baltic Sea and Space Cluster - Pentagon Helix HUB of maritime and space industry**

The BSS Cluster is developing in the Pentagon Helix HUB. It integrates the transfer of knowledge between science and business, supports social initiatives, local governments and administration, develops investor relations in the maritime and space industry. The cluster acts as a smart organization. We view maritime and space business in a holistic manner. BSSC integrates technological, legal and economic solutions at the scientific, business and social level.

BSSC Partnership and Memembers know-how

The partnership of the Space Sciences Committee of the Polish Academy of Sciences with the Baltic Sea and Space Cluster has resulted in international projects. Knowledge transfer

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between universities and the space and maritime industries has developed at the national and international level. Representatives of such universities like the Naval Academy, the University of Gdansk, the Gdansk University of Technology, and the University of Administration and Business have actively participated in these activities. The contribution of the research workers of the Institute of Oceanology of the Polish Academy of Sciences is very large. They brought a strong potential of knowledge about the use of space in sea research to the activities of the Committee and the Cluster.

The participation of business representatives, members of the Baltic Sea and Space Cluster is very important. Among them are: Pomeranian Special Economic Zone, Gdynia and Gdansk Sea Port Authorities, Nauta Shipyard and Crist Shipyard, Hydromega and Cadour Consulting, Marine Technology and Sea Data, Echogram and Sevenet. The representatives of the Port of Hamburg, Hutchison Ports and ICTSI contributed a lot of knowledge during conferences and B2B meetings. A unique activity in the field of education of engineers is the interuniversity studies of the 2nd degree Space and Satellite Technologies, which initiated and successfully develops the Naval Academy, Maritime University and Gdansk University of Technology

The Polish Maritime Cluster is strongly based in seaports, shipyards, the Pomeranian Special Economic Zone and innovative companies involved in the production and services of maritime industries. Research and education are an important part of the cluster's activity. In Gdynia, in the area of the former Gdynia Shipyard, the production profile was changed. Instead of simple vessels for container and ro-ro ships and bulk carriers, specialist vessels worth EUR 200 million are being built in Gdynia for the offshore industry, as well as research and special vessels.

BSSC Members, Polish universities, design offices, shipyards have experience in zero-emission technologies and make decisions that aim at long-term sustainable development. Poland is actively building innovative zero-emission ships (ZEV), especially ferries and passenger ships. Their recipients are shipowners from the Scandinavian countries and the North Sea region. Moreover, many ZEV and hybrid ships from Poland are awarded at international competitions.

The BSSC Think Tank has a strong position in the Baltic Sea market. The main objective is to identify trends in the global maritime economy and space technologies and their environment, as well as to create strategies and set directions for development in the maritime economy and space technologies in the Baltic Sea Region. The idea of integrating the activities of the Committee and the Cluster was born during the conference "Space and the sea – at the meeting point of the horizon" (<https://www.iopan.pl/KNK2018/>) at the Institute of Oceanology of the Polish Academy of Sciences. The idea of cooperation in science and maritime and space business was born on the initiative of 3 professors: Zdzisław Brodecki, Edmund Wittbrodt and Marek Grzybowski, President of the Board of the Polish Maritime Cluster. The idea was quickly transformed into a new organization: the Baltic Sea and Space Cluster. (<http://polishscience.pl/pl/powstal-baltycki-klaster-morski-i-kosmiczny/>).

BSSC THINK TANK is an initiative that was created during the conference Maritime Policy, and developed during conferences organized by the Space Sciences PAN Commission in cooperation with scientific centers and business representatives at the Institute of Oceanology of the Polish Academy of Sciences, University of Business Administration and Naval Academy. Their aim was to analyze the implementation of Poland's maritime policy and the development of space technologies and to determine the methods, actions and tools for optimal use of Poland's maritime and cosmic scientific and industrial potential and the position of our country in the Baltic Sea Region.

In Poland, as an expert, BSSC operates in the smart specializations of Pomerania. ISP1 – Offshore and port-logistics technologies; "maritime" specialization, which includes: ship and

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offshore construction (e.g. placing offshore wind farms), logistics in ports and at their hinterland, use of biological resources of the sea. ISP 2 – Interactive technologies in the information environment, specializing in “ICT”, i.e. information and communication technologies, including: ICT solutions for production and services, ICT tools for managing urban space, management of large data sets, business use of satellite technologies. The BSSC was the initiator of the creation and development of the national smart maritime specialization. Innovative marine technologies in the area of specialized vessels, marine and coastal constructions as well as maritime and inland logistics and transport.

