

World Conference on Science and Art for Sustainability

September 22–24, 2025, Belgrade, Serbia



REPORT

International Decade of Sciences for Sustainable Development

2024–2033



WORLD CONFERENCE ON SCIENCE AND ART FOR SUSTAINABILITY BELGRADE 2025

Science and Art for Sustainability

On August 25, 2023, the United Nations (UN) General Assembly proclaimed *the International Decade of Sciences for Sustainable Development (IDSSD)*, from 2024 to 2033. The idea of IDSSD was launched by the International Union of Pure and Applied Physics (IUPAP), the World Academy of Art and Science (WAAS), and The Club of Rome (CoR) in September 2022 in Belgrade, Serbia, within *the World Conference on Basic Sciences for Sustainable Development*, as the flagship event for Europe within *the International Year of Basic Sciences for Sustainable Development (IYBSSD)*. The UN General Assembly gave the task to prepare and implement the overall program of IDSSD to the UN Educational, Scientific and Cultural Organization (UNESCO).

The integral goal of IDSSD is to significantly contribute to tracing the pathways towards regeneration and sustainability of nature and society as well as human security and peace. This should be done following eight Human Security Dimensions (HSDs), specified by the UN Development Programme (UNDP) in January 1994 and September 2022, and 17 Sustainable Development Goals (SDGs), defined by the UN General Assembly in September 2015. These dimensions and goals are related to the existential problems and challenges facing the Earth and humanity today, which are: depletion of natural resources, pollution, climate change, and biodiversity loss; human inequality and inequity, and corruption; intercultural conflicts and forced migrations; political and economic sanctions, color revolutions, military interventions, and wars. Today, it is clear that these problems have complex and multiple disciplinary character while the efforts of scientific communities are mostly limited to separated disciplines. In addition, the problems are interdependent and can mutually reinforce one another. Therefore, a systemic and multiple disciplinary approach in looking for their solutions is necessary. However, the current state of affairs clearly shows that it will not be possible to carry out the SDGs and HSDs by 2030, as it was planned.

On April 16, 2024, The Earth-Humanity Coalition (EHC) was founded as an association of global, regional, and national scientific organizations with the task to prepare and implement, in close cooperation with UNESCO, various initiatives within the overall IDSSD program. IUPAP, WAAS, CoR, and the UNESCO-MOST-BRIDGES Coalition (BRIDGES) were among the



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founding Members of EHC. The first of these initiatives was the EHC-WAAS Program of Sciences for Sustainable Development, which had been prepared by WAAS. It currently includes two series of webinars, several world conferences, and a number of journal articles and reports.

The EHC-WAAS Program is based on the conviction that acquiring knowledge along the chain of basic, applied, social, and humanistic disciplines by scientific communities worldwide, within the disciplinary boundaries, must be often supplemented with multidisciplinary and interdisciplinary analyses followed by transdisciplinary syntheses. This endeavor should sometimes include traditional local knowledge and the results of its interactions with contemporary science generated knowledge. The main aim of the Program is to contribute to the establishment of a solid foundation for advancements of technology, agriculture, industry, and education towards sustainable, secure, and peaceful development at the local, national, regional, and global scales. Besides, in the Program, relations between science and art are underlined, as between two distinct but complementary methods of inquiry about nature, society, and human beings with the same aim—to unravel the sense of the universe and communicate their findings to others. The results of science, being objective, and the results of art, being subjective, should influence and enrich one another, and thus push farther the boundaries of a true and deep understanding of the universe.

The EHC-WAAS Program should be applied worldwide, in both the Global North and the Global South, and in their cooperation following the principles of multilateralism, guaranteeing the respect of rights of every country in every domain, and the objective of well-being for all on a healthy planet.

It is well known that relationships between scientists and artists on the one side and policy-makers and all other science and art stakeholders in the public and

private sectors on the other side are characterized by a lack of respect and trust. Therefore, the EHC-WAAS Program includes a strong request that novel ways of communication and cooperation of the two sides, based on sincere mutual respect and trust, must be developed and nurtured. The aim is to overcome the barriers that prevent these interactions as well as to effectively use the levers that stimulate them. This should lead to the evolution of these communications from the one-sided and market-driven ones to a wide-participatory co-creation of approaches and agendas of science, technology, art, and education driven by the societally relevant problems and challenges. Besides, all three pillars of science and art diplomacy, being science and art for diplomacy, science and art in diplomacy, and diplomacy for science and art, should be continually used. These pillars cover the soft power of science and art to improve relations between countries even where official relations are strained or severed, the ways how science and art achievements help inform diplomatic objectives and foreign policy, and the ability

of diplomacy to facilitate cooperation in science and art across borders, respectively.

The World Conference on Science and Art for Sustainability, held on September 22–24, 2025 in Belgrade, Serbia, was the first conference within the EHC-WAAS Program and a flagship event within IDSSD. The aims of the Conference were: to listen to prominent individuals acting in different science and art disciplines and coming from different parts of the world, to induce fruitful interactions among them, and to deduce from all that some concrete conclusions on the contributions of science and art to sustainable, secure, and peaceful development to be presented to the interested policy-makers and other science and art stakeholders at the local, national, regional, and global scales. The organization of the event was funded by the Alliance of National and International Science Organizations for the Belt and Road Regions (ANSO), the World Academy of Art and Science (WAAS), the Serbian Academy of Sciences and Arts (SASA), PSP Farman Holding, Belgrade, Serbia, and Jeff Ubois and Smiljana Antonijević.



Introductory Session: International Decade of Sciences for Sustainable Development

A Decade for Impact: Mobilizing Science and Art for a Sustainable Future

– Menattallah Elserafy



The International Decade of Sciences for Sustainable Development (IDSSD) marks a critical moment for global action. Science and art, as complementary forces of knowledge and expression, hold transformative potential to address today's existential challenges; from climate change and inequality to peacebuilding and innovation. This talk explored how UNESCO is advancing the IDSSD through inclusive, interdisciplinary strategies that empower communities, harness creativity, and build



capacity across the Global South. By bridging scientific rigor with artistic insight, we can shape a more resilient, just, and sustainable world.

The Earth-Humanity Coalition: All Sciences and All Knowledge for Equitable Well-Being on a Healthy Planet – Michel Spiro



This lecture showed the goals/ambitions of two initiatives: the first one (2022–2023), the International Year of Basic Sciences for Sustainable Development, which promoted curiosity driven sciences to feed the pool of knowledge that subsequent generations

will use to face their problems, and the second one (2024–2033), the International Decade of Sciences for Sustainable Development.

The Earth-Humanity Coalition, which was inspired by and born from those two initiatives, promotes participative citizen sciences, co-constructed of all sciences and all knowledge, including traditional, which are transformative and impact oriented at all scales (villages, groups of villages, regions, countries, groups of countries, and global), on our way to act for equitable well-being on a healthy planet. These citizen sciences must be collaborative, inspired by the CERN model,



with the goal of establishing a worldwide network of transdisciplinary hubs for sustainable development, like CERN did in establishing a worldwide network (at all scales) of laboratories for the Higgs boson discovery and study (the Worldwide LHC Grid, which is both an infrastructure and a network).

The set-up of this infrastructure/network was started with the Earth-Humanity Coalition.



Transdisciplinary Education – Janani Ramanathan



Education is one of the most powerful tools we have devised to equip future generations with the essence of all the knowledge that humanity has gathered over millennia. Education and the application of the knowledge gained have helped us extend the human lifespan, abridge time and space, develop science and technology, and make life much easier than at any time in history. However, there is much scope for improvement, just as there is much more that needs to be done to solve the problems of the world.

One of the ways in which we can improve our education system and make it more effective in solving the world's problems is by making it transdisciplinary.

Most of the problems confronting global society today are reflections of the fragmentation of research, theory, knowledge, and policy-making into disciplinary silos. This division of our knowledge results in policies and programs that do not fully and accurately represent the complex sources of the problems

and the multidimensional strategies needed to address them effectively. We need greater integration within the disciplines as well as between science and art, subjective and objective dimensions, knowledge and its social responsibility, and the learner and life.



A transdisciplinary education that integrates knowledge and perspectives from multiple disciplines possesses the depth and insight to understand the rich complexity of the world. It goes beyond subject boundaries and is centered around real-world issues. It encourages collaboration across fields, fosters innovation and creativity, and focuses on the overall development of the student. Such knowledge is important because it can help to address real-world challenges such as climate change, AI governance and ethics, healthcare, and equitable global economic development. To cite one specific example, it can meet the critical need for peace today because it naturally fosters understanding, dialogue, collaboration, and problem-solving across boundaries—disciplinary, cultural, social and national.

Specialization and discipline-specific expertise have their place, undoubtedly. However, we also need future leaders, thinkers, and members of civil society with inter-sectorial, integrated perspectives that equip them to work towards the fulfilment of the United Nations' Sustainable Development Goals.

Earth-Humanity Reconciliation: Towards Peaceful Ecological Civilisations through Plural Pathways – Carlos Álvarez-Pereira

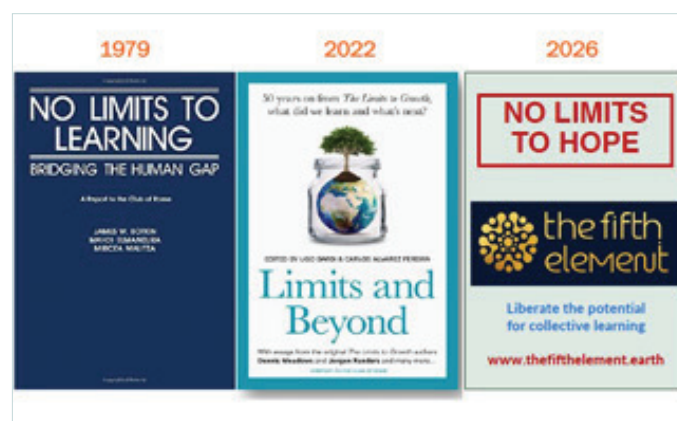


We explore the conditions for the emergence of a post-hegemonic landscape of relations among humans and within ecosystems.

There is an urgency for human societies to address the humanity's existential challenges through peaceful cooperation

and emulation and deliver a multiplicity of pathways to ecological civilisations, grounded in local geography, history, and culture.

We call "pluriversality" this new state of affairs for the sake of a desirable 21st century.



Opening Session

Nebojša Lalić



Nebojša Lalić welcomed all the participants and gave a brief history of the Serbian Academy for Sciences and Arts (SASA). The Serbian Academy is an independent institution that works as per a special law of the Republic of Serbia. The members of the Academy elect the management and take the most important decisions at the assembly meetings. SASA has 36 corresponding and 98 full members. It has served to develop good national as well as international relations, and hosts many important events. The beautiful building that served as the venue of the Conference sessions has become very well-known in Belgrade. All its rooms are occupied for the different activities of the academy.

SASA has eight departments, three branches in different cities of Serbia, eight institutes, as well as library, archives, galleries, and a number of other domains of the academy's activities. Departments are the centers of SASA's activities, and are devoted to various subjects such as the natural sciences like mathematics, physics and geoscience, chemical and biological sciences, technical and medical sciences, social sciences like language and literature, historical sciences, and the Arts, all of which reflect the multidisciplinary structure of the Academy. Scientific activities are one of the major focuses of SASA. The Academy is also an important publishing institution, publishing about 65 titles per year. Most of the books are scientific ones. SASA also serves as an art gallery and has hosted 240 exhibitions. SASA is one of the pillars that led to the UN General Assembly adopting a resolution proclaiming 2024-2033 as the International Decade of Sciences for Sustainable Development (IDSSD).