BSSC existing solutions and processes for hubs

BSSC actively participated in establishing a network of clusters in the Baltic Sea region. BSSC is an active participant in this network. The cluster is active in international projects of the Baltic Sea region in the area of blue economy. The cluster with its expert knowledge participates in international projects that allow the creation of GALATEA Blue Growth Accelerator and ZEV HUB (<https://zevinnovation.eu/>).

The ZEVinnovation project is funded by Iceland, Liechtenstein and Norway through the EEA and Norway Grants Fund for Regional Cooperation. The ZEVinnovation project aims to establish a sustainable and efficient network for the development of innovative technologies that will bring together active stakeholders. The project is implemented by multi-sectoral partners from Croatia, Norway and Poland: Center of Technology Transfer LLC (Croatia), Baltic Sea and Space Cluster (Poland), Inovacije i razvoj LLC (Croatia), ÅKP AS (Norway) and Vinco Innovation AS (Norway). Regardless of the differences in size and population, partner's countries face common environmental challenges concerning resource limitations and vulnerability to climate changes. The transnational partnership should open up a wider market and help members of the ZEVinnovation HUB to enter the international supply chain. GALATEA Project (<https://galateaproject.eu/>) works like as HUB, it connects the markets from the supply and demand sides. The Baltic Sea and Space Cluster was invited to the project by Pôle Mer Méditerranée and Aerospace Valley from France. They appreciated the strong brand of the Cluster on the market of the Baltic Region and Central Europe. An important feature of the project is the integration of activities of strong partners from 3 sea basins: the Atlantic, the Baltic and the Mediterranean Sea, emphasize the authors of the project. The leader is the strong French Maritime Cluster Pôle Mer Méditerranée – Toulon Var Technologies. Participating in the development of blue innovations are: Aerospace Valley (France); Corallia Clusters Initiative / Research Center Athena (Greece); Asociación Clúster de Movilidad y Logística de Euskadi (Spain); Fundació Eurecat (Spain); Catalan Water Partnership (Spain); Asociatia Cluj IT (Romania) and the Baltic Sea and Space Cluster (Poland, Baltic Sea region). The main goal of joint activities is to create innovation and develop new intersectoral and cross-border value chains – this can be seen from the selection of partners. It will finance those SMEs that are innovative, ambitious and collaborative in the maritime, ICT, aviation and space sectors.

SpaceUp Project is a project financed by the EU Framework programme for Research and Innovation (Horizon 2020). Throughout the project lifetime six Space Academies will take place in various locations in Europe, networking new space tech entrepreneurs with potential partners and customised business services will be provided to selected companies, helping them accelerate on the road to success! Throughout the project lifetime 6 Space Academies will take place in various locations in Europe, networking new space tech entrepreneurs with potential partners in Finance, Business, Space Clusters and Science Parks, plunging Start-ups into a genuinely European Space ecosystem.

ECOPRODIGI Project (<https://ecoprodigie.eu/>). BSSC is associated partner. The project works like a HUB, it connects the markets from the supply and demand sides. It is an important project in which the BSSC (former Polish Maritime Cluster) participates.

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Ecoprodigi project increases eco-efficiency in the Baltic Sea region maritime sector by creating and piloting digital solutions in close cooperation between industry end-users and research organisations.

The ELMAR (<http://electric-water-mobility.eu/>). project aims to support SMEs at emerging the international supply chains as well as accessing foreign sales markets for boats & ships with electric propulsions. Project consortium works like a HUB, it connects the markets from the supply and demand sides. The consortium consists of the partners from Germany, Poland and Lithuania, representing regional development agencies, scientific institutions, branch associations of the yacht technology suppliers, owners of the historical ships as well as electric boat producers

E-LASS initiative. BSSC is a founding member of this business and research initiative (<https://e-lass.eu/>). Founded in 2013, E-LASS is a well-established European network for Lightweight Applications at Sea with approx. 400 members in 30 countries. Twice a year, the E-LASS members and RAMSSES partners meet for a seminar and industry tour to discuss innovative solutions and to enhance the use of lightweight materials within maritime and offshore industry. E-LASS works closely with the MariLight.Net.