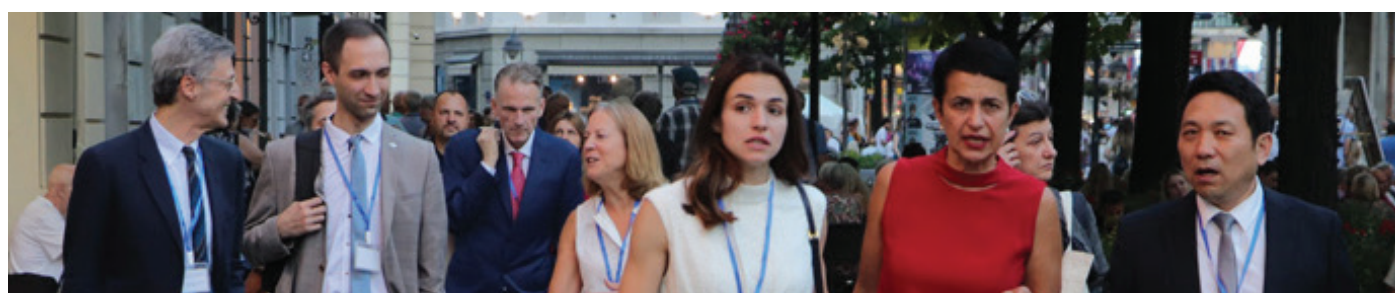
Sukit Limpijumnong



Sukit Limpijumnong welcomed everyone on behalf of the Alliance of National and International Science Organizations for the Belt and Road Regions (ANSO). ANSO is a non-profit, non-governmental international organization, co-founded by the Chinese Academy of Science and 36 scientific institutions in 2018. It operates through 78 member institutions across 52 countries. The Conference marks a pivotal moment within IDSSD. It is a testament of our collective commitment to addressing the most pressing challenges facing our planet and humanity. The integral goals of the Decade and the Conference are to significantly contribute to tracing pathways toward the regeneration and sustainability of nature and

society, and to foster human security and peace. We are here to align our efforts with the UN SDGs and the eight human security dimensions, which guide our path toward a more equitable and habitable world. The problems of our time are complex, interconnected, and demand multi- and trans-disciplinary solutions. The traditional boundaries of scientific disciplines are simply not enough to tackle these global challenges effectively. So transdisciplinary collaboration, interaction of contemporary science and technology with traditional knowledge, and the unique synergy of science and art are essential. Science and art are distinct yet profoundly complementary method of enquiry. Science offers objective understanding while art provides the subjective interpretation. Together, they can push the boundary of human understanding. The result of our scientific endeavours, combined with the power of artistic expression, can influence and enrich one another, fostering deeper insights and more impactful solutions.

The Conference bridges the gap between scientists, artists, policymakers, and all other stakeholders, developing communication and cooperation based on mutual respect and trust. The gathering of experts from diverse disciplines and regions worldwide will stimulate productive interactions, derive actionable conclusions, and provide implementable insights in order to accelerate our progress toward a truly sustainable, secure, and peaceful future for all.



Zhijun Yi



Zhijun Yi welcomed everyone present and stated that this gathering is not only to focus on knowledge but, as a global community, to leverage the integration of science and art for social development. In today's world, sustainability

is a way of thinking and acting in response to serious challenges. Transdisciplinarity and international scientific cooperation are vital. Sustainability involves many different disciplines. So we cannot separate art from science. Similarly, we cannot separate science from ourselves.

How can we promote a positive interaction, such as between the natural science and the social science, for economic, social and environmental development in a practical way? This is a very important question

that needs to be answered. Earlier discussions in the Conference highlighted that science and knowledge must be inclusive in order to achieve sustainability. This Conference can contribute to a more comprehensive understanding of how science and art can work for the sustainability that our digitalized society and earth need.

International science cooperation has great power. If we are to promote science for human beings and green development, if we are to promote people-to-people exchange and communication in science and art, we need trust - trust between scientists, trust amongst agencies, trust for the shared purpose. Therefore, the value of trust is a necessary consideration for achieving sustainability. We should work together across borders to further enhance international partnership, inspire new ideas, and share research results. This is possible when there is more trust among people of all countries.

Garry Jacobs



Garry Jacobs stressed the need for a historical perspective to understand the global social turbulence we witness today, and find solutions that lead to sustainable development and human security for all. Humanity's

rapid evolution in knowledge and technology reflects a broader transformation of global society. While this progress has produced extraordinary achievements and opportunities, it has also generated unforeseen challenges that threaten sustainability and stability. Despite the optimism following the adoption of the 2015 Sustainable Development Goals (SDGs), progress has stalled. The world faces growing turbulence, contributing to a global sense of uncertainty about the future.

A key turning point in humanity's scientific journey came in 1945, when the Manhattan Project demonstrated the destructive potential of scientific advancement misapplied. This moment revealed that scientific progress without ethical and social responsibility could imperil civilization. Recognizing this, prominent thinkers and scientists including Albert Einstein and Robert

Oppenheimer founded the World Academy of Art and Science in 1960, emphasizing that science must serve humanity rather than power or profit. They envisioned transnational, transdisciplinary collaboration where knowledge integrates both art and science to address complex global challenges holistically.

History since then has repeatedly shown that solutions confined to disciplinary silos often generate new crises—such as population explosions following medical breakthroughs or environmental degradation after agricultural revolutions. Humanity's persistent failure lies not in a lack of intelligence but in fragmented thinking that overlooks interconnected consequences. The call now is for a new kind of knowledge—integrative, ethical, and globally conscious—that unites disciplines, sectors, and nations.

As global crises intensify, we need a transformation toward integrated, human-centered arts and science. The future depends on transdisciplinary understanding, cooperation among diverse sectors, and conscious management of social transformation. Only by aligning knowledge, leadership, and ethics can humanity harness its immense capacities for collective welfare and ensure that scientific progress contributes to lasting human security.



Cadmus

Promoting Leadership in Thought that Leads to Action

Cadmus is a biannual print and electronic journal focusing on economy, security and global governance. Published by the World Academy of Art and Science, it is a journal for fresh thinking and new perspectives that integrates knowledge

from all fields of science, art and humanities to address real-life issues, inform policy and decision-making, and enhance our collective response to the challenges and opportunities facing the world today.

Contributions of Basic and Applied Sciences to Sustainability

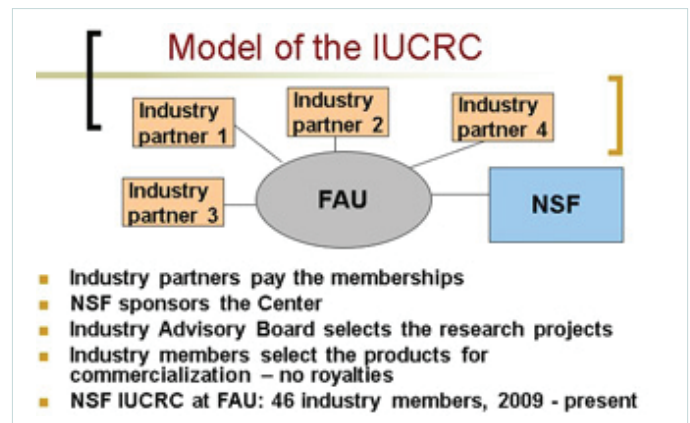
SESSION 1.1



From left to right: Michel Spiro (Moderator), Borko Furht, Gian Francesco Giudice, Ugo Bardi & Marian Asantewah Nkansah

Data Science and Artificial Intelligence – Borko Furht

This presentation explored the critical role of collaborative innovation in artificial intelligence (AI) and data science, emphasizing the importance of partnerships between academia, industry, and government. It highlighted a successful model of cross-sector collaboration through the NSF-sponsored Industry/University Cooperative Research Center for Advanced Knowledge Enablement, which boasts 45 industry members and supports over 50 applied research projects. It showcased real-world examples of how these partnerships drive technological advancements and address complex societal challenges. Additionally, it discussed successful projects led by the faculty and students that have resulted in start-up companies, patent inventions, and commercially successful products and services. By examining these case studies, it aimed to demonstrate how structured collaboration fosters innovation and maximizes the impact of AI and emerging technologies.



CERN and the Role of Big Science in Society – Gian Francesco Giudice



CERN is developing some of the most complex and ambitious scientific projects ever undertaken by humanity. Given the considerable financial and human resources involved, it is natural to question whether society should support such costly basic research programs. Using CERN as an example, this presentation addressed this question and highlighted the societal benefits of a diverse scientific program that includes both small- and large-scale projects.



Not Just Global Warming: CO₂ as a Pollutant – Ugo Bardi

The impact of increasing CO₂ concentrations on Earth's ecosystem is normally discussed only in terms of its radiative forcing effects, that is, in terms of global warming. Nevertheless, CO₂ is an active molecule which has important biochemical effects. One of the effects is the increase in seawater acidity, but this effect appears in all aqueous environments, including the fluids in living beings. CO₂ affects the two main reactions that create and maintain Earth's biosphere: photosynthesis and respiration.

In the case of photosynthesis, it is known that increasing CO₂ atmospheric concentrations increase the reaction rate and hence the agricultural yields, but that does not normally generate an increase in the nutritional content of the food produced.

In the case of respiration, high CO₂ concentrations negatively affect the metabolic rate of metazoa and the cognitive performance of human beings, even at the levels not much higher than the current ones. The projected increase in CO₂ concentrations for the coming decades can only worsen the problem, especially considering the



The Role of Carbon Dioxide in the Evolution of Intelligence: Solving the Dinosauroid Question Preprint v1

human habit of living in closed spaces, where the CO₂ concentration is higher than in the open air.

This presentation explored what is currently known about the metabolic effects of CO₂ on human beings and on the biosphere with the objective of providing an interdisciplinary assessment of the field and the perspectives created by a continuing increase of the human CO₂ perturbation.

Chemistry and Society – Marian Asantewah Nkansah



Chemistry has revolutionised the world in various areas such as development of new materials, technologies, and industries. It has provided solutions to some of humanity's most pressing challenges, including improvement in quality of life, with the corresponding increase of lifespan in many jurisdictions due to advances in vaccine production and highly effective diagnostic tools.

Chemistry's impact on society is multifaceted. It has contributed to advancement in various aspects of life, including healthcare, agriculture, energy, and industry. Life-saving medicines, vaccines, and diagnostic tools have been developed. Fertilizers, pesticides, and genetic engineering have increased food production. Production of innovative new materials has contributed to functionality, improved performance, and sustainability. Chemistry plays a vital role in developing

sustainable solutions, such as renewable energy, green materials, and eco-friendly processes. It helps reduce environmental impact by designing products and processes that minimize waste, pollution, and carbon footprint, ultimately contributing to a more sustainable future for all while limiting reliance on fossil fuels.

In the midst of all the good that chemistry does for the world, it also poses a number of challenges. The production and use of chemicals can harm the environment. The manufacturing industry and exploitation of natural resources also contribute to pollution and climate change, which are potential existential risks. There is therefore a need for careful and strategic management to minimize these risks while harnessing the benefits of chemistry.

This presentation explored chemistry's impact on society with a look at its benefits, challenges, and future directions. Chemistry plays a crucial role in addressing global challenges like climate change, sustainable development, and public health. It can also promote innovation, entrepreneurship, and economic growth.

A multi-stakeholder approach to responsible practice in chemistry involving scientists, policymakers, industry leaders, and civil society can ensure an equitable share of the benefits of chemistry. The future of chemistry holds promise by pursuing the advances made in nanotechnology, biotechnology, and materials science while opening up new possibilities. It is evident that chemistry will continue to shape our world and improve our lives.

SESSION 1.2



From left to right: Goran Milašinović (Moderator), Aleksandr Bugay, Detai Zhou, Dejan Trbojevic & Andre Terzic

Radiation Induced Disorders in Human Brain in Interplanetary Missions

– Aleksandr Bugay

In the past decades, much progress has been made to understand the mechanisms of central nervous system (CNS) functional disorders connected with different neurodegenerative diseases like multiple sclerosis and Huntington's, Parkinson's, and Alzheimer's diseases. However, there have been no advances in understanding the basis of radiation-induced cognitive disorders. Prior to 1970, the human brain was thought to be highly radioresistant and radiotherapy became one of the common tools for brain tumor treatment. Now, brain tumor patients survive long enough after irradiation to experience radiation-induced functional deficits, including progressive impairments in memory, attention, and executive function. Moreover, it has been recently found that high charge and energy ions of the galactic cosmic rays will make a great contribution to the health risk to astronauts during deep space missions. It has been shown that heavy charged particle exposure of laboratory animals even at much lower doses than those used in radiotherapy leads to heavier violation of mental and motor functions. Therefore, there is a critical need to investigate the mechanisms responsible for harmful effects of radiation in various brain regions as well as their integration at relevant doses and radiation types. Recent advances in space radiobiology, including ground-based irradiation experiments at particle accelerators, potential countermeasures, and the feasibility of long-term interplanetary manned space missions were discussed.



Control and Safety System of the Chinese initiative Accelerator Driven System (CiADS)

– Detai Zhou

The Chinese initiative Accelerator Driven System (CiADS) is a next-generation research facility developed to demonstrate the feasibility of nuclear waste transmutation and sustainable nuclear energy production. Based on a sub-critical reactor driven by a high-power proton accelerator, CiADS integrates the multiple complex subsystems that require precise coordination, real-time control, and high-integrity protection.

This presentation introduced the architecture and implementation of the control and safety system of CiADS, with a focus on its unified hardware platform and multilayered protection strategy. The key subsystems—including the beam permit system, machine protection,



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timing distribution, beam diagnostics, and temperature/vacuum monitoring—are all built upon a standardized

modular hardware platform. Each function is realized through the dedicated expansion boards sharing a common controller base, simplifying the system integration, maintenance, and scalability.

The unified platform adopts a combination of the FPGA-based logic processing and high-reliability industrial communication protocols to ensure deterministic control and fast signal propagation. The machine protection and beam permit subsystems are tightly integrated with the real-time fault detection, interlock propagation, and actuator triggering mechanisms. Special emphasis is placed on achieving a deterministic latency across the safety-critical signal path, using optical links and redundant I/O modules. Additionally, the design supports the real-time data acquisition and centralized monitoring via EPICS (Experimental Physics

and Industrial Control System), allowing the operators to visualize the system status and trace the fault origins in a timely manner.

The design and debugging of the interlock logic and beam auto-recovery logic have been completed. Valuable engineering experience has been gained during the actual testing and commissioning process. The future work will focus on optimizing the system architecture and operational strategies to further improve the stability and maintainability of the control and safety system. This system is expected to play a key role in the long-term operation of CiADS, providing a reliable support for the stable and safe operation of the high-power proton accelerator, and serving as a valuable reference for the implementation of similar large-scale research facilities.

Accelerators for Ion Cancer Therapy – Dejan Trbojevic

Radiation therapy is commonly used in treating cancer either in combination with surgery, chemotherapy, immunotherapy, hormone therapy, blood stem cell transplant, etc., or it can be used as external or internal treatment. Accelerators are used as the sources of external radiation like protons or other ions up to fully ionized carbon. They are also used for production of isotopes, where the treatment can be implemented with internal radiation. Radiation works by killing the cancer cells via damaging their DNA. The external ion radiation is expanding throughout the world exponentially, with 130 operating radiation therapy facilities. This is due to a significant advantage with respect to other radiation treatments, mostly by X-rays. The main advantage in particle radiation therapy is that the beam stops and deposits most of its energy in one place while the X-rays always propagate through the body without stopping. Most of the proton therapy accelerators use 230–250 MeV superconducting cyclotrons with a smaller number using synchrotrons. Circular accelerators in the present and future colliders have large energy consumption, creating an essential sustainability problem. Accelerator project proposals for new colliders, light sources, and new medical accelerators are looking for reduction of used energy, better efficiency, and if possible, recovery of used energy. A sustainable proton cancer therapy accelerator is proposed for the Stony Brook University Hospital (SBUH), in Long Island, New York, USA. It is a "green" accelerator as it is built by using the combined function permanent magnets without the need for

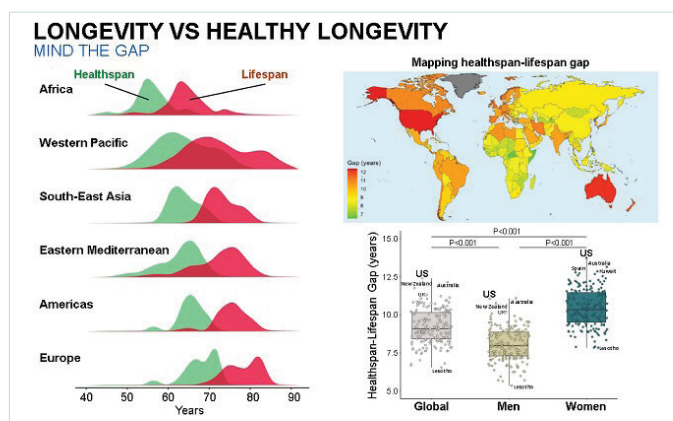


electrical current. In the recent decades, there have been new investigations in radiation cancer therapy with the FLASH effect, where a very large radiation dose is delivered in a very short time, 40 Gy/s. It has been found that the FLASH radiation significantly improves the healthy tissue recovery. The FLASH therapy requirement of 40 Gy/s is to be compared to the dose of 0.01 Gy/s used in conventional radiotherapy. The proton therapy SBUH accelerator delivers protons with the required energies in a 100 ms pulse without changing the magnetic field. The fast-cycling permanent magnet synchrotron has the cycles repeating at a frequency of 500 Hz. Variable magnetic field requirements for different energy settings are the major limitations at all existing hadron cancer radiation therapy facilities. This proton therapy accelerator removes such limitations.



Healthspan-Lifespan Gap: Global Challenge to Healthy Longevity – Andre Terzic

Humans are living longer yet increasingly hampered by disease. Global population health, gauged by the number of years lived (longevity) versus the number of years lived without disease or disability (healthy longevity), was surveilled by interrogating the World Health Organization (WHO) Global Health Observatory, United Nations World Population Prospects, and Global Health Expenditure Database.^{1,2} Life expectancy and health-adjusted life expectancy—estimates of longevity and healthy longevity—increased significantly in the last two decades, being a paramount achievement. However, health-adjusted life expectancy lags longevity gains, resulting in a healthspan-lifespan gap. The healthspan-lifespan gap measures years lived burdened by disease, and has widened significantly over the past twenty years. The healthspan-lifespan gap was mapped for 183 WHO member states and associated demographic, economic, and health indicators identified. Deciphered disease-burden patterns and disparities contributing to gap profiles were delineated across world regions. In all, the healthspan-lifespan gap is a universal threat to healthy longevity.



The massive challenge for the aging population is the pandemic of chronic disease, putting the longevity dividend at risk. Narrowing the healthspan-lifespan gap and redirecting the destiny of humanity from living longer with disease to achieving sustainable healthy longevity is a universal imperative. Case in point: the heart failure epidemic afflicts over 80 million people worldwide, contributing to the healthspan-lifespan gap. Medical science breakthroughs powered by technological innovations are transforming heart health horizons. The quest for sustainable, scalable solutions accelerates—from transplantation (heart recycling) to regeneration (upcycling cell destiny to redirect a diseased heart to heal itself), and decoding and intercepting hidden risks of heart disease before it manifests. The paradigm sustaining healthy heart longevity thus leverages a multidimensional buildout of protective, regenerative, and disease-interceptive perspectives, paving the way to pre-cure solutions for populations at risk. The prospect of sustainably bridging the healthspan-lifespan gap towards an equitable future of global well-being offers a beacon of hope for humanity.

¹ A. Garmany A and A. Terzic, *JAMA Netw. Open* 7, 12 (2024).

² A. Garmany and A. Terzic, *Comm. Med.* 5, 381(2025).



Contributions of Sciences to Sustainable Development of the Belt and Road Regions

SPECIAL SESSION 1



From left to right: Row 1: Nebojša Lalić (Moderator), Klaus Mainzer, Charalampos Baniotopoulos, Athanasia Printza, Row 2: Žiga Turk, Mariana Tian

An Alliance of National & International Science for Sustainability Needs Sustainable AI – Klaus Mainzer

The United Nations SDGs (Sustainable Development Goals) deserve full support to secure the future of the planet and human civilisation. Unfortunately, some nation states are so preoccupied with their national budgets that they lose sensibility of this human goal. This makes alliances such as ANSO all the more important in order to realise the SDGs together. As a first step, decarbonisation must be driven forward. However, renewable energies are probably not enough, so nuclear energy and alternative fuels must also be taken into account. On this basis, sustainable development can be realised with energy efficiency, increasing flexibility and a circular economy.

This produces an enormous amount of data (big data) that can only be mastered through digitalisation and artificial intelligence (AI). The problem is that classic digitalisation and AI are themselves huge energy guzzlers, which in turn contribute to environmental pollution. In contrast, evolution and the human brain are incredibly energy-efficient. What can we learn from nature? This lecture was therefore about alternative computer architectures that are orientated towards the human brain (neuromorphic computing). Together with quantum computing, neuromorphic computing realises sustainable AI that contributes to solving our SDG problems.

References

1. K. Mainzer, *Künstliche Intelligenz – Wann übernehmen die Maschinen?* (Springer, Berlin, 2019) (Chinese translation: Tsinghua University, Beijing, 2022).
2. K. Mainzer, *Zukunft durch nachhaltige Innovation: Im Wettkampf der Systeme* (Springer Gabler, Wiesbaden, 2023).
3. K. Mainzer, *Artificial Intelligence of Neuromorphic Systems: From Digital, Analogue, Quantum, and Brain-Orientated Computing to Hybrid AI* (World Scientific, Singapore, 2024).
4. K. Mainzer, *Complex Systems, Artificial Intelligence, and Emerging Technologies: Innovation in the 21st Century* (World Scientific, Singapore, 2025).



Sustainable Energies in the Era of Artificial Intelligence – Charalampos Baniotopoulos

Sustainable energy systems are at the core of the global transition to low-carbon economies, with wind, solar, and wave energy representing the most widely adopted and promising renewable sources. Wind energy harnesses kinetic energy from atmospheric motion using turbines, solar energy captures sunlight through photovoltaic cells, and wave energy utilises ocean surface motion to generate power. These and other renewable sources reduce dependence on fossil fuels contributing to global efforts toward decarbonisation and climate resilience. However, the performance and durability of sustainable energy infrastructure are significantly influenced by environmental actions, such as fluctuating wind speeds, wave dynamics, solar irradiance variability, and extreme weather events characterised by highly stochastic features. These environmental loads impose complex stresses on infrastructure components, such as welded joints in turbine towers and support structures. Fatigue and degradation resulting from these dynamic actions pose serious challenges to long-term system reliability and structural integrity.

In recent years, the integration of Data-Driven methods and Artificial Intelligence (AI) has emerged as a transformative force in enhancing the performance and management of renewable energy systems.^{1,2} By leveraging vast datasets from sensors, satellite imagery, and historical weather patterns, AI algorithms can accurately predict environmental conditions and their impact on energy generation. In particular, machine learning models offer predictive capabilities for resource availability, enabling proactive energy forecasting and optimisation.³ Moreover, AI-driven predictive maintenance and operation strategies offer significant advantages in minimising downtime



and extending the lifespan of sustainable energy infrastructure. Digital Twin models, being virtual replicas of physical assets, combined with AI, allow for real-time monitoring, simulation, and decision-making to ensure optimal operational performance under changing environmental conditions. For instance, predictive analytics can identify early signs of corrosion fatigue or material wear, allowing timely interventions that reduce repair costs and prevent catastrophic failure and collapse.⁴

The synergy between AI and sustainable energy not only enhances the efficiency and resilience of renewable energy systems but also supports global sustainability targets by improving energy yield, reducing operational costs, and minimising environmental impact. As the energy sector continues to embrace digital transformation, the role of AI becomes increasingly central to the development of smarter, safer, and more adaptive renewable energy infrastructures. This is evident from a plethora of recently achieved research outcomes that serve as a foundation for a new strategic direction within the Belt and Road Initiative.

¹ X. Tang, J. Heng, S. Kaewunruen, K. Dai, and C. Baniotopoulos, *Artificial Intelligence-Powered Digital Twins for Sustainable and Resilient Engineering Structures*, *Bauingenieur* 9, 270 (2024), <https://doi.org/10.37544/0005-6650-2024-09-36>.

² J. Heng, J. Zwang, S. Kaewunruen, Y. Dong, and C. Baniotopoulos, *Digital Twin-Based Deterioration Prognosis of Steel Wind Turbine Towers in Modular Energy Islands*, *Proceedings in Civil Engineering* 6, 1111 (2023), <https://doi.org/10.1002/cepa.2573>.

³ J. Heng, J. Zhang, Y. Dong, S. Kaewunruen, and C. Baniotopoulos, *Digital Twin-Based Hybrid Prognosis on Corrosion Fatigue Deterioration of Steel Wind Turbine Towers in Modular Energy Islands*, *Proceeding of the 10th Eurosteel Conference*, September 12–14, 2023, Amsterdam.