Polish Maritime Cluster HUB

BSSC in Poland organizes cooperation between the companies of the Polish Maritime Cluster (<https://balticcluster.pl/>), universities, business and local governments and communities. BSSC organizes knowledge transfer and business cooperation between markets. BSSC connects the market of buyers with the market of suppliers of products and services operating in the companies of the Polish Maritime Cluster.

1. Agata Sochaczewska, ***Cosmic" technology OptiNav and the security of cosmic mission***, Optical Navigation For Industry and Humans, Robots and Space (OptiNav Sp. z o.o.)
2. Zdzisław Długosz, PhD., ***Critical infrastructure security in the space industries***, Director, Security and Safety Research Institute

The development of space civilization is not only its progression through space exploration and exploration, but also the space technology sector, the development of human resources in the technology sector and the use of satellite data to solve global security problems. In addition, this development also includes educational, integration and design activities, as well as the construction of national and European space infrastructure. Thus, by the security of the space infrastructure facility (Space Port), we should understand:

1. Certain desirable and positively valued conditions of its functioning ensuring the duration, survival, improvement and development of such an organization at a given level of its progression.
2. A set of organizational, technical, technological, property and other values of political and economic importance, related to the existence of a being placed in the heuristic integration function, ensuring the civilization development.

The complexity of the modern world and the lack of its final prediction causes, forced by the problems indicated in the study, the special role of information and its political and economic value, which is of paramount importance for the study of the security-determined transfer of knowledge, the development of space civilization. In addition, information and its security as the basic organizational condition of space research using the so-called space technologies means that now knowledge has become both a source of civilization development and a source of threats.

The content of the study is, in the intention of the author, a preliminary analysis of this issue, understood as an introduction, epistemological cognition, understood as knowledge

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that has been practically verifiable so far, and a gnoseological view understood as conceptual knowledge in the intentional and cognitively rational area of human consciousness, concerning the space technology sector and space exploration. In this situation, adjusted to the given direction of considerations, the general outline of the reasoning includes:

1. Security of civilization progress in the face of identified problems of globalization, inducing a human striving for multidisciplinary cognitive improvement of his insight into space with the help of developed products and technologies.
2. Information and its security as the basic organizational condition for the security of space infrastructure.

The complexity of the modern world and the lack of its final prediction causes, forced by the problems indicated in the study, the special role of information and its political and economic value, which is of paramount importance for the study of the security-determined transfer of knowledge, the development of space civilization. In addition, information and its security as the basic organizational condition of space research using the so-called space technologies means that now knowledge has become both a source of civilization development and a source of threats.

The problem of the security of Space Ports in the study results from the author's experience in the area of his professional interests in the security of knowledge transfer. The content of the study, on the other hand, is the author's hermeneutics, explaining and interpreting the achievements of the doctrine between the originals of its authors, and reduced to their coding into the practical dimension of the security area in the development of space civilization, based on, for example, the development of the space technology sector.

3. Maciej Brzozowski, ***SeaPort Safety and Security. Port Hamburg case study***, Port Hamburg Marketing

The port of Hamburg is a universal port which handles all kinds of sea cargo. The annual throughput of approx. 130 million tons and ca. 8,5 million TEU makes it the biggest and the busiest port in Germany, as well as third biggest port in Europe. Requirements as to the safe transport of high-quality or dangerous goods and the need for counter-terrorism measures in the transport and logistics industry are growing. For Hamburg Port Authority, safety and security of operations belong to most important goals, next to efficiency, reliability, and operational excellency, therefore it continues to implement the required port infrastructure measures in this area. HPA is responsible to implement system of safe movement of ships, as well as all other means of transport. Special attention is paid to large vessels, which create extraordinary risk due to their size when maneuvering in tight port basins and fairway channel. Some 9000 ships are calling the port of Hamburg every year, inclusive 189 Ultra Large Container Ships with capacity of over 18,000 TEU (2020), which are extremely important due to their size (length 400 m, beam ca. 60 m) and value.