⁴ J. Heng, J. Zhang, Y. Dong, C. Baniotopoulos, and G. Yang (2024), *Coupling Multi-Physics Models to Corrosion Fatigue Prognosis of High-Strength Bolts in Floating Offshore Wind Turbine Towers*, *Engineering Structures* 301, 117309 (2024), <https://doi.org/10.1016/j.engstruct.2023.117309>.



Transforming Health Care for Sustainability & Health Outcomes that Matter to People

– Athanasia Printza



Health systems, over-burdened and under-resourced, are struggling to address a rise in chronic conditions and the impact of the climate crisis on health. Healthcare, whose mission is protecting and promoting health, has a significant impact on the environment. A new era of science and innovation provides the potential to transform how healthcare is designed, developed, and delivered. Sustainability within health services means reducing environmental impacts while maintaining high-quality patient care, thus protecting and promoting the health and well-being of current and future generations.

Key challenges for sustainable healthcare are the carbon footprint (related to energy consumption for heating, cooling, and medical equipment), medical waste, water consumption, and resource-intensive clinical practices. Healthcare contributes an estimated 4.4% of global net emissions through energy consumption, transport, and product manufacture, use, and disposal, while delivering care and procuring products and technologies. Each

country's healthcare climate footprint is correlated to health spending. The higher the spending (percentage of a country's GDP), the higher the per capita healthcare emissions. China's health sector emits one-seventh of the greenhouse gases emissions per capita of that of the United States, and just under one-half of that of the European Union.

Several countries are implementing sustainable healthcare goals, with a coordinated approach to legislation, regulations, reporting, innovation, and budgeting. Strategies include decarbonization, energy efficiency, telemedicine, waste reduction, digital transformation, sustainable procurement, green hospital design, sustainable clinical practices, and sustainability policies and incentives. Resource-intensive hospitals aim at reducing energy use, cutting waste, and optimizing workflows (digital records and AI diagnostics).

Value-based healthcare (VBHC) is based on the principle of delivering the best possible healthcare outcomes at the lowest cost. It is a transformative model that shifts the focus to value, reduces the use of resources, and improves efficiency. VBHC fosters prevention, proactive management of chronic diseases, and integrated care along the full health pathways, leverages technology for efficiency, and engages patients in their care. It measures outcomes using standardized metrics and real-world data. Outcomes become the basis for decision-making. VBHC is inherently more sustainable than traditional models. Sustainable healthcare is a public health imperative and health is a strategic investment in our current and future well-being and prosperity.

Sustainable and Regenerative Economics: Making the World a Better Place – Žiga Turk

Sustainability is not stasis. It is continuity – the capacity for systems, societies, and civilizations to endure by evolving. It implies stewardship, not stagnation, care, not conservation, for its own sake. In the heart of Europe, the barren hills of the Slovenian Karst stand as testament to this paradox. Stripped of their ancient forests, they supplied the timber piles that underpin the city of Venice – a marvel of art and engineering that rose from the swamp and endures today. The Karst suffered, but Venice was built. This historical episode reminds us that progress has a price and leaves a footprint. Karst suffered but Venice prospered. The sum total is vastly positive.

From the age of environmental protection to the rise of the circular economy, we have deepened our understanding of what it means to live well within



planetary boundaries. Indeed, there are physical boundaries, and it looks as if humanity might run out of this or that. But there is one unlimited resource:

that which we do not know is infinite. This means that there is an infinite potential to innovate ourselves out of those boundaries, which humanity has been doing ever since.

The next stage of the evolution of environmentalism is the regenerative economy—an approach that aims not merely to sustain the world as it is, but to leave it better than we found it. It seeks to restore ecosystems, renew communities, and redesign industrial processes to generate net-positive outcomes.

CROSS-REIS (CROSS-disciplinary network for research excellence in Regenerative Economy Innovation eco-Systems) is a Horizon Europe project coordinated by the University of Niš and supported by the institutions across the Western Balkans and the EU. Its mission is to build scientific capacity and foster innovation eco-systems that support regenerative economic practices—including in construction, waste, urban

biodiversity, and value-driven entrepreneurship. The University of Ljubljana proudly contributes to this effort.

Within this agenda, the construction sector carries a unique burden and promise. As both a major emitter and a shaper of the built environment, it holds transformative potential—to not only reduce harm, but to design futures worth inhabiting. Our choices in materials, design, and value creation today will define the world of our children.

Perhaps this is more clearly seen in countries that are still lifting their populations out of poverty. In the words of President Xi Jinping, "People's aspirations for a better life will not change". It is this enduring human desire—for dignity, for security, for beauty and purpose—that should guide our scientific, artistic, and policy commitments in the decades to come. We should be moving forward, not standing still, and if this means cutting a few trees, so be it if the purpose is valuable.

Belt and Road Initiative (BRI) in the Context of Interaction and Interdependence between the EU and China Regions – Mariana Tian

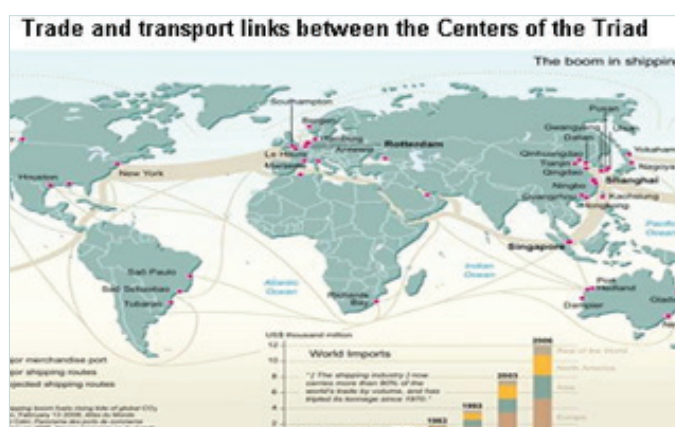
The introduction of the talk provided a brief overview of the construction of the new infrastructural foundation of the world economic order in the context of geopolitical rivalry.

The first part of the talk was based on a comparative analysis between the Chinese and European views on "regionalization" and "globalism", including the process of national and continental regionalization as a stage of the global process of globalization of economic and social life. The general principles, factors, and social, economic and cultural-religious criteria for the regionalization of the world as well as the main components of the globalization process were examined. The cultural and political peculiarities of the Asia-Pacific and American regions were indicated on the one hand, and on the other, it was clarified why Europe is a "Europe of the regions". Special attention was paid to the specifics and differences in the Chinese and European views regarding the development of "economic globalization" and "political globalization".

The second part of the report was devoted to the issues related to the Chinese "activity" in Europe and the EU's respective reactions to the Chinese Initiative, including the so-called "European Silk Road", the "Eurasian Trade Axis" and the "Three Seas Initiative", the alternatives in the Caspian and Black Sea region, the Azerbaijan and "North-South" corridors, the geographical and infrastructural advantages of Georgia, and above all, the attitude of the countries of the initiative for a pragmatic cooperation of "China-CEE" and the BRI.

The third part of the report was focused on the challenges and risks facing China's BRI at the present time (Trump 2.0). The object of the study was the impact of the side factors against the backdrop of the current global crises and political "complications" in the Balkan region—the processes of migration and urbanization and their resulting consequences, and the "hot" conflicts in Ukraine, the Middle East, and other parts of the world.

In the final part of the report, Bulgaria's place in the BRI was examined and an option for the country's inclusion in the global infrastructure projects through the "Bulgarian Black Sea Free Economic Zone" was presented. It was indicated to what extent Bulgaria is affected by the global world problems, how it will participate in solving them, and what hinders and what helps Bulgaria's full integration into the world community. A forecast was made of when and how this could happen.



Virtual Science and Art Exhibitions

SPECIAL SESSION 2



From left to right: Vesna Vučinić (Moderator), Pashington Obeng, Pu Chen & Yev Kravt

Origin of Humanity: Pan African Heritage Perspective – Pashington Obeng

This discussion focused on the Pan African Heritage Museum's (PAHM) contribution to the ongoing discourses on the Origins of Humanity and Civilizations. The analysis uses digital scholarship to draw attention to the Museum's varied and engaging exhibits. Africa: Origin of Humanity Exhibits, based on paleoanthropological, geoscientific and palaeoecological studies, contains renderings of the first humans who walked the Earth around 3.6 million years ago, as well as the evolution of our species, Homo Sapiens (wise thinking humans). The exhibits further address how early hominins adapted to their environments, creating civilizations and thus reflecting differences in innovation and technological advances. In this digitized space, visitors observe how early hominins used tools within macrofloral contexts.

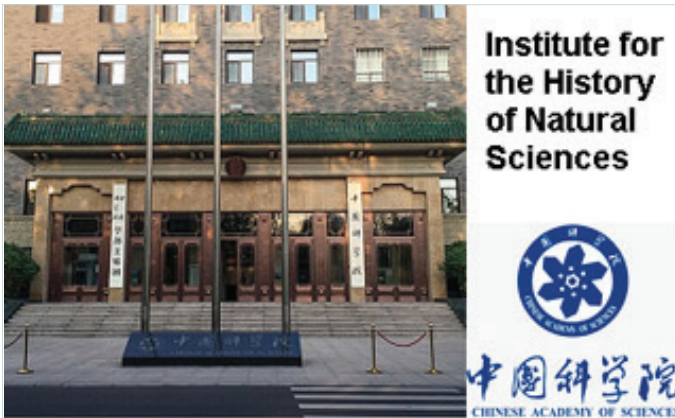


The digitized technology used fosters immersive experiences through the combination of 3D images, text, sound, and video renderings. The renderings unfold along virtual galleries of scaled dimensions to allow visitors to dive into a 360° environment, where there is no boundary between the physical and virtual worlds. In these exhibits, sensory experiences, sight, hearing, and reading connect and reconnect visitors through simulation and animation.

The digital museum is the prequel to the physical museum that is going to be built at Pomadze Hills, Winneba, Ghana, West Africa, at a strategic location 65 kilometers from the capital of Ghana, Accra, and 87 kilometers from major dungeons, castles, and forts in the Central Region of Ghana. While Winneba is not yet an archeological site, Pomadze Hills promises to be an important place to curate a Pan African Heritage eco-museum because of the socio-economic and cultural possibilities it will provide the local people and visitors to the site. This eco-museum is going to create job opportunities, using raw materials from its surroundings and thus allowing residents and visitors to enter the intersection of Pomadze Hills and the digitized museum to fully engage with and contribute to the mission and vision of the PAHM. In this context, the Museum's vision is made concrete in shaping the socioeconomic, stewardship, conservation, and sustainable use of the communities' tangible and intangible resources that promote indigenous and external businesses. These efforts are aimed at helping contemporary humans understand our interconnectedness and the origins of our species as humans and how we can forge a collective future. Insights from the PAHM point to how humans can continue to create a holistic, humane, and sustainable world for all humans.



Investigating Things and Extending Knowledge: A Visual History of Natural Science in China – Pu Chen



This exhibition offers a visually immersive journey through the history of natural science in China. Centered on the theme of "gewu qiongli" (investigating things and extending knowledge), the exhibition presents a curated selection of historical illustrations, scientific diagrams, manuscript sketches, annotated maps, and cross-cultural visual materials, highlighting how Chinese thinkers observed, represented, and understood the natural world.

With images drawn from classical works in astronomy, medicine, mathematics, agriculture, and engineering, the exhibition reveals the depth and diversity of China's scientific heritage. Through captioned visuals and concise interpretive texts, visitors are invited to explore how

image-making functions as a mode of inquiry and a means of codifying knowledge.

Rather than displaying artifacts, the exhibition foregrounds visual sources as historical documents and intellectual expressions—inviting reflection on the dynamic ways in which Chinese science developed across time and cultural encounters.

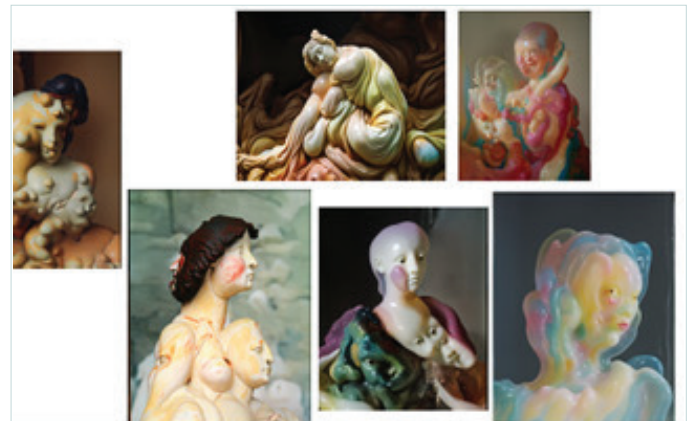
Doppelgänger: Reflections, Replicas and the Self in the Age of the Digital Double

– Yev Kravt

We live in a time of endless reflection. One body, many selves, physical and digital, authentic and fabricated, curated and corrupted, fractured across timelines, networks and platforms. The notion of the doppelgänger has haunted human consciousness for centuries, surfacing in ancient myth, in psychoanalysis, in cinema, and now in the very devices we keep in our pockets. Today, it is not merely a spectral figure or literary trope; it is a login, a bot, a dataset. A silent algorithmic mirror that watches, predicts and sometimes betrays.

The Doppelgänger exhibition, curated by Yev Kravt, brings together 12 digital artists, designers, architects and musicians whose practices engage with mirroring and multiplicity. Some approach these themes philosophically, others through a social lens. Some address it performatively, with an air of deliberate deceit. All of those featured here work on the same unsettling question: In a world where everything can be copied, what remains that is still real?

The exhibition unfolds entirely within an infinity space. Visitors enter through a specially designed virtual pavilion by Maria Touloupou; once inside, an infinity space reveals artworks that appear familiar, variations on known paintings, sculptures or architectural forms, yet they have all been warped by algorithmic processes



and machine learning. AI in many ways is a replica of human behaviour: it trains itself on our images, our words, our ideas, and our histories. At its core, it is the ultimate doppelgänger of all that has ever existed.

Throughout history and across cultures, the double has served as both aspiration and threat, representing our hopes as well as our fears. In myth, the twin can take the form of a divine companion, a ghostly spirit, a paranormal appearance or an embodiment of the soul. Though our interest in the double might be ancient, our new reality multiplies the self by design, across social media, virtual worlds and AI-driven platforms.



Contributions of Social and Humanistic Sciences to Sustainability

SESSION 2.1



From left to right: Carlos Álvarez Pereira (Moderator), Nemanja Mrđić, Feng Jiang, Robert Costanza & Tibor Várady

Viminacium from a Roman Capital City to the Leading Sustainable Archaeological Park – Nemanja Mrđić



Twenty centuries ago, Viminacium was established as the military stronghold with civilian settlement that developed to become the capital of the Moesia Superior province. Today, after decades of systematic and careful excavations, we celebrate twenty years of forming the largest and most complex archaeological park in Serbia. The Institute of Archaeology with its two spin-off companies was formed not just for protecting the ancient ruins in the Archaeological Park, but for further development of a large congress and most advanced research center to manage, protect, and present the ancient Roman heritage. By involving into the UNESCO transnational serial nomination of the Frontiers of the Roman Empire, Viminacium has positioned itself among the world's most famous and renowned sites leading in

the presentation of cultural heritage. We tend to be a backbone of the future local tourism and the central point of two huge Serbian cultural routes: the future UNESCO world heritage site The Danube Limes (450 km) and the Road of the Roman Emperors in Serbia (600 km).

Festivals, concerts, and children camps are all parts of the continuous annual agenda. Different events with long-term tradition help in reaching all social and age groups. Scientific and sport camps are an investment into the future to educate children who will continue our mission related to cultural heritage. Our team is also leading in education of all generations with innovative and attractive approaches.

With strong and well-developed visitor infrastructure and more than 100,000 tourists per year, Viminacium has also taken a role in the regional and local economical sustainable development. Apart from 35–40 scientific researchers, almost 100 families live of the work related to the Archaeological Park in different aspects. Engagement of the local population is crucial for protection, understanding, and exploitation of the cultural heritage. Multiple ongoing international projects and income from the tourism industry provides sustainability and huge potential for the future development. Twenty years of steady development (from 2006) mark a huge experience that can now be applied to development of new archaeological parks.

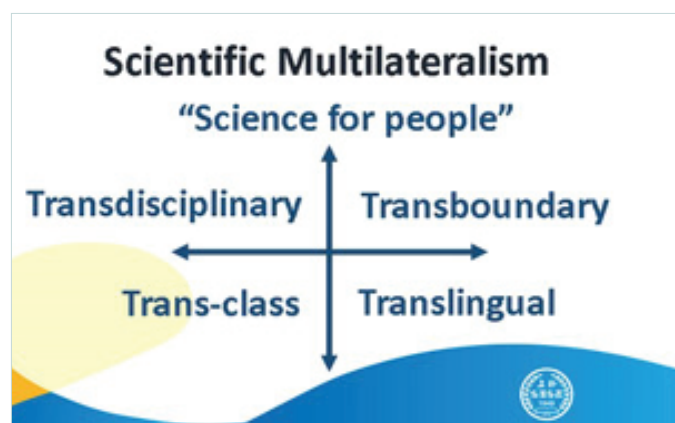


Multilateralism – Feng Jiang

The resurgence of geopolitics worldwide has eroded the ideals and institutional frameworks established by nations after World War II to promote peace and development through cooperation. Conflicts and wars are increasing, subjecting global peace to its most severe postwar challenge. Human production and activities have caused unprecedented damage to the natural environment, with climate change threatening the very foundation of human existence. New technologies, particularly digital and artificial intelligence, now deeply intervene in and control human behavior, destabilizing the social fabric upon which humanity depends.

Geopolitics, climate change, and artificial intelligence constitute three interconnected global threats to human survival, which no single nation or society can adequately address alone. Governments and societies worldwide must cooperate in response. Multilateralism is therefore the imperative path forward.

To this end, we must strengthen the UN-centered global governance system. While enhancing its political and security functions to advance consultation, collaboration, and benefit-sharing, we must also



prioritize its societal dimension. We must recognize that international order is built not only by states but also by societies. While respecting national sovereignty, the UN should cultivate global citizenship consciousness to forge worldwide social consensus in overcoming the destructive impacts of geopolitics, climate change, and AI.

The UN belongs not only to governments but equally to societies. Structured channels for societal participation must therefore be institutionalized.

Creating a Sustainable Wellbeing Future for Humans and the Rest of Nature

– Robert Costanza



The world faces a convergence of social, environmental, and economic crises, which have a common cause: our addiction to an outdated development paradigm based on fossil-fuelled GDP growth at all costs. A different approach is needed based on the goal of the wellbeing of the entire integrated system of humans embedded in the rest of nature. Creating this future will require a credible system to replace reliance on GDP growth with a more comprehensive, dynamic understanding of the links among the many contributors to sustainable and inclusive human wellbeing and the wellbeing of the rest of nature. Central to this is the recognition, modelling, and valuation of the multifaceted contributions of natural

and social capital. It will also require acknowledging the extent of our lock-in or addiction to the current system and the appropriate strategies, interventions, and therapies needed to allow the transition to a sustainable and inclusive wellbeing economy and society.



International Law: Between Sustainable Reality and Sustainable Phrases

– Tibor Várady



Establishing a better reality is a crucial goal of international law. An important part of the task is a true understanding of realities. Human rights are properly expressed in international treaties, but there is a permanent danger and a lasting trend to perceive principles as phrases, and to divorce them from realities. Patterns of slogan-oriented thinking, born in ideologies, may survive the ideology itself. Positive inspirations might also turn into a swing detached from realities. There are strong trends aiming to push truly important topics (like affirmative action, the woke movement, or modern slavery) to one or other side of ideological controversy.

Threats to human rights are changing, and solutions can only be crafted after rightful confrontation with present threats. It is critically important to create a true perception of human rights, including rights of minorities and rights of socially unequal people. The phenomenon of modern slavery that has gained some ground must not be disregarded. Equality can only become reality if its concept includes an equal opportunity to maintain cultural and religious differences—and to overcome social differences. Sustainability is a true goal—but it may also get turned to a phrase. One has to look at human rights from a close distance, and protection can only function if our efforts are focusing on present menaces.

International Decade of Sciences for Sustainable Development, 2024–2033



On August 25th 2023, the United Nations General Assembly proclaimed *the International Decade of Sciences for Sustainable Development* (IDSSD), from 2024 to 2033. IDSSD offers a unique opportunity for humanity to fully harness the power of science in advancing sustainable development and securing a safe and prosperous future for everyone.

UNESCO, entrusted as the lead agency, is developing and sharing a clear vision and dedicated mission of IDSSD in close consultation with Member States, potential partners from other UN agencies, International Science Council, scientific unions, and science academies. One such partner is the Earth-Humanity Coalition (EHC), consisting of member organizations involved in knowledge co-production for sustainability—international scientific unions, science academies, laboratories, universities, research institutes and NGOs among others. EHC is a tool that will transform the way sciences and all knowledges are used to contribute to sustainable development.



SESSION 2.2



From left to right: Dragan Đuričin (Moderator), Dragan Simeunović, Nebojsa Nakicenovic, Alessio Surian & Fadwa El Guindi

Introduction – Dragan Đuričin

People understand what scientific achievements are, how they have been created, and how to interpret and implement them. Basic science is crucial to navigate changes of progress in our daily lives, from climate emergency to vaccines, from gene-editing to artificial intelligence tools and applications. The mission of social, humanitarian, and behavioral sciences is complementary—to create the context and play the catalyst role in this endeavor. No doubt that these days the troubling trends of "polycrisis" are spilling over into every corner of the global economy and society. The construct "polycrisis" explains that separate crises (economic, social, climate, biotic, geopolitical, psychological, etc.) simultaneously emerge, and interact and amplify each other.



From the start of economic neoliberalism, almost a half-century ago, until today, we have witnessed one major crisis per decade and almost 500 crises of smaller intensity in the whole period. Economic systems are exposed not only to the structural imbalances by design, but also to the negative impact of external asymmetric shocks like climate change, microbe mutations, geopolitical disputes, and echo chambers inspired destruction of social cohesion. Due to massive militarization, technological breakthroughs are perceived as a threat, rather than as an opportunity. So, humanity is currently hanging on a thread, suffering from the simultaneous pressures of the so-called 2WMD—the Weather of Mass Destruction and the Weapons of Mass Destruction.

The topic of this session is mutual interrelationships between basic and social sciences (economics, psychology, political science, and anthropology) as a prerequisite for the current crisis mitigation and sustainable development.

Politics as the Art of Illusion – Dragan Simeunović



Illusion is necessary to make ones live easier and happier. The principle of this necessity exists both at the individual and general level.

Illusion is a necessary part of politics as well, and illusionism is one of its favorite means. The power of illusion stems precisely from man's constant need for it, which politicians often abuse to achieve their own, rather than general, social goals. Through the concept of the common good, set in such a principle, one enters the field of political illusions and manipulations.

Due to a discrepancy between what people really want from the truth and what they really get from it, there is a wide space in the political sphere for the creation of political illusion through lies. The difference between what is proclaimed as an ideal and what citizens get in the distribution of power leaves room for politics as an art of illusion.

Integrated Science and Research for the Benefit of the People and the Planet

– Nebojsa Nakicenovic

Monumental challenges are facing the world, from wars of unprecedented destruction, human suffering due to exclusion, economic crisis, and geopolitical disruption that require evidence-based policy advice more than ever before. Scientific advice needs to be systemic as these formidable problems facing humanity require approaches that are inter- and trans-disciplinary, that are integrated and holistic. Yet science has disciplines, including all sciences from humanities, medicine, and engineering to law.

Arguably, science has made essential contributions to human progress ever since the emergence of the Industrial Revolution. Human development was impressive, global economy increased 100 times but also carbon dioxide emissions, some 30 times, in the two centuries. As a result, global-mean temperature increase exceeded 1.5°C last year. Particularly impressive was the development during the past five or so decades, often called the period of the Great Acceleration, that improved life of many but also left billions behind without access to even basic needs while increasing pressure on planetary systems, like climate change or biodiversity loss, so that we truly live in the Anthropocene.

Thus, science is needed more than ever. At the same time, trust in science is eroding and political cycles are short while the complex problems facing humanity need long-term vision and strategy. Science should be a bridge between self-centered and short-term gains and interests, and what needs to be done and how to achieve safe and just future for all.