To ensure safe navigation HPA and the city of Hamburg are carrying out the project of the fairway adjustment of the Lower Elbe and Outer Elbe as one of priority development projects in the field of waterways. Deeper and broader fairway channel will significantly increase safety of navigation and improve nautical conditions. The works have just been completed and the adjusted fairway shall be soon made available for ships. Of course, these are not maneuvering unassisted, when approaching or leaving the port. Ships rely on port, river, and sea pilots as well as tugs as well as instructions from port captain. Important assistance is rendering a special unit called Hamburg Vessel Coordination Center. HVCC is coordinating ships' movements, which is extremely important not only because of coordination of

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mooring at terminals, but also to avoid situation when two large vessels meet on the Lower Elbe outside passing box and not being able to pass by one another.

A lot of attention the port is putting on maintaining safe traffic on its road and rail infrastructure. Every day there are ca. 200 train entering or leaving the port, as well as some 33,000 lorries and other vehicles. The roads and rail tracks have been equipped with sensors measuring various parameters of traffic as well as parameters of selected important devices (e.g. rail switches). The existing port system can monitor the current situation on rail and road infrastructure in real time with centimeter accuracy and inform truckers and rail operators in case of disruptions of traffic jams. Truckers can plan their journeys within the port of Hamburg which helps them to avoid heavy traffic on selected roads, but also to make the traffic smooth.

In the future, all traffic within port area shall be controlled by the Port Traffic Center. Digital Port Twin shall enable to test quickly possible alternative solutions in case of an emergency in the port to minimize potential loss and to avoid a traffic disaster.

Security is gaining on importance, as more and more processes in the port are being automated and controlled by IT systems. Potentially, attacks of hackers could lead to hacking customer and employee data, breaking security systems in warehouses, interference in the management of ports and authorities (customs), kidnappings of drones, autonomous ships or trucks and reputational damage or intellectual property losses.

Solutions in the field of Industry 4.0 create foundations for the substantial enhancement of efficiency through automation, networking, and communication of real objects with virtual systems for planning and control of operations. However, this leads to a variety of risks that affect the stability of processes and IT security through cyber-attacks. There are no standards for securing against cyber-attacks and monitoring system stability as far as automation of the systems and data exchange is concerned. German Federal Ministry for Transport and Digital Infrastructure (BMVI) has prepared a IHATEC funding program to support innovative projects which deal with these problems. These projects include:

- AUTOSEC, focusing on stability and resilience of automated systems against cyber-attacks,
- HITS-Moni, focusing on detection and protection against cyber-attacks,
- ROboB, focusing on container release on terminals by means of blockchain technology.

The results of these projects shall not be widely discussed; however, the systematic approach of governing bodies shows the importance of security issues. Enhancing the security of IT systems in ports and on port terminals is a long road which never ends, and these projects are just a few steps towards resilient IT port systems.

#### 4. Krzysztof Szymichowski, **State energy security - diversification of oil supplies**, Security and Safety Research Institute

##### The security of oil supply

The security of energy supply affects everyone along the supply chain. The global energy sector faces challenges to provide billions of people with permanent energy supplies, in a sustainable way, at acceptable prices. These issues pose a considerable risk to the international political and economic balance. It is often forgotten that energy security is unlikely to last forever.

##### Supply dependence

Oil resources around the world are very unevenly distributed, with the EU having very few. The energy resources market is extremely sensitive to the political situation both in oil producing regions and the countries of transit.

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Global oil supplies can at any time be physically interrupted due to events in producing regions and transit zones, especially caused by a political turmoil, piracy or a state of war. There are questions not only about the level of dependence, but also about the security of ensuring a stable price and harmony of supplies.

A percentage rate of 95% was assumed for Poland's dependence of oil supply, defined in the Polish Energy Policy. The majority of the oil is imported from Russia. Such a high level of dependence from a single supplier creates a serious risk. Therefore, for years there have been attempts to diversify the import sources and the transport routes.

#### Structure of imports

The structure of the oil import origins indicates the overwhelming dominance of Russia as a supplier.

The situation is caused mainly by economic reasons. For years Russian crude oil has been shipped by 'Przyjazn' pipeline to Polish refineries at a better price than sea imports but it's often oposite now. Compared to Brent oil from the North Sea, REBCO was cheaper. The fact that Polish refineries are focused on refining oil, which is provided by the Russians, is of a considerable importance, too. Unfortunately the quality of oil supplied from russisn fields of West Siberia is much lower quality than during past years.