Scientific advice must be evidence-based and peer-reviewed, open, inclusive, and independent, to avoid



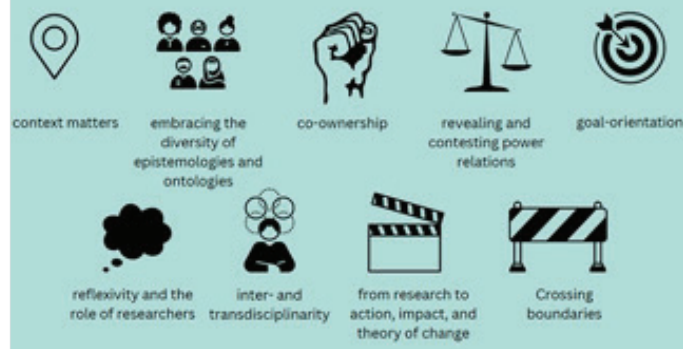
self-interests. This means that science needs to be transformed as well. For example, science needs to speak with one language that is easily understandable; scientific controversies and critical discussions are essential part of the evidence-based research, but advice needs to be simple, Hungarian-American economist Kaldor talked about Stylized Facts and Einstein said that things have to be as simple as possible but not simpler than that. Should this not be the case indicates that we do not understand the problems.

The safe and just future for all can be achieved through disruptive and inclusive change about people and societies, and in values and behaviors leading to a powerful transformation along with improving human capacity through the digital revolution and the integration of innovations into new systems and human activities. An essential priority should be to develop science, technology, and innovation roadmaps to better understand the potential benefits and dangers of transformational change for the people and the planet.



A Cultural-Historical Approach to Learning and Sustainability – Alessio Surian

Key characteristics of Co-production



The presentation was a review of current findings concerning knowledge co-creation and issues of cultural diversity in sustainability education and planning for sustainability studies. It provided data from the case studies focusing on phenomenological approaches to explore the educational conditions that enable students and planners to relate to their own territories by sharing, co-creating knowledge and fostering their agency to address current socio-ecological crises. Examples included specific methods such as Collective writing and Photovoice each as a "process through which people can identify, represent, and enhance their community

through a specific photographic technique" (Wang & Burris, 1997, p. 374). Participants were encouraged to share their stories by taking photographs and commenting on them orally and in writing. It involved selecting images that reflect both local challenges and local resources. Today, it is adaptable to the digital environment and to the use of short videos as well. It is argued that education projects that focus on social, political, and environmental issues can benefit from adopting a critical perspective on place, i.e., characterised by decolonisation and reinhabitation (Scully, 2012; Tuck et al., 2014).

Human Security Relativized – Fadwa El Guindi

Upon examining coverage of events of global import, a pattern emerged in which focus was more or only on what some refer to as the Global North leaving out the Global South. Events dealing with Europe or the West in general get wide mainstream attention, whereas other events of significance are only dismissively mentioned even by thought organizations in talks and conferences. Africa, Arab and Islamic East, and Asia are left out. Even as some promoted ideas such as human security, they followed the same pattern. So, the speaker wrote an article analyzing current political events and included equally significant yet neglected global events. She described the process as relativizing human security, that is, broadening it and extending its canvas, not by words but by analysis, to cover equally significant matters happening in the Global South.

The world today is undergoing a dramatic change in character and form of its alignments. There is BRICS not just G7, there is China not just the United States, there is Russia not just Europe. And there are the peoples of the Middle East and Africa, rich not only in natural resources but in civilizational history and identities of dignity. Therefore, if we adopt such notions as Human Security for All we might as well include All.

Anthropology is not quite "social science", i.e., quantification and measurement. As Albert Einstein put it: "Not everything that counts can be counted and not everything that is counted counts". Nor is it not quite



"natural science", experimentation, and predictability, although many field projects included these. It tends to be classified as Human Science, although not entirely about humanism, which, as Edgar Morin put it, there is more than one humanism. Anthropology developed as a multi-disciplinary field for studying humankind, both uniform (we are one species) and diverse (in cultural traditions). Its methodological tool is unique, characterized by a particular perspective that allows for exactly what it purports to do in order to study humankind as a whole—a depth in its gaze and breadth through relativism. This is how the speaker as an anthropologist sees the world, as a whole, rather than a bifurcated globe of powerful and powerless—a point of relevance to UN concerns and to the focus of this world conference.

Contributions of Arts to Sustainability

SESSION 3.1



From left to right: Vesna Vučinić (Moderator), Vesna Goldsworthy, Maja Herman Sekulić, Mario Petrucci & Anni Kumari

Iron Curtain: The Novel as an Analytical Form – Vesna Goldsworthy



Although ostensibly a work of historical fiction, set in the mid-1980s and with a plot divided between Margaret Thatcher's Britain and an unnamed Soviet satellite state, the novel *Iron Curtain* (W. W. Norton, 2023) was widely analysed for the ways in which it reflects current East-West relationship and mutual perceptions. In a feature dedicated to the work, *The New Yorker* spoke of *Iron Curtain*—selected as one of its best books in 2023—as revitalising and updating the Cold War émigré novel. While using it as a starting point to investigate the ways in which fictional form simultaneously performs and interrogates national stereotypes and political orthodoxies, this presentation also attempted to look at

Iron Curtain in correlation with the author's academic work, especially as it relates to images of East and West in *Inventing Ruritania: Imperialism of the Imagination* (Yale University Press, 1998).

The Digital Galaxy – Maja Herman Sekulić

When the globally relevant poet, novelist, essayist, critic, and translator, Maja Herman Sekulić, wrote a revolutionary treatise on the transition from *Gutenberg* to *Digital Galaxy*, it was purposeful to place her ideas in a wider theoretical constellation that included indispensable thinkers such as Adorno, Foucault, and McLuhan, according to professor Ratko Božović in his Introduction to the book.

In the book *Digital Galaxy*, the author did not agree to the absolute dominance and the darkness of the digital labyrinth. In an explosion of critical attitude in relation to digital ubiquity, the author is in clear rivalry with the artificial fabrication of media communication and its indoctrination. Her thoughts flicker in the solitude of creative self-determination. The creativity is, in her analytical opinion, a prerequisite for the expression of individual talent. It is also a prerequisite for the beauty and joy of poetry-making and artistic expression in general. Maja Herman Sekulić believes that art, in terms of value, is superior to the spectacular miracles of the technical mind. Without art, there is neither beauty of the world nor the mystery of human being, as an imaginary being.

In 2005, Maja Herman Sekulić became the first Serbian author whose novel *The Silk King* was published in electronic form, in English, thus the first writer from Serbia who experienced that her book became globally available, which is surely the most advantageous side of electronic editions. Despite that, her love for the printed book did not wane, on the contrary, it grew stronger!



Some things have objectively changed since the 1st edition of her *Digital Galaxy*, in 2011, and in the 3rd edition of the book, in 2023, she added a chapter on AI, but stayed firm with her conviction that every real revolution brings with it both positive and negative phenomena, as she tried to show there.

Art and Sustainability: Salvation and the Unholy Trinity – Mario Petrucci

At their very best, art and poetry have acted as cultural guardians, sustaining us throughout the ages in our growth towards awareness, alertness, and engagement. At this critical juncture in human history, what do they now offer us in our efforts to enact profound eco-friendly transformation at the species level? The first half of this presentation provided essential environmental and psychological context; drawing on nearly half a century of research, teaching, debate, and artistic practice, Petrucci identified and isolated a triad of core systemic causes for the global inadequacy of our environmental response thus far. Together, these three ubiquitous obstacles to eco-friendly change go a long way to explaining, with efficiency and penetration, why it is that modern homo sapiens seems endlessly beset by delay, denial, and addiction, in spite of the manifest urgency of our eco-predicament. Petrucci introduced us to what he called "the unholy Trinity": Bad Memes, Framed Questions, and Radical Inertia. He also clarified, in simple yet stark terms, what may be the foremost cause for ongoing "eco-lethargy", understood as that frequent and often intractable sluggishness (from individual to international level) in addressing the eco-crisis deeply enough, quickly enough. Petrucci also questioned whether the very term "sustainability" is itself quagmired in the unholy Trinity. In the attempt, then, to mobilise sometimes difficult but essential



socio-economic renewals, art/poetry can not only be our rhetorical ally, but also provide a means to convert resignation and doom into hope and positivity, a proposition the second part of the talk explored and substantiated. What can art reasonably contribute to our evolving conception of ourselves and our endangered ecological and geopolitical systems, and what kinds of art are most likely to succeed? Art that challenges, rather than merely entertains, is one key to a workable answer. Whether it be art's knack for defamiliarisation or an artistically propelled "consciousness reboot", Petrucci reflected on a sometimes overlooked cultural cavalry charge.

Spirals: The Structural and the Spectacular across Mathematics and Painting

– Anni Kumari



spiral in combination with other numeric sequences and algebraic equations, we can generate a fascinating range of logarithmic spirals, such as the Golden spiral, the Fibonacci spiral, the *Spira mirabilis*, etc. Many of these spiral variants have been associated with the compositions of paintings by some of the great masters and it would be interesting to see if they could be applied to some extent to the abstract paintings of modern and contemporary artists like Hilma af Klint, Louise Bourgeois, Bridget Riley, and Julie Mehretu. In recent times, there has been popular interest in locating and plotting prime numbers on spiral grids and writing algorithms that generate specific kinds of patterns based on the Sacks spiral, the Ulam spiral, and the Prime Phyllotaxis spirals. These spiral pathways have an inherent beauty, rhythm, and spiritual energy that has drawn the attention of contemporary artists as a tool to convey responses about existential realities, paradoxes, and absurdities.

Spirals occur everywhere in nature and have been studied by mathematicians and artists for their peculiar properties and visual allure. They can appear both static, as a defined curve on a canvas or in a mathematical equation, as well as dynamic, suggesting a process of unfolding or growth. This duality allows for a rich range of interpretations in mathematics and painting.

If we look at simulations of Albrecht Durer's construction of an Archimedean spiral and his study of a conical helix based on it, we realize the importance that artists have laid on mastering mathematical thinking as a way to guide their artistic instincts. By using the Archimedean

SESSION 3.2



From left to right: Mirjana Nikolić (Moderator), Vera Milanković, Irena Živković, Áine Clarke & Aleksander Zidanšek

The Song Was Our Salvation – Vera Milanković



Serbia is perhaps an example of cultural resilience through centuries of isolation during the Turkish occupation, by passing on from generation to generation the oldest tradition of Serbian epic poem/song¹ and singing, as a means for maintaining national customs, faith and language. That was of crucial importance for Serbian existence, survival of national identity and culture. The submissive, seductive technology, dominating the vast majority of the world culture, depends on a mediator—electronic device. This is evident in Serbia especially since the spring of 2020. Gradually our senses of hearing and touch are being dominated by vision. Digital technology has been gradually replacing analogue

technology, resulting in "perfection" as opposed to spontaneity.

Singing, as an important part of Serbian identity, heritage and tradition, initially within a family as the basic social unit and further the whole nation through education, is being jeopardized on one hand by market and media, and on the other by lack of awareness of its importance. Education has an important duty: to teach the children how to teach their parents to take part in singing with all its emotional, aesthetic and ethical benefits.

¹ In the Serbian language, song means both poem and song.

Applied Arts and Materials Science – Irena Živković

"A scientist is someone who uses creativity to discover; an artist is someone who uses discovery to create, and thus the circle is creatively closed."

– Alistair Crombie

The interconnection between science and art, while often seen as innovative in the modern age, has in fact been present throughout the entire development of human civilization. The close relationship between these two essential fields began at the dawn of human history and has remained a constant throughout time. It is well known that Leonardo da Vinci's entire body of work blended artistic expression with scientific inquiry, defining the spirit of the Renaissance. Similarly, Galileo, both an artist and a scientist, lived in the era spanning from Michelangelo's death to Isaac Newton's birth. He symbolized the transition between two major European intellectual movements: from the world of the rational, constructive artist to that of the creative,



innovative scientist. Many later discoveries followed this same principle. Photography, for example, as well as the development of polymer materials, are both products of this interplay. Step by step, we have witnessed a growing mutual development and interaction between materials science and the applied

arts. Today, numerous artworks incorporate advanced materials such as nanomaterials, smart materials, or biodegradable materials. Sustainability has become a key issue and can serve as a vital bridge between art and materials science. When we narrow our focus to the applied arts, such as fashion design, industrial design, ceramics, textiles, interior architecture, or scenography, the connection to materials science and sustainability becomes even more direct and practical. It is a space where aesthetics, function, and materials literally work in harmony.