Recent years have brought changes in the structure of global oil market prices caused by considerable mining technology development together with the exploration and production growth in the US and Canada. Therefore, an increase in supply diversification is to be expected, when it comes to both the quantity of oil from existing suppliers as well as the emergence of new exporters supplying oil to our market.

There are only two possible delivery directions of oil import to Poland: the 'Przyjazn' pipeline from the Russian suppliers and by the marine oil terminal – Naftoport. Clearly, there is the lack of network structure of pipelines, enabling the southbound supplies from the deposits of central Asia. Oil deliveries from the Caspian region can only take place through the Russian pipelines. From the Mediterranean and North Africa the deliveries are only possible by sea.

#### Future

Economic and energy security all have a lot in common. Desired economic development should be based on energy supplies and alliances. The strategic goal of governments needs to be a close co-operation, energy solidarity with other consumers and openness in relations with energy producers. The construction and modernisation of transshipment, transport and storage infrastructure is indeed of a great importance in the security process of oil supplies. The model of the modern world is closely linked to the ongoing economic growth that constantly needs a driving force. Technological progress is aimed at continuously increasing natural resources production, including energy, because it contributes to economic growth. One of the key questions that should be asked is the future of energy – what is going to happen when key economic resources become unavailable? How can the growth of technology meet the needs of economic growth?

## RESEARCH SESSION

*chair: dr hab. Dariusz Ficek, prof. AP*

1. Tomasz Zapadka, **Radiation budget of the Baltic Sea surface based on satellite data**, Pomeranian Academy of Słupsk

This work discusses the possibilities and limitations of using satellite data to determine the radiation budget NET and its components at the Baltic Sea surface in near real time. The presented approach enables determination of daily radiation fluxes over the entire Baltic Sea employing data from satellites in combination with data from numerical

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prognostic models (UMPL, M3D, 3D CEMBS). Data from satellite radiometers like SEVIRI, AVHRR are used together with algorithms that take into account the specificity of this sea and are developed based on large empirical data sets collected in this region. The analysis showed that daily average NET had been calculated with RMSD of 15 Wm<sup>-2</sup>. Daily NET maps are created every day and presented in SatBałtyk System designed to monitor the Baltic Sea environment. Conclusions from the monthly and annual analyses made so far will be shown in this presentation.

2. Małgorzata Polkowska, ***Situational awareness in Space - aspects of law, politics and safety***, Academy of Art of War

The awareness of the importance of the SSA system has been discussed since the 70s. Meanwhile, it is necessary for space-faring nations to properly implement it into national law. This is especially important for building the system in an international and European environment, with a strong focus on strategic, security, and defense aspects. The international space treaties do not establish a general obligation to disclose and share situational awareness data and information. Moreover, national security systems and military space information systems can be considered as obstacles to international cooperation in this field. International cooperation in the field of SSA's will therefore be governed by the terms of special bilateral and multilateral agreements. The most important aspect of an SSA is the need to cooperate at different levels through separate legal entities. This cooperation is based on national law. Data exchange policy is essential but must take into account the tension between data protection and SSA objectives.

3. Andrzej Urbanek, ***Space Security: collision with the Autonomous Vehicles***, Pomeranian Academy of Słupsk

4. Maciej Nyka, Tomasz Bąkowski, ***Land-Sea-Space intersection on the Maritime Spatial Planning Process***, University of Gdańsk

5. Marcin Dornowski, Daria Bieńkowska, Magdalena Konopacka, ***Mental Health in Professional Life According to Stress. Medical and Legal Issue***, Academy of Physical Education and Sport in Gdańsk/ Pomeranian Academy of Słupsk/ University of Business and Administration

Aims: 1. Defining the level of influence of neurofeedback EEG sessions on stress model profiles experienced during different stressors implementation in molecular, biochemical, neurophysiological, psychomotorical signatures. 2. To identify and deconstruct the existing legal, psychological and biological conditions of human labour performed under high levels of stressors: eg. isolation, sleep-deprivation, psychological pressure resulting from multitasking and team work, in an environment aggressive for the human body, displaying properties such as: extreme temperatures and pressure, very high or low humidity, polar night/day, magnetic storms, maximal physical effort etc. Such conditions can be identified in three basic fields the authors are intending to scrutinize: offshore oil-rigs, polar stations and space missions. 3. Subject: A case control approach was followed comprising of healthy young male participants: 8 (high temperature stressor) group and 8 (fatigue exercise stressor) group. Methods: Genes expression changes connected with stress reaction of human cells (expression changes of genes recognized as associated with human psychological abilities or in case of difficulties of blood sampling miRNA profiling of saliva

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samples will be conducted). Vienna Test System: eye – hand, stress tolerance, attention, memory with sEMG (m. rectus abdominis, m. trapezius) it allows precisely to record the duration of latent voluntary contraction and relaxation, can be used for assessment of the intensity of central commands that control muscle contraction; questionnaires: KPS (stress feel), UMACL (mood) Plopa, Markowski, Neo-PI-R (personality), PERMA (well-being) PERMA – Kern; EEG brainwaves signals evaluation (alpha, beta, gamma, theta, and delta) which reflects the mental state of subjects. Experiment: Four measurements of each stress signatures were engaged. First part (two measurements) before and after stressors implementation (high temperature, fatigue exercise) was executed before neurofeedback EEG sessions. Second part after neurofeedback EEG session. After biomedical methods legal issue will be addressed. The legal sciences project specialist will work to identify and deconstruct the existing legal, psychological and biological conditions of human labour performed under high levels of stressors: eg. isolation, sleep deprivation, psychological pressure resulting from multitasking and team work, in an environment aggressive for the human body, displaying properties such as: extreme temperatures and pressure, very high or low humidity, polar night/day, magnetic storms etc. Such conditions can be identified in three basic fields the authors are intending to scrutinize: off-shore oil rigs, polar stations and space missions.

Legal approach: 1. Comparative analysis of the existing rules in contract, labour and medical law, which are presumed inadequate to effectuate the safety culture. 2. Analyzing the current standard of care for polar scientists, oil rig workers and ASTRONAUTS (incl. Antarctic Astronauts overwintering on the Concordia station where the psychological and physiological challenges are similar to those experienced by astronauts on the ISS and will help assess how people will perform on future missions to the Moon, Mars or beyond) and identifying elements of the standard of care that will need to change in order to respond to respective medical challenges.

6. Ryszard Kozłowski, ***Homo Cosmicus - dilemmas, reality or fiction***, Pomeranian Academy in Słupsk

Since ancient times, we have been observing how philosophy engages in scientific issues. This is how a cosmology or a philosophy of science arose. The idea of a cosmic man is part of this trend - it is a response to advanced human activities in space. In the present development of science, is it not too early to ask "who is the cosmic man? Is the cosmic man close to the idea of homo dei or "Great Man" ?

7. Zdzisław Brodecki, ***Synergic Brain***, University of Business and Administration

1. Works on building an artificial intelligence (humanoid robots and modern IT technologies) are far from reaching their final goal. In the near future we may expect a process of development from Artificial Intelligence (AI) through Artificial General Intelligence (AGI) to Superintelligence (S). Then the interface 'brain-computer' will be in the heart of synergetics. For that reason a question of synergy of civilization (forms of dialogue and principles of universalism), synergy of captivity (social situation in which people willingly limit their personal freedom in favour of a certain entity – a state, regional community or even international community) and synergy inquiry (those roots are searched for the philosophy of science) should be carefully studied.

2. There is no doubt that the network of 'collective human brain' in connection with 'intelligent robots' (synergic brain) will gradually become the fundamental element of legal personality and legal order in the context of prevention, control and responsibility.

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3. Philosophy of law becomes particularly meaningful to lawyers in situation where they have to face a conflict of natural justice (a core element of modern philosophy of politics) with efficiency (a core element of modern philosophy of growth). Natural justice is the category of legal norms which formalise behaviour rules (ethical values) in form of dignity (human personality, freedom and equality, procedural dignity) and judicial justice (an impartial judge, harmony between individual rights and collective rights, procedural justice). Those two forms of natural justice are behind the constitutional concept of 'rule of law and social justice' (as described in art. 2 of the Polish Constitution). Such concept is an inherent part of legal order – being on the top of hierarchy of norms. Thus the 'right' and 'judicial justice' (reflection of ethical values) comes before the 'good' (reflection of efficiency as the synthesis of legality and rationality). For this reason the supremacy of ethical principles over praxeological rules should be accepted by the doctrine and juridical judgements.

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