A sustainable approach in the applied arts can follow several developing directions. These include: creating artworks using biodegradable or recycled materials, developing sustainable materials through artistic experimentation, or engaging in conceptual art that critiques the current system. Research into biodegradable materials has significantly influenced industrial and product design by promoting a circular approach. Products are now designed to be easily disassembled, repaired, or recycled, while still maintaining performance and minimizing ecological impact. Numerous architectural projects also embrace sustainable goals by integrating innovative materials, such as combinations of traditional and modern

elements. Examples include walls made from earth and fibres, biodegradable components, 3D-printed structures, and sustainably designed interiors and furniture crafted from responsibly sourced wood, recycled plastics, or hempcrete. Art installations increasingly use recycled materials—metals, glass, textiles, thermoplastic polymers—or even repurpose waste as an artistic medium, a practice known as "trash" art or eco-sculpture.

Artistic experimentation also often takes place outside scientific laboratories, in home or studio environments. Examples include bioplastics made from starch, glycerol, alginate, or mycelium (mushroom material), which can be moulded into specific shapes. In textile and fashion design, natural dyeing methods are becoming more common, including the use of plant-based dyes, bacterial and microorganism dyeing, or even sunlight-powered dyeing processes. Textiles are also being developed that change shape or transparency in response to the human body. Ultimately, art has always served as a means of raising awareness. It continues to do so today by conceptually criticizing existing systems and informing audiences about the ecological footprint of materials, resource exploitation, and ethical issues in production.

The Power of Visual Storytelling: Co-Creating a World of Three Zeros – Áine Clarke



This talk traced Azimut Company's evolution from commercial production to purpose-driven documentary filmmaking, culminating in a feature length documentary: "A World of 3 Zeros. Zero Net Carbon Emissions. Zero Poverty. Zero Unemployment". The presenter revealed how skills perfected in high-stakes advertising—emotional connection, simplified messaging, and flawless execution—were redirected toward amplifying social entrepreneurs' vital work.

Central to the presentation was the challenge of bridging trust gaps between knowledge creators (scientists and artists) and implementers (policymakers and communities). The speaker illustrated this through three powerful examples: how Hollywood transformed public

perception of medical professionals, how innovative Formula 1 storytelling blended fiction with reality, and how clear visual communication about the ozone layer facilitated unprecedented global cooperation through the Montreal Protocol.

Drawing inspiration from Nobel Peace Laureate Professor Muhammad Yunus's approach with Grameen Bank, the documentary embraces true co-creation with communities rather than imposing external solutions. The film showcases diverse initiatives worldwide—from forest restoration to waste transformation and accessible financial services—united by their community involvement and prioritization of impact over profit. This reflects the Conference's vision of science and art as complementary methods of inquiry addressing complex, interconnected challenges.

The film has won 45 awards at film festivals across 25 countries and received academic accreditation for educational purposes in secondary schools and universities. Its distribution strategy follows the nature's model—creating content attractive enough that others naturally spread it, because together we are stronger.

The speaker emphasized the documentary's educational potential, aiming to introduce it in educational institutions globally, in multiple languages, as a catalyst for dialogue about economic alternatives.

They acknowledge global inequities while emphasizing shared responsibility, deliberately amplifying diverse voices from changemakers worldwide.

The presentation concluded by positioning "A World of 3 Zeros" not as a finished product but as the beginning

of a vital conversation about co-creating a sustainable future through trust-building and collaborative action.

One of the principles of social business is "do it with joy"; it should remind us that we are working towards sustainable solutions for the common good.

New Imaging Methods and Innovative Development of Students' Competencies

– Aleksander Zidanšek



The Jožef Stefan International Postgraduate School combines excellent science with innovative educational methods. In this contribution, best practice examples from the Slovenian Research and Innovation Agency (ARIS) program P2-0348, New Imaging and Analytical Methods, and from the Erasmus+ KA220 project, IGNITE – Inspiring the Next Generation of Innovators through Technology and Empathy, were given.

An AI-based system for measuring and developing the competencies was presented along with its applications in the doctoral study program. The results of these applications indicate that students' performance depends

strongly on their level of motivation. Therefore, several strategies were tested for improving the motivation, and the most important findings were presented.

Additionally, the role of AI and large language models in university education were discussed, and some recommendations presented.

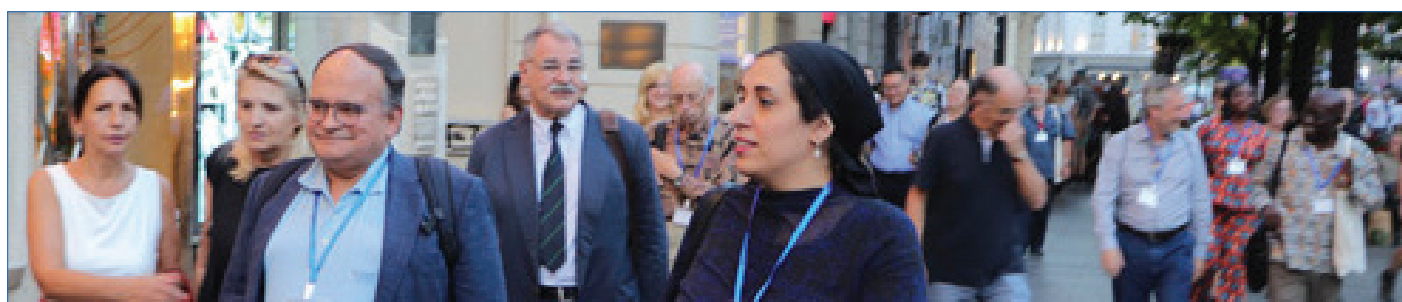
World Conference on Basic Sciences and Sustainable Development September 19–22, 2022, Belgrade, Serbia



Following the initiative of the Union for Pure and Applied Physics (IUPAP), the General Conference of UNESCO proposed in November 2019 to proclaim the year 2022 as the International Year of Basic Sciences for Sustainable Development (IYBSSD 2022). The proposal was based on the facts that since 2005 six international years of basic sciences had been organized and that in September 2015 the United Nations General Assembly endorsed the resolution *Transforming Our World: The 2030 Agenda for Sustainable Development*, which included 17 Sustainable Development Goals, most of which are clearly connected to basic sciences. The main aim of IYBSSD 2022 was to mobilize national, regional, and global scientific institutions to clearly demonstrate to the public and especially to political and business leaders worldwide how basic sciences are helping us to establish an inclusive, balanced, and sustainable development of the planet. The main message was that basic

research is the important initial link in the chain of research and development that can, only as a whole, make nature and society sustainable.

One of the main events within the series of events was the *World Conference on Basic Sciences and Sustainable Development*, held from September 19–22, 2022 in Belgrade, Serbia.



Concluding Session: Interfaces between Science, Art, and Society

Science & Art Interfaces for Peaceful Regenerative Ecocivilization – Paul Shrivastava



There is significant societal agreement on the problems of the Anthropocene—depletion of natural resources, climate change, environmental pollution, biodiversity loss, intercultural conflicts, forced migrations, increasing conflicts, and human inequality and inequity. These are resulting in increased wars and human insecurity.

Peace is a precondition for addressing these challenges. But we are going in the wrong direction with four active wars (in Ukraine, Gaza, Iran, and Pakistan), and rearming the world towards 4% to 5% of global GDP.

Integration of Sciences and Arts to foster holistic understanding of planetary challenges is vital and urgent. We are often presented with a false duality of Science and Art as being opposing ways, as objective vs. subjective, left brain vs. right brain, as two separate cultures. Both Sciences and Arts are fragmented ways of understanding a holistic human-nature oneness. Both are contextualized and shaped by economic sponsorship forces, perceived social needs, and political purposes. We need both to address human challenges of the Anthropocene and minimize conflicts.

We propose a unifying perspective of Planetary Peace which implies peace within oneself, peace with others, and peace with nature. Systems for building such peace are guided by principles of "regenerative" living and economies, and working towards building "ecocivilizations".



For Sciences-Arts-Society interfaces to deliver on sustainability and peace—practitioners in these communities need to work with each other across disciplinary lines. Interfaces between sciences, arts, and society can be in the form of creative content, and individual and institutional practices. On content, we need to move from inter- and multidisciplinary towards Transdisciplinarity—trans (meaning beyond), beyond inquiry to action; beyond individual knowledge production to co-production with stakeholders, to impact; beyond our own expertise bubbles to mass action. Individual and institutional practices must move from serving corporate, government interests to serving public interest, and work for peace and sustainability.

Resourcing the Integration of Sciences and Arts in a time of fiscal austerity: Funding remains a major barrier for both Sciences and Arts. Much focus in the past has been on raising funds or finding money to do things that scientists and artists do. We encourage moving towards new business models for Sciences & Arts institutions. Not just get money to do things but doing different things to generate new value for stakeholders and society. Let us reimagine Universities, Museums, and Cultural Centers as community problem solvers. If we solve real problems, funding will follow.



Bringing the Divides of Academic Science Domains and Non-Academic Knowledge Systems – Steven Hartman



The principles and strategic priorities of the BRIDGES Coalition in UNESCO's Management of Social Transformations programme were framed over four international workshops that brought together more than 50 institutional and organisational partners from around

the world during the Coalition's establishment process in 2019–2021. This effort built upon the premise that the humanities, the arts and the full range of social sciences must play a central role both in strengthening sustainability science research and in forwarding educational and societal action for sustainability.

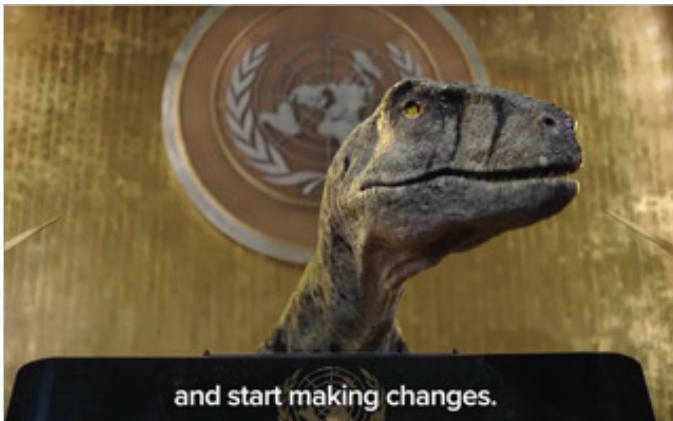
In the context of the more comprehensive span of sciences and STEM disciplines within our academic institutions, the full breadth and depth of knowledge and insight available within social and human sciences—on questions of economic, social, cultural and environmental sustainability—must be understood, now more than ever, as indispensable to meeting the Earth's most pressing challenges in the 21st century. Local, national, regional and global policy and governance solutions demanded by the great socio-ecological challenges facing our children and their children's children cannot be achieved without drawing effectively on these vital domains of knowledge, creativity and ingenuity, both within and across all geographic scales. The anchoring of a humanities-centered sustainability science initiative (BRIDGES) in one of UNESCO's intergovernmental science programs (MOST), launched officially in 2021, underscores the need to mobilize historically under-resourced



humanistic contributions to the natural-science and economic-science research domains long at the center of the field of sustainability science. The BRIDGES Coalition is now developing a portfolio of place-based demonstration projects around the world, carried out in transdisciplinary collaborations with specialists from academic disciplines across the spectrum of the arts, humanities, social sciences, natural sciences and technical fields, and in collaboration with local stakeholders (traditional and indigenous communities, youth and other non-academic participants) as co-equal partners in sustainability research, education and community action for transformative change. This overarching approach is central to the BRIDGES mission, and critical to the unique contribution BRIDGES brings to the UN Decade of Sciences for Sustainable Development and to The Earth-Humanity Coalition, of which UNESCO-MOST BRIDGES is a charter steering group member. This talk spotlighted some of the hallmarks of these contributions, highlighting their underlying rational and promise.



Reliable Knowledge as the Reconciliation of Art & Science – Garry Jacobs



Solving humanity's complex challenges—like climate change, inequality, and conflict—requires more than just scientific knowledge. The founders of the World Academy of Art and Science (WAAS) understood that science alone, despite its immense achievements, cannot solve complex social problems without the complementary insights of the arts, values, and human consciousness. Addressing today's global challenges requires integrating the objective rigor of science with the subjective insight of the arts. Founded on this principle, WAAS promotes a holistic approach to knowledge that values creativity, ethics, and emotional

resonance alongside empirical evidence. Reliable knowledge must be both objective and subjective. Scientific analysis provides essential facts, but values, emotions, and intuition often expressed through art are critical to understanding human motivations and inspiring action.



Reliable knowledge must be both intellectually valid and emotionally compelling, grounded in universal human values. Citing examples drawn from the fields of finance, governance, and climate change, this talk illustrated how art and science, when united, can lead from thought to transformative action. We need a transdisciplinary and value-based approach to knowledge—one that connects science, art, philosophy, ethics, and policy. Reliable knowledge must be actionable, emotionally resonant, and ethically grounded, capable of guiding humanity toward a sustainable and equitable future. The integration of art and science or rational thought and intuitive creativity is essential for creating knowledge that is comprehensive, transformative, and capable of bringing about a paradigm shift in global social development.



Closing Session

Nebojša Nešković



This is the last session of the *World Conference on Science and Art for Sustainability*. We have heard many very interesting, rich, and inspiring talks and discussions, and enjoyed three artistic happenings within the program of the event. In the upcoming two months, we will prepare two documents on *the Conference* to be disseminated throughout the world: a detailed report on the event, to be prepared by WAAS, and *the Belgrade Declaration on Science and Art for Sustainability*, to be prepared by the Program and Organizing Committee of the event and supported by UNESCO. Let me now thank very much all the moderators and speakers at *the Conference* for their extraordinary efforts and contributions to it. Let me also thank very much the funders of the event, primarily the

Alliance of National and International Science Organizations for the Belt and Road Regions, and then WAAS, the Serbian Academy of Sciences and Arts, PSP Farman Holding, and Jeff Ubois and Smiljana Antonijević. I think we have jointly made a step towards a series of similar events worldwide, promoting direct cooperation of scientist and artist for sustainability, security, and peace.



Conference Moderators and Speakers

MODERATORS

1. **Michel Spiro**, Chair, Steering Committee, The Earth-Humanity Coalition (EHC); Past President, International Union of Pure and Applied Physics (IUPAP)
2. **Goran Milašinović**, Director, Pacemaker Center, University Clinical Center of Serbia, Belgrade; President, Commission of Serbia for Cooperation with the United Nations Educational, Scientific and Cultural Organization (UNESCO)
3. **Nebojša Lalić**, Secretary General, Serbian Academy of Sciences and Arts (SASA); Governing Board, Alliance of National and International Science Organizations for the Belt and Road Regions (ANSO)
4. **Vesna Vučinić**, Faculty of Philosophy, University of Belgrade, Serbia; World Academy of Art and Science (WAAS); Former Chair, World Council of Anthropological Associations (WCAA)
5. **Carlos Álvarez Pereira**, Secretary General, The Club of Rome (CoR); World Academy of Art and Science (WAAS); Steering Committee, The Earth-Humanity Coalition (EHC)
6. **Dragan Đurićin**, Advisory Committee for the Implementation of the International Decade of Sciences for Sustainable Development, United Nations Educational, Scientific and Cultural Organization (UNESCO); World Academy of Art and Science (WAAS); Governing Board, Serbian Chapter of The Club of Rome (SC CoR)
7. **Mirjana Nikolić**, Rector, University of Arts in Belgrade, Serbia

SPEAKERS

1. **Menattallah Elserafy**, Basic Sciences, Research, Innovation and Engineering Section, Division of Science Policy and Capacity Building, Natural Sciences Sector, United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris, France
2. **Michel Spiro**, Chair, Steering Committee, The Earth-Humanity Coalition (EHC); Past President, International Union of Pure and Applied Physics (IUPAP)
3. **Janani Ramanathan**, Secretary General, World Academy of Art and Science (WAAS); Governing Council, UNESCO-MOST BRIDGES Coalition (BRIDGES)
4. **Carlos Álvarez Pereira**, Secretary General, The Club of Rome (CoR); World Academy of Art and Science (WAAS); Steering Committee, The Earth-Humanity Coalition (EHC)
5. **Nebojša Lalić**, Secretary General, Serbian Academy of Sciences and Arts (SASA); Governing Board, Alliance of National and International Science Organizations for the Belt and Road Regions (ANSO)
6. **Sukit Limpijumnong**, President, Alliance of National and International Science Organizations for the Belt and Road Regions (ANSO); President, National Science and Technology Development Agency, Pathum Thani, Thailand (pre-recorded video)
7. **Zhijun Yi**, Deputy Executive Director of the Secretariat, Alliance of National and International Science Organizations for the Belt and Road Regions (ANSO)
8. **Garry Jacobs**, President and Chief Executive Officer, World Academy of Art and Science (WAAS); Chairman of the Board of Directors and Chief Executive Officer, World University Consortium (WUC); The Club of Rome (CoR)
9. **Borko Furht**, Florida Atlantic University (FAU), Boca Raton, USA; Director, National Science Foundation (NSF) Industry-University Cooperative Research Center for Advanced Knowledge Enablement, FAU
10. **Gian Francesco Giudice**, Head, Theoretical Physics Department, European Organization for Nuclear Research (CERN), Geneva, Switzerland
11. **Ugo Bardi**, National Interuniversity Consortium of Materials Science and Technology, University of Florence, Italy; The Club of Rome (CoR); World Academy of Art and Science (WAAS)
12. **Marian Asantewah Nkansah**, Department of Chemistry, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana; Ghana Academy of Arts and Sciences; African Academy of Sciences
13. **Aleksandr Bugay**, Director, Laboratory of Radiation Biology, Joint Institute for Nuclear Research (JINR), Dubna, Russia; Commission on Biological Physics, International Union of Pure and Applied Physics (IUPAP)
14. **Detai Zhou**, Advanced Nuclear Energy Center, Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou, China
15. **Dejan Trbojevic**, Collider Accelerator Department, Brookhaven National Laboratory, Upton, New York, USA
16. **Andre Terzic**, Mayo Clinic, Rochester, Minnesota, USA
17. **Klaus Mainzer**, Senior Excellence Faculty, Technical University of Munich, Germany; Carl Friedrich von Weizsäcker Center, Eberhard Karls University of Tübingen, Germany; President, European Academy of Sciences and Arts (EASA)
18. **Charalampos Baniotopoulos**, School of Engineering, University of Birmingham, UK; Civil Engineering Department, Aristotle University of Thessaloniki, Greece; European Academy of Sciences and Arts (EASA)
19. **Athanasia Printza**, School of Medicine, Aristotle University of Thessaloniki, Greece; European Academy of Sciences and Arts (EASA)

20. **Žiga Turk**, Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia; European Academy of Sciences and Arts (EASA)

21. **Mariana Tian**, Scientific Secretary, Division "Man and Society", Bulgarian Academy of Sciences, Sofia

22. **Pashington Obeng**, Chief Executive Officer, Pan African Heritage Museum, Accra, Ghana

23. **Pu Chen**, Institute for the History of Natural Sciences, Chinese Academy of Sciences, Beijing (the abstract read by the moderator)

24. **Yev Kravt**, ART for The World, Geneva, Switzerland

25. **Nemanja Mrđić**, Institute of Archaeology, Belgrade, Serbia

26. **Feng Jiang**, Chairman, Shanghai Area Studies Association, China; Chairman of the Council, Shanghai Academy of Global Governance and Area Studies, China

27. **Robert Costanza**, Institute of Global Prosperity, University College, London, UK; Crawford School of Public Policy, Australian National University, Canberra; The Club of Rome (CoR)

28. **Tibor Várady**, Serbian Academy of Sciences and Arts (SASA)

29. **Dragan Simeunović**, Faculty of Political Sciences, University of Belgrade, Serbia; Vice President, Serbian Chapter of The Club of Rome (SC CoR) (the abstract presented by the moderator)

30. **Nebojsa Nakicenovic**, Vice Chair, Group of Chief Scientific Advisors, European Commission; Former Deputy Director General, International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria; Vienna University of Technology, Austria; World Academy of Art and Science (WAAS)

31. **Alessio Surian**, Department of Philosophy, Sociology, Education and Applied Psychology, University of Padua, Italy

32. **Fadwa El Guindi**, Board of Trustees, World Academy of Art and Science (WAAS); University of California at Los Angeles, USA

33. **Vesna Goldsworthy**, Department of English and Creative Writing, University of Exeter, UK; School of

Literature, Drama and Creative Writing, University of East Anglia, Norwich, UK

34. **Maja Herman Sekulić**, Vice President, International Academy of Ethics, Chandigarh, India; Academy of American Poets; PEN America; Serbian PEN Center; Association of Writers of Serbia; Serbian Literary Society

35. **Mario Petrucci**, Royal Literary Fund, London, UK; Oxford Brookes University, UK; University of Westminster, London, UK; Brunel University of London, UK; City and Guilds of London Art School, UK; Imperial War Museum, London, UK

36. **Anni Kumari**, Department of Visual Arts, Ashoka University, Sonipat, India (video talk)

37. **Vera Milanković**, Faculty of Music, University of Arts in Belgrade, Serbia; Serbian Chapter of The Club of Rome (SC CoR)

38. **Irena Živković**, Faculty of Applied Arts, University of Arts in Belgrade, Serbia

39. **Aine Clarke**, Co-Founder, Azimut Company, Brussels, Belgium

40. **Aleksander Zidanšek**, Jožef Stefan International Postgraduate School and Jožef Stefan Institute, Ljubljana, Slovenia; Faculty of Natural Sciences and Mathematics, University of Maribor, Slovenia; Board of Trustees, World Academy of Art and Science (WAAS); European Academy of Sciences and Arts (EASA); The Club of Rome (CoR); President, Slovenian Association for The Club of Rome

41. **Paul Shrivastava**, Smeal College of Business, Pennsylvania State University, University Park, USA; Co-President, The Club of Rome (CoR)

42. **Steven Hartman**, Founding Executive Director, UNESCO-MOST BRIDGES Coalition (BRIDGES); World Academy of Art and Science (WAAS); Steering Committee, The Earth-Humanity Coalition (EHC)

43. **Nebojša Nešković**, Vice President for Science and Technology, World Academy of Art and Science (WAAS); The Club of Rome; President, Serbian Chapter of The Club of Rome; Steering Committee, The Earth-Humanity Coalition



Artistic Program

MUSIC HAPPENINGS

National Museum, Belgrade Chamber Choir, Serbia, conductor: **Vladimir Marković**



Ethnographic Museum, Children's Choir of the Serbian Church Choral Society of Pančevo, Serbia, conductor: **Bojana Stražmešterov**



PAINTINGS EXHIBITIONS

Zepter Museum, Legacy of Leposava Lepa Perović, Lazarevac Cultural Center, Serbia,
curator: **Darinka Stanojević**



Ethnographic Museum, Gallery of Naive Art, Kovačica, Serbia, curator: **Ana Žolnaj Barca**



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- [Serbian Academy of Sciences and Arts \(SASA\)](#)

CO-HOSTS

- [Alliance of National and International Science Organizations for the Belt and Road Regions \(ANSO\)](#)
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- [The Club of Rome \(CoR\)](#)
- [Serbian Chapter of The Club of Rome \(SC CoR\)](#)
- [UNESCO-MOST-BRIDGES Coalition \(BRIDGES\)](#)

The organization of the Conference was funded by ANSO, WAAS, SASA, PSP Farman Holding, Belgrade, Serbia, and Jeff Ubois and Smiljana Antonijević.

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- **Steven Hartman**, Founding Executive Director, BRIDGES

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From left to right: Sonja Jovanović, Jovana Todorović, Milan Rajčević, and Nebojša Popović, all from Belgrade, Serbia, and Marta Nešković, from Beijing, China

Technical Team



From left to right: Row 1: Miljana Jovanović, Marija Milićević, Darija Petković, Marko Jelić, Row 2: and Željko Mravik, all from Belgrade, Serbia, and Ibtissame Sidane, from Genoa, Italy

Editorial Team, from WAAS



From left to right: Janani Ramanathan (Team Lead), Vasugi Balaji, Latha Chandrasekaran, Chitra Krishnamoorthy & Hariny Narayan